

H.A. Clark Memorial Field

Airport Master Plan

AIRPORT MASTER PLAN

For

H.A. Clark Memorial Field (CMR)
Williams, Arizona

Prepared for

City of Williams

By

Coffman Associates
Airport Consultants

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Airport Master Plan

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Introduction

H.A. Clark Memorial Field

Airport Master Plan

INTRODUCTION

The H.A. Clark Memorial Field Airport Master Plan Update provides an evaluation of the airport's aviation demand and an overview of the systematic development that will best meet those demands. The Federal Aviation Administration (FAA) recommends that an airport update its master plan every 7 to 10 years, or as necessary to address local changes. The master plan establishes development objectives and provides a 20-year planning period that details specific study elements including airfield configuration, facility development, on-airport land use development recommendations, and support facilities. It also serves as a tool for evaluating airport improvement priorities, as well as justifying the need for federal and state funding assistance. The previous master plan for H.A. Clark Memorial Field was completed in May 2007. This master plan update is a necessary evaluation of the airport's existing conditions, capabilities and role, potential improvement needs, impact on the local economy, and value related to the national air transportation system.

The City of Williams recognizes the importance of air transportation to the community, as well as the associated challenges inherent in maintaining a safe and efficient airport environment. The cost of maintaining an airport is an investment which yields impressive benefits to the community. With a sound and realistic master plan, H.A. Clark Memorial Field can maintain its role as an important link to the national air transportation system for the region, while maintaining the existing public and private investments in its facilities.

An important outcome of the master plan process is a recommended development plan that reserves sufficient space for future facility needs. Such planning will protect development areas and ensure they will be readily available when required. The intended outcome of this study is a detailed on-airport land use concept which outlines specific uses for all areas of airport property, including strategies for revenue enhancement.

STUDY OVERVIEW

The City of Williams is responsible for funding capital improvements at the airport, as well as obtaining FAA and Arizona Department of Transportation – Aeronautics Group (ADOT) development grants. Additionally, the city oversees private entities' facility enhancements and infrastructure development on airport property to ensure compliance with federal, state, and local regulations. The master plan provides guidance for future development and justification for funding airport projects by the FAA and ADOT through an updated capital improvement program (CIP).



The airport master plan process will follow a systematic approach outlined by the FAA to identify existing and future airport needs in advance of actual need for improvements. This is done to ensure that city officials and airport staff can coordinate environmental reviews, project approvals, design, financing, and construction to minimize the negative effects of maintaining and operating inadequate or insufficient facilities. The intended result is a recommended development concept that outlines the proposed uses for separate areas of the airport.

The City of Williams has contracted with Coffman Associates, Inc. (a national airport planning firm) to undertake the airport master plan update. The study is prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, and (AC) 150/5300-13A, *Airport Design*.

MASTER PLAN GOALS AND OBJECTIVES

The primary goal of this master plan is to develop and maintain a financially feasible, long-term development program, which will satisfy aviation demand of the region; be compatible with community development, other transportation modes, and the environment; and enhance employment and revenue for the local area. Accomplishing this goal requires an evaluation of the existing airport to decide what actions should be taken to maintain a safe, adequate, and reliable facility.

The master plan will provide guidance, through an updated CIP, to outline for the airport sponsor (City of Williams) what investments may be required for the future development and maintenance of the airport facilities. The plan will consider and be coordinated with other planning studies in the area and with aviation plans developed by the FAA and ADOT. This study will also take into consideration historical planning documents, including the *H.A. Clark Memorial Field Airport Master Plan* (2007), as well as the most recently updated Airport Layout Plan (ALP) dated February 2008.

Some specific goals of this master plan update are outlined below:

- Justify proposed development through the technical, economic, and environmental investigation of concepts and alternatives;

- Provide an effective graphic presentation of the development of the airport and anticipated land uses in the vicinity of the airport;

- Establish a realistic schedule for the implementation of the development proposed in the plan, particularly the short-term CIP;

- Propose an achievable financial plan to support the implementation schedule;

- Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before a development project is approved;

- Present a plan that adequately addresses the issues and satisfies local, state, and federal regulations;

- Establish the framework for a continuing planning process. Such a process should monitor key conditions and permit changes in plan recommendation as required;
- Research and evaluate socioeconomic factors likely to affect the air transportation demand in the region;
- Determine the projected facility needs of airport users through the year 2040, by which to support airport development alternatives;
- Recommend improvements that will enhance the airport's safety capabilities to the maximum extent possible;
- Produce current and accurate airport base maps and ALP drawings;
- Establish a schedule of development priorities and a program for the improvements proposed in the master plan;
- Prioritize the airport capital improvement program and develop a detailed financial plan;
- Develop a robust and productive public involvement throughout the planning process; and
- Conduct an aeronautical survey that is compliant with Airport Data and Information Portal (ADIP) standards and includes airspace and obstruction information submitted to, and approved by, the FAA.

The master plan will provide recommendations from which the City of Williams may take action to improve the airport and all associated services important to public needs, convenience, and economic growth. The plan will benefit all residents of the area by providing a single comprehensive plan that supports and balances the continued growth of aviation activities and the environmental preservation of the surrounding areas.

MASTER PLAN TASKS

The master plan for the airport specifically address the following tasks:

- Assist the City of Williams through a Planning Advisory Committee (PAC), which is made up of a group of stakeholders, including government representatives, airport users, tenants, and local community leaders, in determining a vision for the airport;
- Conduct a series of public information workshops to allow the general public an opportunity to be informed on the airport and provide input related to the study process;

- Conduct a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, identifying strengths, weaknesses, realistic markets, goals, resources, and strategies to move forward. This analysis will factor the strengths and weaknesses of the airport to include physical and operational features. The analysis will also present the same for competing airports in the region;

- Establish goals and priorities for the airport to meet the vision based on the realistic evaluation of the facility in terms of configuration, condition, amenities, location, competition, and forecasted aviation demand;

- Identify airfield alternatives based on goals and opportunities as well as applicable airport design standards. The analysis will include an evaluation of the airfield geometry to address potential runway incursion hot spots and nonstandard conditions, in addition to providing recommendations for conformance and improvement;

- Provide a landside development plan that identifies areas for accommodating the forecasted growth of aviation, aviation-related businesses and, if appropriate, areas for non-aviation revenue-producing opportunities. Consideration will be given to the potential new or expanded aviation facilities, including, but not limited to, aircraft storage hangar capacity, aircraft parking apron space, and support facilities;

- Access compatible land uses near the airport; and

- Prioritize pavement/facility preservation and rehabilitation recommendations in order of greatest overall positive impact.

BASELINE EXPECTATIONS

This type of study typically outlines some baseline expectations that will be used throughout the analysis. The baseline expectations for this study include:

- The airport will continue to operate as a publicly owned airport throughout the 20-year period;

- The airport will continue to serve general aviation tenants, itinerant and/or local general aviation aircraft operations, air taxi, and military operators;

- The aviation industry will grow through the planning period as projected by the FAA. Specifics of projected growth in the national commercial and general aviation industry are contained in Chapter Two - Forecasts; and

- A federal and state airport improvement program will be in place through the planning period to assist in funding capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

The H.A. Clark Memorial Field Airport Master Plan is being prepared in accordance with the scope of services that has been coordinated with the City of Williams and the FAA. The study has 10 specific elements that are intended to assist in the identification of future facility needs and provide supporting rationale for their implementation. **Exhibit IA** provides a graphical depiction of the elements and process involved with the study.

Element 1 – Initiation includes the development of the scope of services, budget, and schedule. A PAC is also formed, and study materials will be assembled in a workbook format. General background information will be established that will include outlining the goals and objectives to be accomplished during the master plan.

Element 2 – Inventory summarizes facilities and operational data, area airspace, weather conditions, population and economic data, vicinity land uses, and environmental conditions of the airport and surrounding area. New aerial photography and planimetric mapping of the airport is also obtained to aid in the study process. An ADIP survey is included in this element to ensure a detailed collection of airport and aeronautical data.

Element 3 – Forecasts examines the potential aviation demand for general aviation, air taxi, and military activity at the airport over a 20-year period. Specific indicators for based aircraft, aircraft operations, and peaking characteristics will be required to meet the projected aviation demand at the airport through the planning period. Additionally, an updated evaluation of potential commercial service/air tour activity will be undertaken as part of the study process.

Element 4 – Facility Requirements determines the available capacities of various facilities at the airport, whether they conform with FAA standards, and what facility updates or new facilities will be needed to comply with FAA requirements and/or projected 20-year demand.

Element 5 – Airport Alternatives considers a variety of solutions to accommodate projected airside and landside facility needs through the long-term planning period. An analysis is completed to identify the strengths and weaknesses of each proposed development alternative, with the intention of determining a single direction for development.

Element 6 – Recommended Master Plan Concept and Capital Financial Plan provides both a graphic and narrative description of the recommended plan for the use, development, and operation of the airport. A detailed CIP is included which defines the schedule and costs for the recommended development projects. In addition, an economic benefit analysis is conducted to measure and analyze the economic impacts of the airport.

Element 7 – Airport Layout Plan (ALP) Drawing Set is developed to depict existing and proposed facilities and provide the official ALP drawings that are produced as a result of the recommended development plan. These drawings are used by the FAA and ADOT in determining grant eligibility and funding.

PROJECT WORK ELEMENTS

→ PAC #1

KEY:
PAC - Planning Advisory Committee
PIW - Public Information Workshop
WP - Working Paper

INVENTORY

- Airport facilities
- Airspace and air traffic control
- Area socioeconomic data
- Local planning and land use
- Airport GIS survey and aerial mapping

→ WP

FORECASTS

- Based aircraft and fleet mix
- Annual aircraft operations
- Potential commercial / air tour operator demand

→ WP

FACILITY REQUIREMENTS

- Taxiways
- Airfield capacity
- Hangar facilities
- Design categories
- Runway length and strength
- Support facilities
- Terminal building
- Aprons
- Navigational aids

→ WP

→ PAC #2 PIW #1

AIRPORT ALTERNATIVES

- Evaluate development scenarios (airside, landside, support)

→ WP

→ PAC #3 PIW #2

RECOMMENDED MASTER PLAN CONCEPT/ ENVIRONMENTAL REVIEW

- Detailed master plan facility and land use plans
- Review evaluation of NEPA environmental categories
- Noise exposure
- Recycling plan

→ WP

FINANCIAL PLAN/CAPITAL IMPROVEMENTS

- Airport development schedule (CIP)
- Cost estimates
- Funding sources

→ WP

→ PAC #4 PIW #3

AIRPORT LAYOUT PLANS/LAND USE COMPATIBILITY

- Airport layout plan
- Landside drawing
- Airspace/approach drawings
- On-airport land use plan
- Property map
- Land use plan

FINAL DOCUMENTATION/DELIVERABLES

- Draft Master Plan Report
- Master Plan/ALP Approvals
- Final Master Plan Report
- Electronic Documentation

Exhibit IA
PROJECT WORK FLOW

Element 8 – Environmental Evaluation provides the city with proper guidance regarding, and compliance with, the *National Environmental Policy Act* (NEPA). Throughout the study process, environmental factors are evaluated that assess existing and future conditions on and adjacent to the airport. This preliminary environmental evaluation follows FAA guidelines in implementing NEPA. A recycling plan will also be prepared that explores existing recycling efforts at the airport and will outline opportunities to improve the diversion of waste from landfills.

Element 9 – Public Coordination and Communication provides opportunities to inform the public on the master plan process. Working papers are prepared at various milestones in the planning process. A series of PAC meetings and public information workshops are also planned during the process to discuss study findings.

Element 10 – Final Reports and Approvals provide documents which depict the findings of the study effort and present the study and its recommendations to appropriate local organizations. The final document incorporates the revisions to previous working papers prepared under earlier elements into a usable master plan document.

STUDY PARTICIPATION

The H.A. Clark Memorial Field Airport Master Plan is a collaborative effort within the airport's community and region. This community includes local citizens and businesses, community organizations, city officials, airport users, airport tenants, and aviation organizations. As a component of the region, state, and national aviation system, the master plan is of importance to both state and federal agencies responsible for overseeing the air transportation system.

TABLE A | Planning Advisory Committee
H.A. Clark Memorial Field Airport Master Plan

Representing Entities
Airport Administration
Airport Advisory Board
Fixed Base Operator
City of Williams Economic Development
City of Williams City Council
Federal Aviation Administration
Arizona Department of Transportation - Aeronautics Group
Arizona Military Airspace Working Group
Arizona State Land Department
Arizona Pilots Association
Aircraft Owners and Pilots Association
Airport Tenants / Users

In order to assist in the development of the master plan, the City of Williams has identified a group of stakeholders including government representatives, airport users and tenants, and local community leaders to act in an advisory role. In the development of the master plan, members of this PAC will meet four times at designated points during the study process to review study materials and provide comments to help ensure that a realistic, viable plan was developed. **Table A** details organizations represented within the PAC.

A series of open house public information workshops are also conducted as part of the study coordination effort. These workshops are designed to allow all interested parties to become involved and provide input concerning the master plan process. Notices of meeting times and locations are advertised through local media outlets. Draft working papers and other information related to the study can be found online at **https://haclark.airportstudy.net.**

SWOT ANALYSIS

A SWOT analysis is a strategic business planning tool used to identify **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats. This tool is applied to an action or a plan and used to identify the internal and external forces that may influence the goal or objective of the plan. For this study, a SWOT analysis will be applied to the airport within the confines of the master plan. As a result, it provides a continuous vision and direction for the development of H.A. Clark Memorial Field Airport.

SWOT DEFINITIONS

This SWOT analysis will group information into two categories:

- **Internal** - attributes of the airport and market area that may be considered strengths or weaknesses to the action, objective, or element.

- **External** - attributes of the aviation industry that may pose opportunities or threats to the action, objective, or element.

The SWOT further categorizes information into one of the following:

- **Strengths** - internal attributes of the airport that are helpful to achieving the action, objective, or element.

- **Weaknesses** - internal attributes of the airport that are harmful to achieving the action, objective, or element.

- **Opportunities** - external attributes of the industry that are helpful to achieving the action, objective, or element.

- **Threats** - external attributes of the industry that are harmful to achieving the action, objective, or element.

SWOT ANALYSIS EXERCISE

A SWOT analysis was conducted with the PAC to identify key factors that might be addressed in the master plan. A summary of the results from the SWOT analysis exercise is shown in **Table B**. These results were used to frame the subjective or judgmental processing of the data presented in the master plan.

TABLE B | SWOT Analysis
H.A. Clark Memorial Field Airport

Internal	**Strengths**	
	No encroachment of non-compatible land uses	City utilities on airport
	No noise issues	Wide taxiways
	Abundant space for airport development	Plenty of apron space
	Runway length/width	Runway to Taxiway separation 400'
	Accessible via major interstate	AWOS
	Maintenance available on-airport	Lighted Runway/Taxiways
	FBO	ARFF Potential
	Nice Terminal building and maintenance building	Ample aircraft parking
	Weaknesses	
	Rural Setting	No instrument approach procedures
	Limited hangar space	
External	**Opportunities**	
	Potential for operating tour flights (fixed wing/helicopter)	Flight Training (fixed wing/helicopter)
	Part 135 charter operations	Large aircraft storage (Jet)
	Scheduled airline service (Boutique Air)	Additional small aircraft storage
	GPS instrument approaches	
	Threats	
	Pilot Shortage	Tourism Downturn (Covid)

Chapter One

Inventory

H.A. Clark Memorial Field

Airport Master Plan

Chapter One
Inventory

To produce a realistic and adequate plan for future growth at H.A. Clark Memorial Field (CMR), it is essential to understand the framework within which the airport functions. An initial task within this master plan consists of gathering data to provide a clear definition of the airport's physical and operational features, including facilities, users, and activity levels. The information that follows forms the baseline for developing this report.

The initial action necessary in preparing a master plan is the collection of all pertinent data that relates to the area served by the airport as well as the airport itself. The information outlined in this chapter provides a foundation for all subsequent chapters. Some of the information was obtained through on-site inspections of the airport and interviews with airport staff and tenants, as well as aerial and ground photography and project record drawings. Other useful sources of information include documents prepared by the Federal Aviation Administration (FAA), Arizona Department of Transportation – Aeronautics Group (ADOT), and the City of Williams. Online data has also been collected as it relates to the airport and areas served by the airport. This inventory was conducted using the following sources of information:

- *H.A. Clark Memorial Field Airport Master Plan*, 2007
- *City of Williams General Plan*, adopted by City Council inn December 2013
- *National Plan of Integrated Airport Systems 2021-2025*, October 2020
- Arizona State Aviation System Plan Update, October 2018
- General Aviation Airports: A National Asset, May 2012
- Arizona Commerce Authority
- Arizona Office of Economic Opportunity
- City of Williams (www.williamsaz.gov)
- Northern Arizona Aviation Services (www.nazaviation.com)
- Airport records
- On-site visits
- Interviews with airport staff, tenants, and users
- Aerial and ground photography
- Various federal, state, and local publications

This chapter describes the physical facilities at the airport. Aviation-specific information on the airspace, aviation activity, and role of the airport are described. The chapter also details the environment in which the airport operates, including socioeconomic characteristics of the region.



AIRPORT SYSTEM PLANNING ROLES

Airport planning exists on many levels: national, state, and local. Each level has a different emphasis and purpose. On a national level, H.A. Clark Memorial Field Airport is included in the *National Plan of Integrated Airport Systems* (NPIAS). At the state level, the airport is included in the Arizona *State Aviation System Plan* (SASP). The local planning document is primarily the airport master plan, which was last updated and approved by the Williams City Council in May of 2007.

FEDERAL AIRPORT PLANNING

The nationwide system of airports which exists today is a direct result of federal policy that promotes the development of civil aviation. Much of the nation's network of existing airports was initially constructed by the federal government. In most cases, maintenance and development of airports is still primarily funded through various federal grant programs that aid communities in the care of their respective airfields. As part of the continuing effort to maintain a thriving national airport system in the United States, Congress maintains a plan for development and maintenance of airports called the NPIAS.

H.A. Clark Memorial Field Airport is classified in the current NPIAS (2021-2025) as a basic general aviation airport. Approximately 88 percent of airports included in the NPIAS are classified as general aviation facilities. Basic airports fulfill the principal role of a community airport by providing a means for private general aviation flying, linking the community with the national airport system, and making other unique contributions. In some instances, the airport is the only way to access the community and provides emergency response access, such as emergency medical or firefighting and mail delivery. These airports typically have moderate levels of activity with an average of nine propeller-driven aircraft and no jets. Many of these airports are in rural areas. Basic airports account for 7 percent ($2.9 billion) of the development costs identified in the current NPIAS. **Table 1A** outlines and describes the different categories of general aviation airports.

TABLE 1A | NPIAS General Aviation Airport Roles

Role	Description
National	Supports the national and state system by providing communities with access to national and international markets in multiple states and throughout the United States.
Regional	Supports regional economies by connecting communities to statewide and interstate markets.
Local	Supplements communities by providing access to primarily intrastate and some interstate markets.
Basic	**Links the community with the national airport system and supports general aviation activities (e.g., emergency services, charter or critical passenger service, cargo operations, flight training and personal flying).**
Unclassified	Provides access to the aviation system.

Source: 2021-2025 National Plan of Integrated Airport Systems

STATE AIRPORT PLANNING

H.A. Clark Memorial Field Airport is included in the 2018 update of the *Arizona State Aviation System Plan* (SASP). **Table 1B** outlines and describes the roles of the public use airports in the state as defined by the SASP. The SASP identifies H.A. Clark Memorial Field as a General Aviation – Rural Airport. The purpose of the SASP is to provide a framework for the integrated planning, operation, and development of Arizona's aviation assets. The 2018 SASP provides important insight into how Arizona's airports can remain highly advanced, safe, and responsive to the public's needs today and throughout the 20-year planning horizon.

The SASP outlines three basic goals for the 67 public use airports located in Arizona. They are as follows:

1. **Safety and Security**—Arizona should maintain a safe and secure airport system as measured by compliance with applicable safety and security standards while supporting health and safety-related services and activities.

2. **Fiscal Responsibility**—Arizona should implement cost-effective investment strategies to meet current and projected demand while remaining adequately accessible to Arizona citizens, visitors, and businesses.

3. **Economic Support**—Arizona should advance a system of airports that promotes Arizona's growth and development.

TABLE 1B | State Airport Roles

Role	Role Parameters	Function
Commercial Service - International	International commercial service	Year-round scheduled commercial service to international destinations for people and cargo. High levels of activity with many jets and multi-engine propeller aircraft.
Commercial Service - National	Domestic commercial service	Scheduled commercial service to domestic destinations for people and cargo. May provide seasonal scheduled commercial service to a limited number of international destinations. Moderate to high levels of activity with jets and multi-engine propeller aircraft.
Reliever	FAA-designated airport that relieves congestion at a commercial service airport	Serves to relieve congestion at commercial service airports. Supports the national air system and provides access to markets across the U.S. Moderate to high levels of activity with jets and multi-engine propeller aircraft.
General Aviation - Community	250 instrument operations, 10 based aircraft or one based jet, and aircraft fuel	Supports regional economies and provides access to markets in Arizona and nearby states. Moderate levels of activity with jets and multi-engine propeller aircraft.
General Aviation - Rural	**2,500 operations or 10 based aircraft, and aircraft fuel**	**Serves a supplemental role in local economies, primarily serving smaller business, recreational, and personal flying.**
General Aviation - Basic	All other general aviation airports	Serves a limited role in the local economy, primarily serving recreational and personal flying.

Source: 2018 Arizona State Aviation System Plan Update

LOCAL AIRPORT PLANNING

Locally, the airport master plan is the primary planning document for an airport. The master plan is intended to provide a 20-year projection for airport development based on aviation demand forecasts and facility needs. As previously stated, H.A. Clark Memorial Field Airport's last master plan was completed and approved in 2007. As time passes, the forecast element of a master plan becomes less reliable due to changes in aviation activity and/or the economy. FAA design standards can also change over time. The FAA recommends that airports update their master plan every 7 to 10 years, or as necessary, to address any changes that may have occurred during that timeframe.

Another component of the master plan is the Airport Layout Plan (ALP) drawing set. The ALP drawings are used to depict existing and future development on the airfield. The ALP is often updated/revised more frequently. The ALP was last updated in February 2008 as part of the previous master plan study.

REGIONAL SETTING

H.A. Clark Memorial Field serves the City of Williams, which was founded in 1880, and is in the north central portion of Arizona. Williams is approximately 35 miles west of Flagstaff and 110 miles east of Kingman. The City of Williams is easily accessible from Interstate 40, which crosses east to west across northern Arizona.

AIRPORT LOCATION

H.A. Clark Memorial Field is located approximately three miles north of the City of Williams on approximately 300 acres in the Kaibab National Forest in west-central Coconino County. The airport is accessible via Interstate 40 and Airport Road. **Exhibit 1A** depicts H.A. Clark Memorial Field and the City of Williams in their regional settings.

REGIONAL CLIMATE AND WEATHER CONDITIONS

Climate must be a consideration when preparing an airport master plan. Climatic conditions and weather can affect the types of operations that can be conducted at an airfield, as well as affect facility needs. Average temperatures are important in determining runway length requirements, as high surface temperatures and humidity will result in a need for longer runways. Prevailing wind speed and direction are also a factor. Runway orientation is dependent on predominant wind patterns for the area, while cloud cover percentages and frequency of other climatic conditions will determine the need for navigational aids and lighting.

The climate for CMR can be described as semi-arid, due to its location and higher elevation. Summers are warm, but the City of Williams does not experience the extreme heat found at lower elevations in other parts of the state. July, which is typically the hottest month, has an average high temperature of 83.3 degrees Fahrenheit (F). Winter temperatures range from mild to cold, with daytime highs in the mid-40s and lows in the mid-20s. The average daily low temperature during the coldest month of the year, which is December, is 23.2 degrees F. It is common for daily temperatures to vary up to 30 degrees F in a single day. The area receives slightly more precipitation than the hot, desert climates found in the southern parts of Arizona. Historical data shows August as the month in which the most precipitation occurs in the region, with 3.41 inches. Most precipitation is in the form of rain during the monsoon season, but CMR also receives snow regularly during the winter months.

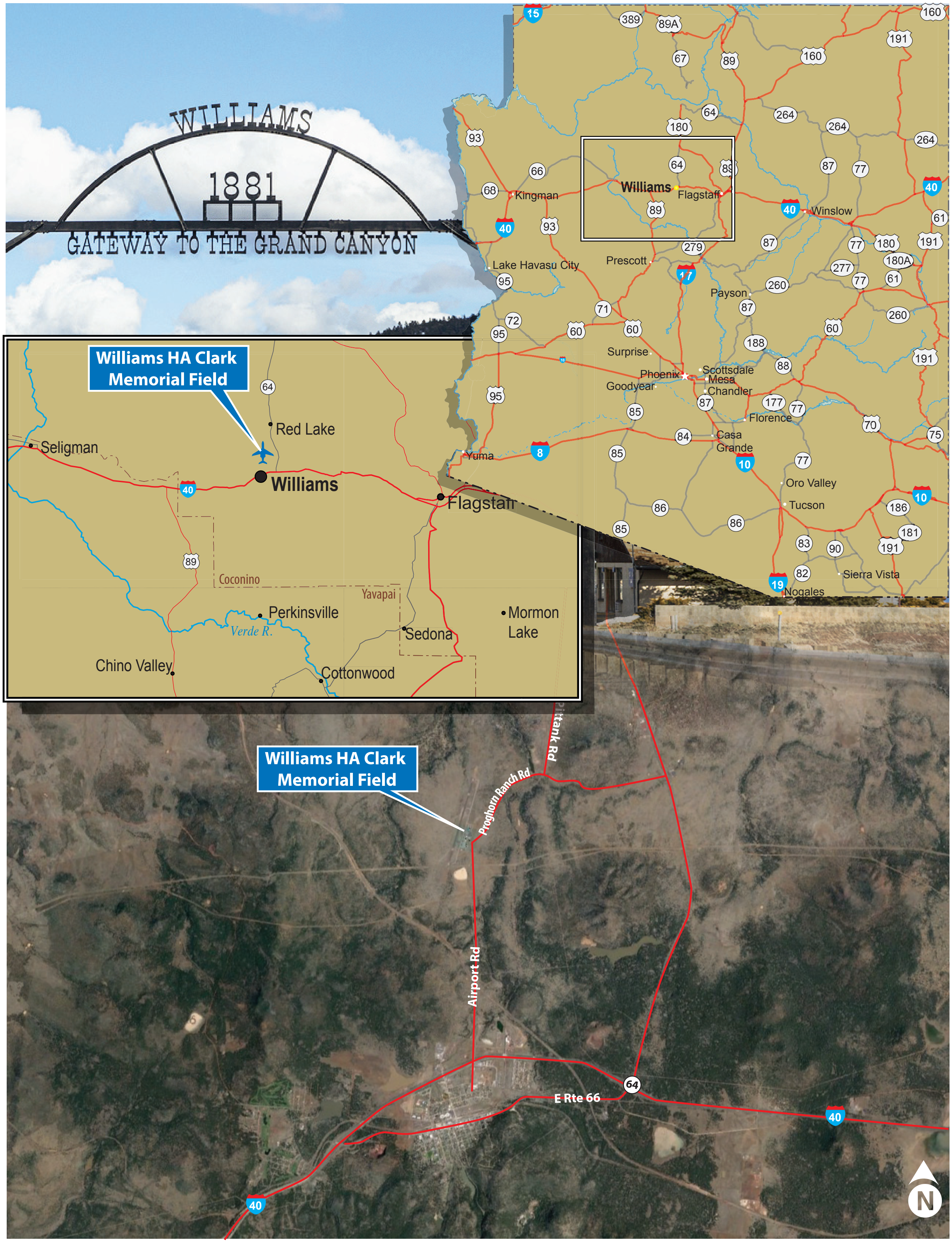


Exhibit 1A
LOCATION MAP

Wind patterns in the region typically vary by season in terms of the prevailing wind direction, and wind speeds are consistently between six to nine knots with peak average wind speeds of 9.18 knots occurring in May. Graphs of monthly average temperature, precipitation, and windspeed can be found on **Exhibit 1B**. Historical weather data presented in the exhibit has been sourced from the National Oceanic and Atmospheric Administration (NOAA) via the weather reporting station located at the airport and is comprised of over 215,800 individual observations between January 1, 2010 and December 31, 2019.

There are three basic types of weather conditions recognized by the aviation community: visual meteorological conditions (VMC), instrument meteorological conditions (IMC), and poor visibility conditions (PVC). In VMC, pilots may elect to fly under visual flight rules (VFR), which means they are responsible for their own separation from other aircraft traffic. If conditions are not favorable for VFR flight, such as conditions that exist under IMC, pilots must fly under instrument flight rules (IFR) and file an instrument flight plan. Flying in IMC would make it necessary for the pilot to rely on instrumentation to safely conduct a flight under these conditions. Separation services are provided to IFR traffic by Air Route Traffic Control Center (ARTCC). IMC at an airport indicate that cloud ceilings are below 1,000 feet above the ground and visibility less than three miles. Any weather conditions less than IMC are known as PVC.

According to the on-airport weather observations, VMC occurs 97.56 percent of the time. IMC occurs 1.37 percent of the time and PVC conditions occur just 1.06 percent of the time. A breakdown of weather condition data is available in **Table 1C**.

Table 1C | Weather Conditions
H.A. Clark Memorial Field

Condition	Cloud Ceiling	Visibility	Percent of Total
VMC	≥ 1000' AGL	> 3 statute miles	97.56%
IMC	≥ 500' AGL to < 1000' AGL	1-3 statute miles	1.37%
PVC	< 500' AGL	< 1 statute miles	1.06%

VMC- Visual meteorological Conditions
IMC- Instrument Meteorological Conditions
PVC- Poor Visibility Conditions
AGL- Above Ground Level
Note: Weather observations obtained from ASOS H.A. Clark Memorial Field, AZ

Source: NOAA National Climatic Data Center January 2010 - December 2019

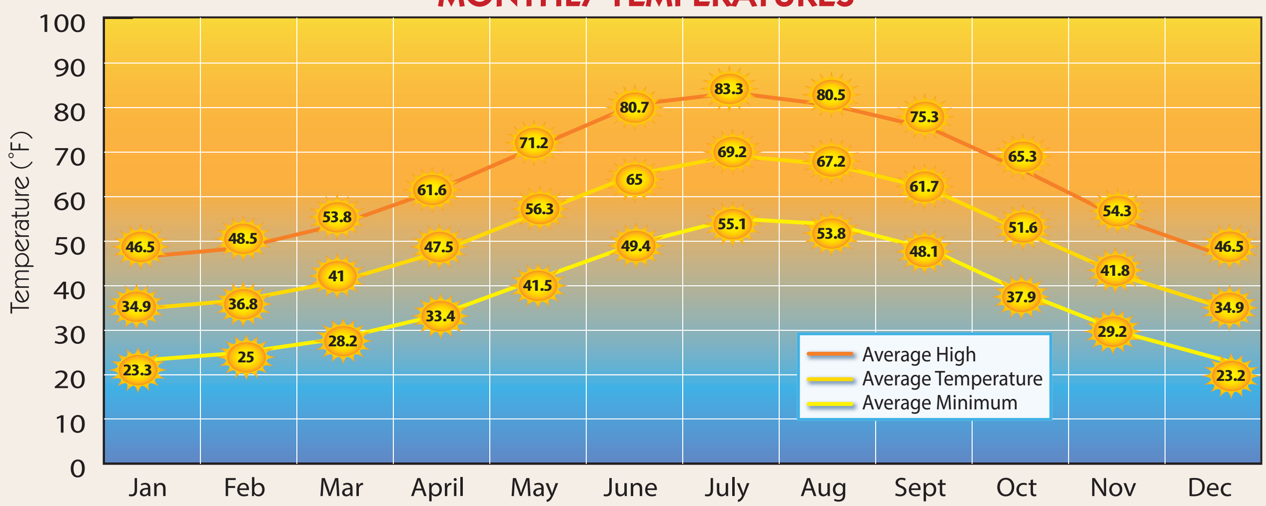
AIRPORT HISTORY

To assist in funding capital improvements, the FAA has provided funding assistance to H.A. Clark Memorial Field through the Airport Improvement Program (AIP). The AIP is funded through the Aviation Trust Fund, which was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances a portion of the operation of the FAA.

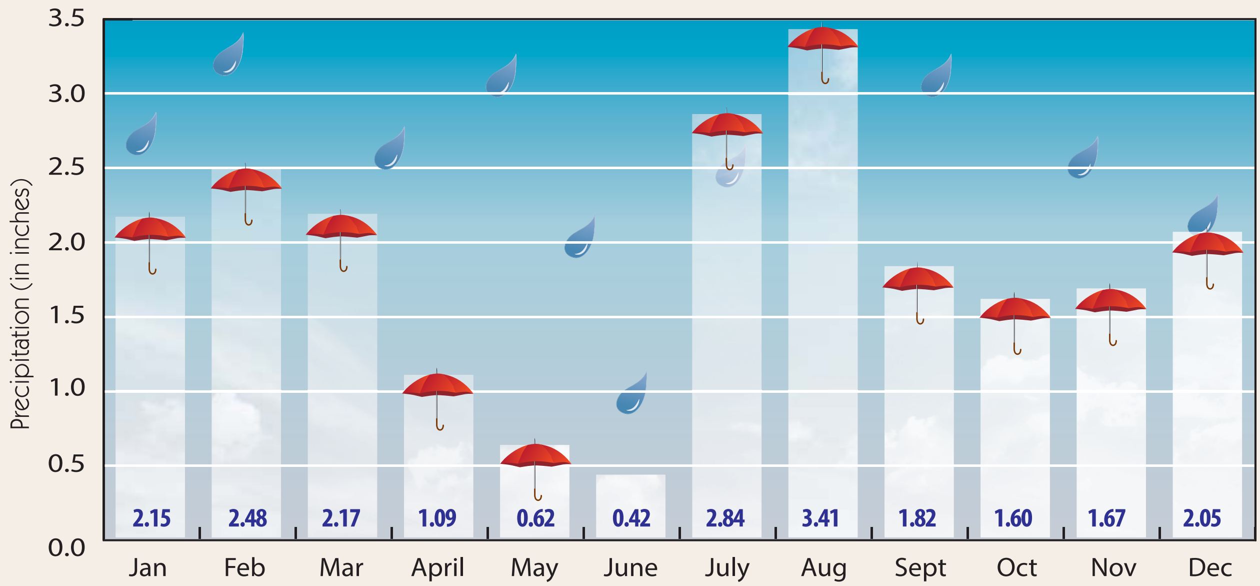
CAPITAL IMPROVEMENTS

Significant improvements have been made to the airport since its establishment. To assist in funding capital improvements, the FAA and ADOT have provided funding assistance to H.A Clark Memorial Field Airport through the AIP. Airport improvement funds are collected through user fees, additional taxes on airline airfares, and aviation fuel taxes. As airports grow, or safety standards change over time, funding is needed to maintain a safe and efficient airport environment. The *Airport and Airway Development and Revenue Act* of 1970 established the Aviation Trust Fund which funds the AIP. Generally, federal AIP grants fund 91.06 percent of FAA-approved airport improvement projects for airports in the State of Arizona. Airport

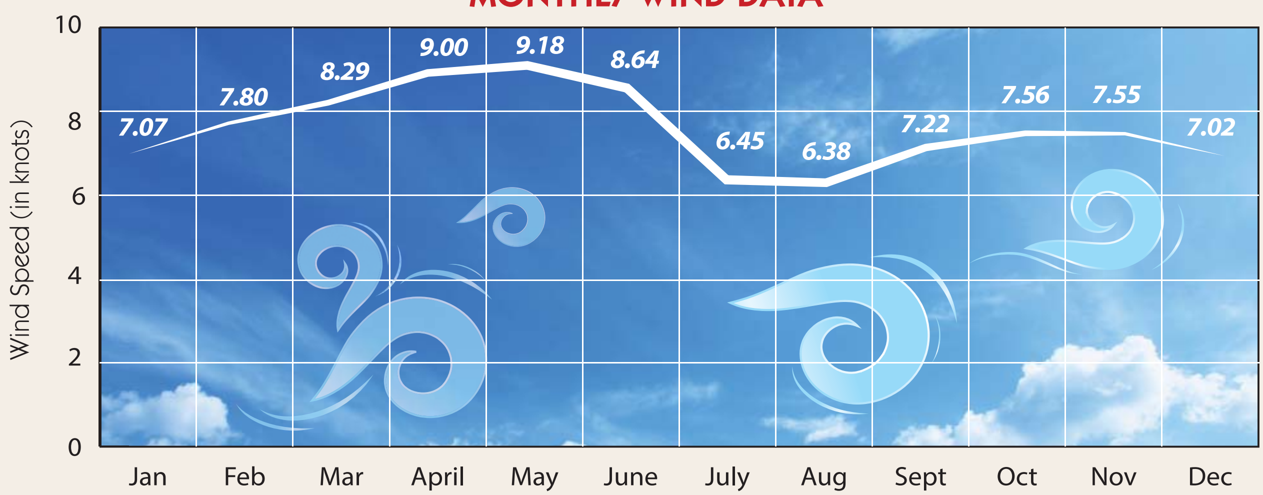
MONTHLY TEMPERATURES



MONTHLY PRECIPITATION



MONTHLY WIND DATA



Source: NOAA National Climatic Center, Asheville, North Carolina. HA Clark Memorial Field Airport, Williams, Arizona.
OBSERVATIONS: 215, 818 All Weather Observations. Jan. 1, 2010 - Dec, 31 2019

Exhibit 1B
CLIMATE

sponsors are responsible for the remaining 8.94 percent; however, through Arizona's State Aviation Fund, airport sponsors are eligible to receive state matching grants for 50 percent of the sponsor's share. As a result, a typical project cost is broken out as 91.06 percent federal funding, 4.47 percent state funding, and 4.47 percent airport sponsor funding. It is important to note that this master plan was funded through an ADOT grant, which covers 90 percent of the total cost of the project. The remaining 10 percent match is the responsibility of the City of Williams.

Table 1D summarizes approximately $7.5 million in grant-aided capital improvement projects undertaken at the airport since 2007. Of this total, the airport has received approximately $5.7 million in federal grants and approximately $1.8 million in state grants. This has included funding for a variety of airport improvement projects listed in **Table 1D**.

TABLE 1D | Capital Improvement History
H.A. Clark Memorial Field

Year	Grant Number	Project Description	Grant Amount
Federal Grants			
2007	AIP20	Rehabilitate Taxiway	$1,307,592
2008	AIP21	Rehabilitate Taxiway (Phase 1)	$1,141,964
2009	AIP22	Install Taxiway Lighting (Taxiway A)	$845,500
2012	AIP23	Rehabilitate Apron [Approximately 3,800 Square Yards, Phase II]	$551,307
2016	AIP24	Rehabilitate Apron	$105,471
2017	AIP25	Reconstruct Apron	$800,701
2019	AIP26	Rehabilitate Apron Design	$23,670
2019	AIP26	Rehabilitate Runway Design	$35,005
2019	AIP26	Rehabilitate Apron	$869,102
2019	AIP26	Rehabilitate Taxiway Design	$30,000
Subtotal Federal Grants			**$5,710,312**
State Grants			
2008	E8S86 01D	Design Reconstruction of original apron (4,500 SY)	$67,500
2008	E8S87 01D	Upgrade PAPI to 4 light system (Design Only)	$22,500
2008	E8S93 01P	Install PACS/SACS and perform Obstruction Survey	$180,000
2012	E2S2V 01D	Design Airport Perimeter Road (approx. 18,000 lf)	$157,500
2013	E4S1Z 01C	Upgrade AWOS Equipment	$90,000
2017	E6S1E 01C	(APMS project) Thin Asphalt Runway Overlay/PFC	$887,034
2020	E0S2J 01P	Update Airport Master Plan	$405,000
Subtotal State Grants			**$1,809,534**
TOTAL ALL GRANTS			**$7,519,846**

Source: FAA and ADOT - Aeronautics Group

AIRPORT ADMINISTRATION

H.A. Clark Memorial Field is owned, operated, and maintained by the City of Williams. An Airport Advisory Committee provides recommendations to the City Council on the administration and development of the airport. The Airport Advisory Committee is made up of ten members and is headed by the Chairman, who is appointed by the mayor and serves a term of one year.

AIRPORT ACTIVITY

Records of airport operations are essential for determining required facilities, as well as eligibility for federal funding. Airport staff and the FAA record key operational statistics, including aircraft operations and based aircraft. Analysis of historical activity levels aid in projecting future trends which will enhance the airport's ability to plan for future facility demands. The following sections detail specific operational activities.

BASED AIRCRAFT

Identifying the current number of based aircraft is important to the master planning analysis. An accurate number of based aircraft helps to determine existing demand for facilities at the airport, including aircraft storage needs, parking apron space, pilot and passenger services, and other support facilities. **Table 1E** provides a summary of based aircraft for H.A. Clark Memorial Field as reported by airport management. As presented, there are currently 12 general aviation aircraft based at the airport. All current based aircraft are single engine piston powered aircraft.

TABLE 1E | Based Aircraft and Annual Operations
H.A. Clark Memorial Field

Based Aircraft	2020
Single Engine	12
Multi-engine	0
Turboprop	0
Jet	0
Helicopter	0
Other	0
Total	**12**
Annual Operations	
Itinerant	
Air Taxi	500
General Aviation	4,500
Military	0
Total Itinerant	**5,000**
Local	
General Aviation	1,500
Total Local	**1,500**
TOTAL OPERATIONS	**6,500**

Source: Airport records; Terminal Area Forecast (January 2020)

AIRCRAFT OPERATIONS

Aircraft operations (takeoffs and landings) are another indicator of aeronautical activity at H.A Clark Memorial Field. Aircraft operations are classified as local or itinerant. Local operations often consist of pilot training activity such as touch-and-go operations, or operations that take place within sight of the airport. Itinerant operations consist of aircraft that arrive from or depart to destination airports outside the local operating area.

Aircraft operations can be separated into four general categories: air carrier, air taxi, general aviation, and military.

- **Air Carrier** – scheduled or nonscheduled operations by aircraft with seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds, carrying passengers or cargo for hire or compensation.
- **Air Taxi** - operations associated with aircraft originally designed to have no more than 60 passenger seats or a cargo payload of 18,000 pounds, carries cargo or mail on either a scheduled or charter basis, and/or carries passengers on an on-demand basis or limited scheduled basis.
- **General Aviation** - civil aviation operations other than scheduled air services that can range from ultralights to large business jets.
- **Military** - operations conducted by aircraft and helicopters with a military designation.

Due to the absence of an airport traffic control tower (ATCT) at the airport, it can be difficult to maintain an accurate count of the airport's operations. An estimated account of annual activity is available via the FAA *Terminal Area Forecast* (TAF) publication. The most current data estimates that H.A. Clark Memorial Field has approximately 6,500 operations per year. The TAF provides a breakdown of estimated operation totals for the airport by type. **Table 1E** further details the estimated operations totals identified in the TAF.

It is important to note that there are no commercial air carrier operations currently taking place at the airport. However, for planning purposes, this master plan is tasked with analyzing the future potential for commercial air carrier activity at the airport. Analysis related to this activity segment will be conducted when preparing forecasts of aviation demand in the next chapter.

ON-AIRPORT FACILITIES

This section provides a description of the existing facilities at H. A. Clark Memorial Field. Airport facilities are typically separated into two broad categories: airside facilities and landside facilities. The airside category includes facilities directly related to aircraft operations such as runways, taxiways, lighting, marking, navigational aids, and weather reporting. The landside category includes those facilities necessary to provide a safe transition from surface to air transportation and support aircraft parking, servicing, storage, maintenance, and operational safety on the ground.

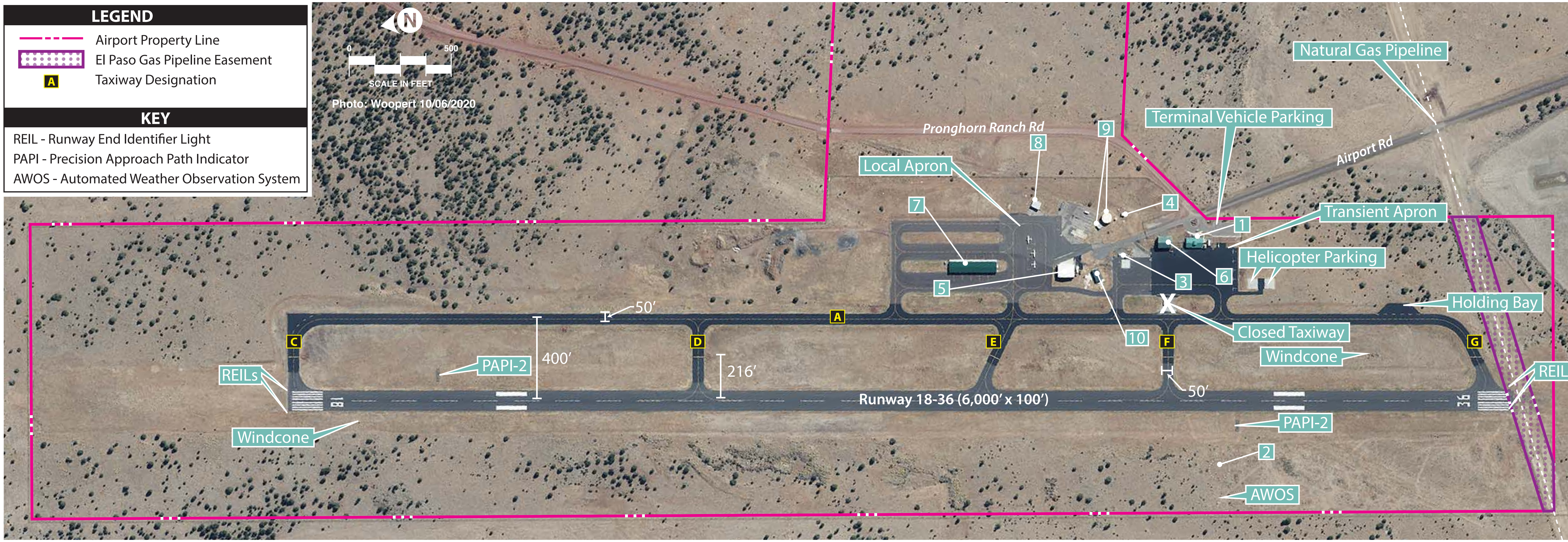
AIRSIDE FACILITIES

The airside facilities are depicted and detailed on an aerial photograph for visual reference on **Exhibit 1C**. Airside facility data is discussed in the following sections.

Runway 18-36

H.A. Clark Memorial Field is served by a single runway that is orientated in a north-south manner. Runway 18-36 is designated as such based on the magnetic heading a pilot would be reading when departing from or approaching the runway. The runway measures 6,000 feet long and 100 feet wide. The Runway 18 end slopes down from the Runway 36 end, resulting in an approximate 60-foot difference in elevation, or a gradient of one percent. The runway is constructed of asphalt and is reported to be in good condition by the official FAA Form 5010-1 *Airport Master Record* publication.

Runway 18-36



1. Terminal Building

2. Segmented Circle/Windcone

3. Fuel Farm/ Self-Service Fueling System

4. Rotating Beacon/ Electric Vault

5. NAZA Executive Box Hangar

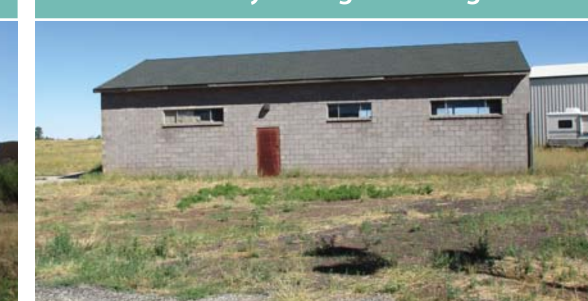
6. ARFF/Maintenance/Firefighting Building

7. T-Hangars

8. Open Box Hangar

9. Water Tank & Pump House

10. City Storage Building



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Runway Strength

Based on the design of the pavement, a runway can provide differing load-bearing capacities. Pavement strength is an indication of the runway's ability to withstand repeated use by aircraft on a regular basis. There are different aircraft landing gear configurations that displace aircraft weight differently, thereby affecting a runway's ability to handle the load. Single wheel loading (S) refers to having one wheel per landing gear strut. Dual wheel loading (D), dual tandem wheel loading (2D), and double dual tandem (2D/2D2) include the design of aircraft with additional wheels on each landing gear strut which help distribute the aircraft's weight on the runway surface. Runway 18-36 is strength rated at 15,000 pounds (S). Additionally, no Pavement Classification Number (PCN) has been assigned.

Runway/Taxiway Markings

Pavement markings are important to aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. Runway 18-36 has non-precision runway markings that include runway designations, centerline, edges, aiming points, and threshold markings.

Runway 18-36 Marking

Taxiway centerline markings are provided to assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway edges. Holding positions are also marked on the connector taxiways leading directly onto the runway. The hold lines serve as an alert to prevent pilots from entering the runway environment inadvertently. Hold lines also serve to ensure that landing aircraft have adequately cleared the active runway. The hold line positions associated with Runway 18-36 are currently marked at least 216 feet from the runway centerline.

Taxiway A

Taxiways

Taxiway A is a full-length parallel taxiway that is 50 feet wide, situated adjacent to the east side of Runway 18-36, and has a separation from the runway centerline to the taxiway centerline of 400 feet. Additionally, there are five entrance/exit taxiways connecting parallel Taxiway A and Runway 18-36. The taxiways at the airport are designated alphabetically from north to south as Taxiways C, D, E, F, and G.A holding bay is located adjacent to the south end of parallel Taxiway A, prior to Taxiway G.

Aircraft Holding Bay

Holding bays serve as run-up areas for departing aircraft to complete equipment checks prior to takeoff. There are also several other taxilanes leading to other landside facilities and aircraft storage hangars that have not been specifically designated. A graphical depiction of the layout of the taxiways is depicted on **Exhibit 1C**.

Rotating Beacon

Airfield Lighting and Signage

Airfield lighting systems extend an airport's usefulness into periods of darkness and/or poor visibility. A variety of lighting systems are installed at the airport for this purpose. These lighting systems are categorized by function and include the following:

Runway Threshold Lighting

- **Airport Identification Lighting:** The location of the airport at night or during low-visibility weather is universally identified by a rotating beacon. As a civilian airport, the rotating beacon projects two beams of light, one white and one green, separated by a 180-degree rotation. The rotating beacon at CMR is located approximately 300 feet northeast of the airport terminal building.

- **Runway and Taxiway Lighting:** Runway and taxiway lighting utilizes fixtures placed near the edge of the pavement to define the lateral limits of the pavement. The runway is equipped with medium intensity runway lighting (MIRL) as well as runway threshold lighting. This lighting is essential for safe operations during night and/or poor visibility conditions. Taxiway A and all connector taxiways are equipped with medium intensity taxiway lighting (MITL). These lights provide guidance on the airport to maintain safe and efficient access from the runway to the aircraft parking areas. Some areas of apron and aircraft parking areas without MITL are equipped with elevated taxiway edge reflectors.

Elevated Edge Reflectors

- **Visual Approach Lighting:** Each end of Runway 18-36 is equipped with visual approach lighting in the form of a 2-light precision approach path indicator (PAPI-2). The PAPI-2 consists of a system of lights located adjacent to each runway end. These lights give an indication of being above, below, or on the designated descent path to the runway threshold. A PAPI system has a range of five miles during the day and up to 20 miles at night. The PAPI system for this runway provides a 3.00-degree glide path, which is standard.

Precision Approach Path Indicator (PAPI-2)

- **Runway End Identifier Lights:** Runway 18-36 is also equipped with runway end identifier lights (REILs) at each end. REILs provide rapid and positive identification of the end of the runway. The system consists of two synchronized, unidirectional flashing lights. The lights are positioned on each corner of the runway landing threshold, facing the approach area and aimed at an angle of 10 to 15 degrees.

Runway End Identifier Lighting (REIL)

- **Pilot Controlled Lighting:** All runway and taxiway lighting systems can be controlled by using an aircraft's radio transmitter. The lighting can be adjusted to the pilot's preference by tuning the radio to the airfield's common traffic advisory frequency (CTAF) and keying the microphone. This system, which is referred to as pilot-controlled lighting, allows pilots to increase or decrease the intensity of the airfield lighting system from the aircraft.

Airfield Signage

- **Airfield Signage:** The airport has a runway/taxiway signage system that assists pilots in identifying their location on the airfield and directing them to their desired location. The presence of runway/taxiway signage is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of aircraft movement areas. The signage system installed at the airport includes runway and taxiway designations, holding positions, routing/directional signage, runway end, and runway exits.

Weather and Communication Aids


Windcone, Segmented Circle, and AWOS

The airport is equipped with an automated weather observation system (AWOS). The AWOS provides automated aviation weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS system reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airfield elevation corrected for temperature). The AWOS equipment is located on the west side of the airfield approximately 1,500 feet northwest of the Runway 36 threshold. Weather information can be obtained from the AWOS by utilizing the radio frequency (121.125 MHz) or by calling 928-635-1278. AWOS broadcasts are updated hourly and provide arriving and departing pilots with the current surface weather conditions, communication frequencies, and other important airport-specific information.


Supplemental Windcone

The airport is also equipped with a lighted wind cone and a segmented circle. The segmented circle is approximately 160 feet east of the AWOS. The wind cones indicate wind speed and direction information to pilots, and the segmented circle indicates aircraft traffic pattern information. Supplemental wind cones are also available at each runway end. **Exhibit 1C** depicts the locations of all weather and communication aids.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies into point-to-point guidance and position information. Aircraft operating in the vicinity of H.A. Clark Memorial Field can utilize the network of very-high frequency omni-directional range (VOR) facilities. Distance measuring equipment (DME) is a system that is commonly combined with VORs. A VOR/DME gives pilots bearing information to or from a station, and the DME provides distance information to aircraft that are equipped with the necessary equipment and instrumentation. VORTAC is similar to VOR/DME but uses a tactical air navigation system or (TACAN) beacon which is utilized by military aircraft but can still be read by civilian DME equipment. CMR is not equipped with a VOR/DME, but there are nearby facilities that can be used such as Flagstaff VOR/DME, Drake VORTAC, or Grand Canyon VOR/DME, all of which are active and available for use.

Today, the most used navigational aid is the global positioning system (GPS). GPS is a "constellation" of approximately 30 satellites orbiting Earth, making it possible for users with ground receivers to pinpoint their geographic location. The location accuracy is anywhere from 100 to 10 meters for most equipment. Most aircraft today are equipped with GPS receivers, and GPS is the primary navigational aid used by modern aviators. GPS allows pilots to determine altitude, speed, and location so they can directly navigate to a specified point without using any ground-based navigational facility. With GPS, pilots can directly navigate to any airport in the country and are not required to navigate to, or triangulate a position using ground based navigational facilities. GPS can also be utilized to provide instrument approach procedures (IAPs) at airports that do not have ground based navigational aids.

LANDSIDE FACILITIES

At a general aviation airport such as H.A. Clark Memorial Field, landside facilities support the aircraft and pilot/passenger handling functions, as well as other non-aviation facilities that typically provide a revenue stream to the airport. These facilities can often include a terminal building, general aviation facilities, and support facilities such as fuel storage, vehicle parking, and roadway access. Non-aviation related facilities, such as restaurants and industrial parks, may also constitute landside development. The primary landside facilities at the airport are also identified on **Exhibit 1C**.

Terminal Building

The terminal building at H.A. Clark Memorial Field was built in 2000 and provides approximately 4,200 square feet of space. The terminal building is situated in a desirable midfield location east of Runway 18-36 and can be accessed via Airport Road. Available in the terminal building are a spacious open lobby area, fixed base operator (FBO) service counters, five offices for airport or FBO management, restrooms, waiting areas, and a vending machine area. Currently, the FBO, Northern Arizona Aviation Services (NAZA) leases the terminal space from the City of Williams. More information regarding FBO operations will be provided later in this chapter.

Airport Terminal Building

Vehicle Parking

The terminal building vehicle parking area consists of approximately 1,000 square yards of asphalt pavement southeast of the terminal building. The parking area provides a total of 27 vehicle parking spaces. Of these spaces, there are 26 standard spaces and one handicap space.

Terminal Vehicle Parking

Airport Maintenance/Firefighting Equipment Building

Directly north of the Terminal Building is an airport maintenance building used for storing airport maintenance equipment and firefighting equipment. In 2001 an emergency response and firefighting vehicle was purchased by the airport through AIP grant funding. The building was originally intended to house the vehicle and was to be utilized as a future aircraft rescue and firefighting (ARFF) facility. The building was funded through AIP grant funding in 2003 and 2004. The maintenance and firefighting equipment building provides approximately 3,400 square feet of storage space and has two large access doors.

Airport Maintenance/Firefighting Equipment Building

Firefighting Services

As a general aviation airport, CMR is not required to maintain on-site ARFF equipment or services. The City of Williams does, however, have a volunteer fire department that responds to airport emergencies. Firefighting equipment is stored in the airport maintenance building for use in case of an emergency.

The Williams Fire Department (WFD) was officially established in 1921 and is a volunteer fire department. The WFD roster consists of 24 volunteer members, including 19 firefighters and 5 support members. The WFD does not have personnel manning any of the three fire stations in the City of Williams or the airport. Firefighters are dispatched by the Williams Police Department and available members respond to the closest fire station. The WFD is an all-hazard agency and responds to traffic accidents, fires, medical calls, and airport emergencies.

Aircraft Parking Aprons

The aircraft parking aprons at H.A. Clark Memorial Field are located east of Runway 18-36. The local general aviation apron area encompasses approximately 11,000 square yards, including eight marked tiedown spaces and access to the hangar facilities. Another section of apron encompasses approximately 18,000 square yards and is split into three sections providing locations for the existing T-hangars, space for additional hangar development, and/or additional aircraft parking. The main transient apron, adjacent to the terminal facility, encompasses approximately 14,600 square yards and provides five marked tiedown spaces. There are also two concrete helicopter parking pads measuring 50 feet by 50 feet, located directly south of the main transient apron area.


Local Aircraft Parking Apron


Transient Aircraft Parking Apron

Aircraft Hangar Facilities

Hangar facilities at H.A. Clark Memorial Field, total approximately 19,400 square feet of aircraft hangar storage space. The hangars available at CMR consist of a 10-unit T-Hangar measuring approximately 13,000 square feet, an open Box Hangar that provides 1,400 square feet, and the Northern Arizona Aviation Services (NAZA) executive box hangar which measures 5,000 square feet All of the hangar facilities are located adjacent to Taxiway A north of the Terminal on the east side of the airport.


Open Box Hangar


10 Unit Hangar Building

Fuel Facilities

The fuel storage tank at H.A. Clark Memorial Field is located above ground adjacent to the northeast side of main apron, as previously shown on **Exhibit 1C**. The fuel farm consists of one self-serve storage tank, which holds 12,000 gallons of 100LL fuel. The fuel farm is leased from the City of Williams by the fixed base operator (FBO) Northern Arizona Aviation Services (NAZA). Currently, there is no fixed jet fuel storage tank on the field. Jet fuel is stored and dispensed from two 2,000-gallon fuel trucks.


Fuel Farm


Jet Fuel Delivery Truck

Security Fencing and Gates

The airport perimeter is equipped with 8-foot chain-link fencing with three strands of barbed wire. An automated access gate is located near the terminus of Airport Road. In addition to the automated access gate, there are five manual lock gates around the airport.


Airport Perimeter Fencing


Main Entrance Gate at Airport Road

City Storage Building

The City maintains a building located immediately north of the terminal apron that is used as an equipment storage facility.


City Storage Building

Utilities

Electricity is provided to the airport via an Arizona Public Service (APS) electric line owned by the City of Williams. A one-million-gallon water tank provides potable water at the facility. The water must be hauled to the site via tanker truck because there are currently no city water or sewer services available at the airport. The water pressure is maintained by an electric water pump and wastewater is routed through a septic system. A natural gas pipeline runs adjacent to Airport Road and transitions through the airport property on the south side adjacent to the approach end of Runway 36. The gas line is not connected to any of the airport's facilities, but it is important to note its location as it can impact possible future development on the airport.


Water Storage Tank and Pumphouse

General Aviation Services

FBOs are providers of various aviation-related services. Some of the services that FBOs provide include aircraft fueling, flight training, aircraft maintenance, aircraft rental, hangars, aircraft parking and storage, and flight planning as well as pilot lounge areas, pilot supplies, courtesy vehicles, catering, and charter services.

Northern Arizona Aviation Services (NAZA) is a full-service FBO located at CMR, which operates from the airport terminal building. NAZA offers a multitude of aviation-related services including full service fueling (Jet A), self-serve fueling (100LL), aircraft parking, hangar rental, aircraft maintenance services, a pilot's lounge, broadband Wi-Fi, courtesy cars, and vending machines.

NAZA Maintenance Hangar

Currently, NAZA leases from the city the largest single hangar on the field, a 5,000-square-foot box hangar. The City of Williams owns the hangar and NAZA utilizes the hangar to perform its aircraft maintenance activities and to provide temporary aircraft storage space.


NAZA Maintenance Hangar

PAVEMENT MANAGEMENT PROGRAM

Preservation of pavement at airports is one of the largest challenges faced by federal, state, and local governments. ADOT monitors pavement conditions at airports through its Airport Pavement Preservation Program (APPP). Pavements are inspected on a three-year cycle and are assigned rating of 0-100, with 100 being excellent condition based on the pavement condition index (PCI). It is a statistical measure and requires manual survey of the pavement. PCI is an accepted method of visually assessing pavement conditions. PCI surveying processes and calculation methods have been standardized for both roads and airport pavements and is widely used in transportation civil engineering.

Exhibit 1D depicts the current pavement condition as identified ADOT's Airport Pavement Management Report dated November 2017. The reported PCIs are downgraded each year as necessary as the pavement ages. The exhibit depicts the estimated pavement conditions in 2020 as reported by ADOT. In 2020, Runway 18-36 is estimated to have a PCI rating of 88. Parallel Taxiway A and taxiway connectors C, D, and G were given a PCI rating of 71, while taxiway connectors E and F have an estimated PCI of 88. The transient apron possesses a PCI of 82, and the local aircraft tiedown apron was found to have the lowest PCI rating of 45. The pavement surrounding the general aviation hangars was assigned a PCI of 63, whereas the helicopter parking pads have an estimated PCI of 77. While portions of the transient apron to the north near the fuel farm are estimated to have PCI ratings of 63 and 67, they have recently been rehabilitated, likely improving their PCI, but recent improvements are not calculated into the ADOT database until another physical inspection can be made and new PCI ratings are assigned. These ratings are estimated based on previous inspections conducted in 2017. Overall, the airport's pavements are in good condition. Pavement conditions must continue to be monitored and maintained to extend its useful life and structural integrity.

FAA grant assurances for projects funded under the FAA AIP require a pavement maintenance system be utilized. To meet this requirement and ensure that the limited pavement maintenance funds are spent in the most cost-effective manner, ADOT developed the Airport Pavement Management System (APMS) in 2003.

The program provides pavement evaluation, design services, construction administration, and construction management at more than 60 airports statewide. The system prioritizes preventative maintenance projects with the greatest benefit for pavement dollar expended. The system also identifies pavement sections that require rehabilitation, based on their PCI.

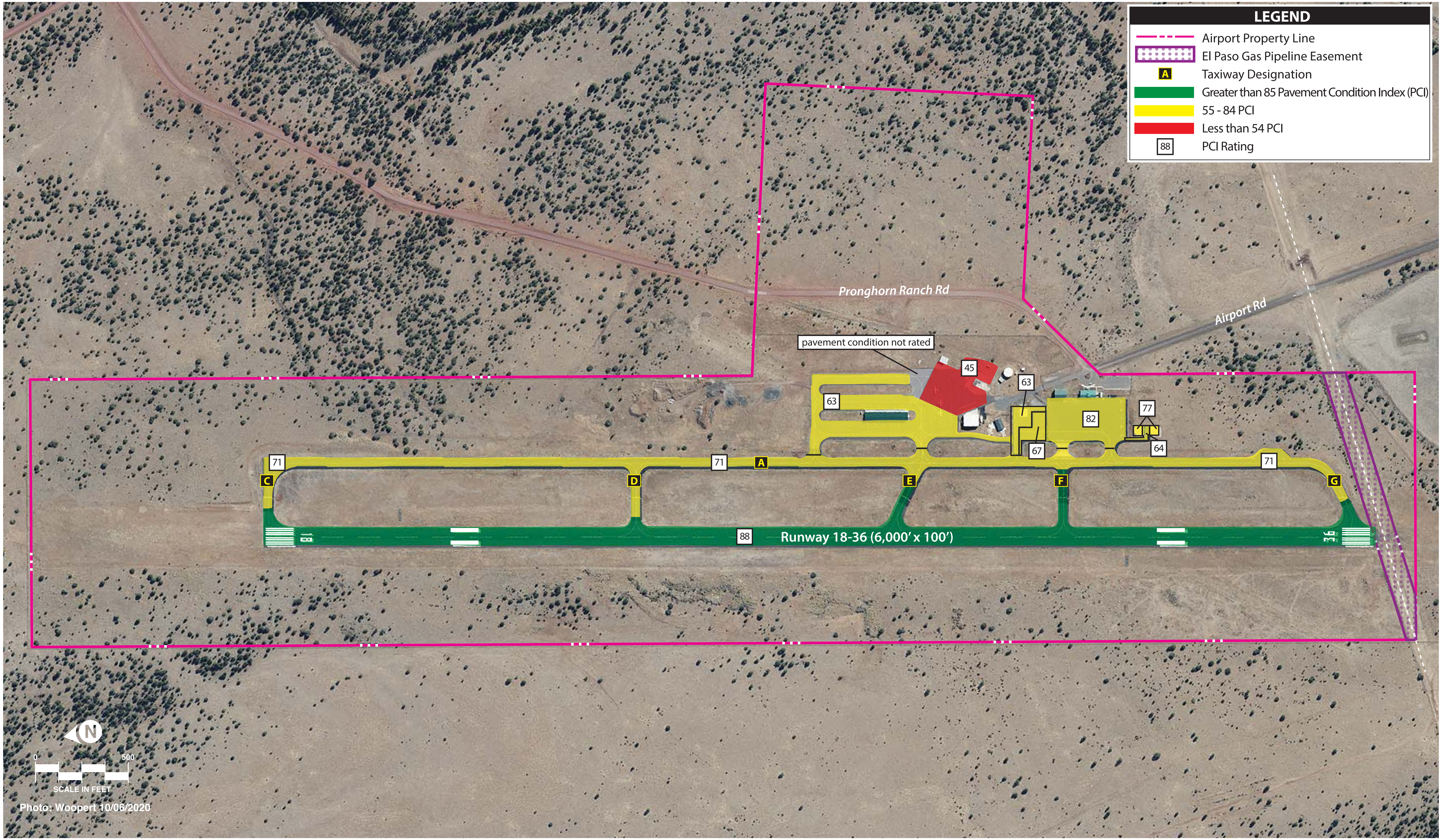
Between 2013 and 2016, 39 airports in Arizona received pavement maintenance projects through the APMS program. The total APMS construction costs during this time period are presented in **Table 1F**.

Table 1F | APMS Construction Costs

Year	Annual Cost
2013	$5,252,543
2014	$4,801,721
2015	$6,304,774
2016	$4,675,111
TOTAL	**$21,034,149**

Source: Arizona Airport Pavement Management System 2017

In May 2017, ADOT suspended APMS rehabilitations through 2018 due to funding shortfalls. PCI evaluations will continue to monitor the status of airport pavement in Arizona. The program has resumed in fiscal year 2019 and is funded at $5 million per year for five years for a total of $25 million.



Source: Arizona Airports Pavement Management System (APMS) Airport Pavement Preservation Program (APPP) PCI evaluated by Applied Pavement Technology (2017)

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H.A. Clark Memorial Field received APMS grant funding assistance for the recent runway asphalt overlay in 2017 but has not been the recipient of any other APMS funding since the program has been reinstituted.

AREA AIRSPACE

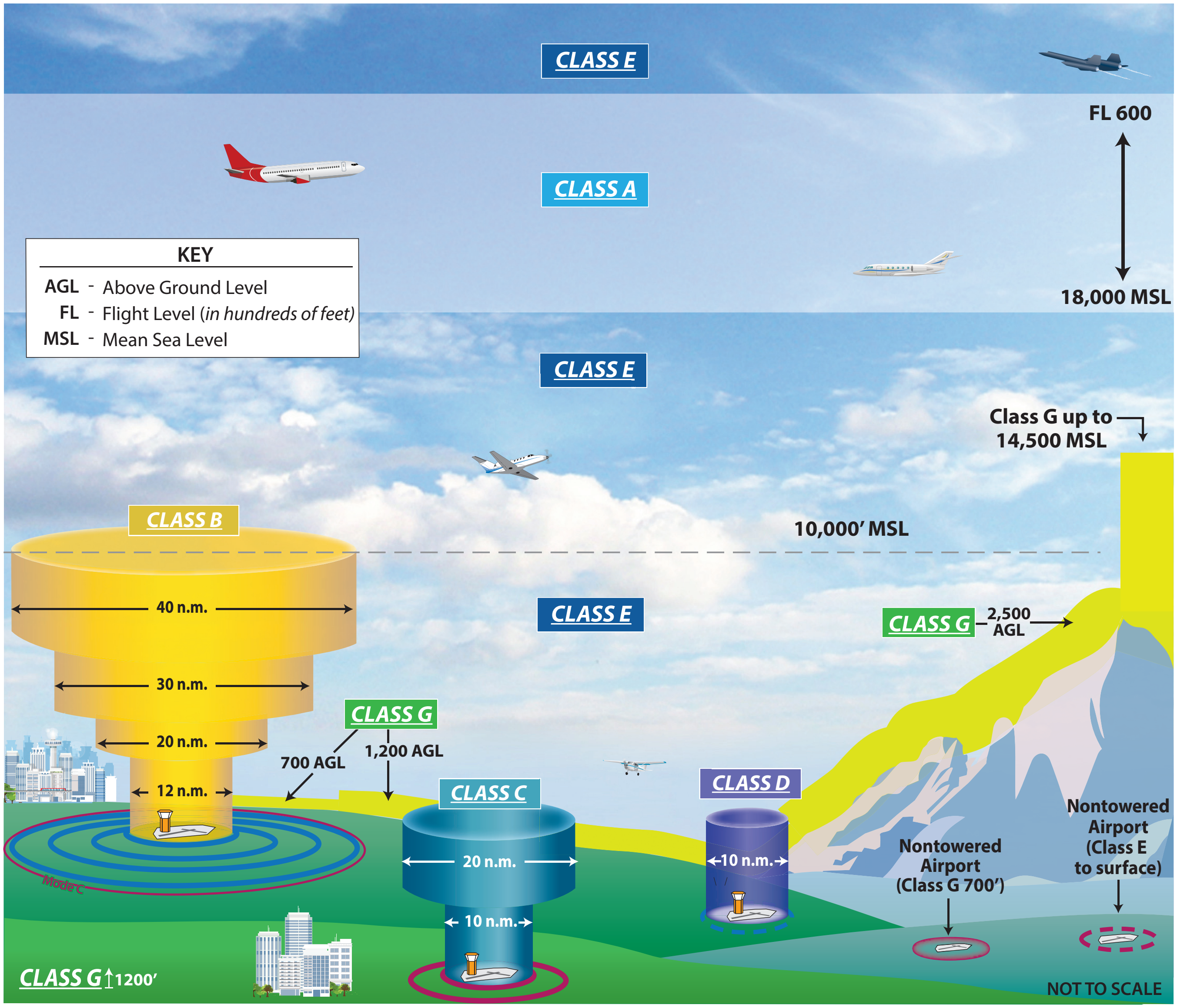
The *Federal Aviation Administration Act* of 1958 established the FAA as the responsible agency for the control and use of navigable airspace within the United States. The FAA has established the National Aerospace System (NAS) to protect persons and property on the ground and to establish a safe environment for civil, commercial, and military aviation. The NAS is defined as the common network of U.S. airspace, including air navigational facilities; airports and landing areas; aeronautical charts; associated rules, regulations, and procedures; technical information; and personnel and material. System components shared jointly with the military are also included as part of this system.

AIRSPACE STRUCTURE

To ensure a safe and efficient airspace environment for all aspects of aviation, the FAA has established an airspace structure that regulates and establishes procedures for aircraft using the National Airspace System. The U.S. airspace structure provides for categories of airspace, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G as described below. **Exhibit 1E** generally illustrates each airspace type in three-dimensional form and **Exhibit 1F** depicts airspace in the vicinity of H.A. Clark Memorial Field.

Class A: Class A is controlled airspace and includes all airspace from 18,000 feet mean sea level (MSL) to Flight Level 600 (approximately 60,000 feet MSL). This airspace is designed in Federal Aviation Regulation (F.A.R) Part 71.193, for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under instrument flight rules (IFR) operations. The aircraft must have special radio and navigational equipment, and the pilot must obtain clearance from an air traffic control (ATC) facility to enter Class A airspace. Additionally, the pilot must possess an instrument rating to operate in Class A.

Class B: Class B is controlled airspace surrounding high-activity commercial service airports (i.e., Phoenix Sky Harbor International Airport). Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high performance, passenger-carrying aircraft at major airports. In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation equipment and must obtain clearance from air traffic control. A pilot is required to have at least a private pilot certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for the Class B airspace. Aircraft are also required to utilize a Mode C transponder within a 30 nautical-mile range of the center of the Class B airspace. A Mode C transponder allows air traffic control to track the location and altitude of the aircraft. The nearest Class B airspace is centered on Phoenix Sky Harbor International Airport which is approximately 112 nautical miles south of CMR.



DEFINITION OF AIRSPACE CLASSIFICATIONS

CLASS A Think A - Altitude. Airspace above 18,000 feet MSL up to and including FL 600. Instrument Flight Rule (IFR) flights only, ADS-B 1090 ES transponder required, ATC clearance required.

CLASS B Think B - Busy. Multi-layered airspace from the surface up to 10,000 feet MSL surrounding the nation's busiest airports. ADS-B 1090 ES transponder required, ATC clearance required.

CLASS C Think C - Mode C. Mode C transponder required. ATC communication required. Generally airspace from the surface to 4,000 feet AGL surrounding towered airports with service by radar approach control.

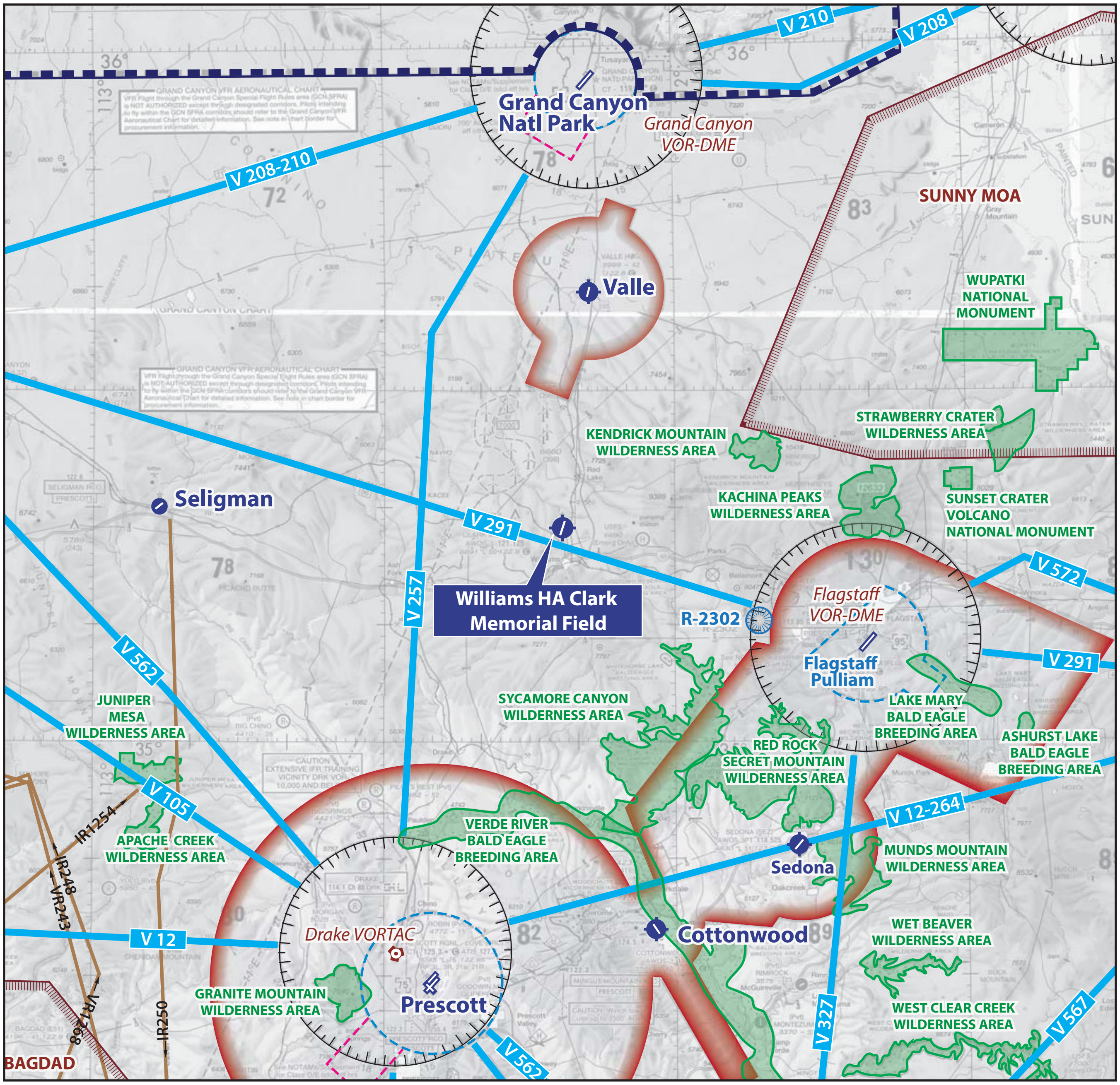
CLASS D Think D - Dialogue. Pilot must establish dialogue with tower. Generally airspace from the surface to minimum 2,500 feet AGL surrounding towered airports.

CLASS E Think E - Everywhere. Controlled airspace that is not designated as any other Class of airspace.

CLASS G Think G - Ground. Uncontrolled airspace. From surface to a 1,200 AGL (in mountainous areas 2,500 AGL) Exceptions: near airports it lowers to 700′ AGL; some airports have Class E to the surface. Visual Flight Rules (VFR) minimums apply.

Source: www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/15_phak_ch15.pdf

Exhibit 1E
AIRSPACE CLASSIFICATION



LEGEND

- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VORTAC
- Compass Rose
- Class D Airspace
- Class E Airspace
- Special Flight Rules Area
- Class E Airspace with floor 700 ft. above surface
- Victor Airways
- MOA - Military Operations Area
- Prohibited, Restricted, Warning and Alert Areas
- Military Training Routes
- Wilderness Areas

Source: US Department of Commerce, National Oceanic and Atmospheric Administration; Las Vegas, February 27,2020
US Department of Commerce, National Oceanic and Atmospheric Administration; Pheonix, October 10,2019

Class C: Class C is controlled airspace surrounding lower-activity commercial service and some military airports. The FAA has established Class C airspace at 120 airports around the country, as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high performance, passenger-carrying aircraft at major airports. To operate inside Class C airspace, aircraft must be equipped with a two-way radio, an encoding transponder, and the pilot must have established communication with ATC. There is currently no Class C airspace in the vicinity of CMR.

Class D: Class D is controlled airspace surrounding most airports with an operating ATCT and not classified under B or C airspace designations. The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nautical miles from the airport extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path. Class D airspace surrounds Flagstaff Pulliam Airport, Prescott Regional Airport, and Grand Canyon National Park Airport.

Note: All aircraft operating within Classes A, B, C, and D airspace must be in constant radio contact with the air traffic control facility responsible for that airspace sector.

Class E: Class E is controlled airspace surrounding an airport that encompasses all instrument approach procedures and low-altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with the appropriate air traffic control facility when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio contact with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

Class G: Class G is uncontrolled airspace typically in rural areas that do not require communication with an air traffic control facility. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level (AGL). While aircraft may technically operate within this Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, F.A.R. Part 91.119, *Minimum Safe Altitudes*, specify minimum altitudes for flight.

Airspace within the vicinity of H.A. Clark Memorial Field is depicted on **Exhibit 1F**. The airport is in Class G airspace, with Class E airspace directly above with a floor 1,200 feet over the surface extending to Class A airspace at 18,000 feet MSL.

SPECIAL USE AIRSPACE

Special use airspace is defined as airspace where activities must be confined because of their nature, or where limitations are imposed on aircraft not taking part in those activities. Special use airspace identifies for other users the areas where these non-standard operations may be occurring by outlining active times and/or altitudes to provide separation information in the area. Most special use airspace is designated on FAA aeronautical charts. The special use airspace in the vicinity of H.A Clark Memorial Field is also depicted on **Exhibit 1F**.

Victor Airways: Victor airways are for aircraft arriving or departing the regional area and navigating by using very high frequency omni-directional range (VOR) facilities. This system of federal airways, referred to as victor airways, has been established. Victor airways are corridors of airspace eight miles wide that extend upward from 12,000 feet AGL to 18,000 feet MSL and extend between VOR facilities. There are several victor airways surrounding the airport, and they are identified with blue lines marked with a “V” preceding a designation number on **Exhibit 1F**.

Military Operations Area (MOA): A MOA is an area of airspace designated for military training use. This is not restricted airspace; however, pilots who use this airspace should be on alert for the possibility of military traffic. A pilot may need to be aware that military aircraft can be found in high concentrations, conducting aerobatic maneuvers, and possibly operating at high speeds and/or at lower elevations. The nearest MOA to CMR is the Sunny MOA which is approximately 17 nm to the northeast. Each MOA will have its own designated airspace block and hours of operation. The activity status of a MOA is advertised by a Notice to Airmen (NOTAM) and notated on sectional charts.

Restricted Airspace: Restricted airspace is an area (volume) of airspace typically used by the military in which the local controlling authorities have determined that air traffic must be restricted (if not continually prohibited) for safety or security concerns. It is depicted on aeronautical charts with the letter "R" followed by a serial number. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. Restricted airspace zones may always not be active; in such cases, there are typically schedules of local dates and times available to aviators specifying when the zone is active, and at other times, the airspace is subject to normal operation for the applicable airspace class. East of the airport restricted area R-2302 is depicted on **Exhibit 1F**.

Alert Areas: Alert areas are depicted on aeronautical charts to inform non-participating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity, such as military operations. Pilots should be particularly alert when flying in these areas. Military activities or other flight training in these areas typically operate at lower altitudes and may occur at any time of the day or night. General aviation flights are not restricted within these areas, but pilots are strongly cautioned to be alert for high-speed military training aircraft. There are no alert areas in the vicinity of CMR.

Military Training Routes: Military Training Routes (MTRs) are designated airspace established for use by high performance military aircraft to train below 10,000 feet AGL and in excess of 250 knots. There are visual (VR) and instrument (IR) designated MTRs. MTRs with no segment above 1,500 feet AGL will be designated with the VR or IR, followed by a four-digit number. MTRs with one or more segments above 1500 feet AGL are identified by the route designation, followed by a 3-digit number. The arrows on the route show the direction of travel. MTRs in the vicinity of CMR are depicted on **Exhibit 1F** using a beige colored line and associated with their identifying number. There are multiple MTRs in the region due to the airport’s proximity to several MOAs.

Wilderness Areas: Several wilderness areas exist in proximity to H.A Clark Memorial Field. Aircraft are requested to maintain a minimum altitude of 2,000 feet AGL over National Park areas, which include all wilderness areas and breeding grounds. FAA Advisory Circular (AC) 91-36C defines the surface as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of the canyon or valley. Wilderness areas surrounding CMR are depicted in green on **Exhibit 1F**. The nearest wilderness area, Kendrick Mountain Wilderness Area, is approximately 10 nautical miles northeast and consists of 6,510 acres of protected wilderness.

Grand Canyon Special Flight Rules Area (SFRA)

The Grand Canyon National Park Special Flight Rules Area (SFRA) is a unique area designed to promote aviation safety and facilitate VFR navigation in this popular flight area. The rules for the area can be found on a special FAA chart which contains aeronautical information for the general aviation VFR pilots on the front side, and commercial VFR air tour operations on the backside. The SFRA is intended to maintain separation of tour flight operations from general aviation (GA) activity. VFR corridors are established which allow general aviation pilots to fly as low as 10,500 feet MSL above the canyon. GA pilots outside of the established corridors must remain above 14,500 feet MSL when flying directly above the canyon. When pilots operate in this area special air-to-air communication frequencies and altimeter procedures are used to promote safety within the high traffic area. Numerous VFR checkpoints are also available on the special for ease of location identification.

AIRSPACE CONTROL

The FAA has established 21 Air Traffic Control Centers (ARTCCs) throughout the continental United States to control aircraft operating under IFR within controlled airspace and while enroute. An ARTCC assigns specific routes and altitudes along federal airways to maintain separation and orderly traffic flow. The Albuquerque ARTCC controls IFR air traffic enroute to and from CMR.

Flight service stations (FSS) are air traffic facilities which provide pilot briefings, flight plan processing, in-flight radio communications, search and rescue (SAR) services, and assistance to lost aircraft in emergency situations. FSS also relay ATC clearances, process NOTAMs, broadcast aviation metrological and aeronautical information, and notify Customs and Border Protection of trans-border flights. The Prescott Flight Service Station is the nearest FSS to the airport.

H.A. Clark Memorial Field is a Class G airport which is non-towered airspace, meaning there is no ground-based airport traffic control tower (ATCT) on the airfield. Pilots will give position reports when in the vicinity of the airport to all other air traffic monitoring the CTAF. Aircraft operating to/from the airport can be provided separation clearance by the Albuquerque ARTCC.

INSTRUMENT APPROACH PROCEDURES

An instrument approach procedure (IAP) is defined as a series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually. There are three categories of IAPs: precision approach (PA), approach with vertical guidance (APV), and non-precision approach (NPA).

- **Precision Approach:** A PA uses a navigation system that provides both course and glidepath deviation.
- **Approach with Vertical Guidance:** An APV also uses a navigation system for both course and glidepath deviation, but not to the same standards as a traditional precision approach.
- **Non-Precision Approach:** An NPA uses a navigation system for course deviation but does not provide glidepath information.

The FAA creates and publishes airport-specific instrument approach procedures designed to each individual airport environment and available navigational aids. The capability of an instrument approach procedure is defined by the visibility and the cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance a pilot must be able to see in order to complete the approach. A cloud ceiling is defined as the height of the lowest layer of clouds, above the surface, that are either broken or overcast. If the observed visibility and/or cloud ceiling are below the prescribed minimums for the approach, the pilot cannot legally complete the approach. H.A. Clark Memorial Field does not currently support any published IAPs.

Instrument procedures based on GPS have become very common across the country. GPS is inexpensive, as it does not require a significant investment in ground-based systems by the airport or the FAA. GPS instrument approaches can also provide circling minimums which allows pilots the flexibility to land on the runway end more closely aligned with the prevailing wind conditions. This flexibility typically requires circling approaches to have higher visibility and cloud ceiling minimums than the straight-in approaches. The reason for this is to allow sufficient visibility and ground clearance to navigate visually from the approach to the desired runway end for landing. The airport has requested a GPS instrument approach procedure from FAA which is scheduled be implemented in October 2021.

LOCAL OPERATING PROCEDURES

H.A. Clark Memorial Field is situated at an elevation of 6,690 feet MSL. The traffic pattern at CMR is maintained to provide the safest and most efficient use of the airspace surrounding the airport. The airport utilizes a standard left-hand traffic pattern, and the recommended traffic pattern altitude is 7,700 feet MSL. Recommended operating procedures discourage the straight-in and straight-out departure of aircraft. Aircraft should enter the traffic pattern using a 45-degree angle entry to the downwind leg or overfly the airport at midfield 500 feet above the traffic pattern to enter a left downwind.

REGIONAL AIRPORTS

There are several publicly owned, public-use airports of various sizes, capacities, and functions within a 50 nautical-mile radius of H.A. Clark Memorial Field. It is important to consider the capabilities and limitations of these airports when planning for future changes and improvements at the airport. Information pertaining to each airport was collected from the most recent FAA Form 5010-1 *Airport Master Record* and identifies each airport's characteristics. **Table 1G** provides information on the roles, facilities, services, and operational levels these airports experience. Analysis of public-use airports in the region indicates there are several facilities serving the needs of all types of aviation activity.

Table 1G | Airports Within 50NM
H.A. Clark Memorial Field

Airport	Nautical Miles/ Direction	NPIAS Service Level	Based Aircraft	Annual Operations	Longest Runway	Visibility Minimum
H.A. Clark Memorial Field (CMR)	-	General Aviation	12	6,500	6,000	Visual
Valle Airport (40G)	21 nm N	N/A	7	1,450	4,199	Visual
Flagstaff Pulliam Airport (KFLG)	28 nm ESE	Primary Commercial	112	44,909	8,800	1/2 mile
Sedona Airport (KSEZ)	34 nm SE	General Aviation	59	35,000	5,132	1 1/2 mile
Seligman Airport (P23)	34 nm W	N/A	2	1,100	4,800	Visual
Cottonwood Airport (P52)	35 nm SSE	General Aviation	65	20,740	4,252	1 mile
Grand Canyon National Park Airport (KGCN)	39 nm N	Primary Commercial	39	52,144	8,999	3/4 mile
Prescott Regional Airport (KPRC)	41 nm S	Primary Commercial	262	232,592	7,619	1/2 mile

Sources: FAA Form 5010-1 Airport Master Record; basedaircraft.com; NPIAS

AREA LAND USE AND ZONING

Area land use surrounding the airport can have a significant impact on operations and growth. Understanding the land uses and zoning designations surrounding the airport will assist in making appropriate recommendations for the future sustainability of H.A. Clark Memorial Field in terms of economic development and environmental compatibility.

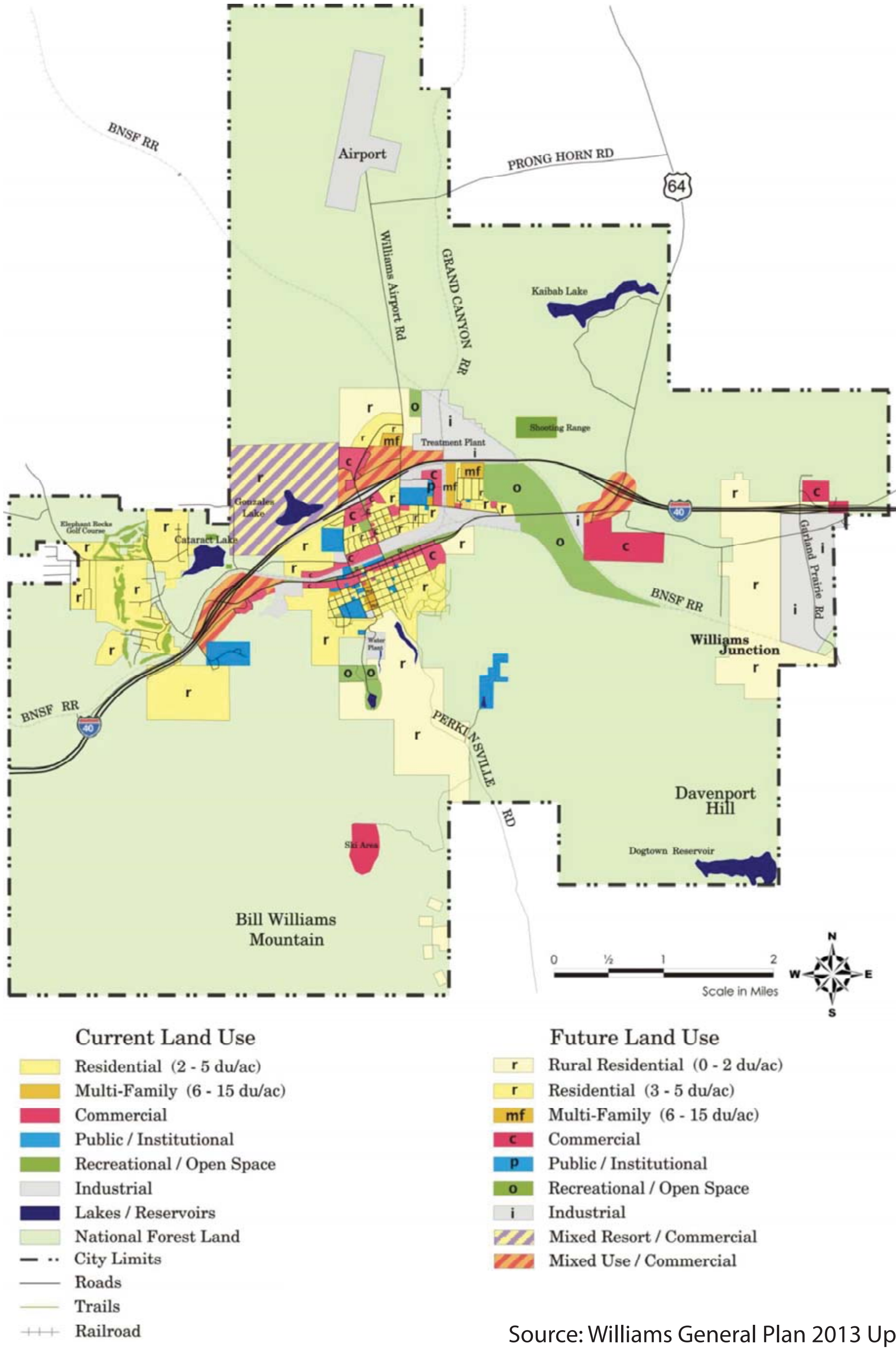
EXISTING LAND USES AND ZONING

As stated previously, H.A. Clark Memorial Field is situated on approximately 303 acres at an elevation of 6,690 feet MSL. The airport, which is owned by the City of Williams, is located approximately three miles north of the City in Coconino County.

The City of Williams Planning and Zoning Commission is responsible for establishing land use and zoning regulations in the city, which are then approved by City Council. The airport property is designated for airport development, and the neighboring open parcels surrounding the airport are designated as National Forest. All surrounding zoning regulations are considered compatible with the airport. **Exhibit 1G** identifies the current and projected land use for the City of Williams and the areas surrounding the airport as identified in the *Williams General Plan 2013 Update*.

SOCIOECONOMICS

Socioeconomic characteristics of an airport's surrounding area can provide valuable information to derive an understanding of the dynamics of growth near an airport. This information is crucial in determining aviation demand level requirements, as most aviation demand is directly related to the socioeconomic conditions of the surrounding region. Statistical analysis of population, employment, and



Source: Williams General Plan 2013 Update income trends outline the economic strength of a region and can help determine the ability of the area to sustain a strong economy in the future. The forecast chapter of this master plan will be used to provide a better understanding of the roles that socioeconomic factors play, while the information in the following sections will serve as an introduction to socioeconomic trends in the study area.

POPULATION

Population is a key socioeconomic factor to consider when planning for future airport needs. Historical and forecast population trends provide an indication of the potential of the region to sustain growth in aviation activity. Population data for the City of Williams, Coconino County, and the state of Arizona are discussed to provide past and present population metrics of the region in which the airport serves. Since 2005, Williams has grown in population at a compound annual growth rate (CAGR) of 0.56 percent, which is slower than Coconino County (0.91 percent) and slower than Arizona as a whole (1.55 percent). Over the same period the United States has increased in population at a rate of 0.77 percent CAGR. **Table 1H** presents historical population statistics.

TABLE 1H | Historical Population Statistics

	2005	2010	2015	2020	CAGR
City of Williams	3,083	3,032	3,185	3,352	0.56%
Coconino County	127,025	134,618	139,024	145,508	0.91%
State of Arizona	5,839,077	6,407,774	6,833,596	7,351,399	1.55%
United States	295,516,553	309,326,085	320,742,673	331,472,851	0.77%

CAGR: Compound Annual Growth Rate

Source: Arizona Office of Economic Opportunity, U.S. Census Bureau

EMPLOYMENT

Analysis of an area's employment base can provide valuable insight into the overall well-being of the region. Some indicators of economic health include availability of jobs, variety of employment opportunities, and types of wages provided by local employers. Employment data for the region is calculated by analyzing the number of employees in the area.

Table 1J gives historical employment data for Coconino County, the State of Arizona, and the United States since 2005. Total employment in Coconino County has grown at a CAGR of 1.31 percent since 2005, which is slightly slower than state growth rates over this time period. The State of Arizona's employment has seen a higher growth rate with a CAGR of 1.48 percent, while the United States has experienced a CAGR of 1.23 percent.

TABLE 1J | Historical Employment Statistics

	2005	2010	2015	2020	CAGR
Coconino County	74,562	76,341	83,483	90,663	1.31%
State of Arizona	3,219,820	3,181,571	3,548,174	4,011,191	1.48%
United States	172,338,348	172,901,690	190,315,792	206,901,316	1.23%

CAGR: Compound Annual Growth Rate

Source: Arizona Office of Economic Security / azcommerce.com

PER CAPITA PERSONAL INCOME

Table 1K presents per capita personal income (PCPI) for Coconino County, the State of Arizona, and the United States. PCPI is determined by dividing the total economic output by population. In order for PCPI to grow, income growth must outpace population growth significantly. Arizona's PCPI has increased at a CAGR of 2.53 percent since 2005. Coconino County PCPI has outpaced Arizona with a growth rate of 3.66 percent and the United States has experienced a slightly lower increase to PCPI with a CAGR of 3.22 percent over this time period.

TABLE 1K | Historical Per Capita Personal Income (adjusted to current 2020 dollars)

	2005	2010	2015	2020	CAGR
Coconino County	$29,480	$34,406	$42,726	$50,525	3.66%
State of Arizona	$32,220	$33,635	$39,676	$46,876	2.53%
United States	$35,849	$40,546	$48,977	$57,668	3.22%
CAGR: Compound Annual Growth Rate					

Source: U.S. Department of Commerce, Bureau of Economic Analysis

ENVIRONMENTAL INVENTORY

The environmental inventory addresses existing conditions at H.A. Clark Memorial Field and the surrounding environs. This inventory is intended to help identify relevant environmental issues that should be considered during the preparation of the Airport Master Plan. The inventory is organized using the resource categories contained in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (2015). Available information regarding the environmental conditions at the airport and within the surrounding area has been derived from internet resources, agency maps, special studies, and existing literature. A comprehensive list of the resources is included in this section.

AIR QUALITY

The concentration of various pollutants in the atmosphere describes the local air quality. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short- and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for criteria pollutants: ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), coarse particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead (Pb).

Based on federal air quality standards, a specific geographic area can be classified as either an "attainment," "maintenance," or "nonattainment" area for each pollutant. The threshold for nonattainment designation varies by pollutant.

Coconino County is designated as an attainment area for all federal criteria pollutants.[1]

[1] U.S. Environmental Protection Agency *Nonattainment/Maintenance Status for Each County by Year for All Criterial Pollutants* (https://www3.epa.gov/airquality/greenbook/anayo_az.html)

BIOLOGICAL RESOURCES

Biotic resources include the various types of plants and animals that are present in an area. The term also applies to rivers, lakes, wetlands, forests, and other habitat types that support plants and animals.

The U.S. Fish and Wildlife Service (USFWS) is charged with overseeing the requirements contained within Section 7 of the *Endangered Species Act* (ESA). The ESA was put into place to protect animal or plant species whose populations are threatened by human activities. Along with the FAA, the USFWS reviews projects to determine if a significant impact to protected species will result in the implementation of a proposed project. Significant impacts occur when a proposed action could jeopardize the continued existence of a protected species or will result in the destruction or adverse modification of federally designated critical habitat in the area.

On September 10, 2020 SWCA Environmental Consultants (SWCA) performed a biological field survey (BFS) of the airport and adjacent area to determine the presence of endangered and/or threatened species and habitat.[2] Twenty-seven species protected under the ESA have been identified in Coconino County; however, it was determined that none of these species are likely to occur near the airport for the following reasons:

- The airport is beyond known geographic or elevation ranges; and/or
- The airport does not contain vegetation or landscape to support these species.

The USFWS Information for Planning and Consultation (IPaC) report was also considered for airport property, and four species federally listed as threatened or endangered which have the potential to occur were identified in the vicinity of the airport, described in **Table 1L** below. Like the biological survey, the IPaC report notes that habitat for these species is not found on airport property.

TABLE 1L | Federally Listed Threatened or Endangered Species
H.A. Clark Memorial Field – Williams, AZ

Common Name	*Scientific Name*	Federal Status	Habitat	Potential For Occurrence
Birds				
California condor	*Gymnogyps californianus*	Endangered; experimental, non-essential population	Nesting sites are in caves, crevices, and potholes in isolated regions of the Southwest. Historically, habitat range for California condors are limited primarily to southcentral California, southern Utah, southern Nevada, and northern Arizona. Because this species is in danger of extinction throughout all or a significant portion of its range, experimental populations were reintroduced into northern Arizona as an effort to preserve the species. This experimental population has a "non-essential" designation (NEP), meaning the population is not essential to the continued survival of the species.	Unlikely to Occur
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	Found in mature montane forests and woodlands and steep, shady, wooded canyons, and can be found in mixed-conifer and pine-oak vegetation habitat. Typically will nest in older forests of mixed-conifers or ponderosa pine.	Unlikely to Occur

[2] SWCA Environmental Consultants, Inc. *Biological Evaluation for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona* (September 24, 2020).

TABLE 1L | Federally Listed Threatened or Endangered Species
H.A. Clark Memorial Field – Williams, AZ

Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	The yellow-billed cuckoo uses a variety of riparian woodland vegetation (cottonwood, willow, or salt cedar) at elevations below 6,000 amsl*. Dense understory foliage appears to be an important factor in nest site selection and appears to require large blocks of habitat for breeding.	Unlikely to Occur
Reptiles				
Northern Mexican gartersnake	*Thamnophis eques megalops*	Threatened	The Northern Mexican garter snake prefers to live at elevations of 3,000 ft. to 5,000 ft. and is considered a riparian obligate. This snake primarily lives in the following general habitat types: 1) source-area wetlands, 2) large river riparian woodlands and forests, and 3) streamside gallery forests.	Unlikely to Occur
* amsl – above mean sea level				

Source: SWCA Environmental Consultants, Inc. Biological Evaluation for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona (September 24, 2020); U.S. Fish and Wildlife Service: Information for Planning and Consulting (https://ecos.fws.gov/ipac/)

According to the USFWS Critical Habitat Mapper, there is no critical habitat on airport property. However, critical habitat for the Mexican spotted owl is identified approximately four miles south of the airport.[3]

Additional federal laws that may be applicable to the airport are the *Bald and Golden Eagle Protection Act* (BGEPA) and *Migratory Bird Treaty Act* (MBTA), prohibiting activities that would harm eagles and other migratory birds, their eggs, or nests. Birds protected under the BGEPA and MBTA may nest, winter, or migrate throughout the area, including those protected by the ESA. Under the requirements of the BGEPA and MBTA, all project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project.

Sixteen migratory birds were observed during the September 2020 BFS, all of which are protected under the MBTA. No active nests were found during the site visit; however, other signs of small wildlife which could be prey to larger migratory raptors were observed at the airport. The IPaC report, which was also consulted, lists eight migratory bird species that could be present at the airport. All avian species protected by the MBTA and BGEPA identified by both SWCA and the IPaC resource list are listed in **Table 1M**.

[3] U.S. Fish and Wildlife Service *Critical Habitat Mapper* (https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77)

The Arizona Game and Fish Department (AGFD) Heritage Data Management System (HDMS) state-wide database was consulted for records of occurrence of federally listed species and other species of special concern near the airport. HDMS reported that the northern goshawk (*Accipiter gentilis*), the bald eagle – winter population, and the golden eagle (*Aquila chrysaetos*) have been documented within two miles of the airport. Due to the existing vegetation and wildlife management at the airport, both the northern goshawk and bald eagle are not likely to occur.

The BFS notes that the airport does contain foraging habitat and suitable prey, such as the Gunnison's prairie dog, for the golden eagle was identified at the airport during the September 2020 site visit. The airport does not contain breeding or roosting habitat for the golden eagle.

TABLE 1M | Birds Protected Under the *Migratory Bird Treaty Act*
H.A. Clark Memorial Field – Williams, AZ

Species Name	Scientific Name
Migratory Birds Observed by SWCA Consultants, Inc.	
House finch	*Haemorhous mexicanus*
Western bluebird	*Sialia Mexicana*
Mountain bluebird	*S. currucoides*
Lesser goldfinch	*Spinus psaltria*
Brewer's sparrow	*Spizella breweri*
Chipping sparrow	*S. passerine*
Common raven	*Corvus corax*
Vester sparrow	*Pooecetes gramineus*
Blue-gray gnatcatcher	*Polioptila caerulea*
Red-tailed hawk	*Buteo jamaicensis*
Barn swallow	*Hirundo rustica*
Turkey vulture	*Cathartes aura*
Western meadowlark	*Sturnella neglecta*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Mountain chickadee	*Poecile gambeli*
Say's phoebe	*Sayornis saya*
IPaC Resource List	
Bald Eagle	*Haliaeetus leucocephalus*
Black-throated sparrow	*Amphispiza bilineata*
Black-throated gray warbler	*Dendroica nigrescens*
Common black hawk	*Buteogallus anthracinus*
Grace's warbler	*Dendroica graciae*
Pinyon jay	*Gymnorhinus cyanocephalus*
Red-faced warbler	*Cardellina rubrifrons*
Rufous hummingbird	*Selasphorus rugus*

Source: SWCA Environmental Consultants, Inc. Biological Evaluation for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona (September 24, 2020); U.S. Fish and Wildlife Service: Information for Planning and Consulting (https://ecos.fws.gov/ipac/)

CLIMATE

The EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018*, found that the transportation sector, which includes aviation, accounted for 28.2 percent of U.S. greenhouse gas (GHG) emissions in 2018. Of this, the aviation sector contributed 175.5 million metric tons (MMT) of carbon dioxide equivalent (CO_2e), or nearly 9.3 percent of all transportation emissions.[4, 5] Transportation sources include cars, trucks, ships, trains, and planes. Most GHGs from transportation sources are CO_2 emissions resulting from the combustion of petroleum-based products in internal combustion engines. Relatively insignificant amounts of methane (CH_4), hydrofluorocarbon (HFC), and nitrous oxide (N_2O) are emitted during fuel combustion. From 1990 to 2018, total transportation emissions increased. While this upward trend is largely due to increased demand for travel, much of this travel was done in passenger cars and light-duty trucks. In addition to transportation-related emissions, **Figure 1A** shows all 2018 GHG emissions sources in the U.S.

[4] Aviation activity consists of emissions from jet fuel and aviation gasoline consumed by commercial aircraft, general aviation, and military aircraft.
[5] Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018, Table 2-13 (https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018)

Increasing concentrations of GHGs can affect global climate by trapping heat in the Earth's atmosphere. Scientific measurements have shown that Earth's climate is warming with concurrent impacts, such as warmer air temperatures, rising sea levels, increased storm activity, and greater intensity in precipitation events. This climate change is a global phenomenon that can also have local impacts.[6] GHGs, such as water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3), are both naturally occurring and anthropogenic (man-made).

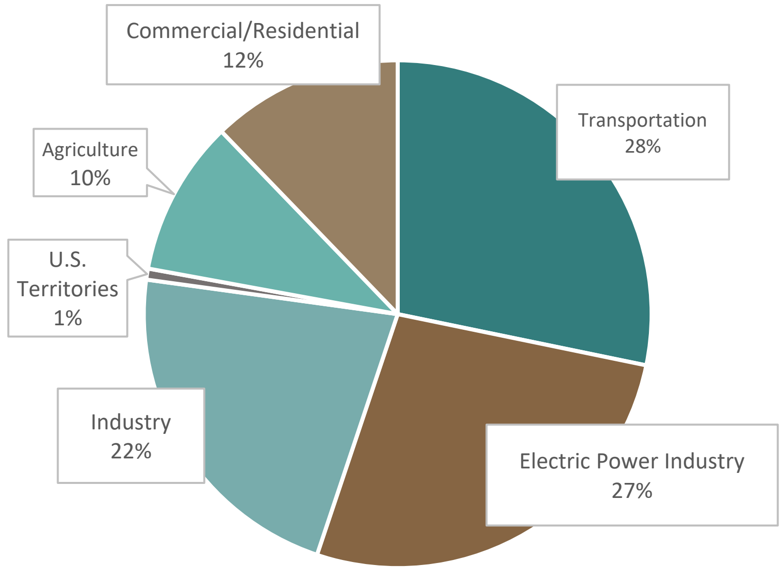


Figure 1A - 2018 Sources of Greenhouse Gas Emissions in the U.S.
Source: U.S. EPA (2020)

Research has also shown a direct correlation between fuel combustion and GHG emissions. GHGs from anthropogenic sources include CO_2, CH_4, N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). CO_2 is the most important anthropogenic GHG because it is a long-lived gas that remains in the atmosphere for up to 100 years.

Information regarding the climate in the City of Williams and the surrounding region, including wind, temperature, and precipitation, are discussed earlier in Chapter One.

COASTAL RESOURCES

Federal activities involving or affecting coastal resources are governed by the *Coastal Barriers Resource Act* (CBRA), the *Coastal Zone Management Act* (CZMA), and Executive Order (E.O.) 13089, *Coral Reef Protection*.

H.A. Clark Memorial Field is located approximately 343 miles from the Pacific Ocean, the nearest U.S. protected coastal area. Therefore, the airport is not located within a coastal zone. The closest National Marine Sanctuary is the Channel Islands National Marine Sanctuary, sited approximately 403 miles west of the airport.

DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f)

Section 4(f) of the Department of Transportation (DOT) Act, which was recodified and renumbered as Section 303(c) of 49 USC, provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly or privately owned historic sites, public parks, recreation areas, or waterfowl and wildlife refuges of national, state, regional, or local importance unless there is

[6] Intergovernmental Panel on Climate Change *AR5 Synthesis Report: Climate Change 2014* (https://www.ipcc.ch/)

no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

Table 1N summarizes properties of each type that may be protected under Section 4(f) of the DOT Act within the vicinity of the airport.

TABLE 1N | Department of Transportation Section 4(f) Resources Within the Vicinity of the Airport
H.A. Clark Memorial Field – Williams, AZ

Facility	Distance From Airport (Miles)	Direction From Airport
National Register of Historic Places		
Grand Canyon Railway	0.5	East
First Methodist Episcopal Church and Parsonage	0.9	Northeast
DelSue Motor Inn (now known as the Grand Motel)	3.0	South
Williams Residential Historic District	3.1	South
Williams Historic Business District	3.1	South
Urban Route 66 - Williams	3.3	South
Negrette House	3.5	South
Camp Clover Ranger Station	4.4	Southwest
National Recreation Area		
Lake Mead National Recreation Area	77.5	Northwest
Wilderness Area		
Sycamore Canyon Wilderness	14.4	Southeast
Wildlife Refuge		
Bill Williams River	123.0	Southwest
Parks		
Kaibab National Forest – Tusayan and Williams District – Kaibab Lake campgrounds	2.0	Southeast
Dream Acres Community Recreation Area	3.0	South
Cureton Park	3.0	South
Welcome and History Park	3.2	South
Monument Park	3.4	South
Cataract Lake County Park	3.8	Southwest
Bearizona Wildlife Park	3.8	Southeast
Buckskinner Park	4.3	South

Sources: Google Earth Aerial Imagery (dated May 1, 2019); Coffman Associates analysis

FARMLANDS

Under the *Farmland Protection Policy Act* (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland, to consider appropriate alternative actions which could lessen adverse effects, and to assure that such federal programs are, to the extent practicable, compatible with state or local government programs and policies to protect farmland. The FPPA guidelines, developed by the U.S. Department of Agriculture (USDA), apply to airport activities where federal funds are applied and involves the irreversible conversion of important farmland to non-agricultural uses. Important farmland is classified as prime, unique, or of state or local importance, as determined by the appropriate government agency and concurred by the Secretary of Agriculture. FPPA can be exempt when:

- Land is not considered important farmland. Such instances include land which is already developed or irreversibly converted;
- Land is already committed to urban development, including land designated as an urban area by the U.S. Census Bureau;
- Land committed to water storage;
- The construction of non-farm structures to support agricultural operations; or
- The construction or land development for national defense purposes.

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS), soil data for the airport is not currently available. In 2009, a preliminary draft for an Environmental Assessment (EA) was performed for the acquisition of three parcels of land directly adjacent to the airport totaling approximately 160 acres, managed by the U.S. Forestry Service and Kaibab National Forest, from a private entity.[7] Coordination with the Natural Resources Conservation Service indicated that these parcels were previously considered prime farmland. However, due to the absence of irrigated water or an irrigation system, both of which are necessary to meet the definition of prime farmland, those project areas were exempt from FPPA. The airport is not farmed or irrigated at this time.

The U.S. Census Bureau reports that the airport is located in a non-urbanized area.[8]

HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminants may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. The EPA's Environmental Justice Screening and Mapping Tool (*EJSCREEN*) reports no Superfund sites within five miles of the airport.[9] There are two brownfields sites in the vicinity of the airport. One site is located along North Cunning Boulevard/North State Highway 64, while the other is located within the heart of Williams, AZ.

The Williams Transfer Station, a solid waste facility, is located approximately 2.5 miles southeast of the airport.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*. In addition, the *Antiquities Act of 1906*, the *Historic Sites Act of 1935*, and the *American Indian Religious Freedom Act of 1978* also

[7] Coffman Associates, Inc. - *Preliminary Draft Environmental Assessment for Proposed Property Acquisition at H.A. Clark Memorial Field* (September 2009)
[8] U.S. Census Bureau (https://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/ua/)
[9] U.S. Environmental Protection Agency *EJSCREEN* (https://ejscreen.epa.gov/mapper/)

protect historical, architectural, archaeological, and cultural resources. Impacts may occur when a proposed project causes an adverse effect on a resource which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

In September 2020, SWCA conducted an archaeological field survey of the entire airport to determine if historically significant artifacts are present.[10] During the field survey, five isolated occurrences (IOs) were identified consisting of flaked stone debitage, a nearly completed corner-notched projectile point, tested cobble, and a fragment of an historic-era sun-colored amethyst bottle. It was determined these IOs are ineligible for the NRHP.

Four in-use gas pipelines partially bisect the southern portion of the airport and are owned and operated by the El Paso Natural Gas Company. Three of these pipelines are considered historic era, as they are more than 50 years in age. Since these three historic-era pipelines are in use, they are exempt from Section 106 review in accordance with a notice from the Advisory Council on Historic Preservation.

Eight sites listed on the National Register of Historic Places (NRHP) database are within five miles of the airport and are listed in **Table 1P** below.

TABLE 1P | Resources on the National Register of Historic Places
H.A. Clark Memorial Field – Williams, AZ

Historic Resource	Year Constructed	Distance From Airport (Miles)	Direction From Airport
Grand Canyon Railway	1901	0.0	East
First Methodist Episcopal Church and Parsonage	1891	0.9	Northeast
DelSue Motor Inn (now known as the Grand Motel)	1936	3.0	South
Williams Residential Historic District	Late 1800s and early 1900s	3.1	South
Williams Historic Business District	Late 1800s and early 1900s	3.1	South
Urban Route 66, Williams	1920s	3.3	South
Negrette House	1893	3.5	South
Camp Clover Ranger Station	1934	4.4	Southwest

Source: National Park Service – National Register of Historic Places (https://www.nps.gov/subjects/nationalregister/index.htm)

The nearest Native American feature is the Navajo Nation Reservation, located approximately 35 miles northeast of the airport.

LAND USE

The airport and surrounding environs are within the jurisdiction of the City of Williams. Land surrounding the airport is within the Kaibab National Forest – Tusayan and Williams District land. According to the City of Williams, the airport is zoned Light Industrial (I-1), a zoning classification intended for light industrial uses, such as public utilities, scientific research, or manufacturing. Airports are allowed in the I-1 district with the approval of a conditional use permit.

[10] SWCA Environmental Consultants *Cultural Resources Survey for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona* (October 2020).

According to the City of Williams *General Plan Update* (2013),[11] the airport is identified as an industrial use. Future land uses around the airport are described earlier in this chapter and are depicted on **Exhibit 1G**.

Bisecting the southern portion of the airport is a natural gas pipeline for El Paso Natural Gas. The pipeline is just beyond the Runway 36 end. The location of the pipeline is shown on **Exhibit 1H**.

NATURAL RESOURCES AND ENERGY SUPPLY

E.O. 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* instructs federal agencies to advance the nation's energy security and environmental performance by achieving specified goals. Natural resources and energy supply provide an evaluation of a project's consumption of natural resources. It is the policy of FAA Order 1053.1, *Energy and Water Management Program for FAA Buildings and Facilities*, to encourage the development of facilities that exemplify the highest standards of design, including principles of sustainability.

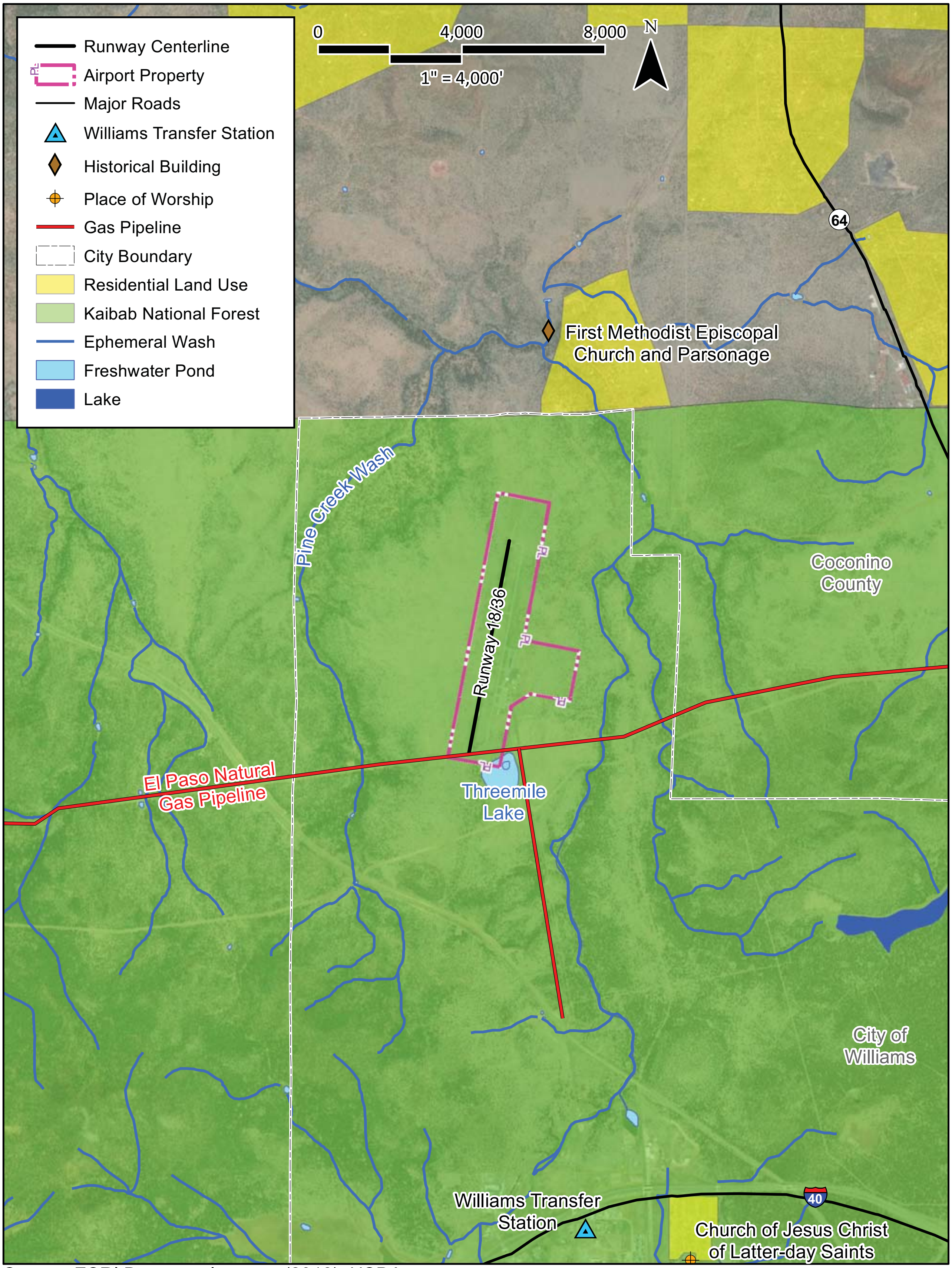
Natural resources and energy supply are discussed earlier in this chapter under "Fuel Facilities" and "Utilities."

NOISE AND NOISE-COMPATIBLE LAND USE

Federal land use compatibility guidelines are established under 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*. According to 14 CFR Part 150, residential land uses and schools are noise-sensitive land uses that are not considered compatible with a 65 decibel (dB) Day-Night Average Sound Level (L_{dn}). Other noise-sensitive land uses (such as religious facilities, hospitals, or nursing homes), if located within a 65 dB L_{DN} contour, are generally compatible when an interior noise level reduction of 25 dB is incorporated into the design and construction of the structure. Special consideration should also be given to noise-sensitive areas within Section 4(f) properties where the land use compatibility guidelines in 14 CFR Part 150 do not account for the value, significance, and enjoyment of the area in question (FAA 2015). No Part 150 study has been conducted for the airport.

Noise-sensitive land uses near the airport consist primarily of park lands surrounding the airport and residential uses to the north. Additional noise-sensitive land uses within approximately three miles of the airport are outlined in **Table 1Q** below.

[11] City of Williams, AZ Planning and Zoning – *City of Williams General Plan 2013 Update* (December 12, 2013)



Source: ESRI Basemap Imagery (2018), USDA, National Piping Mapping System, USFWS

Exhibit 1H
ENVIRONMENTAL SENSITIVITIES

TABLE 1Q | Noise-Sensitive Land Uses within Three Miles of Airport
H.A. Clark Memorial Field - Williams, AZ

Facility	Distance From Airport (Miles)	Direction From Airport
Schools/Child Care Centers		
Williams Elementary/Middle School	2.9	South
Places of Worship		
Williams Church of Christ	2.9	South
The Church of Jesus Christ of Latter-day Saints	2.9	South
Senior Care Facilities		
Arizona Senior Care	2.8	South
Park Facilities		
Kaibab National Forest – Tusayan and Williams District	0.0	National forest surrounds airport
Dream Acres Community Recreation Area	3.0	South
Cureton Park	3.0	South

Sources: Google Earth Aerial Imagery (dated May 1, 2019); Coffman Associates analysis

SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* specifically requires that a federal action causing disproportionate impacts to an environmental justice population (i.e., a low-income or minority population), be considered, as well as an evaluation of environmental health and safety risks to children.

Socioeconomics

Socioeconomics is an umbrella term used to describe aspects of a project that are either social or economic in nature. A socioeconomic analysis evaluates how elements of the human environment such as population, employment, housing, and public services might be affected by a proposed action and the alternative(s). The FAA has identified factors to consider when evaluating the context and intensity of potential environmental impacts, generally dependent on whether the potential socioeconomic impact(s) are interrelated with or inseparable from a physical or natural environmental effect. Impacts to consider include (but are not limited to):

- Induce substantial economic growth in an area, either directly or indirectly;
- Disrupt to divide the physical arrangement of an established community;
- Cause extensive relocation when sufficient replacement housing is unavailable;
- Cause extensive relocation of community businesses what would cause severe economic hardship for affected communities;
- Disrupt local traffic patterns and substantially reduce the levels of service of roads serving an airport and its surrounding communities; or
- Produce a substantial change in the community tax base.

The EPA's *EJSCREEN* was consulted and identified the presence of low-income population within five miles of the airport. The population within five miles of the airport is approximately 4,221, of which 39 percent is considered low-income. The per capita income within the three-mile buffer area is $28,292.

Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. Meaningful Involvement[12] ensures that:

- people have an opportunity to participate in decisions about activities that may affect their environment and/or health;
- the public's contribution can influence the regulatory agency's decision;
- their concerns will be considered in the decision-making process; and
- the decision-makers seek out and facilitate the involvement of those potentially affected.

The EPA's *EJSCREEN* was consulted and identified the presence of minority populations within five miles of the airport. According to the report, there is a population of approximately 4,221 persons with this five-mile survey area, of which 32 percent have been identified as a minority race. As indicated in **Table 1R**, approximately 25 percent of the population consider themselves Hispanic or Latino.

TABLE 1R | Population Characteristics Within Five Miles
H.A. Clark Memorial Field - Williams, AZ

Characteristic	Five-Mile Buffer Of Airport
Total Population	**4,221**
Race (alone or in combination with one or more other races)	
White	84%
Black or African American	1%
American Indian and Alaska Native	2%
Asian	1%
Native Hawaiian/Pacific Islander	0%
Some other race	7%
Reporting two or more races	5%
Hispanic or Latino (of any race)	25%

Source: U.S. EPA EJSCREEN (2020)

Children's Environmental Health and Safety

Federal agencies are directed, per E.O. 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, to make it a high priority to identify and assess the environmental health and safety risks that may disproportionately impact children. Such risks include those that are attributable to products or substances that a child is likely to encounter or ingest (air, water, food, or drinking water) or may be exposed to.

According to the U.S. EPA *EJSCREEN* report, approximately 30 percent of the population within the five-mile study area previously identified is under the age of 17.

[12] Requirements for meaningful public involvement by minority and low-income populations are addressed in Paragraph 2-5.2.b of FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*.

VISUAL EFFECTS

Visual effects deal broadly with the extent to which a proposed action or alternative(s) will either (1) produce light emissions that create an annoyance or interfere with activities; or (2) contrast with, or detract from, the visual resources and/or the visual character of the existing environment. Each jurisdiction will typically address outdoor lighting, scenic vistas, and scenic corridors in zoning ordinances and their general plan.

Light Emissions

Light emissions include any light that originates from a light source into the surrounding environment, such as airfield and apron floodlighting, navigational aids, parking lot illumination, and roadway lighting. Glare is a type of light emission that occurs when light is reflected off a surface, including solar panels or window glass.

Light emission impacts relate to the extent to which any light or glare results from a source that could create an annoyance for people or will interfere with normal activities. In general, local jurisdictions will include ordinances in the local code addressing outdoor illumination to reduce the impact of light on surrounding properties.

In 2001, Coconino County, recognizing the importance of preserving the region's unique conditions for astronomical observations, passed a dark sky ordinance encouraging lighting practices to minimize light pollution, light trespass, and conserve energy while maintaining nighttime safety, especially for those areas near observatories. Although this ordinance was passed at the county level, the city recognizes it as the dark sky preservation standard for the city.[13]

While this ordinance is in place to reduce light pollution around the county's observatories, it is understood that not all areas are near observatories, and therefore lighting zones are established to allow flexibility in outdoor lighting use. The lighting zones are as follows:

- Zone I: All areas within Coconino County located within 2.5 miles of the following observatories:
  - The Hall telescope at Lowell Observatory on Anderson Mesa;
  - The Kaj Strand telescope at the U.S. Naval Observatory; and
  - Rodan Crater.
- Zone II: All areas within Coconino County more than 2.5 miles and less than seven miles from the above referenced locations.
- Zone III: All other areas within Coconino County.

The airport is located within Zone III, and therefore will have the least restrictive lighting requirements under this code.

The City of Williams or surrounding environs are not a designated dark sky place by the International Dark-Sky Association.[14]

[13] City of Williams, AZ Planning and Zoning (https://www.williamsaz.gov/departments_and_services/planning_and_zoning)
[14] International Dark Sky Association (https://www.darksky.org/)

Visual Resources and Visual Character

Visual character refers to the overall visual makeup of the existing environment where a proposed action or its alternative(s) will be located. For example, areas near densely populated areas generally have a visual character that could be defined as urban, whereas less developed areas could have a visual character defined by the surrounding landscape features, such as open grass fields, forests, mountains, or deserts, etc.

Visual resources include buildings, sites, traditional cultural properties, and other natural or manmade landscape features that are visually important or have unique characteristics. Visual resources may include structures or objects that obscure or block other landscape features. In addition, visual resources can include the cohesive collection of various individual visual resources that can be viewed at once or in concert from the area surrounding the site of the proposed action or alternative(s).

Impact on visual resources and visual character typically relates to a reduction in the aesthetic quality of the surrounding environs from development, construction, or demolition. When making a determination of visual impacts, consideration should be made whether a proposed project or alternative(s) will have an effect on any visual resources or alter local character.

The City of Williams' *Zoning Ordinance* does not address scenic vistas or corridors. The City of Williams and the airport are located within the Kaibab National Forest, and the city's *General Plan* address the forest's importance as both a visual and an economic resource. Historic Route 66, which is also an Arizona Department of Transportation (ADOT) Scenic Road, passes though the downtown business district of the city, which is over three miles south of the airport. Due to this significant distance, the airport is not visible from passing motorists due to the route's significant distance.

WATER RESOURCES

Wetlands

The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act* (CWA). Wetlands are defined in E.O. 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or will support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mudflats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic (absent of air or oxygen) conditions during the growing season (hydric).[15]

[15] National Resources Conservation Service – U.S. Department of Agriculture (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/hydric/?cid=nrcs142p2_053961)

According to USFWS, which manages the National Wetlands Inventory on behalf of all federal agencies, a portion of a freshwater pond, identified as Threemile Lake, is on airport property. This is based on color infrared imagery from 1980. Upon review of a Google Earth aerial image (dated May 1, 2019), the pond appears to be dry and is intended to retain water during precipitation events. The airport received an Approved Jurisdictional Determination from the U.S. Army Corps of Engineers as part of the Airport Master Plan study confirming that there are no waters of the U.S. at the airport.

Ephemeral drainages, including the Pine Creek Wash, are located in the immediate environs of the airport; however, no ephemeral washes are located on airport property (**Exhibit 1H**).

Floodplains

E.O. 11988, *Floodplain Management*, directs federal agencies to take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the floodplains.

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 04005C6330G and 04005C6337G (dated September 3, 2010) indicates the airport is not located within a floodplain.

Surface Waters

The CWA establishes water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc. Additionally, Congress has mandated (under the CWA) the National Pollutant Discharge Elimination System (NPDES). The Arizona Department of Environmental Quality has the authority to administer the NPDES program in the state, tribal lands excluded. The Arizona Pollutant Discharge Elimination System (AZPDES) permit mandates certain procedures required to prevent contamination of water bodies from stormwater runoff.

Examples of direct impacts to surface waters include any in-water work resulting from the expansion of an existing FAA facility adjacent to surface waters, or withdrawal of water from surface water for construction or operations. No impaired waters under Section 303(d) of the CWA are located within the vicinity of the airport.

In September 2020, SWCA performed a field investigation to determine whether the ephemeral drainages on airport property and Threemile Lake qualify as waters of the United States (WOTUS) and would be considered jurisdictional by the U.S. Army Corps of Engineers (USACE).[16] This study was assessed based on both the previous definition of a WOTUS and the *Navigable Waters Protection Rule* (NWPR)[17], which went into effect June 22, 2020.

The airport does have several on-site drainage features, including an unnamed ephemeral wash. The study concluded these drainages do not show signs of ordinary high-water mark (OHWM) limits, which is an indicator of a WOTUS under the pre-NWPR definition. The unnamed ephemeral wash does appear to be swale-like in nature, but also did not have OHWM indicators. The unnamed ephemeral drainage feature also is unlikely to contribute flow to the nearest traditional navigable water (TNW), which is the Colorado River located more than 80 miles north. These ephemeral features, including the unnamed ephemeral wash, would not likely be considered a WOTUS under the pre-NWPR definition due to the absence of OHWM indicators. Under the current NWPR, since these features are not tributaries due to the significant distance from a TNW, these drainage features would not be considered a WOTUS.

Threemile Lake may be classified as an "intermittent feature," but it does not contribute to a jurisdictional waterway or a TNW in a typical year. Threemile Lake does display OHWM, totaling approximately 1.2 acres. Under the pre-NWPR definition, Threemile Lake could be considered jurisdictional since there are indicators of OHWM. However, under the current NWPR, it would not be considered a WOTUS since it is over 80 miles to the closest TNW (i.e., the Colorado River).

A request for an Approved Jurisdictional Determination (AJD) was forwarded to the USACE on December 2, 2020 to concur with these findings. USACE issued an AJD on March 3, 2021 with the determination of there is no WOTUS at H.A. Clark Memorial Field.

Groundwater

Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater, such as wells, springs, and other water sources. Examples of direct impacts to groundwater could include withdrawal of groundwater for operational purposes or reduction of infiltration or recharge area due to new impervious surfaces. The airport is underlain by rock that is minimally permeable but may contain locally productive aquifers.[18]

The Upper Santa Cruz and Avra Basin sole source aquifer (SSA) is the nearest SSA to the airport, which is located approximately 176 miles southeast of the airport.[19]

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[16] SWCA Environmental Consultants, Inc. (November 30, 2020) *Approved Jurisdictional Determination Review for the H.A. Clark Memorial Field Property in Williams, Coconino County, Arizona*

[17] Under the Navigable Waters Protection Rule, waters of the United States are defined as: 1) territorial seas and traditional waters; 2) perennial and intermittent tributaries to those waters; 3) certain lakes, ponds, and impoundments of jurisdictional waters; and 4) wetlands adjacent to other jurisdictional waters. U.S. Environmental Protection Agency – *Navigable Waters Protection Rule* (https://www.epa.gov/nwpr)

[18] U.S. Geologic Survey – Aquifers and Groundwater (https://water.usgs.gov/ogw/aquifer/101514-wall-map.pdf)

[19] U.S. Environmental Protection Agency Sole Source Aquifer for Drinking Water (https://www.epa.gov/dwssa)

Wild and Scenic Rivers

The *National Wild and Scenic Rivers Act* was established to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The closest designated Wild and Scenic River is a segment of the Verde River, located approximately 60 miles southeast of the airport.[20]

The Nationwide River Inventory (NRI) is a list of over 3,400 rivers or river segments that appear to meet the minimum *Wild and Scenic Rivers Act* eligibility requirements based on their free-flowing status and resource values. The development of the NRI resulted from Section 5(d)(1) in the *Wild and Scenic Rivers Act*, directing Federal agencies to consider potential wild and scenic rivers in the comprehensive planning process.[21] The river closest to the airport which appears on the NRI is a segment of the Oak Creek, West Fork, located approximately 24 miles southeast of the airport.

ENVIRONMENTAL INVENTORY SOURCES

A variety of resources were used during the inventory process. The following listing reflects a compilation of these sources.

Federal Emergency Management Agency Flood Map Service Center:
https://msc.fema.gov/portal/search?AddressQuery=H.A.%20Clark%20Memorial%20Field%20-%20Williams%2C%20AZ#searchresultsanchor

Intergovernmental Panel on Climate Change:
https://www.ipcc.ch/

National Wild and Scenic Rivers System:
https://rivers.gov/wsr-act.php

Natural Resources Conservation Service, Web Soil Survey:
https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

U.S. Environmental Protection Agency, *EJSCREEN*:
https://ejscreen.epa.gov/mapper/

U.S. Environmental Protection Agency, Green Book National Area and County-Level Multi-Pollutant Information:
https://www3.epa.gov/airquality/greenbook/anayo_az.html

U.S. Fish and Wildlife Service Information, Information for Planning and Consultation:
https://ecos.fws.gov/ipac/

[20] National Wild and Scenic Rivers System (https://rivers.gov/wsr-act.php)
[21] National Park Service – Nationwide Rivers Inventory (https://www.nps.gov/subjects/rivers/nationwide-rivers-inventory.htm)

U.S. Fish and Wildlife Service National Wetlands Inventory:
https://www.fws.gov/wetlands/data/Mapper.html
U.S. Geological Survey National Map:
https://viewer.nationalmap.gov/advanced-viewer/

U.S. National Park Service – National Register of Historic Places:
https://www.nps.gov/subjects/nationalregister/index.htm

SUMMARY

The information discussed in this chapter provides a foundation upon which the remaining elements of the planning process will be constructed. Information on current airport facilities and utilization will serve as a basis, with additional analysis and data collection, for the development of forecasts of aviation activity and facility requirement determinations. The inventory of existing conditions is the first step in the process of determining those factors which will meet projected aviation demand in the community and the region.

Chapter Two

Forecasts

H.A. Clark Memorial Field

Airport Master Plan

Chapter Two
Forecasts

The definition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for H.A. Clark Memorial Field (CMR) will focus on demand indicators, such as based aircraft, based aircraft fleet mix, annual aircraft operations, and peaking operational periods. In addition, potential commercial service demand indicators will be examined to evaluate the airport's opportunity to support commercial passenger services.

The objective of forecasting is to predict the potential aviation activity and the magnitude of change expected over the next 20 years. Many factors must be considered at the national, regional, and local levels, making it virtually impossible to predict year-to-year fluctuations of activity over the next two decades with any certainty. Therefore, it is important to remember that forecasts serve as guidelines, and planning must remain flexible to respond to a range of unforeseen developments.

It should be noted that aviation activity can be affected by numerous outside influences that may occur locally, regionally, or nationally. At the time of this writing in December 2020, the biggest factor currently influencing the aviation industry is the COVID-19 pandemic that has resulted in a significant reduction in air travel. While general aviation and business aviation operations have been returning to pre-COVID levels, there is still much uncertainty as to how this health crisis will affect airports in the coming months, or the lasting impacts it may have on the industry as a whole. With that in mind, it is important to note that aviation demand forecasts should be used for advisory purposes only. It is recommended that planning strategies remain flexible to accommodate unforeseen events, and that airport decision-makers be prepared to adapt plans as necessary.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve forecasts developed in conjunction with airport planning studies. The FAA reviews individual airport forecasts with the objective of comparing them to its *Terminal Area Forecast* (TAF). Aviation activity forecasts provide important input to the benefit cost analysis associated with airport development, and the FAA reviews these analyses when federal funding requests are submitted.

This particular master plan update is being funded by a state-local grant through Arizona Department of Transportation – Aeronautics Group (ADOT). Ordinarily, these types of projects are federally funded, and the FAA must review and approve the forecasts. In this case, the FAA has agreed to review and approve the forecasts so that the master plan findings can be recognized by the FAA for approval of future grant funding based on the study.

Only two components of a master plan are approved by the FAA: the aviation demand forecasts and the Airport Layout Plan (ALP). The ALP will be updated later in this study. FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and the Airports Capital Improvement Plan* (ACIP), September 2019, states that forecasts should be:

- Realistic;
- Based on the most recent data available;
- Reflective of the current and anticipated future conditions at the airport;
- Supported by information in the study; and
- Able to provide adequate justification for the airport planning and development.

FORECASTING APPROACH

The forecasting process for an airport master plan consists of a series of basic steps that vary in complexity depending on the issues to be addressed and the type of airport being studied. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines seven standard steps involved in the forecast process, including:

1. **Identify Aviation Activity Measures:** The level and type of the aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.

2. **Review Previous Airport Forecasts:** May include the FAA TAF, state or regional system plans, and previous master plans.

3. **Gather Data:** Determine what data is required to prepare the forecasts, identify data sources, and collect historical and forecast data.

4. **Select Forecast Methods:** There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgement.

5. **Apply Forecasts Methods and Evaluate Results:** Prepare the actual forecasts and evaluate for reasonableness.

6. **Summarize and Document Results:** Provide supporting text and tables, as necessary.

7. **Compare Forecasts Results with FAA's TAF:** Follow guidance in FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and the Airports Capital Improvement Plan* (ACIP), September 2019. In part, the order indicates that the forecasts should not vary significantly (more than 10 percent in the 5-year timeframe or 15 percent in the 10-year timeframe) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for H.A. Clark Memorial Field was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined, along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for the airport that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

NATIONAL AVIATION TRENDS AND FORECASTS

The forecasts developed for the airport must consider national, regional, and local aviation trends. The following section describes trends in aviation. This information is utilized both in statistical analysis and to aid the forecast preparer in making any manual adjustments to the forecasts, as necessary.

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was *FAA Aerospace Forecast – Fiscal Years 2020-2040*, published in April 2020. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

Since its deregulation in 1978, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility that was associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but cash poor. However, the great recession of 2007-09 marked a fundamental change in the operations and finances of U.S airlines. Since the end of the recession in 2009, U.S. airlines revamped their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation with three major mergers in five years. The results of these efforts have been impressive: 2019 marks the eleventh consecutive year of profitability for the U.S. airline industry. Looking forward, there is confidence that U.S. airlines have finally transformed from a capital intensive, highly cyclical industry to an industry that generates solid returns on capital and sustained profits.

ECONOMIC ENVIRONMENT

According to the FAA forecast report, as the economy recovers from the most serious economic downturn and slow recovery since the Great Depression, aviation will continue to grow over the long run.

Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA forecast calls for passenger growth over the next 20 years to average 1.9 percent annually. The uptick in passenger growth in 2014 will continue into 2020, spurred on by favorable economic conditions in the U.S. and the world. Oil prices averaged $60 per barrel in 2019, edging down to $53 in 2020, and the forecast assumes they will increase beginning in the early 2020s to reach $104 by the end of the forecast period in 2040.

The global economy weakened in 2019; however, the U.S. experienced GDP growth that, although slower than the strong rate seen in 2018, was still above its estimated long-term trend.

Meanwhile, economic downturns remain in Germany and Italy, while the high growth scenarios present in India and China slowed. Additional potential headwinds for the global economy include a slowdown in global trade, political tensions in several countries, and most notably, the COVID-19 global pandemic, the impacts of which are yet to be fully realized. Global economic growth is projected to accelerate in 2021, with economies expected to return to long-term growth trends during the early years of the 2020s.

NATIONAL GENERAL AVIATION TRENDS

Within the general aviation section, the FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts “active aircraft,” not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

The long-term outlook for general aviation is stable. The FAA projects the active general aviation fleet to drop slightly from 212,335 aircraft in 2019 to 210,380 aircraft in 2040 – a difference of 1,955 aircraft. While steady growth in both GDP and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft – continues to shrink over the FAA’s forecast.

In 2019, the FAA estimated there were 142,335 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 1.0 percent from 2019-2040, resulting in 115,970 by 2040. This reflects a decline of -1.1 percent annually for single engine pistons and -0.5 percent for multi-engine pistons.

Total turbine aircraft are forecast to grow at an annual growth rate of 1.9 percent through 2040. The FAA estimates there were 32,035 turbine-powered aircraft in the national fleet in 2019, and there will be 46,675 by 2040. This includes annual growth rates of 1.2 percent for turboprops, 2.4 percent for business jets, and 1.8 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 1.0 percent through 2040. The FAA estimates there were 27,725 experimental aircraft in 2019, and these are projected to grow to 33,475 by 2040. Sport aircraft are forecast to grow 3.6 percent annually through the long-term, growing from 2,700 in 2019 to 5,430 by 2040. **Exhibit 2A** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. General aviation operations, both local and itinerant, declined significantly with the 2008-2009 recession and subsequent slow recovery. Through 2040, total general aviation operations are forecast to grow 0.4 percent annually. Air taxi/commuter operations are projected to decrease by 0.7 percent annually throughout the planning period.

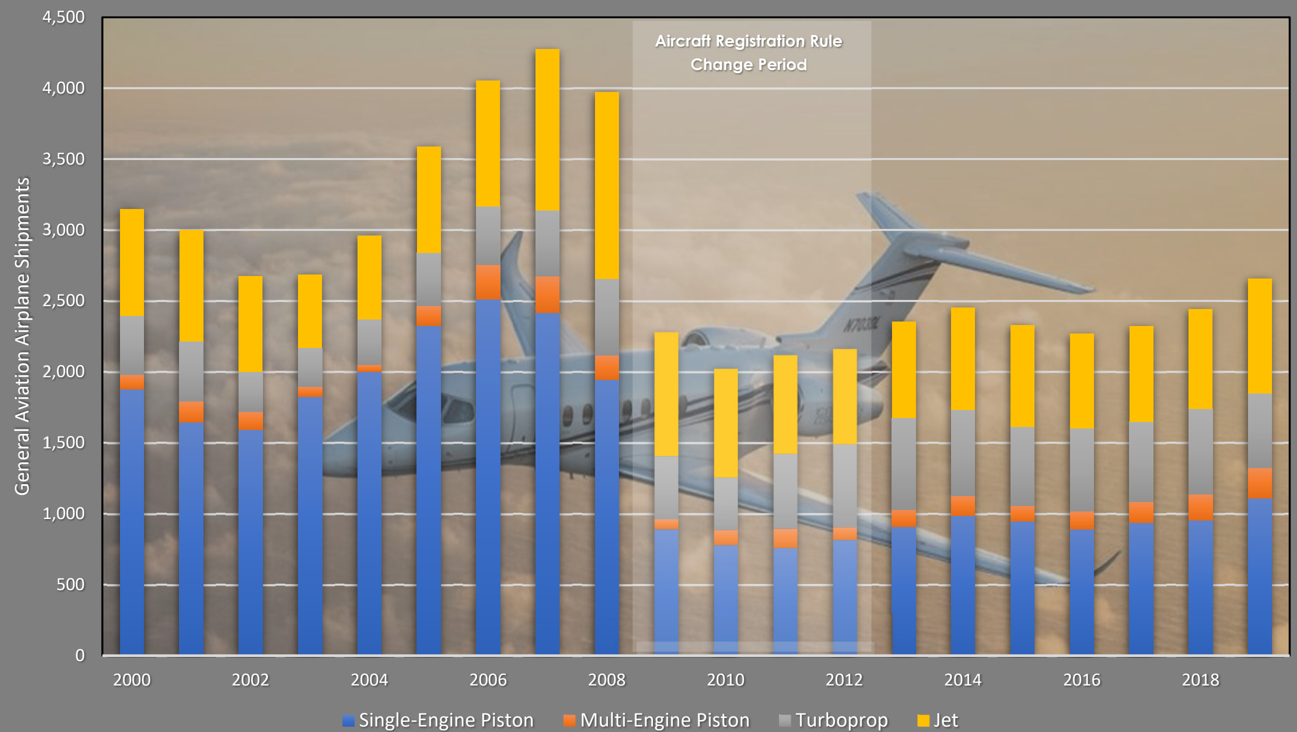
General Aviation Aircraft Shipments and Revenue

The 2008-2009 economic recession had a negative impact on general aviation aircraft production, and the industry was slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. Since this time, aircraft manufacturing has stabilized and returned to growth. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will continue to show gains in the coming years, especially in the turbine aircraft market. **Figure 2A** presents currently available historical data related to general aviation aircraft shipments.

Worldwide shipments of general aviation airplanes have increased each of the last three years with a total of 2,658 units delivered around the globe, compared to 2,268 units in 2016. Worldwide general aviation billings were also highest since 2014. In 2019, $23.5 billion in new general aviation aircraft were shipped as compared to $20.6 billion in 2018. North America continues to be the largest market for general aviation aircraft and leads the way in the manufacturing of piston, turboprop, and jet aircraft. The Asian-Pacific region is the second largest market for piston-powered and turboprop aircraft.

Business Jets: Business jet deliveries grew from 703 units in 2018 to 809 units in 2019, the most since 2009. The North American market accounted for 67.1 percent of business jet deliveries, which is a 2.0 percent increase in market share compared to 2018.

FIGURE 2A | General Aviation Airplane Shipments



Source: General Aviation Manufacturers Association, *2019 Databook*

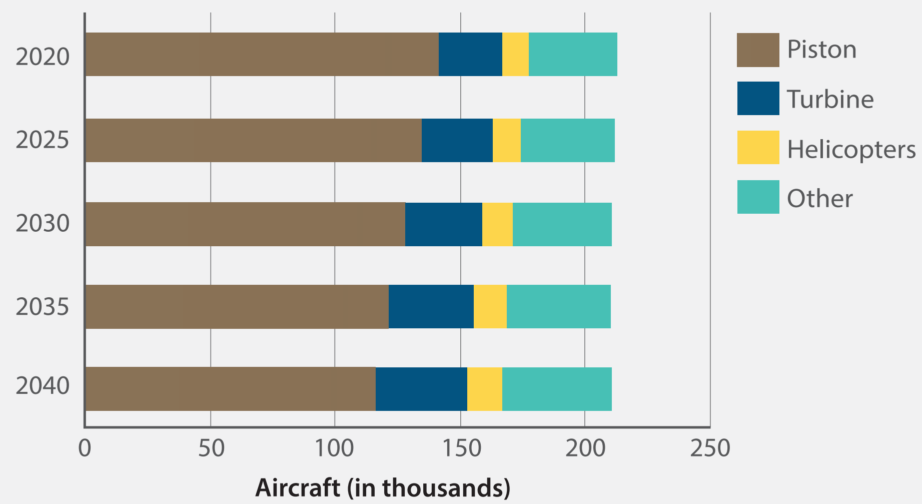
Turboprops: Turboprop shipments were down from 601 in 2018 to 525 in 2019. North America's market share of turboprop aircraft, however, increased by 0.5 percent in the last year. The Latin American and Middle East African markets also increased, while the European and Asian-Pacific markets decreased their market share.

Pistons: In 2018, piston airplane shipments grew to 1,111 units over 2017's shipment of 954 units. North America's market share of piston aircraft deliveries recovered from a 4.1 percent decline in 2018 with a 4.9 percent increase in 2019. The Asian-Pacific and Latin American markets experienced declines in market share during the past year.

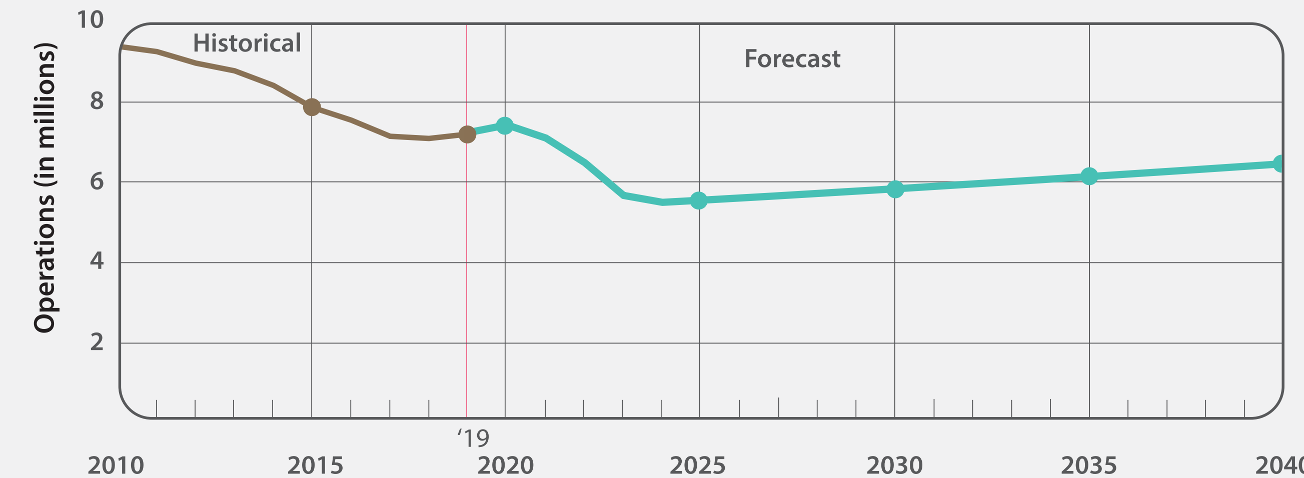
U.S. Pilot Population

There were 466,900 active pilots certificated by the FAA at the end of 2019, excluding student pilot certificates. All pilot categories, except for private, rotorcraft only, and recreational only certificates, continued to increase. Except for student pilots and airline transport pilots (ATP), the number of active general aviation pilots is projected to decrease about 12,120 (down 0.2 percent annually) between 2019 and 2040. The ATP category is forecast to increase by 25,150 (up 0.7 percent annually). The FAA has suspended the student pilot forecast due to insufficient data.

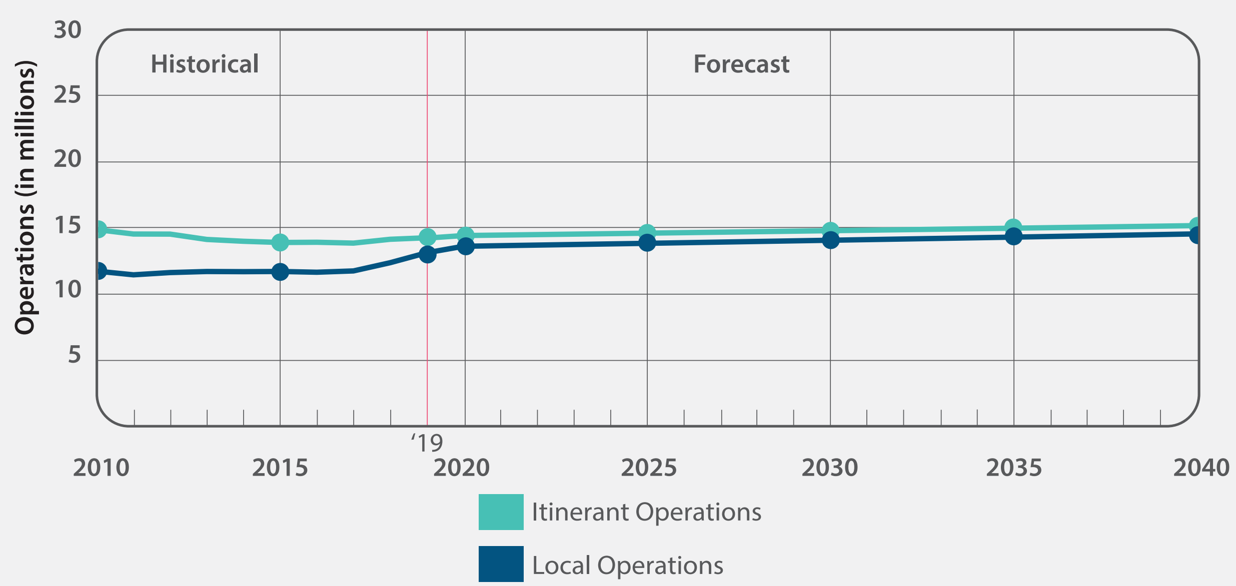
U.S. Active General Aviation Aircraft



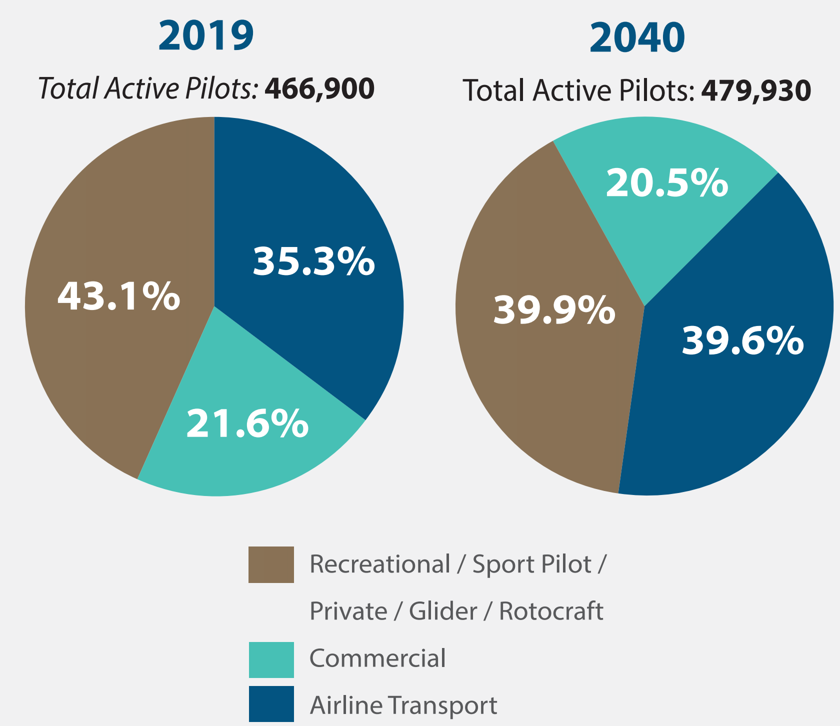
U.S. Air Taxi Operations



U.S. General Aviation Operations



Active Pilots By Certificate



Excludes Student Pilot Certificates

Source: FAA Aerospace Forecasts FY2020-2040

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RISKS TO THE FORECASTS

While the FAA is confident that its forecasts for aviation demand and activity can be reached, this is dependent on several factors, including the strength of the global economy, security (including the threat of international terrorism), and oil prices. Higher oil prices could lead to further shifts in consumer spending away from aviation, dampening a recovery in air transport demand. Oil prices moved lower in 2019 to about $60 per barrel and lower still in early 2020 but are projected to gradually increase to $100 per barrel by 2040.

As stated previously, the rapid spread of the COVID-19 that began in early 2020 now presents a new risk without clear historical precedent. It is not known at this point how the virus will affect aviation in the long-term; however, impacts have already been felt in 2020 and could carry over into 2021. The long-term impact of COVID-19 on the aviation industry will not be understood until the full spread or intensity of the human consequences, as well as the breadth and depth of possible economic fallout, is known.

AIRPORT SERVICE AREA

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation. The service area is determined primarily by evaluating the location of competing airports, their capabilities, their services, and their relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport, as well as the specific areas of aviation demand the airport is intended to serve. H. A. Clark Memorial Airport is classified as a Basic General Aviation airport within the NPIAS, meaning that its primary role is to provide the community with access to the national airport system and a means for general aviation flying. General aviation is a term used to describe a diverse range of aviation activities, which includes all segments of the aviation industry except commercial air carriers and the military. General aviation is the largest component of the national aviation system and includes activities such as pilot training, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and corporate use.

The service area for an airport is a geographic region from which an airport can be expected to attract the largest share of its activity. The definition of the service area can then be used to identify other factors, such as socioeconomic and demographic trends, that influence aviation demand at an airport. Aviation demand will be impacted by the proximity of competing airports, the surface transportation network, and the strength of general aviation services provided by an airport and competing airports.

As in any business enterprise, the more attractive the facility is in terms of service and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to an airport from more distant locales.

H.A. Clark Memorial Field's service area is driven by aircraft owners/operators and where they choose to base their aircraft. The primary consideration of aircraft owners/operators when choosing where to base their aircraft is convenience (i.e., easy access and proximity to the airport). As a general rule, an airport's service area can extend up to and beyond 30 miles. The proximity and level of general aviation services are largely a defining factor when describing the general aviation service area. A description of nearby airports was previously completed in Chapter One and presented in Table 1G. There are eight public-use airports within 50 nautical miles (nm) of CMR, with varying levels of services and amenities.

When discussing the general aviation service area, two primary demand segments need to be addressed. The first component is the airport's ability to attract based aircraft. Under this circumstance, the most effective method of defining the airport's service area is by examining the number of registered aircraft owners in proximity to the airport. As previously mentioned, aircraft owners typically choose to base at an airport near their home or business. Based on the current registered aircraft data, presented on **Exhibit 2B**, there are 119 registered aircraft within 30 nm of H.A. Clark Memorial Field. Of these, eight registered aircraft are based at the airport. The remainder of based aircraft at CMR are registered to addresses outside of the 30 nm service area.

The second demand segment to consider is itinerant aircraft operations. In most instances, pilots will opt to utilize airports nearer their intended destination; however, this is also dependent on the airport's capabilities in accommodating the aircraft operator. As a result, airports offering better services and facilities are more likely to attract itinerant operators in the region.

With several competing airports in the region, including Flagstaff Pulliam Airport which is within 30 nm of H.A. Clark Memorial Field, the primary general aviation service area is defined by its convenience to its users and its ability to compete for based aircraft. The primary service area designated for the airport consists of the City of Williams and the surrounding communities. In addition, the airport serves areas of rural Coconino County. Therefore, for planning purposes, forecasts will consider projected growth of registered aircraft in the county.

SERVICE AREA DEMOGRAPHIC AND SOCIOECONOMIC TRENDS

Demographic and socioeconomic conditions also provide an important baseline for preparing aviation demand forecasts. Local variables, such as population and employment, are indicators for understanding the dynamics of the community and can relate to local trends in aviation activity. Analysis of the demographics and socioeconomics of the airport service area will give a more comprehensive understanding of the conditions influencing the region which support H.A. Clark Memorial Field. **Table 2A** provides a summary of the demographic and socioeconomic data presented in Chapter One, as well as forecasts of these characteristics over the next 20 years. Forecast data for population was obtained from the Arizona Office of Economic Opportunity, and the forecast data for employment and per capita personal income (PCPI) was obtained from the Woods & Poole Complete Economic and Demographic Data prepared in 2020.

Based & Registered Aircraft Address Locations		
Distance	**Based Aircraft**	**Registered Aircraft**
0-10 nm	7	7
10-20 nm	1	5
20-30 nm	0	107
Total	**8**	**119**

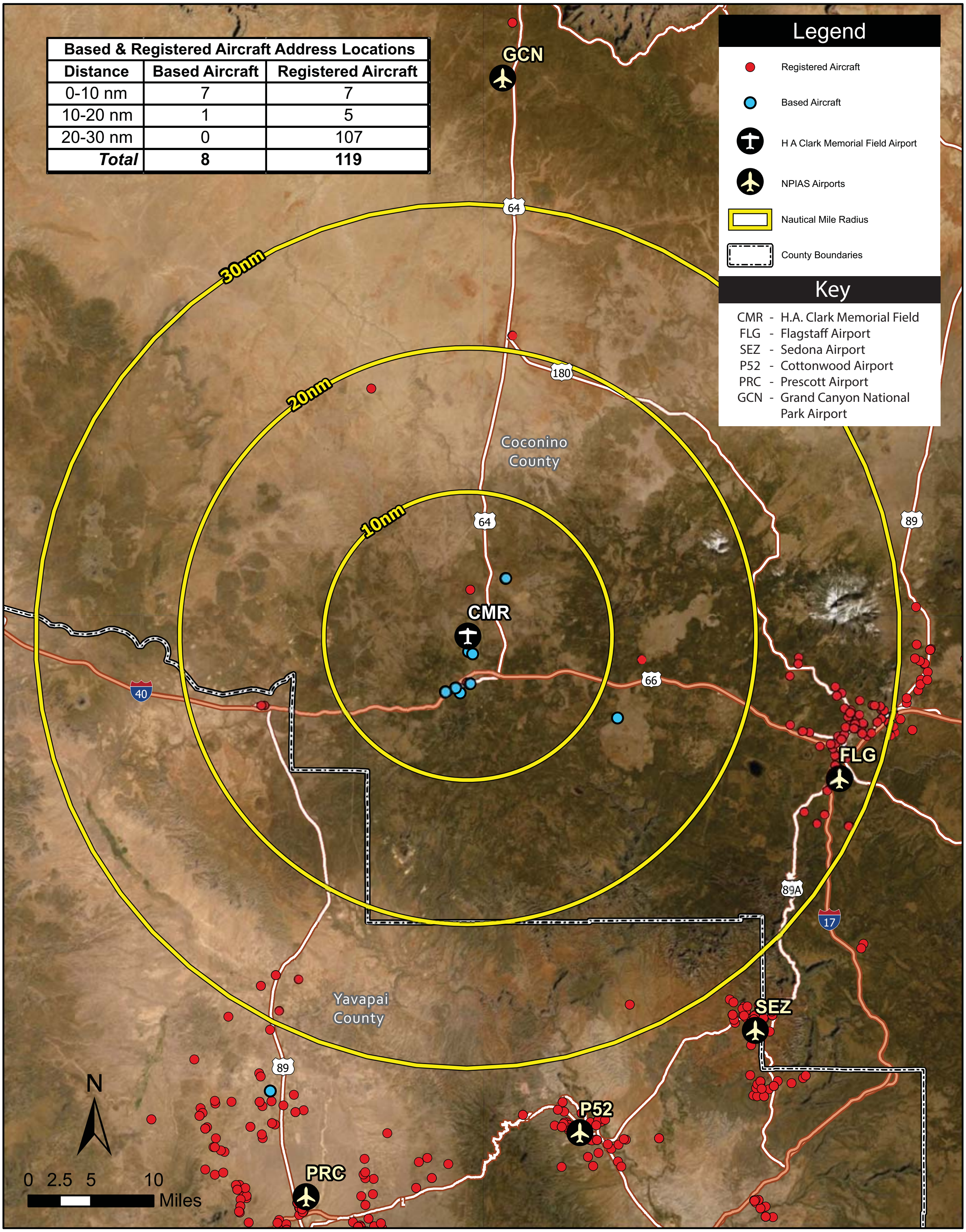


Exhibit 2B
REGISTERED AND BASED AIRCRAFT

Table 2A | Socioeconomic History and Forecasts
H.A. Clark Memorial Field

	HISTORICAL			FORECAST			
	2005	2020	CAGR	2025	2030	2040	CAGR
City of Williams							
Population	3,083	3,352	0.56%	3,383	3,378	3,327	-0.04%
Coconino County							
Population	127,025	145,508	0.91%	152,241	158,953	171,860	0.84%
Employment	74,562	90,663	1.31%	98,535	106,428	123,003	1.54%
PCPI	$29,480	$50,525	3.66%	$62,298	$78,903	$128,724	4.79%
Arizona							
Population	5,839,077	7,351,399	1.55%	7,815,485	8,293,848	9,273,159	1.17%
Employment	3,219,820	4,011,191	1.48%	4,387,305	4,758,616	5,518,506	1.61%
PCPI	$32,220	$46,876	2.53%	$57,606	$72,631	$117,210	4.69%

CAGR- Compound Annual Growth Rate
PCPI- Per Capita Personal Income

Sources: U.S. Census Bureau, Arizona Office of Economic Opportunity; Woods and Poole 2020

POPULATION

Total resident population for the primary airport service area (City of Williams) in 2020 was estimated at 3,352, which makes up approximately 2.3 percent of Coconino County's total population. Projections for population in the service area estimate a negative 0.04 percent compound annual growth rate (CAGR) over the next 20 years, resulting in 3,327 residents by 2040.

In 2020, Coconino County was estimated to have a population of 145,508 residents. The population for the county is forecast to increase to 171,860 by 2040, representing a 0.84 percent CAGR over the planning period. For comparative purposes, population for the State of Arizona has experienced a 1.55 percent CAGR since 2005, and the forecast for population across the state is projected to increase at a CAGR of 1.17 percent over the next 20 years.

EMPLOYMENT

Historical and forecast employment data for Coconino County and the State of Arizona are also presented. Between 2005 and 2020, County employment exhibited a 1.31 percent CAGR. Over the next 20 years, the county's employment is forecast to grow at a higher rate than has been experienced since 2005. Projections for the county call for a 1.54 percent CAGR in employment through 2040. The state's employment is forecast to increase at a rate of 1.61 percent, which is a higher growth rate than the last 20 years.

PER CAPITA PERSONAL INCOME

Table 2A also compares PCPI, adjusted to 2020 dollars, for the county and state. Coconino County's PCPI for 2020 was $50,525. Compared to $29,480 in 2005, the PCPI grew at a rate 3.66 percent annually over the timeframe. The State of Arizona saw a 2.53 percent annual increase over the same time period. Projections for Coconino County estimate significant growth in PCPI over the next 20 years, predicting a 4.79 percent CAGR. The same can be said for the State of Arizona, projected at a 4.69 percent CAGR.

AVIATION FORECAST METHODOLOGY

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgement of the forecast analysis, based upon professional experience, knowledge of the aviation industry, and assessment of the local situation is important in the final determination of the preferred forecast.

By developing several projections for each aviation demand indicator, a reasonable planning envelope, or range of forecasts, will emerge. The selected forecast may be one of the individual projections based on the local conditions and will almost always fall within the planning envelope. Some combination of the following forecasting techniques is utilized to develop the planning envelope for each demand indicator.

Trend line projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical demand data and then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same way as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Market share analysis involves a historical review of aviation activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections but can provide a useful check on the validity of other forecasting techniques.

Historical growth analysis is a simple forecasting method in which the historical annual growth rate is identified and then extended out to forecast years. This analysis method assumes factors that impacted growth in the past will continue into the future.

Correlation analysis provides a measure of the direct relationship between two separate sets of historic data. If there is a reasonable correlation between the data, further evaluation using regression analysis may be employed.

Regression analysis is a statistical technique that yields an r-squared (r^2) value which shows the level of the correlation between variables. If the r^2 value is greater than 0.95, it indicates a strong predictive reliability.

Beyond five years, the predictive reliability of the forecasts can diminish. Therefore, it is prudent for the airport to reassess the assumptions originally made and revise the forecasts based on the current airport and industry conditions. Facility and financial planning usually require at least a 10-year review since it often takes several years to complete a major facility development program.

Another consideration is that technological advances in aviation have historically altered, and will continue to change, the growth rates in aviation demand over time. The most obvious example is the impact of jet aircraft on the aviation industry, which resulted in a growth rate that far exceeded expectations. Such changes are difficult, if not impossible, to predict and there is no mathematical way to estimate their impacts. It is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

Forecasts of aviation demand for H.A. Clark Memorial Field have been developed by utilizing statistical methods, available existing forecasts, and analyst expertise. The following section presents the aviation demand forecasts and includes activity in two broad categories: based aircraft and annual operations.

AVIATION DEMAND FORECASTS

The following forecast analysis examines each of the aviation demand categories expected at H.A. Clark Memorial Field over the next 20 years. Each segment will be examined individually, and then collectively, to provide an understanding of the overall aviation activity at the airport through 2040. Forecasts for airport activities include the following:

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations – Local and Itinerant
- Air Taxi and Military Operations
- Peaking Characteristics
- Annual Instrument Approaches

The following sections will examine historical trends regarding these categories of activity and project future demand for these segments of aviation activity at the airport. These forecasts will become the basis for planning future facilities, both airside and landside, at the airport.

For a general aviation airport such as CMR, based aircraft, annual aircraft operations, and peak activity levels are the most important indicators of aviation demand that need to be forecast. Future facility requirements, such as hangars and apron area, are derived from the general aviation forecasts.

Analysis presented later in this study will also consider commercial and/or air tour passenger activity projections at the airport. As such, passenger enplanement forecasts have been developed to identify facility needs based upon the potential for an air tour operator, on-demand service, or possibly the entry of regularly scheduled charter/mainline commercial service operator activities at the airport. Forecasts related to the potential for commercial passenger service activities are detailed later in this chapter and kept separate from the general aviation forecasts.

Registered Aircraft Forecast

Historical registered aircraft in Coconino County since 2010 are included on the top portion of **Table 2B**. Aircraft registrations have decreased from 310 in 2010 to 240 registrations as reported in December of 2020. The historic peak was reached in 2011, when there were 316 aircraft registered in the county. Aircraft registration generally declined in the years following, likely due in part to the FAA's requirement that aircraft owners re-register their aircraft to retain U.S. civil aircraft status. As a result, previously registered aircraft that may have been sold, scrapped/destroyed, or registered to multiple addresses were dropped from the database.

Table 2B | Registered Aircraft Projections - Coconino County
H.A. Clark Memorial Field

Year	County Registrations	U.S. Active Aircraft	Market Share Of U.S. Aircraft	Service Area Population	Aircraft Per 1,000 Population
2010	310	223,370	0.1388%	134,618	2.30
2011	316	220,453	0.1433%	134,269	2.35
2012	306	209,034	0.1464%	136,152	2.25
2013	267	199,927	0.1335%	136,713	1.95
2014	268	204,408	0.1311%	137,583	1.95
2015	268	210,031	0.1276%	139,024	1.93
2016	279	211,794	0.1317%	140,515	1.99
2017	273	211,757	0.1289%	141,107	1.93
2018	257	211,749	0.1214%	142,854	1.80
2019	253	212,335	0.1192%	144,174	1.75
2020	240	212,380	0.1130%	145,508	1.65
Constant Market Share of U.S. Active Aircraft (CAGR- -0.05%)					
2025	239	211,400	0.1130%	152,241	1.57
2030	238	210,440	0.1130%	158,953	1.50
2040	238	210,380	0.1130%	171,860	1.38
Increasing Market Share of U.S Active Aircraft (CAGR- 1.24%)					
2025	256	211,400	0.1210%	152,241	1.68
2030	278	210,440	0.1320%	158,953	1.75
2040	307	210,380	0.1460%	171,860	1.79
Constant Ratio Projection per 1,000 County Residents (CAGR- 0.84%)					
2025	**251**	**211,400**	**0.1188%**	**152,241**	**1.65**
2030	**262**	**210,440**	**0.1246%**	**158,953**	**1.65**
2040	**284**	**210,380**	**0.1348%**	**171,860**	**1.65**
Increasing Ratio Projection Per 1,000 County Residents (CAGR- 1.79%)					
2025	259	211,400	0.1224%	152,241	1.70
2030	286	210,440	0.1360%	158,953	1.80
2040	342	210,380	0.1626%	171,860	1.99

Source: FAA Aircraft Registration Database; FAA Aerospace Forecasts- FY 2020-2040; Coffman Associates Analysis

The Coconino County registered aircraft fleet mix for 2020 shows that most registered aircraft in the county have fallen within the single-engine piston category. In 2020, 153 of the 240 county-registered aircraft were single-engine piston. The next largest segment with 43 registrations was the "other" category, which includes gliders, balloons, and experimental aircraft. There were also 12 multi-engine piston aircraft, 14 helicopters, 7 turboprops, 4 jets, and 7 unmanned aerial vehicles (UAV).

Different forecasting strategies were used to determine registered aircraft projections. The first strategy evaluated the county's market share of total active GA aircraft in the U.S. This market share analysis compares aircraft ownership trends in the Coconino County against national aircraft ownership trends. As detailed in **Table 2B**, the market share has fluctuated between 0.1130 percent and 0.1464 percent since 2010. In 2020, the service area held a market share of 0.1130 percent. Carrying this figure forward as a constant results in a decrease in registered aircraft in the service area over the long term, dropping from 240 registrations in 2020 to 239 in 2025 and 238 registrations in both 2030 and 2040. This is a result of the FAA projecting active aircraft in the national fleet to decline over the planning period.

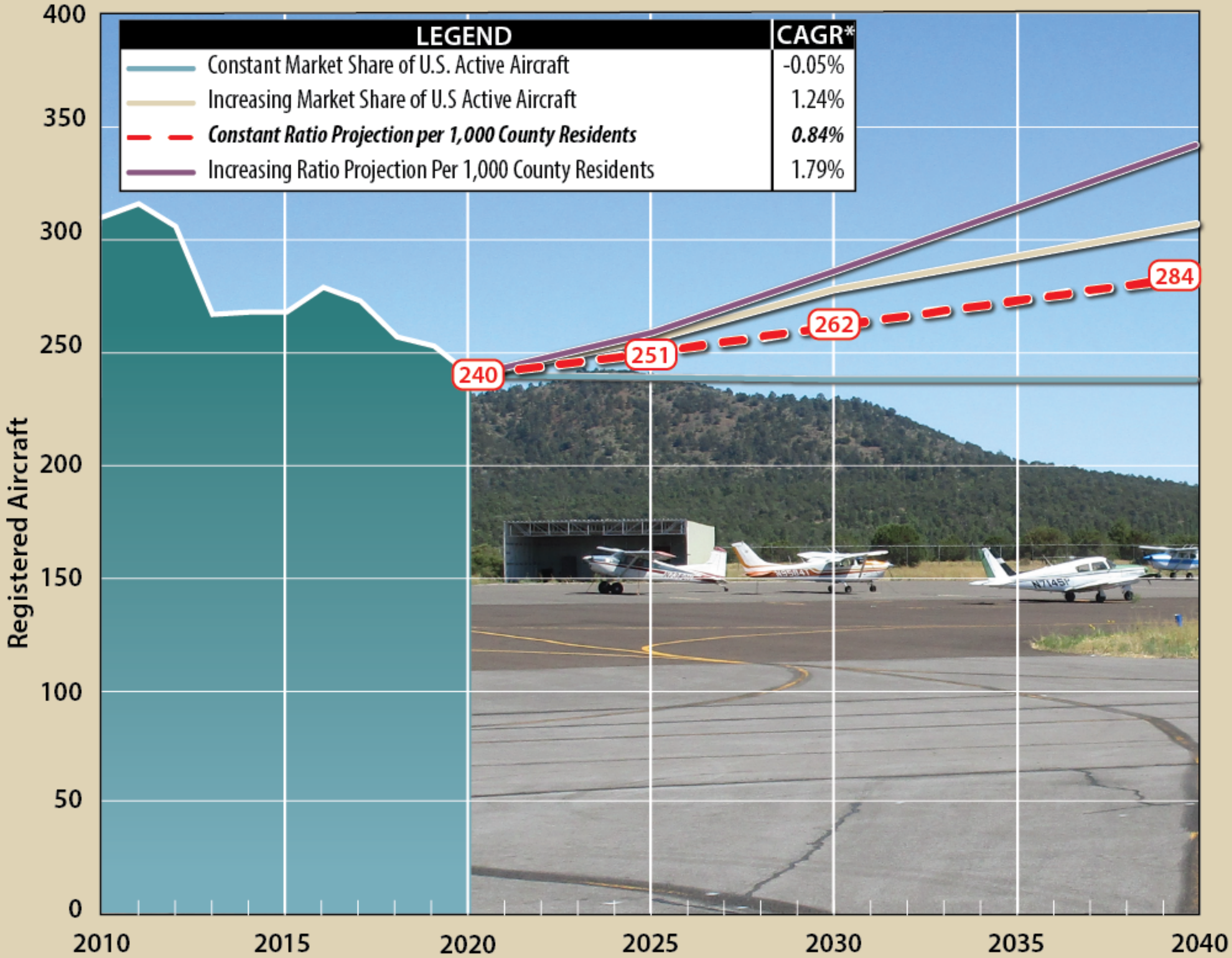
An increasing market share projection was prepared that considers the potential for county registrations returning to near the historic high market share of 0.1464 percent that was reached in 2012. This results in a compound annual growth rate (CAGR) of 1.24 percent, which equates to 307 registered aircraft by 2040 – an increase of 67 county registered aircraft over the next 20 years.

Population trends have also been used to analyze and project aircraft registrations within the county. This projection method analyzes the county population as a ratio of the historical registered aircraft per 1,000 population. In 2020, there were 1.65 registered aircraft per 1,000 population in Coconino County. Carrying this ratio forward as a constant results in 284 registered aircraft by 2040, for a CAGR of 0.84 percent.

An increasing ratio projection was also evaluated. A moderate increasing ratio projection was analyzed based on the recent five-year high of 1.99 aircraft per 1,000 population. This projection results in 342 registered aircraft by 2040 for a CAGR of 1.79 percent.

A graph comparison of each projection is shown in **Figure 2B**. The registered aircraft projections prepared result in a range between 238 and 342 service area registered aircraft. The increasing ratio projection represented the high end of the planning envelope with 342 and likely overstates the growth potential since aircraft registrations typically grow at slower rates than population. The constant market share projection represents the low end of the planning envelope, with 238 service area registrations by 2040. This forecast is also considered unreasonable, as the probability of registrations decreasing over the 20-year forecast period is unlikely. A more reasonable forecast is the constant ratio per 1,000 county residents, which projects 284 registered aircraft in Coconino County by 2040. This projection shows moderate growth in registered aircraft. Therefore, this projection will be carried forward as the selected forecast for registered aircraft.

FIGURE 2B: Registered Aircraft - Coconino County



* CAGR - Compound Annual Growth Rate

BASED AIRCRAFT FORECAST

Historically, the FAA did not require airports to report their based aircraft counts, nor did they validate based aircraft at airports. This has changed in recent years, and now the FAA mandates that airports report their based aircraft levels. These counts are recorded in the National Based Aircraft Inventory (Basedaircraft.com) program and maintained and validated by the FAA to ensure accuracy.

According to the FAA's database, CMR has only 3 based aircraft, a count which differs from current airport records. Thus, it is recommended that the airport update the based aircraft information in the basedaircraft.com system. Historic based aircraft counts have been derived from the FAA *Terminal Area Forecasts* (TAF) for the years 2010-2019. While the TAF counts are not validated, they do provide some historical perspective. According to the historical data, based aircraft based at the airport over the last 10 years have ranged between 16 in 2010 to 12 in 2020.

Like the registered aircraft forecasts, based aircraft forecasts have been developed using market share and population data as comparison points. As shown in **Table 2C**, the projections evaluate the airport's market share of based aircraft as compared to the county registrations. In 2020, the airport's market share was 5.00 percent. Carrying this percentage through the forecast years results in a total of 14 based aircraft in 2040 and a CAGR of 0.85 percent.

Table 2C | Market Share Based Aircraft Forecasts
H.A. Clark Memorial Field

Year	Airport Based Aircraft	Coconino County Registered Aircraft	Market Share Of Registered Aircraft
2010	16	310	5.16%
2012	12	306	3.92%
2014	4	268	1.49%
2016	3	279	1.08%
2018	3	257	1.17%
2019	12	253	4.74%
2020	12	240	5.00%
Constant Market Share of County Registered Aircraft (CAGR-0.85%)			
2025	13	251	5.00%
2030	13	262	5.00%
2040	14	284	5.00%
Increasing Market Share of County Registered Aircraft (CAGR- 3.24%)			
2025	***14***	***251***	***5.50%***
2030	***17***	***262***	***6.50%***
2040	***23***	***284***	***8.00%***

Source: FAA Terminal Area Forecast (January 2020); Airport Records; Coffman Associates Analysis

An increasing market share projection was also developed. The projection considers a moderate rise from 5.00 percent market share of the registered aircraft in the county today to a high of 8.00 percent by 2040, resulting in moderate growth in based aircraft over the planning period. Under this scenario, there would be 23 based aircraft in 2040, equating to a CAGR of 3.24 percent. The increasing market share projection is more likely considering that currently the airport's hangar waiting list has more than 30 prospective tenants awaiting vacancies or development of additional hangars at the airport.

Projections based on city and county population were also developed and are presented in **Table 2D**. In 2020, there were 3.58 based aircraft per 1,000 city residents. The first forecast carries this ratio forward as a constant, resulting in no growth in based aircraft. The next projection considers increasing ratio to 4.80 aircraft per 1,000 city residents. This is reflective of a CAGR of 1.44 percent, which equates to 16 based aircraft in 2040.

The projections based on county population considers stronger growth based on population growth in the county, a constant ratio of aircraft per 1000 county residents results in 14 based aircraft in 2040 and a CAGR of 0.68 percent. An increasing ratio of based aircraft per 1000 county residents results in a future based aircraft projection of 31 and a CAGR of 4.85 percent.

Table 2D | Based Aircraft Forecast per Population
H.A. Clark Memorial Field

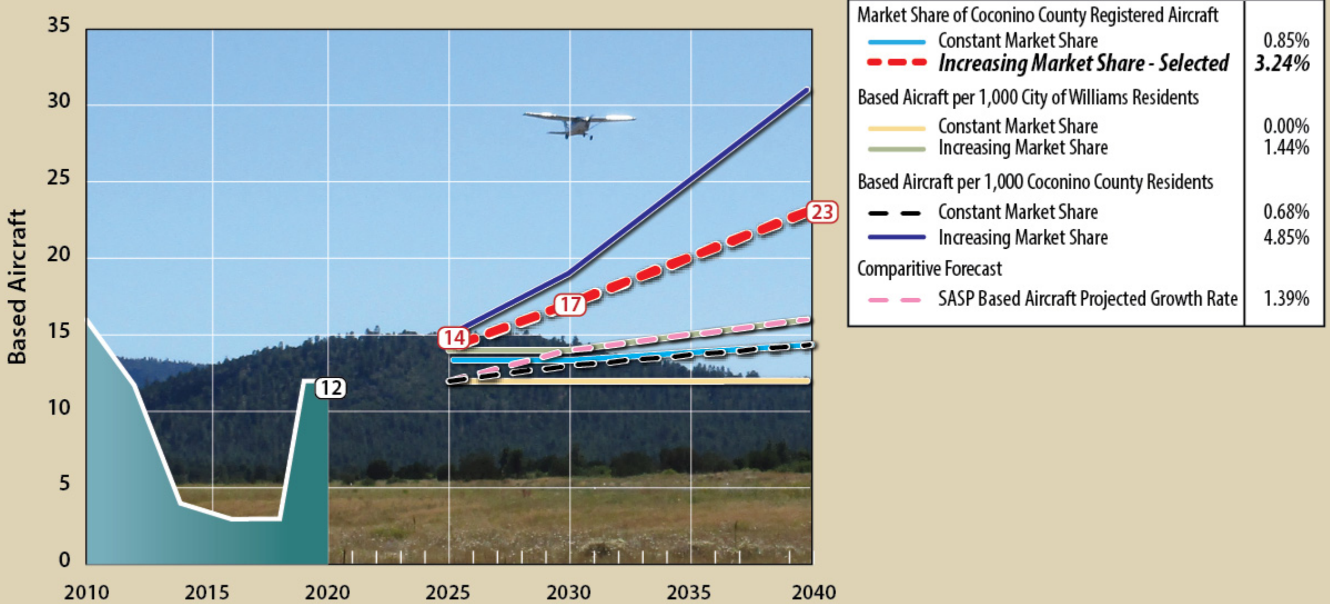
Year	Based Aircraft	City Of Williams Population	Aircraft Per 1,000 City Residents	Coconino County Population	Aircraft Per 1,000 County Residents
2010	16	3,032	5.28	134,618	0.12
2012	12	2,993	4.01	136,152	0.09
2014	4	3,129	1.28	137,583	0.03
2016	3	3,234	0.93	140,515	0.02
2018	3	3,310	0.91	142,854	0.02
2020	12	3,352	3.58	145,508	0.08
Constant Ratio Projection per 1,000 City Residents (CAGR-0.00%)					
2025	12	3,383	3.58	152,241	0.08
2030	12	3,378	3.58	158,953	0.08
2040	12	3,327	3.58	171,860	0.07
Increasing Ratio Projection per 1,000 City Residents (CAGR-1.44%)					
2025	13	3,383	3.80	152,241	0.08
2030	14	3,378	4.20	158,953	0.09
2040	16	3,327	4.80	171,860	0.09
Constant Ratio Projection per 1,000 County Residents (CAGR-0.68%)					
2025	12	3,383	3.60	152,241	0.08
2030	13	3,378	3.76	158,953	0.08
2040	14	3,327	4.13	171,860	0.08
Increasing Ratio Projection per 1,000 County Residents (CAGR-4.85%)					
2025	15	3,383	4.50	152,241	0.10
2030	19	3,378	5.65	158,953	0.12
2040	31	3,327	9.30	171,860	0.18

Source: Arizona Office of Economic Opportunity; Coffman Associates Analysis

The FAA TAF was not included for comparison. As stated previously, the TAF reports just three based aircraft in 2020, whereas the reported based aircraft count at the airport has been recorded at 12 for the same year. The TAF has flatlined the based aircraft projection therefore it shows no growth in based aircraft.

Figure 2C depicts the based aircraft forecasts which have resulted in a planning envelope ranging between 12 at the low end to 31 at the high end. Considering that H.A. Clark Memorial Field has a hangar wait list of approximately 30 individuals and only one vacant hangar available, as well as apron space already allotted for new hangar development, it is reasonable to assume moderate growth in based aircraft over the planning period. Therefore, the selected based aircraft projection that will be carried forward is the increasing share of county registered aircraft, with 23 based aircraft in 2040.

FIGURE 2C: Based Aircraft



* CAGR - Compound Annual Growth Rate

Based Aircraft Fleet Mix Forecast

The fleet mix of based aircraft is often more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can have a greater impact on design standards for the runway and taxiway system compared to a greater number of smaller, single engine piston-powered aircraft.

The based aircraft fleet mix forecast for CMR is presented in **Table 2E**. Fleet mix projections have been developed based upon the FAA's estimates of how the national fleet mix will evolve over the planning horizon.

In 2020, all based aircraft at the airport fell into the single-engine piston category. This is projected to remain the majority category over the planning period, with slow and steady growth in the number of single-engine piston aircraft based at the airport by 2040. Considering the airport's proximity to the Grand Canyon and other popular tourist attractions in the area there are potential opportunities to grow. As such, forecasting reflects potential for based helicopters and turboprop aircraft at the airport. No multi-engine piston aircraft forecast in the future fleet mix, in line with decreasing national trends.

TABLE 2E | Based Aircraft Fleet Mix
H.A. Clark Memorial Field

	EXISTING		FORECAST						
Aircraft Type	**2020**	**Percent**	**2025**	**Percent**	**2030**	**Percent**	**2040**	**Percent**	**Net Change**
Single Engine	12	100.0%	14	100.0%	15	88.2%	19	82.6%	7
Multi-Engine	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
Turboprop	0	0.0%	0	0.0%	1	5.9%	2	8.7%	2
Jet	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
Helicopter	0	0.0%	0	0.0%	1	5.9%	2	8.7%	2
Totals	**12**	**100.0%**	**14**	**100.0%**	**17**	**100.0%**	**23**	**100.0%**	11

Source: Airport Records; Coffman Associates analysis

OPERATIONS FORECASTS

Operations at H.A. Clark Memorial Field are classified as either general aviation, air taxi, or military. General aviation operations include a wide range of activity, from recreational use and flight training to business and corporate uses. Air taxi operations are those conducted by aircraft operating under FAR Part 135, otherwise known as “for-hire” or “on-demand” activity. Military operations include those operations conducted by various branches of the U.S. military.

Aircraft operations are further classified as local and itinerant. A local operation is a takeoff or landing performed by an aircraft that operates within sight of an airport, or which executes simulated approaches or touch-and-go operations at an airport. Generally, local operations are characterized by training activity. Itinerant operations are those performed by aircraft with a specific origin or destination away from an airport. Typically, itinerant operations increase with business and commercial use since business aircraft are used primarily to transport passengers from one location to another.

Since H.A. Clark Memorial Field is not equipped with an airport traffic control tower (ATCT), precise operational (takeoff and landing) counts are not available. Sources for estimated operational activity at the airport include the FAA TAF, and Equation 15 in FAA’s “Model for Estimating General Aviation Operations at Non-towered Airports Using Towered and Non-towered Airport Data.” The FAA TAF indicates a total of 6,500 operations in 2020 (5,000 itinerant / 1,500 local). Equation 15, which factors in regional population and regional registered and based aircraft, resulted in a total of 4,909 estimated annual general aviation operations at the airport.

As can be seen, the equation model estimates are similar to the TAF. The model has verified that the FAA TAF estimates are reasonable for future facility needs planning. As a result, a baseline estimate derived from the TAF of 6,500 general aviation operations will be utilized for the purposes of this master plan. The percentage of local and itinerant operations was also derived from the FAA TAF estimate, which call for a 77/23 percent split between itinerant and local operations, respectively.

Several methods have been employed to develop a reasonable planning envelope with regard to airport operations. The following sections present multiple new operations forecasts that are specific to H.A. Clark Memorial Field.

General Aviation Operations Forecast

Table 2F presents annual general aviation operations as a ratio per based aircraft at the airport. As shown in the table, the 2020 estimate of 6,000 annual general aviation operations equate to 500 operations per based aircraft. Two different forecasts were conducted for general aviation operations. First, a constant number of operations per based aircraft was used to project aircraft operations by applying 500 per based aircraft which yielded 11,500 operations by 2040. The second forecast increases the number of operations per based aircraft throughout the planning period. In general, higher operations per based aircraft are experienced at airports with higher numbers of local operations than itinerant operations. Increasing the operations per based aircraft ratio to 600 operations per based aircraft yields 13,800 general aviation operations by 2040.

Another forecast examined is an extrapolation of the growth rate projected by the 2018 Arizona State Airports System Plan (SASP) Update. A growth rate of 1.45 percent has been applied to the airport's current and forecasted based aircraft to yield a general aviation operations total of 8,675 by 2040, which would represent a decline of operations per based aircraft.

TABLE 2F | General Aviation Operations Forecasts
H.A. Clark Memorial Field

Year	Based Aircraft	Itinerant Ga Operations	Local Ga Operations	Total Annual Ga Operations	Operations Per Based Aircraft
2010	16	4,600	3,000	7,600	475
2012	12	4,100	1,500	5,600	467
2014	4	4,100	1,500	5,600	1,400
2016	3	4,100	1,500	5,600	1,867
2018	3	4,500	1,500	6,000	2,000
2020	12	4,500	1,500	6,000	500
Constant Operations per Based Aircraft (CAGR - 3.31%)					
2025	***14***	***5,400***	***1,600***	***7,000***	***500***
2030	***17***	***6,500***	***2,000***	***8,500***	***500***
2040	***23***	***8,900***	***2,600***	***11,500***	***500***
Increasing Operations per Based Aircraft (CAGR - 4.25%)					
2025	14	5,700	1,700	7,400	530
2030	17	7,300	2,200	9,500	560
2040	23	10,600	3,200	13,800	600
SASP Preferred Operations Forecast (CAGR - 1.45%)					
2025	14	5,000	1,500	6,500	464
2030	17	5,400	1,600	7,000	412
2040	23	6,200	1,800	8,000	348

Sources:
[1] 2018 State Aviation System Plan
[2] FAA Terminal Area Forecast (January 2020); Airport Records

It is also important to note that these methodologies do not consider air taxi, military, or other specialty aircraft operations at the airport. Separate forecasts related to these types of operations will be detailed in the following sections.

The FAA projects an increase in aircraft utilization and the number of general aviation hours flown nationally through the long-term planning period of this study. This trend, along with the projected growth in based aircraft and the fact that the airport serves a popular tourist destination supports growth in annual general aviation operations during the planning period. The selected forecast results in 11,500 annual general aviation operations by 2040 and accounts for an increase in operations per based aircraft. This represents a CAGR of 3.31 percent. Local and itinerant operations splits are projected to remain with itinerant operations outpacing local operations at a rate of 77 percent itinerant to 23 percent local. **Figures 2D** and **2E** present the general aviation operations forecasts for local and itinerant operations at H.A. Clark Memorial Field.

FIGURE 2D: GA Itinerant Operations

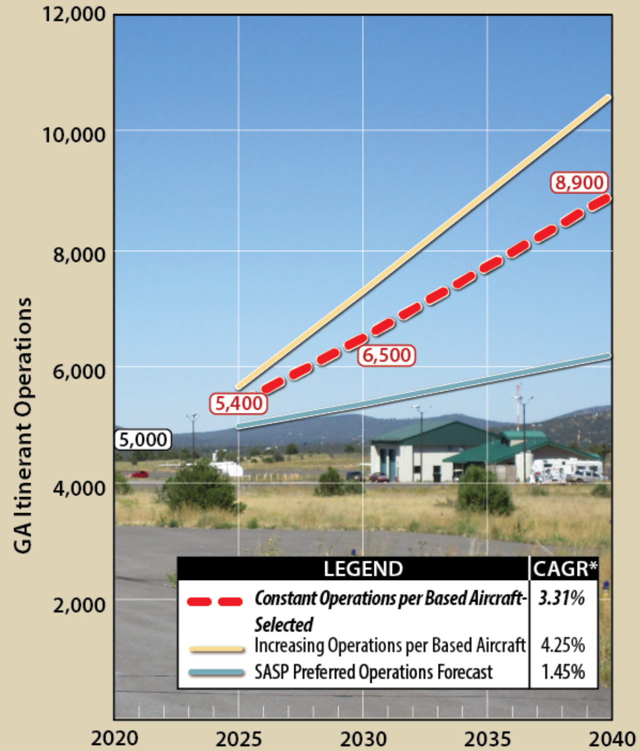
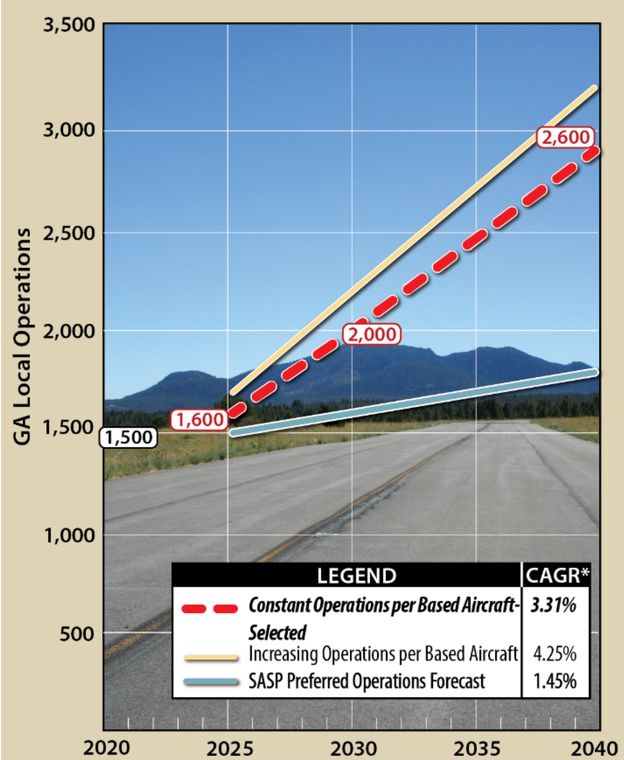


FIGURE 2E: GA Local Operations



Air Taxi Operations

Air taxi are defined as operations with authority to provide "on-demand" transportation of persons or property by aircraft with fewer than 60 passenger seats. Air taxi includes a broad range of operations, including some smaller commercial service aircraft, some charter aircraft, air cargo aircraft, fractional ownership aircraft, and air ambulance services. The FAA TAF for 2020 estimates that there were 500 air taxi operations performed at H.A. Clark Memorial Field.

According to the current *FAA Aerospace Forecasts - Fiscal Years 2020-2040*, air taxi operations are projected to experience a decline of 2.4 percent through year 2030 but return to some growth by 2040 for an overall decline of 0.7 percent over the course of the planning period. The primary reason for the projected decrease is the transition by commuter airlines to larger aircraft with more than 60 passenger seats, which will then be counted as air carrier operations as opposed to air taxi operations. While air taxi operations that are performed by commuter airlines are decreasing, air taxi by business and charter jets is expected to continue to grow. For the purposes of this study, the projected air taxi growth rate within the TAF for the State of Arizona is applied. Air taxi operations at the airport are forecast to increase at a 0.55 percent CAGR through 2040 resulting in approximately 560 air taxi operations. Air taxi forecasts are presented in **Table 2G**. The forecast increase in air taxi activity is prudent when considering the business and tourism activities in the region that often support air taxi operations at an airport.

TABLE 2G | Air Taxi Operations Forecast
H.A. Clark Memorial Field

Year	Air Taxi Operations
2020	500
TAF Forecast Growth Rate (CAGR= 0.55%)	
2025	520
2030	540
2040	560

Source: FAA TAF; Coffman Associates analysis

Military Operations

Military activity accounts for the smallest portion of operational activity at the airport according to the FAA TAF. The TAF estimates zero military operations per year. For planning purposes, a constant of 100 total itinerant operations annually will be utilized in forecasting. While it is true that military use of the airport is low, it is unlikely to be zero. Some sporadic military activity is known to happen at the airport. As such, this is consistent with typical industry practices for projecting military operations given the unpredictable nature of military activity.

Total Operations Forecast

Table 2H presents a summary of the operations for all aircraft activity segments at H.A. Clark Memorial Field. The operational projections equate to a 3.18 percent CAGR. The selected total operations forecast for the airport is as follows: Year 2025 – 7,620 operations; Year 2030 – 9,140 operations; and Year 2040 –12,160 operations**.**

TABLE 2H | Total Operations Forecast
H.A. Clark Memorial Field

	ITINERANT OPERATIONS				LOCAL OPERATIONS		
Year	General Aviation	Air Taxi	Military	Total Itinerant	General Aviation	Total Local	Total Operations
2020	4,500	500	0	5,000	1,500	1,500	**6,500**
Selected Total Operations Forecast (CAGR 3.18)							
2025	5,400	520	100	6,020	1,600	1,600	**7,620**
2030	6,500	540	100	7,140	2,000	2,000	**9,140**
2040	8,900	560	100	9,560	2,300	2,300	**12,160**

Source: Coffman Associates analysis

Comparison to FAA TAF

The FAA will review the forecast presented in this master plan for consistency with the TAF. The local FAA Airports District Office (ADO) or Regional Airports Division are responsible for forecast approvals.

TABLE 2J | Forecast Comparison to the FAA Terminal Area Forecast
H.A. Clark Memorial Field

Year	Airport Activity	FAA TAF	Percent Difference
Based Aircraft			
2020	12	3	120.00%
2025	14	3	129.41%
2030	17	3	140.00%
2040	23	3	153.85%
Annual Aircraft Operations			
2020	6,500	6,500	0.00%
2025	7,620	6,500	15.86%
2030	9,140	6,500	33.76%
2040	12,160	6,500	60.66%

Source: FAA TAF (2020); Coffman Associates analysis

When reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Forecasts of based aircraft and annual aircraft operations are consistent with the TAF if they differ by less than 10 percent in the 5-year period and 15 percent in the 10-year forecast period. If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be utilized for FAA decision making. **Table 2J** presents the direct comparison of the master planning forecasts with the TAF published January 2020.

The FAA allows this differential because the TAF forecasts are not intended to replace forecasts developed locally (i.e., in this master plan). While the TAF can provide a point of reference or comparison, the purpose of the TAF is much broader in defining FAA national workload measures. As previously discussed, The FAA TAF simply maintains a static projection showing no growth for based aircraft or annual operations through the long-term planning period of this master plan.

For based aircraft, the FAA TAF misstates the 2020 base year figure. The TAF identifies a total of three based aircraft. In reality, there are 12 aircraft currently based at CMR according to current airport records. The presence of the existing based aircraft has been verified by airport management through detailed recordkeeping. While the percent difference between the TAF and the master plan forecasts exceed the FAA tolerances for based aircraft, the reasons for the difference is evident. The TAF is simply not an accurate reflection of based aircraft at the airport, and it projects no growth in based aircraft through the next 20 years, while the master plan calls for modest growth.

The same applies for annual aircraft operations, the TAF estimate for operations was utilized as a baseline, but the TAF does not accurately account for existing based aircraft operations or forecast any for any growth in based aircraft or operations over the 20-year planning period. The master plan forecasts an increase in based aircraft and an increase in general aviation activity through the planning period as while accounting for additional growth in air taxi and military operations. This results in a master plan forecast that differs from the TAF by 15.86 percent through the 5-year period and 33.76 percent in the 10-year period.

PEAKING CHARACTERISTICS

Airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month**- The calendar month in which peak aircraft operations occur.
- **Design Day**- The average day in the peak month. This indicator is calculated by dividing the peak month operations by the number of days in the month.
- **Busy Day**- The busy day of a typical week in the peak month.
- **Design Hour**- The peak hour within the design day.

The peak month is an absolute peak within a given year. All other peak periods will be exceeded at the various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

Without an ATCT, accurate operational information related to aircraft activity is not available to directly determine peak operational activity at the airport. Therefore, peak period forecasts have been determined according to trends experienced at similar airports and by examining operational counts completed at the airport in 2020.

Typically, the peak month of activity at an airport accounts for approximately 10 to 15 percent of the airport's annual operations. For planning purposes, peak month operations have been estimated at 13 percent of annual operations and typically occur during the summer months when many tourists travel to Williams to escape high temperatures associated with lower elevations. The design day operations were calculated by dividing the peak month by 30. The design day is primarily used in airfield capacity calculations.

The busy day provides information for use in determining aircraft parking requirements. The busiest day of each week accounts for approximately 18 percent of weekly operations. To determine the typical busy day, the design day is multiplied by 1.25, which represents approximately 18 percent of the days in a week. Design hour operations were determined at 15 percent of the design day operations. The peaking characteristics are summarized in **Table 2K** for the short, intermediate, and long-term planning horizons.

TABLE 2K | Peak Operations Forecast
H.A. Clark Memorial Field

	2020	2025	2030	2040
Annual Operations	6,500	7,620	9,140	12,160
Peak Month	850	990	1,190	1,580
Design Day	30	30	40	50
Busy Day	40	40	50	60
Design Hour	5	5	6	8

Source: Coffman Associates analysis

ANNUAL INSTRUMENT APPROACHES

An instrument approach, as defined by the FAA, is "an approach to an airport with the intent to land an aircraft in accordance with an instrument flight rule (IFR) flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude." To qualify as an instrument approach, an aircraft must land at an airport after following published instrument approach procedures. Currently, the airport does not support any instrument approach procedures. A request by the City of Williams has been made to the FAA to install approach procedures and the approach procedures are expected to be reviewed by the FAA in 2021. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. Practice or training approaches do not count as AIAs nor do instrument approaches that occur in visual conditions.

It is unusual for pilots to perform local operations when IFR conditions exist. AIAs may be expected to increase as transient operations by more sophisticated aircraft, (e.g., turboprop and business jets) increase through the planning period. For this reason, AIA projections consider a constant estimate of two percent of annual itinerant operations. The projections are presented in **Table 2L**.

TABLE 2L | Annual Instrument Approaches
H.A. Clark Memorial Field

Year	Annual Instrument Approaches	Itinerant Operations	Ratio
2020	0	5,000	0.00%
2025	120	6,020	2.00%
2030	143	7,140	2.00%
2040	191	9,560	2.00%

Source: Coffman Associates analysis

Exhibit 2C presents a summary of the aviation forecasts previously detailed in this chapter. These forecasts for aviation activity, including based aircraft and annual aircraft operations, are key to determining future facility requirements.

POTENTIAL COMMERCIAL SERVICE/AIR TOUR ENPLANEMENTS AND OPERATIONS

Although there are currently no scheduled commercial airline or air tour activities offered at the airport, as part of this master plan, an analysis of passenger enplanements and commercial operations is being examined to determine potential opportunities and facility needs should the airport experience future commercial service or air tour activities.

Over the past several years, there have been significant changes in the commercial service industry serving airports. Airline business practices have evolved recently to help airlines become more profitable. Most carriers charged for checked luggage. Most also charge for defined “extras” or “perks” such as greater seat depth, expanded leg room, or window/aisle seats. These charges have generated significant profit centers for the airlines.

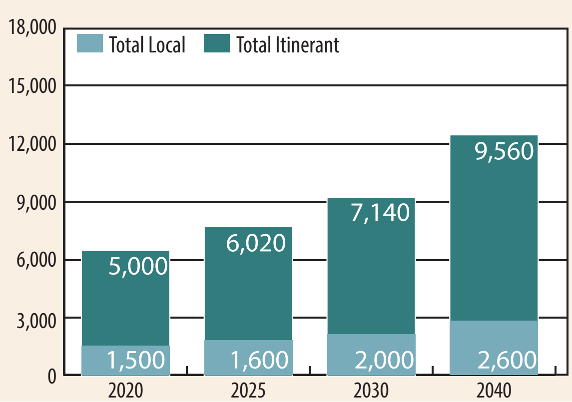
In 2007, the U.S. economy was just entering the most significant recession since the Great Depression. Prior to the COVID-19 pandemic, economic conditions had improved with nominal growth rates annually since 2009. During the financial crisis of 2008-09, airlines slashed their flying capacities substantially in response to the sudden decline in demand for air travel. In the following years, even as the demand environment improved, network airlines did not add significant capacity. This was a practice commonly referred to as capacity discipline. The airlines have held back increasing capacity until more recently, which resulted in increased profitability, but fewer network flights and fewer new market routes added.

At present, commercial service opportunities at H.A. Clark Memorial Field are limited due to the proximity of scheduled air service in nearby Flagstaff. Recently, airlines have consolidated and are reluctant to add routes/new airports. The likelihood of any traditional mainline legacy carrier (American, Delta, and United) and/or Southwest Airlines moving into the airport is improbable. These airlines are strong anchors at Phoenix Sky Harbor International Airport and McCarran International Airport and historic trends would suggest that moving to an outlying, tertiary market is unlikely. These carriers tend to favor the trappings of a larger hub airport as they depend upon the ability to link their passengers via the “hub-and-spoke” system.

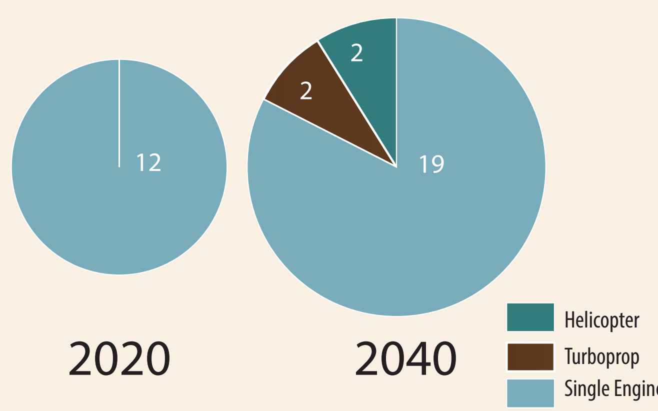
	2020	2025	2030	2040
BASED AIRCRAFT				
Single Engine	12	14	15	19
Multi-Engine	0	0	0	0
Turboprop	0	0	1	2
Jet	0	0	0	0
Helicopter	0	0	1	2
TOTAL BASED AIRCRAFT	**12**	**14**	**17**	**23**
ANNUAL OPERATIONS				
ITINERANT				
General Aviation	4,500	5,400	6,500	8,900
Air Taxi	500	520	540	560
Military	0	100	100	100
Total Itinerant	**5,000**	**6,020**	**7,140**	**9,560**
LOCAL				
General Aviation	1,500	1,600	2,000	2,600
Total Local	**1,500**	**1,600**	**2,000**	**2,600**
TOTAL OPERATIONS	**6,500**	**7,620**	**9,140**	**12,160**
PEAK OPERATIONS				
Annual Operations	6,500	7,620	9,140	12,160
Peak Month	850	990	1,190	1,580
Design Day	30	30	40	50
Busy Day	40	40	50	60
Design Hour	5	5	6	8
ANNUAL INSTRUMENT APPROACHES*	**0**	**120**	**143**	**191**

*Pending approval of instrument approach procedure

Total Operations



Based Aircraft Fleet Mix



The opportunity to attract regularly scheduled commuter airline "feeder" service, is hindered by the airport's proximity to United Airlines and American Airlines services which available just 35 miles east of Williams in Flagstaff. Historically, commuter airlines serving these markets utilized smaller turboprop aircraft. In recent years, the airlines have started using regional jets, making these markets and routes more appealing to passenger demand and economical/efficient for the airlines.

Another opportunity for commercial passenger service at the airport could involve non-traditional and/or low-cost passenger airlines. Non-traditional airlines (e.g., Allegiant Airlines) utilize an irregular schedule versus the daily departure schedule of the legacy carriers and Southwest Airlines. For example, Allegiant Airlines could serve a market departing Tuesday with a return on Saturday. Other low-cost options like Frontier, Spirit, Virgin America, etc., may offer daily departures but very limited schedule options. This type of service is often built around the origination and destination (O&D) model and could cater to the tourism market that serves the City of Williams and the surrounding region.

There are many non-traditional or low-cost carrier options, but most are in relative infancy. New market entrants using non-traditional models including "clubs," "memberships," and the like are options as well. New entrants like Contour Airlines, Boutique Airlines, Jet Suite X, and others are also potential carriers which generally fly smaller aircraft, often turboprop aircraft, seating fewer passengers.

It should be noted that these non-traditional or low-cost carriers tend to generate a demand of specific users, most commonly leisure travelers desiring low airfares. The users are willing to sacrifice things, such as schedule frequency and traditional perks associated with airline reward programs, in favor of low fares. Business travelers tend not to use these airlines as they are less reliable and offer fewer connections. Generally, local passenger demand for these airlines is limited when compared to a legacy carrier or Southwest Airlines.

Estimating the number of potential scheduled commercial service enplanements and operations is a function of the type of aircraft in use and the load factors. In the following sections, enplanement and commercial operations that may result from this and other potential commercial service operators will be presented. These forecasts are simply being conducted to offer long-term potential and will be considered separate from the planning forecasts presented earlier in this chapter. The primary purpose of this analysis is to provide the City of Williams and airport management with important facility planning information should commercial service and/or air tours become available at the airport in the future.

SCHEDULED COMMERCIAL SERVICE ENPLANEMENTS AND OPERATIONS

H.A. Clark Memorial Field, having never supported commercial airline services, means that there is a lack of historical enplanement data for passenger service. Therefore, it is challenging to develop a reasonable forecast of future passenger enplanements. Traditional trend-line and regression analyses do not generate a reasonable forecast as there is no history to examine. The method employed here is to examine comparable markets throughout the State of Arizona and surrounding region with similar-size city populations and other similar characteristics, such as proximity to a regional and larger hub airport and regional airport enplanement levels. The relationship between a service area's population and enplanements is called the travel propensity factor (TPF).

The TPF is predominantly impacted by the proximity of an airport to other regional airports with higher levels of service or “hub” airports. Regional airports with higher TPF ratios tend to be located farther from hub airports in relatively isolated areas. These airports generally have a service area that extends into adjacent, well-populated regions or have some type of air service advantage that attracts more of those passengers who might otherwise choose to drive to a more distant hub airport. Generally, the higher the TPF, the more likely air travelers are to utilize the local airport for commercial service.

Table 2M presents 10 comparable markets with similar characteristics to the City of Williams. Most markets that were analyzed are within a manageable driving distance to a larger hub airport. These airports also serve communities with smaller populations. The table presents the 2010 enplanements at each of the communities at their local airport. A travel propensity factor is then determined by dividing the community population with the 2010 enplanements. The TPF is also calculated utilizing the 2019 community population and enplanement levels. The distance from each airport and the closest commercial service or hub airport is then considered.

TABLE 2M | Travel Propensity Factor and Comparable Markets

Comparable Markets	2010 Population	2010 Enplanements	2010 TPF	2019 Population	2019 Enplanements	2019 TPF	Miles To Nearest Hub
Page Municipal Airport – Page, AZ	7,247	5,795	0.8	7,529	41,579	5.523	272 - Las Vegas
Yuma Int'l Airport – Yuma, AZ	93,064	82,163	0.883	98,285	100,480	1.022	172 - San Diego
Flagstaff Airport – Flagstaff, AZ	65,870	62,109	0.943	75,038	119,864	1.597	144 - Phoenix
Ernest Love Field – Prescott, AZ	39,843	7,836	0.197	44,299	27,771	0.627	100 - Phoenix
Show Low Regional Airport – Show Low, AZ	10,660	3,080	0.289	11,442	4,574	0.400	178 - Phoenix
Lea County Regional Airport - Hobbs, NM	34,122	334	0.01	39,141	27,774	0.710	97 - Midland
Cavern City Air Terminal – Carlsbad, NM	26,239	2,606	0.099	29,810	5,224	0.175	150 - Midland
Mason City Municipal Airport – Mason City, IA	27,944	13,852	0.496	26,931	8,056	0.299	120 - Des Moines
North Platte Reg. Airport – North Platte, NE	24,705	8,391	0.34	23,639	16,120	0.682	260 - Denver
East Texas Regional Airport – Longview, TX	80,455	21,836	0.271	81,631	27,160	0.333	125 - Dallas
Average TPF			**0.433**			**1.137**	

TPF: Travel Propensity Factor

Sources: Population - U.S. Census Bureau; Enplanements - FAA Air Carrier Activity Information System and Bureau of Transportation Statistics

In 2010, the average TPF of the airports serving the 10 selected cities was 0.433. By 2019, the average TPF had increased to 1.137, with nine cities increasing their TPF and only one city decreasing.

It is important to note, the enplanement numbers presented in **Table 2M** are based on 2019 enplanement levels at the various airports. The Covid-19 pandemic of 2020 has had a major impact on aviation services in the United States. The potential lasting effects on are impossible to predict at this time.

Table 2N presents three different potential enplanement forecast approaches based upon the TPF comparison analysis. The high, low, and average TPFs from the comparison analysis are applied to the population forecast of CMR to develop potential enplanement levels. The first projection applies the lowest 2019 TPF from the comparison markets (Cavern City Air Terminal (Carlsbad, NM – 0.175), which results in an enplanement projection of 582 by 2040. The second projection applies the average 2019 TPF of the comparison analysis (1.137), which results in an enplanement projection of 3,783 by 2040. The third projection applies the high TPF of the comparison analysis (Page Municipal Airport – 5.523), which results in an enplanement projection of 18,375 by 2040.

TABLE 2N | Market Share and Travel Propensity Projections
H.A. Clark Memorial Field

Year	H.A. Clark Memorial Field Enplanements	Williams Population	Travel Propensity Factor	U.S. Domestic Enplanements	Market Share
Low Travel Propensity Factor					
2025	592	3,383	0.175	844,000,000	0.00007%
2030	591	3,378	0.175	909,000,000	0.00007%
2040	582	3,327	0.175	1,090,000,000	0.00005%
Average Travel Propensity Factor					
2025	3,846	3,383	1.137	844,000,000	0.00046%
2030	3,841	3,378	1.137	909,000,000	0.00042%
2040	3,783	3,327	1.137	1,090,000,000	0.00035%
High Travel Propensity Factor					
2025	18,684	3,383	5.523	844,000,000	0.00221%
2030	18,657	3,378	5.523	909,000,000	0.00205%
2040	18,375	3,327	5.523	1,090,000,000	0.00169%

Sources: Population - Arizona Office of Economic Opportunity; Enplanements - FAA Aerospace Forecasts - FY 2020 - 2040; Coffman Associates analysis

It should be noted that the projections presented in **Table 2N** are for comparative purposes only and do not serve as a viable potential enplanement forecast for H.A. Clark Memorial Field. The airports offered in the comparison are regionalized with regularly scheduled airline operators linking to hub airports. These markets are not served primarily and/or only by non-traditional charter or member airline operators.

Potential Commercial Enplanement and Operations Forecast

Another methodology for forecasting potential enplanements and commercial operations is by considering potential flight schedules and aircraft fleets of the on-demand and scheduled airline operators. The potential enplanement and operations estimates are based on a potential flight schedule, as well as a limited set of factors - primarily population and distance to a hub airport. Factors that may positively affect enplanement levels include reliability of the airline, frequency of the schedule, convenience, advertising budget, as well as an unlimited number of community factors, such as industry, businesses, places of higher education, and recreational attractions.

The purpose here is to identify multiple scenarios of potential enplanement and operational figures that can be refined later if necessary. One additional factor to consider is the willingness of a passenger to drive a longer distance to a hub airport.

Table 2P presents three different potential enplanement and operations scenarios. The first scenario is strictly based upon the flight schedule of a commercial air taxi operator, such as Boutique Air. This scenario uses the 8-seat Pilatus PC-12 at an estimated 80 percent boarding load factor (BLF). The operator would conduct a total of 12 flights per week. Under this scenario, the airport could experience an estimated annual enplanement level of 3,744 and an annual commercial operations level of 1,248.

The second scenario assumes a commuter airline operator conducting 7 flights per week with a 19-seat aircraft such as a Beech 1900. This operator would function at an 80 percent BLF. Under this scenario, potential annual enplanements total 5,460, while overall estimated commercial operations total 728.

Finally, the third scenario assumes more significant growth in scheduled air service at the airport to include commuter airline service utilizing an ERJ-145 jet. With this operator functioning at 80 percent BLF, this scenario produces the potential for 4,160 enplanements and 208 commercial operations on an annual basis.

TABLE 2P | Enplanements and Operations Based on a Potential Flight Schedule
H.A. Clark Memorial Field

Aircraft Type	ARC	Seats	BLF %	Occupied Seats	Departure Frequency	Total Enplanements	Total Operations
Scenario 1							
Pilatus PC-12	A-II	8	80%	6	12x Weekly	3,744	1,248
Scenario 2							
Beech 1900	B-II	19	80%	15	7x Weekly	5,460	728
Scenario 3							
ERJ-145	C-II	50	80%	40	2x Weekly	4,160	208

Source: Coffman Associates analysis

Potential Commercial Service Enplanements Summary

The analysis in this section presents various enplanement scenarios for H.A. Clark Memorial Field. Due to the lack of historical context for commercial service activity, it is difficult to predict which of these scenarios is more likely to occur and, in fact, there is no guarantee that the airport will be able to develop and maintain consistent commercial service activity at all. For this reason, the enplanement projections are separated from the overall annual aircraft operations and based aircraft forecasts that will be submitted to the FAA for review and approval. The purpose of preparing enplanement projections is to provide the City of Williams with the ability to plan for facilities and services to accommodate commercial activities should they develop in the future.

The enplanement projection scenarios resulted in a wide range of possibilities for the airport; from approximately 592 enplanements up to 18,375 enplanements annually. In all likelihood, enplanement potential for the airport is somewhere in between these high and low figures. Therefore, for the purposes of this study, an enplanement level of 5,000 and an annual operational level of 1,200 operations per year will be carried forward as the selected scenario when considering terminal building and support facility requirements. Again, this enplanement scenario is not intended to serve as a forecast of activity but will be used to establish potential facility needs should commercial enplanements become a reality at H.A. Clark Memorial Field in the future.

POTENTIAL AIR TOUR ENPLANEMENTS AND OPERATIONS

H.A. Clark Memorial Field also has the potential for air tour/sightseeing flights. The airport's proximity to the Grand Canyon National Park (GCNP) and other popular tourist destinations like Sedona make the airport an ideal location for air tour operations. The purpose of this section is to explore the potential based on tour operations at other airports that support such operations and determine what the air tour enplanements and operations potential could be in the future.

Air Tour Enplanements

H.A. Clark Memorial Field scenic air tour enplanements will largely be driven by tourism in the area. As such, visitor counts provide a strong and trackable indicator of tourism to the area. Williams Visitor Center has collected visitor data since 2015. While this does not account for all visitors to the area, it does provide a baseline visitor count with which to compare. Additional data sets collected consist of the GCNP visitor data since the year 2000. This data has been compared with Grand Canyon National Park Airport's enplanements which are primarily driven by air tours.

To develop a forecast for potential air tour enplanements, a comparison was made with data collected from the Grand Canyon National Park Airport. The historic percentage of air tour enplanements to park visitors was examined. The resulting percentages were then used to create several projections based upon the average rate of enplanements per visitor that the park has experienced over the last 20-years. The percentage of park visitors to enplanements has fluctuated between 11.77 and 4.20 percent and has averaged 7.44 percent. By analyzing these metrics, a potential enplanement forecast for H.A. Clark Memorial Field can be made by applying the percentage of visitors to air tour enplanements collected from Grand Canyon National Park Airport.

Table 2Q presents high, medium, and low projections based upon Williams Visitor Center data. Since 2015, the average number of visitors to Williams has averaged 90,500. Projections can then be made based on the number of visitors that could be expected to potentially take a sightseeing tour.

Table 2Q | Air Tour Enplanements Forecasts
HA Clark Memorial Field

Year	Williams Visitors	Air Tour Enplanements	Enplaned % Of Visitors
Low Ratio Projection (CAGR-9.68%)			
2025	90,500	900	1.0%
2030	90,500	2,300	2.5%
2040	90,500	3,600	4.0%
Medium Ratio Projection (CAGR-9.27%)			
2025	90,500	1,800	2.0%
2030	90,500	3,600	4.0%
2040	90,500	6,800	7.5%
High Ratio Projection (CAGR-9.12%)			
2025	90,500	2,700	3.0%
2030	90,500	6,300	7.0%
2040	90,500	10,000	11.0%

Source: Williams Visitor Center Records, Coffman Associates Analysis

For planning purposes, the average visitor total over the last several years is projected to remain constant throughout the planning period. It is possible that Williams could see growth in visitors possibly resulting in more enplanements, but that analysis is beyond the scope of this master plan. The analysis concludes that based on this information that an air tour operator at H.A. Clark Memorial could potentially expect to see between 3,600 to 10,000 annual enplanements. For planning purposes, potential for 5,000 annual air tour enplanements will be utilized moving forward to analyze the facility needs. The average number of enplanements per operation conducted in a small single engine aircraft or helicopter is expected to be four which translates to roughly 1,250 potential air tour operations per year.

PEAKING CHARACTERISTICS BASED UPON POTENTIAL ENPLANEMENTS AND OPERATIONS

Table 2R outlines the peaking characteristics for the potential enplanement scenario of 10,000 (5,000 air tour enplanements and 5,000 commercial service enplanements) total annual enplanements. In general, airport capacity and facility needs related to specific activity types will typically consider the levels of activity during a peak or design period. Determination of peaking characteristics related to commercial activity is important for the planning and design of the passenger terminal building as well as associated facilities and services. The analysis is commonly utilized as a basis for determining the appropriate size of the terminal building and the functional areas therein. Terminal building elements could include hold rooms, security checkpoints, concessions, restrooms, baggage claim area, etc. The peaking characteristics could also relate to aircraft gates and apron space.

TABLE 2R | Potential Commercial Service Peaking Characteristics
H.A. Clark Memorial Field

Peak Potential Enplanements	
Annual Enplanements	10,000
Peak Month	833
Design Day	15
Design Hour	15
Peak Potential Commercial Service Operations	
Annual Operations	2,450
Peak Month	204
Design Day	6.6
Design Hour	1

Source: Coffman Associates analysis

Given the lack of historical commercial enplanement and operational data, the peak month projections for commercial activity were calculated simply by dividing the potential annual enplanements by 12. The peak potential enplanements for the design day are based upon the potential flight schedule described in Scenario 2 in the previous section, resulting in an enplanement design day 15. The potential enplanement design hour is based upon the seating capacity of the aircraft included in the selected scenario, which is the Beech 1900 aircraft with 19 passenger seats.

As previously mentioned, the peak potential monthly commercial operations were derived by dividing the potential annual operations under each scenario by 12. In the same fashion, the operational levels of the potential design were calculated simply by dividing the design month under each scenario by 31. This calculation provides a potential design day total of approximately 6.6 commercial operations. Finally, peak potential design hour operations are based upon the potential flight schedule and frequency of operations in this scenario.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classifications systems that group aircraft types based on their performance (approach speed in landing gear configuration) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements such as runways, taxiways, taxilanes, and aprons.

AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently in use or are expected to be in use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft. The design aircraft is classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA AC 150/5300-13A, Change 1, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2D.**

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed referred to as (V_{REF}) if specified, or if V_{REF} is not specified, 1.3 times the stall speed (V_{SO}) at the aircraft's maximum certified landing weight may be substituted. V_{REF}, V_{SO}, and the maximum certificated landing weight are established for each aircraft by the certification authority of the country of registry.

The AAC refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards will be. The AAC, categorized by letters A through E, is the aircraft approach category and relates to aircraft approach speed. The ACC mostly applies to runways and runway related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and runway/taxiway separation standards.

Airplane Design Group (ADG): The ADG, categorized by a roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall into different categories, the higher group is used. ADG influences design standards for taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG): A classification of aircraft based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and in some cases the separation distance between parallel taxiways. Other taxiway elements, such as the taxiway safety area (TSA), taxiway object free area (TOFA), taxiway separation to parallel taxiway or fixed or movable objects, and taxiway wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

Exhibit 2E summarizes the classification of the most common aircraft in the national fleet today. It should be noted that helicopters are not assigned an AAC or ADG given their unique operating characteristics. As such, they are not considered when determining an airport's critical design aircraft.

AIRPORT AND RUNWAY CLASSIFICATION

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airport facilities are to be designed and built.

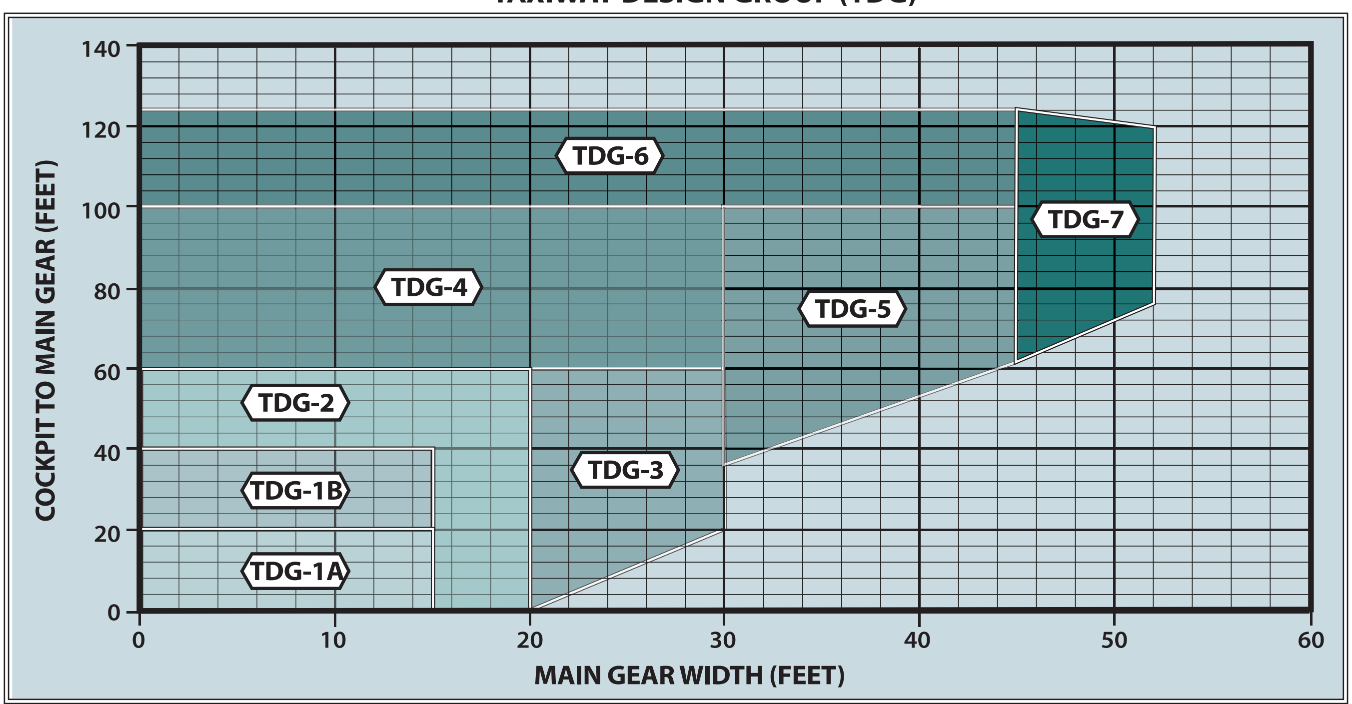
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR* (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



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

A-I

Aircraft	TDG
Beech Baron 55	1A
Beech Bonanza	1A
Cessna 150, 172	1A
Eclipse 500	1A
Piper Archer, Seneca	1A

B-I

Aircraft	TDG
Beech Baron 58	1A
Beech King Air 90	1A
Cessna 421	1A
Cessna Citation CJ1 (525)	1A
Cessna Citation 1(500)	2
Embraer Phenom 100	1B

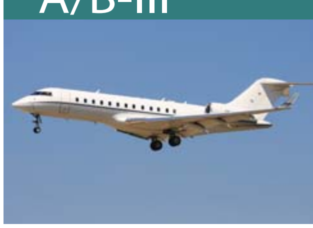
A/B-II 12,500 lbs. or less

Aircraft	TDG
Beech Super King Air 200	2
Cessna 441 Conquest	1A
Cessna Citation CJ2 (525A)	2
Pilatus PC-12	1A

B-II over 12,500 lbs.

Aircraft	TDG
Beech Super King Air 350	2
Cessna Citation CJ3(525B), Bravo (550), V (560)	2
Cessna Citation CJ4 (525C)	1B
Cessna Citation Latitude/Longitude	1B
Embraer Phenom 300	1B
Falcon 10, 20, 50	1B
Falcon 900, 2000	2
Hawker 800, 800XP, 850XP, 4000	1B
Pilatus PC-24	1B

A/B-III



Aircraft	TDG
Bombardier Dash 8	3
Bombardier Global 5000, 6000, 7000, 8000	2
Falcon 6X, 7X, 8X	2

C/D-I

Aircraft	TDG
Lear 25, 31, 45, 55, 60	1B
Learjet 35, 36 (D-I)	1B

C/D-II

Aircraft	TDG
Challenger 600/604/ 800/850	1B
Cessna Citation VII, X+	1B
CRJ-700	2
Embraer Legacy 450/500	1B
ERJ-135, 140, 145	2
Gulfstream IV, 350, 450 (D-II)	2
Gulfstream G200/G280	1B
Lear 70, 75	1B

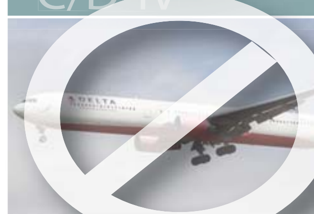
C/D-III less than 150,000 lbs.

Aircraft	TDG
Boeing 737-700, BBJ	3
CRJ-900, 1000	2
ERJ-170, 175, 190, 195	3
Gulfstream V	2
Gulfstream G500, 550, 600, 650 (D-III)	2

C/D-III over 150,000 lbs.

Aircraft	TDG
Airbus A319-100, 200	3
Boeing 737 -800, 900, BBJ2 (D-III)	3
MD-83, 88 (D-III)	4

C/D-IV



Aircraft	TDG
Airbus A300-100, 200, 600	5
Boeing 757-200	4
Boeing 767-300, 400	5
MD-11	6

D-V

Aircraft	TDG
Airbus A330-200, 300	5
Airbus A340-500, 600	6
Boeing 747-100 - 400	5
Boeing 777-300	6
Boeing 787-8, 9	5

Note: Aircraft pictured is identified in bold type.

Exhibit 2E
AIRCRAFT REFERENCE CODES

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be designed and built. The RDC is based upon planned development and has no operational component. The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

Airport Reference Code (ARC): An airport designation that signifies the airport's highest RDC, minus the visibility component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to utilize the airport safely. The current ALP for H.A. Clark Memorial Field, which will be updated as part of this master plan, identifies an existing ARC of B-II and anticipates an ultimate ARC B-III.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and the RVR. The APRC describes the current operational capabilities of the runway under certain meteorological conditions where no special operating procedures are necessary, as opposed to the RDC which is based upon planned development with no operational component. The APRC for a runway is established based upon a minimum runway to taxiway centerline separation.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to takeoff operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC but is composed of two components: AAC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently utilizing or are expected to utilize the airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG. In the case of an airport with multiple runways, a design aircraft is selected for each runway.

The first consideration is the safe operation of aircraft likely to use the airport. Any operation of an aircraft that exceeds design criteria of an airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base airport design on an aircraft that uses the airport infrequently.

The design aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, excluding touch-and-go operations. Planning for future aircraft use is of particular importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that the short-term development does not preclude the reasonable long-range potential needs of the airport.

According to FAA AC 150/5300-13A, *Airport Design*, "airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft never likely to be served by the airport are not economical." Selection of the current and future critical design aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT CRITICAL DESIGN AIRCRAFT

The FAA maintains the *Traffic Flow Management System Count* (TFMSC) database which documents certain aircraft operations at airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. It includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Therefore, it is likely that there are more operations at the airport than are captured by this methodology. Typically, this data can be analyzed to determine the types and classifications of aircraft utilizing the airport regularly to determine a critical design aircraft. Unfortunately, TFMSC data is not available for H.A. Clark Memorial Field and was not able to be utilized in this analysis.

Because H.A. Clark Memorial Field is a non-towered airport and TFMSC data is not available operational data is limited. For this reason, the study must rely on airport records for operations data. Based aircraft fleet mix can play an important role in determining an airport's critical aircraft, but in this case, all based aircraft are single engine piston powered aircraft which are not considered particularly demanding and are certainly not the most demanding aircraft currently operating on the airfield.

Another method commonly utilized at non-towered general aviation airports is analyzing fuel sales data to tally operations of certain aircraft types. The FBO has been tracking fuel sales data since 2017. The data provided by the FBO only contains information pertaining to aircraft that purchased fuel at the airport. 100LL sales do not detail types of aircraft, only gallons pumped from the self-service fuel facilities. Jet A sales are recorded by hand and were able provide more specific aircraft information such as aircraft tail numbers and types. While the data does provide some insight into operations activity at the airport, it can be assumed that there were many operations that took place at the airport that were not recorded in any way.

Overall, according to the fuel records, the most demanding aircraft to utilize the airport in terms of AAC were in the B-II category. Drawing from the limited operations data, no single aircraft type in the B-II category can be designated as the "critical aircraft" because no specific aircraft in the B-II category can be verified as operating at a frequency of at least 500 operations per year based upon airport fuel records.

Although, multiple aircraft within the B-II category utilize the airport regularly and combined operations of those aircraft easily meet the threshold of 500 operations per year. Some of the B-II category aircraft listed in the airport's fuel records include Cessna Citation CJ3, Cessna Citation XL, and King Air 350.

These aircraft utilizing the airport on a regular basis and constitute a substantial number of operations. The aviation demand forecasts indicate the potential for growth in based aircraft and increased activity at the airport. The type and size of aircraft using the airport regularly can impact the design standards to be applied to the airport system. Therefore, it is important to understand what type of aircraft may use the airport in the future. Factors such as population and employment growth in the airport's service area, proximity to and level of service at other airports, and development at the airport can influence future activity.

Therefore, based on the operations analysis, the forecasts presented, and the airport's the current design standard, it is recommended that the airport maintain the existing RDC B-II and plan to remain an ultimate RDC B-II throughout the planning horizon.

RUNWAY DESIGN CODE

Each runway at an airport is assigned an RDC. The RDC relates to specific FAA design standards that should be planned in relation to each runway, regardless of whether the airport currently meets the appropriate design standards (to be discussed in Chapter Three).

Runway 18-36

Runway 18-36 measures 6,000 feet in length by 100 feet in width. The currently approved ALP (2008) defines Runway 18-36 as an existing ARC B-II and ultimate ARC B-III. Currently, no justification exists to plan for any ADG III category aircraft, therefore, the existing and ultimate RDC is B-II.

Non-Precision Instrument (RNAV GPS) approaches are being reviewed by the FAA, meaning that the airport could achieve visibility minimums down to as low as ¾-mile with advancements in global positioning system (GPS) technology. As a result, the ultimate RDC for Runway 18-36 should at least be analyzed for **RDC B-II-4000.**

AIRPORT DESIGN SUMMARY

Table 2S summarizes the design aircraft components to be applied at the airport. The ultimate RVR (visibility) component for Runway 18-36 may change based on analysis and recommendations regarding potential instrument approach capability. The APRC and DPRC are also depicted for the runway system.

Table 2S | Design Aircraft Parameters
H.A. Clark Memorial Field

Runway Design Parameters	Runway Design Code (RDC)	Approach Reference Code (APRC)	Departure Reference Code (DPRC)
Existing			
Runway 18-36	B-II-VIS	D/IV/VIS	D/IV
400' runway/taxiway separation		D/V/VIS	D/V
Ultimate			
Runway 18-36	B-II-4000	D/IV/4000	D/IV
400' runway/taxiway separation		D/V/4000	D/V

Source: FAA AC 150/5300-13A, Change 1, Airport Design

SUMMARY

H.A. Clark Memorial Field is a significant aviation facility that serves a vital function for the regional area. This chapter has outlined the various activity levels that might reasonably be anticipated over the next 20 years at the airport. The primary forecasts of aviation activity, including based aircraft and operations, is key to determining future facility requirements. There are currently 12 based aircraft at the airport, and this number is forecast to grow to 23 aircraft by 2040. It is estimated that the airport experienced approximately 6,500 operations in 2020. The total number of operations is forecast to grow to approximately 12,160 by 2040.

The fleet mix operations, or type and frequency of aircraft use, is important in determining facility requirements and environmental impacts. While single engine piston-powered aircraft are expected to continue to represent the majority of based aircraft, the long-term forecast considers that most of the growth in based aircraft will be single engine propeller driven aircraft with potential for growth in the turboprop and helicopter categories. In addition, potential scheduled commercial service activities (enplanements and operations) have been analyzed for further input into identifying future facility needs.

The next step in the master plan process is to use the forecasts to determine development needs for the airport through 2040. Chapter Three will address airside elements, such as safety areas, runways, taxiways, lighting, and navigational aids, as well as landside requirements, including hangars, aircraft aprons, and support services. As a general observation, H.A. Clark Memorial Field is positioned for growth into the future. The remaining portions of the master plan will lay out how that growth can be accommodated in an orderly, efficient, and cost-effective manner.

Chapter Three

Facility Requirements

H.A. Clark Memorial Field

Airport Master Plan

Chapter Three
Facility Requirements

Proper airport planning requires the translation of forecast aviation demand into the specific types and quantities of facilities that can adequately serve the identified demand. This chapter will analyze the existing capacities of H.A. Clark Memorial Field's (CMR) facilities. The existing capacities will then be compared to the forecast activity levels prepared in Chapter Two to determine the adequacy of existing facilities, as well as to identify if deficiencies currently exist or may be expected to materialize in the future. The chapter will present the following elements:

- Planning Horizon Activity Levels
- Airfield Capacity
- Airport Physical Planning Criteria
- Airside and Landside Facility Requirements

As indicated in Chapter One, airport facilities include both airside and landside components. Airside facilities include those that are related to the arrival, departure, and ground movement of aircraft. These components include:

- Runways
- Taxiways
- Navigational and Approach Aids
- Airfield Lighting, Marking, and Signage

Landside facilities are needed for the interface between air and ground transportation modes. These components include:

- Terminal Services
- Aircraft Hangars
- Aircraft Parking Aprons
- Airport Support Facilities

The objective of this effort is to identify, in general terms, the adequacy of existing airport facilities, outline what new facilities may be needed, and determine when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated to determine the most practical, cost-effective, and efficient means for implementation.



PLANNING HORIZONS

Development of an airport should rely more upon actual demand than a time-based forecast figure. This is especially true of the aviation industry as it is often reliant on strong economic conditions. The current COVID-19 pandemic, as well as previous maladies such as the Great Recession of 2008 and September 11, 2001, can abruptly change aviation demand factors. Thus, in order to develop a master plan that is aimed at being responsive to demand rather than time-based, a series of planning horizon milestones have been established, as discussed in Chapter Two – Forecasts. These planning horizons take into consideration the reasonable range of aviation demand projections for H.A. Clark Memorial Field.

The most important reason for utilizing milestones is to guide facility development according to need generated by actual demand levels. Very rarely will aviation demand follow a "if you build it, they will come" philosophy. Moreover, the Federal Aviation Administration (FAA) and Arizona Department of Transportation – Aeronautics Group (ADOT) grant-in-aid programs will require specific justification for proposed facility development. These funds cannot be extended without "proof of need." The demand-based schedule provides flexibility in development, as the schedule can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and needs-based program. **Table 3A** presents the planning horizon milestones for each activity demand category.

TABLE 3A | Planning Horizon Activity Levels
H.A. Clark Memorial Field

	BASE YEAR 2020	PLANNING HORIZONS		
		Short Term	Intermediate Term	Long Term
Annual Aircraft Operations				
Itinerant	5,000	6,020	7,140	9,560
Local	1,500	1,600	2,000	2,600
Total Airport Operations	***6,500***	***7,620***	***9,140***	***12,160***
Based Aircraft				
Single Engine	12	14	15	19
Multi-engine	0	0	0	0
Turboprop	0	0	1	2
Jet	0	0	0	0
Helicopter	0	0	1	2
Total Based Aircraft	***12***	***14***	***17***	***23***

In addition to the aviation activity forecasts presented above, forecasts for potential commercial service/air tour enplanements and operations were also detailed earlier in this study. Many assumptions were made to derive a potential demand level for future commercial service activities. Based upon this analysis, it is determined that these types of aviation service segments would likely not materialize until at least the long-term planning period of this study, if at all. Nonetheless, it is important to recognize the potential facility needs that would be required to accommodate commercial passenger service and/or air tour activities at the airport. Facility needs will be based on the following long-term commercial activity projections:

- Annual Passenger Enplanement Potential – 10,000
- Annual Commercial Aircraft Operations Potential – 2,450

AIRFIELD CAPACITY

An airfield's capacity is expressed in terms of its annual service volume (ASV). ASV is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year without incurring significant delay factors. As aircraft operations near or surpass the ASV, delay factors increase exponentially. The airport's ASV was examined utilizing FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

FACTORS AFFECTING ANNUAL SERVICE VOLUME

This analysis accounts for specific factors about the airfield in order to calculate the airport's ASV. The following describes the input factors and considerations when determining ASV as they relate to H.A. Clark Memorial Field and include airfield layout, weather conditions, aircraft mix, and operations.

Runway Configuration – The existing airfield configuration consists of a single runway supported by a parallel taxiway. Runway 18-36 is 6,000 feet long and 100 feet wide.

Runway Use – Runway use in capacity conditions will be controlled by wind and/or airspace conditions. For, H.A. Clark Memorial Field the direction of takeoffs and landings is typically determined by the speed and direction of the wind. It is generally safest for aircraft to takeoff and land into the wind, avoiding a crosswind (wind that is blowing perpendicular to the travel of the aircraft) or tailwind components during these operations.

Exit Taxiways – Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determine the occupancy time of an aircraft on the runway. The airfield capacity analysis gives credit to taxiway exits located within the prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runways. Based upon mix, only exit taxiways between 2,000 feet and 4,000 feet from the landing threshold count in the exit rating. The exits must be at least 750 feet apart to count as separate exit taxiways. Utilizing these criteria, Runway 18-36 is credited with two exit taxiways in each direction.

Weather Conditions – Weather conditions can have a significant impact on airfield capacity. Airport capacity is usually highest in clear weather when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety and air traffic vectoring. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period, thus reducing overall airfield capacity.

Aircraft Mix – The aircraft mix for the capacity analysis is defined in terms of four aircraft classifications. Classes A and B consist of small- and medium-sized propeller and some jet aircraft, all weighing 12,500 pounds or less. These aircraft are associated primarily with general aviation activity, but do include some air taxi, air cargo, and commuter aircraft. The majority of aircraft operations at H.A. Clark Memorial are those in Classes A and B.

Percent Arrivals – The percentage of arrivals as they relate to total operations of the airport is important in determining airfield capacity. Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. The aircraft arrival-departure percentage split is typically 50/50, which is the case at H.A. Clark Memorial Field.

Touch-and-Go Activity – A touch-and-go operation involves an aircraft making a landing and then an immediate takeoff without coming to a full stop or exiting the runway. As previously discussed in Chapter Two, these operations are normally associated with general aviation training activity and classified as a local operation. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and takeoff occurs within a shorter time period than individual operations. Touch-and-go operations at H.A. Clark Memorial Field account for approximately less than five percent of total annual operations. A similar percentage is expected in the future.

Peak Period Operations – Average daily operations and average peak hour operations during the peak month are utilized for the airfield capacity analysis. Operations activity is important in the calculation of an airport's ASV as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times throughout the year.

Given the factors outlined above, the existing and ultimate airfield ASV ranges between 150,000 and 200,000 annual operations. In 2020, the airport had an estimated 6,500 operations, which is approximately three percent of the airfield's estimated ASV. By the end of the long-term planning period, total annual operations are expected to represent approximately six percent of the airfield's ASV. The ASV does not indicate a point of absolute gridlock for the airfield; however, it does represent the point at which operational delay for each aircraft operation will increase exponentially. According to

FAA Order 5090.5, planning for capacity improvement projects should begin when operations reach approximately 60 percent of ASV. Since this threshold is not projected to be met over the next 20 years, no projects specifically triggered by a capacity deficiency are required. While no significant capacity improvements will be necessary, options to improve airfield efficiency will still be considered as part of this master plan.

AIRFIELD REQUIREMENTS

The analyses of the operational capacity and the critical design aircraft are used to determine airfield needs related to the arrival, departure, and ground movement of aircraft. Dimensional design standards have been established by the FAA in the following areas: Runway Elements, Runway Design Standards, Taxiways, Navigational and Approach Aids, and Airfield Lighting and Signage.

RUNWAY ELEMENTS

The existing runway system at H.A. Clark Memorial Field will be analyzed from several perspectives to ensure the overall system adheres to FAA design standards for properly corresponding demand components. The runway elements to be examined include orientation, length, width, and strength, as presented below.

Runway Orientation

Key considerations in the runway configuration of an airport involve the orientation for wind coverage and the operational capacity of the runway system. FAA AC 150/5300-13A, *Airport Design***,** recommends that a crosswind runway should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis.

The 95 percent wind coverage is computed based on the crosswind component not exceeding 10.5 knots (12 mph) for Runway Design Code (RDC) A-I and B-I; 13 knots (15 mph) for RDC A-II and B-II; 16 knots (18 mph) for RDC A-III, B-III, and C-I through D-II; and 20 knots (23 mph) for RDC C-III through D-IV.

Ten years of wind data was collected from the onsite automated weather observation system (AWOS) at H.A. Clark Memorial Field. The data has been analyzed to identify wind coverage provided by the existing runway orientation. As detailed on **Exhibit 3A**, the orientation of Runway 18-36 provides 95.87 percent coverage for the 10.5 knot crosswind component; 98.31 percent coverage for 13 knots, and greater than 99 percent coverage for 16- and 20-knot components. The results of the analysis conclude that the runway meets the 95 percent wind coverage required by the FAA and no crosswind runway is necessary.

Runway Length

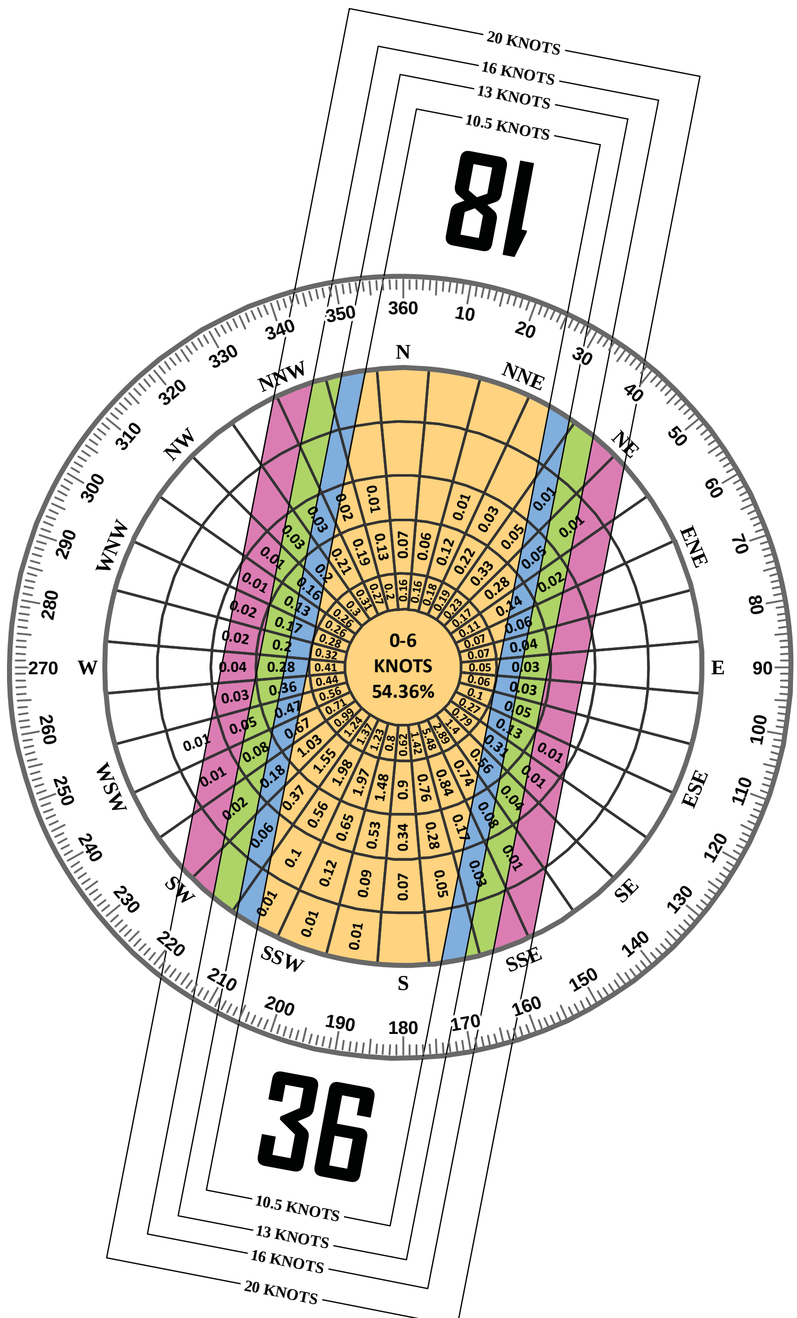
AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides guidance for determining runway length needs. The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the runway
- Stage length of the longest nonstop destination (specific to larger aircraft)

The airport elevation at H.A. Clark Memorial Field is 6,690 feet above mean sea level (MSL). The temperature used for airport design is the mean maximum daily temperature during the hottest month. According to National Oceanic and Atmospheric Administration (NOAA) data, the mean maximum temperature is 83.3 degrees Fahrenheit (F) during the month of July, and the published gradient of Runway 18-36 is one percent sloping up to the south. This information is utilized in the following runway length analyses.

Airplanes operate on a wide variety of available runway lengths. Many factors will govern the sustainability of runway lengths for aircraft, such as elevation, temperature, wind, aircraft weight, wing flap settings, runway condition (wet or dry), runway gradient, vicinity airspace obstructions, and any special operating procedures. Airport operators can pursue policies that maximize the sustainability of the runway length. Policies such as area zoning and height and hazard restricting can protect an airport's runway length. Airport ownership (fee simple easement) of land leading to the runway ends reduces the possibility of natural growth or man-made obstructions. Planning of runways should include an evaluation of aircraft types expected to use the airport now and in the future. Future planning should be realistic and supported by the FAA-approved forecasts and should be based on the critical design aircraft (or family of aircraft).

ALL WEATHER WIND COVERAGE				
Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18-36	95.87%	98.31%	99.68%	99.95%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
HA Clark Memorial Field Airport
Williams, Arizona

OBSERVATIONS:
215,818 All Weather Observations
Jan. 1, 2010 - Dec, 31 2019

Exhibit 3A
WINDROSE

Small Aircraft

Most operations at the airport are conducted using smaller GA aircraft weighing less than 12,500 pounds. Following guidance from AC 150/5325-4B, to accommodate 95 percent of these small aircraft, a runway length of 8,000 feet is recommended. For 100 percent of small aircraft and 100 percent of small aircraft with 10 passenger seats or more, 8,100 feet of runway length is recommended.

Table 3B summarizes the runway length needs for small aircraft. Turboprops such as the Pilatus, Caravan, and/or smaller King Air 100, could require up to 8,100 feet in more demanding operational conditions. At present, Runway 18-36 currently does not meet the length requirements to accommodate 100 percent of small aircraft or 100 percent of small aircraft with 10 or more passenger seats.

TABLE 3B | Runway Length Requirements (Small Airplanes)
H.A. Clark Memorial Field

Airport and Runway Data	
Airport elevation	6,690 feet above MSL
Mean daily maximum temperature of the hottest month	83.3° F (July)
Maximum difference in runway elevation	60.5 feet
Runway Lengths Recommended for Airport Design	
Small airplanes with less than 10 passenger seats:	
95 percent of small airplanes	8,000 feet
100 percent of small airplanes	8,100 feet
Small airplanes with 10 or more passenger seats	8,100 feet

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

Business Aircraft

While most general aviation activity is conducted by small piston-powered aircraft, H.A. Clark Memorial is also used by business jet and turboprop aircraft (larger Beechcraft King Air family of turboprops, Cessna Citation family of business jets), which generally require longer runway lengths. Runway length requirements have been calculated for aircraft weighing more than 12,500 pounds but less than 60,000 pounds, including most small to mid-sized business jet aircraft. These calculations take into consideration the runway gradient and landing length requirements for contaminated runways (wet and slippery). Business jets tend to need greater runway length when landing on a wet surface because of their increased approach speeds. AC 150/5325-4B stipulates that runway length determination for business jets consider a grouping of airplanes with similar operating characteristics. The AC provides two separate "family groupings of airplanes," each based upon their representative percentage of aircraft in the national fleet. The first grouping is those business jets that make up 75 percent of the national fleet, and the second group is those making up 100 percent of the national fleet.

Table 3C presents a partial list of common aircraft in each aircraft grouping. A third group considers business jets weighing more than 60,000 pounds. Runway length determination for these aircraft must be based on the performance characteristics of the individual aircraft.

TABLE 3C | Business Jet Categories for Runway Length Determination

75 percent of the national fleet	MTOW (lbs.)	75-100 percent of the national fleet	MTOW (lbs.)	Greater than 60,000 pounds	MTOW (lbs.)
Lear 35	20,350	Lear 55	21,500	Gulfstream II	65,500
Lear 45	20,500	Lear 60	23,500	Gulfstream IV	73,200
Cessna 550	14,100	Hawker 800XP	28,000	Gulfstream V	90,500
Cessna 560XL	20,000	Hawker 1000	31,000	Global Express	98,000
Cessna 650 (VII)	22,000	Cessna 650 (III/IV)	22,000		
IAI Westwind	23,500	Cessna 750 (X)	36,100		
Beechjet 400	15,800	Challenger 604	47,600		
Falcon 50	18,500	IAI Astra	23,500		
MTOW: Maximum Take-Off Weight					

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design

Table 3D presents the results of the runway length analysis for business jets developed following the guidance provided in AC 150/5325-4B. To accommodate 75 percent of the business jet fleet at 60 percent useful load, a runway length of 7,900 feet is recommended. This length is derived from a raw length of 7,293 feet that is adjusted, as recommended, for runway gradient and consideration of landing length needs on a contaminated runway. To accommodate 75 percent of the fleet at a 90 percent useful load would require a runway length of 9,200 feet. Accommodating 100 percent of the business jet fleet at either 60 or 90 percent useful load, would necessitate a runway length in excess of 11,000 feet. Due to the high elevation of the airport combined with the high temperatures experienced, the specific recommended runway lengths cannot be determined for 100 percent of the business jet fleet as the chart contained in the AC does not provide runway length calculations beyond 11,000 feet.

TABLE 3D | Business Jet Runway Length Requirements
H.A. Clark Memorial Field

Airport Elevation	6,690 feet above MSL			
Average High Monthly Temp.	83.3° F (July)			
Runway Gradient	60.5 feet			
Fleet Mix Category	**Raw Runway Length from FAA AC**	**Runway Length With Gradient Adjustment (+605')**	**Wet Surface Landing Length for Jets (+15%)***	**Final Runway Length**
75% of fleet at 60% useful load	7,293'	7,898'	5,500’	7,900
75% of fleet at 90% useful load	8,600'	9,205'	7,000’	9,200'
100% of fleet at 60% useful load	11,000'+	11,000'+	5,500'	11,000'+
100% of fleet at 90% useful load	11,000'+	11,000'+	7,000'	11,000'+

* Max 5,500' for 60% useful load in wet conditions and 7,000’ for 90% useful load in wet conditions.

Source: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

A more specific method of determining runway length requirements for jet aircraft is to examine aircraft flight planning manuals under conditions specific to the airport. Several aircraft were analyzed for takeoff length required with a design temperature of 83.3 degrees F at a field elevation of 6,690 feet MSL. **Table 3E** provides a detailed runway takeoff length analysis for some of the most common business jet and turboprop aircraft in the national fleet. This data was obtained from Ultranav software, which computes operational parameters for specific aircraft based on flight manual data. The analysis includes the maximum takeoff weight (MTOW) allowable and the percent useful load from 60 percent to 100 percent. The figures are shaded green and red based upon their proximity to the current length of Runway 18-36 (6,000 feet), with red figures exceeding the current runway length. Of the aircraft examined, this analysis shows that during the hottest periods of the year, Runway 18-36 can accommodate only 44 percent of the aircraft examined at 60 percent useful load and progressively less as the load factor increases to only two aircraft at 100 percent useful load. The average takeoff length in each column exceeds the current runway length.

Table 3E | Business Aircraft Takeoff Length Requirements
H.A. Clark Memorial Field

		Takeoff Length Requirements (feet)				
Aircraft Name	**MTOW**	**60%**	**70%**	**80%**	**90%**	**100%**
Beechjet 400A	16,300	6,732	O/L	O/L	O/L	O/L
King Air C90GTi	10,100	3,773	4,058	4,368	4,678	4,988
Citation II (550)	13,300	5,437	6,114	6,932	8,349	10,000
Citation V (Model 560)	15,900	4,810	5,263	5,749	O/L	O/L
Citation 560 XL	20,000	6,234	6,909	O/L	O/L	O/L
Citation Bravo	14,800	6,300	6,880	7,532	8,234	O/L
Citation Encore	16,630	5,497	6,142	6,917	7,890	8,763
Citation I/SP	11,850	4,616	O/L	O/L	O/L	O/L
Citation Mustang	8,645	O/L	O/L	O/L	O/L	O/L
Citation Sovereign	30,300	5,125	5,674	6,483	7,554	O/L
Citation Ultra	16,300	4,801	5,236	5,704	6,213	O/L
Citation VII	23,000	8,261	O/L	O/L	O/L	O/L
Citation (525A) CJ2	12,375	5,162	5,737	6,326	O/L	O/L
Citation CJ3	13,870	5,070	5,673	6,489	7,371	8,523
Challenger 300	38,850	7,514	8,265	9,072	10,000	10,000
Falcon 10	18,740	O/L	O/L	O/L	O/L	O/L
Falcon 2000	35,800	8,574	9,437	O/L	O/L	10,000
Gulfstream 200	35,450	8,960	O/L	O/L	O/L	O/L
Gulfstream 100	24,650	7,674	8,570	O/L	O/L	O/L
Hawker 750	27,000	O/L	O/L	O/L	O/L	O/L
Hawker 900 XP	28,000	6,128	6,765	O/L	O/L	O/L
King Air 200 GT	12,500	5,048	5,219	O/L	O/L	O/L
King Air 350	15,000	5,970	6,174	6,350	O/L	O/L
King Air 1900D	17,120	6,284	6,751	7,233	7,782	O/L
Lear 31A	17,000	6,619	7,317	8,220	9,418	O/L
Pilatus PC-12	9,921	3,448	3,775	4,122	4,489	4,875
Premier 1A	12,500	8,605	9,984	10,000	10,000	10,000
Average Takeoff Length*		**6,110**	**6,497**	**6,766**	**7,665**	**8,394**

Runway length calculation assumptions: 6,690 MSL field elevation; 83.3° F ambient temperature; 1.0% runway grade
Green = Adequate runway length available; Red = Inadequate runway length available
* Average Takeoff length totals do not consider O/L lengths
MTOW – Maximum Takeoff Weight
O/L – Outside Operating Limits
Source: Ultranav software

Table 3F presents the runway length required for landing under three operational categories: Title 14 Code of Federal Regulations (CFR) Part 25, CFR Part 135, and CFR Part 91k. CFR Part 25 operations are those conducted by individuals or companies operating their own transport category aircraft (non-commercial). CFR Part 91k includes operations in fractional ownership, which utilize their own aircraft under direction of pilots specifically assigned to said aircraft. CFR Part 135 applies to all for-hire charter operations. Part 91k and Part 135 rules regarding landing operations require operators to land at the destination airport within 60 percent of the effective runway length. An additional rule allows for operators to land within 80 percent of the effective runway length if the operator has an approved destination airport analysis in the airport's program operating manual. The landing length analysis conducted accounts for both scenarios.

Table 3F | Business Aircraft Landing Length Requirements
H.A. Clark Memorial Field

		Landing Lengths Required for:					
		CFR Part 25		CFR Part 135		CFR Part 91K	
Aircraft Name	**MLW**	**Dry**	**Wet**	**Dry (.6)**	**Wet (.6)**	**Dry (.8)**	**Wet (.8)**
King Air C90GTi	9,600	1,699	No Data	2,832	No Data	2,124	No Data
Citation II (550)	12,700	3,365	8,133	5,608	13,555	4,206	10,166
Citation V (Model 560)	15,200	4,319	6,424	7,198	10,707	5,399	8,030
Citation 560 XL	18,700	4,611	7,269	7,685	12,115	5,764	9,086
Citation Bravo	13,500	5,780	9,265	9,633	15,442	7,225	11,581
Citation Encore	15,200	4,416	6,778	7,360	11,297	5,520	8,473
Citation I/SP	11,350	2,864	3,293	4,773	5,488	3,580	4,116
Citation Mustang	8,000	3,753	5,434	6,255	9,057	4,691	6,793
Citation Sovereign	27,100	3,969	5,444	6,615	9,073	4,961	6,805
Citation Ultra	15,200	4,447	6,632	7,412	11,053	5,559	8,290
Citation VII	20,000	4,478	6,262	7,463	10,437	5,598	7,828
Citation (525A) CJ2	11,500	4,408	6,361	7,347	10,602	5,510	7,951
Citation CJ3	12,750	4,226	5,900	7,043	9,833	5,283	7,375
Challenger 300	33,750	3,022	5,792	5,037	9,653	3,778	7,240
Falcon 10	17,640	3,207	3,689	5,345	6,148	4,009	4,611
Falcon 2000	33,000	3,607	4,148	6,012	6,913	4,509	5,185
Gulfstream 200	30,000	4,568	5,253	7,613	8,755	5,710	6,566
Gulfstream 100	20,700	4,245	7,634	7,075	12,723	5,306	9,543
Hawker 750	23,350	3,099	5,117	5,165	8,528	3,874	6,396
Hawker 900 XP	23,350	3,099	4,982	5,165	8,303	3,874	6,228
King Air 200 GT	12,500	1,496	No Data	2,493	No Data	1,870	No Data
King Air 350	15,000	3,498	4,023	5,830	6,705	4,373	5,029
King Air 1900D	16,765	3,676	4,228	6,127	7,047	4,595	5,285
Lear 31A	16,000	3,663	5,861	6,105	9,768	4,579	7,326
Pilatus PC-12	9,921	2,310	No Data	3,850	No Data	2,888	No Data
Premier 1A	11,600	4,171	5,515	6,952	9,192	5,214	6,894
Average Landing Length		**3,692**	**5,802**	**6,154**	**9,669**	**4,615**	**7,252**

Runway length calculation assumptions: 6,690 MSL field elevation; 83.3° F ambient temperature; 1.0% runway grade
Green = Adequate runway length available; Red = Inadequate runway length available
MLW – Maximum Landing Weight
Source: Ultranav software

The landing length analysis shows that aircraft operating at maximum landing weight (MLW) under Part 135 rules needing to land within 60 percent of the effective runway length during wet conditions is the most restrictive with some aircraft, such as the Cessna Citation Bravo and Gulfstream 100, needing over 12,000 feet. The average length needed for this category is approximately 9,700 feet. As shown in the table, turboprop aircraft are not as adversely affected by wet or contaminated runway conditions as jet aircraft. Therefore, turboprop aircraft often require less runway length than jet aircraft under wet runway conditions.

As previously noted, the FAA will typically only support runway length planning to the 60 percent useful load factor unless it can be demonstrated that business jets are frequently operating fully loaded (90 percent). At H.A. Clark Memorial Field, most business aircraft are not able to take off on Runway 18-36 at or above 60 percent useful load. The analysis for landing length shows that most business jets that utilize the airport can be accommodated under Part 25 and Part 91k. Although the runway can accommodate some aircraft under Part 135 (dry conditions), the average length needed is approximately 6,150 feet. When factoring in wet conditions, the landing length increases, and many exceed the current runway length. Accumulations of snow and ice will also dramatically increase landing length requirements. The landing length analysis shows an average landing length of 7,250 feet for aircraft operating under CFR Part 91k during wet conditions and an average landing length of 9,670 feet for aircraft operating under CFR Part 135 during wet runway conditions.

Runway Length Summary

Many factors are considered when determining appropriate runway length for safe and efficient operations of aircraft at H.A. Clark Memorial Field. The airport should strive to accommodate business jets to the greatest extent possible as demand would dictate. Runway 18-36 is currently 6,000 feet long and can accommodate most business jets currently operating at the airport, especially with shorter trip lengths and during cool to warm temperatures. However, the analysis shows that during hot days and at useful loads of 60 percent or greater, many aircraft are subject to weight restrictions, while others may not be able to operate at all.

Aircraft such as the King Air 90 and the Pilatus PC-12 can operate at their maximum takeoff weight even during the hottest periods of the summer. Based on the data presented in **Tables 3E and 3F**, the Citation CJ3, is likely to be weight-restricted during the hot summer periods and may require additional runway length to operate at higher useful loads.

Justification for any runway extension to meet the needs of business jets would require regular use on the order of 500 annual itinerant operations. This is the minimum threshold required to qualify as the runway's critical aircraft to obtain FAA grant funding assistance. While the data shows that the existing length of primary Runway 18-36 does not fully provide for all jet activity, especially during hot weather conditions and/or when jet aircraft are carrying full useful loads, it is sufficient for the current critical design aircraft, while the ultimate critical design aircraft may be weight-restricted during hot or wet/slippery conditions. Larger business jets do operate at the airport on occasion, but do not currently operate more than 500 times annually. Therefore, an extension to Runway 18-36 is not likely to be approved for FAA grant funding in the near term. However, long term operations could potentially shift towards higher usage by larger business jets; thus, various runway lengths up to 8,100 feet will be examined during the Alternatives chapter of this master plan.

Runway Width

Runway width design standards are based primarily on the airport's critical aircraft but can also be influenced by the visibility minimums of published instrument approach procedures. Under existing conditions RDC B-II-VIS, the runway width required is 75 feet. The runway's current width is 100 feet, which helps to provide a margin of safety. The ultimate RDC for Runway 18-36 is B-II-4000, for which FAA design criteria requires a minimum runway width of 75 feet.

At 100 feet, the current width of the runway exceeds the standard. Ultimate RDC B-II design criteria calls for a width of 75 feet for design aircraft. The 100 feet of width will continue to provide added safety enhancements for these operations. As such, it is recommended that the existing width of Runway 18-36 be maintained in the future. Although, it should be noted that the FAA could elect to only fund maintenance of up to 75 feet in width while the remaining width would need to be covered by ADOT and/or through a local funding source such as the City of Williams.

Runway Strength

An important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. Runways are issued strength ratings by the FAA, which are based on design parameters that support a high volume of aircraft at or below the published weight, allowing the pavement to survive its intended useful life. However, the strength rating of a runway does not preclude aircraft weighing more than the published strength rating from using the runway. Aircraft weighing more than the published weight could damage the runway in severe conditions, but more likely will simply reduce the life cycle of the pavement.

All federally obligated airports must remain open to the public, and it is typically up to the pilot of the aircraft to determine if a runway can support their aircraft safely. An airport sponsor cannot restrict an aircraft from using the runway simply because its weight exceeds the published strength rating. On the other hand, an airport sponsor has an obligation to properly maintain the runway and protect the useful life of the runway, typically for 20 years.

According to the previously approved ALP, the strength rating for Runway 18-36 is 15,000 pounds for single wheel loading (S). Ultimately, for a B-II runway routinely serving aircraft exceeding 12,500 lbs, the airport should consider 30,000 single wheel loading (S) and 60,000 dual wheel loading (D) strength rating.

Runway Markings

Runway markings are typically designed to the type of instrument approach available on the runway. FAA AC 150/5340-1M, *Standards for Airport Markings*, provides guidance necessary to design airport markings.

Although the runway is not currently equipped with any instrument approaches, it is equipped non-precision instrument markings. Because the airport is planned for an instrument approach in the future, these markings should be maintained throughout the planning horizon.

RUNWAY DESIGN STANDARDS

The FAA has established several safety surfaces to protect aircraft operational areas and keep them free from obstructions that could affect their safe operation. These include the runway safety area (RSA), runway object free area (ROFA), runway obstacle free zone (ROFZ), and runway protection zone (RPZ). **Table 3G** presents the applicable design standards for the runway.

TABLE 3G | Runway Design Standards
H.A. Clark Memorial Field

	Runway 18-36 Existing	Runway 18-36 Ultimate
Runway Design Code	B-II-VIS	B-II-4000
Visibility Minimums	Visual	≥ ¾-mile
RUNWAY DESIGN		
*Runway Safety Area**		
Width	150	150
Length Beyond Departure End	300	300
Length Prior to Threshold	300	300
*Runway Object Free Area**		
Width	500	500
Length Beyond Departure End*	300	300
Length Prior to Threshold*	300	300
Runway Obstacle Free Zone		
Width	400	400
Length Beyond Runway End	200	200
*Approach Runway Protection Zone (RPZ)***		
Inner Width	500	1,000
Outer Width	700	1,510
Length	1,000	1,700
*Departure Runway Protection Zone (RPZ)***		
Inner Width	500	500
Outer Width	700	700
Length	1,000	1,000
RUNWAY SEPARATION		
Runway Centerline to:		
Parallel Taxiway	240	240
Hold Line Markings	200	200
Aircraft Parking Apron	250	250

Note: All dimensions in feet unless otherwise noted.
* Existing RSA and ROFA extend beyond current airport property boundaries
** Existing and ultimate RPZs extend beyond current airport property boundaries

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

The entire RSA, ROFZ, and ROFA should be under the direct control of the airport sponsor to ensure these areas remain free of obstacles and can be readily accessed by maintenance and emergency personnel. It is not required that the RPZ be under airport ownership, but it is strongly recommended. An alternative to fee-simple ownership of the RPZ is the purchase of avigation easements (acquiring control of designated airspace within the RPZ) or have sufficient land use control measures in place which ensure the RPZ remains free of incompatible development. **Exhibit 3B** depicts the existing and ultimate safety areas.

Dimensional standards for the various safety areas associated with the runway are a function of the type of aircraft (ARC) expected to use the runway, as well as the approved instrument approach visibility minimums. At the airport, Runway 18-36 has an existing RDC of B-II-VIS and a planned ultimate RDC of B-II-4000.

Runway Safety Area (RSA)

The RSA is defined in FAA AC 150/5300-13A, *Airport Design,* as a "surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of undershoot, overshoot, or excursion from the runway." The RSA is centered on the runway and dimensioned in accordance with the approach speed of the critical design aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose, such as runway edge lights or approach lights.

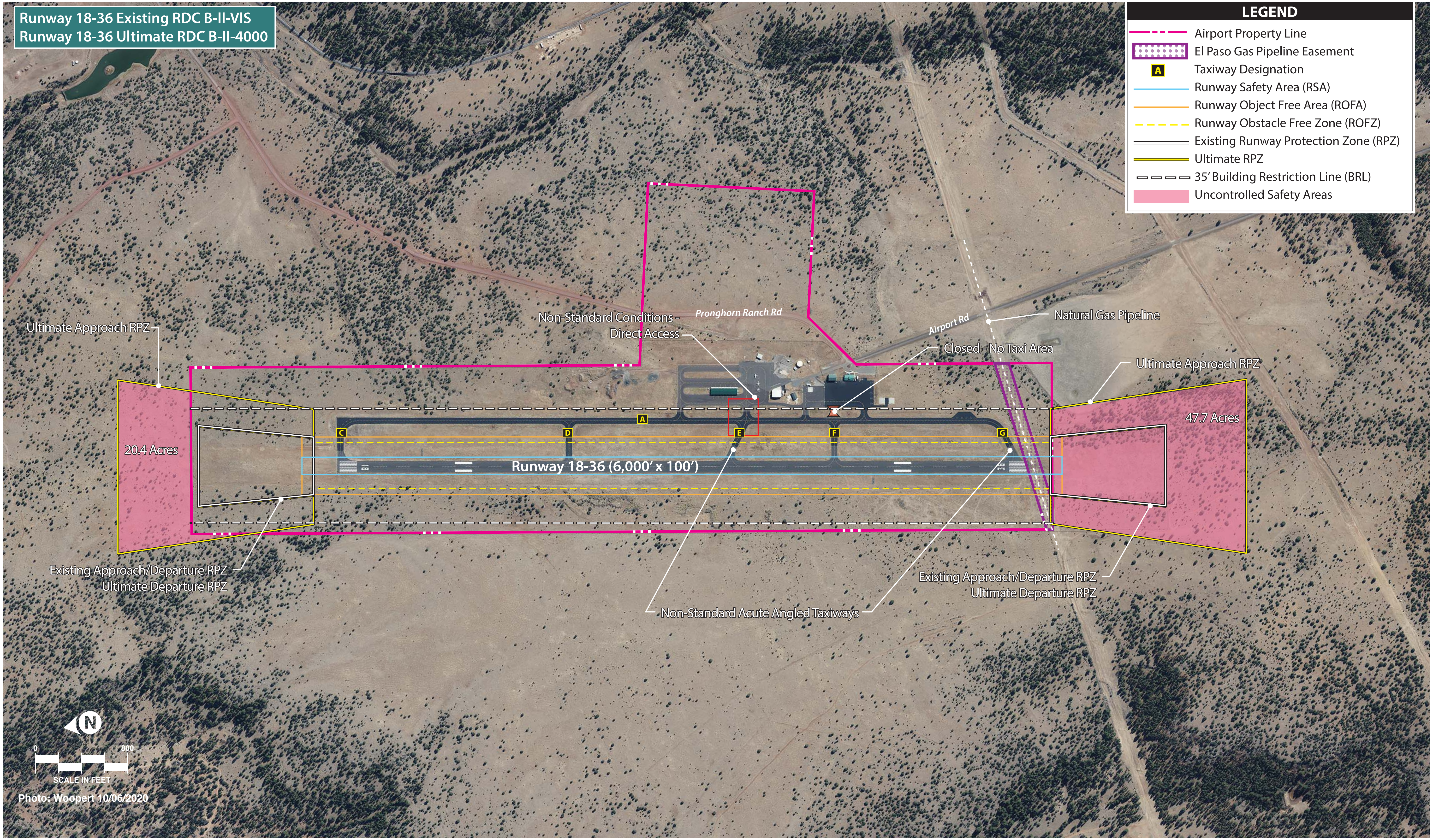
The FAA has placed a higher significance on maintaining adequate RSA at all airports. Under Order 5200.8, effective October 1, 1999, the FAA established the *Runway Safety Area Program.* The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

Under existing B-II-VIS conditions, the RSA serving Runway 18-36 is 150 feet wide centered on runway centerline and 300 feet beyond each end of the runway. Under ultimate RDC B-II-4000 conditions, the RSA will remain the same. As depicted on **Exhibit 3B**, an examination of the RSA for this runway under existing and ultimate conditions revealed that a portion of the RSA extends approximately 100 feet beyond the airport property line, south of the Runway 36 threshold. FAA recommends that airport sponsors control all portions of the RSA associated with the runway by simple ownership of the property. As such, the airport should seek to acquire the property within the existing and ultimate RSA.

Runway Object Free Area (ROFA)

The ROFA is "a two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The ROFA does not have to be graded and level like the RSA; instead, the primary requirement for the ROFA is that no object in the ROFA penetrates the lateral elevation of the RSA. The ROFA is centered on the runway, extending out in accordance with the critical design aircraft utilizing the runway.

For Runway 18-36, under existing RDC B-II design standards with visual approaches only, the ROFA is 500 feet wide and extends 300 feet beyond each end of the runway. For ultimate RDC B-II design standards with approach visibility minimums not lower than ¾-mile, the existing ROFA remains the same. Similar to the RSA, a portion of the ROFA extends approximately 100 feet beyond airport property to the south of the Runway 36 threshold under the existing and ultimate conditions. As such, the airport should acquire this uncontrolled portion of the ROFA at the same time as the RSA.


Runway 18-36 Existing RDC B-II-VIS
Runway 18-36 Ultimate RDC B-II-4000
LEGEND
Airport Property Line
El Paso Gas Pipeline Easement
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Existing Runway Protection Zone (RPZ)
Ultimate RPZ
35' Building Restriction Line (BRL)
Uncontrolled Safety Areas
Ultimate Approach RPZ
Non-Standard Conditions - Direct Access
Pronghorn Ranch Rd
Airport Rd
Natural Gas Pipeline
Closed - No Taxi Area
Ultimate Approach RPZ
20.4 Acres
47.7 Acres
Runway 18-36 (6,000' x 100')
A
C
D
E
F
G
Existing Approach/Departure RPZ
Ultimate Departure RPZ
Existing Approach/Departure RPZ
Ultimate Departure RPZ
Non-Standard Acute Angled Taxiways
N
0
800
SCALE IN FEET
Photo: Woolpert 10/06/2020

Runway Obstacle Free Zone (ROFZ)

The ROFZ is an imaginary volume of airspace which precludes object penetrations, including taxiing and parked aircraft. The only allowance for ROFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The ROFZ is established to ensure the safety of aircraft operations. If the ROFZ is obstructed, an airport's approaches could be removed, or approach minimums could be increased.

The FAA's criterion for runways utilized by aircraft weighing more than 12,500 pounds requires a clear ROFZ to extend 200 feet beyond the runway ends and be 400 feet wide (200 feet on either side of the runway centerline). The ROFZ standards are currently met on Runway 18-36 and should be maintained as such.

Runway Protection Zone (RPZ)

The RPZ is a trapezoidal area centered on the runway, beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses, in order to enhance the protection of people and property on the ground. The RPZ is comprised of the central portion of the RPZ and the controlled activity area. The central portion of the RPZ extends from the beginning to the end of the RPZ, is centered on the runway, and is the width of the ROFA. The controlled activity area is any remaining portions of the RPZ. The dimensions of the RPZ vary per the visibility minimums serving the runway and the type of aircraft (design aircraft) operating on the runway.

While the RPZ is intended to be clear of incompatible objects or land uses, some uses are permitted with conditions and other land uses are prohibited. According to AC 150/5300-13A, the following land uses are permissible within the RPZ:

- Farming that meets the minimum buffer requirements;
- Irrigation channels as long as they do not attract birds;
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator;
- Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable; and,
- Unstaffed navigational aids (NAVAIDs) and facilities, such as required for airport facilities that are fixed by function in regard to the RPZ.

Any other land uses considered within RPZ land owned by the airport sponsor must be evaluated and approved by the FAA Office of Airports. The FAA has published *Interim Guidance on Land Uses Within a Runway Protection Zone* (September 2012), which identifies several potential land uses that must be evaluated and approved prior to implementation. The specific land uses requiring FAA evaluation and approval include:

- Buildings and structures. Examples include, but are not limited to residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.;
- Recreational land use. Examples include, but are not limited to golf courses, sports fields, amusement parks, other places of public assembly, etc.;

- Transportation facilities. Examples include, but are not limited to:
    - Rail facilities - light or heavy, passenger or freight,
    - Public roads/highways, and
    - Vehicular parking facilities;
- Fuel storage facilities (above and below ground);
- Hazardous material storage (above and below ground);
- Wastewater treatment facilities; and,
- Above-ground utility infrastructure (i.e., electrical substations), including any type of solar panel installations.

The *Interim Guidance on Land within a Runway Protection Zone* states, "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Currently, the RPZ review standards are applicable to any new or modified RPZ. The following actions or events could alter the size of an RPZ, potentially introducing an incompatibility:

- An airfield project (e.g., runway extension, runway shift),
- A change in the critical design aircraft that increases the RPZ dimensions,
- A new or revised instrument approach procedure that increases the size of the RPZ, and/or
- A local development proposal in the RPZ (either new or reconfigured).

Since the interim guidance only addresses a new or modified RPZ, existing incompatibilities are generally (but not always) grandfathered under certain circumstances. While it is still necessary for the airport sponsor to take all reasonable actions to meet the RPZ design standard, FAA funding priority for certain actions, such as relocating existing roads in the RPZ, will be determined on a case-by-case basis.

RPZs have been further designated as approach and departure RPZs. The approach RPZ is a function of the Aircraft Approach Category (AAC) and approach visibility minimums associated with the approach runway end. The departure RPZ is a function of the AAC and departure procedures associated with the runway. For a particular runway end, the more stringent RPZ requirements (usually associated with the approach RPZ) will govern the property interests and clearing requirements that the airport sponsor should pursue.

The existing RDC B-II-VIS approach and departure RPZs associated with the Runway 18 end are located within the airport property line, but the RPZs south of Runway 36 extend beyond the airport property line and encompass approximately 13.9 acres on public land surrounding the airport. The City of Williams should acquire the property either by simple fee acquisition or obtain an avigation easement to protect the approach area. **Figure 3A** depicts the existing RPZs for Runway 18-36

Figure 3A: Runway Protection Zones - Existing B-II-VIS

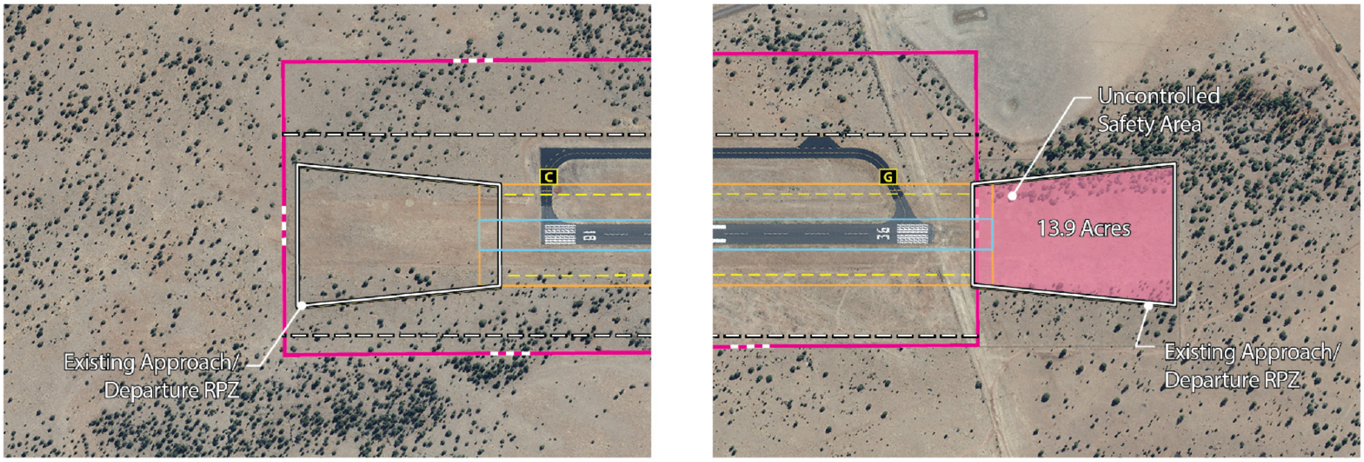
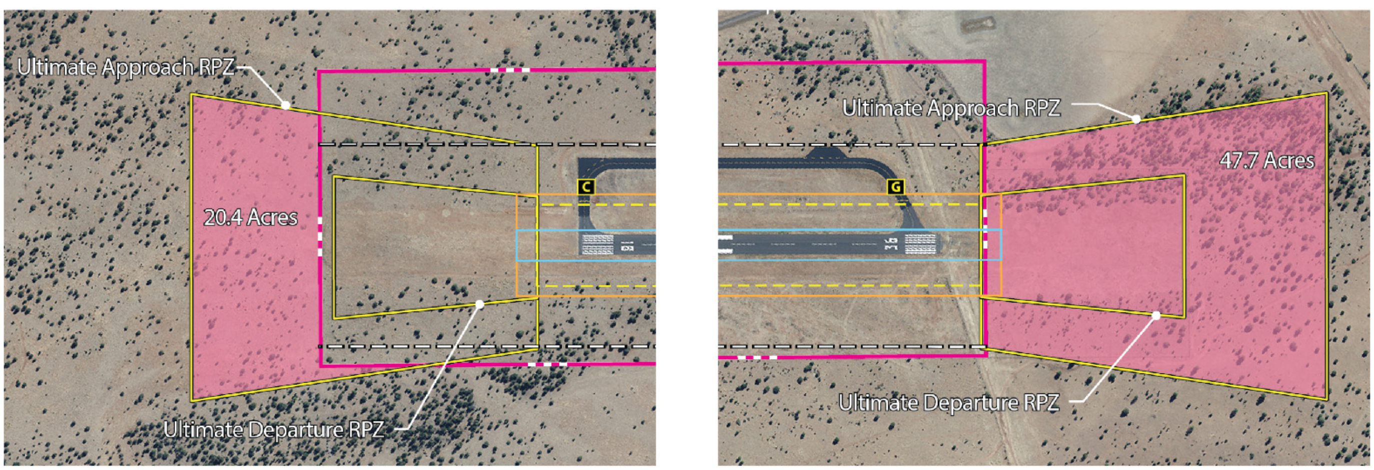


Figure 3B depicts the RPZs associated with ultimate RDC B-II-4000 runway conditions. These RPZs are significantly larger due to the instrument approach procedures which allow aircraft to land in visibility conditions as low as ¾-mile. The approach RPZs expand significantly on both ends of the runway. To the south, the airport should consider the acquisition of fee simple property interests or an avigation easement over approximately 47.7 acres of land. Similarly, to the north approximately 20.4 acres would ultimately need to be controlled for approach protection.

Figure 3B: Runway Protection Zones - B-II-4000



Building Restriction Line (BRL)

The BRL identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the ROFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria.

Two primary factors contribute to the determination of the BRL: type of runway (“utility” or “other-than-utility”) and the capability of the instrument approaches. Runway 18-36 is an “other than utility” runway that currently has visual-only approaches to each runway end. The BRL is the product of CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, defined as being 500 feet wide for other-than-utility runways having either visual or non-precision instrument approaches with visibility minimums greater than ¾- mile. The primary surface determines the location from which the transitional surface begins. From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet. At H.A. Clark Memorial Field, the 35-foot BRL is set at 495 feet from centerline, as depicted on **Exhibit 3B**. Presently, all landside facilities are located outside of the BRL.

As stated, the capability of the instrument approaches impacts the location of the BRL. Improved instrument approaches with lower visibility minimums are being evaluated at CMR. The approach being considered would likely be a GPS approach requiring no additional navigational equipment at the airport. Potentially, under what is known as a (LPV [localizer performance with vertical guidance] GPS with not lower than ¾ mile visibility minimums) could be possible but will not impact the existing BRL as Runway 18-36 would still be considered a non-precision runway. It should be noted that if an instrument approach with visibility minimums of lower than ¾-mile are pursued for Runway 18-36 in the future, the primary surface would increase to 1,000 feet wide. This would result in shifting the BRL to 745 feet from the Runway 18-36 centerline. No approaches below ¾-mile visibility are being considered at this time.

Runway/Taxiway Separation

The design standard for the separation between runways and parallel taxiways is a function of the critical design aircraft and the instrument approach visibility minimum. The separation standard for existing B-II-VIS and ultimate RDC B-II-4000 is 240 feet from the runway centerline to the parallel taxiway centerline. Parallel Taxiway A serving Runway 18-36 is currently 400 feet from the runway; therefore, the current location of the taxiway exceeds the separation standards for current and long-term design conditions and should be maintained if possible.

Much like the situation described previously relating to runway width, the 400 feet of separation between the runway and the taxiway exceeds the existing and ultimate design standards identified by the master plan. The separation does provide enhanced safety on the airfield but may not be eligible to receive FAA funding to maintain the additional pavement necessary to maintain the current separation distance in the future.

Hold Line Separation

Holding position markings are placed on taxiways leading to runways. When approaching the runway, pilots should stop short of the holding position marking line. FAA design standards call for hold lines to be 200 feet from runway centerline for B-II runways with visual approaches as well as runways with approach minimums not lower than ¾-mile. The FAA also recommends that hold lines be parallel with the runway so that a pilot is fully perpendicular to the runway with a clear, unobstructed view of the entire runway length.

At H.A. Clark Memorial Field, hold lines have been recently relocated to 216 feet from the runway centerline on all connector taxiways as part of a taxiway rehabilitation project. The hold lines are parallel to the runway centerline and meet FAA separation requirements.

Aircraft Parking Apron Separation

Under existing and ultimate conditions, aircraft parking areas should be at least 250 feet from the Runway 18-36 centerline. Currently, all aircraft parking areas exceed this standard as over 500 feet of separation exists between the runway and any designated aircraft parking apron to the east. The airport should ensure these separation standards are maintained in compliance with FAA regulations should additional apron areas be considered (to be discussed in the Landside Facility Requirement section).

TAXIWAYS

The design standards associated with taxiways are determined by the Taxiway Design Group (TDG) or the Airplane Design Group (ADG) of the critical design aircraft. As determined previously, the applicable ADG for Runway 18-36 is ADG II. **Table 3H** presents the taxiway design standards related to ADG II.

TABLE 3H | Taxiway Dimensions and Standards
H.A. Clark Memorial Field

STANDARDS BASED ON WINGSPAN	ADG II
Taxiway Protection	
Taxiway Safety Area width (feet)	79
Taxiway Object Free Area width (feet)	131
Taxilane Object Free Area width (feet)	115
Taxiway Separation	
Taxiway Centerline to:	
Fixed or Movable Object (feet)	65.5
Parallel Taxiway/Taxilane (feet)	105
Taxilane Centerline to:	
Fixed or Movable Object (feet)	57.5
Parallel Taxilane (feet)	97
Wingtip Clearance:	
Taxiway Wingtip Clearance (feet)	26
Taxilane Wingtip Clearance (feet)	18
STANDARDS BASED ON TDG	**TDG 2**
Taxiway Width Standard (feet)	35
Taxiway Edge Safety Margin (feet)	7.5
Taxiway Shoulder Width (feet)	15

ADG: Airplane Design Group
TDG: Taxiway Design Group

Source: FAA AC 150/5300-13A, Change 1, Airport Design

The table also shows those taxiway design standards related to TDG. The TDG standards are based on the main gear width (MGW) and cockpit to main gear (CMG) distance of the critical design aircraft expected to use those taxiways. Different taxiway and taxilane pavements can and should be planned to the most appropriate TDG design standards based on usage.

The current taxiway design for Runway 18-36 is TDG 2. As such, the taxiways supporting Runway 18-36 must be at least 35 feet wide, currently the taxiway width of Taxiway A and each connector taxiway is 50 feet, which exceeds the standard. The 50 feet of width will continue to provide added safety enhancements for aircraft operations. If possible, it is recommended that the existing taxiway width be maintained in the future. Again, it should be noted that the FAA could elect to only fund maintenance of up to 35 feet in width while the remaining width would need to be covered by the ADOT and/or through a local funding source such as the City of Williams.

Taxiway Design Considerations

FAA AC 150/5300-13A, Change 1, *Airport Design*, provides guidance on recommended taxiway and taxi-lane layouts to enhance safety by avoiding runway incursions. A runway incursion is defined as "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The taxiway system at CMR generally provides for the efficient movement of aircraft; however, AC 150/5300-13A, Change 1, *Airport Design*, provides recommendations for taxiway design. The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation.

Taxi Method: Taxiways are designed for "cockpit over centerline" taxiing with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate "judgmental oversteering," which is where the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.

Steering Angle: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.

Three-Node Concept: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right- and left-angle turns and a continuation straight ahead.

Intersection Angles: Turns should be designed to 90 degrees wherever possible. For acute-angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

Runway Incursions: Taxiways should be designed to reduce the probability of runway incursions.

- *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three node" concept.
- *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
- *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
- *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
- *Increase Visibility*: Right-angle intersections, both between taxiways and runways, provide the best visibility. Acute-angle runway exits provide for greater efficiency in runway usage but should not be used as runway entrance or crossing points. A right-angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.

- *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
- *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
- *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

Runway/Taxiway Intersections:

- *Right-Angle*: Right-angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs so they are visible to pilots.
- *Acute-Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
- *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

Taxiway/Runway/Apron Incursion Prevention: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.

- *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and make lighting and marking more difficult.
- *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
- *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, Change 1, *Airport Design*, states that "existing taxiway geometry should be improved whenever feasible, with emphasis on designated 'hot spots.'" Currently, there are no hot spots published by the FAA at H.A. Clark Memorial Field.
Primarily, the taxiway system at CMR meets the recommended design and geometry standards set forth by the FAA. However, there are certain non-standard conditions that include:

- Acute angled Taxiway G and Taxiway E are non-standard and not justified for airport capacity needs.
- Taxiway E provides direct access from the local aircraft parking apron to Runway 18-36.

In the Alternatives chapter, potential solutions to any non-standard condition will be presented. Analysis in the next chapter will also consider improvements which could be implemented on the airfield to minimize runway incursion potential, improve efficiency, and better conform to FAA standards for taxiway design.

Taxilane Design Considerations

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas. As a result, taxilanes can be designed to varying design standards depending on the type of aircraft utilizing the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft typically accessing a T-hangar. The Alternatives chapter will consider various designs for improving the safe movement of aircraft via taxilanes as hangar and apron facilities expand over time.

NAVIGATIONAL AND APPROACH AIDS

Navigational aids are devices that provide pilots with guidance and position information when utilizing the runway system. Electronic and visual guidance to arriving aircraft enhance the safety and capacity of the airfield. Such facilities are vital to the success of an airport and provide additional safety to passengers using the air transportation system. While instrument approach aids are especially helpful during poor weather, they are often used by pilots conducting flight training and operating larger aircraft when visibility is good.

Instrument Approach Aids

Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids provide an exact course alignment and vertical descent path for an aircraft on final approach to a runway, while non-precision instrument approach aids provide only course alignment information. In the past, most precision instrument approaches in the United States have been implemented via the instrument landing system (ILS); however, with advances in global positioning system (GPS) technology, it can now be used to provide both vertical and lateral navigation for pilots under certain conditions.

H.A. Clark Memorial does not currently offer any instrument approach procedures but is expected to be evaluated for one by the FAA as early as the summer of 2021. As a basic general aviation airport, visibility minimums as low as 1-mile are common. However, the airport does experience some operations by cabin class aircraft and adding an LPV GPS approach to the runway could bring visibility minimums down to not lower than ¾-mile. This option will be discussed further in the next chapter.

Visual Approach Aids

In most instances, the landing phase of any flight must be conducted in visual conditions. To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. The most common visual approach aids at airports include the visual approach slope indicator (VASI) and precision approach path indicator (PAPI). Currently, Runway 18-36 is equipped with two-box PAPIs. These approach aids should be maintained throughout the planning period. Consideration should be given to upgrading the PAPI to a four light system if instrument approaches are installed and the airport experiences increased activity by larger aircraft including turboprops and business jets.

Runway end identification lights (REILs) are flashing lights located at the runway threshold end that facilitate rapid identification of the runway end at night and during poor visibility conditions. They provide pilots with the ability to identify the runway thresholds and distinguish the runway end lighting from other lighting on the airport and in the approach areas. Runway 18-36 is equipped with REILs and should be maintained throughout the planning horizon.

Weather Reporting Aids

CMR has a segmented circle west of the Runway 36 end, as well as two supplemental wind cones. The segmented circle provides local traffic patterns and wind cones provide information to pilots regarding wind speed and direction and should be maintained throughout the planning period. Consideration should be given to lighting the supplemental wind cones located on the airfield.

The airport is equipped with an AWOS-III, which provides weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. This information is then transmitted on radio frequency 121.125 MHz. In addition, pilots and individuals can call a published telephone number (928-635-1278) and receive the information via an automated voice recording. The AWOS-III should be maintained through the planning period.

AIRFIELD LIGHTING AND SIGNAGE

The location of the airport at night is universally indicated by a rotating beacon. The beacon is located north of the airport terminal building on the east side of Runway 18-36. The beacon should be maintained through the planning period.

Runway lighting provides the pilot with positive identification of the runway and its alignment. The runway is served by medium intensity runway lighting (MIRL), and medium intensity taxiway lighting (MITL) is provided on the taxiways. This system is vital for safe and efficient ground movements. Light emitting diode (LED) technology, which has many advantages, including lower energy consumption, longer lifetime, tougher construction, reduced size, greater reliability, and faster switching, should be considered for any existing incandescent lights. Elevated edge reflectors are in several of the more remote locations around the aircraft parling and storage areas and should be maintained or upgraded to MITL in the future.

Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Lighted signs are installed on the runway and taxiway system on the airfield. The signage system includes runway and taxiway designations. All signs should be maintained throughout the planning period, and consideration should be given to gradually replacing all lighted signs with LED technology, as necessary.

AIRFIELD FACILITY REQUIREMENTS SUMMARY

A summary of the airside facilities projected to be needed at H.A. Clark Memorial Field is presented on **Exhibit 3C**.

LANDSIDE FACILITY REQUIREMENTS

Landside facilities are those necessary for the handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacity of the various components of each element was examined in relation to projected demand to identify future landside facility needs. At H.A. Clark Memorial Field, this includes components for general aviation needs such as:

- General Aviation Terminal Facilities and Auto Parking
- Aircraft Storage Hangars
- Aircraft Parking Aprons
- Airport Support Facilities

In addition to landside facility requirements, potential non-aeronautical land uses will also be evaluated. These are portions of airport property that are suitable for non-aviation purposes and can generate revenue for the airport, such as agriculture or industrial. While airport property is generally subject to Airport Improvements Program (AIP) grant assurances, airports can request a release of federal obligations for certain areas of property that are not necessary for aviation uses. These requests are facilitated under the *FAA Reauthorization Act of 2018*, Section 163, which governs the FAA's authority over non-aeronautical development.

Presently, there are several areas within airport property that could potentially be used for non-aviation purposes. The next chapter will highlight these areas and discuss Section 163 in more detail.

GENERAL AVIATION TERMINAL FACILITIES AND AUTO PARKING

General aviation terminal facilities have several functions. Space is required for a pilots' lounge, flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by fixed base operators (FBOs) for these functions and services. Currently, general aviation terminal services are provided within the airport terminal building, and includes a pilots' lounge and waiting area, a conference room, weather computer, and restrooms.

CATEGORY	EXISTING	ULTIMATE
Runway	**Runway 18-36**	**Runway 18-36**
Runway Design Code	RDC B-II-VIS	Evaluate RDC B-II-4000
Length	6,000'	Analyze extension up to 8,100'
Width*	100'	Maintain
Pavement Strength	15,000 (S)	30,000 (S) / 60,000 (D)
Safety Areas		
RSA	Portions of RSA extend beyond airport property	Acquire fee simple acquisition for RSA and ROFA
ROFA	Portions of ROFA extend beyond airport property	
RPZ	Runway 36 approach / departure RPZs extend beyond existing airport property line	Acquire property interests for RPZ
Taxiways		
Design Group	TDG 2	Maintain
Width*	50'	All taxiways associated with Runway 18-36 maintain at least 35' wide
Parallel Taxiway Separation*	400'	Maintain
Holding Bay	Non-standard holding bay serving Runway 18-36	Redesign or remove holding bay
Taxiway Geometry	Non-standard conditions associated with Taxiway E (direct access) and Taxiways E and G (acute angled taxiways)	Examine taxiway system for safety, efficiency, and proper geometry
Navigational and Approach Aids		
Instrument Approaches	No instrument approach procedures available	Evaluate GPS approach procedures to 3/4-mile visibility minimums
Weather Aids	AWOS-III	Maintain
	Windcones	Maintain
	Segmented Circle	Maintain
Approach Aids	PAPI-2	Maintain (Consider PAPI-4)
	REILs	Maintain
Lighting, Marking, and Signage		
Identification	Rotating Beacon	Maintain
Runway Lighting	MIRL	Maintain (Consider LED technology)
Taxiway Lighting	MITL	Transition elevated edge reflectors to MITL (Consider LED technology)
Runway Marking	Non-Precision Markings	Maintain
Holding Positions	216' from runway centerline	Maintain
Signage	Lighted airfield signs	Maintain (Consider LED technology)

*Exceeds design standards and therefore may not be eligible to receive AIP funding to maintain current condition

KEY

RDC - Runway Design Code
RSA - Runway Safety Area
ROFA - Runway Object Free Area
ROFZ - Runway Object Free Zone
RPZ - Runway Protection Zone
GPS - Global Positioning System
LED - Light Emitting Diode
AWOS - Automated Weather Observation System
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
REIL - Runway End Identification Light
PAPI - Precision Approach Path Indicator
S - Single Wheel Loading
D - Double Wheel Loading

Exhibit 3C
AIRSIDE FACILITY REQUIREMENTS

The methodology used in estimating general aviation terminal facility needs was based upon the number of airport users expected to utilize general aviation facilities during the design hour. Space requirements for terminal facilities were based on providing 125 square feet per design hour itinerant passenger. A multiplier of 2.7 in the short term, increasing to 3.0 in the long term, was also applied to terminal facility needs in order to better determine the number of passengers associated with each itinerant aircraft operation. This increasing multiplier indicates an expected increase in business and recreational operations through the long-term. These operations often support larger turboprop and jet aircraft, which accommodate an increasing passenger load factor.

Table 3J outlines the space requirements for general aviation terminal services at the airport through the long-term planning period. As shown in the table, up to 1,900 square feet of space could be needed in the long term for general aviation passengers. The amount of space currently offered by the terminal building is estimated at 4,200 square feet, which is adequate over the planning period and should be maintained.

TABLE 3J | General Aviation Terminal Area Facilities
H.A. Clark Memorial Field

	Available	Short Term	Intermediate Term	Long Term
Terminal Services Building (sf)	4,200	1,000	1,000	1,900
Design Hour Passengers	5	8	8	15
Passenger Multiplier	2.5	2.7	2.8	3
Total Vehicle Parking Spaces	**27**	**15**	**18**	**27**

Source: Coffman Associates analysis

General aviation vehicular parking demands have also been determined for H.A. Clark Memorial. Currently, there are approximately 27 vehicle parking spaces adjacent to the terminal building. Other airfield tenants typically park at their own hangars. Space determinations for itinerant passengers were based on an evaluation of existing airport use, as well as standards set forth to help calculate projected terminal facility needs. The parking requirements of based aircraft owners should also be considered. Although some owners prefer to park their vehicles in their hangar, safety can be compromised when automobile and aircraft movements are intermixed. For this reason, separate parking requirements, which consider one-half of based aircraft at the airport, were applied to general aviation automobile parking space requirements. Utilizing this methodology, parking requirements for general aviation activity call for 15 spaces in the short term, increasing to 27 spaces in the long-term planning horizon. This analysis concludes that general aviation parking spaces currently available at the airport are adequate to meet the long-term needs.

AIRCRAFT STORAGE HANGARS

Utilization of hangar space varies as a function of local climate, security, and owner preferences. The trend in general aviation aircraft, whether single or multi-engine, is toward more sophisticated aircraft (and, consequently, more expensive aircraft); therefore, many aircraft owners prefer enclosed hangar space to outside tiedowns.

The demand for aircraft storage hangars is dependent upon the number and type of aircraft expected to be based at the airport in the future. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, actual hangar construction should be based upon actual demand trends and financial investment conditions.

It is important to note that the types of hangars detailed in this section are categorized based on the proposed size and layout of the facility, and do not necessarily correspond with the locally designated hangar facility categories. For example, certain categories, such as T-hangars and linear box hangars, can be grouped into the same category. Other hangar types, such as condominium box hangars, aircraft storage hangars, FBO, and specialized aviation service operator (SASO) hangars, correspond to conventional style hangars detailed in this section.

There are a variety of aircraft storage options typically available at an airport, including shade hangars, T-hangars, linear box hangars, executive/box hangars, and bulk storage conventional hangars. Shade hangars are the most basic form of aircraft protection and are common in warmer climates. These structures provide a roof covering, but no walls or doors. There are no shade hangars at H.A Clark Memorial Field.

T-hangars are intended to accommodate one small single engine piston aircraft or, in some cases, one multi-engine piston aircraft. T-hangars are so named because they are in the shape of a "T," providing a space for the aircraft nose and wings, but no space for turning the aircraft within the hangar. Basically, the aircraft can be parked in only one position. T-hangars are commonly "nested" with several individual storage units to maximize hangar space. In these cases, taxiway access is needed on both sides of the nested T-hangar facility. T-hangars are popular with aircraft owners with tighter budgets as they tend to be the least expensive enclosed hangar space to build and lease. There is currently one 10-unit T-hangar facility at the airport, totaling 13,000 square feet (sf) of aircraft storage capacity.

Executive/box hangars and conventional hangars are the larger, clear span hangars typically located facing the main aircraft apron at airports. These hangars provide for bulk aircraft storage and are often utilized by airport businesses, such as an FBO and/or SASOs (an aircraft maintenance business, for example). Executive hangars generally range in size from 1,500 sf to 10,000 sf, while conventional hangars are typically larger than 10,000 sf. Often, a portion of a conventional hangar is utilized for non-aircraft storage needs, such as maintenance or office space. There are two executive hangars at the airport encompassing approximately 6,400 sf. There are currently no conventional hangars at the airport.

Planning for future aircraft storage needs is based on typical owner preferences and standard sizes for hangar space. For determining future aircraft storage needs, a planning standard of 1,200 square feet per single-engine piston aircraft and 1,500 square feet per multi-engine piston aircraft is utilized for T-hangars. For conventional hangars, a planning standard of 3,000 square feet is utilized for turboprop aircraft, 5,000 square feet is utilized for business jet aircraft, and 1,500 square feet is utilized for helicopter storage needs.

At present, H.A. Clark Memorial Field has a total of 12 based aircraft. Currently, there are no hangars available for lease as all are currently occupied. Providing a mix of aircraft storage options is preferred when planning storage needs in order to meet the varied needs of aircraft owners. **Table 3K** provides a summary of the aircraft storage needs through the long-term planning horizon.

TABLE 3K | Aircraft Hangar Requirements
H.A. Clark Memorial Field

	Available	Short Term	Intermediate Term	Long Term	Needed Capacity
Total Based Aircraft to be Hangared	12	14	17	23	
Hangar Area Requirements					
T-Hangar Area (sf)	13,000	15,400	16,600	21,400	8,400
Executive/Conventional Hangar Area (sf)	6,400	6,400	9,400	12,400	6,000
Service/Maintenance Area (sf)	0	1,800	3,900	6,800	6,800
Total Hangar Area (sf)	**19,400**	**23,600**	**29,900**	**40,600**	**21,200**

* Open box hangar is included in Executive Hangar area calculations
Source: Coffman Associates analysis

Future hangar requirements indicate that there is a potential need for approximately 14,400 square feet of combined T-hangar and executive/conventional hangar storage capacity. In addition, approximately 6,800 square feet could be needed for aircraft service and maintenance for a total hangar space requirement of 21,200 square feet through the long-term planning period. Due to the projected increase in based aircraft, annual general aviation operations, and hangar storage needs, facility planning will consider additional hangars at the airport. It is expected that the aircraft storage hangar requirements will continue to be met through a combination of hangar types. The largest need could involve the construction of conventional-style hangars that are better suited to accommodate larger turboprop and jet aircraft. T-hangar storage space requirements are also projected to grow over time as new piston-driven aircraft base at the airport.

It should be noted that hangar requirements are general in nature and based on the aviation demand forecasts. The actual need for hangar space will further depend on the actual usage within hangars. For example, some hangars may be utilized entirely for non-aircraft storage, such as maintenance; yet from a planning standpoint, they have an aircraft storage capacity. Therefore, the needs of an individual user may differ from the calculated space necessary.

AIRCRAFT PARKING APRONS

The aircraft parking apron is an expanse of paved area intended for aircraft parking and circulation. Typically, a main apron is centrally located near the airside entry point, such as the terminal building or FBO facility. Ideally, the main apron is large enough to accommodate transient airport users as well as a portion of locally based aircraft. Often, smaller aprons are available adjacent to FBO or SASO hangars and at other locations around the airport. The apron layout at H.A. Clark Memorial Field generally follows this typical pattern.

The combined aircraft parking and movement areas at H.A. Clark Memorial totals approximately 43,600 square yards (sy). A planning criterion of 800 square yards was used for single and multi-engine itinerant aircraft, while a planning criterion of 1,600 square yards was used to determine the area for transient turboprop and jet aircraft. A parking apron should also provide space for locally based aircraft that require temporary tiedown storage. Locally based tiedowns typically will be utilized by smaller single engine aircraft; thus, a planning standard of 650 square yards per position is utilized.

The total apron parking requirements are presented in **Table 3L**. Currently, the existing parking aprons encompass approximately 43,600 sy of space. This is divided among three aprons: the transient apron (14,600 sy), the local apron north of the terminal area (11,000 sy), and the apron serving the T-hangars (18,000 sy). Available apron space is sufficient to meet long-term needs of general aviation (GA) activity at the airport.

TABLE 3L | Aircraft Parking Apron Requirements
H.A. Clark Memorial Field

	Available	Short Term	Intermediate Term	Long Term
Aircraft Positions				
Based/Local GA Aircraft	8	8	8	8
Transient GA Aircraft	5	4	4	6
Corporate Jet Aircraft	0	1	1	2
Total Parking Positions	**13***	**13**	**13**	**16**
Total Apron Area (sy)	**43,600**	**9,400**	**9,400**	**13,200**

*Available parking accounts for marking parking positions only

Source: Coffman Associates analysis

There are currently 13 marked positions available for based and itinerant aircraft at the airport, eight located on the local apron and five located on the transient apron. As shown in the table, 16 marked tiedown positions could be needed through the planning period of this study.

In addition to fixed-wing aircraft parking, there are two 50’x50’ dedicated helicopter parking locations providing a total of 400 square feet of helicopter parking area. Helicopter operations should be segregated to the extent practicable to increase safety and efficiency of aircraft parking aprons. The helicopter parking locations currently available at the airport should be sufficient throughout the long-term planning horizon.

POTENTIAL COMMERCIAL PASSENGER TERMINAL FACILITIES

Components of the passenger terminal area complex include the terminal building, gate positions, aircraft apron area, vehicle parking, and surface access roads. Based upon the potential commercial enplanements and operations analysis conducted in Chapter Two, this section identifies potential passenger terminal facilities required to meet a scenario of 10,000 enplanements composed of approximately 5,000 commercial service enplanements and 5,000 air tour enplanements. The premise of this scenario is that, at some point in the future, H.A. Clark Memorial Field could attract a scheduled commercial operator and/or air tour operator(s). It is important to note that this passenger terminal complex requirements analysis is based entirely on theoretical enplanement and operations levels. The purpose of this section is simply to provide the City of Williams with an idea of what types and sizes of facilities would be needed should commercial services demand reach this level at the airport.

The review of the capacity and requirements for various terminal complex functional areas was performed with guidance from FAA AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. Airport Passenger Terminal Planning and Design, Report 25, published by the Airport Cooperative Research Program (ACRP), was also sourced. **Table 3M** summarizes the future capacity requirements for the terminal building.

Passenger terminal building requirements were developed for the following functional areas:

- Airline Ticketing and Operations
- Security Screening
- Departure Facilities
- Baggage Claim
- Terminal Services – Rental Cars and Concessions
- Public Use Areas – Restrooms and Lobby Areas
- Administration/Support
- Internal Facilities – Circulation, Mechanical, and HVAC

TABLE 3M | Potential Terminal Building Requirements
H.A. Clark Memorial Field

	Potential Need
Terminal Building Requirements	
Ticketing/Check-In	
No. of Agent Positions	1
Counter Frontage (lf)	6
Ticket Lobby Queue (sf)	80
Ticket Office (sf)	250
Outbound Baggage (sf)	290
Subtotal Ticketing/Check-in	**620**
Airline Operations (sf)	
Counter Area	70
Airline Ops/Makeup	250
Subtotal Airline Operations	**320**
Security Screening	
Security Checkpoints	1
Checkpoint Station Area (sf)	360
Security Queue Area (sf)	50
Security Office Space (sf)	700
Subtotal Security Checkpoint (sf)	**1,110**
Departure Facilities	
Peak Occupants	15
Holdroom Area (sf)	630
Baggage Claim	
Claim Display (lf)	10
In-Bound Baggage	120
Claim Display Floor Area (sf)	50
Claim Lobby Area (sf)	180
Subtotal Bag Claim Area (sf)	**230**
Rental Car Counters	
Counter Frontage (lf)	3
Counter Office Area (sf)	50
Counter Queue Area (sf)	20
Subtotal Rental Car Area (sf)	**70**
Concessions (sf)	
Food and Beverage	120
Gift Shops	80
Subtotal Concessions	**200**
Public Waiting Lobby/Circulation (sf)	
Total Public Waiting Lobby/Circulation	840
Restrooms (sf)	
Total Restroom Area	140
SUBTOTAL FUNCTIONAL SPACE	**4,160**
Internal Facilities	
HVAC/Mechanical/Stairwells (sf)	340
GROSS TERMINAL BUILDING SPACE (SF)	**4,500**
lf: linear feet sf: square feet	

Source: Coffman Associates analysis

Ticketing and Check-In

The first destination for enplaning passengers in the terminal building is usually the airline ticket counter. The ticketing area consists of the ticket counters, queuing area for passengers in line at the counters, and the ticket lobby which provides circulation.

The ticket lobby should be arranged so that the enplaning passenger has immediate access and clear visibility to the individual airline ticket counters upon entering the building. Circulation patterns should allow the option of bypassing the counters with minimum interference. Provisions for seating should be minimal to avoid congestion and to encourage passengers to proceed to the security checkpoint and gate area. Airline ticket counter frontage, counter area, counter queuing area, ticketing lobby, and airline office and operations area requirements for the potential enplanement level have been calculated.

Under a scenario of 10,000 annual enplanements, a maximum of one ticket agent positions would be needed, requiring approximately 6 feet of linear ticket counter space. A ticket counter of this size would necessitate an estimated 80 square feet of queue area. All total, approximately 620 square feet of ticketing/check-in area would be needed.

Airline Operations

The airline operations area encompasses all space necessary for the processing of passengers and baggage. This includes the area behind the ticket counter, offices, and baggage make-up and storage areas. In total, the airline operations area would need to encompass approximately 320 square feet of space.

Security Screening

Security screening requirements are subject to Transportation Security Administration (TSA) regulations, and the level of security may be changed by TSA security directive if unusual levels of threat are perceived. The screening checkpoints are a regulated requirement and must be designed to meet the TSA mandates for operational space and equipment support as specified in TSA's Security Checkpoint Design Guide, February 2006.

The security checkpoint area can be functionally divided into three components: checkpoints, checkpoint area, and queue area. The appropriate size for the checkpoint area, where actual passenger screening takes place, is estimated by providing 360 square feet per checkpoint station. It is anticipated that one station will be needed.

The security checkpoint queue is the area that accommodates passengers as they wait in line to be screened. The queue line is calculated by providing 16 square feet per design hour enplaning passenger. Ultimate planning forecasts 50 square feet to be needed for the security line queue.

Space in the terminal building should also be provided for TSA personnel. This office space should be located away from the security screening functions. Potential planning considers 700 square feet of TSA office space per available security checkpoint. In the future, at least 700 square feet of office space could be provided for TSA office functions. Altogether, it is estimated that 1,100 square feet could be needed for security and security checkpoints under the given potential enplanement level.

Departure Gates and Holdroom

The need for jetways is dependent upon the airline schedule and type of aircraft serving an airport. Under this enplanement scenario, within one hour, it is estimated that one aircraft may need access to a gate.

The secure holdroom is the waiting area for passengers who have completed the screening process and are waiting to board the aircraft. Holdroom space is calculated at 15 square feet per peak hour enplaned passenger plus 350 square feet per gate. For the commercial service analysis at H.A. Clark Memorial Field, the potential peak hour is 15 passengers; therefore, a holdroom of approximately 630 square feet is needed.

Baggage Claim

The passenger arrival process consists primarily of those facilities and functions that reunite the arriving passengers with their checked baggage. Passenger baggage claim facilities are estimated at 60 percent of peak hour deplaning passengers. The potential claim display need is 10 linear feet of baggage claim carousel.

The inbound baggage unloading area is designed to allow ground support equipment to pull into a covered sally-port where baggage is offloaded onto the baggage claim carousel. Potential inbound baggage unloading area needs are estimated at 12 square feet per linear foot of baggage carousel frontage need. This results in an estimated need of 120 square feet.

Baggage claim floor area is calculated at five square feet per linear foot of claim display (carousel length). Based upon the 10,000 annual enplanement level, it is estimated that 50 square feet would be needed at peak periods.

The baggage claim lobby is determined by taking into consideration the number of deplaning passengers during the peak hour and the estimated number of visitors greeting arriving passengers. This planning scenario estimates a total area of approximately 180 square feet to be needed for the baggage claim area.

Terminal Services

Similar to airline ticketing, rental car counter facilities include office, counter area, and queue areas. Rental car facilities could provide approximately three linear feet of counter space, 50 square feet of office space, and 20 square feet for queuing area. Combined, rental car facilities would consist of an estimated 70 square feet.

In addition, many terminal buildings will provide food, beverage, and gift shop concessions in the unsecured and/or secured areas of the terminal building. Calculations for concessions are based primarily on annual enplanements. Under the estimated 10,000 annual enplanement scenario, total concessions area could include approximately 200 square feet.

Public Waiting and Greeting Lobby/Circulation

The public lobby and circulation areas are where passengers or visitors may comfortably relax while waiting for arrivals or departures. The greeting lobby area is typically immediately outside security stations. In today's post-9/11 environment, visitors must remain outside the secure departure areas, so a public lobby is important. Public waiting and greeting lobby areas are based upon design hour passengers. For planning purposes, 35 square feet is allotted for 80 percent of the total design hour passengers. Based upon these planning techniques, approximately 840 square feet could be needed for public areas.

Restrooms

Restrooms should be planned for both the public areas and the secure areas of the terminal building. Potential public restroom space is a function of total peak hour passengers and visitors at the airport. The public restroom facilities should be planned at an estimated 140 square feet.

Internal Facilities

Internal facilities include mechanical/HVAC functions and stairwells. Potential needs for circulation are estimated at 11 percent of the total programmed terminal building space. Any additions to the terminal building should also take into consideration the needs of the internal facilities.

Commercial Airline Terminal Building Requirements Summary

Altogether, under a 10,000 annual enplanement scenario, gross terminal building space requirements total an estimated 4,500 square feet. It should be noted that terminal building space requirements are purely scenario-based and are for advisory purposes only. Future planning will consider passenger terminal functions at the airport.

Terminal Access Roadway

The capacity of the airport access and terminal area roadways is the maximum number of vehicles that can pass over a given section of a lane or roadway during a given time period. It is normally preferred that a roadway operates below capacity to provide reasonable flow and minimize delay to the vehicles using it. Thus, prudent planning should be exercised when planning the location and roadway access to a potential future terminal building. Alternative analysis in the next chapter will further analyze this roadway access improvement based upon potential terminal locations.

Terminal Curb Frontage and Vehicle Parking

The curb element is the interface between the terminal building and the ground transportation system. The length of curb required for the loading and unloading of passengers and baggage is determined by the type and volume of ground vehicles anticipated in the peak period on the design day.

A typical problem for terminal curb capacity is the length of dwell time for vehicles utilizing the curb. At airports where the curb front has not been strictly patrolled, vehicles have been known to be parked at the curb while the driver and/or riders are inside the terminal checking in, greeting arriving passengers, or awaiting baggage pick-up. Since most curbs are not designed for vehicles to remain curbside for more than two to three minutes, capacity problems can ensue. Since the events of 9/11, most airports police the curb front much more strictly for security reasons. This alone has reduced the curb front capacity problems at most airports.

TABLE 3N | Airline Terminal Vehicle Requirements H.A. Clark Memorial Field

Terminal Curb	
Enplane Curb (ft)	20
Deplane Curb (ft)	50
Total Curb (ft)	70
Auto Parking	
Total Public Parking	58
Employee	7
Rental Car	3
Total All Parking	**68**

Potential enplaning curb length needs are estimated at 90 percent of peak hour enplanements, while potential deplaning curb needs are estimated at 105 percent of peak hour enplanements. **Table 3N** presents the terminal curb requirements as they would apply to the potential 10,000 annual enplanement scenario.

Vehicle parking in the airline passenger terminal area of an airport includes those spaces utilized by passengers, visitors, and employees of the airline terminal facilities. Parking spaces are classified as public, employee, and rental car. Calculations of vehicle parking needs take into consideration estimates of the mode of transportation to and from the airport, peak hour enplanements, and annual enplanements. For H.A. Clark Memorial Field, it is estimated that 85 percent of passengers would arrive/depart by private automobile, 10 percent would utilize rental car services, and five percent would utilize a taxi service. Employee parking space requirements are estimated at five percent of total private automobile space requirements. Potential terminal parking requirements are shown in **Table 3N**. Future planning should consider approximately 68 spaces to best accommodate potential commercial service activities detailed earlier in this study.

Title 14 CFR Part 139 Certification of Airports

Based upon the potential commercial passenger service scenario presented previously in this study, H.A. Clark Memorial Field would be required to become a Title 14 CFR Part 139 certificated airport in order to accommodate this demand segment. The regulation (which implemented provisions of the *Airport and Airway Development Act of 1970*, as amended November 27,1971) set standards for the marking and lighting of areas used for operations, firefighting and rescue equipment and services, the handling and storing of hazardous materials, the identification of obstructions, and safety inspection and reporting procedures.

The Title 14 CFR part 139 requirements applicable under this potential scenario relate to the type of aircraft serving the airport. To define the airport's class, it is important to understand the distinction between the definition of large and small air carrier aircraft.

- A large air carrier aircraft is designed for 31 passenger seats or more.
- A small air carrier aircraft is designed for 10 to 30 passenger seats.

It should be noted that Title 14 CFR Part 139 requirements do not apply to airports served by scheduled air carrier aircraft with nine seats or less and/or unscheduled air carrier aircraft with 30 seats or less.

Title 14 CFR part 139 defines four airport classifications as follows:

- **Class I** – an airport certificated to serve scheduled operations of large air carrier aircraft that also can serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft. A Class I airport may serve any class of air carrier operations.
- **Class II** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.
- **Class III** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.
- **Class IV** - an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

H.A. Clark Memorial Field's classification will depend upon what types of commercial operations are being conducted. The scenarios previously identified would classify the facility as a Class III or IV airport.

AIRPORT SUPPORT FACILITIES

Various other landside facilities that play a supporting role in overall airport operations have also been identified. These support functions include facilities related to fuel storage, aircraft rescue and firefighting (ARFF), maintenance, utilities, and security.

Fuel Storage

Fuel at the airport is provided by the FBO and stored in two locations, with capacities of 12,000 gallons for 100LL which is stored in a fuel tank on the field, and 4,000 gallons for Jet A fuel which is stored between two 2,000-gallon fuel delivery trucks. Based on historic fuel flowage records from the last three years provided by the FBO, the airport pumped an average of 3,225 gallons of Jet A and 26,915 gallons of 100LL annually. Dividing the total fuel flowage by the total number of operations provides a ratio of fuel flowage per operation. Between 2018 and 2020, the airport pumped approximately 0.5 gallons of Jet A per operation and 4.14 gallons of 100LL per operation. It is anticipated that, over the course of the planning period, the Jet A flowage ratio will increase slightly as the airport accommodates larger jets and the 100LL flowage ratio will remain static.

Maintaining a 14-day fuel supply would allow the airport to limit the impact of a disruption of fuel delivery. Currently, the airport has enough static fuel storage to meet the 14-day supply criteria for both Jet A and 100LL fuel. Based on these usage assumptions and projected design day operations, no additional storage for either Jet A or 100LL is projected to be needed. It would be recommended that the storage of Jet A fuel be maintained in a dedicated fuel storage tank similar to how 100LL is currently stored. **Table 3P** summarizes the forecasted fuel storage requirements through the planning period.

TABLE 3P | Fuel Storage Requirements
H.A. Clark Memorial Field

			PLANNING HORIZON		
	Available	Current Need*	Short Term	Intermediate Term	Long Term
Jet A					
Daily Usage (gal.)	4,000	9	10	20	30
14-Day Supply (gal.)		200	200	300	400
Annual Usage (gal.)		3,224	3,700	7,300	11,000
100LL					
Daily Usage (gal.)	12,000	70	120	160	210
14-Day Supply (gal.)		1,700	1,700	2,300	2,900
Annual Usage (gal.)		26,915	43,800	58,400	76,700
*Current need reflects average of last three years' fuel flowage.					

Sources: Historic fuel flowage data provided by the airport; fuel supply projections prepared by Coffman Associates.

Aircraft Rescue and Firefighting

Presently, there is no dedicated ARFF facility at the airport, although firefighting and emergency equipment is stored in a garage on airport property. Requirements for ARFF services at an airport are established under Title 14 CFR Part 139, which applies to the certification and operation of airports served by any scheduled or unscheduled passenger operation of an air carrier using an aircraft with more than nine seats. Since the airport is not a Part 139 facility, an on-site ARFF facility is neither required nor justified. At present, emergency services are provided by the Williams Volunteer Fire Department.

Maintenance Facilities

There is a dedicated airport maintenance and equipment storage building which also serves to house the airports firefighting equipment. The maintenance building space available meets the current need. If the airport grows significantly to a point where current storage is inadequate the airport could consider the addition of additional buildings specifically dedicated to the storage of airport maintenance equipment.

Utilities

The availability and capacity of the utilities serving the airport are important factors in determining the development potential of the airport property, as well as the land immediately adjacent to the facility. The airport is not connected to city water and sewer services. Ultimately, the availability of water, gas, sewer, and power sources are of primary concern when assessing available utilities. Given the forecast potential for future landside facility growth, the utility infrastructure serving the airport may need to be expanded to serve future development.

Perimeter Fencing and Gates

Perimeter fencing is used at airports primarily to secure the aircraft operational area and reduce wildlife incursions. The physical barrier of perimeter fencing has the following functions:

- Gives notice of the legal boundary of the outermost limits of a facility or security-sensitive area.
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion-detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Optimizes the use of security personnel, while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security.
- Limits inadvertent access to the aircraft operations area by wildlife.

H.A. Clark Memorial Field has 8-foot chain-link fencing with three strands of barbed wire around the airport's perimeter. The fencing should be maintained throughout the planning horizon.

LANDSIDE FACILITY REQUIREMENTS SUMMARY

A summary of the landside facilities projected to be needed at H.A. Clark Memorial Field is presented on **Exhibit 3D**.

SUMMARY

This chapter has outlined the safety design standards and facilities required to meet potential aviation demand projected at H.A. Clark Memorial Field for the next 20 years. In an effort to provide a more flexible airport master plan, the yearly forecasts from Chapter Two have been converted to planning horizon levels. The short term roughly corresponds to a five-year timeframe, the intermediate term is approximately 10 years, and the long term is 20 years. By utilizing planning horizons, the City of Williams and airport management can focus on demand indicators for initiating projects and grant requests rather than on specific dates in the future.

In the next chapter, potential improvements to the airside and landside systems will be examined through a series of development alternatives. Landside development will be separated into aeronautical and non-aeronautical uses, including options for the airport to enhance revenue streams through non-aviation uses. Most of the alternatives discussion will focus on those capital improvements that would be eligible for federal and state grant funds. Other projects of local concern will also be presented. Ultimately, an overall development plan that presents a vision beyond the 20-year scope of this airport master plan will be developed for H.A. Clark Memorial Field.

Aircraft Storage Hangar Requirements

	Available	Short Term	Intermediate Term	Long Term
T-Hangar Area (sf)	13,000	15,400	16,600	21,400
Executive/Conventional Hangar Area (sf)	6,400	6,400	9,400	12,400
Service/Maintenance Area (sf)	0	1,800	3,900	6,800
Total Hangar Area (sf)	**19,400**	**23,600**	**29,900**	**40,600**

Aircraft Parking Apron

	Available	Short Term	Intermediate Term	Long Term
Total Parking Positions	13	13	13	16
Total Apron Area (sy)	43,600	9,400	9,400	13,200

General Aviation Terminal Area Facilities and Parking

	Available	Short Term	Intermediate Term	Long Term
Terminal Services Building (sf)	4,200	1,000	1,000	1,900
Total Vehicle Parking Spaces	27	15	18	27

Support Facilities

	Available	Short Term	Intermediate Term	Long Term
14-Day Supply (gal.) - 100LL	12,000	1,700	2,300	2,900
14-Day Supply (gal.) - Jet A*	4,000	200	300	400

* Recommend installation of permanent Jet A fuel storage tank

Exhibit 3D
LANDSIDE FACILITY REQUIREMENTS

Chapter Four

Airport Alternatives

H.A. Clark

Memorial Field

Airport Master Plan

Chapter Four
Airport Alternatives

In the previous chapter, airport facilities required to satisfy the demand through the long-range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. The purpose of this chapter is to formulate and examine rational airport development alternatives that can address the short-, intermediate-, and long-term planning horizon levels. Because there are a multitude of possibilities and combinations, it is necessary to focus on those opportunities which have the greatest potential for success. Each alternative provides a differing approach to meet existing and future facility needs, and these layouts are presented for purposes of evaluation.

Airports require careful planning to ensure long-term viability. Some airports become constrained due to limited space (property) availability, while others may become constrained due to encroachment of adjacent land use development. Thoughtful consideration should be given to the layout of future facilities and impacts they could have on potential airfield improvements at H.A. Clark Memorial Field (CMR), especially those related to the runway and taxiway system and the property availability for landside development. Proper planning at this time will ensure the viability of the airport for both aviation and economic growth.

The primary goal of this planning process is to develop a realistic plan for meeting the needs resulting from the projected market demand over the next 20 years. The plan of action should be developed in a manner that is consistent with the future goals and objectives of the City of Williams, airport users, and local citizens, who have a vested interest in the development and operation of H.A. Clark Memorial Field.

The purpose of this chapter is to develop the underlying rationale which supports the final recommended development concept. Through this process, an evaluation of the highest and best uses of airport property will be made, while also weighing local development goals, physical and environmental constraints, and appropriate airport design standards.

The development alternatives for H.A. Clark Memorial Field can be categorized into two functional areas: airside (runways, taxiways, navigational aids, etc.) and landside (hangars, parking aprons, terminal area, and vehicle parking, etc.). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of airport property to provide revenue support for the airport, and to benefit the economic well-being of the community and surrounding region, must be considered.

Each functional area interrelates and affects the development potential of the other. Therefore, all relevant airside and landside areas are examined individually, and then combined, to ensure the final plan is functional, efficient, and cost-effective. The total impact of all these functional areas on the existing airport must be evaluated to determine if investment in the airport will meet the needs of the community, both during and beyond the 20-year planning period of this master plan.



The alternatives presented in this chapter are developed to meet projected aviation demand and comply with Federal Aviation Administration (FAA) design standards to the greatest extent practicable. While capital outlays necessary to implement a plan are important, the alternative analysis completed here will not limit or judge reasonable development plans based on projected costs. The investment necessary for each alternative is not considered at this point to ensure that the final plan first meets the needs of the airport and its users. The approach is intended to ensure that the best plan is put forth, not the lowest cost plan. Only where a project cost would be extraordinarily high is it considered as a limiting factor. Once a final plan is developed, cost estimates will be developed for each individual project considered during the next 20 years.

Through coordination with the City of Williams, the Planning Advisory Committee (PAC), and the public, an alternative, or combination of two or more alternatives, will be refined and modified as necessary into a recommended development concept. Therefore, the alternatives presented in this chapter can be considered a starting point in the evolution of a recommended development concept for the future of the airport.

NON-DEVELOPMENT ALTERNATIVES

Prior to the presentation of development alternatives for H.A Clark Memorial Field, there are non-development options that should be considered. Non-development alternatives include a “no-build” or “do-nothing” alternative, development of a new replacement airport at a new location, or closure of the existing airport and the transfer of services to another existing airport. The following presents a discussion of the three primary non-development alternatives and the impact of pursuing each.

NO-BUILD/DO-NOTHING ALTERNATIVE

The no-build alternative essentially considers making no new capital investments in the airport. Limited maintenance and upkeep would continue so that the airport remains safe for aviation activity. No new hangars or apron area would be planned to be built by the airport sponsor; however, this would not, and could not, include the prohibition of hangar construction by a private entity. The obvious result of the no-build alternative is that the airport would be unable to accommodate forecasted demand for aviation services in the area.

The primary reason a community might choose a no-build alternative is to ultimately not be bound by the grant assurances associated with the acceptance of airport development grants. Grant assurances are part of the grant package contract that the airport sponsor commits to when accepting a development grant from the FAA. As such, airport sponsors are bound to maintain the useful life of the facilities developed or equipment acquired for an airport development project. Useful life is a term not to exceed twenty (20) years from the date of acceptance of a grant offer of federal (FAA) funds for a project. There is no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal (FAA) funds.

The unavoidable consequence of the no-build alternative is that the capability of the airport would diminish over time. H.A. Clark Memorial Field's ability to serve as a local general aviation airport for the City of Williams and the surrounding area would deteriorate. This would lead to diminished activity levels and, ultimately, negatively impact the local and regional economy. Safety concerns would arise, especially if necessary and routine maintenance was deferred and the liability for damage to aircraft or accidents would increase. The long-term consequences of the no-build alternative would be to reduce the quality of the existing airport facilities over time, producing undesirable results. This scenario would result in an overall unpleasant experience for businesses, regular users, and visitors.

H.A. Clark Memorial Field has received more than $7.5 million in FAA and Arizona Department of Transportation – Aeronautics Group (ADOT) development grants since 2007. These grants represent a direct economic stimulus that has lasting positive economic impacts. The City has a vested interest in maintaining and improving airport facilities for business and general aviation users. Without a commitment to ongoing improvement of the airport, users of the airport will be constrained from taking full advantage of the airport's air transportation capabilities.

RELOCATE AIRPORT ALTERNATIVE

This option considers constructing a new airport to replace the existing airport. The new airport would have to be completed prior to closure of the existing airport. Additional studies beyond the scope of this master plan would be required. These would include a feasibility study, a site selection study, a master plan for the replacement site, and appropriate environmental documentation of the new site (typically an environmental assessment [EA] or environmental impact statement [EIS]).

An important consideration is the potential cost associated with both constructing a new airport and closing the existing airport. A broad estimate for constructing a replacement airport is in the hundreds of millions of dollars to construct a new airport with similar capabilities as the existing airport.

A more detailed analysis would need to be undertaken to identify an acceptable site and to refine the project cost estimates. A large portion of the development costs would be eligible for FAA grant funding. Typically, non-revenue-producing facilities to be located within the airport property line are eligible for FAA funding. New terminal buildings are eligible for FAA grant funding; however, funding eligibility is restricted to public use areas only. Elements outside the property line, such as utility extensions and surface roads, and other privatized facilities are not eligible for funding. Moreover, the City could have other financial costs, such as the cost of retiring existing leases with private or public entities. As an example, a fixed base operator (FBO) could need to be compensated for its facilities and, in some cases, loss of business, potentially resulting in costs extending into millions of dollars.

Often the trigger for pursuing a replacement airport is encroachment upon the existing airport to the point where it can no longer fulfill its role in the national aviation system. The airport is not being encroached upon because surrounding property is part of the Kaibab National Forest. In its current location, the airport is capable of serving its existing and future aviation users.

If a replacement airport feasibility study were to be undertaken, a detailed analysis should identify a site capable of developing equivalent airside and landside facilities that exist at H.A. Clark Memorial Field today, while providing convenient access to the local and regional service areas.

TRANSFER SERVICE TO ANOTHER AIRPORT ALTERNATIVE

The feasibility of transferring services to an alternate airport relies on answering two primary questions: first, is a capable alternative airport reasonably located to accommodate the airport's primary service area and, second, can a nearby airport accommodate H.A. Clark Memorial Field's existing and projected aviation demand factors? An analysis of regional airports has been completed to determine if transferring aviation demand is reasonable.

There are seven public-use airports within 50 nautical miles of H.A. Clark Memorial Field. These airports include: Valle Airport (40G), Flagstaff Pulliam Airport (KFLG), Sedona Airport (KSEZ), Seligman Airport (P23), Cottonwood Airport (P52), Grand Canyon National Park Airport (KGCN), and Prescott Regional Airport (KPRC). Each of these public-use airports is included in the FAA's *National Plan of Integrated Airport Systems* (NPIAS) and is eligible for FAA funding through the Airport Improvement Program (AIP). These seven airports provide varying levels of aviation services and amenities.

Classified within the NPIAS, as a "Basic" general aviation airport, H.A. Clark Memorial Field's service area is largely driven by aircraft owners/operators and where they choose to base their aircraft. Most of the registered aircraft that are based at the airport belong to owners who reside or work within 10 miles of the airport. None of the other airports in the region are geographically located to provide convenient access to H.A. Clark Memorial Field's primary service area and its users, which would lead to a lower utilization rate and significant economic losses for the local area.

As mentioned, the airport has accepted more than $7.5 million dollars in federal and state development grant funding since 2007, which obligates the airport sponsor, through grant assurances, to maintain the airport as an airport. Closing the existing airport and transferring services to another existing airport would be considered a violation of these grant assurances, requiring repayment of grants not yet fully depreciated. The investments made, as well as the economic benefits received from the airport, both public and private, could not readily be shifted or regenerated to another airport without significant costs/losses.

NON-DEVELOPMENT ALTERNATIVES SUMMARY

The purpose of this master plan is to examine aviation needs at the present-day H.A. Clark Memorial Field over the course of the next 20 years. Therefore, this master plan will examine the needs of the existing airport and will present a program of needed capital improvement projects to cover the scope of the plan. Nonetheless, various non-development alternatives may be considered by the airport sponsor.

Information pertaining to the three most common non-development alternatives has been presented. These are the no-build, relocate/replacement alternatives, and transfer of services. This evaluation is not intended as a recommendation to pursue one of these alternatives; instead, it is for informational purposes only. If the airport sponsor were to pursue one of these alternatives, additional study beyond the scope of this master plan would be required.

Two of the three non-development alternatives would lead to the closure, or a significantly reduced operation, of the existing airport. There is a lengthy process to obtain approval for this course of action. As outlined, the primary hindrance to considering airport closure is the fact that airports have accepted federal development grants that include certain grant assurances, one of which is to maintain the improvement for its useful life (20 years). If an airport is closed in the interim, then the sponsor could be required to refund all or a portion of the past federal investment. Moreover, private investments by any airport operator would also require some form of repayment based on negotiated lease terms. The non-development options are not found to be feasible, practical, or prudent. H.A. Clark Memorial Field is a vibrant facility with abundant growth potential remaining. As such, the non-development alternatives will no longer be considered further in this planning process.

AIRPORT DEVELOPMENT OBJECTIVES

It is the goal of this master plan to produce a safe and efficient airfield, as well as landside facilities, which includes appropriate general aviation terminal space, aircraft storage mix, and aviation businesses to best serve forecast aviation demands. However, before defining and evaluating alternatives, specific airport development objectives will be considered. As owner and operator, the City of Williams provides the overall guidance for the operation and development of the airport. It is of primary concern that the airport is marketed, developed, and operated for the betterment of the community and its users. The following development objectives have been defined for this planning effort:

- Conform to FAA and ADOT design and safety standards, wherever practical, for the mix of aircraft that could potentially use the airport during the 20-year planning period.
- Preserve and protect public and private investments in existing airport facilities.
- Develop a safe, attractive, and efficient aviation facility in accordance with applicable federal, state, and local regulations.
- Provide adequate airport capacity which will meet the long-term planning horizon demand levels (general aviation, aviation businesses, support facilities, and potential return of commercial service).
- Reflect and support the long-term planning efforts currently applicable to the region.
- Identify any future land acquisition needs.
- Develop a facility with a focus on self-sufficiency in both operational and development cost recovery.
- Ensure that future development is environmentally compatible.

REVIEW OF PREVIOUS PLANS

Exhibit 4A depicts the previous Airport Layout Plan (ALP) completed and approved in 2008. The Airport Layout Drawing (ALD) provides information on existing and ultimate conditions at the airport, including:

- Airport data related to airport category, Airport Reference Code (ARC), elevation, wind conditions, temperature, and navigational aids located at the airport.
- Runway data related to the critical design aircraft, safety areas, markings, lighting, and visual and navigational aids associated with the runway and taxiway system.

Additionally, the ALD graphically depicts information and further outlines airside and landside recommendations based upon previous airport planning that include:

- Existing ARC B-II and Ultimate ARC B-III design standards for Runway 18-36.
- Addition of an approach lighting system (ALS) with visibility minimums not lower than 1/2-mile serving Runway 36.
- A 2,000-foot extension to the north end of Runway 18-36.
- Property acquisitions for runway extension and additional landside development through a proposed land exchange with Yavapai County.
- Additional landside development in the form of a maintenance equipment storage facility, hangars, aircraft parking, and support facilities.

The assumptions made and conclusions drawn from the previous planning efforts will be independently evaluated in this master plan. Some elements from the previous planning efforts may continue to be viable and could be included in this planning effort. Other elements may no longer be viable based on changes to design standards (FAA published new design standards in September 2012), changes in the long-term vision for the airport, environmental concerns, and/or financial considerations. The remainder of this chapter will present various alternatives to consider for both the airside and landside development of the airport.

AIRPORT LAND USE PLANNING

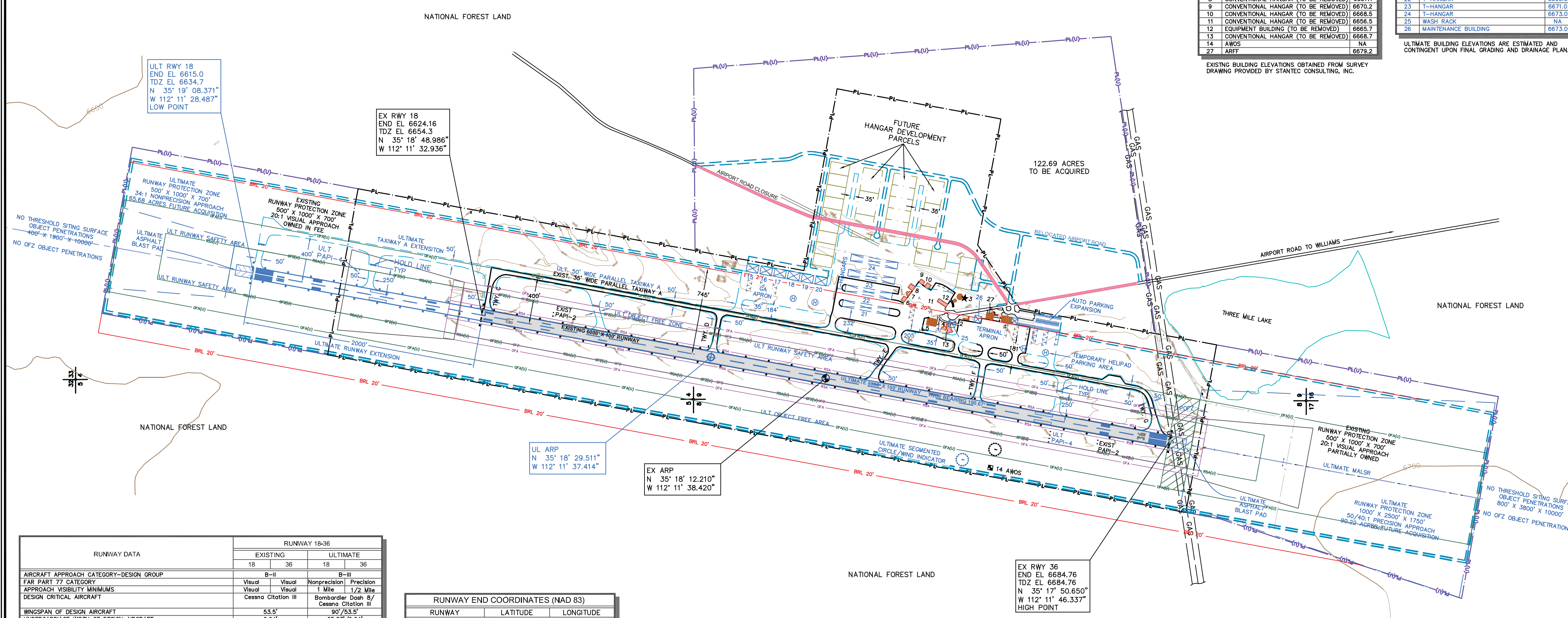
Ultimately, the purpose of the alternatives analysis is to identify specific uses for airport property to create the safest and most efficient operating environment and allow the airport to market itself to developers and businesses so that it can maximize its revenue potential on-airport. Land use planning is a very common practice for communities across the country. The primary purpose of airport land use planning is to adequately plan for future needs in an organized, efficient, and beneficial manner. Airport planning also commonly considers land use planning concepts to ensure that development is orderly, efficient, safe, and maximizes available land inventories.

AIRPORT BUILDING TABLE		
EXIST	DESCRIPTION	TOP ELEV
1	TERMINAL	6670.3
2	FUEL STORAGE	6663.5
3	ROTATING BEACON	6664.6
4	T-HANGAR (TO BE REMOVED)	6665.8
5	AVIATION SVCS. OF NORTHERN ARIZONA	6676.6
6	CONVENTIONAL HANGAR (TO BE REMOVED)	6664.3
7	T-HANGAR (TO BE REMOVED)	6668.7
8	CONVENTIONAL HANGAR (TO BE REMOVED)	6667.1
9	CONVENTIONAL HANGAR (TO BE REMOVED)	6670.2
10	CONVENTIONAL HANGAR (TO BE REMOVED)	6668.5
11	CONVENTIONAL HANGAR (TO BE REMOVED)	6656.5
12	EQUIPMENT BUILDING (TO BE REMOVED)	6665.7
13	CONVENTIONAL HANGAR (TO BE REMOVED)	6668.7
14	AWOS	NA
27	ARFF	6679.2

EXISTNG BUILDING ELEVATIONS OBTAINED FROM SURVEY DRAWING PROVIDED BY STANTEC CONSULTING, INC.

AIRPORT BUILDING TABLE		
ULT	DESCRIPTION	TOP ELEV
15	CONVENTIONAL HANGAR	6665.0
16	CONVENTIONAL HANGAR	6665.0
17	CONVENTIONAL HANGAR	6666.0
18	CONVENTIONAL HANGAR	6667.0
19	CONVENTIONAL HANGAR	6668.0
20	CONVENTIONAL HANGAR	6669.0
21	T-HANGAR	6669.0
22	T-HANGAR	6669.0
23	T-HANGAR	6671.0
24	T-HANGAR	6673.0
25	WASH RACK	NA
26	MAINTENANCE BUILDING	6673.0

ULTIMATE BUILDING ELEVATIONS ARE ESTIMATED AND CONTINGENT UPON FINAL GRADING AND DRAINAGE PLAN.



RUNWAY DATA	RUNWAY 18-36			
	EXISTING		ULTIMATE	
	18	36	18	36
AIRCRAFT APPROACH CATEGORY–DESIGN GROUP	B–II		B–III	
FAR PART 77 CATEGORY	Visual	Visual	Nonprecision	Precision
APPROACH VISIBILITY MINIMUMS	Visual	Visual	1 Mile	1/2 Mile
DESIGN CRITICAL AIRCRAFT	Cessna Citation III		Bombardier Dash 8/ Cessna Citation III	
WINGSPAN OF DESIGN AIRCRAFT	53.5'		90'/53.5'	
UNDERCARRIAGE WIDTH OF DESIGN AIRCRAFT	9.04'		25.83'/9.04'	
APPROACH SPEED (KNOTS) OF DESIGN AIRCRAFT	114		90'/114	
MAXIMUM CERTIFIED TAKEOFF WEIGHT (LBS) OF DESIGN AIRCRAFT	22,000		43,000/22,000	
RUNWAY EFFECTIVE GRADIENT	1.0%		0.9%	
RUNWAY MAXIMUM GRADIENT	1.0%		0.9%	
PAVEMENT DESIGN STRENGTH (in thousand lbs.)[1]	15(S)		30(S), 60(D)	
RUNWAY APPROACH SLOPE	20:1	20:1	34:1	50:1
RUNWAY END ELEVATION (MSL)	6624.5'	6684.7'	6615.0'	6684.7'
RUNWAY TOUCHDOWN ZONE ELEVATION (MSL)	6654.3'	6684.7'	6634.7'	6684.7'
RUNWAY HIGH POINT ELEVATION (MSL)	6684.7'		6684.7'	
RUNWAY LOW POINT ELEVATION (MSL)	6624.5'		6615.0'	
LINE OF SIGHT REQUIREMENT MET	YES		YES	
RUNWAY LENGTH	5992'		8000'	
RUNWAY WIDTH	100'		100'	
RUNWAY BEARING (TRUE)	10.66°	190.67°	10.66°	190.67°
RUNWAY SAFETY AREA LENGTH BEYOND RUNWAY END	300'	300'	800'	800'
RUNWAY SAFETY AREA WIDTH	150'		400'	
RUNWAY OBJECT FREE AREA LENGTH BEYOND RUNWAY END	300'	300'	800'	800'
RUNWAY OBJECT FREE AREA WIDTH	500'		800'	
RUNWAY OBSTACLE FREE ZONE LENGTH BEYOND RUNWAY END	200'	200'	200'	200'
RUNWAY OBSTACLE FREE ZONE WIDTH	400'		400'	
DISTANCE FROM RUNWAY CENTERLINE TO HOLD BARS AND SIGNS	250'		250'	
RUNWAY MARKING	NP	NP	NP	P
STANDARD SEPARATION – RUNWAY CL TO PARALLEL TAXIWAY CL	400'		400'	
STANDARD SEPARATION – TAXIWAY CL TO FIXED OR MOVABLE OBJECT	65.5'		65.5'	
RUNWAY THRESHOLD DISPLACEMENT	0'	0'	0'	0'
RUNWAY SURFACE/PAVEMENT MATERIAL	Asphalt		Asphalt	
RUNWAY PAVEMENT SURFACE TREATMENT	None		None	
RUNWAY LIGHTING	MIRL		MIRL	
TAXIWAY WIDTH	35'		50'	
TAXIWAY SURFACE MATERIAL	Asphalt		Asphalt	
TAXIWAY OBJECT FREE AREA WIDTH	131'		186'	
TAXIWAY SAFETY AREA WIDTH	79'		118'	
TAXIWAY WING TIP CLEARANCE	26'		34'	
TAXIWAY MARKING	Centerline		Centerline	
TAXIWAY LIGHTING	NONE		MITL	
RUNWAY NAVIGATIONAL AIDS	NONE		GPS	
RUNWAY VISUAL AIDS	Rotating Beacon PAPI–2 (18,36) REIL (18,36)		Rotating Beacon MALSR PAPI–4 (18,36) REIL (18,36)	

[1]Pavement strengths are expressed in Single(S), Dual(D), and Dual Tandem (DT) wheel loading capacities.

RUNWAY END COORDINATES (NAD 83)		
RUNWAY	LATITUDE	LONGITUDE
EXISTING RUNWAY 18	35° 18' 48.986" N	112° 11' 32.936" W
ULTIMATE RUNWAY 18	35° 19' 08.371" N	112° 11' 28.487" W
EXISTING RUNWAY 36	35° 17' 50.650" N	112° 11' 46.337" W

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
—PL— · —	—PL(U)— · —	AIRPORT PROPERTY LINE
32|33 5|4	32|33 5|4	SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
★		AIRPORT ROTATING BEACON
		AVIGATION EASEMENT (IF APPLICABLE)
		BUILDING ON AIRPORT
		ABANDON BUILDING
		BUILDING OFF AIRPORT
—BRL 20'—	—BRL 20'—	BUILDING RESTRICTION LINE (BRL)
— x —	— x —	FENCE
		AIRPORT PAVEMENT
Ⓗ		HELICOPTER PARKING SPACE
		HOLD MARKING
— OFA —	— OFA(U) —	OBJECT FREE AREA
— RSA —	— RSA(U) —	RUNWAY SAFETY AREA
— OFZ —	— OFZ(U) —	OBSTACLE FREE ZONE
		PRECISION OBSTACLE FREE ZONE
		RUNWAY PROTECTION ZONE
		MALSR
• • • • PAPI–4	• • • • PAPI–4	PAPI
		RUNWAY THRESHOLD LIGHTS & REIL
		SEGMENTED CIRCLE/WIND INDICATOR
		TIEDOWNS
—6650—	—6650—	TOPOGRAPHY

GENERAL NOTES:

1. HORIZONTAL DATUM: NORTH AMERICAN DATUM 1983 – NAD83; VERTICAL DATUM: NORTH AMERICAN DATUM 1988 – NAVD88.
2. EXISTING AND ULTIMATE RUNWAY COORDINATES AND ELEVATIONS PROVIDED BY STANTEC CONSULTING, INC 12/03/07.
3. THERE ARE NO PRIMARY OR SECONDARY AIRPORT CONTROL STATIONS AT H. A. CLARK MEMORIAL FIELD.
4. NO OFZ PENETRATIONS
5. FENCE LINE EXTENDS ALONG PROPERTY LINE AND WHERE SHOWN.
6. SEE SHEET 2 OF FOR AIRPORT FACILITY IMPROVEMENT DETAILS.

AIRPORT DATA			
OWNER: City of Williams		AIRPORT NPIAS CODE: GA	
CITY: Williams, Arizona		COUNTY: Coconino, Arizona	
RANGE: R 2 E		TOWNSHIP: T22N	
H. A. CLARK MEMORIAL FIELD (CMR)		EXISTING	ULTIMATE
AIRPORT SERVICE LEVEL		GA	Commercial Service
AIRPORT REFERENCE CODE		B–II	B–III
AIRPORT ELEVATION		6684.7' MSL	6684.7' MSL
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		83.7° July	83.7° July
AIRPORT REFERENCE POINT (NAD 83)	Latitude	35° 18' 12.210" N	35° 18' 29.511" N
	Longitude	112° 11' 38.420" W	112° 11' 37.414" W
AIRPORT INSTRUMENT APPROACH		NONE	GPS
NAVAIDS		Airport Beacon AWOS PAPI–4 (18,36) REIL (18, 36)	Airport Beacon GPS, AWOS MALSR (36) PAPI–4 (18,36) REIL (18, 36)
GPS AT AIRPORT		No	Yes

All coordinates are horizontal NAD83 and vertical NAVD88

FOR APPROVAL BY
City of Williams

Mr. Dennis Wells
City Manager
DATE:

FAA APPROVAL STAMP

MAGNETIC NORTH

Magnetic Declination
11° 40 East (February 2008)
Annual Rate of Change
0° 6' West (February 2008)

0 400 800
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D.
2	NEW FENCE LINE: CONNECTOR T/W–WIDEN R/W TO 100'	12/7/01	GJG	RJZ
1	TO REFELCT TERMINAL AREA AND AWOS AS BUILT	4/19/00	BTM	GM

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

H. A. CLARK MEMORIAL FIELD

AIRPORT LAYOUT DRAWING

WILLIAMS, ARIZONA

PLANNED BY: Eric S. Pfeifer
DETAILED BY: Diana L. Hopkins
APPROVED BY: Christopher M. Hugunin

February 2008 | SHEET 1 OF 12

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates R:\CAD\HopkinsD\MP\CMR (H A Clark)\ALP\CMR ALD.dwg Printed Date: 2-13-08 04:06:56 PM DHopkins

Exhibit 4A
2008 AIRPORT LAYOUT DRAWING

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An airport land use plan has been prepared for future development at H.A. Clark Memorial Field. This is a simple plan based on separation of activity levels and historic development, and it should be taken in the intent it was developed – to serve simply as a guide for the airport sponsor to consider. It is fully understood that the airport sponsor may modify the plan, if necessary, to satisfy its intended goals and needs. The airport land use plan depicted on **Exhibit 4B** includes six broad development categories:

- Airport Operations
- General Aviation
- Airfield Support
- Terminal Area
- Aviation Reserve
- Non-Aviation Revenue Support

The **Airport Operations** land use category is designated to delineate areas not available for landside development. This area has been established based on existing airfield conditions and includes safety areas associated with the runway system, as well as the clearances needed for taxiways. This area should remain clear of objects except for those fixed by navigational function. If changes are made in line with airside alternatives previously discussed, the airport operations area would change, thereby changing landside use options as well.

General Aviation represents the full array of aviation activities and includes users that provide aviation services or house aircraft. A good example of this type of use is an FBO. These uses will generate a moderate activity level on both the airside and landside, including based aircraft and itinerant aircraft traffic. Facilities typical of general aviation uses range from T-hangars to larger conventional hangars. These users, however, are more commonly those who only have one primary hangar facility and are best suited for flight line access. This use is also characteristic of facilities which simply house based aircraft. The most common use is for T-hangars or executive/box hangars. Daily activity for these areas is relatively low as the aircraft owners will commonly operate only sporadically throughout the week, or less often.

Airfield Support refers to areas where essential airport infrastructure is located. These areas must be maintained to provide necessary services at the airport. Examples include a water storage tank, pumphouse, electrical vault, and airport equipment storage facilities.

The **Terminal Area** is currently used primarily for transient aircraft operations and is reserved for any future commercial aviation activity which may occur at the airport. The terminal provides space for passenger processing in the terminal building. The terminal area can also be utilized for aircraft storage if demand for commercial passenger service is not sufficient to necessitate any new development. Landside alternatives, to be discussed, will also consider potential passenger terminal development in the airport's existing terminal area, should demand dictate.

Aviation Reserve includes those areas on airport property that are currently undeveloped and should be dedicated for potential aviation-related development or protection of the Airport Operations Area in the future, given their location to the runway and taxiway system.

Non-Aviation Revenue Support uses are allowed on airports for areas not required for aviation purposes. In some cases, airport land inventories allow for non-aviation uses if the areas are not accessible to the airfield. This use could support commercial, industrial, or business park development, and would provide the airport with an opportunity to improve revenue streams on land that would otherwise remain vacant.

Previous analysis identified numerous considerations for improved or expanded facilities, including airfield geometry improvements, terminal facility needs, and new hangar facilities. The land needed to accommodate the 20-year landside facility requirements is not anticipated to exceed the undeveloped/ vacant property currently available for development. With a surplus of property that is accessible to/from the airfield system, H.A. Clark Memorial Field has a great opportunity to market itself to potential developers and increase land lease revenues. For areas that are not easily accessible to the airfield system, such as land east of Pronghorn Ranch Road, possibilities for non-aviation related developments exist, such as industrial parks or business centers, that can increase land lease revenues for the airport.

It should be noted that the airport does not have the approval to release/sell or use undeveloped property for non-aviation purposes at this time. Specific approval from the FAA will be required to utilize undeveloped property for non-aviation uses. This planning document does not gain approval to sell or use airport property for non-aviation uses, even if those uses are ultimately shown in the master plan and on the ALP. Prior to employing any land uses or land use changes on airport property, other than aviation-related, a separate request justifying the use of airport property will be required. This study can be a source for developing that justification.

AIRPORT ALTERNATIVE CONSIDERATIONS

As previously detailed, the development alternatives are categorized into two functional areas: airside and landside. Airside considerations relate to runways, taxiways, navigational aids, lighting and marking aids, etc., and require the greatest commitment of land area to meet the physical layout of the airport, as well as the required airfield safety standards. The design of the airfield also defines minimum set-back distances from the runway and object clearance standards. These criteria are defined first to ensure that the fundamental needs of the airport are met. Landside considerations include hangars, aircraft parking aprons, terminal services, as well as utilization of remaining property to provide revenue support for the airport and to benefit the economic development and well-being of the regional area.

Exhibit 4C presents both airside and landside alternative considerations that will be specifically addressed in this analysis. These issues are the result of the findings of the aviation demand forecasts and facility requirements evaluations, as well as input from the PAC, airport management, City of Williams, and the general public.

The remainder of this chapter will describe various development alternatives for airside and landside facilities. Although each area is treated separately, ultimate planning will integrate the individual requirements, so they can complement one another.


Runway 18-36 Existing RDC B-II-VIS
Runway 18-36 Ultimate RDC B-II-4000
LEGEND
Airport Property Line
El Paso Gas Pipeline Easement
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Existing Runway Protection Zone (RPZ)
Ultimate RPZ
35' Building Restriction Line (BRL)
Uncontrolled Safety Areas
Airport Operations
General Aviation
Airfield Support
Terminal Area
Aviation Reserve
Non-Aviation Reserve Support
Natural Gas Pipeline
Pronghorn Ranch Rd
Airport Rd
Ultimate Approach RPZ
20.4 Acres
Runway 18-36 (6,000' x 100')
13.77 Acres
A
C
D
E
F
G
Existing Approach/Departure RPZ
Ultimate Departure RPZ
Existing / Ultimate Approach / Departure RPZ
N
SCALE IN FEET
Photo: Woolpert 10/06/2020

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Airside Considerations

- Evaluate fee simple acquisition of runway safety area (RSA) and runway object free area (ROFA) south of Runway 18-36
- Acquire Property Interest for existing and ultimate runway protection zones (RPZs)
- Eliminate direct access from aircraft parking apron and Runway 18-36
- Redesign non-standard (acute angled) taxiways to 90-degree (right-angled) taxiway connections as practicable
- Analyze enhanced instrument approach procedures (IAPs)
- Analyze runway extension of up to 2,100 feet on the north end of Runway 18-36
- Identify property acquisition area required for runway extension and ultimate RSA/ROFA/RPZ
- Consider increasing Runway 18-36 load bearing capacity to support 30,000 single wheel loading (S) and 60,000 dual wheel loading (D)
- Consider LED technology for runway/taxiway lighting and airport signage
- Redesign non-standard holding bay adjacent to parallel Taxiway A
- Upgrade visual approach lightning to PAPI-4
- Narrow taxiways to 35' as necessary for TDG 2 design standards

Landside Considerations

- Consider additional aircraft storage hangar development
- Consider permanent jet fuel storage options
- Identify areas suitable for additional general aviation parking
- Consider installation of an aircraft wash rack
- Identify locations for additional aviation and non-aviation revenue support development

Exhibit 4C
ALTERNATIVE CONSIDERATIONS

AIRSIDE PLANNING CONSIDERATIONS

Airside planning considerations generally relate to those airport elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the airport. Planning must factor and balance many airside items, including meeting FAA design parameters of the established design aircraft, instrument approach capability, airfield capacity, runway length, taxiway layouts, and pavement strengths. Each of these elements for H.A. Clark Memorial Field was analyzed in the previous chapter. The alternatives to follow will examine airside improvement opportunities to meet design standards and/or capacity constraints. This will include comparisons between the airport's existing Runway Design Code (RDC) of B-II-VIS and ultimate RDC of B-II-4000 on Runway 18-36, as the size of the safety areas associated with each of these design codes varies and thus will have varying impacts on airfield development. An RDC of B-II-5000 will also be shown for comparison purposes in case the airport decides not to pursue lower visibility minimums on Runway 18-36.

Exhibit 4D outlines the primary airside planning issues to be considered in this alternatives' analysis.

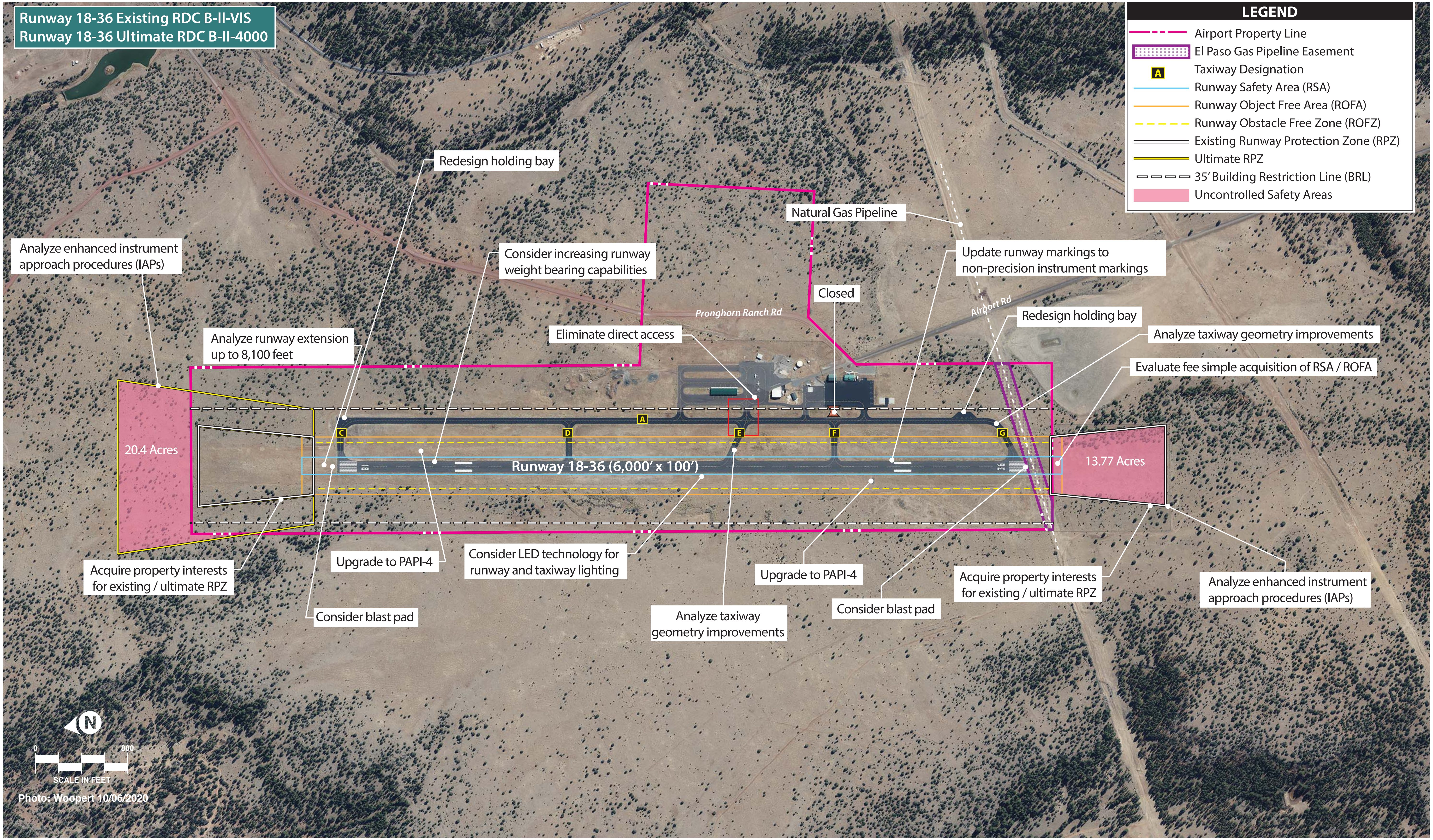
AIRFIELD DESIGN STANDARDS

Applicable standards for airport design are outlined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*. The design of airfield facilities is primarily based on the physical and operational characteristics of aircraft using the airport. As discussed in Chapter Two, an RDC is applied to each runway at an airport to identify the appropriate design standards for the runway and associated taxiway system. The RDC is made up of the Aircraft Approach Category (AAC), the Airplane Design Group (ADG), and the approach visibility minimums expressed in runway visual range (RVR) values. It relates to the largest and fastest aircraft that regularly operate at the airport. The FAA has historically defined regular use as at least 500 annual operations at the airport. While this can, at times, be represented by one specific make and model of aircraft, most of the runways' RDC values are represented by several different aircraft, which collectively operate frequently at the airport.

As a basic general aviation airport within the NPIAS, the airport should be capable of supporting moderate levels of aviation activity and accommodating general aviation aircraft, as well some business jets. The critical design aircraft analysis in Chapter Two concluded that Runway 18-36 should meet RDC B-II-4000 design standards in the ultimate condition, due to operational growth and anticipated greater use by larger, more demanding aircraft.

SAFETY AREAS

As identified in the previous chapter, the existing/ultimate runway safety area (RSA) and runway object free area (ROFA) extend approximately 100 feet beyond the airport property line south of Runway 18-36. This property should be acquired by the airport sponsor through fee simple acquisition to ensure that these safety areas surrounding the runway environment are protected from obstructions and/or incompatible land uses.


Runway 18-36 Existing RDC B-II-VIS
Runway 18-36 Ultimate RDC B-II-4000
LEGEND
Airport Property Line
El Paso Gas Pipeline Easement
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Existing Runway Protection Zone (RPZ)
Ultimate RPZ
35' Building Restriction Line (BRL)
Uncontrolled Safety Areas
Redesign holding bay
Natural Gas Pipeline
Analyze enhanced instrument approach procedures (IAPs)
Consider increasing runway weight bearing capabilities
Update runway markings to non-precision instrument markings
Closed
Pronghorn Ranch Rd
Airport Rd
Redesign holding bay
Eliminate direct access
Analyze runway extension up to 8,100 feet
Analyze taxiway geometry improvements
Evaluate fee simple acquisition of RSA / ROFA
20.4 Acres
Runway 18-36 (6,000' x 100')
13.77 Acres
Acquire property interests for existing / ultimate RPZ
Upgrade to PAPI-4
Consider LED technology for runway and taxiway lighting
Upgrade to PAPI-4
Acquire property interests for existing / ultimate RPZ
Analyze enhanced instrument approach procedures (IAPs)
Consider blast pad
Analyze taxiway geometry improvements
Consider blast pad
N
0
800
SCALE IN FEET
Photo: Woolpert 10/06/2020

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As discussed in the previous chapter, the dimensions of the runway protection zones (RPZs) associated with each runway end are dependent upon the runway's RDC and approach visibility minimums. Each runway end has an approach and a departure RPZ. Both the approach and departure RPZs on each end of Runway 18-36 are shown on **Exhibit 4D**.

The existing RPZs are based on RDC B-II-VIS, which are visual approach minimums. Alternatives to follow will evaluate an ultimate RDC B-II-4000, which will include significantly larger approach RPZs associated with instrument approaches not lower than ¾-mile. All property within an RPZ should be controlled by the airport sponsor either through fee simple acquisition or an avigation easement to protect the approaches from any incompatible developments. If incompatibilities exist within an RPZ, they could potentially need to be removed or the runway environment altered to account for any incompatibilities. However, the FAA ultimately will determine if incompatible land uses will be permitted to remain within the RPZ. Currently, 13.77 acres of the Runway 36 approach RPZ extends beyond the airport's existing property line, while the existing Runway 18 approach RPZ is within airport boundaries. In the ultimate B-II-4000 condition, the RPZ size increases and would result in approximately 20.4 acres of the Runway 18 approach RPZ extending beyond airport property. Property interests should be acquired by the airport to maintain control of the property within the RPZ.

INSTRUMENT APPROACH CONSIDERATIONS

The instrument approach capability at an airport is an important consideration that directly impacts the utility of the airport, with lower visibility minimums increasing the utility of an airport. From an economic development standpoint, it is important to achieve the lowest possible visibility minimums. The best approach minimums possible will prevent aircraft from having to divert to another airport, which can create additional operating costs and time delays for aircraft operators, their passengers, as well as on-airport businesses.

Currently, Runway 18-36 is served by visual approaches only. However, the airport has recently submitted a request to the FAA for published instrument approach procedures. Coordination between the FAA, airport management, and the airport's consultants has identified that area navigation (RNAV) global positioning system (GPS) instrument approach procedures are currently being evaluated, with the potential to offer minimum approach visibilities of not lower than one mile serving each end of Runway 18-36.

Approach minimums allowing a not lower than ¾-mile visibility approach may be possible for aircraft landing on Runway 18 in the future, while terrain obstructions in the approach surface for Runway 36 would make it highly unlikely that visibility minimums lower than one mile can be achieved for aircraft landing on Runway 36. Another obstacle limiting the possibility of lower visibility minimums on Runway 36 is potential interference with existing instrument approach procedures associated with Prescott Regional Airport, which is located approximately 40 nautical miles south of H.A. Clark Memorial Field. As such, each airfield alternative to follow will examine approach minimums of not lower than ¾-mile on Runway 18 and not lower than one mile on Runway 36.

Exhibit 4E depicts the approach and departure profiles associated with Runway 18-36 in its existing condition and with potential extensions to the runway, which will be discussed later in this chapter. The graphic also shows potential obstructions to the approach/departure surfaces presented by the terrain surrounding the airport.

Any change to the runway environment that includes a new or revised instrument approach procedure that increases the RPZ dimensions is subject to a further evaluation of the RPZs, meeting updated guidance from the FAA. If an airport cannot fully control the entirety of the RPZ from being free of incompatible land uses, the FAA can require a change to the runway environment to properly secure the RPZs. If enhanced instrument approach procedures are pursued on either runway end at the airport, it is important that airport management properly coordinate with the FAA to ensure full use of the runway being affected. As such, each airfield alternative to follow will examine the ultimate RPZs serving Runway 18-36 with approach minimums of not lower than ¾-mile and not lower than one mile, respectively.

In addition to the RPZs, the determination of airspace obstructions that may be associated with these improved approach procedures would need to be further evaluated. The two primary resources for determining airspace obstructions are Title 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace* and *Terminal Instrument Procedures* (TERPS). Part 77 is a filter which identifies potential obstructions, whereas TERPS is the critical tool in determining actual flight obstructions, as its analysis is used to evaluate and develop instrument approach procedures, including visibility minimums and cloud heights associated with approved approaches.

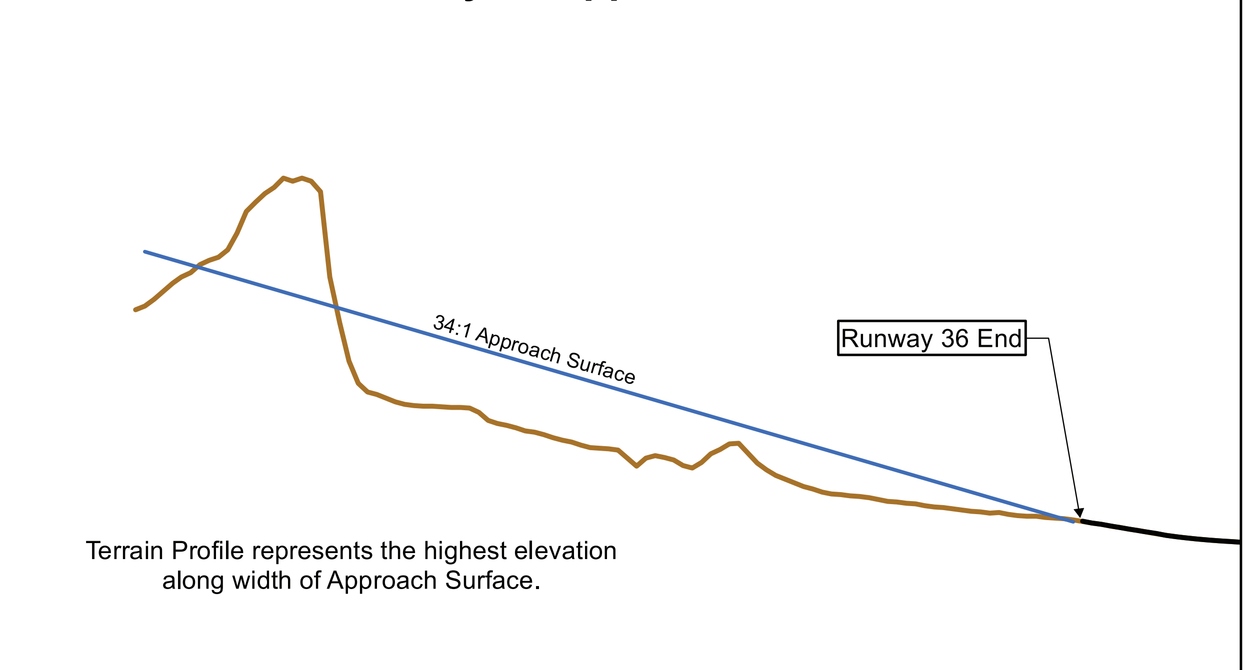
Further evaluation by the FAA would be needed to determine the extent of removing or lowering potential obstructions that may exist to support an instrument approach procedure that could serve ultimate conditions proposed on Runway 18-36. The FAA has also set forth other various conditions and criteria for a runway to achieve lower visibility minimums. These conditions and criteria are outlined in **Table 4A**.

AIRFIELD GEOMETRY

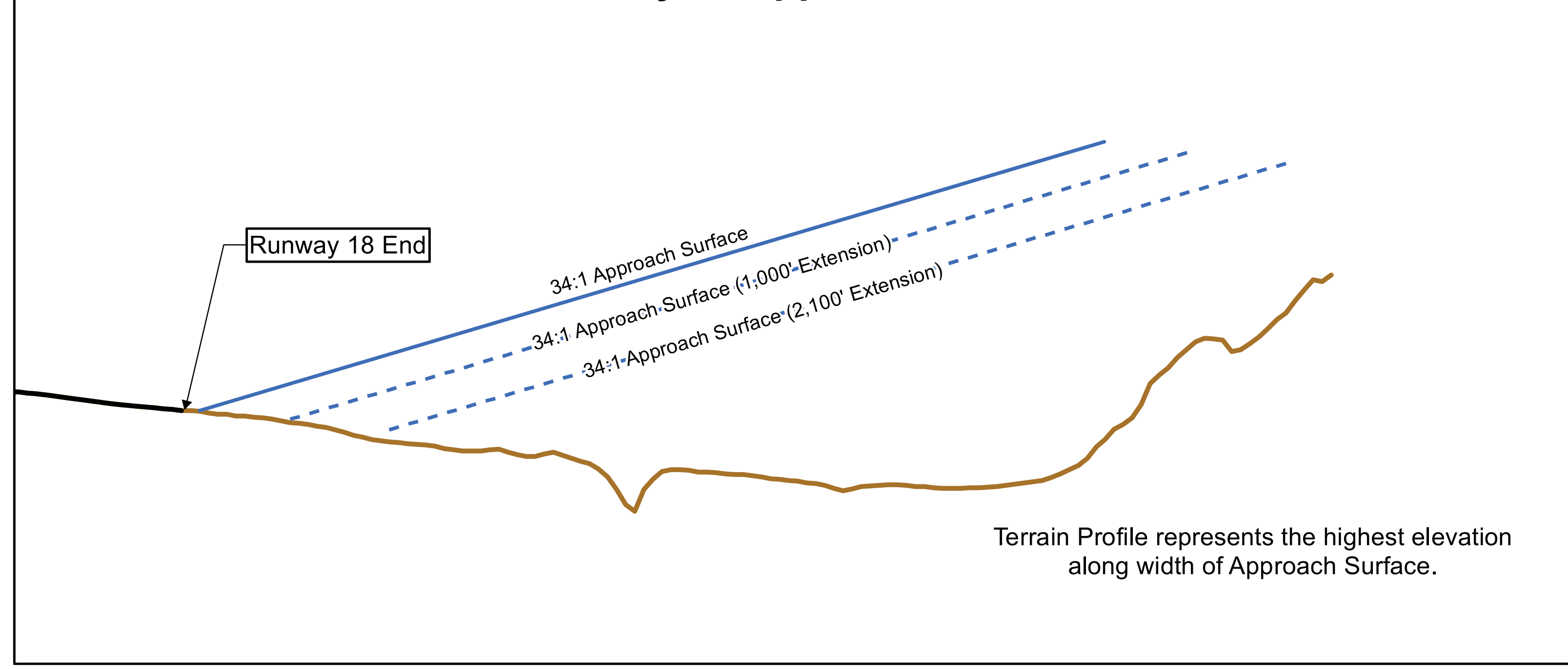
Primarily, the taxiway system at H.A. Clark Memorial Field meets the recommended design and geometry standards set forth by the FAA. However, there are certain existing non-standard taxiway geometry conditions that need to be addressed. Each of these conditions can lead to pilots inadvertently taxiing onto the runway, creating a runway incursion and other potentially dangerous airfield safety concerns. Potential solutions to correct these non-standard conditions are addressed in the airside alternatives to follow. These non-standard conditions include:

- Taxiway E and Taxiway F provide direct access from the aircraft parking apron to a runway environment. It should be noted that a recent airfield pavement rehabilitation project closed the portion of Taxiway F connecting parallel Taxiway A and the terminal parking apron. As such, this no longer serves as a direct access issue to the runway system.
- Taxiway G is non-standard as it is not aligned at a 90-degree angle to Runway 18-36. It is important to note that the existing El Paso Gas Pipeline and associated easement directly south of Taxiway G could disallow the realignment of the taxiway; however, the alternatives to follow will show a potential realignment.

Part 77 Non-Precision Runway 36 Approach Profile



Part 77 Non-Precision Runway 18 Approach Profile



Source: Terrain profiles derived from USGS 1/3 Arc Second NED.

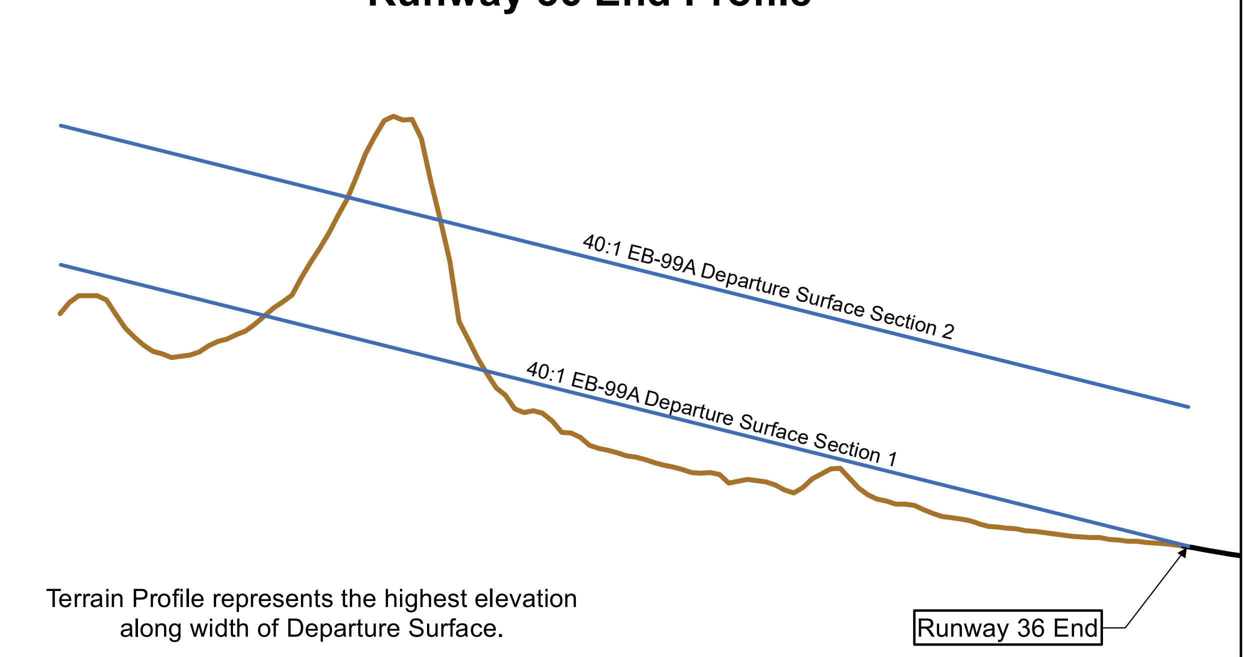
Note: Ultimate condition runway end elevations approximated, planned runway end elevations may differ.

Existing Approach/Departure Surface Profile
Ultimate Approach/Departure Surface Profile
Existing Runway Profile
Terrain Profile

Horizontal Scale: 0 — 2,000 — 4,000; 1" = 2,000'

Vertical Scale: 0 — 200 — 400; 1" = 200'

EB-99A Departure Surface Runway 36 End Profile



EB-99A Departure Surface Runway 18 End Profile

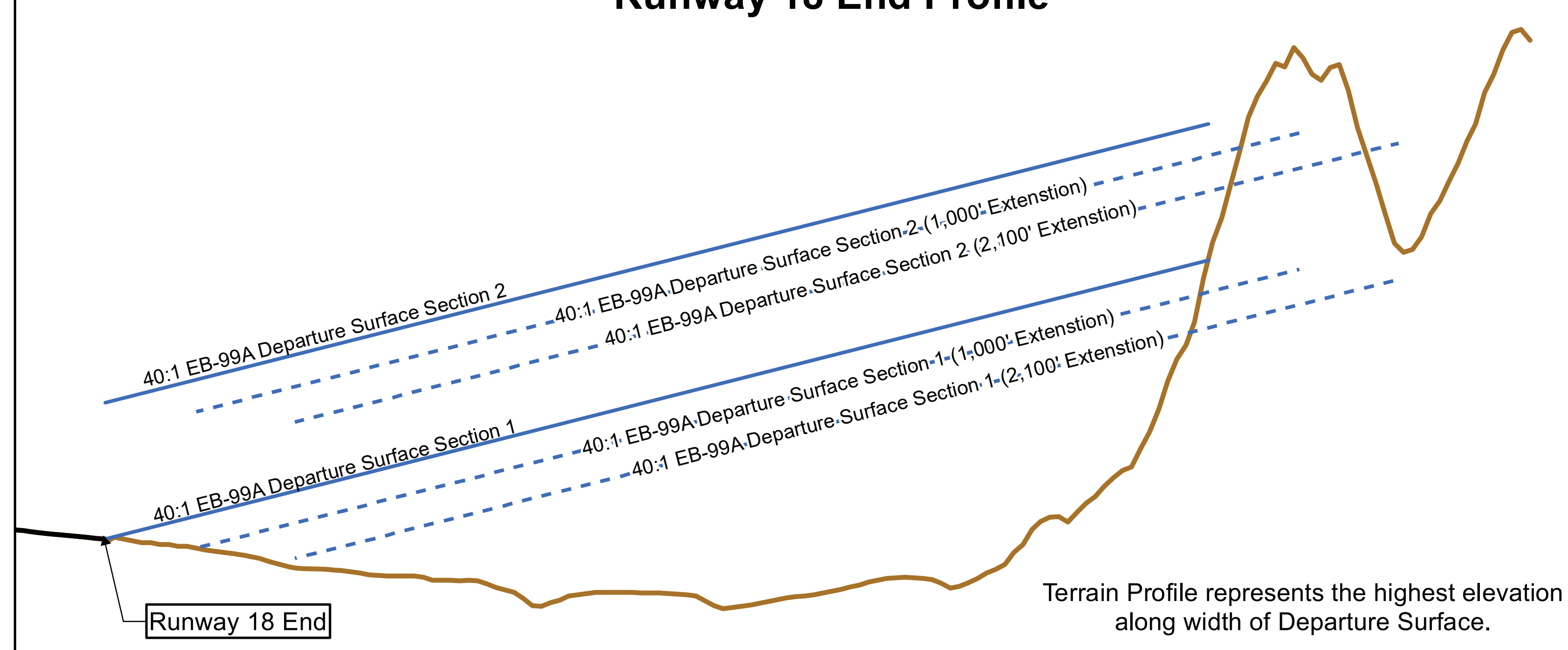


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TABLE 4A | Standards for Instrument Approach Procedures

Criteria	Visibility Minimums	
	≥1 Mile	¾-mile to < 1 Mile
HATh	≥ 250 feet	≥ 250 feet
TERPS GQS	Clear	Clear
PA final approach surfaces	Not Required	Not Required
POFZ (PA & APV only)	Not Required	Not Required
TERPS Chapter 3, Section 3	20:1 Clear	20:1 Clear
ALP	Required	Required
Minimum Runway Length	3,200 feet	3,200 feet
Runway Markings	Non-precision	Non-precision
Holding Position Signs & Markings	Non-precision	Non-precision
Runway Edge Lights	HIRL/MIRL	HIRL/MIRL
Parallel Taxiway	Recommended	Required
Approach Lights	Recommended	Recommended
Applicable Runway Design Standards (e.g., OFZ)	≥ ¾-statute mile approach visibility minimums	≥ ¾-statute mile approach visibility minimums
Threshold Siting Criteria to be Met	20:1 Clear	20:1 Clear
Survey Required	NVGS	VGS (PA & APV)/NVGS

HATh – Height Above Threshold
TERPS – United States Standard for Terminal Instrument Procedures
GQS – Glide Path Qualification Surface
OFZ – Obstacle Free Zone
PA – Precision Approach
ALP – Airport Layout Plan
HIRL – High Intensity Runway Lights
MIRL – Medium Intensity Runway Lights
VGS – Vertically Guided Survey
NVGS – Non-Vertically Guided Survey
APV – Approach with Vertical Guidance

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

RUNWAY BLAST PADS

A runway blast pad is a surface adjacent to the end of the runway designed to reduce erosion created by aircraft jet blast and/or propeller wash. Currently, Runway 18-36 is not outfitted with blast pads on either end of the runway. RDC B-II runway design standards recommend that Runway 18-36 is equipped with blast pads measuring 95 feet wide and extending 150 feet beyond the runway threshold.

HOLDING BAYS

The FAA has provided updated guidance on the configuration of holding bays. This guidance recommends that holding bays be designed to allow aircraft to bypass one another to taxi. Redesigned holding bays are proposed in the alternatives to comply with updated holding bay design standards.

RUNWAY LENGTH

The runway length analysis in the previous chapter concluded that the existing length of Runway 18-36 (6,000 feet) is insufficient to meet the current and future demand at the airport. The existing and ultimate critical design aircraft at H.A. Clark Memorial field are made up of a combination of aircraft in the B-II category, which includes aircraft, such as the Citation CJ3, Citation XL, and King Air 350. Due to the airport's high elevation, density altitude issues arise during warm summer periods, causing larger aircraft, such as the aforementioned critical aircraft and other similar business jets, to be unable to operate at the airport or to be severely weight-restricted during certain times of the year. According to guidance provided in AC 150/5325-4B, the runway length recommendation to accommodate 75 percent of the business jet fleet at 60 percent useful load is 7,900 feet at H.A. Clark Memorial Field.

Additionally, the runway length analysis concluded that in order to accommodate 95 percent of small general aviation aircraft (weighing less than 12,500) during the most demanding conditions, the recommended runway length is 8,000 feet. To accommodate 100 percent of the small aircraft fleet, 8,100 feet is recommended.

Furthermore, when considering wet runway conditions, landing length requirements of the aircraft analyzed in Chapter Three often increase, and many exceed the current runway length. When analyzing the runway landing length of the most demanding aircraft operating at the airport, the average wet runway length required at maximum landing weight (MLW) for aircraft operating under Part 91k is 7,200 feet and approximately 9,600 feet for aircraft operating under Title 14 Code of Federal Regulations (CFR) Part 135. Larger aircraft, such as the Gulfstream and certain Cessna Citation models, require more than 10,000 feet of runway.

The facility requirements concluded that additional length on the runway is necessary to accommodate the current and future aviation demand. For this reason, the alternatives to follow consider an extension to Runway 18-36. To obtain AIP funding, the FAA will require further analysis for justification of a runway extension. However, for the purposes of this study, planning for a runway extension allows the City to prepare by developing land use and zoning policies that limit the potential for nearby developments that would restrict future airport expansion.

RUNWAY STRENGTH

The pavement strength for Runway 18-36 is reported at 15,000 pounds single wheel loading (S). Published runway strengths for dual wheel loading (D) are not currently reported. While aircraft weighing more than the certified strength can operate on the runways, the life span of the pavements can be shortened due to the utilization of heavier loads over time. Future consideration should be given to providing a pavement strength of 30,000 pounds single wheel loading (S) and 60,000 pounds dual wheel loading (D). This strength rating will better accommodate regular operations by larger business jets that are currently operating at the airport and the potential for commercial service aircraft if that demand segment were to be introduced to the airport.

The FAA has recently moved to implementing the International Civil Aviation Organization (ICAO) pavement classification number (PCN) for identifying strength of airport pavements. The PCN is a five-part code described as follows:

PCN Numerical Value: Indicates the load-carrying capacity of the pavement expressed as a whole number. The value is calculated based on a number of engineering factors, such as aircraft geometry and pavement usage.

- Pavement Type: Expressed as either R for rigid pavement (most typically concrete) or F for flexible pavement (most typically asphalt).
- Subgrade Strength: Expressed as A (High), B (Medium), C (Low), or D (Ultra Low). A subgrade of A would be considered very strong, like concrete-stabilized clay, and a subgrade of D would be very weak, like un-compacted soil.
- Maximum Tire Pressure: Expressed as W (Unlimited/No Pressure Limit), X (High/254 psi), Y (Medium/181 psi), or Z (Low/72 psi). This indicates the maximum tire pressure the pavement can support. Concrete surfaces are usually rated W.
- Process of Determination: Expressed as either T (technical evaluation) or U (physical evaluation). This indicates how the pavement was tested.

According to the FAA 5010 Airport Master Record, Runway 18-36 has not been assigned a PCN value. Consideration should be given to determining a PCN value in order to better understand the runway's weight-bearing capabilities.

AIRSIDE ALTERNATIVES

Three airside alternatives have been prepared to address the issues outlined above. The details of each alternative are described below.

AIRSIDE ALTERNATIVE 1

Depicted on **Exhibit 4F**, Airside Alternative 1 contains two separate alternatives focused primarily on correcting the airfield geometry issues identified previously. Alternative 1A shows the removal of portions of Taxiway E (west of Taxiway A) and Taxiway F (east of Taxiway A) to eliminate the direct access that is provided between the aircraft parking area and Runway 18-36. The taxiway connector associated with Taxiway E would be relocated farther south to still allow aircraft to access the parking apron from the parallel taxiway. As previously detailed, the portion of Taxiway F east of parallel Taxiway A has been marked as closed. As such, this condition could remain to satisfy the direct access issue for this piece of pavement. Alternative 1A also includes redesigned holding bays at each end of Taxiway A. Runway blast pads measuring 95 feet wide by 150 feet long are added to each end of Runway 18-36. The runway is equipped with a PAPI-2, and this alternative proposes an upgraded PAPI-4 system. Approximately 13.8 acres not currently within the airport property line is shown as property to be acquired, in order for the airport to maintain control of the RSA, ROFA, and RPZ south of the Runway 36 end.

On the bottom half of the exhibit, Airside Alternative 1B eliminates the direct access provided by Taxiways E and F and replaces Taxiway E with a standard right-angled taxiway connector. Alternative 1B also shows removal of existing Taxiway G and redesigns the taxiway to provide a standard 90-degree right-angled taxiway connection. As previously discussed, the existence of the El Paso Gas Pipeline may not allow for the relocation of Taxiway G. Like Alternative 1A, Alternative 1B depicts redesigned holding bays per updated FAA design standards, the addition of runway blast pads, and property acquisition to maintain control of safety areas. The taxiway width is also reduced to 35 feet to align with TDG 2 design standards. In addition to the 13.8 acres south of Runway 36, an additional 20.4 acres are to be acquired for approach protection associated with an ultimate instrument approach procedure offering not lower than ¾-mile visibility minimums (ultimate RDC B-II-4000) on Runway 18.

AIRSIDE ALTERNATIVE 2

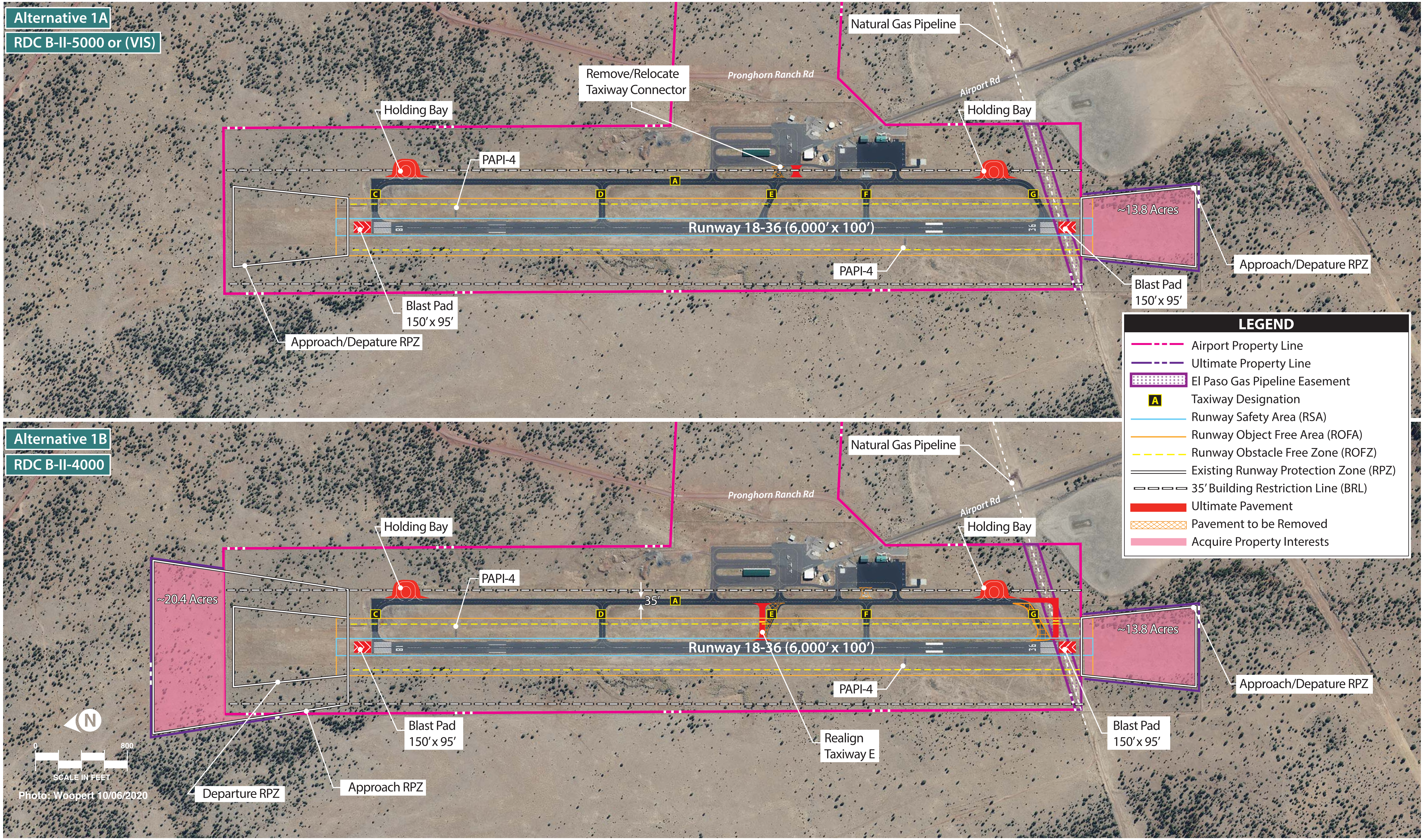
Airside Alternative 2 is depicted on **Exhibit 4G**. This alternative presents three options for extending Runway 18-36 2,100 feet to provide a total runway length of 8,100 feet. Alternative 2A assumes that any future instrument approach will provide visibility minimums not lower than one mile. In this case, the amount of property to be acquired to accomplish the runway extension is reduced. Approximately 52.1 acres of additional property would be needed north of Runway 18-36 to support an extension of both the runway, Taxiway A, and landside buffer. Alternative 2A also includes the addition of holding bays and blast pads at both ends of the runway, as well as the acquisition of property south of Runway 36 to protect the safety areas. (Note: The 13.8 acres of planned property acquisition south of Runway 36 will remain constant throughout the alternatives because a lower approach on the south end of the runway is unlikely due to reasons previously described in this chapter).

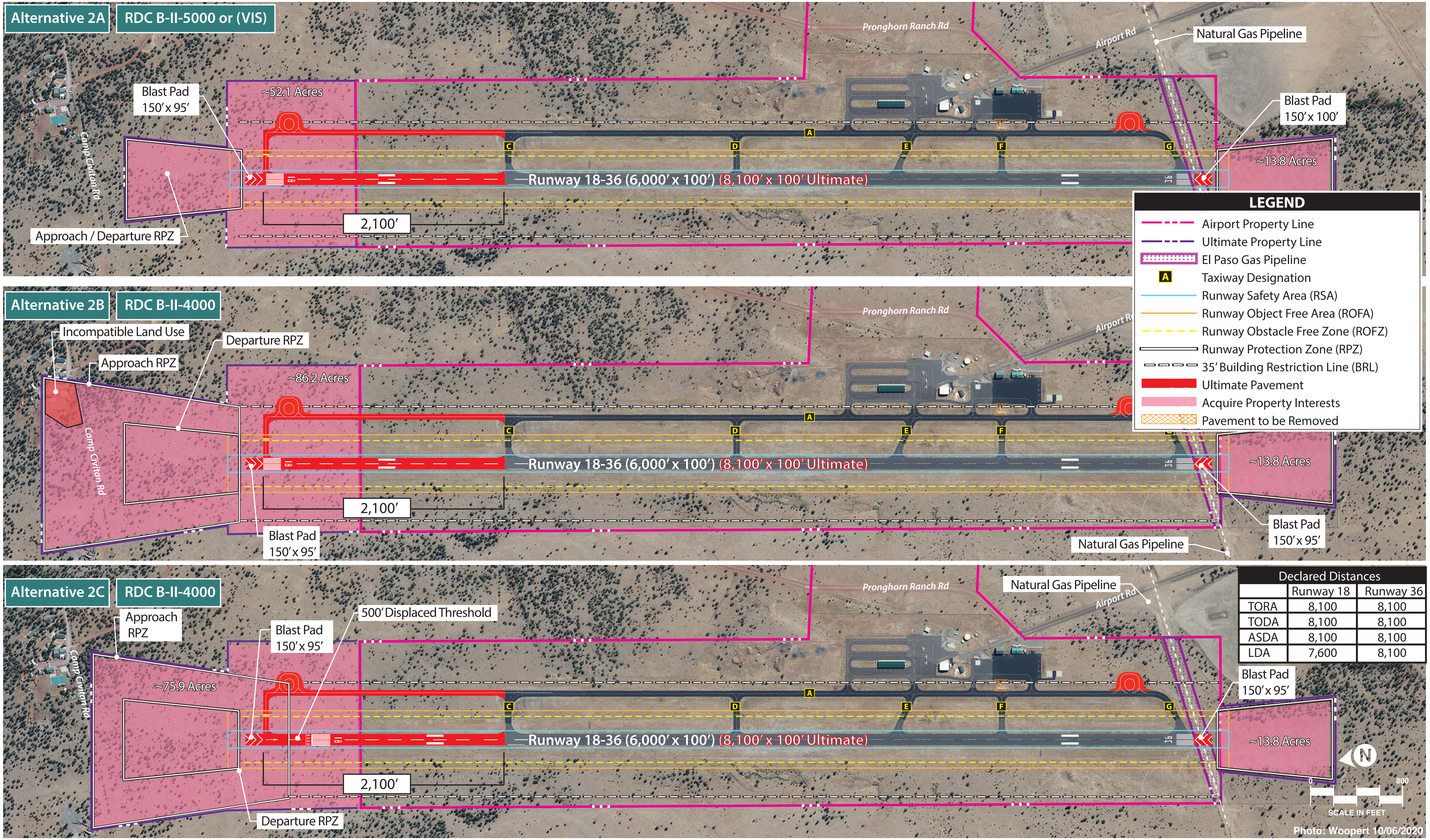
Alternative 2B presents the same 2,100-foot northerly runway extension and includes an instrument approach with visibility minimums of not lower than ¾-mile. This expands the approach RPZ to 48.97 acres, increasing the total amount of property to be acquired north of the runway to 86.2 acres. This alternative also introduces incompatibilities into the ultimate approach RPZ for Runway 18. In order to accomplish this alternative, the incompatibilities, which include buildings as well as Camp Civitan Road, would potentially have to be removed or relocated from the northeastern corner of the ultimate approach RPZ prior to implementing the enhanced approach procedures.

Alternative 2C also depicts the full 2,100-foot extension to Runway 18-36 and not lower than ¾-mile approach visibility minimums, with an option to avoid the potential removal/relocation of incompatibilities in the ultimate Runway 18 approach RPZ. To maintain the RPZ clear of incompatible uses, a 500-foot displaced threshold is implemented on Runway 18 and declared distances are established. The amount of land to be acquired north of the runway in this alternative is approximately 75.9 acres. This runway extension alternative proposes the use of declared distances to remain in compliance with FAA safety area design standards related to RPZ.

When airports are constrained by off-airport development or terrain, airport operators can employ the use of displaced thresholds and declared distances to maintain adequate safety areas required to meet the FAA design standards. Declared distances are the effective runway lengths that the airport operator declares available for take-off run, take-off distance, accelerate-stop distance, and landing distance available. Pilots utilize these measurements in their runway length calculations. Definitions of the four declared distances are as follows:

- Takeoff Run Available (TORA) - The length of the runway declared available and suitable to accelerate from brake release to lift-off, plus safety factors.


Alternative 1A
RDC B-II-5000 or (VIS)
Natural Gas Pipeline
Remove/Relocate Taxiway Connector
Pronghorn Ranch Rd
Airport Rd
Holding Bay
Holding Bay
PAPI-4
Runway 18-36 (6,000' x 100')
~13.8 Acres
Approach/Depature RPZ
PAPI-4
Blast Pad 150' x 95'
Blast Pad 150' x 95'
Approach/Depature RPZ
LEGEND
Airport Property Line
Ultimate Property Line
El Paso Gas Pipeline Easement
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Existing Runway Protection Zone (RPZ)
35' Building Restriction Line (BRL)
Ultimate Pavement
Pavement to be Removed
Acquire Property Interests
Alternative 1B
RDC B-II-4000
Natural Gas Pipeline
Pronghorn Ranch Rd
Airport Rd
Holding Bay
Holding Bay
PAPI-4
35'
~20.4 Acres
Runway 18-36 (6,000' x 100')
~13.8 Acres
Approach/Depature RPZ
PAPI-4
Blast Pad 150' x 95'
Realign Taxiway E
Blast Pad 150' x 95'
Departure RPZ
Approach RPZ
N
0
800
SCALE IN FEET
Photo: Woolpert 10/06/2020



Declared Distances

	Runway 18	Runway 36
TORA	8,100	8,100
TODA	8,100	8,100
ASDA	8,100	8,100
LDA	7,600	8,100

Exhibit 4G
AIRSIDE ALTERNATIVE 2

- Takeoff Distance Available (TODA) - The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA available to accelerate from brake release past lift-off, to start of take-off climb, plus safety factors.
- Accelerate Stop Distance Available (ASDA) - The length of the runway plus stop-way declared available and suitable to accelerate from brake release to take-off decision speed, and then decelerate to a stop, plus safety factors.
- Landing Distance Available (LDA) - The distance from the threshold to complete the approach, touch-down, and decelerate to a stop, plus safety factors.

Under this alternative, the LDA on Runway 18 would be 7,600 feet to allow for the approach RPZ associated with Runway 18 to remain clear of existing development north of the airport. All other declared distances associated with Runway 18, as well as aircraft operations on Runway 36, would allow for the full 8,100 feet to be utilized in takeoff and landing calculations.

AIRSIDE ALTERNATIVE 3

Exhibit 4H presents Airside Alternative 3, which examines a 1,000-foot runway extension to provide a total runway length of 7,000 feet. Alternative 3A assumes that the approach visibility minimums for instrument approaches to either end of Runway 18-36 remain at or above one mile. This alternative requires less land acquisition (13.7 acres) for approach protection north of the runway. It should also be noted that a small portion of the proposed land acquisition to the north would satisfy meeting RSA and ROFA design standards, which would extend slightly beyond the north end of existing airport property associated with this alternative.

Alternative 3B considers the same runway extension as Alternative 3A but assumes a not lower than ¾-mile visibility minimum approach to Runway 18. Under this condition, the approach RPZ associated with Runway 18 expands to 48.9 acres, which would require that the airport acquire property interests over the larger area to accommodate the enhanced approach capability. Unlike Alternative 2, a proposed 1,000-foot extension would not introduce incompatibilities associated with existing development north of the airport. Like previous alternatives, blast pads are also added to each end of Runway 18-36 and a redesigned holding bay is shown east of Taxiway A on both alternatives.

AIRSIDE ALTERNATIVES SUMMARY

The airside development considerations have focused on several elements that include mitigating safety area deficiencies, improving existing and future taxiway development on the airfield, enhancing instrument approach capabilities to the runway system, and analyzing other ancillary airfield support items. These alternatives will be considered by the PAC, airport management, the City of Williams, and the general public. Following discussion and review with these entities, a recommended airside development concept will be drafted and presented in the next chapter. No single alternative may satisfy all stakeholder needs; however, finding a compromise that allows the airport to continue to meet the needs of its users and grow as an economic engine, while minimizing negative impacts to the community, is the goal.

LANDSIDE PLANNING CONSIDERATIONS

Generally, landside issues are related to those facilities necessary or desired for the safe and efficient parking and storage of aircraft, movement of pilots and passengers to and from aircraft, airport support facilities, and overall revenue support functions. Landside planning considerations, previously summarized on **Exhibit 4C**, will focus on strategies following a philosophy of separating activity levels. To maximize airport efficiency, it is important to locate facilities together that are intended to serve similar functions. The best approach to landside facility planning is to consider the development to be like that of a community where land use planning is the guide. For airports, the land use guide in the terminal and general aviation areas should generally be dictated by aviation activity levels. Due to the amount of developable land available at H.A. Clark Memorial Field, consideration will also be given to non-aviation uses that can provide additional revenue support to the airport and support economic development for the region.

Landside planning issues focus on facility-locating strategies following a philosophy of separating activity levels. Therefore, it is important to plan for an appropriate mix of smaller T-hangars, executive hangars, and larger conventional hangars.

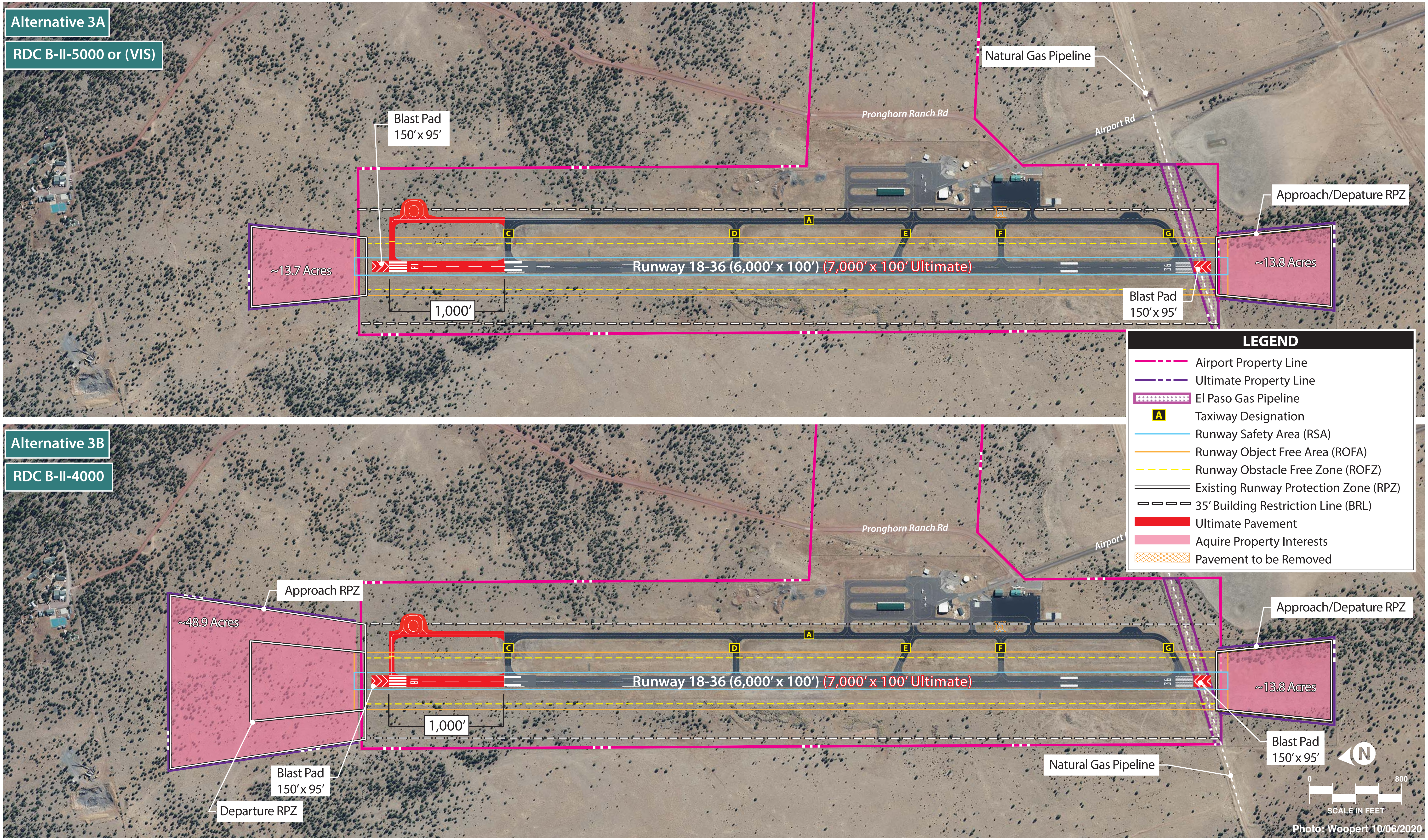
The orderly development of the airport terminal and general aviation areas (those areas parallel to the runway and along the flight line) can be the most critical, and probably the most difficult, development to control on an airport. A development approach of "taking the path of least resistance" can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

The alternatives to be presented are not the only options for development. In some cases, a portion of one alternative could be intermixed with another. Also, some alternative development concepts could be replaced with others. The final recommended plan only serves as a guide for the airport, which will aid in strategic planning of available properties. Many times, airport operators change their plan to meet the need of specific users. The goal in analyzing landside development alternatives is to focus future development so that airport property can be maximized.

HANGAR DEVELOPMENT

Analysis in Chapter Three indicated that the airport should plan for the construction of additional aircraft hangars over the next 20 years. Hangar development takes on a variety of sizes corresponding with several different intended uses.

Aviation businesses are essential to providing the necessary services on an airport. This includes privately owned businesses involved with, but not limited to, aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. These types of operations are commonly referred to as FBOs or specialized aviation service operators (SASOs). The facilities associated with businesses such as these include large, conventional-type hangars that hold several aircraft. High levels of activity often characterize these operations, with a need for apron space for the storage and circulation of


Alternative 3A
RDC B-II-5000 or (VIS)
Natural Gas Pipeline
Blast Pad
150' x 95'
Pronghorn Ranch Rd
Airport Rd
Approach/Depature RPZ
~13.7 Acres
~13.8 Acres
Runway 18-36 (6,000' x 100') (7,000' x 100' Ultimate)
Blast Pad
150' x 95'
1,000'
LEGEND
Airport Property Line
Ultimate Property Line
El Paso Gas Pipeline
Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Existing Runway Protection Zone (RPZ)
35' Building Restriction Line (BRL)
Ultimate Pavement
Aquire Property Interests
Pavement to be Removed
Alternative 3B
RDC B-II-4000
Pronghorn Ranch Rd
Approach RPZ
~48.9 Acres
Approach/Depature RPZ
~13.8 Acres
Runway 18-36 (6,000' x 100') (7,000' x 100' Ultimate)
1,000'
Blast Pad
150' x 95'
Blast Pad
150' x 95'
Natural Gas Pipeline
Departure RPZ
SCALE IN FEET
Photo: Woolpert 10/06/2020

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aircraft. These facilities are best placed along ample apron frontage with good visibility from the runway system for transient aircraft. Utility services are also needed for these types of facilities, as well as vehicle parking areas.

Aircraft hangars used for the storage of smaller aircraft primarily involve T-hangars, shade hangars, or linear box hangars. Since storage hangars often have lower levels of activity, these types of facilities can be located away from the primary apron areas in more remote locations of the airport. Limited utility services are needed for these areas.

Other types of hangar development can include executive hangars for accommodating either one larger aircraft or multiple smaller aircraft. Typically, these types of hangars are used by corporations with company-owned aircraft or by an individual or group of individuals with multiple aircraft. These hangar areas typically require all utilities and segregated roadway access.

Table 4B summarizes the aircraft hangar types and corresponding size and aviation uses that are typically associated with each facility. Currently, there are approximately 19,400 square feet of hangar space (including maintenance area) provided on the airport, made up of a combination of hangar types previously discussed.

TABLE 4B | Aircraft Hangar Types

Hangar Type	Typical Size	Aviation Uses
Conventional	Clear span hangars greater than 10,000 square feet	FBOs, SASOs, and other commercial aviation activities resulting in high activity uses
Executive	Clear span hangars less than 10,000 square feet	SASOs, corporate flight departments, and private aircraft storage resulting in medium-to high-activity uses
T-Hangar/Linear Box	Individual storage spaces offering 1,200 - 1,500 square feet	Private aircraft storage resulting in low activity uses

FBO – Fixed Base Operator
SASO – Specialized Aviation Service Operator

As depicted on **Exhibit 4B**, there are multiple large areas dedicated for Aviation Reserve, which are ideal for future potential aviation-related development. Given the large amount of airport property dedicated for Aviation Reserve land use, alternative analysis to follow will not explore the full and complete development of these areas; however, it is recommended that these areas be reserved should demand materialize. Alternatives proposed for aviation development include airport property located on the east side of the airfield. Furthermore, alternative development considers reserving terminal development area should commercial aviation activity become a reality at H.A. Clark Memorial Field in the future. Given the development potential for these portions of airport property, alternatives to follow will detail development options for the areas identified.

REVENUE SUPPORT LAND USES

As part of this master plan, consideration is being given to portions of airport property to be utilized for non-aviation purposes. As can be seen from the analysis of facility needs conducted so far, significant portions of airport property are needed to help satisfy existing and projected aviation demand. Prudent planning, however, will evaluate various land uses that could be developed for non-aviation purposes that would be compatible with aviation-related activity to further support and enhance the airport's self-sufficiency.

It should be noted that the airport does not have the approval to use undeveloped property for non-aviation purposes at this time. Specific approval from the FAA will be required to utilize undeveloped property for non-aviation uses. This planning document does not gain approval for non-aviation uses, even if these uses are ultimately shown in the master plan and on the airport layout plan (ALP). A separate request justifying the use of airport property for non-aviation uses will be required. This study can be a source for developing that justification.

An environmental determination will also be required. While FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* states that a release of an airport sponsor from federal obligations is normally categorically excluded and would not require an Environmental Assessment (EA), the issuance of a categorical exclusion is not automatic, and the FAA must determine that no extraordinary circumstances exist at the airport. Extraordinary circumstances would include a significant environmental impact to any of the environmental resources governed by federal law. An EA may be required if there are extraordinary circumstances. The generalized land use alternatives to follow outline areas on the airport which could be planned and ultimately developed for non-aviation-related uses.

BUILDING RESTRICTION LINE

The building restriction line (BRL) identifies suitable building area locations on the airport. The BRL encompasses the RPZs, the ROFA, navigational aid critical areas, areas required for terminal instrument procedures, and other areas necessary for meeting airport line-of-sight criteria.

Two primary factors contribute to the determination of the BRL: type of runway (utility or other-than-utility) and the capability of the instrument approaches. Runway 18-36 is considered an "other-than-utility" runway, which is intended to be used by aircraft in the "other than utility category" or "large aircraft" category with a gross weight greater than 12,500 pounds.

The BRL is the product of Title 14 CFR Part 77 transitional surface clearance requirements. These requirements stipulate that no object be located in the primary surface, defined as being no closer than 250 feet from a non-precision instrument runway centerline and not closer than 500 feet to a runway served by a precision instrument approach. For H.A. Clark Memorial Field, the existing primary surface is 500 feet wide (250 feet on either side of the runway centerline). From the primary surface, the transitional surface extends outward at a slope of one vertical foot to every seven horizontal feet. For the ultimate airfield condition potentially accommodating a not lower than ¾-mile approach, the primary surface expands to 1,000 feet wide (500 feet on either side of the runway centerline). As such, the alternatives to follow consider this scenario.

The location of the BRL is dependent upon the selected allowable structure height. Traditionally, the BRL is set at a point where the transitional surface is 20 feet or 35 feet above runway elevation. A 20-foot BRL associated with a one-mile minimum approach visibility to Runway 18-36 does not interfere with any existing or proposed airport infrastructure. It should be noted that the landside alternatives to follow depict a 20-foot BRL in association with a not lower than ¾-mile visibility instrument approach.

LANDSIDE ALTERNATIVE 1

Landside Alternative 1, depicted on **Exhibit 4J**, focuses on expanding the general aviation parking apron to the north and east. The apron expansion provides additional space for aircraft storage hangars and 26 additional marked aircraft parking positions, which are included on the southeast corner of the apron expansion area.

Several proposed hangar development areas, which include conventional hangars, executive hangars, and T-hangars, are shown. The proposed hangar layouts are separated into high-, medium-, and low-activity level areas. This alternative features a 55,000-square-yard apron expansion with three 100'x100' conventional hangars proposed on the north end of the expanded apron in order to allow for easy access for larger aircraft, such as business jets. Two 80'x80' executive hangars are planned north of the existing T-hangar, with an 11-unit T-hangar proposed east of the existing T-hangars. Farther east on the expanded apron area, four rows of 50'x50' executive hangars are planned, providing 24 individual executive hangars. One conventional hangar measuring 100'x100' is located on existing pavement north of the water storage tank on the field. In all, this alternative provides for an additional 40,000 square feet of conventional hangar space, 72,800 square feet of executive hangar space, and 15,000 square feet of T-hangar space, for a total of 127,800 square feet of additional aircraft storage capacity. New vehicle parking areas are planned to the north of the apron expansion.

Landside Alternative 1 also includes construction of an aircraft wash rack immediately adjacent to an existing open box hangar, as well as four additional helicopter parking pads to support potential helicopter air tour operations.

With the potential for more commercial activity at the airport, a terminal expansion area is reserved surrounding the existing terminal should the need for a terminal expansion become necessary.

Aviation reserve parcels, shown in purple, are intended to be kept available for additional aviation development in the future. East of the proposed apron expansion, there are approximately 35 acres of airport property that is not easily accessible for aviation use due to the presence of Pronghorn Ranch Road, which is a heavily trafficked unpaved dirt road connecting Airport Road to Arizona State Highway 64. This alternative considers paving Pronghorn Ranch Road and separating the area into non-aviation revenue support parcels, with additional paved access roads into the area.

LANDSIDE ALTERNATIVE 2

Landside Alternative 2, presented on **Exhibit 4K**, proposes a 49,000-square-yard apron expansion to accommodate additional aircraft parking and hangar storage at the airport. Like the previous alternative, aircraft activity levels are considered as part of the layout of aircraft storage hangars, with larger hangars located nearest to the runway environment. Three 100'x150' conventional hangars are proposed north of the existing apron, parallel to Runway 18-36, with three additional conventional hangars measuring 100'x100' situated perpendicular to the runway, facing south. Each of these groups of conventional hangars provides vehicle parking and road access via Pronghorn Ranch Road. Another 100'x100' conventional hangar is located north of the transient apron. Expansion to the east of the existing apron pavement provides storage for lower activity level aircraft and includes 18 50'x50' executive hangars and two 11-unit T-hangar complexes. The existing T-hangar is planned to be expanded to offer five additional storage units. In all, Landside Alternative 2 plans for the addition of 85,000 square feet of conventional hangar storage space, 45,000 square feet of executive storage area, and 37,500 square feet of T-hangar space, for a total of 167,500 square feet.

Additional apron pavement is planned to the south of the proposed executive hangars and includes eight marked positions. An aircraft wash rack is proposed north of the airport's water storage tank.

Non-aviation-related revenue support parcels are located east of Pronghorn Ranch Road and additional paved roads are shown to provide access to the parcels. Aviation reserve parcels are drawn parallel to the runway between the existing BRL and the airport property line.

LANDSIDE ALTERNATIVE 3

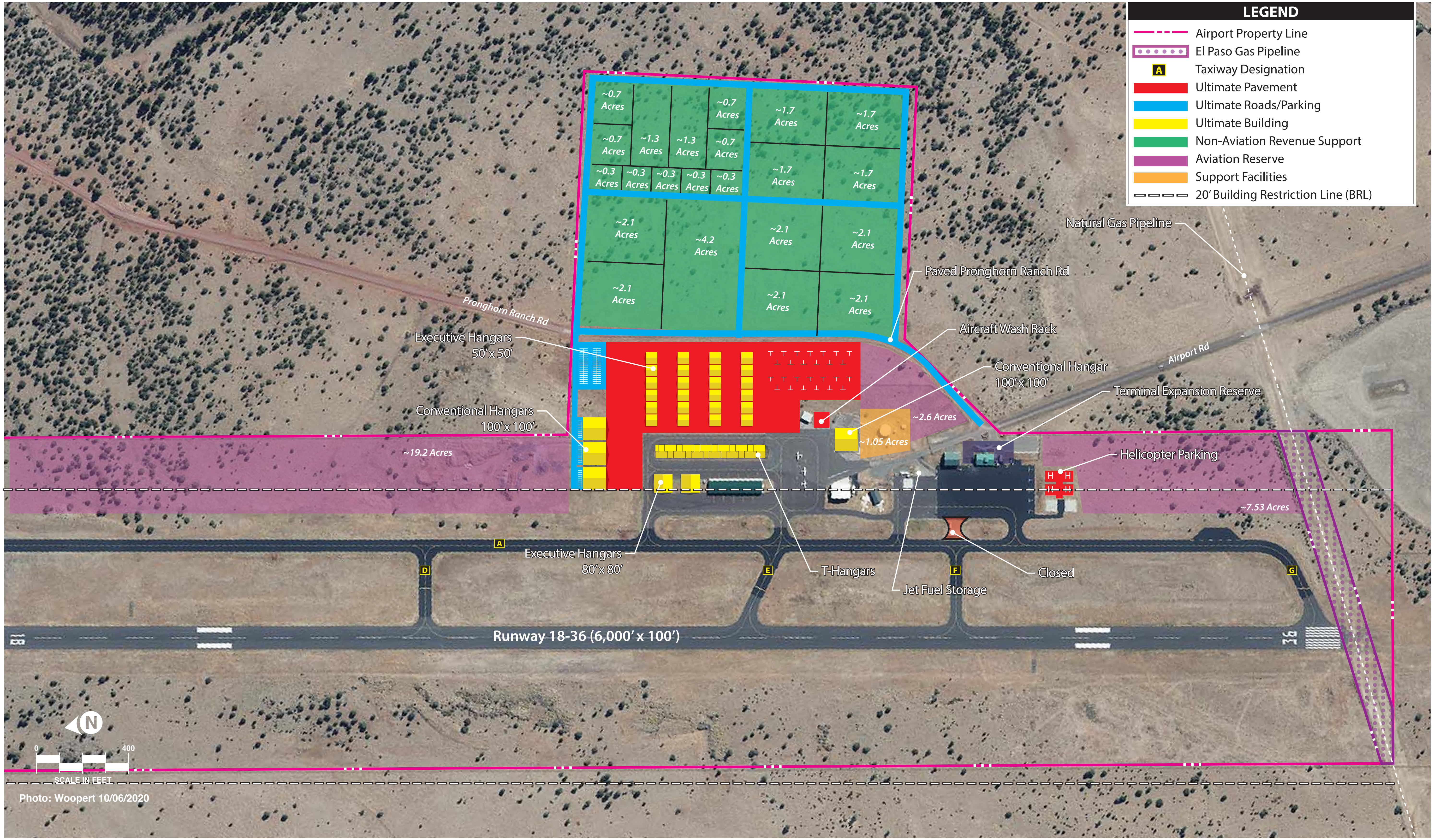
The third and final landside alternative is depicted on **Exhibit 4L**. On the north end of the existing apron, a 4,000-square-yard apron expansion and two 100' x100' conventional hangars are proposed. Moving south onto the existing apron, this alternative plans for 14 60'x60' executive hangars, as well as an expansion of the existing T-hangar. A 60'x200' shade hangar complex is planned on the existing local apron, south of the T-hangar. A second apron expansion of approximately 30,000 square yards is planned to the east, providing 20 aircraft parking positions and three conventional hangars that, combined, offer 35,000 square feet of aircraft storage space. Access to these hangars is provided via Pronghorn Ranch Road, and each hangar has designated vehicle parking areas. A final apron expansion area is shown south of the transient apron, which could support four additional 100'x100'conventional hangars. The total aircraft storage capacity for this alternative includes 95,000 square feet of conventional hangar space, 50,400 square feet of executive hangar space, 7,500 square feet of T-hangar space, and 12,000 square feet of space in the planned shade hangars. Combined, this would provide a total of 164,900 square feet of additional capacity. The proposed aircraft wash rack is planned for a location north of the transient apron, adjacent to the self-serve fueling area.

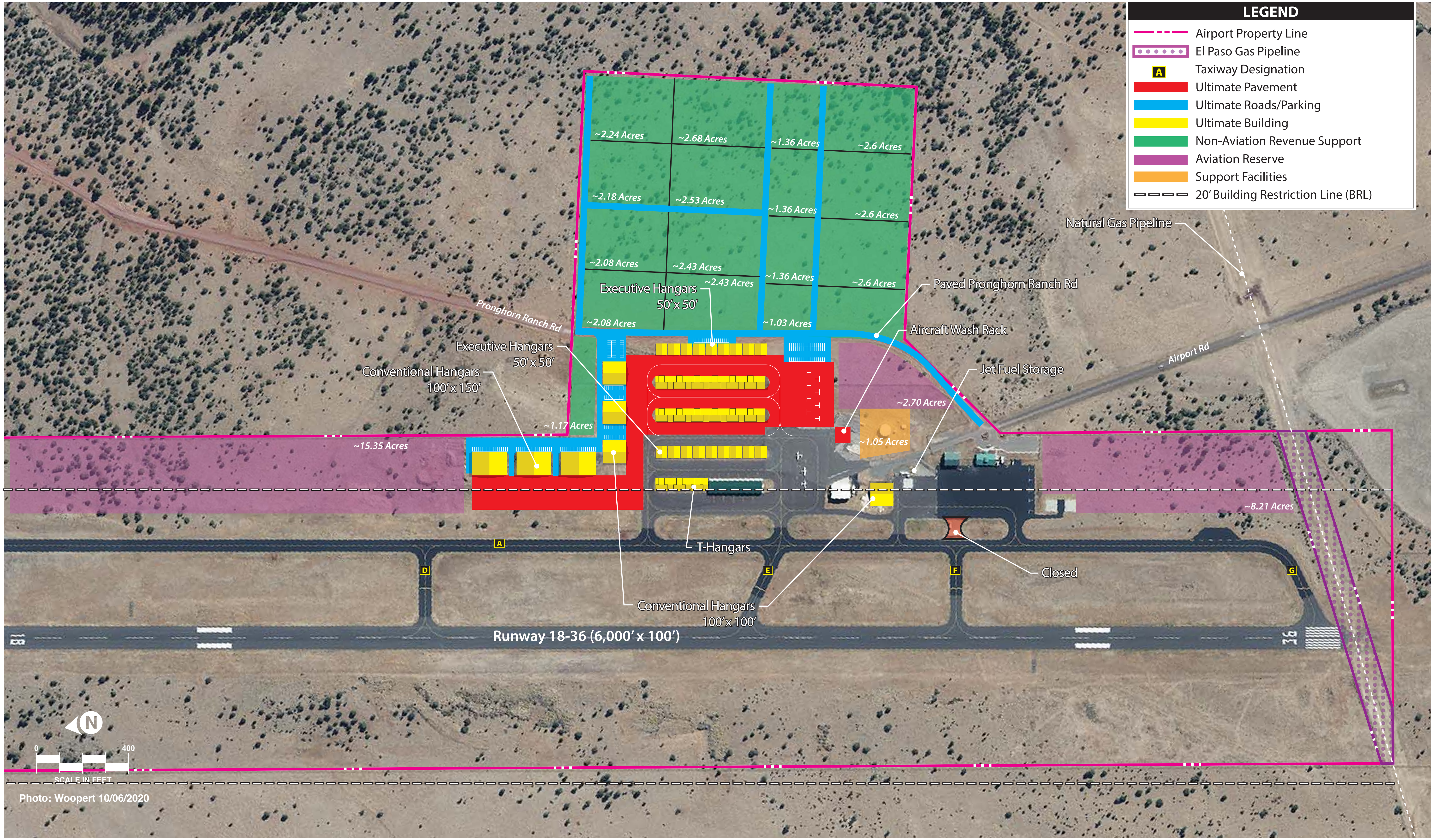
LANDSIDE ALTERNATIVES SUMMARY

The landside alternatives previously detailed accommodate a wide array of aviation activities that either currently occur, or could be expected to occur, at H.A. Clark Memorial Field in the future. As with many of the alternatives detailed in this chapter, airport staff should continually monitor the demand that is occurring on the airfield and in the region to help determine the potential need for enhanced landside facilities, both aviation and non-aviation related. Each of the development options considers a long-term vision that would, in some cases, extend beyond the 20-year scope of this master plan. It is beneficial to provide a long-term vision for the airport for future generations.

ALTERNATIVE ANALYSIS SUMMARY

The process utilized in assessing airside, terminal, and general aviation development alternatives involved a detailed analysis of facility requirements, as well as future growth potential. Existing and ultimate airport design standards were considered at each stage of development.


LEGEND
Airport Property Line
El Paso Gas Pipeline
Taxiway Designation
Ultimate Pavement
Ultimate Roads/Parking
Ultimate Building
Non-Aviation Revenue Support
Aviation Reserve
Support Facilities
20' Building Restriction Line (BRL)
Natural Gas Pipeline
Paved Pronghorn Ranch Rd
Aircraft Wash Rack
Conventional Hangar 100'x 100'
Terminal Expansion Reserve
Helicopter Parking
Executive Hangars 50'x 50'
Conventional Hangars 100'x 100'
Executive Hangars 80'x 80'
T-Hangars
Jet Fuel Storage
Closed
Pronghorn Ranch Rd
Airport Rd
~19.2 Acres
~2.6 Acres
~1.05 Acres
~7.53 Acres
Runway 18-36 (6,000' x 100')
SCALE IN FEET
Photo: Woopert 10/06/2020


LEGEND
Airport Property Line
El Paso Gas Pipeline
A Taxiway Designation
Ultimate Pavement
Ultimate Roads/Parking
Ultimate Building
Non-Aviation Revenue Support
Aviation Reserve
Support Facilities
20' Building Restriction Line (BRL)
~2.24 Acres
~2.68 Acres
~1.36 Acres
~2.6 Acres
~2.18 Acres
~2.53 Acres
~1.36 Acres
~2.6 Acres
~2.08 Acres
~2.43 Acres
~1.36 Acres
~2.6 Acres
~2.43 Acres
Executive Hangars 50'x 50'
~2.08 Acres
~1.03 Acres
Pronghorn Ranch Rd
Natural Gas Pipeline
Paved Pronghorn Ranch Rd
Aircraft Wash Rack
Jet Fuel Storage
Airport Rd
Executive Hangars 50'x 50'
Conventional Hangars 100'x 150'
~2.70 Acres
~1.17 Acres
~15.35 Acres
~1.05 Acres
~8.21 Acres
A
D
E
F
G
T-Hangars
Closed
Conventional Hangars 100'x 100'
Runway 18-36 (6,000' x 100')
18
36
N
0
400
SCALE IN FEET
Photo: Woopert 10/06/2020

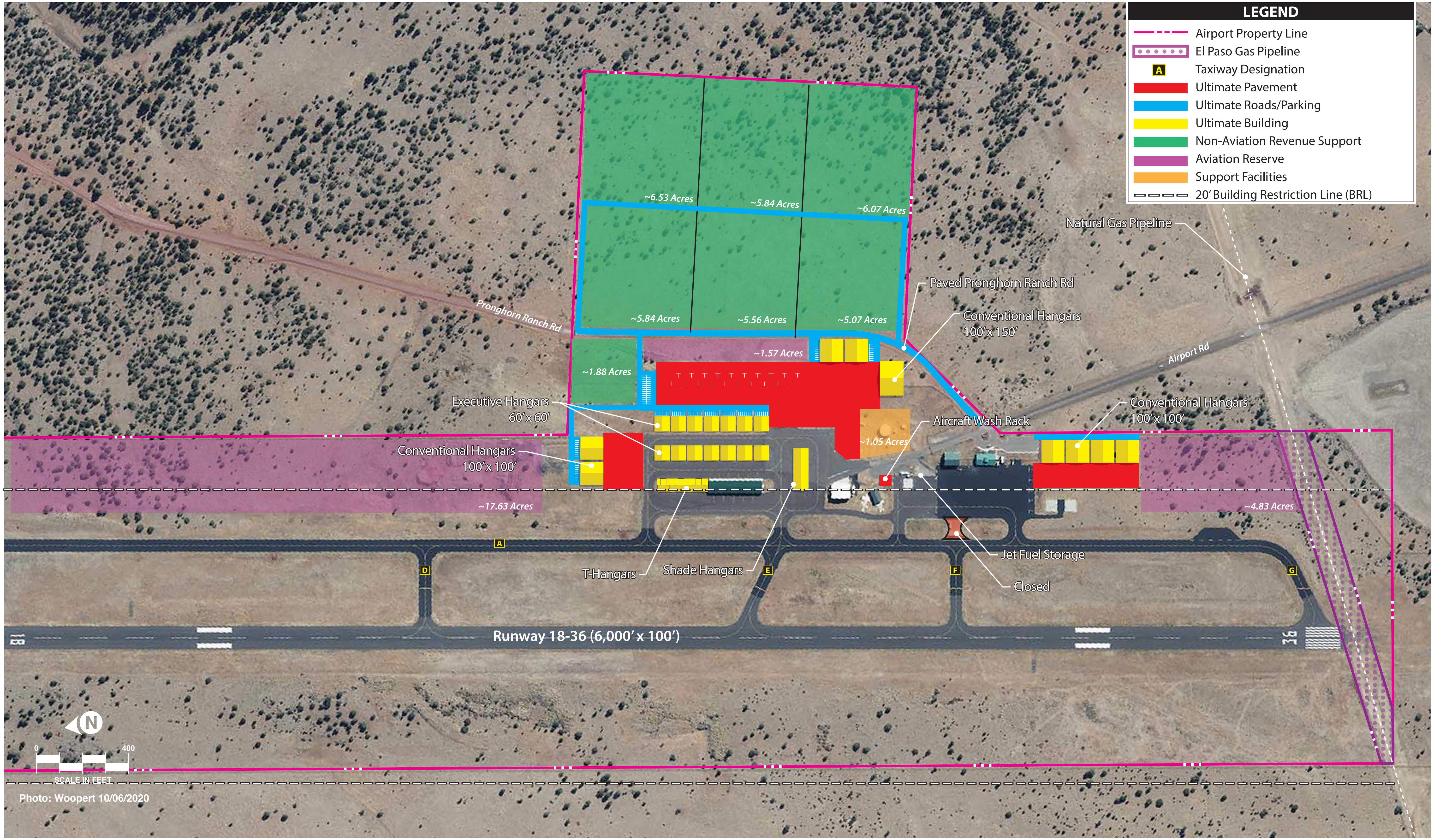


Exhibit 4L
LANDSIDE ALTERNATIVE 3

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Several development alternatives related to both the airside and the landside have been presented. On the airside, the major considerations involve extending Runway 18-36, implementing and enhancing approach visibility minimums, and correcting taxiway geometry in areas that do not meet design standards. The alternatives have shown there are several positive and negative impacts that need to be weighed, including potential impacts on surrounding land uses and roadways.

On the landside, alternatives were presented to consider additional hangar development and potential for aviation-related and non-aviation-related revenue support. The alternatives focused on meeting the long-term facility demands of each of the various aviation activities within the existing airport property boundary.

After review by the City of Williams, the PAC, and public, a recommended concept will be presented in the next chapter. The resulting plan will represent an airside facility that fulfills safety and design standards and a landside complex that can be developed as demand dictates.



Chapter Five

Recommended Master Plan Concept

H.A. Clark Memorial Field

Airport Master Plan

H.A. Clark Memorial Field
Airport Master Plan

Chapter Five
Recommended Master Plan Concept

The airport master planning process for H.A. Clark Memorial Field (CMR) has evolved through the development of forecasts of future demand, an assessment of future facility needs, and an evaluation of airport development alternatives to meet those future facility needs. The planning process has included three sets of draft working papers, which were presented to the Planning Advisory Committee (PAC) and discussed at several coordination meetings. The draft material has also been presented at a public information workshop and has been available on a dedicated project website throughout the process.

In the previous chapter, several alternatives were analyzed to explore options that can accommodate growth and development of the airport and fully meet FAA design standards. The development alternatives have been refined into a single recommended development plan. This chapter describes, in narrative and graphic form, the recommended direction for the future use and development of the H.A. Clark Memorial Field. Where appropriate, the alternatives are summarized and a rationale for the selected alternative is presented.

MASTER PLAN CONCEPT

The master plan concept represents the development direction for H.A. Clark Memorial Field through the planning period and beyond. It represents an ultimate configuration for the airport that meets Federal Aviation Administration (FAA) design standards and provides a variety of landside development options to meet the increasing demands on the airport by different aviation and non-aviation activities. It is important to note that the development concept provides for anticipated facility needs over the next 20 years, as well as establishing a vision and direction for meeting facility needs even beyond the planning horizons established in this master plan.

When assessing development needs, this study has separated the airport system into airside and landside functional areas. Airside components relate to runways, taxiways, navigation-al aids, etc., and require the greatest commitment of land area to meet the physical layout of the airport. Landside components include hangars, aircraft parking aprons, terminal services, as well as the utilization of remaining airport property to provide revenue support for the airport and to benefit the economic development of the regional area. The master plan concept is a consolidation of these airside and landside functions as depicted on **Exhibit 5A**.



AIRSIDE DEVELOPMENT CONCEPT

The airside element, as depicted on **Exhibit 5A**, of the recommended development concept relates to planned improvements to the runway and taxiway system. The following sections will discuss the recommended concept, including resolution of the issues addressed in the alternatives chapter.

CRITICAL AIRCRAFT SUMMARY

Future planning for the airport is largely based on the forecasts of aviation demand and the applicable critical aircraft. The forecasts presented in Chapter Two indicated that over the next 20-years the airport should plan for based aircraft to potentially increase from 12 to 23. Operations are forecast to nearly double going from 6,500 to 12,000. Most based aircraft and aircraft operations are anticipated to be single engine piston powered aircraft. In the intermediate and long-term planning horizons the airport may realize increased activity by turboprops and business jets.

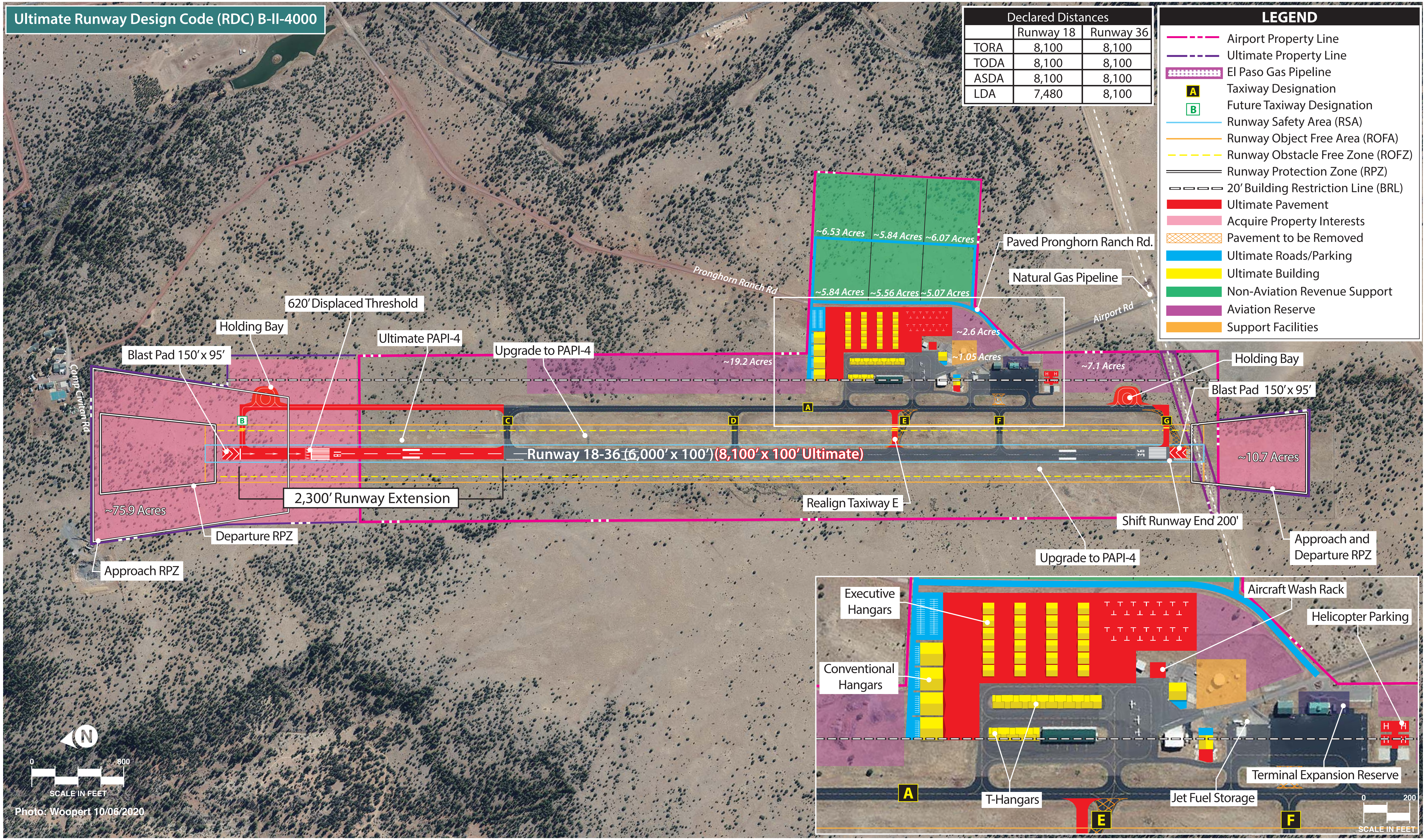
The critical aircraft is that aircraft or family of aircraft with similar characteristics that account for more than 500 annual operations. According to the current (2008) airport layout plan, the airport is classified as a B-II facility. This classification includes piston powered aircraft, most turboprops, and small business jets. This classification is planned to remain the same as a significant (more than 500 operations) influx of operations by aircraft in the C-II category (medium and large business jets) are not anticipated. Therefore, the recommended development concept considers the application of B-II design standards.

RUNWAY LENGTH

Runway 18-36 is currently 6,000 feet long and 100 feet wide. This length is adequate to accommodate most general aviation aircraft most of the time, however on hotter days, some operators may be weight restricted especially if they have longer haul lengths. As a result, an extension of the runway is planned. The timing of the extension will depend upon when justification exists and, for purposes of this master plan, that is anticipated in the out-years of the plan. Nonetheless, it is important to reflect the runway extension for current airspace and land use protection purposes.

Analysis presented in Chapter Three – Facility Requirements indicated that a total runway length of 8,100 feet would meet the needs of all small aircraft and most of the business jets. Several alternative development concepts were analyzed in Chapter Four – Alternatives. Following review, the recommended development concept combines the most appropriate elements from those alternatives into a single concept.

The presence of the El Paso Gas Pipeline to the immediate south of the Runway 36 end is restrictive of an extension in this direction. While it may be technically permissible to pave over the underground pipeline, it is preferrable to not do that. Therefore, the runway extension considered is located on the north end of the airport.



Declared Distances	Runway 18	Runway 36
TORA	8,100	8,100
TODA	8,100	8,100
ASDA	8,100	8,100
LDA	7,480	8,100

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On the south end of the runway, the runway safety area (RSA) extends beyond airport property. The RSA should be entirely on airport property. Taxiway G is an angled threshold entrance to Runway 36 where 90-degree runway/taxiway intersections are the FAA standard in order to give pilots full peripheral views.

To address these issues, the end of Runway 36 is planned to be shifted approximately 200 feet to the north. This distance will bring the RSA onto airport property and allow for Taxiway G to be reconfigured into a 90-degree intersection. This runway shift will also facilitate a blast pad beyond the new Runway 36 end that will not cross the pipeline.

The extension on the north end is 2,300 feet in length. Combined with the removal of 200 feet of runway length on the south end, the total runway length will be 8,100 feet. There is a homestead north of the airport that would fall within the runway protection zone (RPZ) for instrument approach visibility minimums of ¾-mile to Runway 18. To mitigate this incompatible land use within the future RPZ the landing threshold to Runway 18 is displaced by 620 feet. When a landing threshold is displaced, it is necessary to implement declared distances, which were previously described in Chapter Four – Alternatives.

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

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

Implementation of declared distances is intended to provide full Runway 18 RPZ land use compatibility if/when visibility minimums are lower than 1-mile. When declared distances are implemented, a separate approach and departure RPZ are defined. Without declared distances the departure RPZ is either the same size as the approach RPZ or contained entirely within the approach RPZ. In this case, the departure RPZ for aircraft departing from Runway 36 is contained entirely within the approach RPZ to Runway 18. For instrument approaches with not less than 1-mile visibility minimums, the approach and departure RPZ are the same size. If visibility minimums remain at 1-mile or more then declared distances will not be necessary and the full 8,100 feet of runway is available in both directions. Therefore, the implementation of declared distances is only triggered if/when visibility minimums are below 1-mile as planned for the approach to Runway 18. Table 5A summarizes the planned declared distances for the runway when visibility minimums for Runway 18 are below 1-mile.

TABLE 5A | Declared Distances with Runway Extension Alternative
H.A. Clark Memorial Field

Parameters	Runway 18	Runway 36
Takeoff Run Available (TORA)[1]	8,100	8,100'
Takeoff Distance Available (TODA)[2]	8,100	8,100'
Accelerate Stop Distance Available (ASDA)[3]	8,100	8,100'
Landing Distance Available (LDA)[3]	7,480	8,100'

[1] Departure RPZ begins 200 feet from the end of the TORA.
[2] TORA cannot be longer than TODA. Departure surface is set on TODA. TODA can be shortened to mitigate departure surface penetrations; if so, TORA is shortened, too.
[3] Available runway length plus RSA. Approach RPZ begins 200 feet from the landing threshold.

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

RUNWAY WIDTH

Runway 18-36 is currently 100 feet wide. The standard runway width is 75 feet for B-II runways with visibility minimums not lower than ¾-miles. This plan calls for a not lower than ¾-mile approach to Runway 18. If the instrument approach visibility minimums were lower than ¾-mile, then the standard runway width is 100 feet.

This plan calls for maintaining the existing runway width of 100 feet to continue to provide an added safety margin. Visibility minimums below ¾-mile are not planned due to expected terrain issues surrounding the airport. In the future, with advancement in avionics and GPS positioning, it is feasible that the airport could achieve lower than ¾-mile visibility minimums, therefore, maintaining the existing runway width is recommended.

At the time of the next full reconstruction of the runway, the FAA may seek justification for maintaining the 100-foot width. If that justification is not anticipated, then the FAA has the option to fund a reconstruction of only 75 feet of runway width. The airport sponsor could choose to fund the remaining 25 feet of width to maintain the runway at 100 feet wide.

RUNWAY STRENGTH

An important feature of airfield pavement is its ability to withstand repeated use by aircraft. Runways are issued strength ratings by the FAA, which are based on design parameters that support a high volume of aircraft at or below the published weight, allowing the pavement to survive its intended useful life. However, the strength rating of a runway does not preclude aircraft weighing more than the published strength rating from using the runway. Aircraft weighing more than the published weight could damage the runway in severe conditions, but more likely will simply reduce the life cycle of the pavement.

The current strength rating for Runway 18-36 is 15,000 pounds for single wheel loading (S). As the airport experiences more frequent activity by aircraft weighing more, the useful life of the pavement will be reduced. It is therefore recommended that the pavement strength rating be increased to 30,000 pounds (S) and 60,000 pounds for dual wheel landing gears.

A separate project solely to increase the pavement strength is not recommended, instead, when the runway is to be rehabilitated or reconstructed, consideration should be given to increasing the pavement strength at that time.

TAXIWAY IMPROVEMENTS

As noted in Chapter Three – Facility Requirements, Taxiway E and G are non-conforming currently. Both are angled taxiways where the current standard is for runway connecting taxiways to be at 90-degrees. Taxiway E also allows for direct access to the runway from an apron area.

Taxiway E is planned to be reconstructed at the standard 90-degree angle and offset from taxilane entrance to the aircraft apron. Taxiway G is planned to be reconstructed at the standard 90-degree angle and shifted approximately 200 feet to the north. The shift to the north is to bring the RSA completely onto airport property as required by FAA design standards.

Taxiway F currently allows for direct access from the aircraft apron to the runway. This design increases the possibility of a runway incursion. Current design standards call for eliminating direct access taxiways. That portion of Taxiway F between Taxiway A and the apron is planned to be removed. It should be noted that Taxiway F is currently closed to taxiing aircraft.

Taxiway A is parallel to Runway 18-36 and is separated from the runway by 400 feet. For a B-II runway with not lower than ¾-mile visibility minimums the standard separation distance is 240 feet. For a B-II runway with visibility minimums of lower than ¾-mile the standard separation distance is 300 feet. Typically, when reconstruction is necessary for a parallel taxiway that exceeds the separation design standard, the FAA will support maintaining the existing separation distance. The existing 400-foot runway to taxiway separation distance is planned to be maintained through the 20-year planning period.

An aircraft holding bay is planned on both ends of Taxiway A. The holding bays allow for pilots to pull off the main taxiway to perform pre-flight checks and engine run-ups. Hold bays are eligible for FAA grant funding when peak hour operations reach 30. The forecasts from this study estimate peak hour operations of 8. Therefore, when the airport considers adding the hold bays, additional analysis may be necessary to determine the funding eligibility.

VISUAL APPROACH AIDS

Both ends of Runway 18-36 are outfitted with a two-box precision approach path indicator (PAPI). This is an excellent visual aid that provides a red and/or white light to indicate to the pilot if they are on the correct glide path to the runway. A four-box version of a PAPI is typically installed at airports with a high volume of activity by turboprops and business jets. If the future, the PAPIs at the airport are planned to be upgraded to the four-box system.

The existing runway end identification lights (REILs) that facilitate rapid identification of the runway end at night and during poor visibility conditions are planned to be maintained throughout the planning horizon.

CMR has three wind cones: a lighted windcone within the segmented circle and two unlit supplemental windcones.

LANDSIDE CONCEPT

H.A. Clark Memorial Field has a well define terminal and hangar development area on the southeast side of the runway. The terminal area currently has a terminal building (4,200 s.f.), a fuel farm, a 10-unit T-hangar building (13,000 s.f.), an executive box hangar (5,000 s.f.), an open-faced box hangar (1,400 s.f.), a firefighting station, and a city equipment storage building. Current hangar space provided is approximately 19,400 square feet.

The forecasts indicate the airport should plan for at least an additional 21,200 square feet of hangar space. The recommended concept depicted on **Exhibit 5A**, shows four 10,000 square foot executive box hangars, 24 executive box hangars each encompassing approximately 3,000 square feet, two box hangars encompassing 6,000 square feet, and 17 T-hangar units. In total, the plan depicts approximately 200,000 square feet of new hangar space.

The plan as depicted far exceeds the hangar needs as identified in the forecasts. The plan therefore provides a long-term vision for the terminal area and gives airport management flexibility to accommodate any unforeseen increases in hangar demand. It also allows airport management to reserve the appropriate space for specific hangar types.

Airport Road is the main entrance to the airport. Pronghorn Ranch Road is an unpaved road that extends from Airport Road to the north and to the northeast. A portion of Pronghorn Ranch Road is planned to be paved. This portion will ultimately provide access to the north side of the terminal area where new hangars are planned. This paved portion of Pronghorn Ranch Road will also serve airport property to the east that is planned to support non-aeronautical development.

An aircraft wash rack is planned on the eastern edge of the terminal apron. Wash racks provide a water source and capture systems to prevent cleaning fluids from contaminating the ground.

Currently, the airport provides Jet A fuel only by delivery truck. As activity by aircraft with turbine engines increases, there may be a need for a static Jet A fuel tank. A 12,000-gallon Jet A storage tank is planned next to the existing AvGas static tank.

The airport currently has two helicopter parking positions at the southeast end the terminal area. Four more helicopter parking positions are planned to accommodate potential growth in helicopter activity.

The plan will require acquisition of certain land areas. On the south end, the RPZ will extend off airport property. It is recommended that the airport acquire approximately 10.7 acres of this RPZ land. While airport ownership of RPZ lands is not required, it is the most effective method for preventing height hazards or incompatible land uses. On the north end, acquisition of approximately 75.9 acres of land is recommended to accommodate the runway extension and the associated RPZ.

To the east of Pronghorn Ranch Road is airport property encompassing approximately 35 acres. This land is physically separated from the airfield by the road and will not be able to support aeronautical development. This land has therefore been identified to possibly support non-aeronautical development that is compatible with airport operations. This type of development would generate revenue for the airport in the form of ground leases.

LAND USE – ON AIRPORT

The recommended concept largely reflects the initial land use designations shown previously on Exhibit 4B. The refined airport land use map is presented on **Exhibit 5B**. The following summarizes the on-airport land use designations.

AIRFIELD OPERATIONS

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

AVIATION DEVELOPMENT

The Aviation Development land use category includes those areas that should be reserved for development that requires access to the Airfield Operations area. This might include aircraft hangars and transportation terminals. Any aviation business needing access to the runway and taxiway system should locate in these areas. Generally, any land adjacent to the runway/taxiway system should be reserved for current and future aviation purposes.

NON-AVIATION REVENUE SUPPORT

This land use classification includes development that is compatible with aviation activities but is unlikely to require access to the runway and taxiway system. Typically, it is preferable that activities in these areas complement airport activities to some degree, but that is not required. Examples of potential uses include research facilities, laboratories, manufacturing and processing facilities, warehouses, and other facilities compatible with an airport environment.

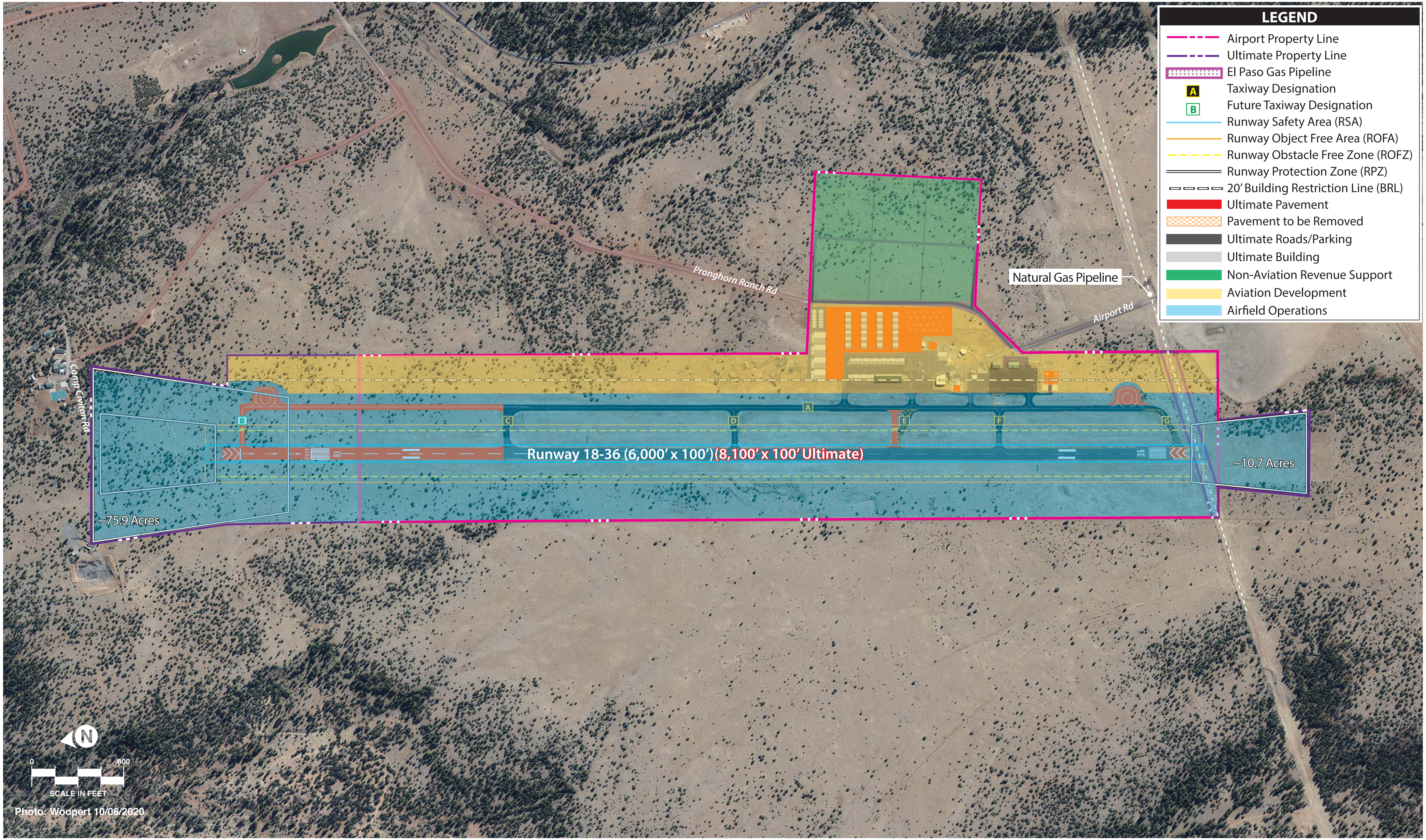
Development of airport property with non-aviation uses is only permitted by the FAA if it can be shown that the land will not be needed for aviation uses in the future. When non-aviation uses are introduced, the airport must receive a fair-market lease from the tenant, either through a land lease or facility lease. There is a 35-acre parcel to the east of Pronghorn Ranch Road that is physically separated from the airfield and will likely never be needed for aviation development.

The airport land use map is a concept drawing that will be included as one of the official drawings in the Airport Layout Plan (ALP) set. Identifying potential non-aviation land in the ALP set is only the first step toward allowing non-aviation uses. The airport must follow a prescribed FAA process to release the land from airport obligations. The airport must also receive fair-market value from any developer or tenant for a ground lease. All revenue generated from the lease must remain with the airport and cannot be diverted for other needs that are unrelated to the airport.

SUMMARY

The recommended master plan concept depicted on **Exhibit 5A** presents a long-term strategic development plan for the airport. On the airside, Runway 18-36 is planned to be extended from 6,000 feet to 8,100 feet to better accommodate current activity.

The next chapter of this master plan will present a 20-year capital improvement program (CIP) and a project phasing plan for implementation of the CIP. Strategies for funding the recommended development plan are also presented.


LEGEND
Airport Property Line
Ultimate Property Line
El Paso Gas Pipeline
Taxiway Designation
Future Taxiway Designation
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
Runway Obstacle Free Zone (ROFZ)
Runway Protection Zone (RPZ)
20' Building Restriction Line (BRL)
Ultimate Pavement
Pavement to be Removed
Ultimate Roads/Parking
Ultimate Building
Non-Aviation Revenue Support
Aviation Development
Airfield Operations
Natural Gas Pipeline
Pronghorn Ranch Rd
Airport Rd
Camp Clinton Rd
Runway 18-36 (6,000' x 100') (8,100' x 100' Ultimate)
~75.9 Acres
~10.7 Acres
SCALE IN FEET
Photo: Woolpert 10/06/2020

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Chapter Six

Capital Program

H.A. Clark Memorial Field

Airport Master Plan

Chapter Six
Capital Program

The analyses completed in previous chapters evaluated development needs at the airport over the next 20 years and beyond, based on forecast activity and operational efficiency. Next, basic economic, financial, and management rationale is applied to each development item so that the feasibility of each item contained in the plan can be assessed.

The presentation of the capital improvement program (CIP) has been organized into two sections. First, the airport development schedule and CIP cost estimate is presented in narrative and graphic form. Second, capital improvement funding sources on the federal, state, and local levels are identified and discussed.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Now that the recommended development concept has been presented, and specific needs and improvements for the airport have been established, the next step is to determine a realistic schedule (implementation timeline) and associated cost estimates for the plan. The recommended improvements are grouped by planning horizon: short term, intermediate term, and long term. The short-term planning horizon is further subdivided into yearly increments.

As a master plan is a conceptual document, implementation of the capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects may require additional infrastructure improvements (i.e., drainage improvements, extension of utilities, etc.) that may take more than one year to complete. In addition, on an annual basis, the airport capital improvement plan (ACIP) is updated in coordination with Federal Aviation Administration (FAA) and the Arizona Department of Transportation – Aeronautics Group (ADOT).

At this juncture, it is difficult to know, precisely, what the cost of individual projects will be; however, preparing order-of-magnitude cost estimates is an effective way to get a feel for the current costs. Many federal agencies utilize a system of five classes of estimates, as presented in **Table 6A**.

TABLE 6A | Cost Estimate Classification

Estimate Class	Name	Purpose	Project Definition Level
Class 5	Order of Magnitude	Screening or Feasibility	0% to 2%
Class 4	Intermediate	Concept Study or Feasibility	1% to 15%
Class 3	Preliminary	Budget, Authorization, or Control	10% to 40%
Class 2	Substantive	Control or Bid/Tender	30% to 70%
Class 1	Definitive	Check Estimate or Bid/Tender	50% to 100%

Source: U.S. Department of Energy



Once the list of recommended projects was identified and refined, project-specific cost estimates were developed. The cost estimates include environmental documentation, design, engineering, construction administration, and contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficient for planning purposes. Cost estimates were developed based on recent airport construction costs in the region. Cost estimates for each of the development projects in the CIP are in current (2021) dollars. **Exhibit 6A** presents the proposed CIP for H.A. Clark Memorial Field Airport.

FAA utilizes a priority ranking system to help objectively evaluate potential airport projects. Projects are weighted toward safety, infrastructure preservation, standards, and capacity enhancement. FAA will participate in the highest priority projects before considering lower priority projects, even if a lower priority project is considered a more urgent need by the local sponsor. Nonetheless, the project should remain a priority for the airport, and funding support should continue to be requested in subsequent years.

An important goal of the CIP is to ensure that future projects for which the airport may request FAA funding are included on the list. On an annual basis, the CIP is updated and reviewed with FAA and ADOT. Projects on the CIP will be moved up and down, depending on priority and funding availability. Periodically, new projects will arise that can then be added to the annual CIP presented to the FAA and ADOT.

Often hangar construction is left to the private sector. It is typical for private hangar development to include a portion of the ramp area in front of the hangar. Taxilanes providing access to/from hangar areas are generally eligible for FAA grant funding unless they are exclusive use taxilanes.

The following sections will describe in greater detail the projects identified for the Airport over the next 20 years. The short-term projects cover the first five years and are presented in yearly increments. The intermediate term covers years 6-10, and long-term projects cover years 11-20. All projects are ranked according to their priority at the time of developing the list. **Exhibit 6B** presents the 20-year CIP phasing plan.

SHORT-TERM PROJECTS (YEARS 1-5)

The projects identified for the short-term planning period have been prioritized based on airport need and potential to be funded. If any of these projects cannot be funded in the timeframe indicated, the airport sponsor should move the project to a more appropriate timeframe.

2022 Projects

Project #1: Rehabilitate Helipads and Taxiway A (Mill/Overlay/Mark)
Description: This project will rehabilitate both Taxiway A and the existing helipad. The current PCI value is "66" which is an indication that these primary pavement surfaces need pavement preservation such as milling/overlay. While a project of this type is eligible for FAA funding, this project is planned to be funded at 90 percent through a state grant with a 10 percent local match.
Cost Estimate: $705,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

ID	PROJECT DESCRIPTION	NPR	Federal Share	State Share	Local Share	Total
SHORT TERM (Years 1-5)						
1 - 2022	Rehabilitate Helipads and Taxiway A (Mill/Overlay/Mark)	62	$0	$634,500	$70,500	$705,000
2 - 2022	Rehabilitate Airport Access Rd. - Design & Construct	20	$327,816	$16,092	$16,092	$360,000
3 - 2023	Replace Airfield Signs/Rename Connecting Taxiways	75	$182,120	$8,940	$8,940	$200,000
4 - 2024	Taxiway E Realignment - Design	62	$68,295	$3,353	$3,353	$75,000
5 - 2024	Wildlife Hazard Assessment & Management Plan	52	$91,060	$4,470	$4,470	$100,000
6 - 2022	Pavement Preservation - Runway 18-36 (Crack Fill/Slurry Seal)	66	$0	$397,800	$44,200	$442,000
7 - 2025	Taxiway E Realignment - Construct	62	$682,950	$33,525	$33,525	$750,000
8 - 2026	Construct Perimeter Road - Phase 1 & 2	19	$364,240	$17,880	$17,880	$400,000
9 - 2027	Environmental Assessment - Runway Extension	62	$273,180	$13,410	$13,410	$300,000
10 - 2027	Upgrade to Four-Box PAPIs	77	$364,240	$17,880	$17,880	$400,000
SHORT TERM TOTAL			**$2,353,901**	**$1,147,850**	**$230,250**	**$3,732,000**
INTERMEDIATE TERM (Years 6-10)						
11	Remove Taxilane F Apron Connector	28	$100,166	$4,917	$4,917	$110,000
12	Land Acquisition - Rwy 36 RPZ (10.7 acres)	41	$282,286	$13,857	$13,857	$310,000
13	Land Acquisition - Rwy 18 (75.9 acres)	41	$2,003,320	$98,340	$98,340	$2,200,000
14	Extend Runway (2,300')/Reconfigure Rwy 36 and Twy G - Construct	51	$9,096,894	$446,553	$446,553	$9,990,000
15	Hold Bays (2x) - Construct	56	$633,778	$31,111	$31,111	$696,000
16	Aircraft Wash Rack - Construct	51	$437,088	$21,456	$21,456	$480,000
17	General Aviation Apron Expansion (Phase 1) - Construct	50	$3,924,686	$192,657	$192,657	$4,310,000
18	General Aviation Apron Expansion (Phase 2) - Construct	50	$3,551,340	$174,330	$174,330	$3,900,000
19	General Aviation Apron Expansion (Phase 3) - Construct	50	$4,257,055	$208,973	$208,973	$4,675,000
20	Install Jet A Fuel Tank (12,000 gal)	-	$0	$0	$1,155,000	$1,155,000
INTERMEDIATE TERM TOTAL			**$24,286,613**	**$1,192,194**	**$2,347,194**	**$27,826,000**
LONG TERM (Years 11-20)						
21	Master Plan Update	62	$318,710	$15,645	$15,645	$350,000
22	Expand Helicopter Pads (4x)	57	$318,710	$15,645	$15,645	$350,000
23	Pave Portion of Pronghorn Ranch Road	20	$1,161,015	$56,993	$56,993	$1,275,000
24	Rehibilitate Existing Terminal Apron (Crack Fill/Slurry Seal)	60	$173,014	$8,493	$8,493	$190,000
25	Rehabilitate Existing General Aviation Apron (Crack Fill/Slurry Seal)	60	$191,226	$9,387	$9,387	$210,000
26	Rehabilitate All Taxiways (Mill/Overlay/Mark)	62	$2,731,800	$134,100	$134,100	$3,000,000
27	Rehabilitate Runway 18-36 (Mill/Overlay/Mark)	66	$4,507,470	$221,265	$221,265	$4,950,000
28	Perimeter Fencing Improvements	78	$1,425,089	$69,956	$69,956	$1,565,000
29	Roadway to Serve Non-Aviation Parcels	-	$0	$0	$645,000	$645,000
LONG TERM TOTAL			**$10,827,034**	**$531,483**	**$1,176,483**	**$12,535,000**
GRAND TOTAL			**$37,467,548**	**$2,871,526**	**$3,753,926**	**$44,093,000**

NPR - National Priority Rating (Estimate)

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

Project #2: Rehabilitate Airport Access Road – Design & Construct
Description: The entrance road to the airport is in poor condition and is failing. This project would rehabilitate approximately 600 feet of the airport access road.
Cost Estimate: $360,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

2023 Projects

Project #3: Replace Airfield Signs/Rename Connecting Taxiways
Description: The current connecting taxiways at CMR are C (at Runway 18 threshold), D, E, F, and G (at Runway 36 threshold). The new designations will be A2 (at Runway 18 threshold), A3, A4, A5, A6 (at Runway 36 threshold). Connecting Taxiway A1 is reserved for the connection to an extended runway. Parallel Taxiway A will remain with the same designation.
Cost Estimate: $200,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

2024 Projects

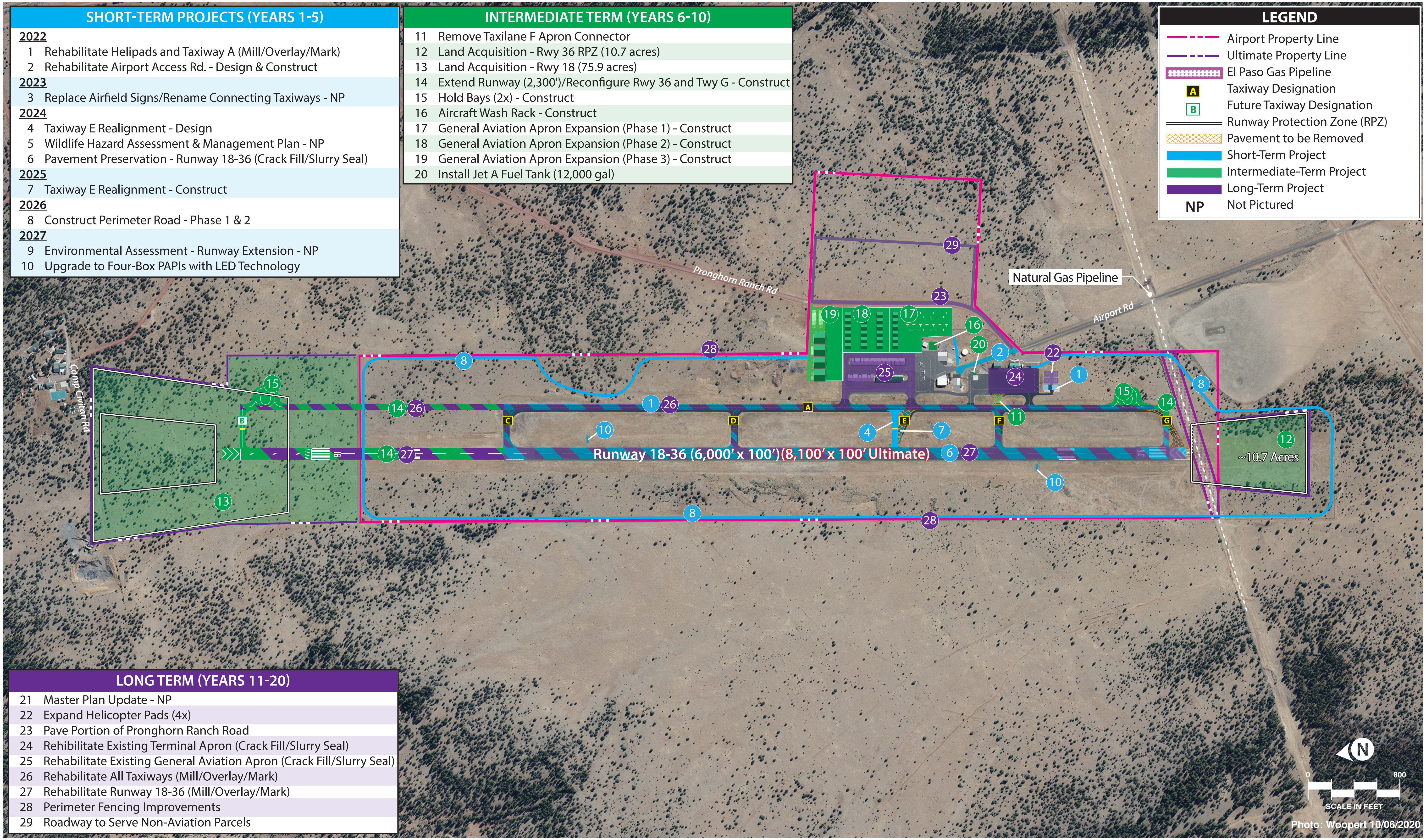
Project #4: Taxiway E Realignment - Design
Description: Taxiway E is non-standard in that it is angled, and it provides direct access to the general aviation apron. This project is to reconstruct Taxiway E in a location that is set slightly to the north of its current intersection with Taxiway A. This new configuration would force pilots to turn onto Taxiway A prior to proceeding to or from the runway.
Cost Estimate: $75,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #5: Wildlife Hazard Assessment & Management Plan
Description: The FAA requires airport sponsors to maintain a safe operating environment, which may include conducting Wildlife Hazard Assessments (WHA) and preparing Wildlife Hazard Management Plans (WHMP). The Wildlife Hazard Management Plan identifies the specific actions the airport will take to mitigate the risk of wildlife strikes on or near the airport. This study will result in a specific management plan with a list of projects that airport could implement to reduce or eliminate wildlife hazards.
Cost Estimate: $100,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #6: Pavement Preservation – Runway 18-36 (Crack Fill/Slurry Seal)
Description: The current PCI of the runway is "81". Values below "85" are an indication that preventative maintenance is necessary. This project considers a crack fill/slurry seal/remarking project to extend the useful life of the runway. Funding for this project is planned from a 90 percent state grant with a 10 percent local match.
Cost Estimate: $442,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

SHORT-TERM PROJECTS (YEARS 1-5)	
2022	
1	Rehabilitate Helipads and Taxiway A (Mill/Overlay/Mark)
2	Rehabilitate Airport Access Rd. - Design & Construct
2023	
3	Replace Airfield Signs/Rename Connecting Taxiways - NP
2024	
4	Taxiway E Realignment - Design
5	Wildlife Hazard Assessment & Management Plan - NP
6	Pavement Preservation - Runway 18-36 (Crack Fill/Slurry Seal)
2025	
7	Taxiway E Realignment - Construct
2026	
8	Construct Perimeter Road - Phase 1 & 2
2027	
9	Environmental Assessment - Runway Extension - NP
10	Upgrade to Four-Box PAPIs with LED Technology

INTERMEDIATE TERM (YEARS 6-10)	
11	Remove Taxilane F Apron Connector
12	Land Acquisition - Rwy 36 RPZ (10.7 acres)
13	Land Acquisition - Rwy 18 (75.9 acres)
14	Extend Runway (2,300')/Reconfigure Rwy 36 and Twy G - Construct
15	Hold Bays (2x) - Construct
16	Aircraft Wash Rack - Construct
17	General Aviation Apron Expansion (Phase 1) - Construct
18	General Aviation Apron Expansion (Phase 2) - Construct
19	General Aviation Apron Expansion (Phase 3) - Construct
20	Install Jet A Fuel Tank (12,000 gal)



LONG TERM (YEARS 11-20)	
21	Master Plan Update - NP
22	Expand Helicopter Pads (4x)
23	Pave Portion of Pronghorn Ranch Road
24	Rehibilitate Existing Terminal Apron (Crack Fill/Slurry Seal)
25	Rehabilitate Existing General Aviation Apron (Crack Fill/Slurry Seal)
26	Rehabilitate All Taxiways (Mill/Overlay/Mark)
27	Rehabilitate Runway 18-36 (Mill/Overlay/Mark)
28	Perimeter Fencing Improvements
29	Roadway to Serve Non-Aviation Parcels

Exhibit 6B
PROJECT PHASING

2025 Projects

Project #7: Taxiway E Realignment - Construct
Description: This is the construction element of the Taxiway E realignment project previously designed. The Taxiway is planned at a width of 50 feet, which is the same as the existing taxiways. In addition, the existing PCI value for Taxiway E is "62," which is an indication that it is need of reconstruction.
Cost Estimate: $750,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

2026 Projects

Project #8: Construct Perimeter Road – Phase 1 & 2
Description: Currently, the airport does not have a perimeter service road. As a result, airport management must utilize the runway and taxiway system when performing airfield inspections. This project would provide a paved perimeter service road.
Cost Estimate: $400,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

2027 PROJECTS

Project #9: Environmental Assessment – Runway Extension
Description: The Environmental Assessment is a study to be completed prior to implementation of the runway extension project.
Cost Estimate: $300,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #10: Upgrade to Four Box PAPIs with LED Technology
Description: The airport currently has two box PAPIs that need replacement. They are planned to be upgraded to the four box PAPI type.
Cost Estimate: $400,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Short Term Project Summary

The short-term projects include rehabilitation of Taxiway A and installation of new airfield signs that reflect the new Taxiway naming nomenclature. Taxiway E is planned to be realigned/reconstructed to meet recent changes to FAA design standards that discourage direct access from apron areas to runways. Construction of a paved perimeter road is also planned. An environmental assessment in support of extending the runway is also planned in the short-term planning period as justification will dictate.

The short-term projects total approximately $3.73 million. The share eligible for FAA funding is estimated at $2.35 million. The portion eligible for ADOT funding is estimated at $1.15 million, and the remaining local share is $230,000.

INTERMEDIATE TERM PROJECTS (YEARS 6-10)

Project #11: Remove Taxilane F Apron Connector
Description: This project is the removal of a short segment of Taxilane F between the terminal apron and Taxiway A. Currently, this taxilane segment is closed to prevent an inadvertent runway incursion by a pilot who could taxi directly from the apron to the runway. This project will make the closure of the taxilane permanent.
Cost Estimate: $110,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #12: Land Acquisition – Runway 36 RPZ (10.7 Acres)
Description: To ensure that the runway protection zones (RPZ) are protected from the development of incompatible land uses, FAA recommends that airports fully own RPZ lands. This project is the acquisition of approximately 10.7 acres for the Runway 36 RPZ.
Cost Estimate: $310,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #13: Land Acquisition – Runway 36 RPZ (75.9 Acres)
Description: To accommodate the planned runway extension and the future RPZ lands, the airport needs to acquire approximately 75.9 acres of land to the north of Runway 18.
Cost Estimate: $2,200,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #14: Extend Runway (2,300')/Reconfigure Runway 36 & Taxiway G - Construct
Description: The runway is planned to be extended to the north by 2,300 feet and shortened on the Runway 18 end by 200 feet. The removal of 200 feet of runway on the south end is to facilitate the reconstruction of threshold Taxiway G to a standard 90-degree angle. The 200-foot runway shift will also remove all pavement including the planned future blast pad off of the pipeline easement. Extension of the runway will have to be justified by the documentation of 500 or more operations by aircraft that need the additional length and the completion of the EA.
Cost Estimate: $9,990,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #15: Hold Bays (2x) – Construct
Description: Hold bays are planned near both ends of Taxiway A. The hold bays will allow pilots to pull off the taxiways to perform pre-flight checks and engine runups while allowing other aircraft to bypass them to get to the runway. Federal participation in the construction of hold bays is typically justified by activity levels reaching 30 operations per hour. Current forecasts for the airport do not reach this level.
Cost Estimate: $696,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #16: Aircraft Wash Rack - Construct
Description: A wash rack is an important feature for any airport. Pilots/owners are able to clean their aircraft and perform minor repairs in a designated location. Wash racks have separator systems to extract cleaning fluids and other solvents so they can be properly disposed of.
Cost Estimate: $480,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #17: General Aviation Apron Expansion (Phase 1) - Construct
Description: The plan shows expansion of the general aviation apron to support additional aircraft tie-down positions and to provide access to future hangar development areas. This project is the first phase of three phases. While each of the three phases is in sequential order in this plan, each phase should only be pursued when demand exists to support the need for the project.
Cost Estimate: $4,310,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #18: General Aviation Apron Expansion (Phase 2) - Construct
Description: This is phase two of three for expansion of the general aviation apron.
Cost Estimate: $3,900,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #19: General Aviation Apron Expansion (Phase 3) - Construct
Description: This is phase three of three for expansion of the general aviation apron.
Cost Estimate: $4,675,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #20: Install Jet A Fuel Tank (12,000 gallon)
Description: Currently, Jet A fuel is only available via mobile tanker. This new static storage tank will be installed next to the existing Avgas tank. Fuel tanks are not eligible for federal AIP funding. This project is assumed to be funded through ADOT at 90 percent.
Cost Estimate: $1,155,000
Funding Eligibility: FAA – 0% / ADOT Share – 90% / Local Share – 10%

Intermediate Term Project Summary

The intermediate term projects included are focused around two primary capital projects. The first is the planned extension of the runway which will bring the total length of the runway to 8,100 feet. Certain land acquisition will be required to accommodate the extension. Since land acquisition can be a lengthy process, the city and airport should consider acquiring the necessary land as soon as possible. The second major project is expansion of the general aviation apron in three phases, to accommodate new aeronautical development.

The intermediate term projects total approximately $27.83 million. The share eligible for FAA funding is estimated at $24.28 million. The portion eligible for ADOT funding is estimated at $1.19 million, and the remaining local share is $2.34 million.

LONG TERM PROJECTS (YEARS 11-20)

Project #21: Master Plan Update
Description: FAA recommends that airport master plans be updated every 7-10 years or as needed to address changes at the airport or to FAA priorities. It is anticipated that this study will provide appropriate guidance for airport development for at least 10 years; therefore, this project is planned in the long-term planning period.
Cost Estimate: $350,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #22: Expand Helicopter Pads (4x)
Description: As helicopter activity at the airport increases, there will be a need for additional parking positions. This project is the construction of four helicopter parking positions adjacent the existing spots.
Cost Estimate: $350,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #23: Pave Portion of Pronghorn Ranch Road
Description: Approximately 2,000 feet of Pronghorn Ranch Road is planned to be paved. This roadway segment will extend from the intersection with Airport Road, and it will serve a future airport access road and non-aeronautical development parcels.
Cost Estimate: $1,275,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #24: Rehabilitate Existing Terminal Apron (Crack Fill/Slurry Seal)
Description: The terminal apron is planned for rehabilitation with a crack fill and slurry seal project. The current PCI values for the terminal apron is below "84."
Cost Estimate: $190,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #25: Rehabilitate Existing General Aviation Apron (Crack Fill/Slurry Seal)
Description: The general aviation apron is planned for rehabilitation with a crack fill and slurry seal project. The current PCI values for the terminal apron is below "84" and a portion is less than "54," which means it is near failing.
Cost Estimate: $210,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #26: Rehabilitate All Taxiways (Mill/Overlay/Mark)
Description: This project will mill/overlay/mark the taxiways.
Cost Estimate: $3,000,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #27: Rehabilitate Runway 18-36 (Mill/Overlay/Mark)
Description: This project will mill/overlay/mark the runway to rehabilitate the pavement.
Cost Estimate: $4,950,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #28: Perimeter Fencing Improvements
Description: Over time, sections of the perimeter fence may need repair or replacement. This project assumes that up to 5,000 linear feet of fencing will need to be replaced.
Cost Estimate: $1,565,000
Funding Eligibility: FAA – 91.06% / ADOT Share – 4.47% / Local Share – 4.47%

Project #29: Roadway to Serve Non-Aviation Parcels
Description: A area of approximately 35 acres just north of the terminal area and on the north side of Pronghorn Ranch Road is planned for future non-aeronautical development. A roadway system is planned that is 2,500 feet long which will serve six parcels.
Cost Estimate: $645,000
Funding Eligibility: FAA – 0% / ADOT Share – 0% / Local Share – 100%

Long Term Project Summary

The long-term projects include a primary focus on pavement maintenance with rehabilitation of the terminal and general aviation aprons, taxiways, and the runway. In addition, a portion of Pronghorn Ranch Road is planned to be paved, and a new road accessing non-aeronautical parcels is considered. This master plan should also be updated by the long-term planning period if not before.

The long-term projects total approximately $12.53 million. The share eligible for FAA funding is estimated at $10.82 million. The portion eligible for ADOT funding is estimated at $531,000 and the remaining local share is $1.17 million.

TOTAL CIP SUMMARY

The CIP is intended as a road map of airport improvements to help guide the airport sponsor, FAA, and state aviation officials on needed projects. The plan as presented will meet the forecast demand over the next 20 years and, in many respects, beyond. The first five years of the CIP are separated into yearly installments, and the intermediate- and long-term projects are grouped together. The sequence of projects will likely change due to availability of funds or changing priorities in the years to come. Nonetheless, this is a comprehensive list of capital improvement projects the airport should consider in the next 20 years.

The total CIP is estimated at approximately $44.09 million. The share eligible for FAA funding is estimated at $37.46 million. The portion eligible for ADOT funding is estimated at $2.87 million, and the local share is estimated at $3.75 million.

CAPITAL IMPROVEMENT FUNDING SOURCES

Financing capital improvements at the airport will not rely solely on the financial resources of the airport or the county. Capital improvement funding is available through various grant-in-aid programs on both the state and federal levels. Historically, H.A. Clark Memorial Field Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing to remain realistic and within the range of anticipated grant assistance. The following discussion outlines key sources of funding potentially available for capital improvements at CMR.

FEDERAL GRANTS

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public use airports across the United States. The purpose of this system and its federally based funding is to maintain national defense and to promote interstate commerce. The most recent legislation affecting federal airport funding is the *FAA Reauthorization Act of 2018*.

The current law authorizes the FAA's Airport Improvement Program (AIP) at $3.35 billion for fiscal years 2019 through 2023. The AIP is funded through the collection of user fees, such as those imposed on airline tickets, aircraft parts, and aviation fuel. Eligible airports are those included in the *National Plan of Integrated Airport Systems* (NPIAS), such as CMR. **Table 6B** presents the approximate distribution of AIP funds and those categories for which the airport may be eligible. The FAA determines which source grant funding would come from.

TABLE 6B | Federal AIP Funding Distribution

Funding Category	Percent of Total	Approximate Funds Available	Available to CMR
Passenger Entitlements	26.6%	$891,100,000	No
Cargo Entitlements	3.5%	$117,250,000	No
Nonprimary Entitlements	12.5%	$418,750,000	Yes
State Apportionment	7.4%	$247,900,000	Yes
Alaska Supplemental	0.7%	$23,450,000	No
Small Airport Fund	15.2%	$509,200,000	Yes
Discretionary Set Aside Funds			
Noise and Environmental Set Aside	4.2%	$140,700,000	Yes
Military Airports Program Set Aside	0.5%	$16,750,000	No
Reliever Set Aside	0.1%	$3,350,000	No
Discretionary Remaining after Set Asides			
Capacity/Safety/Security/Noise (C/S/S/N)	5.4%	$180,900,000	Yes
Pure Discretionary	1.8%	$60,300,000	Yes
Discretionary from Converted Entitlements/Apportionment	22.0%	$737,335,000	Yes
Totals	**100.0%**	**$3,350,000,000**	

AIP: Airport Improvement Program

Source: FAA Order 5100.38D, Airport Improvement Program Handbook

Funding for AIP-eligible projects is undertaken through a cost-sharing arrangement in which FAA typically provides up to 90 percent funding with the remaining 10 percent the responsibility of the local airport sponsor. In certain states with a higher portion of federal lands, such as Arizona, the federal share is increased based upon a formula. The federal share in Arizona is 91.06 percent of the cost of the AIP eligible project, and the airport sponsor is responsible for the remaining 8.94 percent as a match. In exchange for this level of funding, the airport sponsor is required to meet various Grant Assurances, including maintaining the improvement for a certain period of time that ranges between three years and in perpetuity. For example, pavement construction projects must be maintained for at least 20 years, and land acquisition for airport purposes must be part of the airport forever. The following discussion of each of the funding categories is contingent upon Congressional authorization (i.e., *FAA Reauthorization Act of 2018*) and an annual appropriation of at least $3.2 billion for AIP.

Passenger Entitlements: AIP provides funding for eligible projects at airports through an entitlement program. Primary commercial service airports receive a guaranteed minimum level of federal assistance each year based on their enplaned passenger levels and Congressional appropriation levels. General aviation airports, such as CMR, are not eligible for funding from this source.

Cargo Entitlements: An airport may receive cargo entitlements if they reach a minimum landed cargo weight of 1.0 million pounds. H.A. Clark Memorial Field Airport has not reached 1.0 million pounds of landed cargo weight in the past and is not anticipated to reach this level in the future and is, therefore, not eligible for funding from this AIP source.

Non-Primary Entitlements (NPE): Non-primary entitlements are the lesser of $150,000 annually or 1/5th of an airport's five-year development costs listed in the NPIAS. As a general aviation airport, CMR is eligible for $150,000 annually.

State Apportionment: Based on an area/population formula, AIP funds are available for distribution to any NPIAS airport within each state. CMR is eligible for AIP grant funding from this source.

Alaska Supplemental: This set-aside is reserved for Alaska airports. CMR is not eligible for AIP funding from this source.

Small Airport Fund: If a large- or medium-hub commercial service airport chooses to institute a passenger facility charge (PFC), which is a fee of up to $4.50 on each airline ticket, for funding of capital improvement projects, then their passenger entitlement is reduced. Part of the reduced entitlement goes to the small airport fund. The small airport fund is reserved for small-hub primary commercial service airports, non-hub commercial service airports, and general aviation airports. CMR is eligible for funds from this source.

Discretionary Set-Aside Funds: Portions of AIP funds are set-asides designed to achieve specific funding minimums for noise compatibility planning and implementation, select former military airfields (Military Airport Program [MAP]), and reliever airports. CMR may be eligible for noise compatibility planning and implementation funds if it meets certain criteria (i.e., a noise compatibility issue). CMR does not qualify for MAP or reliever airport set-aside funds.

Remaining Discretionary Funds: The remaining AIP funds are distributed by FAA based on the priority of the project for which airports have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may be eligible if the function of the structure is to serve airport operations in a non-revenue-generating capacity, such as airport maintenance facilities. Some revenue-enhancing structures, such as T-hangars, may be eligible if all airfield improvements have been made; however, the priority ranking of these facilities is very low.

Whereas entitlement monies are guaranteed on an annual basis when certain thresholds are achieved, discretionary funds are not assured. CMR is eligible for discretionary funds.

STATE AID TO AIRPORTS

The ADOT – Aeronautics Group recognizes the valuable contribution to the state's transportation economy that airports make. Therefore, it administers several programs to aid in maintaining airports in the state. The source for state airport improvement funds is the Arizona State Aviation Fund. Taxes levied by the state on aviation fuel, flight property, aircraft registration tax, and registration fees (as well as interest on these funds) are deposited in the Arizona State Aviation Fund. The State Transportation Board establishes the policies for distribution of these state funds.

AIP Grant Match and Stand-Alone State Grants

Under the State of Arizona's grant program, an airport can receive funding for one-half (4.47 percent of the total project cost) of the local share of projects receiving federal AIP funding. The AIP grant match program for an individual airport sponsor is limited to no more than 10 percent of the average revenue in the Arizona State Aviation Fund for a three-year period. The current maximum AIP matching grant is estimated at $2.0 million. CMR is eligible for matching funds from this source.

The state also provides 90 percent funding for projects which are typically not eligible for federal AIP funding or have not received federal funding. The most available for a single project fluctuates but is approximately $2.0 million. CMR is eligible for this funding source.

Pavement Maintenance Program

The airport system in Arizona is a multi-million-dollar investment of public and private funds that must be protected and preserved. State aviation fund dollars are limited, and the State Transportation Board recognizes the need to protect and extend the maximum useful life of the airport system's pavement. The Arizona Pavement Management System (APMS) has been established to assist in the preservation of Arizona airports' system infrastructure.

Public Law 103-305 requires that airports requesting federal AIP funding for pavement rehabilitation or reconstruction have an effective pavement maintenance program system. To this end, ADOT – Aeronautics Group maintains the APMS.

The Arizona APMS uses the Army Corps of Engineers' "Micropaver" program as a basis for generating a Five-Year Arizona Pavement Preservation Program (APPP). The APPP consists of visual inspections of all airport pavements. Evaluations are made of the types and severities observed, and then entered into a computer program database. PCI values are determined through the visual assessment of pavement conditions in accordance with the most recent FAA Advisory Circular 150/5380-7, *Pavement Management System*, and range from 0 (failed) to 100 (excellent). Every three years, a complete database update with new visual observations is conducted. Individual airport reports from the update are shared with all participating system airports. ADOT – Aeronautics Group ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, ADOT – Aeronautics Group, utilizing the APMS, will identify airport pavement maintenance projects eligible for funding for the upcoming five years. These projects will appear in the state's Five-Year Airport Development Program. Once a project has been identified and approved for funding by the State Transportation Board, the airport sponsor may elect to accept a state grant for the project and not participate in the APPP, or the sponsor may sign an Inter-Governmental Agreement (IGA) with ADOT – Aeronautics Group to participate in the APPP. CMR participates in this program.

State Airport Loan Program

The ADOT Airport Loan Program was established to enhance the utilization of state funds and provide a flexible funding mechanism to assist airports in funding revenue-generating projects, such as hangars and fuel storage facilities. Projects which are not currently eligible for the State Airport Loan Program are considered if the project would enhance the airport's ability to be financially self-sufficient. This program is currently suspended, and its future is unknown at this time.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. A goal of the airport is to generate enough revenue to cover all operating and capital expenditures. As with many general aviation airports, this is not always possible, and other financing methods will be needed.

There are several alternatives for local financing options for future development at the airport, including airport revenues, direct funding from the airport sponsor, bonds, and leasehold financing. These strategies could be used to fund the local matching share or complete a project if grant funding cannot be arranged.

Airport Revenues: An airport's daily operations are funded through the collection of various rates and charges generated by airport operations. Airports that serve both a commercial service sector and the general aviation sector have more potential revenue streams available to them. Potential revenue streams may include landing fees, fuel flowage fees, aircraft parking and remain-over-night fees, terminal building space, hangar space, and land leases.

Bonding: Bonding is a common method to finance large capital projects at airports. A bond is an instrument of indebtedness of the bond issuer to the bond holders, thus a bond is a form of loan or IOU. While bond terms are negotiable, typically the bond issuer is obligated to pay the bond holder interest at regular intervals and/or repay the principal at a later date.

Leasehold Financing: Leasehold financing refers to a developer or tenant financing improvements under a long-term ground lease. The obvious advantage of such an arrangement is that it relieves the airport sponsor of all responsibility for raising the capital funds for the improvement. However, the private development of facilities on a ground lease, particularly on property owned by an airport, produces a unique set of concerns. It may be more difficult for the tenant or developer to obtain private financing as only the improvements and the right to continue the lease can be utilized as collateral. Ground leases at public airports typically provide for reversion of improvements to the airport sponsor at the end of the lease term, which reduces the potential value to a lender taking possession in a default situation. Also, companies wanting to own their property as a matter of financial policy may not locate where land is only available for lease.

Public/Private Partnerships: In addition to leasehold financing, it is acceptable for the airport to enter into some form of public/private partnership for various airport projects. Typically, this would be limited to hangar construction, but there are some examples where a private developer constructs, for example, a taxilane, and deeds it to the airport for ongoing maintenance. When entering any such arrangement, the airport must ensure the private developer does not gain an economic advantage over other airport tenants.

FINANCIAL AUDIT COMPLIANCE

The operations of CMR generate revenues, which are secured by federal grant assurances to be utilized at the airport. All receipts, excluding bond proceeds or related grants and interest, are irrevocably pledged to the punctual payment of operating and maintenance expenses, payment of debt service for as long as bonds remain outstanding, or for additions or improvements to airport facilities.

CMR is owned and operated by the City of Williams, Arizona. The Airport is financially self-supporting and does not receive funding from the county for operating expenses. The accounting methods used for airport revenues appropriately separates airport revenues from general county accounts. This accounting method meets FAA requirements as outlined in the following grant assurances.

Grant Assurance #24 – Fee and Rental Structure: Requires the airport sponsor to set fees, lease rates, and other charges that are directed at making the airport as self-sustaining as possible. Airport sponsors must impose fair market value charges for noncommercial uses of airport property, but aeronautical user charges may be less than fair market value. As demonstrated, the fee and rental structure for airport property and facilities is fair and equitable.

Grant Assurance #25 – Airport Revenues: Restricts the use of airport revenues generated by the airport and local taxes on aviation fuel to be expended for the capital or operating costs of the airport, the local airport system, or other facilities owned or operated by the airport sponsor, which directly and substantially relate to the actual air transportation of passengers or property or noise mitigation efforts. Under the *Single Audit Act of 1984*, the airport must conduct an annual audit and assure the government that airport funds have been properly used. In general, revenue generated by the airport may not be diverted to functions unrelated to the operation and maintenance of the airport. Examples of revenue diversion include:

a) General economic development;
b) Marketing and promotional activities unrelated to the airport;
c) Payments in lieu of taxes or other assessments that exceed the value of services;
d) Payments to compensate sponsoring governmental bodies for lost tax revenues exceeding stated tax rates; and
e) Direct or indirect payments of airport revenues beyond that which is required to pay for services and facilities provided to the airport.

MASTER PLAN IMPLEMENTATION

To implement the master plan recommendations, it is key to recognize that planning is a continuous process and does not end with approval of this document. The airport should implement measures that allow them to track various demand indicators, passenger enplanements, based aircraft, hangar demand, and operations. The issues that this master plan is based on will remain valid for several years. The primary goal is for the airport to best serve the air transportation needs of the region, while striving to be economically self-sufficient.

The actual need for facilities is best established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the airport. In reality, the timeframe in which the development is needed may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate development. Although every effort has been made in this master planning process to conservatively estimate when facility development may be needed, aviation demand will dictate timing of facility improvements.

The value of a master plan is keeping the issues and objectives at the forefront of the minds of managers and decision-makers. In addition to adjustments in aviation demand, when to undertake the improvements recommended in this master plan will impact how long the plan remains valid. The format of this plan reduces the need for formal and costly updates by simply adjusting the timing of project implementation. Updating can be done by the airport manager, thereby improving the plan's effectiveness.

In summary, the planning process requires airport staff to consistently monitor operations and based aircraft. Analysis of aviation demand is critical to the timing and need for new airport facilities.



Appendix A

Glossary of Terms

H.A. Clark Memorial Field

Airport Master Plan

GLOSSARY OF TERMS

A

Above Ground Level: The elevation of a point or surface above the ground.

Accelerate-Stop Distance Available (ASDA): See declared distances.

Advisory Circular: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

Air Carrier: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

Air Route Traffic Control Center (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

Air Taxi: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

Air Traffic Control: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

Air Traffic Control System Command Center: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

Air Traffic Hub: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

Air Transport Association Of America: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

Aircraft: A transportation vehicle that is used or intended for use for flight.

Aircraft Approach Category: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- **Category A:** Speed less than 91 knots.
- **Category B:** Speed 91 knots or more, but less than 121 knots.
- **Category C:** Speed 121 knots or more, but less than 141 knots.

- **Category D:** Speed 141 knots or more, but less than 166 knots.
- **Category E:** Speed greater than 166 knots

Aircraft Operation: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

Aircraft Operations Area (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

Aircraft Owners And Pilots Association: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

Aircraft Rescue And Fire Fighting: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

Airfield: The portion of an airport which contains the facilities necessary for the operation of aircraft.

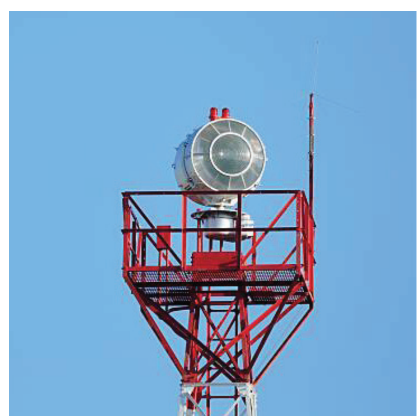
Airline Hub: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

Airplane Design Group (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- **Group I:** Up to but not including 49 feet.
- **Group II:** 49 feet up to but not including 79 feet.
- **Group III:** 79 feet up to but not including 118 feet.
- **Group IV:** 118 feet up to but not including 171 feet.
- **Group V:** 171 feet up to but not including 214 feet.
- **Group VI:** 214 feet or greater.

Airport Authority: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

Airport Beacon: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.


Airport Beacon

Airport Capital Improvement Plan: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

Airport Elevation: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

Airport Improvement Program: A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for airport planning and development.

Airport Layout Drawing (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

Airport Layout Plan (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

Airport Layout Plan Drawing Set: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

Airport Master Plan: A local planning document that serves as a guide for the long-term development of an airport.

Airport Movement Area Safety System: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

Airport Obstruction Chart: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

Airport Reference Code (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

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

Airport Sponsor: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

Airport Surface Detection Equipment: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

Airport Surveillance Radar: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

Airport Traffic Control Tower (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

Airside: The portion of an airport that contains the facilities necessary for the operation of aircraft.

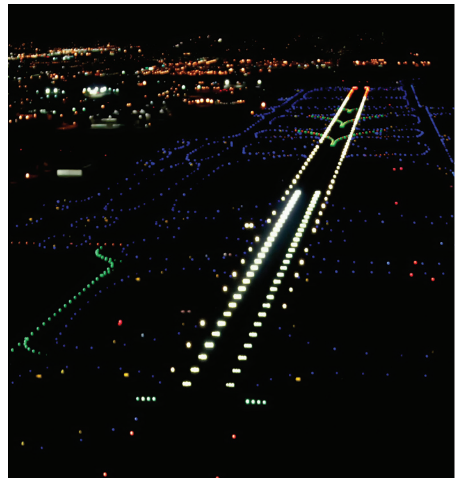
Airspace: The volume of space above the surface of the ground that is provided for the operation of aircraft.

Alert Area: See special-use airspace.

Altitude: The vertical distance measured in feet above mean sea level.

Annual Instrument Approach (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

Approach Lighting System (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on final approach and landing.


Approach Lighting System

Approach Minimums: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

Approach Surface: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

Apron: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

Area Navigation: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

Automated Terminal Information Service (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

Automated Surface Observation System (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

Automatic Weather Observation System (AWOS): Equipment used to automatically record weather conditions (i.e., cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

Automatic Direction Finder (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

Avigation Easement: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

Azimuth: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

Base Leg: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

Based Aircraft: The general aviation aircraft that use a specific airport as a home base.

Bearing: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

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

Blast Pad: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

Building Restriction Line (BRL): A line which identifies suitable building area locations on the airport.

Blast Fence

C

Capital Improvement Plan: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

Cargo Service Airport: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

Ceiling: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

Circling Approach: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

Class A Airspace: See Controlled Airspace.

Class B Airspace: See Controlled Airspace.

Class C Airspace: See Controlled Airspace.

Class D Airspace: See Controlled Airspace.

Class E Airspace: See Controlled Airspace.

Class G Airspace: See Controlled Airspace.

Clear Zone: See Runway Protection Zone.

Commercial Service Airport: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

Common Traffic Advisory Frequency (CTAF): A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

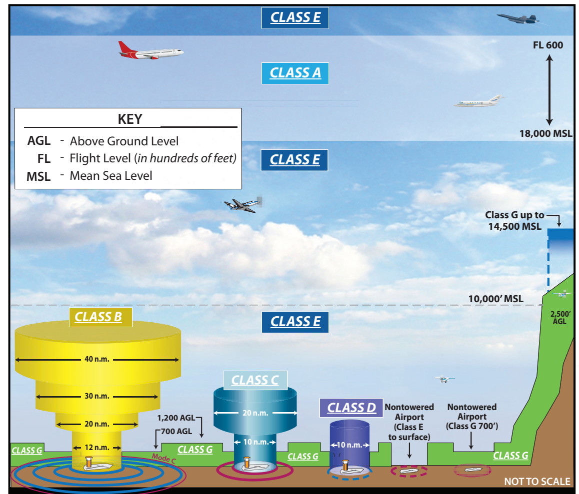
Compass Locator (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

Conical Surface: An imaginary obstruction- limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Controlled Airport: An airport that has an operating airport traffic control tower.

Controlled Airspace: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

CLASS A: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.



Airspace Classifications

CLASS B: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

CLASS C: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

CLASS D: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure. Unless otherwise authorized, all persons must establish two-way radio communication.

CLASS E: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

CLASS G: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

Controlled Firing Area: See special-use airspace.

Crosswind: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

Crosswind Component: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

Crosswind Leg: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

Decibel: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

Decision Height/Decision Altitude: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

Declared Distances: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

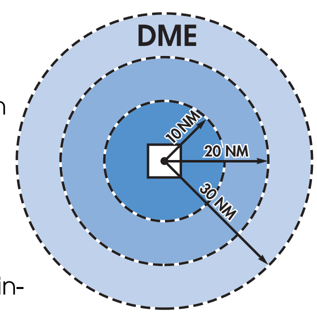
- **Takeoff Run Available (TORA):** The runway length declared available and suitable for the ground run of an airplane taking off.
- **Takeoff Distance Available (TODA):** The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.
- **Accelerate-stop Distance Available (ASDA):** The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.
- **Landing Distance Available (LDA):** The runway length declared available and suitable for landing.

Department Of Transportation: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

Discretionary Funds: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

Displaced Threshold: A threshold that is located at a point on the runway other than the designated beginning of the runway.

Distance Measuring Equipment (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.



DNL: The 24-hour average sound level, in decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

Downwind Leg: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

Easement: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

Elevation: The vertical distance measured in feet above mean sea level.

Enplaned Passengers: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

Enplanement: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

Entitlement: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

Environmental Assessment (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

Environmental Audit: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

Environmental Impact Statement (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

Essential Air Service: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

Federal Aviation Regulations: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

Federal Inspection Services: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

Final Approach: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

Final Approach and Takeoff Area (FATO): A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

Final Approach Fix: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

Finding Of No Significant Impact (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

Fixed Base Operator (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

Flight Level: A measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

Flight Service Station (FSS): An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides preflight and in-flight advisory services to pilots through air and ground based communication facilities.

Frangible Navaid: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

General Aviation: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

General Aviation Airport: An airport that provides air service to only general aviation.

Glideslope (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

- Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or
- Visual ground aids, such as PAPI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

Global Positioning System (GPS): A system of satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

Ground Access: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

Ground Based Augmentation System (GBAS): A program that augments the existing GPS system by providing corrections to aircraft in the vicinity of an airport in order to improve the accuracy of these aircrafts' GPS navigational position

H

Helipad: A designated area for the takeoff, landing, and parking of helicopters.

High Intensity Runway Lights (HIRL): The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

High-speed Exit Taxiway: An acute-angled exit taxiway forming a 30 degree angle with the runway centerline, designed to allow an aircraft to exit a runway without having to decelerate to typical taxi speed.

Horizontal Surface: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

Hot Spot: A location on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

I

Initial Approach Fix: The designated point at which the initial approach segment begins for an instrument approach to a runway.

Instrument Approach Procedure: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions **and the type of flight plan under which an aircraft is operating.**

Instrument Landing System (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer	3. Outer Marker	5. Approach Lights
2. Glide Slope	4. Middle Marker	

Instrument Meteorological Conditions: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

Itinerant Operations: Operations by aircraft that are arriving from outside the traffic pattern or departing the airport traffic pattern.

K

Knots: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

Landside: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

Landing Distance Available (LDA): See declared distances.

Large Airplane: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

Local Operations: Aircraft operations performed by aircraft that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport. Typically, this includes touch and-go training operations.

Localizer: The component of an ILS which provides course guidance to the runway.


Localizer

Localizer Type Directional Aid (LDA): A facility of comparable utility and accuracy to a localizer but is not part of a complete ILS and is not aligned with the runway.

Low Intensity Runway Lights: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

Medium Intensity Runway Lights: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

Military Operations: Aircraft operations that are performed in military aircraft.

Military Operations Area (MOA): See special-use airspace

Military Training Route: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

Missed Approach Course (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

- When the aircraft has descended to the decision height and has not established visual contact; or
- When directed by air traffic control to pull up or to go around again.

Movement Area: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

National Airspace System (NAS): The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

National Plan Of Integrated Airport Systems (NPIAS): The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

National Transportation Safety Board: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

Nautical Mile: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

Navaid: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e., PAPI, VASI, ILS, etc.)

Navigational Aid: A facility used as, available for use as, or designed for use as an aid to air navigation.

Noise Contour: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

Non-directional Beacon (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine their bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NDB

Non-precision Approach Procedure: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

Notice To Air Missions (NOTAM): A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

Object Free Area (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

Operation: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

Outer Marker (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

Pilot-controlled Lighting: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

Precision Approach: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I):** A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.
- **CATEGORY II (CAT II):** A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.
- **CATEGORY III (CAT III):** A precision approach which provides for approaches with minimal less than Category II.

Precision Approach Path Indicator (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. A PAPI normally consists of four light units but an abbreviated system of two lights is acceptable for some categories of aircraft.


Precision Approach Path Indicator

Precision Approach Radar: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

Precision Object Free Zone (POFZ): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFZ is a clearing standard which requires the POFZ to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA is only in effect when the approach includes vertical guidance, the reported ceiling is below 250 feet, and an aircraft is on final approach within two miles of the runway threshold.

Primary Airport: A commercial service airport that enplanes at least 10,000 annual passengers.

Primary Surface: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

Prohibited Area: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

Radial: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

Regression Analysis: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

Remote Communications Outlet (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

Remote Transmitter/receiver (RTR): See remote communications outlet. RTRs serve ARTCCs.

Reliever Airport: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

Restricted Area: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used enroute and for approaches to an airport.

Runway: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

Runway Alignment Indicator Light (RAIL): A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

Runway Design Code: A code signifying the FAA design standards to which the runway is to be built.

Runway End Identification Lighting (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.


REIL

Runway Gradient: The average slope, measured in percent, between the two ends of a runway.

Runway Protection Zone (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minimal.

Runway Reference Code: A code signifying the current operational capabilities of a runway and taxiway.

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

Runway Visibility Zone (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of sight from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

Runway Visual Range (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

Scope: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

Segmented Circle: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers, often co-located with a wind cone.

Shoulder: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder Does Not Necessarily Need To Be Paved.

Slant-range Distance: The straight line distance between an aircraft and a point on the ground.

Small Aircraft: An aircraft that has a maximum certified takeoff weight of up to 12,500 pounds.

Special-use Airspace: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA:** Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.
- **CONTROLLED FIRING AREA:** Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.
- **MILITARY OPERATIONS AREA (MOA):** Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.
- **PROHIBITED AREA:** Designated airspace within which the flight of aircraft is prohibited.
- **RESTRICTED AREA:** Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.
- **WARNING AREA:** Airspace which may contain hazards to nonparticipating aircraft.

Standard Instrument Departure (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

Standard Instrument Departure Procedures: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or enroute airspace.

Standard Terminal Arrival Route (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

Stop-and-go: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

Stopway: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

Straight-in Landing/approach: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

Tactical Air Navigation (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.

Takeoff Runway Available (TORA): See declared distances.

Takeoff Distance Available (TODA): See declared distances.

Taxilane: A taxiway designed for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area and provide access to from taxiways to aircraft parking positions and other terminal areas.

Taxiway: A defined path established for the taxiing of aircraft from one part of an airport to another.

Taxiway Design Group: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

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

Terminal Instrument Procedures: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

Terminal Radar Approach Control: An element of the air traffic control system responsible for monitoring the enroute and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

Tetrahedron: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

Tetrahedron

Threshold: The beginning of that portion of the runway available for landing. In some instances, the threshold may be displaced.

Touch-and-go: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

Touchdown: The point at which a landing aircraft makes contact with the runway surface.

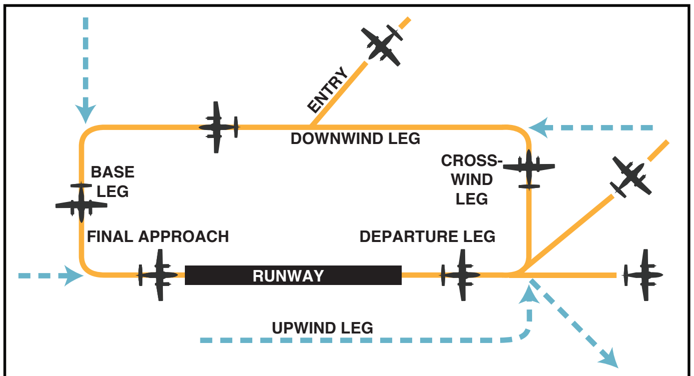
Touchdown and Lift-off Area (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which a helicopter lands or takes off.

Touchdown Zone (TDZ): The first 3,000 feet of the runway beginning at the threshold.

Touchdown Zone Elevation (TDZE): The highest elevation in the touchdown zone.

Touchdown Zone Lighting: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.

Traffic Pattern: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



Traffic Pattern

U

Uncontrolled Airport: An airport without an airport traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

Uncontrolled Airspace: Airspace within which aircraft are not subject to air traffic control.

Universal Communication (UNICOM): A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOMs are shown on aeronautical charts and publications.

Upwind Leg: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

Vector: A heading issued to an aircraft to provide navigational guidance by radar.

Very High Frequency/ Omnidirectional Range (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

Very High Frequency Omnidirectional Range/ Tactical Air Navigation (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

Victor Airway: A system of established routes that run along specified VOR radials, from one VOR station to another.

Visual Approach: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

Visual Approach Slope Indicator (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing. The VASI is now obsolete and is being replaced with the PAPI.

Visual Flight Rules (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

Visual Meteorological Conditions: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

Visual Runway: A runway without an existing or planned instrument approach.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

Warning Area: See special-use airspace.

Wide Area Augmentation System: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Windsock/Windcone: A visual aid that indicates the prevailing wind direction and intensity at a particular location.

Windsock/Windcone

Abbreviations

AC: advisory circular

ACIP: airport capital improvement program

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APRC: approach reference code

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATC: airport traffic control

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DPRC: departure reference code

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator

FY: fiscal year

GA: general aviation

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LNAV: lateral navigation

LOC: localizer

LOM: compass locator at outer marker

LP: localizer performance

LPV: localizer performance with vertical guidance

MALS: medium intensity approach lighting system

MALSR: MALS with runway alignment indicator lights

MALSF: MALS with sequenced flashers

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

MTOW: maximum takeoff weight

NAVAID: navigational aid

NDB: nondirectional radio beacon

NEPA: National Environmental Policy Act

NM: nautical mile (6,076.1 feet)

NPDES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCI: pavement condition index

PCL: pilot-controlled lighting

PIW: public information workshop

POFZ: precision object free zone

PVC: poor visibility and ceiling

RCO: remote communications outlet

RDC: runway design code

REIL: runway end identification lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: taxiway design group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

WAAS: wide area augmentation system

Appendix B

FAA Forecast Approval Letter

H.A. Clark
Memorial Field
Airport Master Plan

U.S. Department of Transportation
Federal Aviation Administration

Western-Pacific Region
Office of Airports
Phoenix Airports District Office

3800 N Central Ave
Suite 1025
Phoenix, AZ 85012

April 14, 2021

Mr. Tim Pettit
City of Williams
Community Development Director <sent via email: tpettit@williamsaz.gov>
H.A. Clark Memorial Airport
113 South First Street
Williams, AZ 86046

H.A Clark Memorial Airport (CMR), Williams, Arizona
Aviation Activity Forecast Approval

Dear Mr. Pettit:

The Federal Aviation Administration (FAA) has reviewed the aviation forecast for the CMR airport master plan update dated March 29, 2021. The FAA approves this forecast and the use of B-II as the existing critical design aircraft, and B-II as the future critical design aircraft for airport planning purposes, including Airport Layout Plan (ALP) development.

In summary, the FAA TAF and the H.A Clark Memorial Airport forecast update regarding total operations exceeds the 10 percent and 15 percent allowance for 5 and 10 year planning horizons. However, the airport forecast update appropriately explains these tolerances due to the most current conditions at the airport and the available data when the forecasts were developed which include an estimated 3.2% compound annual growth rate, the number of actual based aircraft (12 based planes vs. TAF's estimated 3 planes), increased operations, and future airport development. While the 5 and 10 year forecasts do exceed benchmarks established in the FAA's Guidance on Review & Approval of Local Aviation Forecasts published in 2008, approval of this forecast doesn't need to be sent to FAA Headquarters for review because the future growth has been adequately justified.

The forecast was developed using current data, appropriate methodologies, and therefore is approved for planning purposes at H.A Clark Memorial Airport. It is important to note that the approval of this forecast doesn't guarantee funding for large scale capital improvements as future projects will need to be justified by current activity levels at the time the projects are proposed for implementation.

If you have any questions about this forecast approval, please call me at 602-792-1072.

Sincerely,

Jared M. Raymond

JARED M RAYMOND

Digitally signed by JARED M RAYMOND
Date: 2021.04.14 16:14:25 -07'00'

Jared M. Raymond
Phoenix ADO,
Community Planner

Cc: FAA Grant File
Don Kriz, Group Manager – ADOT Aeronautics
Jacob Allen, Airport Planner – Coffman Associates
Matt Quick, Associate - Coffman Associates



Appendix C

Environmental Overview

H.A. Clark Memorial Field

Airport Master Plan

Appendix C
ENVIRONMENTAL OVERVIEW

An analysis of potential environmental impacts associated with proposed airport projects is an essential consideration in the master plan process. The primary purpose of this discussion is to review the master plan concept and associated capital program at the airport to determine whether projects identified in the master plan could, individually or collectively, significantly impact existing environmental resources. Information contained in this section was obtained from previous studies, official internet websites, and analysis by the consultant.

The *FAA Reauthorization Act of 2018* (Act) necessitates changes in how the FAA historically operates with respect to airport oversight. Section 163 of the Act limits the FAA's approval authority over certain projects. Pursuant to Section 163, when a sponsor submits a change to the Airport Layout Plan (ALP), requests a change in land use from aeronautical to non-aeronautical, or requests to dispose of airport-owned land, the FAA would need to determine if the proposal would be subject to the agency's approval authority. This approval is a two-step process. First, the FAA would determine if they had ALP approval authority under Section 163 of the Act. The second step is to determine how the land was acquired and if land release obligations are required.

For projects not categorically excluded under FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, compliance with the *National Environmental Policy Act* (NEPA) is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. Although this section of the Master Plan is not designed to satisfy the NEPA requirements for an individual project, it provides a preliminary review of environmental issues that may need to be considered in more detail within the environmental review processes. It is important to note that the FAA is ultimately responsible for determining the level of environmental documentation required for airport actions.

The environmental inventory included in Chapter One provides baseline information about the airport environs. This section provides an overview of potential impacts to environmental resource categories that could result from implementation of the planned improvements outlined on the master plan concept.

POTENTIAL ENVIRONMENTAL CONCERNS

Table C1 summarizes potential environmental concerns associated with implementation of the master plan concept for H.A. Clark Memorial Field. Analysis under NEPA includes effects or impacts a proposed action or alternative may have on the human environment (see 40 Code of Federal Regulations [CFR] § 1508.1),[1] which can include:

- Construction of a facility or runway in a wetland which results in the loss of a portion of the habitat;

- Noise generated by the proposed action or alternative(s) which adversely affects noise-sensitive land uses; or

- Growth-inducing effects related to induced changes in the pattern of land use, population density or growth rate, and related impacts on air and water and other natural systems, including ecosystems.

TABLE C1 | Summary of Potential Environmental Concerns

AIR QUALITY	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the United States (U.S.) Environmental Protection Agency (EPA) under the *Clean Air Act*, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.**
Potential Environmental Concerns	**No Impact.** Although the projected increase in operations over the 20-year planning horizon of the Master Plan would likely result in additional emissions, Coconino County currently complies with federal NAAQS requirements. Therefore, general conformity review per the *Clean Air Act* is not required. According to the most recent FAA *Aviation Emissions and Air Quality Handbook* (2015), an emissions inventory under NEPA may be necessary for any proposed action that would result in a reasonably foreseeable increase in emissions due to plan implementation. For construction emissions, a qualitative or quantitative emissions inventory under NEPA may be required, depending on the type of environmental review needed for projects defined on the master plan concept.
BIOLOGICAL RESOURCES	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The U.S. Fish and Wildlife Service (USFWS) determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat.** FAA has not established a significance threshold for non-listed species. However, factors to consider are if an action would have the potential for: • Long term or permanent loss of unlisted plant or wildlife species; • Adverse impacts to special status species or their habitats; • Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or • Adverse impacts on a species' reproductive rates, non-natural mortality, or ability to sustain the minimum population levels required for population maintenance.
Potential Environmental Concerns	<u>Federally Listed Species</u> **No Impact.** According to an airport-wide biological field survey report[2], 27 species protected under the *Endangered Species Act* (ESA) are identified in Coconino County (originally discussed in Chapter One). The report concluded that none of these species are likely to occur near the airport for the following reasons: • The airport is beyond known geographic or elevation ranges; and/or • The airport does not contain vegetation or landscape to support these species.

[1] *Effects* or *impacts* to the human environment from a proposed action or alternative are those actions which may be reasonably foreseeable and have a reasonably close causal relationship. Those effects could occur at the same time and place or include effects that are later in time or are farther removed in distance from a proposed action or alternative. Effects or impacts include those on the natural environment, aesthetic, historic, cultural, or socioeconomic, and may have a beneficial or detrimental effect. (Council of Environmental Quality *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act*. July 16, 2020. Federal Register Volume 85, No. 137, Pages 43304 through 43376)

[2] SWCA Environmental Consultants, Inc. (September 24, 2020). *Biological Evaluation for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona*.

	<u>Designated Critical Habitat</u> **No Impact.** Critical habitat has not been identified within the vicinity of the airport. <u>Non-Listed Species</u> **Potential Impact.** Non-listed species of concern include those protected by the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act.* The potential for impacts to migratory birds should be evaluated on a project-specific basis. This may include pre-construction surveys or scheduling construction outside of nesting seasons for these species. The airport-wide biological field survey report noted that no active nests were identified during the site survey; however, other signs of small wildlife which could be prey to larger migratory raptors were observed. The Arizona Game and Fish Department (AGFD) Heritage Data Management System (HDMS) state-wide database reports that northern goshawk, bald eagle (winter population), and golden eagle have been documented within two miles of the airport. Due to the existing vegetation and wildlife management at the airport, neither northern goshawk nor bald eagle are likely to occur. Although the biological field survey report noted the airport contains foraging habitat and suitable prey, such as the Gunnison's prairie dog, for the golden eagle, the airport does not contain breeding or roosting habitat for the golden eagle.
CLIMATE	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Climate; refer to FAA Order 1050.1F's, *Desk Reference*, for the most up-to-date methodology for examining impacts associated with climate change.
Potential Environmental Concerns	**Potential Impact.** An increase in greenhouse gas (GHG) emissions could occur over the 20-year planning horizon of the Master Plan. A project-specific analysis may be required per the FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, based on the parameters of the individual projects.
COASTAL RESOURCES	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significant threshold for Coastal Resources.
Potential Environmental Concerns	**No Impact.** The airport is not located within a coastal zone.
***DEPARTMENT OF TRANSPORTATION ACT*, SECTION 4(f)**	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action involves more than a minimal physical use of a Section 4(f) resource or constitutes a "constructive use" based on an FAA determination that the aviation project would substantially impair the Section 4(f) resource. Resources that are protected by Section 4(f) are publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; and publicly or privately owned land from an historic site of national, state, or local significance. Substantial impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished.**
Potential Environmental Concerns	**Potential Impact.** There are two Section 4(f) resources located less than one mile from the airport: the Grand Canyon Railway (<0.5 mile) and the First Methodist Episcopal Church and Parsonage (0.9 mile). (Although the airport is surrounded by the Kaibab National Forest, the closest developed recreational facilities are campgrounds at Kaibab Lake, located two miles from the airport.) ***Due to the distance these resources are located from the airport, airport activities delineated on the master plan concept would not result in physical use of Section 4(f) properties. Additionally, it is unlikely constructive use of these resources would result from airport activities, and the significance or enjoyment of Section 4(f) properties would not be substantially diminished***. The responsible FAA official would be required to consult with all appropriate federal, state, and local officials having jurisdiction over potential Section 4(f) properties to determine whether project-related impacts would substantially impair the resource. Consultation would occur as part of the NEPA process as specific projects are initiated. Other Section 4(f) resources identified in Chapter One, such as the DelSue Motor Inn, Williams Residential Historic District, Williams Historic Business District, and the Dream Acres Community Recreation Area are more than one mile from the airport and therefore are unlikely to be affected by airport improvements outlined on the master plan concept.
FARMLANDS	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The total combined score on Form AD-1006, *Farmland Conversion Impact Rating*," ranges between 200 and 260.** (Form AD-1006 is used by the U.S. Department of Agriculture, Natural Resources Conservation Service [NRCS] to assess impacts under the *Farmland Protection Policy Act* [FPPA].) FPPA applies when airport activities meet the following conditions:

	• Federal funds are involved;
	• The action involves the potential for the irreversible conversion of important farmlands to non-agricultural uses. Important farmlands include pastureland, cropland, and forest considered to be prime, unique, or statewide or locally important land; or
	• None of the exemptions to FPPA apply. These exemptions include:
	  ○ When land is not considered "farmland" under FPPA; such as land already developed or already irreversibly converted. These instances include when land is designated as an urban area by the U.S. Census Bureau or the existing footprint includes rights-of-way.
	  ○ When land is already committed to urban development.
	  ○ When land is committed to water storage.
	  ○ The construction of non-farm structures necessary to support farming operations.
	  ○ The construction/land development for national defense purposes.

Potential Environmental Concerns	**Potential Impact.** According to the NRCS Web Soil Survey, soil data for the airport is not currently available. However, previous coordination with the NRCS in 2008 stated that land adjacent to the airport, although previously considered prime farmland, no longer has a dependable source of irrigation water or an irrigation system, and that prime farmland is conditional upon these items being in place.[3] For the same reasons, it is not likely that airport lands would be subject to the FPPA. However, future additional projects may require additional coordination with the NRCS.
HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Hazardous Materials, Solid Waste, and Pollution Prevention. However, factors to consider are if an action would have the potential to: • Violate applicable federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management; • Involve a contaminated site; • Produce an appreciably different quantity or type of hazardous waste; • Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or • Adversely affect human health and the environment.
Potential Environmental Concerns	**Potential Impact.** As noted in Chapter One, fueling services at the airport are provided by the Northern Arizona Aviation Services fixed-base operator (FBO). The FBO operates the airport's fuel farm, located adjacent to main terminal building's apron, with one 12,000-gallon aboveground storage tank holding 100 LL fuel. The airport does not have a Jet A fuel storage tank on the field. Jet A fuel is stored and dispensed from two 2,000-gallon fuel trucks. The master plan concept includes the installation of a Jet A fuel tank in the long-term timeframe. These operations are regulated and monitored by the appropriate regulatory agencies, such as the U.S. EPA and the Arizona Department of Environmental Quality (ADEQ). The master plan concept does not include land uses that would produce an appreciably different quantity or type of hazardous waste. However, should this type of land use be proposed, further NEPA review and/or permitting may be required. There are no known hazardous materials or waste contamination sites currently on airport property. There would be no impact to Superfund sites since there are no sites within five miles of the airport. However, there are two brownfields near the airport. One site is located along North Cunning Boulevard/North State Highway 64, while the other is located within the heart of Williams, AZ. These sites are not located on airport property, and activities proposed on the master plan concept (**Exhibit 5A**) would not affect these brownfields.
HISTORIC, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Historical, Architectural, Archaeological, and Cultural Resources. Factors to consider are if an action would result in a finding of "adverse effect" through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS (i.e., a significant impact).
Potential Environmental Concerns	**No Impact.** A cultural resources survey of the airport property was completed as part of the current Airport Master Plan in 2020, and five isolated occurrences and three in-use historic-era structures (El Paso Natural Gas lines) were recorded. No cultural resources eligible for listing on the national or state historic registers are present at the airport.

[3] U.S. Department of Agriculture, NRCS (September 22, 2008). Letter from Thomas Hedt, Assistant State Conservationist to Steve Mechels, Environmental Planner, Coffman Associates, RE: the status of prime and unique land for a proposed 185-acre land acquisition at H.A. Clark Memorial Airfield in Williams, Arizona.

LAND USE	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Land Use. There are also no specific independent factors to consider. The determination that significant impacts exist is normally dependent on the significance of other impacts.
Potential Environmental Concerns	**Potential Impact.** The master plan concept includes property acquisition from the Kaibab National Forest on both ends of the runway to accommodate a future runway extension. A detailed analysis of the land use ramifications related to the acquisition of forest land would be required before the ultimate development of a runway extension could move forward.
NATURAL RESOURCES AND ENERGY SUPPLY	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Natural Resources and Energy Supply. However, factors to consider are if an action would have the potential to cause demand to exceed available or future supplies of these resources.
Potential Environmental Concerns	**Potential Impact**. Planned development projects at the airport could increase demands on energy utilities, water supplies and treatment, and other natural resources during construction; however, significant long-term impacts are not anticipated. Should long-term impacts be a concern, coordination with local service providers is recommended. As previously mentioned, the master plan concept includes the installation of a 12,000-gallon Jet A fuel tank in the long-term timeframe. No impacts to the existing underground El Paso Natural Gas Company pipelines are anticipated due to the master plan concept. These pipelines would be outside proposed development except for a perimeter service road, which would cross the existing pipeline alignment.
NOISE AND NOISE-SENSITIVE LAND USE	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would increase noise by Day-Night Average Sound Level (DNL) 1.5 decibel (dB) or more for a noise-sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.** Another factor to consider is that special consideration needs to be given to the evaluation of the significance of noise impacts on noise-sensitive areas within Section 4(f) properties where the land use compatibility guidelines in Title 14 CFR Part 150 are not relevant to the value, significance, and enjoyment of the area in question.
Potential Environmental Concerns	**No Impact. Exhibit C1** depicts the existing and future noise contours for the airport. The 65 DNL noise exposure contour would remain on airport property in the existing condition. Additionally, the future condition, which includes the proposed runway extension, would remain on property that could be acquired for the proposed extension.
SOCIOECONOMIC, ENVIRONMENTAL JUSTICE, AND CHILDREN'S HEALTH AND SAFETY RISKS	
Socioeconomic	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Socioeconomics. However, factors to consider are if an action would have the potential to: • induce substantial economic growth in an area, either directly or indirectly (e.g., through establishing projects in an undeveloped area); • disrupt or divide the physical arrangement of an established community; • cause extensive relocation when sufficient replacement housing is unavailable; • cause extensive relocation of community businesses that would cause severe economic hardship for affected communities; • disrupt local traffic patterns and substantially reduce the levels of service of roads serving the airport and its surrounding communities; or • produce a substantial change in the community tax base.
Potential Environmental Concerns	**Potential Impact.** The master plan concept for the airport could potentially encourage economic growth for the City of Williams and Coconino County. Results include new construction jobs, new jobs at the airport and other non-aeronautical uses, new housing, and increase the local tax base. The master plan concept does not include any recommendations to acquire residences or relocate businesses.
Environmental Justice	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Environmental Justice. However, factors to consider are if an action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population (i.e., a low-income or minority population), due to: • Significant impacts in other environmental impact categories; or

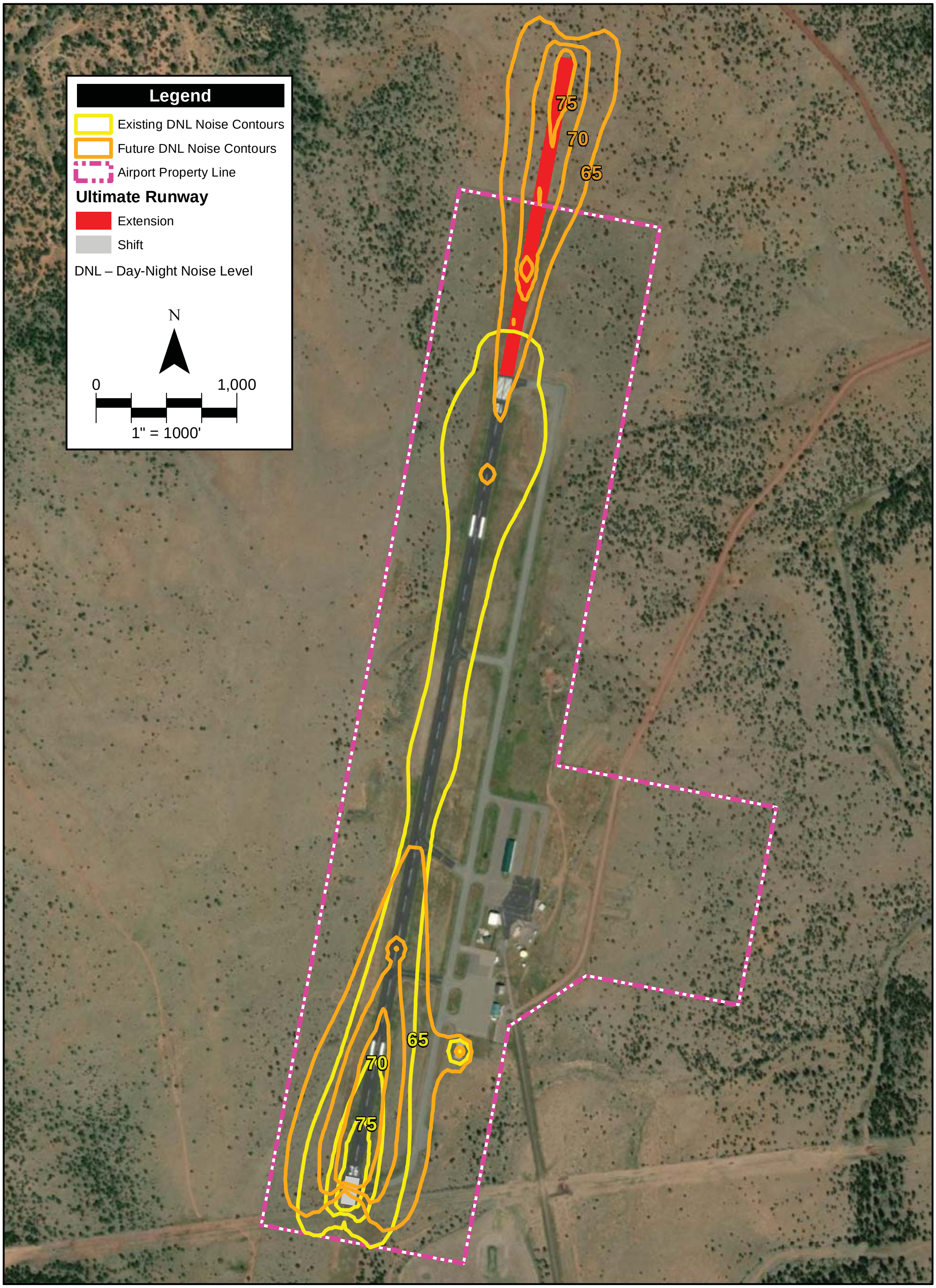


Exhibit C1
EXISTING AND FUTURE NOISE CONTOURS

	• Impacts on the physical or natural environment that affect an environmental justice population in a way that FAA determines is unique to the environmental justice population and significant to that population. Executive Order (E.O.) 12898, *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*, and the accompanying Presidential Memorandum, and Order DOT 5610.2, *Environmental Justice*, require the FAA to provide meaningful public involvement for minority and low-income populations, as well as analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse. Environmental justice impacts may be avoided or minimized through early and consistent communication with the public and allowing ample time for public consideration.
Potential Environmental Concerns	**No Impact.** Both low-income and minority populations have been identified within five miles of the airport. However, the airport is surrounded by the Kaibab National Forest, and there are no residences within a one-mile radius. Thus, it is unlikely that development at the airport would have any impacts on low-income or minority populations. If disproportionately high or adverse impacts are identified as a result of the proposed runway extension, mitigation and enhancement measures and/or offsetting benefits should be taken into consideration.
Children's Health and Safety Risks	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Children's Environmental Health and Safety Risks. However, factors to consider are whether an action would have the potential to lead to a disproportionate health or safety risk to children.
Potential Environmental Concerns	**No Impact.** There are no residential land uses or schools within one mile of the airport.
VISUAL EFFECTS	
Light Emissions	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	The FAA has not established a significant threshold for light emissions. However, a factor to consider is the degree to which an action would have the potential to: • Create annoyance or interfere with normal activities from light emissions; and • Affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resource.
Potential Environmental Concerns	**No Impact.** Future airport airfield lighting, such as what could be installed as part of the runway extension, would typically be exempted from local lighting ordinances. Proposed apron expansion, if lighted, would be required to minimize light spillage off airport property in keeping with local ordinances.
Visual Resources/Visual Character	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Visual Resources/Visual Character. However, a factor to consider is the extent an action would have on the potential to: • Affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources; • Contrast with the visual resources and/ or visual character in the study area; and • Block or obstruct the views of the visual resources, including whether these resources would still be viewable from other locations.
Potential Environmental Concerns	**No Impact.** There are no sensitive viewsheds or scenic corridors within the airport environs. Although surrounded by the Kaibab National Forest, there are no developed recreational uses close to the airport.
WATER RESOURCES	
Wetlands	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would:** **1. Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;** **2. Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;** **3. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);** **4. Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;** **5. Promote development of secondary activities or services that would cause the circumstances listed above to occur; or** **6. Be inconsistent with applicable state wetland strategies.**

Potential Environmental Concerns	**No Impact.** The airport does not contain wetlands or other waters of the U.S. The airport received an Approved Jurisdictional Determination from the U.S. Army Corps of Engineers as part of the Airport Master Plan study confirming that there are no waters of the U.S. at the airport.[4]
Floodplains	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would cause notable adverse impacts on natural and beneficial floodplain values. Natural and beneficial floodplain values are defined in Paragraph 4.k of DOT Order 5650.2, *Floodplain Management and Protection.***
Potential Environmental Concerns	**No Impact.** A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 04005C6330G and 04005C6337G (dated September 3, 2010) indicates the airport is not located within a floodplain.
Surface Waters	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would:** • **Exceed water quality standards established by federal, state, local, and tribal regulatory agencies; or** • **Contaminate public drinking water supply such that public health may be adversely affected.** Factors to consider are when a project would have the potential to: • adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values; • adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • present difficulties based on water quality impact when obtaining a permit or authorization.
Potential Environmental Concerns	**Potential Impact.** The airport manages airport stormwater discharges with an Arizona Pollutant Discharge Elimination System (AZPDES) issued and regulated by the ADEQ. The master plan concept would result in additional impervious surfaces at the airport due to the proposed runway and parallel taxiway extension, a perimeter service road, and expansion of the general aviation apron. Such improvements to the airport will require a revised permit to be issued addressing operational and structural source controls, treatment best management practices (BMPs), and sediment and erosion control. Additional impervious areas would need to be incorporated into the operational stormwater pollution prevention plan (SWPPP) map as they are constructed. An AZPDES General Construction permit would be required for all projects involving ground disturbance over one acre. FAA's Advisory Circular (AC) 150/5370-10G, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control* should also be implemented during construction projects at the airport.
Groundwater	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	**Threshold: The action would:** **1. Exceed groundwater quality standards established by federal, state, local, and tribal regulatory agencies: or** **2. Contaminate an aquifer used for public water supply such that public health may be adversely affected.** Factors to consider are when a project would have the potential to: • Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values; • Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or • Present difficulties based on water quality impacts when obtaining a permit or authorization.
Potential Environmental Concerns	**No Impact.** The airport does not function as an important groundwater recharge area nor is there a sole source aquifer near the airport.
Wild and Scenic Rivers	
FAA Order 1050.1F, Significance Threshold/Factors to Consider	FAA has not established a significance threshold for Wild and Scenic Rivers. Factors to consider are when an action would have an adverse impact on the values for which a river was designated (or considered for designation) through: • Destroying or altering a river's free-flowing nature; • A direct and adverse effect on the values for which a river was designated (or under study for designation);

[4] SWCA Environmental Consultants, Inc. (November 30, 2020). *Approved Jurisdictional Determination Review for the H.A. Clark Memorial Field Property in Williams, Coconino County, Arizona.*

	• Introducing a visual, audible, or other type of intrusion that is out of character with the river or would alter outstanding features of the river's setting; • Causing the river's water quality to deteriorate; • Allowing the transfer or sale of property interests without restrictions needed to protect the river or the river corridor; or • Any of the above impacts preventing a river on the Nationwide Rivers Inventory (NRI) or a Section 5(d) river that is not included in the NRI from being included in the Wild and Scenic River System or causing a downgrade in its classification (e.g., from wild to recreational).
Potential Environmental Concerns	**No Impact.** The nearest designated Wild and Scenic River, the Rio Grande River, is located approximately 235 miles from the airport. The closest river on the NRI is a segment of Cimarron River, which is located approximately 12 miles south of the airport. Projects delineated on the master plan concept would not have adverse effects on these river's outstanding remarkable values (i.e., scenery, recreation, geology, fish, wildlife, and history).

Source: Coffman Associates, Inc analysis

Appendix D

Recylcing Plan

H.A. Clark
Memorial Field
Airport Master Plan

Appendix D
AIRPORT RECYCLING, REUSE, and WASTE REDUCTION

REGULATORY GUIDELINES

FAA Modernization and Reform Act of 2012

The *FAA Modernization and Reform Act of 2012* (FMRA), which amended Title 49, United States Code (U.S.C.), included several changes to the Airport Improvement Program (AIP). Two of these changes are related to recycling, reuse, and waste reduction at airports.

- Section 132(b) of FMRA expanded the definition of airport planning to include "developing a plan for recycling and minimizing the generation of airport solid waste, consistent with applicable State and local recycling laws, including the cost of a waste audit."

- Section 133 of FMRA added a provision requiring airports that have or plan to prepare a master plan, and that receive AIP funding for an eligible project, to ensure that the new or updated master plan addresses issues relating to solid waste recycling at the Airport, including:
    - The feasibility of solid waste recycling at the Airport;
    - Minimizing the generation of solid waste at the Airport;
    - Operation and maintenance requirements;
    - A review of waste management contracts; and
    - The potential for cost savings or the generation of revenue.

State of Arizona Solid Waste Management Plan

The *Arizona Solid Waste Management Plan* (1981)[1] was adopted to promote environmentally sound waste management. General goals of the waste management plan include:

- Promote improved and environmentally sound methods of solid waste management and disposal;
- Promote recovery and reuse of valuable material and energy resources from solid waste;
- Provide policy and procedural guidance to state, substate, and local agencies in the proper management of solid waste; and
- Fulfill requirements of the *Resource Conservation and Recovery Act* (RCRA) and secure the state's continued eligibility for federal financial assistance.

[1] Arizona Department of Environmental Quality (March 1981). *Arizona Solid Waste Management Plan*. Available at: https://legacy.azdeq.gov/environ/waste/solid/

At this time, there are no state laws or regulations that establish solid waste management reduction thresholds. However, other means such as education, outreach, voluntary recycling, and non-profit organizations have been employed to reduce the quantity of solid waste in Arizona.

SOLID WASTE

Typically, airport sponsors have authority over waste handling services in the facilities they own and operate, such as the passenger terminal building, airport-owned t-hangars, and maintenance facilities. Tenants of airport-owned buildings/hangars or tenants that own their own facilities are typically responsible for coordinating their own waste handling services. While the focus of this plan is airport-operated facilities, the airport should work to incorporate facility-wide strategies that create consistency in waste disposal mechanisms. This would ultimately result in the reduction of materials sent to the landfill.

For airports, waste can generally be divided into eight categories:[2]

- **Municipal Solid Waste** (MSW) is more commonly known as trash or garbage consisting of everyday items that are used and then discarded, i.e. product packaging.

- **Construction and Demolition Waste** (C&D) is considered non-hazardous trash resulting from land clearing, excavation, demolition, renovation or repair of structures, roads and utilities, including concrete, wood, metals, drywall, carpet, plastic, pipe, cardboard, and salvaged building components. C&D is also generally labeled as MSW.

- **Green Waste** is a form of MSW yard waste consisting of tree, shrub and grass clippings, leaves, weeds, small branches, seeds, and pods.

- **Food Waste** includes unconsumed food products or waste generated and discarded during food preparation and is also considered MSW.

- **Deplaned Waste** is waste removed from passenger aircrafts. Deplaned waste includes bottles, cans, mixed paper (newspapers, napkins, paper towels), plastic cups, service ware, food waste, and food-soiled paper or packaging.

- **Lavatory Waste** is a special waste that is emptied through a hose and pumped into a lavatory service vehicle. The waste is then transported to a triturator[3] facility for pretreatment prior to discharge in the sanitary sewage system. Due to the chemical in lavatory waste, it can present environmental and human health risks if mishandled. Caution must be taken to ensure lavatory waste is not released to the public sanitary sewerage system prior to pretreatment.

- **Spill Clean and Remediation Wastes** are also special wastes and are generated during cleanup of spills and/or the remediation of contamination from several types of sites on an airport.

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[2] Federal Aviation Administration (April 24, 2013). *Recycling, Reuse and Waste Reduction at Airports*.

[3] A triturator facility turns lavatory waste into fine particulates for further processing (FAA, 2013).

- **Hazardous Wastes** are governed by RCRA, as well as the regulations in 40 Code of Federal Regulations (CFR) Subtitle C, Parts 260 to 270. The U.S. Environmental Protection Agency (EPA) developed less stringent regulations for certain hazardous waste, known as universal waste, described in 40 CFR Part 237, *The Universal Waste Rule*.

As seen on **Exhibit D1**, there are multiple areas where H.A. Clark Memorial Field potentially contributes to the waste stream, including the terminal, airfield, hangars, airport construction projects, and fixed-base operators. To create a comprehensive waste reduction and recycling plan for the airport, all potential inputs must be considered.

EXISTING SERVICES

The fixed-base operator, Northern Arizona Aviation Services, currently administers the airport's waste management and trash collection services, which is picked up by the City's sanitation department on a weekly basis. The airport has three 300-gallon MSW containers at the terminal servicing the terminal.

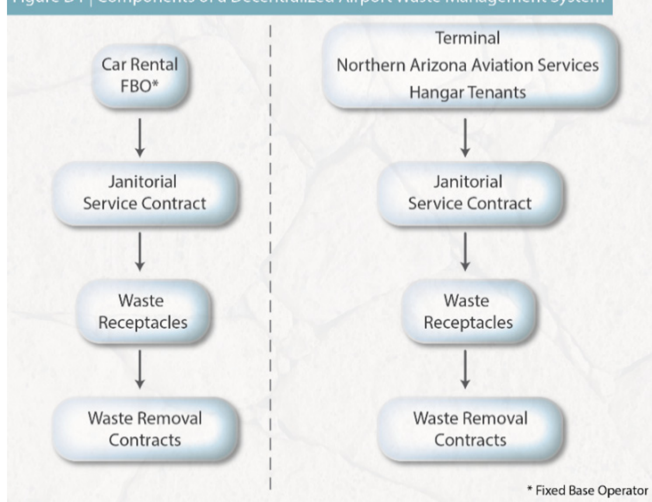
According to the Currently, there is no business curb side recycling pick-up program at the Airport. The city discontinued the city-wide recycling program for business customers. However, recycling can be taken to the Williams Transfer Station free of charge.[4]

SOLID WASTE MANAGEMENT SYSTEM

Airports employ either a *centralized* or a *decentralized* waste management system when managing solid waste and recycling efforts at their facility. The differences between these two methods are discussed in further detail below.

- **Decentralized waste management system.** Under a decentralized waste management system, the airport provides waste containers and contracts for the hauling of waste materials in airport-operated spaces only (**Figure D1**). Airport tenants such as fixed-base operators, retail shops, and others manage the waste from their leased spaces with separate contracts, billing, and hauling schedules. A decentralized waste management system can increase both the number of receptacles on airport property and the number of trips by a waste collection service provider, should the collection schedule for the tenant differ from the airport.

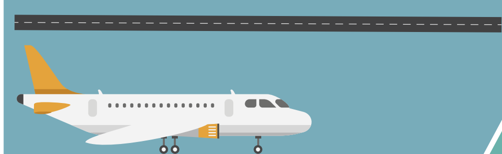
Figure D1 | Components of a Decentralized Airport Waste Management System



Source: Natural Resources Defense Council (December 2006). Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs.

[4] Petit, Tim. Community Development Director of the City of Williams, AZ. Email to M. Quick, Principal of Coffman Associates, Inc. on June 22, 2021.

Airport Waste Streams

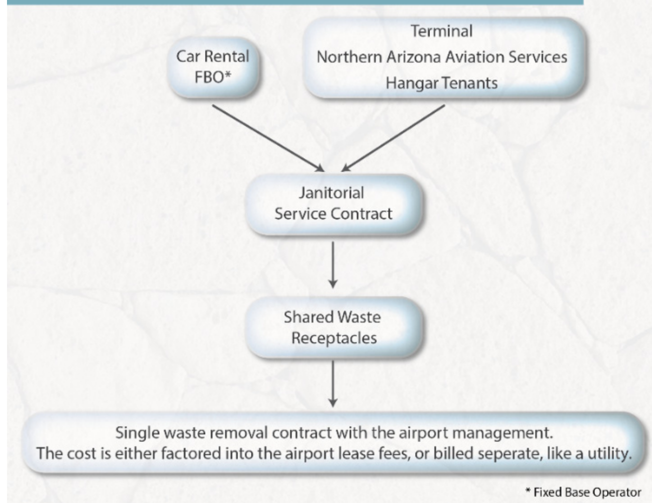
AIRPORT AREA	POTENTIAL INPUTS	POTENTIAL OUTPUTS
TERMINAL & ADMINISTRATION OFFICE 	Pilots Employees	Food Waste, Paper Plastic, Aluminum Cans Trash,Green Waste Deplaned Waste
AIRFIELD 	Aircraft Operations	Runway Rubber Green Waste
AIRCRAFT 	Aircraft Ground Support Equipment (GSE)	Vehicle Waste Plastic Wastewater Hazmat
AIRPORT CONSTRUCTION 	Demolition Construction Re-Construction	Reused Concrete Reused Asphalt Vehicle Waste Soils, Building Materials Wood, General Waste
FIXED BASE OPERATORS 	Employees Clients	Food Waste Paper, Plastic Aluminum Cans Trash, Grease & Oil Green Waste

Source: Recycling, Reuse, and Waste Reduction at Airports, FAA (April 24, 2013)

Exhibit D1
WASTE STREAMS

- **Centralized waste management system.** A centralized waste management system (**Figure D2**) allows the airport to provide receptables for all airport tenants for the collection of waste, recyclables, or compostable materials and waste is collected on the same schedule by a single provider.[5] This strategy can be inefficient for some airports as it requires more effort and oversight on the part of airport management. However, the centralized system is advantageous in that there are less players involved in the overall management of the solid waste and allows greater control by the airport over the type, placement, and maintenance of dumpsters, thereby saving space and eliminating the need for each tenant to have their own containers.

Figure D2 | Components of a Centralized Airport Waste Management System



Source: Natural Resources Defense Council (December 2006). Trash Landings: How Airlines and Airports Can Clean Up Their Recycling Programs.

Waste management services at H.A. Clark Memorial Field are currently managed independently by the tenants, also known as a *decentralized* waste management system.

GOALS AND RECOMMENDATIONS

Solid Waste Reduction Goals

Although there is no current curb-side recycling program, there are other opportunities to reduce the amount of solid waste generated at the Airport. **Table D1** outlines objectives that could help reduce waste generation. To increase the effectiveness of tracking progress at the airport, a baseline state of all suggested metrics should be established to provide a comparison over time.

TABLE D1 | Waste Management Goals

Goals	Objectives
Reduce amount of solid waste generated	Switch to online bill pay to eliminate monthly paper bills
	Conduct a waste audit to identify most common types of waste
	Eliminate purchase of items that are not recyclable (i.e., Styrofoam, plastic bags)
Reuse of materials	Reuse grass clippings as mulch
	Offer reusable dishes to employees
	Reuse cardboard boxes for storage

Source: Coffman Associates, Inc.

[5] The National Academies of Sciences, Engineering, and Medicine Airport Cooperative Research Program (2018). *Airport Waste Management and Recycling Practices*, Synthesis 92.

Recommendations

To maximize waste reduction at the airport, the following recommendations are made:

- **Create a centralized waste management system at the airport.** The airport should actively engage tenants to create a centralized waste management system at the airport to streamline waste management efforts.

- **Audit the current waste management system.** The continuation of an effective program requires accurate data of current waste rates. There are several ways an airport can gain insight into their waste stream, such as requesting weights from the hauler, tracking the volume, or reviewing the bills. But managing the waste system would first start with a waste audit. A waste audit is an analysis of the types of waste produced and is the most comprehensive and intensive way to assess waste stream composition and opportunities for waste reduction. A waste audit should include the following measures:

  - Examination of records
    - Waste hauling and disposal records and contracts
    - Supply and equipment invoices
    - Other waste management costs (commodity rebates, container costs, etc.)
    - Track waste from the point of origin
    - Establish a baseline for metrics

  - Facility walk-through conducted by the airport
    - Qualitative waste information to determine major waste components and waste-generating processes
    - Identify airport locations that generate waste
    - Identify the type of waste is generated by the airport to determine what can be reduced or reused
    - Understand waste pickup and transport practices

  - Waste sort to provide quantitative data on total airport waste generation

- **Create a tracking and reporting system.** Continuing to track solid waste generated would allow the airport to identify areas where a significant amount of waste is generated and would help estimate annual waste volumes. Understanding the cyclical nature of waste generation would allow the airport to estimate costs and would identify areas of improvement.

- **Reduce waste through controlled purchasing practices.** The airport can control the amount of waste generated by prioritizing the purchase of items or supplies that are reusable, compostable, or made from recycled materials.

- **Incorporate an airport-wide waste reduction strategic plan.** Designing an airport-wide waste reduction strategic plan would create consistency in waste deposal mechanisms, ultimately resulting in the reduction of materials sent to the landfill.

If the city reestablishes a curb-side recycling program, the following recommendations are made for airport participation.

- **Initiate a recycling program at the Airport.** To guarantee the Airport reduces the amount of waste hauled to the landfill, materials that cannot be reused or avoided should be recycled, if possible. The Airport should establish internal procedures to ensure there are no unacceptable items contaminating recycling containers, or recyclables thrown in the trash. Clearly marked signage of what is and is not accepted placed near the solid waste and recycling containers is another significant component of a consistent, effective recycling program. H.A. Clark Memorial Field would actively work with the City's sanitation department to ensure recycling containers would be right sized for the existing operation, as well as devise a collection schedule that would best serve the Airport's needs.

- **Provide ongoing tenant education.** It is crucial to encourage tenant participation to assure buy-in of the Airport's new recycling program. To guarantee recycling is part of the airport's everyday business, airport administration can provide training and educational support to personnel, tenants, and others who conduct business at the Airport. In-person meetings with airport tenants could be held to create mutual understanding of the airport's solid waste and recycling goals and how tenants play a vital role in the airport's overall success.



Appendix E

Cultural and Biological Surveys

H.A. Clark Memorial Field

Airport Master Plan

Cultural Resources Survey for the H. A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona

OCTOBER 2020

PREPARED FOR

Coffman Associates

PREPARED BY

SWCA Environmental Consultants

CULTURAL RESOURCES SURVEY FOR THE H. A. CLARK MEMORIAL FIELD AIRPORT MASTER PLAN IN WILLIAMS, COCONINO COUNTY, ARIZONA

Prepared for

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Prepared by

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Arizona Antiquities Act Blanket Permit No. 2020-029bl

SWCA Project No. 59346

SWCA Cultural Resources Report No. 20-623

October 2020

Report Title: Cultural Resources Survey for the H. A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona

Project Name: Clark Memorial Field Environmental Services

Project Location: City of Williams, Coconino County, Arizona

Project Locator UTM: NAD 83 Zone 12, 391530mE 3907517mN

Project Sponsor: Coffman Associates

Sponsor Project Number(s): N/A

Lead Agency: Federal Aviation Administration (FAA)

Agency Project Name/Number: N/A

Other Involved Agencies: City of Williams, Arizona State Museum

Applicable Regulations: Section 106 of the National Historic Preservation Act (Code of Federal Regulations Part 800), Arizona Antiquities Act (Arizona Revised Statutes § 41-841 *et seq*.)

Funding Source: City of Williams

ASLD ROW Application Number: N/A

Description of the Project/Undertaking: The City of Williams, which owns and operates the H. A. Clark Memorial Field Airport, contracted Coffman Associates to update the Airport Master Plan for future airport expansion and development. SWCA Environmental Consultants was subcontracted by Coffman Associates to complete a cultural resources survey of the airport to identify historic properties (i.e., properties listed in or eligible for listing in the National Register of Historic Places [NRHP]) that could be affected by future airport actions.

Project Area/Area of Potential Effects (APE): H. A. Clark Memorial Field Airport property (i.e., lands to be considered in the Airport Master Plan update).

Legal Description: The project area is located in Sections 4–5 and 8–9, Township 22 North, Range 2 East, Coconino County, Gila and Salt River Baseline and Meridian, on the U.S. Geological Survey Williams North, Arizona, 7.5-minute quadrangle.

Land Jurisdiction(s): City of Williams

Total Acres: 303 acres

Acres Surveyed: 303 acres—258 acres (systematic pedestrian survey) and 45 acres (judgmental survey of existing airport facilities, runways, taxiways, aprons, drainage features, parking lot, and airport access road)

Acres Not Surveyed: 0

Consultant Firm/Organization: SWCA Environmental Consultants

Project Number: 59346

Permit Number(s): Arizona Antiquities Act Blanket Permit No. 2020-029bl

ASM Accession No.: 2020-0299.ASM

Date(s) of Fieldwork: September 9–12, 2020

Number of IOs Recorded: Five

Number of Properties Recorded: Three in-use historic-era structures—El Paso Natural Gas (EPNG) Lines 1200, 1201, and 1204

Eligible Properties: None

Ineligible Properties: None

Unevaluated Properties: None

Exempt Properties: Three in-use historic-era structures—El Paso Natural Gas (EPNG) Lines 1200, 1201, and 1204

Previously Recorded Sites/Properties Not Found: None

Comments:

The cultural resources survey of the project area resulted in the recording of five isolated occurrences (IOs) and three historic-era in-use structures. No new or previously recorded archaeological sites or historic-era buildings, structures, or objects were found. The project area is not within a historic district. No properties listed in or eligible for listing in the NRHP are within the APE.

Four of the IOs are prehistoric manifestations and consist of flaked stone debitage, a nearly completed corner-notched projectile point, and a tested cobble. One IO is a historic-era sun-colored amethyst bottle fragment. The IOs are ineligible for the NRHP. Although the airport started as a northeast-southwest–aligned dirt strip in the early 1940s, possibly in response to World War II, the current airport facilities reflect expansion that began in the 1990s, which included realignment, lengthening, and widening of the runway, as well as construction of airport facilities, aprons, taxiways, and parking lots. As such, there are no airport-related historic-era buildings or structures in the project area.

The southern portion of the airport property is partially bisected by four in-use pipelines (EPNG Lines 1200, 1201, 1204, and 1208) owned and operated by El Paso Natural Gas Company (EPNG), a subsidiary of Kinder Morgan, Incorporated. Three of these pipelines are more than 50 years old: Lines 1200, 1201, and 1204. As in-use historic-era natural gas pipelines, they are exempt from Section 106 review in accordance with a notice from the Advisory Council on Historic Preservation (*Federal Register* 67[66]:16364–16365).

PROJECT DESCRIPTION

The City of Williams, which owns and operates the H. A. Clark Memorial Field airport, contracted Coffman Associates to update the Airport Master Plan for future airport expansion and development. SWCA Environmental Consultants (SWCA) was subcontracted by Coffman Associates to complete a cultural resources survey of the airport to identify historic properties (i.e., properties listed in or eligible for listing in the National Register of Historic Places [NRHP]) that could be affected by future airport actions. SWCA's inventory considered the entire 303-acre airport property and involved pedestrian survey of 258 acres of undeveloped airport property and 45 acres of judgmental survey of existing airport facilities, runways, taxiways, aprons, drainage features, parking lot, and airport access road.

PROJECT LOCATION

The H. A. Clark Memorial Field airport is located approximately 3 miles north of the City of Williams in Coconino County, Arizona (Figure 1). It is located in Sections 4–5 and 8–9, Township 22 North, Range 2 East, Coconino County, Gila and Salt River Baseline and Meridian, on the U.S. Geological Survey Williams North, Arizona, 7.5-minute quadrangle (Figure 2).

PHYSIOGRAPHIC CONTEXT

The project area is located about 2.5 miles north of Interstate 40 on the Colorado Plateau. The project area has very little topographic relief and no intermittent or perennial surface water features, ridges, or other prominent landforms. On the southern end of the project area lies Threemile Lake, a seasonal lake that lacks riparian vegetation and likely only contains water after a rainfall event or during the spring snowmelt runoff. Surface sediments consist of well-drained soils formed in residuum and alluvium weathered from late Tertiary to Quaternary-age basalts. The project area elevation is approximately 6,680 feet (2,036 meters) above mean sea level.

The project area lies within the Petran Montane Conifer Forest biotic community (Brown 1994); however, the project area has been disturbed by airport construction, and the vegetation present is primarily annual and perennial grasses, forbs, and low-growing shrubs. Commonly observed plant species include bunch grasses that have been maintained and mowed (Figure 3).

Native plant species observed during the site visit include slender squirreltail (*Elymus elymoides*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), purple threeawn, (*Aristida purpurea*), slender wheatgrass (*Elymus trachycaulus*), false quackgrass (*Elymus x pseudorepens*), false boneset (*Brickellia eupatorioides*), broom snakeweed (*Gutierrezia sarothrae*), curlycup gumweed (*Grindelia squarrosa*), gray globemallow (*Sphaeralcea incana*), common sunflower (*Helianthus annuus*), prairie sagewort (*Artemisia frigida*), Wheeler's thistle (*Cirsium wheeleri*), horsetail milkweed (*Asclepias subverticillata*), flatspine bur ragweed (*Ambrosia acanthicarpa*), southwestern cosmos (*Cosmos parviflorus*), rubber rabbitbrush (*Ericameria nauseosa*), spineless horsebrush (*Tetradymia canescens*), cactus apple (*Opuntia engelmannii*), ponderosa pine (*Pinus ponderosa*), twoneedle pinyon (*Pinus edulis*), oneseed juniper (*Juniperus monosperma*), and Fremont's mahonia (*Mahonia fremontii*).

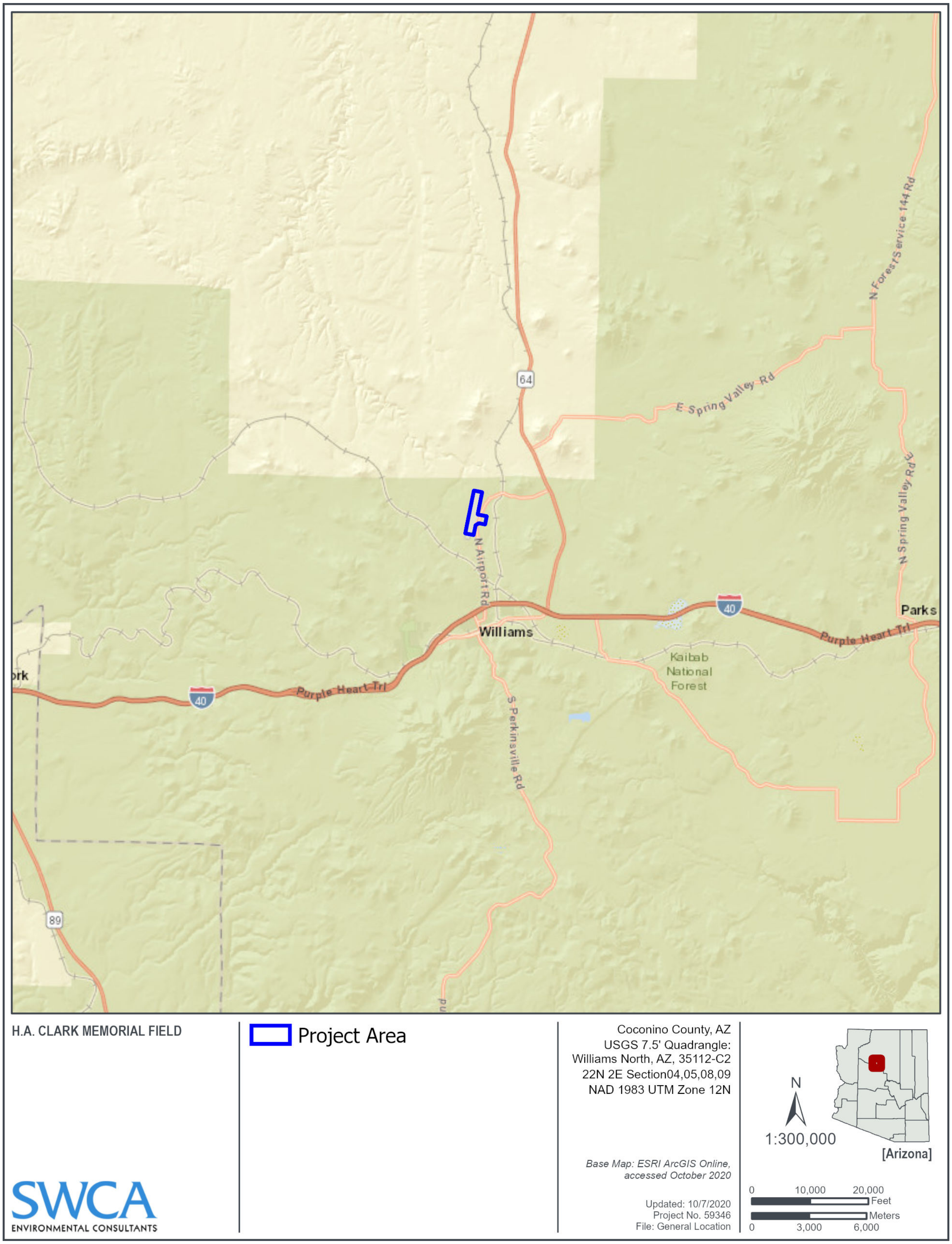

Figure 1. Project vicinity.

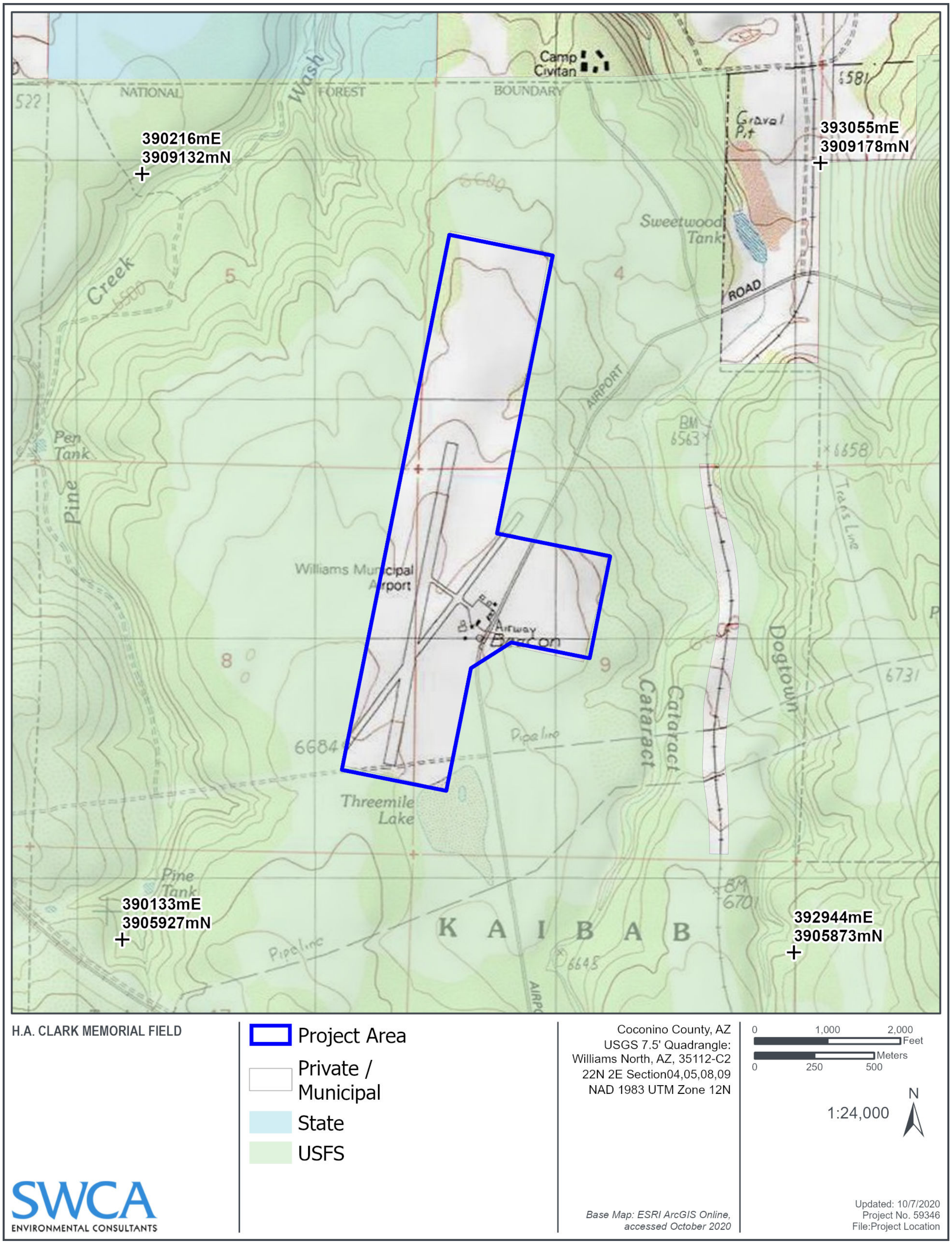

Figure 2. Project location.

Figure 3. Overview of project area, facing north.

CULTURE HISTORY

Following Willey and Phillips (1958), archaeologists generally divide the culture history of the American Southwest (including the project area) into five major periods: Paleoindian (9500–6500 B.C.), Archaic (6500 B.C.–A.D. 500 in the Grand Canyon region), Formative (A.D. 500–1300 at the Grand Canyon), Protohistoric (A.D. 1300–1540 at the Grand Canyon), and Historic (A.D. 1540–present at the Grand Canyon). The region from the Grand Canyon south to the Mogollon Rim and Bill Williams River and from the San Francisco Peaks west to the Colorado River was occupied during all these periods. The Arizona State Historic Preservation Office has commissioned a number of historic context reports that are relevant to historic resources of the region, including studies of the Paleoindian and Archaic period (Mabry 1998), lithic sites (Slaughter et al. 1990), prehistoric non-irrigated agriculture (Doyel 1993), the protohistoric period (Gilpin and Phillips 1998), rock art (Thiel 1995), historic trails (Stein 1994), transcontinental railroading (Janus Associates 1989), cattle ranching (Collins 1996), homesteading (Stein 1990), and logging railroads in northern Arizona (Stein 1989).

Paleoindian Period (9500–6500 B.C.)

The prevailing theory is that Paleoindians were hunters of now-extinct species of megafauna who crossed the Bering Strait from Asia during the end of the Pleistocene glaciations (Bonnichsen and Turnmire 1999), although a coastal migration of broad-spectrum foragers has been proposed as an alternative (Dixon 1999). While the subsistence economy seems to have revolved around the hunting of large game, the presence of grinding tools, small-animal remains, and plant remains at some sites indicates that other available resources were used as well (Stanford 1999). However, a recent study (Waguespack and Surovell 2003) supports the view that the earliest Americans were primarily specialized big-game hunters. This period is divided into the Clovis (9500–9000 B.C.), Folsom (9000–8000 B.C.), and Plano/Cody

(8000–6500 B.C.) complexes based on changes in projectile point technology and the primary big-game species exploited.

The Clovis complex is characterized by large, fluted points with overshot flaking and basal grinding that have been found associated with the remains of Columbian mammoth (*Mammuthus columbi*).
The Folsom complex is characterized by well-made points with concave bases that have been deeply fluted on both sides in the final stage of production. Folsom points have been found associated with extinct long-horned bison (*Bison antiquus*). The Plano/Cody complexes are characterized by a variety of lanceolate projectile point forms exhibiting parallel flaking (such as Midland, Plainview, Eden, Scottsbluff, Belen, and Angostura), as well as Cody knives. These projectile point types have been found associated with the remains of modern bison (*Bison bison*).

Two Clovis projectile point bases from the Coconino Plateau are in Kaibab National Forest (KNF) collections (Lyndon 2005).
One of these was made of Government Mountain obsidian; the other was made of Black Tank obsidian. Paleoindian artifacts made from obsidians and rhyolites of the Mount Floyd and San Francisco volcanic fields indicate that Paleoindians were using the region, acquiring stone for tools, and transporting the stone vast distances.

Although Paleoindian projectile points from the region all demonstrate that Paleoindians used the region from the Grand Canyon to the Mogollon Rim and from the San Francisco Peaks to the Grand Wash Cliffs, evidence for Paleoindian use of the region is extremely rare, and no Paleoindian sites have been identified in this area, let alone excavated.

Archaic Period (7000–500 B.C.)

The Archaic period commenced with a shift from big game hunting to a subsistence strategy dominated by extensive seasonal mobility and hunting of smaller game animals and the exploitation of a variety of economically important wild plants (Huckell 1996). For the purposes of this report, the Archaic period refers to the time between the Paleoindian period and before the introduction of cultigens, when inhabitants practiced broad-spectrum hunting and gathering. With this means of subsistence, emphasis was placed on plant seed resources, while small and large game animals alike were hunted.

This period is generally regarded as the time when aboriginal people became increasingly familiar with regionally available Holocene species and began to use a wider range of plants and animals. Regional traditions of flintknapping, rock art, and basketry emerged, indicating the localization of populations. The long span of the Archaic has been divided into three phases based on changes in material culture, primarily projectile point forms. Across the Coconino Plateau, especially on the KNF, Lyndon (2005) established the regional typology followed here. Jay, Bajada, and Northern Side-Notched points are characteristic of the Early Archaic (9000–6200 B.P.); Pinto/San Jose, Sudden Side-Notched, and Rocker Side-Notched points, as well as a variety of different corner- and side-notched types, typify Middle Archaic (6200–4600 B.P.) projectile points. The Late Archaic (4600–2400 B.P.) is characterized by Gatecliff Split-Stemmed, San Rafael Side-Notched, Gypsum Cave, Elko-Eared, Armijo, and Chiricahua projectile point types.

As part of a recent study focused on Archaic period mobility on the Coconino Plateau, Roberts (2008) determined the geologic and geographic origin of 271 igneous projectile points recovered from the KNF and adjacent areas. Roberts found that the majority of points were manufactured from five local obsidian sources, including Government Mountain, Partridge Creek, Presley Wash, RS Hill/Sitgreaves Mountain, and Black Tank. In addition, based on the results from this study, reliance on these five sources increased through the Archaic period. This pattern likely reflects decreased mobility as the hunter-gatherers occupying the region during this time were transitioning to a more sedentary lifestyle.

Southwestern archaeologists have traditionally used the presence of cultigens to mark the end of the Archaic period; however, recent data suggest that substantial integration of agriculture into foraging economies occurred approximately 3,000 to 3,500 years ago (Huckell 1996). Therefore, the end of the Archaic period is more difficult to define. In this report we use the rise of mixed farming-foraging economies to mark the end of the Archaic period. See Huckell (1996) for a comprehensive discussion of the Archaic period in the Southwest.

Formative Period (500 B.C.–A.D. 1425)

Formative adaptations are characterized by dependence on maize horticulture, construction of permanent dwellings, and, after about A.D. 275, production of pottery. Maize was probably introduced to the Southwest about 2000 B.C., but current archaeological evidence dates the earliest use of maize on the Coconino Plateau to about A.D. 700. Archaeologists refer to the Formative people who lived in the Williams area as the Cohonina.

The Cohonina cultural tradition was centered on the south side of the Grand Canyon (Ahlstrom et al. 1993:73–74). The tradition dates from pre–A.D. 700 to 1150 or 1200 (Roberts 2001; cf. USFS 1996:108). Architecture included masonry pueblos and pit houses, but the Cohonina did not construct kivas. They did, however, have other forms of public architecture, such as “forts” (actually dwellings built in defensible locations, consisting of habitation and storage rooms around a courtyard), plazas, oversized rooms, and ballcourts (Bone 2002). The Cohonina made San Francisco Mountain Gray Ware (Mills et al. 1993; Roberts 2001).

Cohonina sites have been identified from the Grand Canyon on the north to the Mogollon Rim and the headwaters of the Big Chino Wash and Big Sandy River on the south, and from the Little Colorado River on the east to the Colorado River on the west.

The Cohonina practiced limited agriculture and relied heavily on gathering wild plants and hunting. Sites on the headwaters of the Big Sandy River, excavated during the Transwestern Pipeline project (Bair and Stoker 1994), provide some of the most recent information on Cohonina subsistence practices. Pollen samples yielded pollen of pine, cheno-ams, beeweed, purslane, Umbelliferae [parsley family], cholla, and maize. Flotation samples yielded wood of juniper, pine, saltbush/greasewood, and Apache plume. Maize was the only cultigen present. Wild plants represented in the flotation samples included seeds of juniper, dropseed, clammyweed, cheno-ams (including goosefoot), purslane, sunflower, panic grass, Deschampsia, and yucca, as well as pinyon nuts. Faunal bone from the sites represented a wide range of taxa: large mammals (including medium-sized ungulates, artiodactyls, pronghorn, deer, and mountain sheep), medium-sized mammals (gray wolf, coyote/dog, bobcat), rabbit-sized mammals (cottontail and jackrabbit), rodent-sized mammals (prairie dog, Botta’s pocket gopher, pocket mouse, grasshopper mouse, kangaroo rat, woodrat), birds (including northern flicker and roadrunner), lizards, snakes, and turtles/tortoises (including snapping turtle).

Cartledge (1979, 1986) proposed that the Cohonina lived in communities clustered in the woodlands around the bases of the major mountains of the Coconino Plateau: Kendrick Mountain, Sitgreaves Mountain, and Bill Williams Mountain. McGregor’s (1967) work around Mount Floyd showed that a community may also have surrounded this mountain as well. Most communities apparently consisted of small, single-family residential sites clustering around the bases of the major mountains (Cartledge 1979, 1986; Samples 1992; Wilcox et al. 1996). Within each cluster are several types of public architecture: “forts,” sites with large plazas, sites with long rooms, and ballcourts (Bone 2002).

Samples (1992) analyzed 380 sites in 40 square miles (64.4 km^2) around Sitgreaves Mountain. The sites included 242 habitations, one rock art site, five check dams, and 132 artifact scatters. The habitation sites contained an estimated 649 structures, including 301 pit houses and 348 masonry structures.

Bone (2002) investigated public architecture ("forts," plazas and long rooms, and ballcourts) on the Coconino Plateau. He divided his study area into a northern area (bounded by Highway 180 on the north and east, Interstate 40 on the south, and Highway 64 on the west) and a southern area (south of Interstate 40 between Interstate 40 and the Mogollon Rim). More than 200 habitation sites were present in the northern area, along with seven "forts" and five plaza sites or sites with long rooms. More than 200 habitation sites were present in the southern area, along with three "forts," one site with a plaza or long room, and four ballcourts.

Horn-Wilson's (1997) analysis of projectile points from different clusters of excavated sites on the Coconino Plateau indicated that settlement locations may have shifted over time. Early Cohonina (A.D. 850–1000) projectile points were found in four areas: Red Butte, Medicine Valley, Baker Ranch, and Mount Floyd. Late Cohonina (A.D. 1000–1075) points were found in four areas: Red Butte (again), Medicine Valley (again), Sitgreaves Mountain, and Red Lake. Very late Cohonina (A.D. 1075–1200) points were found in only two areas: Red Lake and Medicine Valley. Thus, only Medicine Valley was probably occupied throughout the Formative period, Red Butte was probably occupied in the early and late periods, Red Lake was probably occupied in the late and very late periods, Brown Ranch and Mount Floyd were probably occupied only in the early period, Sitgreaves Mountain was probably occupied only during the late period, and Mesa Butte yielded no projectile points dating to any of the three time periods.

Schroeder (1979:Figure 9) originally defined Cohonina projectile points as long and thin with serrated edges. Horn-Wilson (1997), however, identified 12 types of projectile points on Cohonina sites and concluded that while Schroeder's "Cohonina Projectile Points" were one of these types, they were not the exclusive type made and used by the Cohonina. In his analysis of projectile points recovered from archaeological projects on the Coconino Plateau of the KNF, Lyndon (2005) classified virtually all (n = 69) of the Early Ceramic period (A.D. 400–700) projectile points as Rosegate points. Late Ceramic period (A.D. 700–1300) projectile points were mostly Cohonina points (n = 43, although Lyndon did not analyze all the available specimens, since Horn-Wilson had previously analyzed them). Also dating to this time period were 24 un-notched triangular points, 10 Kahorsho Serrated points, three Nawthis Side-notched points, two Parowan points, one basal- and side-notched point, and one Sitgreaves Serrated point.

The Cohonina made San Francisco Mountain Gray Ware pottery. The paste is sedimentary clay, tempered with fine quartz and feldspar sand, angular to subrounded, with some mica. The relatively thin pottery is ring-built (formed by adding thick coils to a base slab), scraped, and thinned using a paddle and anvil. Pottery types (Table 1) are Floyd Gray (A.D. 700–900), Floyd Black-on-gray (A.D. 700–900), Deadmans Gray (A.D. 775–1200), Deadmans Fugitive Red (A.D. 850–1150), Deadmans Black-on-gray (A.D. 900–1100), Kirkland Gray (undated), and Bill Williams Gray (undated). Ceramic compositional studies to date have not been successful in identifying production localities for San Francisco Mountain Gray Ware (Mills et al. 1993; Roberts 2001).

Fewer than 10 Cohonina graves have been excavated, but apparently the Cohonina practiced extended interment (USFS 1996:113).

A number of chronological sequences have been developed for the Cohonina. Colton (1939) defined three foci: Medicine Valley (A.D. 700–900), Coconino (A.D. 900–1120), and Hull (A.D. 1120–1200). Gladwin (1943) later used the term phases for Colton's foci, a practice followed by most archaeologists today (see, for example, Schwartz [1955], who added a Hermit phase [A.D. 600–700] to the beginning of the sequence). As mentioned above Horn-Wilson (1997) classified projectile points as Early Cohonina (A.D. 850–1000), late Cohonina (A.D. 1000–1075), and very late Cohonina (A.D. 1075–1200). The range of chronological sequences for the Cohonina led Cartledge (1986) to recommend that Cohonina archaeology needed no more chronological frameworks and cultural classifications, an idea seconded by Bair (1994:269). On the other hand, Brew (1946) long ago pointed that classifications are not an end in themselves and should always derive from the research goals of the classifier.

Protohistoric and Historic

After about A.D. 1300, the occupants of Grand Canyon region stopped living in farming villages, and the period from A.D. 1300 to the permanent colonization of the area by Euro-Americans (ca. A.D. 1850) is designated as the Protohistoric period. Pai (Hualapai and Havasupai) and Paiute use of the Grand Canyon region, which began after about A.D. 1300 (Bungart 1994a:103), was a hunting-and-gathering adaptation supplemented by agriculture (Ahlstrom et al. 1993:82). Although some locations were occupied year after year, dwellings were impermanent wickiups that were rebuilt each year. As mentioned above, the Pai manufactured Tizon Brown Ware; they also made a distinctive triangular projectile point with two notches on each side (Bungart 1994b:64, Figures 4r–t).

Euro-American knowledge of the region from the Grand Canyon south to the Mogollon Rim and Bill Williams River and from the San Francisco Peaks west to the Colorado River dates to 1604, when Juan de Oñate, the colonizer of New Mexico, traveled through the region on his way to California. Subsequently, additional Spanish explorers, American fur trappers, and U.S. military expeditions and surveyors investigated the area. In the late nineteenth century, the region became a major transcontinental transportation corridor and was soon colonized by miners, loggers, and ranchers.

In 1851, Lorenzo Sitgreaves conducted a survey to see whether the Zuni River provided a feasible route from Fort Defiance and Zuni Pueblo to the Colorado River at Camp Yuma. It was thought that the Zuni River flowed straight into the Colorado River south of the Grand Canyon, but, as Sitgreaves was soon to learn, the Zuni River was a tributary of the Little Colorado River (Wallace 1984:325–326). Guided by Antoine Leroux, Sitgreaves left Zuni on September 24, 1851, and traveled down the Zuni River to its confluence with the Little Colorado. The expedition followed the Little Colorado River to Grand Falls, then turned west, traversing the volcanic field north of the San Francisco Peaks. From Bill Williams Mountain, the Sitgreaves expedition continued west past present-day Ash Fork, Seligman, and Peach Springs, stopping for two days (October 30 and 31) at Truxton Springs (Camps 27 and 28). Arriving at the Colorado River near present-day Bullhead City, Sitgreaves traveled down its east bank to Camp Yuma (Sitgreaves 1853).

From July 1853 to March 1854, Amiel Weeks Whipple surveyed a railroad route from Fort Smith, Arkansas, to Los Angeles, California. Leaving Zuni Pueblo on November 23, 1853, Whipple and 116 men crossed the Puerco River and followed the Little Colorado River to Sunset Crossing, then headed west past the south side of the San Francisco Peaks through the upper Chino Valley to the Big Sandy River, which they followed south to its confluence with the Santa Maria River (Foreman 1941; Whipple 1854, 1856).

From 1857 to 1859, Edward Fitzgerald Beale made two round trips across northern Arizona, surveying the route for a wagon road. The Beale expeditions traveled pretty much the same route as Sitgreaves, skirting the northern headwaters of the tributaries of the Big Sandy River. On the first trip, in 1857, Beale famously brought along camels to test their suitability as pack animals in the deserts of the Southwest. Beale repeated his 1857 trip in 1858 and 1859, this time without camels. Along the way, he improved the road he had pioneered in 1857 (Beale 1858, 1860; Stacy 1970; Thompson 1983).

Nearby Bill Williams Mountain provides the city of Williams with its name, and is in honor of Bill Williams, an eccentric fur trapper who was killed by a group of Utes on March 14, 1848

(Trimble 2003:81). Two years later, on a map made for the Sitgreaves survey, the mountain and nearby river both bore the Bill Williams name for the first time.

The railroad arrived in Williams in 1877, spurring a period of prosperity and increased population based primarily on lumber and livestock. In the late 1930s, the arrival of U.S. Route 66 (Route 66) increased tourism to Williams. Williams thrived as a tourist hub through the 1950s and 1960s and continues to serve as the "Gateway to the Grand Canyon" (Barnes 1960:91).

H. A. CLARK MEMORIAL FIELD

Information on H. A. Clark Memorial Field is scant. There is no history of the airport property presented in the Airport Master Plan. As a result, the brief overview included herein has been pieced together from personal communication with Kyle Christiansen, Public Works Director for the City of Williams, a few sources found at the Northern Arizona University (NAU) Cline Library Special Collections and Archives, and Newspapers.com.

The earliest mention of the Williams Airport, which was known as Webber Aviation Field, was in 1925 when the Williams-Grand Canyon Chamber of Congress dedicated the local aviation field as Webber Field in honor of the late Lieutenant Webber (*Williams News* 1925). Mr. L. S. Williams, chairman of the Aeronautical Committee stated that a number of famous pilots with their planes would be present during the ceremony from Rockwell Field, San Diego, and from Fort Bliss, Texas ,and that Webber Field is one of the finest fields in the Southwest (*Williams News* 1925). The ceremony included aerial bombing at ground targets, racing of planes around Bill Williams Mountain, wing walking, parachute drops, and stunt flying. The next mention was in March 1927, and references when Lieutenant G. R. Pond landed a Continental Motor Company 10-passager Fokker plane at the airfield from Detroit on a leisurely flight westward, which included stops in Kansas City, Oklahoma City, and Santa Fe (*Arizona Republic* 1927). The plane stopped briefly at the Williams Airport for refueling prior to heading to the Grand Canyon. At the Grand Canyon, Lieutenant Pond and his passengers flew 200 to 300 miles up and down the canyon gorge before heading to Los Angeles and Redlands, California. During an official inspection of the rotary clubs in the 43rd District on November of 1927, the president of the Rotary Club (George Kimbell), along with District Governor Lloyd Henning, visited the Williams Airfield (*Williams News* 1927). President Kimbell announced that the Williams Airport was in excellent condition and that the speedway is over 3,000 feet long and 300 feet wide, sufficient for the largest planes to take off, and encouraged motorists to drive on the speedway to help pack it down. Shortly after the visit, Mr. Kimbell left for the Grand Canyon to notify Mr. Van Zandt with Scenic Airways that the Williams Airfield is ready for his use. Most notably, Colonel Charles A. Lindbergh had taken off from the Williams Airport on April 14 to test his new plane, which was comparatively unfamiliar. After a brief flight, he landed on an improvised landing field on the ranch of Mr. and Mrs. Oliver Morrow, obtained his luncheon, and then continued to fly to the Grand Canyon. Once at the Grand Canyon, Lindbergh was a guest of Scenic Airways and spent the night at El Tovar Hotel (*Arizona Republic* 1928).

Hubert Albert Clark and his wife Clara moved from Los Angeles to Williams, Arizona, in 1928, just before the Great Depression. Here, they operated a campground where Route 66 entered Williams at the railroad crossing. An underpass was constructed to facilitate traffic along Route 66 into Williams in 1932. It was at this time that Clark built the Grand Canyon Court and Station down the road on what is today East Bill Williams Avenue (also designated as Historic Route 66), which boasted a gas station and 42 cabins for tourists along the Mother Road (Sonderman 2010). The court and Mobile gas station were later operated by Harvey Gibbs, who demolished the cabins in the 1950s to make way for the Thunderbird Inn. Today, the site of Clark's famous camp is the Mountain Side Inn.

In the late 1930s, Clark became interested in aviation, and he bought his first airplane in 1937. As an avid aviation booster, Clark assisted in organizing the first local flying club and helped establish the local airport (NAU 2016). In July 1943, while flying home in a new Monocoupe plane he had just purchased in Texas, Clark died tragically in a crash. In 1992, the Williams Airport that Clark helped establish was named the H. A. Clark Memorial Field in his honor (NAU 2016:).

The original airport consisted of a dirt landing strip. It is unclear if the airstrip was used by the military during the war, but local lore tells of the U.S. Army initially using it to land some of its aircraft. This early landing strip was oriented northeast-southwest, and was later realigned (north-south) and extended to 6,000 feet in the early 1990s (personal communication, Kyle Christiansen, City of Williams, to Annie Lutes, SWCA Environmental Consultants, November 9, 2016). The original orientation of the landing strip, approximately 4,000 feet long, can be seen on the 1992 aerial photograph. When the runway was realigned, a new dirt-surfaced apron was constructed to accommodate the aircraft registered at the airport. In 1999, the 6,000-foot runway was rehabilitated and widened to 100 feet, and in 2002 the apron was expanded and paved (City of Williams 2007).

PREVIOUS RESEARCH

Archaeological Records Search

Before fieldwork, SWCA consulted the AZSITE database to identify previously conducted surveys and previously recorded sites in the project area and within a 1-mile radius of the project area. However, since the project area is surrounded by lands administered by KNF and data on previously conducted surveys and recorded sites are not readily available in AZSITE, SWCA contacted KNF to ascertain archival data on KNF lands. KNF provided data on previously conducted surveys and recorded sites within a 500-m (0.3-mile) radius of the project area.

The KNF records search showed that 11 archaeological projects have partially overlapped with the current survey area (Table 1; also see Appendix A) and that six surveys have been conducted within 0.3 mile of the project area. Approximately 11 percent of the project area has been previously surveyed as a result of the 11 surveys. These surveys were conducted by the KNF for residential developments, land exchanges, pipeline right-of-way and repairs, powerline improvements, cattle guard replacements, and airport expansion. The other six surveys conducted within 0.3 mile covered approximately 80 percent of the overall buffer area and were primarily block surveys for residential development and linear surveys for other infrastructure projects. The AZSITE database depicted two projects that partially overlap with the current project area. Both surveys were conducted along the pipelines in the southern portion of the project area.

No archaeological sites are identified in AZSITE or in the KNF data within the project area. According to the KNF data, 11 sites have been documented within 0.3 mile of the project area. These sites consist of seven prehistoric artifact scatters and four historic-era Euro-American trash scatters. Five of the sites correlate to resources depicted within the AZSITE database. According the AZSITE data and a visit to the Archaeological Records Office at the Arizona State Museum (ASM), an additional 10 sites have been documented within a 1-mile radius. These sites are prehistoric manifestations consisting of artifact scatters.

Table 1. Previously Conducted Archaeological Surveys within the Project Area

Agency Number	Project Name	Report Reference
1990-221.ASM / SHPO-2010-1086	EPNG San Juan Pipeline Expansion	Dosh and Dechambre (1991)
R-1975-030-70-0001	Archaeological Investigations for Two Cathodic Protection Stations	KNF GIS Data—conducted by KNF
R-1980-030-70-0042	Pine Creek Range Development Phase III	KNF GIS Data—conducted by KNF
R-1980-030-70-0057	Four Cattle Guard Replacements	KNF GIS Data—conducted by KNF
R-1989-030-70-0037 / A-75.MNA	El Paso Natural Gas Pipeline Survey	KNF GIS Data—conducted by KNF
R-1991-030-70-0075	EPNG Site Eligibility Determinations	KNF GIS Data—conducted by KNF
R-1995-030-70-0019	APS Overhead Powerline Pole Replacement	KNF GIS Data—conducted by KNF
R-1996-030-70-0100	Williams Airport Expansion	KNF GIS Data—conducted by KNF
R-2006-030-70-0097	Northern Arizona Land Exchange	KNF GIS Data—conducted by KNF
R-2014-030-70-0022	ThreeMile Lake and Horse Lake Fence Inventory	KNF GIS Data—conducted by KNF
R-2017-030-70-0008	Hardy Hill and 3 Sisters Cultural Inventory	KNF GIS Data—conducted by KNF

National Register of Historic Places–Listed Properties

The National Park Service's NRHP database was searched to identify properties listed in the NRHP that are located in or within 1 mile of the project area. No NRHP-listed properties were identified within the search area. The NRHP-listed property nearest the project area is the Williams Historic Business District, which is approximately 3 miles south of the project area.

Historical Map Research

In addition to the AZSITE database, General Land Office (GLO) maps were also consulted for the project area. The GLO map of Township 22 North, Range 2 East, filed in 1884, does not show any cultural features, such as historical structures, farm fields, ranches, roads, or other facilities, in the immediate vicinity of the project area. However, a cabin is depicted approximately 0.5 mile east of the project area in Section 4.

The 1922 USGS Williams, AZ, 1 × 2–degree map was also consulted. The map does not depict any features within the project area. In addition, the 1960 USGS Williams, AZ, 15-minute quadrangle depicts the Williams Airport in Sections 8 and 9. Historical aerial photographs found online (National Environmental Title Research, LLC 2020) were also consulted to identify any historic-era properties that were present and may still be present in the search area. Because of airport expansion and realignment during the 1990s, the aerials and maps did not depict any historic-era properties within the current project area.

SURVEY METHODS

Resource Definitions

Archaeological resources were evaluated according to criteria established by the ASM. The criteria recognize two classes of archaeological remains: the site and the IO. The archaeological site is defined under rules adopted for the administration of the Arizona Antiquities Act:

> "Archaeological site" means any area with material remains of past Indian or non-Indian life or activities that are of archaeological interest, including without limitation, historic or prehistoric ruins, burial grounds, and inscriptions made by human agency. (Arizona Antiquities Act, Arizona Revised Statutes 41-841, *et seq.*, Chapter 8-201, A.3)
>
> As interpreted by the ASM, "remains of archaeological interest" may include "purposeful constructions" or simply concentrations of materials more than 50 years old. Additionally, sites should consist of at least one of the following:
>
> 30+ artifacts of a single class (i.e., 30 sherds, 30 tin cans) within an area 15 meters (50 feet) in diameter, except when all pieces appear to originate from a single source (i.e., one ceramic pot, one core, one glass bottle);
>
> 20+ artifacts which include at least 2 classes of artifact types (i.e., sherds, groundstone, nails, glass) within an area 15 meters (50 feet) in diameter:
>
> One or more archaeological features in temporal association with any number of artifacts;
>
> Two or more temporally associated archaeological features without artifacts.
>
> Non-linear, isolated features without associated artifacts may be recorded at the discretion of the archaeologists. An "isolated feature" is defined as a feature that does not have any other features within a 100 meter (325 feet) diameter. This might include isolated rock piles. mine shafts, prospecting pits or unidentified depressions without associated artifact associations. (ASM 1995)

An archaeological occurrence meeting these minimum criteria is recorded as a site. An occurrence not meeting these criteria is generally classified as an IO, although under exceptional circumstances an occurrence may be judgmentally classified as a site.

Survey Coverage

SWCA archaeologists Teodoro Eldridge and Samuel Stapleton surveyed the project area between September 9 and September 12, 2020, resulting in a total of eight person–field days. General conditions for the survey were excellent, and ground visibility was generally 85 percent.

The survey was conducted using standard archaeological techniques following ASM guidelines for survey coverage and site recording methodologies. According to the standards for pedestrian survey established by the ASM, a person conducting a pedestrian survey can achieve 100 percent coverage of a parcel by walking a series of systematic transects spaced no more than 20 m (66 feet) apart. The systematic pedestrian survey involved transects spaced no more than 20 m (66 feet) apart on 258 acres, and judgmental survey within the 45-acre developed portion of the airport, excluding existing airport facilities, runways, taxiways, aprons, drainage features, and parking lots. The judgmental survey focused on those areas that were either not paved, built upon, or highly disturbed.

The archaeologists sought evidence for cultural resources in the form of artifacts (e.g., ceramics, lithics, historical metals, or glass) or features (concentrations of fire-affected rock, charcoal-stained soil, prehistoric or historical structures, or other cultural anomalies). In addition to searching for archaeological remains, the archaeologists included in their survey in-use properties (e.g., buildings, roads, corrals) greater than 50 years old.

Archaeological remains designated as IOs were point-located and recorded using a handheld GPS unit. When culturally diagnostic or unusual items comprised IOs, they were photographed.

National and Arizona Registers Criteria for Evaluation

Four criteria are applied in the evaluation of cultural properties for inclusion in the NRHP (36 Code of Federal Regulations 60.4). The same criteria are used to evaluate properties for inclusion in the Arizona Register of Historic Places (ARHP) (Arizona Administrative Code Section R12-8-302). Normally, a significant property must be at least 50 years old and meet at least one of these four criteria to be considered eligible for listing in the NRHP/ARHP. According to the NRHP/ARHP criteria, the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or that are associated with the lives of persons significant in our past; or

B. that embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguished entity whose components may lack individual distinction; or

C. that have yielded, or may be likely to yield, information important in prehistory or history.

SURVEY FINDINGS

The survey of the project area resulted in identification of five IOs and three historic structures consisting of the in-use EPNG Lines 1200, 1201, and 1204 (Figure 4). No new or previously recorded archaeological sites or historic-era buildings, structures, or objects were found. Four IOs are prehistoric manifestations and one IO is a historic-era manifestation (Table 2).

EPNG Lines 1200, 1201, and 1204

EPNG Lines 1200, 1201, and 1204 are part of the San Juan Mainline pipeline system. From EPNG's beginning through World War II, all gas transmitted through its mainline pipeline system came from the Permian Basin. As the 1940s drew to a close, however, EPNG officials, through their new Western Natural Gas Company, explored other sources to meet growing demand for natural gas in the Southwest, as well as central and northern California (Steely and Newsome 2008). The gas-rich San Juan Basin of northwestern New Mexico, discovered in the 1910s and a major oil producer since the 1920s, offered attractive benefits as the company's next major expansion project. In 1949, the Federal Power Commission (FPC) increased EPNG's California allocation to 250 million cubic feet (cf)/day and authorized the company's mainline pipelines to transmit 901 million cf/day (*The Pipeliner* 1953:15). In September of that year, ENPG began construction of "San Juan Mainline" Nos. 1200 and 1201, parallel 24-inch mainline pipelines that stretched some 450 miles from the San Juan Basin near Farmington, New Mexico, across northern Arizona to the Colorado River and California border at Topock, Arizona. Collectively, the new northern and central Arizona lines supplied Pacific Gas & Electric for the San Francisco Bay area and northern California with some 300 million cf of San Juan Basin and Permian Basin gas per day.

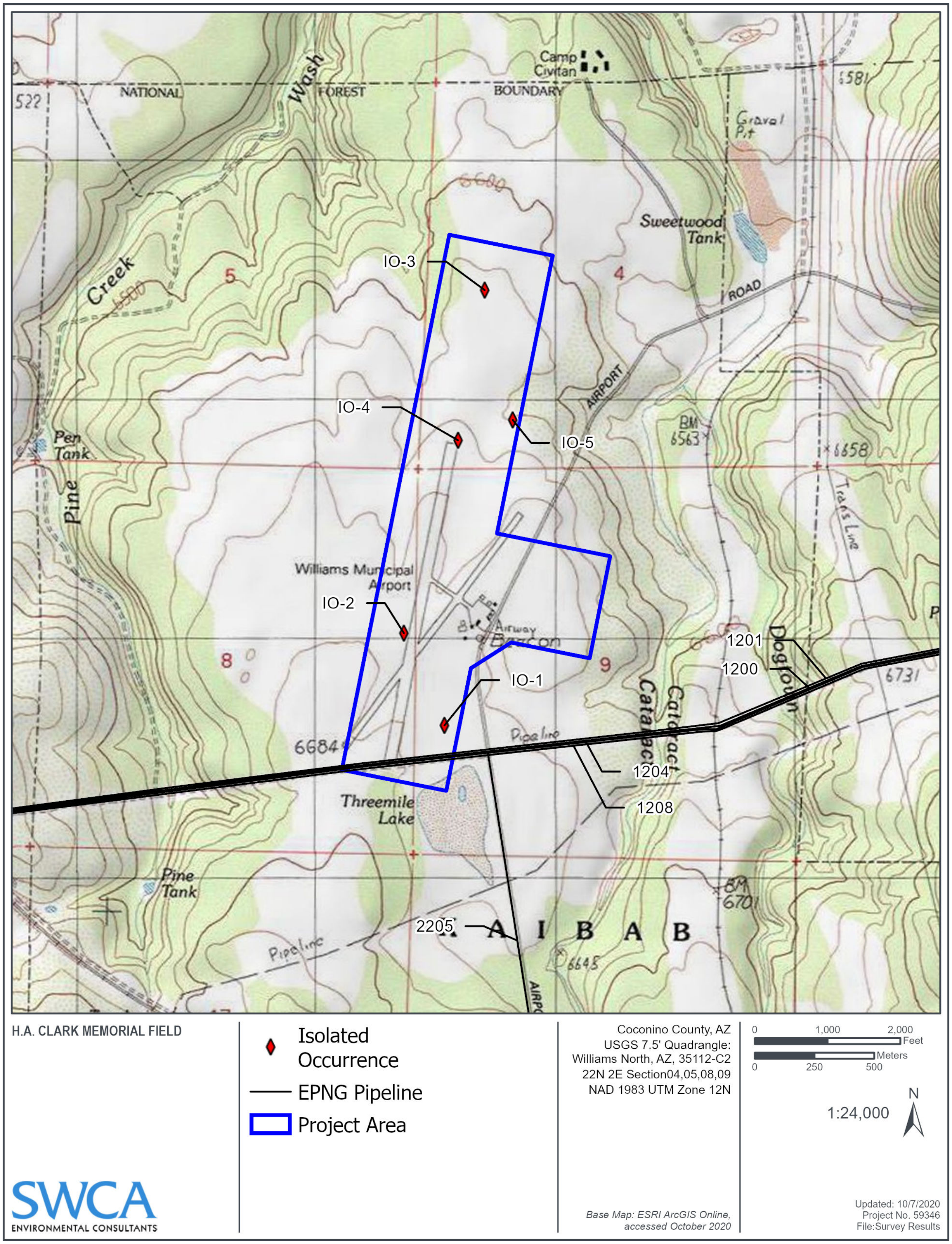

Figure 4. Results of current survey.

EPNG Line 1200 (San Juan Line or Line from San Juan Plant to Franconia Junction) is a 24-inch-diameter pipe that was constructed in 1950. EPNG Line 1201 (San Juan First Loop, or First Loop Line from San Juan Plant to Franconia Junction) is a 30-inch-diameter pipe constructed in 1951. EPNG Line 1204 (San Juan Second Loop Line, or Second Loop Line from San Juan Plant to Franconia Junction) is a 34-inch-diameter pipe that was constructed in 1956. EPNG Line 1208 (San Juan Third Loop Line from Gallup Station to Topock) is a 36-inch-diameter pipe constructed in 1992.

EPNG Lines 1200, 1201, and 1204 have been the subject of numerous upgrades since their original construction. The pipeline route is evident aboveground only by the presence of yellow locator signs. No aboveground facilities are present in the project area. A brief history of the construction of EPNG Line 1007 and historical photographs from its construction are included in *Machine in the Garden: El Paso Natural Gas Company's Mainline Pipelines through the Desert Southwest* (Steely and Newsome 2008), which is the historic context of Pipeline Operations of El Paso Natural Gas in New Mexico, Texas, and Arizona, 1928–1956, and which contains the Advisory Council on Historic Preservation's recommended documentation for mitigating the adverse effects from the abandonment of NRHP-eligible natural gas mainline pipeline systems.

ISOLATED OCCURRENCES

Five IOs were identified during the survey (see Figure 4; Table 2). Four of the IOs are prehistoric manifestations and consist of flaked stone artifacts. One IO is a historic-era manifestation and consists of a single sun-colored amethyst bottle fragment.

Table 2. Isolated Occurrences

IO No.	IO Description	Area of Dispersal	Easting*	Northing*
1	One chert cortical flake, one fine-grained basalt non-cortical flake, and one nearly complete fine-grained basalt corner-notched projectile point (possibly Elko).	3 × 3 m	391481	3906823
2	One sun-colored amethyst bottle fragment.	—	391311	3907209
3	One cortical basalt flake, one cortical obsidian flake, and one tested obsidian cobble.	10 × 10 m	391311	3908645
4	Five obsidian cortical flakes and one tested obsidian cobble.	7 × 7 m	391538	3908017
5	Eleven obsidian non-cortical flakes and five obsidian cortical flakes.	20 × 20 m	391767	3908102

* UTM coordinates (NAD 83), Zone 12

SUMMARY AND MANAGEMENT RECOMMENDATIONS

The cultural resources survey of the project area resulted in the recording of five IOs and three historic-era in-use structures. No new or previously recorded archaeological sites or historic-era buildings, structures, or objects were found. The project area is not within a historic district. No properties listed in or eligible for listing in the NRHP are within the APE.

Four of the IOs are prehistoric manifestations and consist of flaked stone debitage, a nearly completed corner-notched projectile point, and a tested cobble. One IO is a historic-era sun-colored amethyst bottle fragment. The IOs are ineligible for the NRHP. Although the airport started as a northeast-southwest–aligned dirt strip in the early 1940s, possibly in response to World War II, the current airport facilities reflect expansion that began in the 1990s, which included realignment, lengthening, and widening of the runway and construction of airport facilities, aprons, taxiways, and parking lots. As such, there are no airport-related historic-era buildings or structures in the project area.

The southern portion of the airport property is partially bisected by four in-use pipelines (EPNG Lines 1200, 1201, 1204, and 1208) owned and operated by EPNG, a subsidiary of Kinder Morgan, Incorporated. Three of these pipelines are more than 50 years old: EPNG Lines 1200, 1201, and 1204. As in-use historic-era natural gas pipelines, they are exempt from Section 106 review in accordance with a notice from the Advisory Council on Historic Preservation (*Federal Register* 67[66]:16364–16365).

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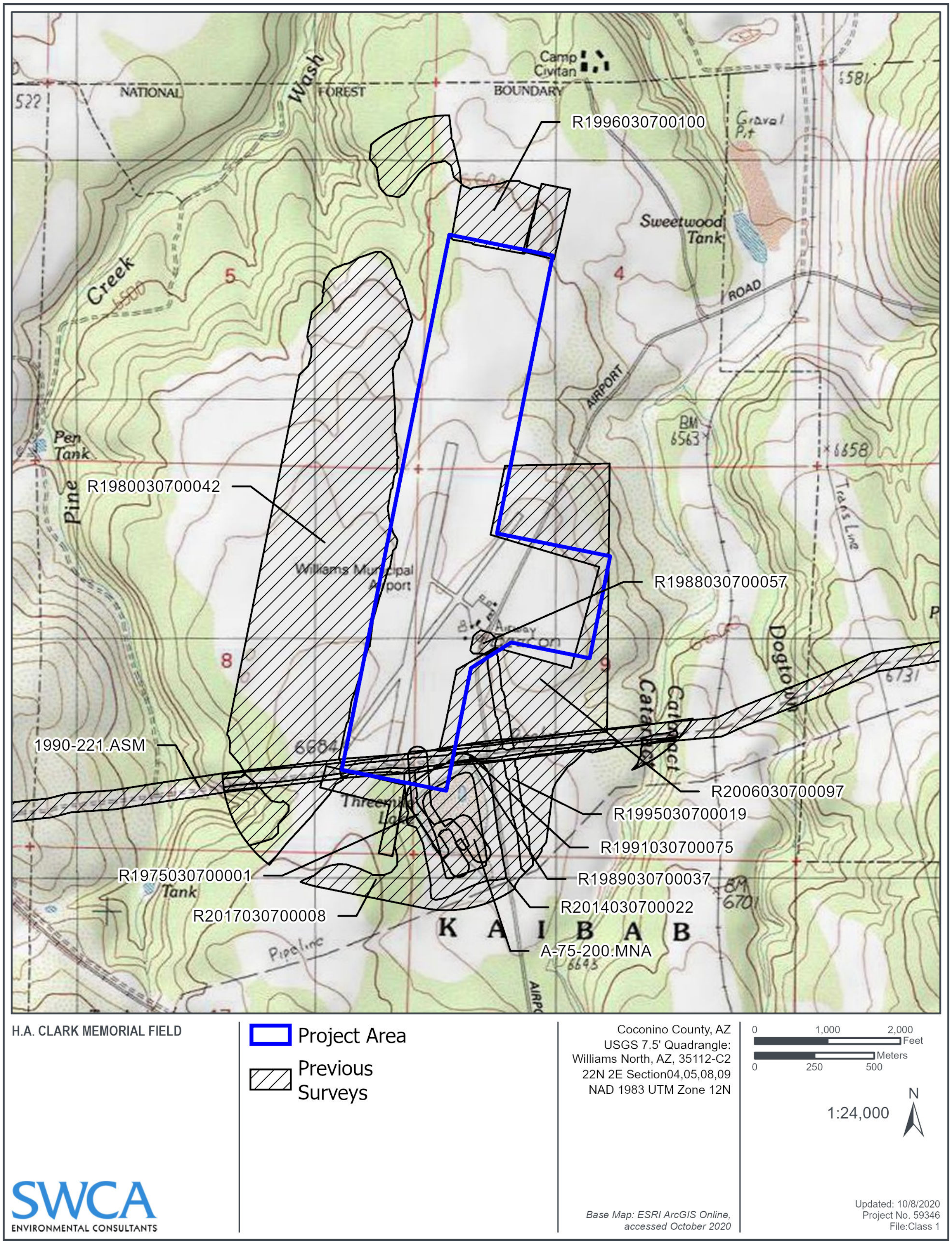
APPENDIX A

Previous Research Map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Creek
ROAD
AIRPORT
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Dogtown
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Pipeline
H.A. CLARK MEMORIAL FIELD
Project Area
Previous Surveys
Coconino County, AZ
USGS 7.5' Quadrangle:
Williams North, AZ, 35112-C2
22N 2E Section04,05,08,09
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SWCA ENVIRONMENTAL CONSULTANTS
Base Map: ESRI ArcGIS Online, accessed October 2020
Updated: 10/8/2020
Project No. 59346
File:Class 1

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Technical Memorandum

To: Matt Quick
Environmental Planner
Coffman Associates
4835 East Cactus Road, Suite 235
Scottsdale, Arizona 85254

From: Tyler Loomis, SWCA Environmental Consultants

Date: September 24, 2020

Re: **Biological Evaluation for the H.A. Clark Memorial Field Airport Master Plan in Williams, Coconino County, Arizona / SWCA Project No. 59346**

INTRODUCTION

This biological evaluation is in support of the H.A. Clark Memorial Field Airport (airport) Master Plan. The airport project area, which totals approximately 303 acres, is located north of the town of Williams and west of State Route 64 in Coconino County, Arizona. The project area is in Section 4, Township 22 North, Range 2 East, Gila and Salt River Baseline and Meridian (Figures 1 and 2). SWCA Environmental Consultants (SWCA) has prepared this technical memorandum to document our efforts to identify the presence of any federally listed species or critical habitats protected under the Endangered Species Act of 1973 (16 United States Code [USC] 1531 et seq.) (ESA) within the project area to determine if future development activities would have the potential to effect such species or critical habitats.

METHODS

SWCA biologist Corina Anderson visited the project area on September 10, 2020, to collect data necessary to complete this biological evaluation. A U.S. Geological Survey 7.5-minute quadrangle (*Williams North, Arizona*) and a map provided by Coffman Associates were used for general orientation and to locate the project boundaries. The site visit consisted of a pedestrian survey of the project area to evaluate vegetation and landscape features considered important to the potential occurrence of special-status plant and animal species. This site visit did not include any species-specific surveys or any systematic surveys for protected biological components, such as birds' nests and vegetation densities. Vegetation was classified to the community level according to the "map" *Biotic Communities of the Southwest* (Brown 1994). The Natural Resources Conservation Service PLANTS database was used for plant naming conventions (Natural Resources Conservation Service 2020). Federally listed species are referred to by the nomenclature used by the U.S. Fish and Wildlife Service (USFWS) for listing.

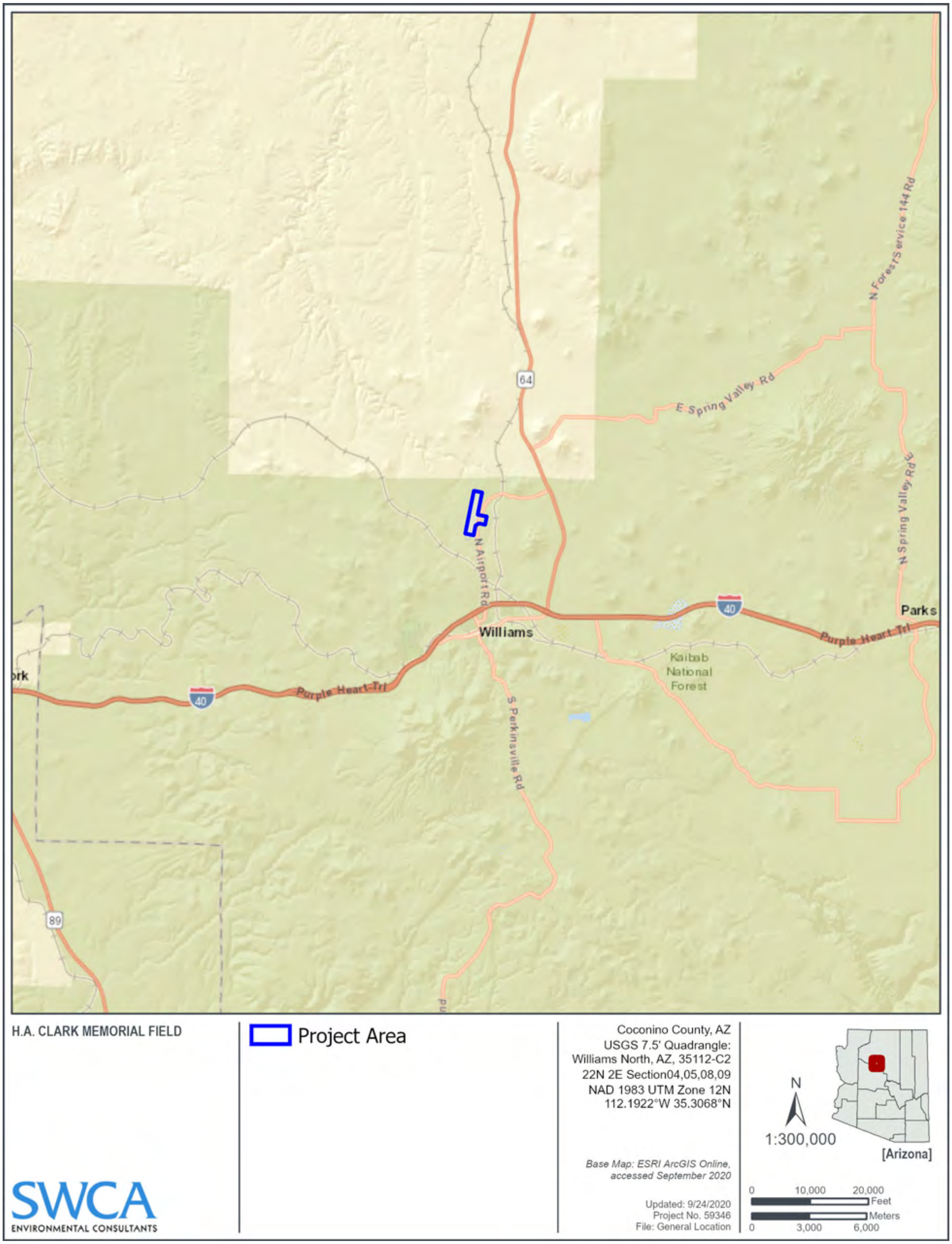

Figure 1. General location of the project area.

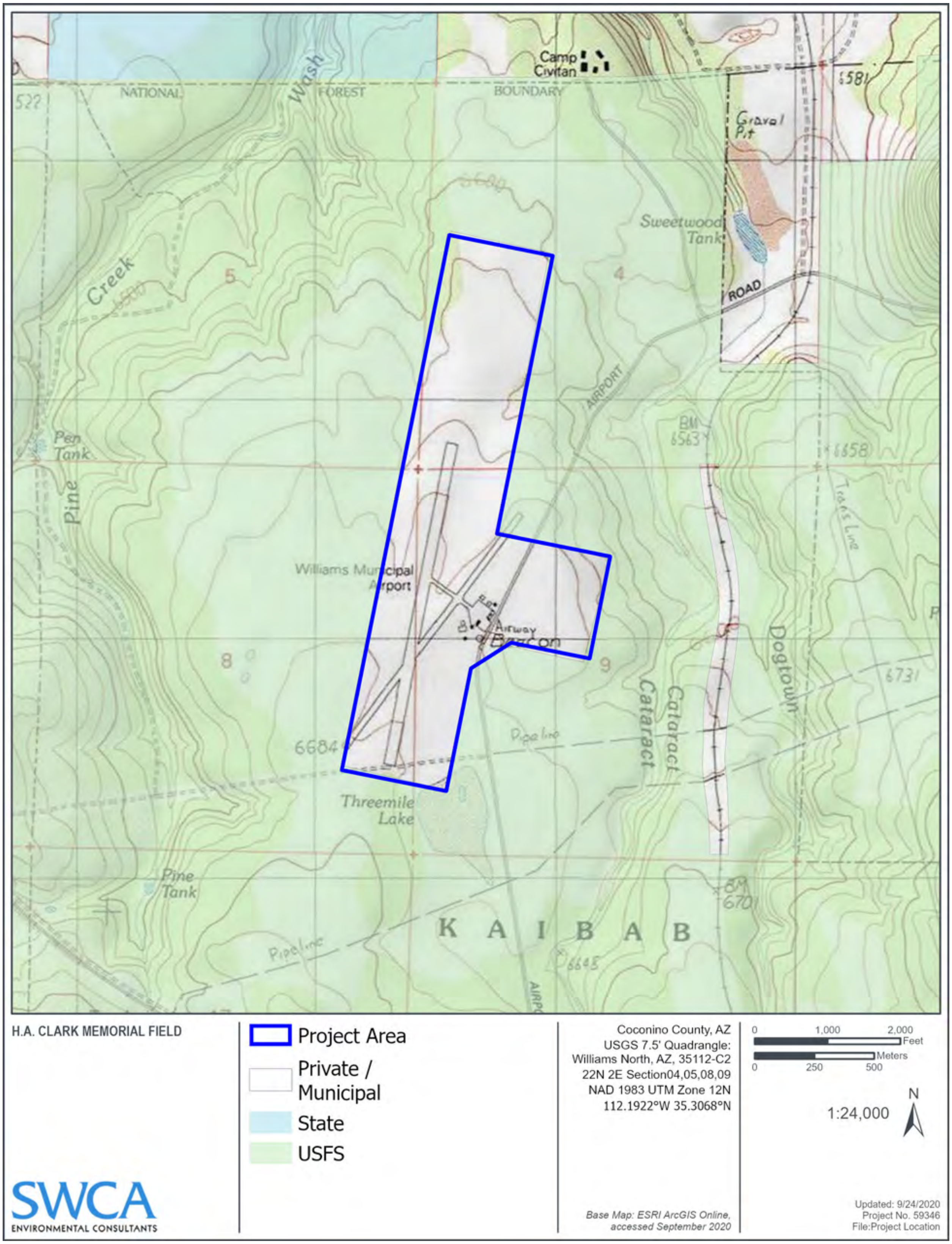

Figure 2. Project area location.

ECOLOGICAL OVERVIEW

The project area is located about 2.5 miles north of Interstate 40 on the Colorado Plateau (Google Earth 2020). The project area has very little topographic relief and no intermittent or perennial surface water features, ridges, or other prominent landforms. On the southern end of the project area lies Threemile Lake, a seasonal lake that lacks riparian vegetation and likely only contains water after a rainfall event or during the spring snowmelt runoff. The project area elevation is approximately 6,680 feet (2,036 meters) above mean sea level.

The project area lies within the Petran Montane Conifer Forest biotic community (Brown 1994); however, the project area has been disturbed by airport construction, and the vegetation present is primarily annual and perennial grasses, forbs, and low-growing shrubs. Commonly observed plant species include bunch grasses that have been maintained and mowed (Figure 3).

Figure 3. Overview of project area, facing north.

No broadleaf deciduous riparian vegetation communities (i.e., communities containing cottonwood [*Populus* spp.], willow [*Salix* spp.], ash [*Fraxinus* spp.], etc.) or suitable bat roost sites (e.g., natural caves or mine features) occur in the project area.

Native plant species observed during the site visit include slender squirreltail (*Elymus elymoides*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), purple threeawn, (*Aristida purpurea*), slender wheatgrass (*Elymus trachycaulus*), quackgrass (*Elymus x pseudorepens*), false boneset (*Brickellia eupatorioides*), broom snakeweed (*Gutierrezia sarothrae*), curlycup gumweed (*Grindelia squarrosa*), gray globemallow (*Sphaeralcea incana*), common sunflower (*Helianthus annuus*), prairie sagewort (*Artemisia frigida*), Wheeler's thistle (*Cirsium wheeleri*), horsetail milkweed (*Asclepias subverticillata*), flatspine bur ragweed (*Ambrosia acanthicarpa*), southwestern cosmos (*Cosmos parviflorus*), rubber rabbitbrush (*Ericameria nauseosa*), spineless horsebrush (*Tetradymia canescens*), cactus apple (*Opuntia engelmannii*), ponderosa pine (*Pinus ponderosa*), twoneedle pinyon (*Pinus edulis*), oneseed juniper (*Juniperus monosperma*), and Fremont's mahonia (*Mahonia fremontii*). No plant species protected under the Arizona Native Plant Law (Arizona Revised Statutes 3-904) as administered by the Arizona Department of Agriculture (ADA) were found during the site visit; more information regarding this state regulation can be found on the ADA's *Protected Native Plants by Category* website (ADA 2015)

Non-native plant species observed during the site visit include sweetclover (*Melilotus officinalis*), horehound (*Marrubium vulgare*), redstem stork's bill (*Marrubium vulgare*), cheatgrass (*Bromus tectorum*), common mullein (*Verbascum thapsus*), common mallow (*Malva neglecta*), prostrate knotweed (*Polygonum aviculare*), puncturevine (*Tribulus terrestris*), and field bindweed (*Convolvulus arvensis*). Of these non-native species, puncturevine and field bindweed are listed as noxious weeds by the ADA under Arizona Administrative Code R3-4-245. More information is available on the ADA's Plant Services Division website (ADA 2020).

WILDLIFE

Sixteen avian species were documented within the project area during the site visit: house finch (*Haemorhous mexicanus*), western bluebird (*Sialia mexicana*), mountain bluebird (*S. currucoides*), lesser goldfinch (*Spinus psaltria*), Brewer's sparrow (*Spizella breweri*), chipping sparrow (*S. passerina*), common raven (*Corvus corax*), vesper sparrow (*Pooecetes gramineus*), blue-gray gnatcatcher (*Polioptila caerulea*), red-tailed hawk (*Buteo jamaicensis*), barn swallow (*Hirundo rustica*), turkey vulture (*Cathartes aura*), western meadowlark (*Sturnella neglecta*), northern rough-winged swallow (*Stelgidopteryx serripennis*), mountain chickadee (*Poecile gambeli*), and Say's phoebe (*Sayornis saya*). All avian species observed in the project area are protected under the Migratory Bird Treaty Act (16 USC 703–712) (MBTA), which provides federal protection to all migratory birds, including nests and eggs. In order to relocate or alter any MBTA-protected nests, it would be necessary to obtain a permit from the USFWS to maintain compliance with the MBTA. However, Section 1 of the Interim Empty Nest Policy of the USFWS, Region 2, states that if the nest is completely inactive at the time of destruction or movement, a permit is not required to comply with the MBTA. If an active nest is observed before or during construction, measures should be taken to protect the nest from destruction and to avoid a violation of the MBTA.

No active bird nests were found in the project area during the site visit. Small mammal burrows were found in the project area during the site visit. Other wildlife or sign of wildlife observed in the project area during the site visit included Gunnison's prairie dog (*Cynomys gunnisoni*), desert cottontail (*Sylvilagus audubonii*), Botta's pocket gopher (*Thomomys bottae*), and woodrat (*Neotoma* spp.).

FEDERALLY LISTED SPECIES

The USFWS maintains a list of protected species and the critical habitat that are known to occur in each Arizona County. SWCA accessed the USFWS Information for Planning and Consultation (IPaC) online database (USFWS 2020a) to obtain information on federally listed species that may occur in Coconino County (Appendix A). These species are currently listed or are proposed for listing as endangered or threatened under the ESA, or are considered non-essential experimental population (NEP) species. The list also includes candidate species for proposal as threatened or endangered. The ESA specifically prohibits the "take" of a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct."

Species Evaluation

The potential for occurrence of each species was summarized according to the categories listed below. Because not all species are accommodated precisely by a given category (i.e., category definitions may be too restrictive), an expanded rationale for each category assignment is provided. Potential for occurrence categories are as follows.

- *Known to occur*—the species has been documented in the project area by a reliable observer.
- *May occur*—the project area is within the species' currently known range, and vegetation communities, soils, etc., resemble those known to be used by the species.
- *Unlikely to occur*—the project area is within the species' currently known range, but vegetation communities, soils, etc., do not resemble those known to be used by the species, or the project area is clearly outside the species' currently known range.

Those species listed by the USFWS were assigned to one of three categories of possible effect, following USFWS recommendations. The effects determinations recommended by USFWS are as follows.

- *May affect, is likely to adversely affect*—the proposed project is likely to adversely affect a species if 1) the species occurs or may occur in the project area and 2) any adverse effect on listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. In the event that the overall effect of the proposed action is beneficial to the listed species but also is likely to cause some adverse effects, the proposed action "is likely to adversely affect" the listed species.
- *May affect, is not likely to adversely affect*—the project is not likely to adversely affect a species if 1) the species may occur but its presence has not been documented and/or surveys following approved protocol have been conducted with negative results, and/or 2) project activity effects on a listed species are expected to be discountable, insignificant, or completely beneficial.
- **Beneficial effects** are contemporaneous positive effects without any adverse effects on the species. **Insignificant effects** relate to the size of the impact and should never reach the scale where take occurs. **Discountable effects** are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects, or 2) expect discountable effects to occur.
- *No effect*—the project will have no effect on a species if 1) it has no likelihood of effect on a listed species or its designated critical habitat (including effects that may be beneficial, insignificant, or discountable), or 2) the species' habitat does not occur in the project area.

None of the 27 species listed by the USFWS as endangered, threatened, or non-essential experimental population for Coconino County are likely to occur in the project area. The project area is clearly beyond the known geographic or elevational range of these species, or it does not contain vegetation or landscape features known to support these species, or both. Habitat requirements, potential for occurrence, and possible effects of the project for these 27 species are summarized in Table 1.

Table 1. Federally Listed Species Potentially Occurring in Coconino County, Arizona

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Apache trout (*Oncorhynchus apache*)	T	Occurs in small, cold, high-gradient streams through mixed-conifer forests and mountain meadows.	Unlikely to occur. There is no aquatic habitat in the project area.	No effect.
Black-footed ferret (*Mustela nigripes*)	E/NEP	Found in grassland plains on mountain basins in association with prairie dogs (*Cynomys* sp.).	Unlikely to occur. There are no reintroduced populations of black-footed ferrets in or near the project area.	No effect.
Brady pincushion cactus (*Pediocactus bradyi*)	E	Grows on benches and terraces at 3,850–4,500 feet above mean sea level (amsl) in the Navajoan Desert near Marble Gorge in a substrate of Kaibab limestone chips overlying soil derived from Moenkopi shale and sandstone outcrops.	Unlikely to occur. The project area is outside the elevational and known geographic range for this species and does not contain suitable habitat parameters.	No effect.
California condor (*Gymnogyps californianus*)	E/NEP	Nesting sites are in caves, crevices, and potholes in isolated regions of the Southwest. Condors forage for carrion along flight routes generally following over foothills and mountains. The USFWS began reintroducing an experimental, nonessential population of California condors into northern Arizona and southern Utah in 1996. These condors are generally found in, or in the vicinity of, Grand Canyon National Park, the Kaibab Plateau, the Vermilion Cliffs, and Zion National Park.	Unlikely to occur. The project area is within the 10(j) area where reintroductions have occurred. Currently, condors are mostly observed below Glen Canyon Dam, west of the project area (NPS 2018). The species could potentially fly over the airport in search of carrion. However, with the active wildlife management and maintenance activities of the airport, it is unlikely that carrion that would attract condors occurs on the airport. There are no suitable nesting sites for this species in the project area.	No effect.
Chiricahua leopard frog (*Rana chiricahuensis*)	T	Found in springs, livestock tanks, and streams in the upper portions of watersheds at elevations of 3,281–8,890 feet amsl.	Unlikely to occur. There is no aquatic habitat present in the project area.	No effect.
Colorado pikeminnow (*Ptychocheilus lucius*)	NEP	Occurs in rivers with high silt content, warm water, turbulence, and varied flow by season under 4,000 feet amsl.	Unlikely to occur. There are no permanent aquatic habitats within the project area, which is also outside the elevational range for this species.	No effect.
Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*)	E	Occurs on gravelly limestone or gravelly loam in desert scrub at elevations between 4,300 and 5,450 feet amsl. Known only from the vicinity of Gray Mountain in Coconino County and north and west to the Arizona Strip in Coconino and Mohave Counties. It may also occur near Joseph City in Navajo County.	Unlikely to occur. The project area is outside the elevational and known geographic range for this species and does not contain suitable habitat parameters.	No effect.
Gila chub (*Gila intermedia*)	E	Inhabits smaller streams, cienegas, and artificial impoundments ranging in elevation from 2,000 to 5,500 feet amsl.	Unlikely to occur. There are no permanent aquatic habitats within the project area, which is also outside the elevational range for this species.	No effect.
Gila trout (*Oncorhynchus gilae*)	T	Found in small, high mountain streams at elevations of approximately 5,000–10,000 feet amsl.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Humpback chub (*Gila cypha*)	E	Occurs at elevations generally below 4,000 feet amsl in a variety of riverine habitats, especially canyon areas with fast currents, deep pools, and boulder habitat. In Arizona, it occurs in the Grand Canyon and Marble Canyon portions of the mainstem Colorado and lower Little Colorado Rivers.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.
Kanab ambersnail (*Oxyloma haydeni kanabensis*)	E	Found in semiaquatic vegetation watered by springs or seeps at the base of sandstone or limestone cliffs at an elevation of approximately 2,900 feet amsl. It requires either shallow standing water or a perennially wet soil surface. Grass or sedge cover is also necessary.	Unlikely to occur. There is no aquatic habitat present in the project area.	No effect.
Little Colorado spinedace (*Lepidomeda vittata*)	T	Inhabits streams and is found in pools with water flowing over fine gravel or silt-mud substrates. Found in East Clear Creek and its tributaries, Chevlon, Silver, and Nutrioso Creeks; and the Little Colorado River.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.
Loach minnow (*Tiaroga cobitis*)	E	This species is a bottom dweller found in small to large perennial creeks and rivers, typically in shallow, turbulent riffles with cobble substrate, swift currents, and filamentous algae. Found at elevations below 8,000 feet amsl.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.
Mexican spotted owl (*Strix occidentalis lucida*)	T	Found in mature montane forests and woodlands and steep, shady, wooded canyons. Can also be found in mixed-conifer and pine (*Pinus* spp.)-oak (*Quercus* spp.) vegetation types. Generally, nests in older forests of mixed conifers or ponderosa pine (*Pinus ponderosa*)–Gambel oak (*Quercus gambelii*). Nests in live trees on natural platforms (e.g., dwarf mistletoe [*Arceuthobium* spp.] brooms), snags, and canyon walls at elevations between 4,100 and 9,000 feet amsl.	Unlikely to occur. The project area does not contain suitable habitat parameters of older forests or canyon walls necessary for this species. The closest designated critical habitat is about 5 miles south of the project area, south of Interstate 40, in unit UGM-13.	No effect.
Mexican wolf (*Canis lupus baileyi*)	E	Inhabits oak and pine-juniper (*Juniperus* spp.) savannas in foothills and mixed-conifer woodlands at elevations above 4,000 feet amsl.	Unlikely to occur. The project area lacks suitable habitat parameters for this species.	No effect.
Navajo sedge (*Carex specuicola*)	T	Occurs at seep springs on vertical cliffs of pink-red Navajo sandstone at elevations of 5,700–6,000 feet amsl.	Unlikely to occur. The project area is outside the elevational and known geographic range for this species and does not contain suitable habitat parameters.	No effect.

Common Name (Species Name)	**Status***	**Range or Habitat Requirements**	**Potential for Occurrence in Project Area**	**Determination of Effect**
Northern Mexican gartersnake (*Thamnophis eques megalops*)	T	This species is most abundant at elevations between 3,000 and 5,000 feet amsl in densely vegetated habitat surrounding cienegas, streams, and stock tanks, in or near water along streams in valley floors and generally open areas but not in steep mountain canyon stream habitat (Rosen and Schwalbe 1988). Considered extant in fragmented populations within the middle to upper Verde River drainage, middle to lower Tonto Creek, Cienega Creek, and a small number of isolated wetland habitats elsewhere in southeastern Arizona.	Unlikely to occur. There are no permanent aquatic habitats in the project area, and the project area is outside the known geographic range of this species.	No effect.
Razorback sucker (*Xyrauchen texanus*)	E	Found in backwaters, flooded bottomlands, pools, side channels, and other slower-moving habitats at elevations below 6,000 feet amsl. In Arizona, populations are restricted to Lake Mohave and Lake Mead and the lower Colorado River below Lake Havasu in the Lower Basin. In the Upper Basin, small remnant populations are found in the Green, Yampa, and mainstem Colorado Rivers.	Unlikely to occur. There are no permanent aquatic habitats in the project area.	No effect.
San Francisco Peaks ragwort (*Packera franciscana*)	T	Alpine tundra above southwestern spruce (*Picea* spp.)-fir (*Abies* spp.) or bristlecone pine (*Pinus aristata*) forests on talus slopes at elevations above 10,900 feet amsl.	Unlikely to occur. The project area is outside the elevational and known geographic range for this species and does not contain suitable habitat parameters.	No effect.
Sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophylax*)	E	Grows on a white layer of Kaibab limestone with little (less than 0.5 inch) or no soil, in an unshaded opening in the piñon-juniper-cliffrose plant community at elevations above 4,000 feet amsl.	Unlikely to occur. The project area is outside the known geographic range for this species and does not contain suitable habitat parameters.	No effect.
Siler pincushion cactus (*Pediocactus [=Echinocactus, =Utahia] sileri*)	T	Found in red or gray gypsiferous badlands and sandy soil high in soluble salts derived from the Moenkopi Formation at elevations between 2,800 and 5,400 feet amsl. In Arizona, occurs at Fort Pierce, Lost Spring Mountain, and Yellowstone and Shinarump Mesas.	Unlikely to occur. The project area is outside the known geographic range of this species.	No effect.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	E	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood (*Populus* spp.), willow (*Salix* spp.), boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*), buttonbush (*Cephalanthus* spp.), and arrowweed (*Pluchea sericea*) are present. Nests are found in thickets of trees and shrubs, primarily those that are 13 to 23 feet tall, among dense, homogeneous foliage. Habitat occurs at elevations below 8,500 feet amsl.	Unlikely to occur. The project area lacks suitable habitat parameters for this species as there are no densely vegetated riparian habitats present.	No effect.
Spikedace (*Meda fulgida*)	E	Found in moderate to large perennial streams, where it inhabits moderate- to fast-velocity waters over gravel and rubble substrates.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.

Common Name (Species Name)	Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Virgin River chub (*Gila seminuda [=robusta]*)	E	Found most commonly in deep, swift (not turbulent) waters with sand and gravel substrates and boulders or other cover at elevations below 4,500 feet amsl. Endemic to the Virgin River in the extreme northwestern part of Arizona.	Unlikely to occur. There are no permanent aquatic habitats within the project area.	No effect.
Welsh's milkweed (*Asclepias welshii*)	T	Found on sparsely vegetated, semi-stabilized sand dunes derived from Navajo sandstone.	Unlikely to occur. The project area is outside the elevational and known geographic range for this species and does not contain suitable habitat parameters.	No effect.
Woundfin (*Plagopterus argentissimus*)	NEP	Found in shallow, warm, turbid, fast-flowing rivers at elevations below 4,500 feet amsl. Extirpated from almost all of its historical range except the mainstem Virgin River from Pah Tempe Springs to Lake Mead in northwestern Arizona. In Arizona, critical habitat accounts for approximately 31.6 miles of the mainstem Virgin River and its 100-year floodplain in Mohave County, Arizona. Experimental, nonessential designation in portions of the Verde, Gila, San Francisco, and Hassayampa Rivers and Tonto Creek.	Unlikely to occur. There are no permanent aquatic habitats within the project area, and the project area is well outside the known range for this species.	No effect.
Yellow-billed cuckoo (Western U.S. Distinct Population Segment) (*Coccyzus americanus*)	T	Typically found in riparian woodland vegetation (cottonwood, willow, or saltcedar) at elevations below 6,600 feet amsl. Dense understory foliage appears to be an important factor in nest site selection. The highest concentrations in Arizona are along the Agua Fria, San Pedro, upper Santa Cruz, and Verde River drainages and Cienega and Sonoita Creeks.	Unlikely to occur. The project area lacks suitable habitat parameters for this species as there are no densely vegetated riparian habitats present.	No effect.

Source: Range or habitat information is from Arizona Game and Fish Department (2020a); USFWS (2020b); Arizona Rare Plant Committee (ca. 2001); and Corman and Wise-Gervais (2005).

*USFWS Status Definitions:

E = Endangered. Endangered species are those in imminent jeopardy of extinction. The ESA specifically prohibits the take of a species listed as endangered. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

T = Threatened. Threatened species are those in imminent jeopardy of becoming endangered. The ESA prohibits the take of a species listed as threatened under Section 4(d) of the ESA. Take is defined by the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.

NEP = Non-Essential Experimental Population. Experimental populations of a species designated under Section 10(j) of the ESA for which the USFWS, through the best available information, believes is not essential for the continued existence of the species. Regulatory restrictions are considerably reduced under a NEP designation.

AGENCY CORRESPONDENCE

The Arizona Game and Fish Department (AGFD) maintains a statewide database, known as the Heritage Data Management System (HDMS), which tracks records for federally listed species and other species of special concern (AGFD 2020b). This database can be accessed through the AGFD (2020a) online environmental review tool (Arizona Heritage Geographic Information System [AZHGIS]). SWCA accessed the database and received a response document and receipt (Appendix B). The receipt portion of the response document provides information such as special-status species information, presence or absence of designated critical habitat, special handling guidelines for wildlife, and preliminary project-type recommendations as given by the AGFD.

The HDMS-generated response reported that northern goshawk (*Accipiter gentilis*), bald eagle – winter population (*Haliaeetus leucocephalus*), and golden eagle (*Aquila chrysaetos*) have been documented within 2 miles of the project area. Due to vegetation and wildlife management at the airport, northern goshawk and bald eagle are unlikely to occur within the project area. The project area contains potential foraging habitat for golden eagle, as suitable prey (Gunnison's prairie dog) was identified on the property during the site visit. There is no breeding or roosting habitat for golden eagle within the airport property.

LIMITATIONS AND WARRANTY

Within the limitations of schedule, budget, and scope of work, SWCA warrants that this study was conducted in accordance with accepted environmental science practices, including the technical guidelines, evaluation criteria, and species' listing status in effect at the time this evaluation was performed, as outlined in the report.

The results and conclusions of this report represent the best professional judgment of SWCA scientists and are based on information provided by the project proponent and on information obtained from agencies and other sources during the course of the study. No other warranty, expressed or implied, is made.

LITERATURE CITED

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APPENDIX A

USFWS-Listed Species IPaC Database Receipt

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513
http://www.fws.gov/southwest/es/arizona/
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

In Reply Refer To: September 10, 2020
Consultation Code: 02EAAZ00-2020-SLI-1416
Event Code: 02EAAZ00-2020-E-03164
Project Name: Clark Memorial Field Environmental Services

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that may occur within one or more delineated United States Geological Survey 7.5 minute quadrangles with which your project polygon intersects. Each quadrangle covers, at minimum, 49 square miles. In some cases, a species does not currently occur within a quadrangle but occurs nearby and could be affected by a project. Please refer to the species information links found at:
http://www.fws.gov/southwest/es/arizona/Docs_Species.htm
http://www.fws.gov/southwest/es/arizona/Documents/MiscDocs/AZSpeciesReference.pdf .

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to consult with us if their projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, we recommend preparing a biological evaluation similar to a Biological Assessment to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If the Federal action agency determines that listed species or critical habitat may be affected by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. You should request consultation with us even if only one individual or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint.” For example, projects that involve streams and river systems should consider downstream effects. If the Federal action agency determines that the action may jeopardize a proposed species or adversely modify proposed critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.
Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend considering them in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 et seq.). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1026 species of birds are protected by the MBTA, including species such as the western burrowing owl (Athene cunicularia hypugea). Protected western burrowing owls are often found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle (or golden eagle) nest occurs in or near the proposed project area, you should evaluate your project to determine whether it is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles:
https://www.fws.gov/migratorybirds/pdf/management/
nationalbaldeaglenanagementguidelines.pdf
https://www.fws.gov/birds/management/managed-species/eagle-management.php.

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following: https://www.fws.gov/birds/policies-and-regulations/incidental-take.php. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at:

https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php.

Activities that involve streams (including intermittent streams) and/or wetlands are regulated by the U.S. Army Corps of Engineers (Corps). We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources.
If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (Gopherus morafkai) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program https://www.azgfd.com/Wildlife/HeritageFund/.

For additional communications regarding this project, please refer to the consultation Tracking Number in the header of this letter. We appreciate your concern for threatened and endangered species. If we may be of further assistance, please contact our following offices for projects in these areas:

Northern Arizona: Flagstaff Office 928/556-2001
Central Arizona: Phoenix office 602/242-0210
Southern Arizona: Tucson Office 520/670-6144

Sincerely,
/s/ Jeff Humphrey Field Supervisor

Attachment

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

Project Summary

Consultation Code: 02EAAZ00-2020-SLI-1416

Event Code: 02EAAZ00-2020-E-03164

Project Name: Clark Memorial Field Environmental Services

Project Type: TRANSPORTATION

Project Description: Airport Master Plan

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.306744239705466N112.19353639810933W

Counties: Coconino, AZ

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
California Condor *Gymnogyps californianus* Population: U.S.A. (specific portions of Arizona, Nevada, and Utah) There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8193	Experimental Population, Non-Essential
California Condor *Gymnogyps californianus* Population: U.S.A. only, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8193	Endangered
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/129/office/22410.pdf	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Northern Mexican Gartersnake *Thamnophis eques megalops* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7655	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC **U.S. Fish & Wildlife Service**

Last login September 24, 2020 03:51 PM MDT

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Coconino County, Arizona

Local office

Arizona Ecological Services Field Office

(602) 242-0210
(602) 242-2513

9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517

http://www.fws.gov/southwest/es/arizona/

http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Black-footed Ferret Mustela nigripes | EXPN

U.S.A. (WY and specified portions of AZ, CO, MT, SD, and UT, see 17.84(g)(9))

This species only needs to be considered if the following condition applies:

- Experimental, non-essential population of black-footed ferrets established pursuant to Section 10(j) of the ESA. Section 7 consultation not required except on lands administered by the U.S. Fish and Wildlife Service or the National Park Service.

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6953

Black-footed Ferret Mustela nigripes | Endangered

Wherever found, except where listed as an experimental population

This species only needs to be considered if the following condition applies:

- Special incidental take provisions pursuant to Section 10(a)(1)(A) of the ESA apply to a reintroduced population of black-footed ferrets. Contact the Arizona Ecological Services Field Office for additional details.

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6953

Mexican Wolf Canis lupus baileyi | Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/3916

Birds

NAME | STATUS

California Condor Gymnogyps californianus | EXPN

U.S.A. (specific portions of Arizona, Nevada, and Utah)

There is **proposed** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/8193

California Condor Gymnogyps californianus | Endangered

U.S.A. only, except where listed as an experimental population

There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/8193

Mexican Spotted Owl Strix occidentalis lucida | Threatened

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/8196

Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* There is **proposed** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Reptiles

NAME	STATUS
Northern Mexican Gartersnake *Thamnophis eques megalops* There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7655	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *Rana chiricahuensis* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

NAME	STATUS
Apache Trout *Oncorhynchus apache* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3532	Threatened
Colorado Pikeminnow (=squawfish) *Ptychocheilus lucius* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3531	EXPN
Gila Chub *Gila intermedia* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/51	Endangered
Gila Trout *Oncorhynchus gilae* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/781	Threatened

Humpback Chub Gila cypha — Endangered
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/3930

Little Colorado Spinedace Lepidomeda vittata — Threatened
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/6640

Loach Minnow Tiaroga cobitis — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/6922

Razorback Sucker Xyrauchen texanus — Endangered
There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/530

Spikedace Meda fulgida — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/6493

Virgin River Chub Gila seminuda (=robusta) — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/1772

Woundfin Plagopterus argentissimus — EXPN
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/49

Snails

NAME	STATUS
Kanab Ambersnail Oxyloma haydeni kanabensis There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6642	Endangered

Flowering Plants

NAME	STATUS

Brady Pincushion Cactus Pediocactus bradyi No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6292	Endangered
Fickeisen Plains Cactus Pediocactus peeblesianus fickeiseniae There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/5484	Endangered
Navajo Sedge Carex specuicola There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8579	Threatened
San Francisco Peaks Ragwort Packera franciscana There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/1721	Threatened
Sentry Milk-vetch Astragalus cremnophylax var. cremnophylax No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8439	Endangered
Siler Pincushion Cactus Pediocactus (=Echinocactus,=Utahia) sileri No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3607	Threatened
Welsh's Milkweed Asclepias welshii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8400	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Fickeisen Plains Cactus Pediocactus peeblesianus fickeiseniae https://ecos.fws.gov/ecp/species/5484#crithab	Final
Humpback Chub Gila cypha https://ecos.fws.gov/ecp/species/3930#crithab	Final

Little Colorado Spinedace *Lepidomeda vittata* https://ecos.fws.gov/ecp/species/6640#crithab	Final
Mexican Spotted Owl *Strix occidentalis lucida* https://ecos.fws.gov/ecp/species/8196#crithab	Final
Narrow-headed Gartersnake *Thamnophis rufipunctatus* For information on why this critical habitat appears for your project, even though Narrow-headed Gartersnake is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/2204#crithab	Proposed
Navajo Sedge *Carex specuicola* https://ecos.fws.gov/ecp/species/8579#crithab	Final
Razorback Sucker *Xyrauchen texanus* https://ecos.fws.gov/ecp/species/530#crithab	Final
San Francisco Peaks Ragwort *Packera franciscana* https://ecos.fws.gov/ecp/species/1721#crithab	Final
Yellow-billed Cuckoo *Coccyzus americanus* https://ecos.fws.gov/ecp/species/3911#crithab	Proposed

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

- Nationwide conservation measures for birds
  http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

APPENDIX B

AZHGIS Online Environmental Review Response

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
Clark Memorial Field BE/PJD

User Project Number:
59346

Project Description:
Airport Master Plan

Project Type:
Development Outside Municipalities (Rural Development), Public & Community Facilities (school, library, church) and associated infrastructure, Maintenance/expansion/rehabilitation of existing facilities

Contact Person:
Corina Anderson

Organization:
SWCA Environmental Consultants

On Behalf Of:
PRIVATE

Project ID:
HGIS-12017

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

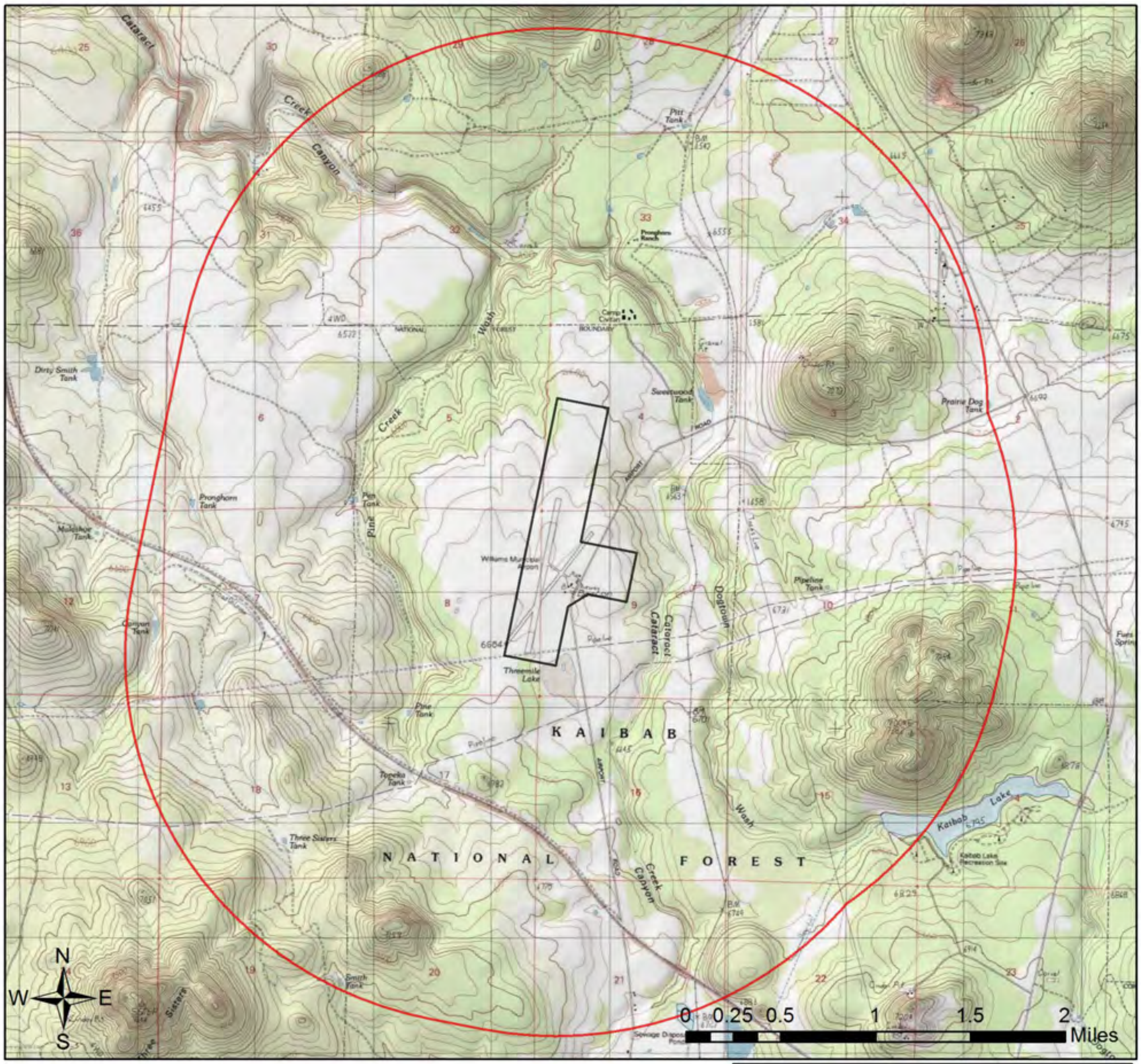
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

Clark Memorial Field BE/PJD

USA Topo Basemap With Locator Map



Project Boundary

Buffered Project Boundary

Project Size (acres): 304.55

Lat/Long (DD): 35.3062 / -112.1928

County(s): Coconino

AGFD Region(s): Flagstaff

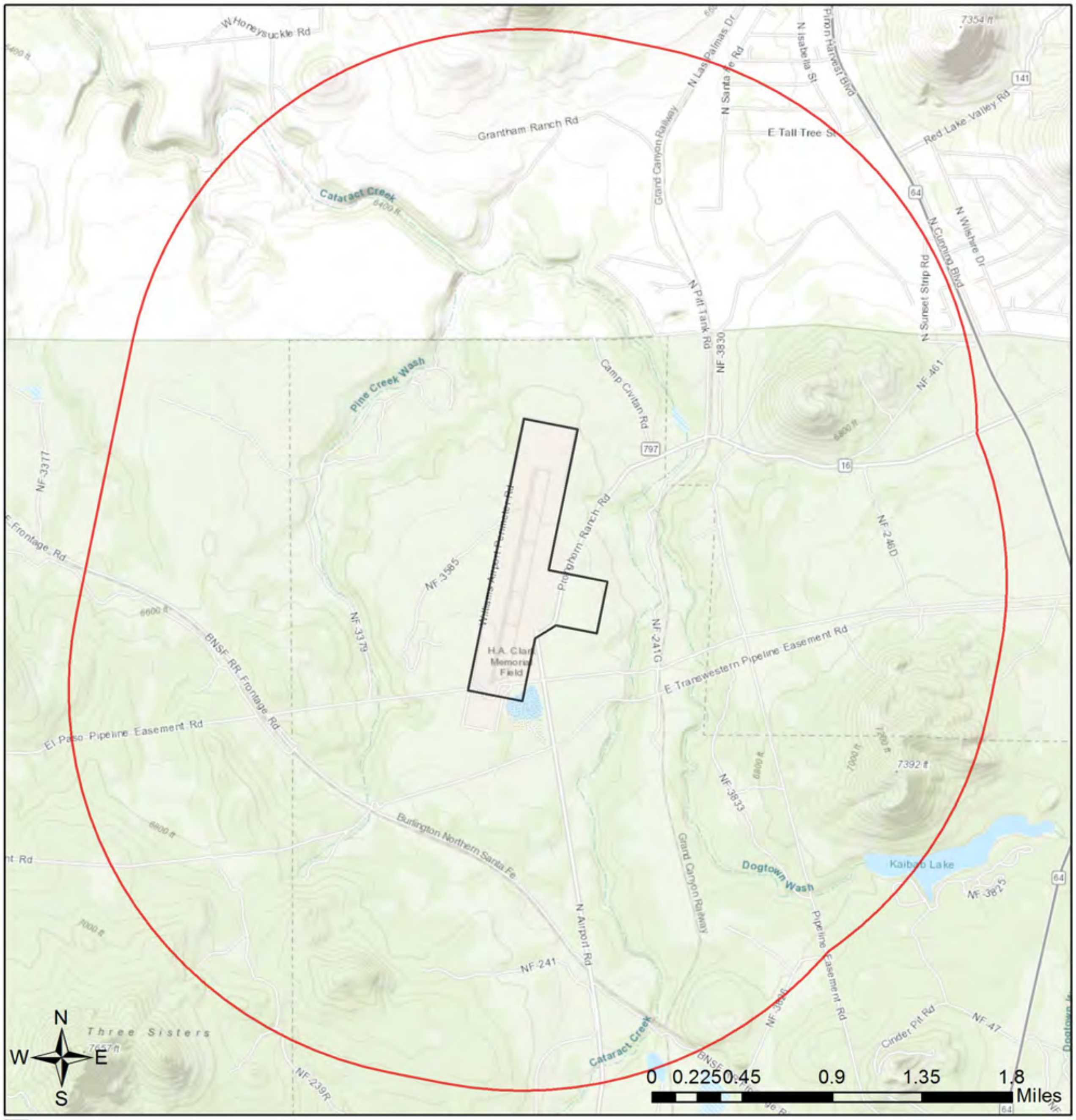
Township/Range(s): T22N, R2E

USGS Quad(s): WILLIAMS NORTH

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap

Clark Memorial Field BE/PJD

Web Map As Submitted By User



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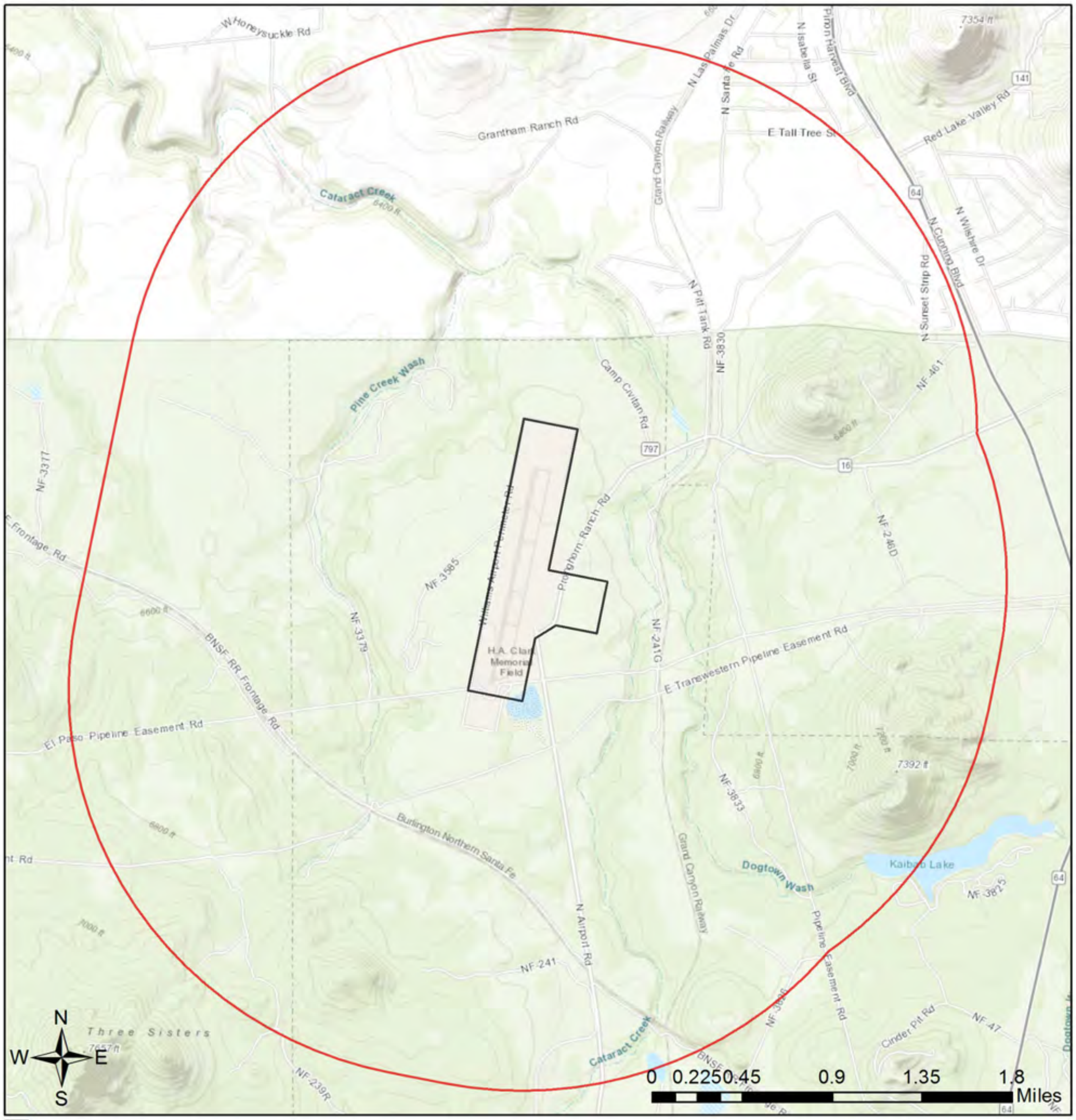
Clark Memorial Field BE/PJD

Important Areas



- Project Boundary
- Buffered Project Boundary
- Wildlife Connectivity
- Important Connectivity Zones
- Pinal County Riparian
- Critical Habitat
- Important Bird Areas

Project Size (acres): 304.55

Lat/Long (DD): 35.3062 / -112.1928

County(s): Coconino

AGFD Region(s): Flagstaff

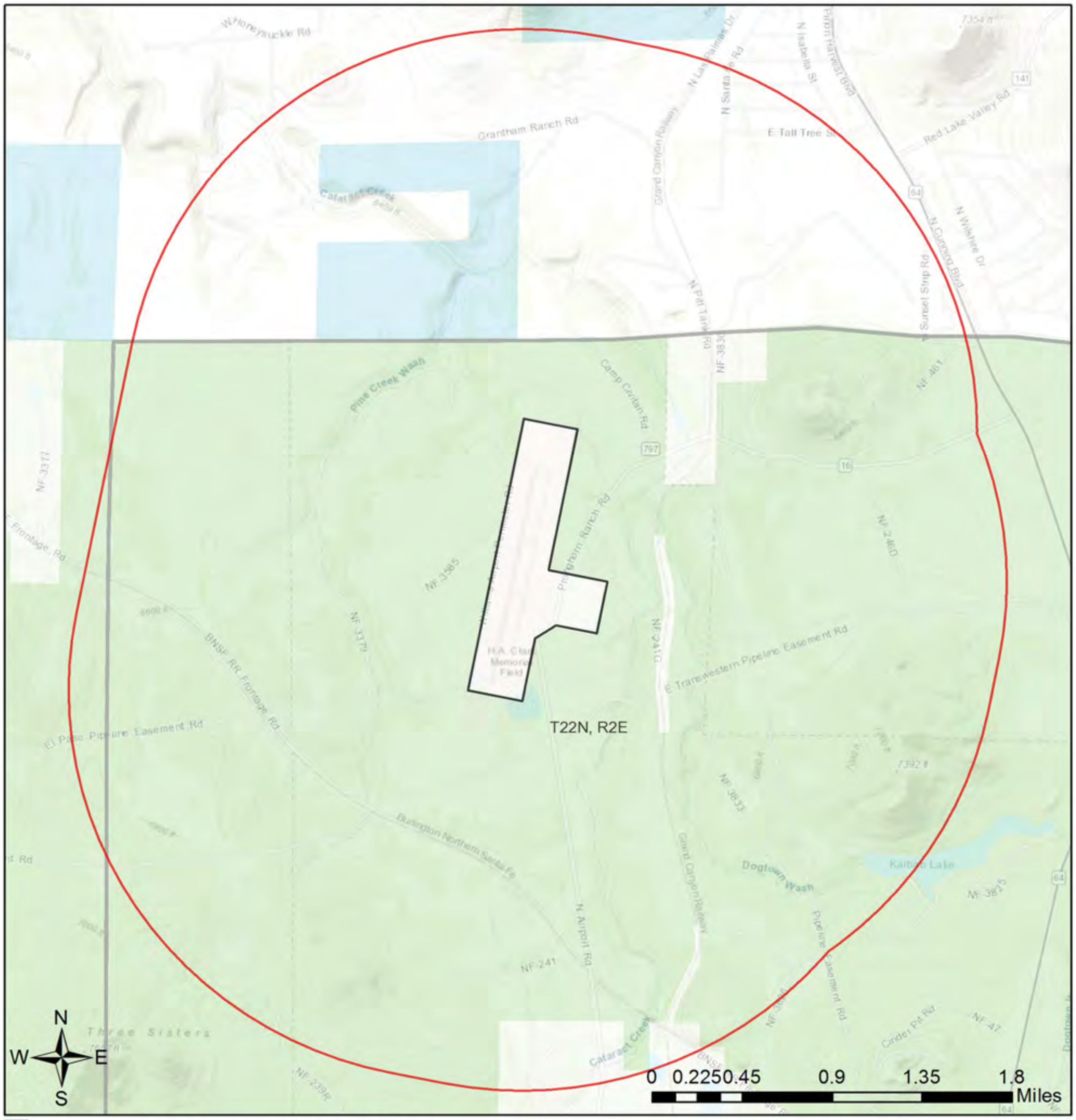
Township/Range(s): T22N, R2E

USGS Quad(s): WILLIAMS NORTH

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Clark Memorial Field BE/PJD

Township/Ranges and Land Ownership



Project Boundary	Military
Buffered Project Boundary	Mixed/Other
Township/Ranges	National Park/Mon.
Land Ownership	Private
AZ Game & Fish Dept.	State & Regional Parks
BLM	State Trust
BOR	US Forest Service
Indian Res.	Wildlife Area/Refuge

Project Size (acres): 304.55

Lat/Long (DD): 35.3062 / -112.1928

County(s): Coconino

AGFD Region(s): Flagstaff

Township/Range(s): T22N, R2E

USGS Quad(s): WILLIAMS NORTH

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Special Status Species Documented within 2 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Accipiter gentilis	Northern Goshawk	SC	S	S		1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC, BGA	S	S		1A

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Special Areas Documented within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Fues Hill - Threemile Lake	Coconino County Wildlife Movement Area - Diffuse					

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Accipiter gentilis	Northern Goshawk	SC	S	S		1B
Ambystoma mavortium nebulosum	Arizona Tiger Salamander					1B
Antilocapra americana americana	American Pronghorn					1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Baeolophus ridgwayi	Juniper Titmouse					1C
Buteo swainsoni	Swainson's Hawk					1C
Cardellina rubrifrons	Red-faced Warbler					1C
Chordeiles minor	Common Nighthawk					1B
Coccothraustes vespertinus	Evening Grosbeak					1B
Contopus cooperi	Olive-sided Flycatcher	SC				1C
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus cerberus	Arizona Black Rattlesnake					1B
Cynomys gunnisoni	Gunnison's Prairie Dog	SC		S		1B
Empidonax wrightii	Gray Flycatcher					1C
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Gymnorhinus cyanocephalus	Pinyon Jay			S		1B
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Melospiza lincolnii	Lincoln's Sparrow					1B
Microtus mexicanus	Mexican Vole					1B
Mustela nigripes	Black-footed Ferret	LE,XN				1A

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Neotamias cinereicollis	Gray-collared Chipmunk					1B
Neotoma stephensi	Stephen's Woodrat					1B
Oreoscoptes montanus	Sage Thrasher					1C
Panthera onca	Jaguar	LE				1A
Patagioenas fasciata	Band-tailed Pigeon					1C
Peucedramus taeniatus	Olive Warbler					1C
Psiloscops flammeolus	Flammulated Owl					1C
Rallus limicola	Virginia Rail					1C
Sphyrapicus thyroideus	Williamson's Sapsucker					1C
Spizella breweri	Brewer's Sparrow					1C
Sturnella magna	Eastern Meadowlark					1C
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Vireo vicinior	Gray Vireo		S			1C

Species of Economic and Recreation Importance Predicted within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Antilocapra americana americana	America Pronghorn					1B
Cervus elaphus	Elk					
Meleagris gallopavo	Wild Turkey					
Odocoileus hemionus	Mule Deer					
Patagioenas fasciata	Band-tailed Pigeon					1C
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Sciurus aberti	Abert's Squirrel					
Ursus americanus	American Black Bear					
Zenaida macroura	Mourning Dove					

Project Type: Development Outside Municipalities (Rural Development), Public & Community Facilities (school, library, church) and associated infrastructure, Maintenance/expansion/rehabilitation of existing facilities

Project Type Recommendations:

Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, canted, or cut to ensure that light reaches only areas needing illumination.

Minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g., microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g., livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants, https://agriculture.az.gov/. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control, https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/water/quality/?cid=stelprdb1044769 The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information https://www.azgfd.com/hunting/regulations.

Follow manufacturer's recommended application guidelines for all chemical treatments. The U.S. Fish and Wildlife Service, Region 2, Environmental Contaminants Program has a reference document that serves as their regional pesticide recommendations for protecting wildlife and fisheries resources, titled "Recommended Protection Measures for Pesticide Applications in Region 2 of the USFWS", http://www.fws.gov/southwest/es/arizona/Documents/ECReports/RPMPA_2007.pdf. The Department recommends that direct or indirect impacts to sensitive species and their forage base from the application of chemical pesticides or herbicides be considered carefully.

Based on the project type entered, coordination with State Historic Preservation Office may be required (http://azstateparks.com/SHPO/index.html).

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptefauna (snakes, lizards, tortoise) from entering ditches.

Based on the project type entered, coordination with Arizona Department of Environmental Quality may be required (http://www.azdeq.gov/).

Development plans should provide for open natural space for wildlife movement, while also minimizing the potential for wildlife-human interactions through design features. Please contact Project Evaluation Program for more information on living with urban wildlife at PEP@azgfd.gov or at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/ and https://www.azgfd.com/Wildlife/LivingWith.

Project Location and/or Species Recommendations:
HDMS records indicate that one or more **Listed, Proposed, or Candidate** species or **Critical Habitat** (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at http://www.fws.gov/southwest/es/arizona/ or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

Analysis indicates that your project is located in the vicinity of an identified ***wildlife habitat connectivity feature***. The **County-level Stakeholder Assessments** contain five categories of data (Barrier/Development, Wildlife Crossing Area, Wildlife Movement Area- Diffuse, Wildlife movement Area- Landscape, Wildlife Movement Area- Riparian/Washes) that provide a context of select anthropogenic barriers, and potential connectivity. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/.
Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

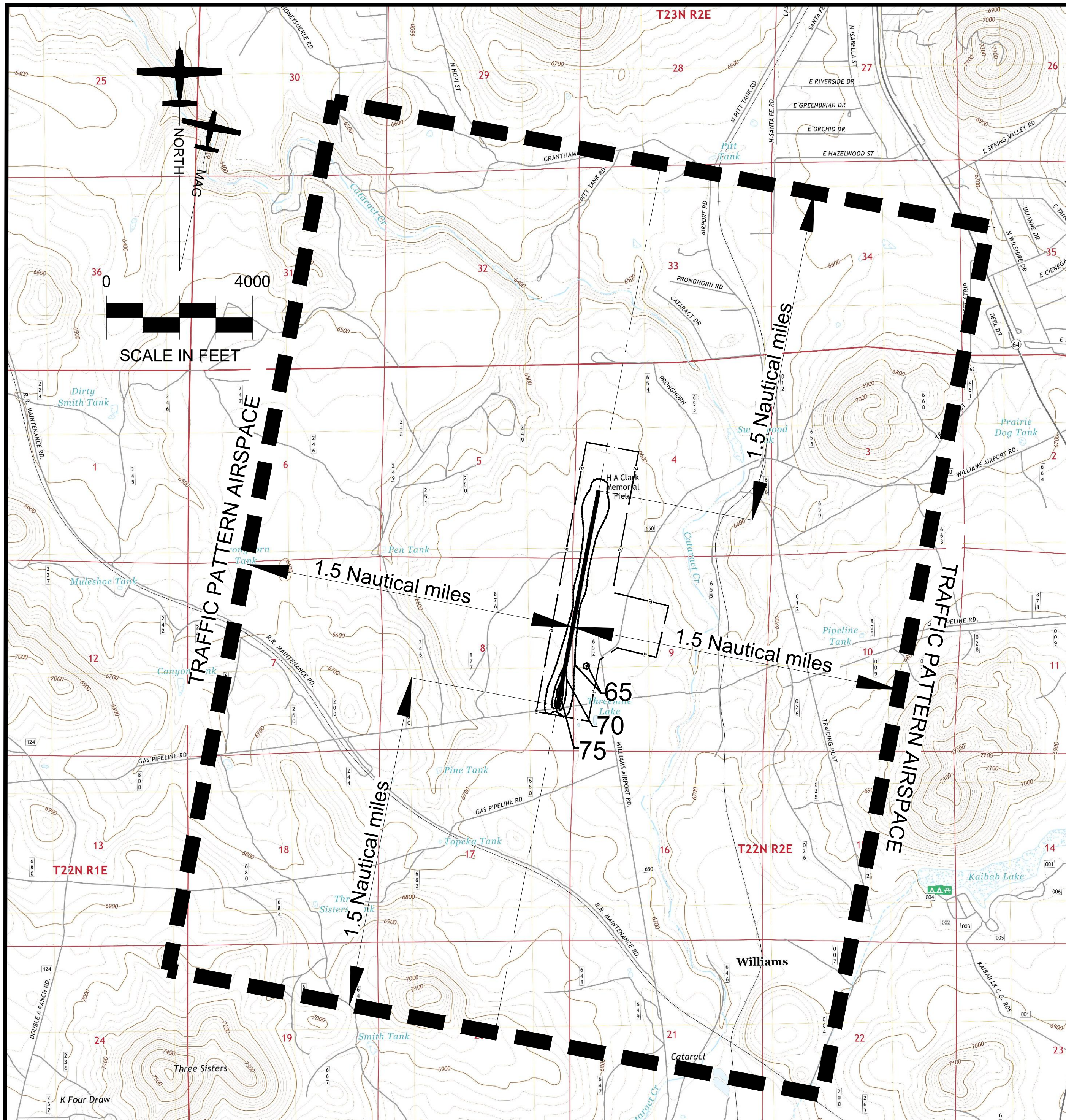
Appendix F

Public Disclosure Map

H.A. Clark
Memorial Field
Airport Master Plan

Appendix F
PUBLIC AIRPORT DISCLOSURE MAP

In 1999, the Arizona Legislature passed Arizona Revised Statute § 28-8486, Territory in the Vicinity Of A Public Airport. According to the stature, the state real estate department shall have and make available to the public on request a map showing the exterior boundaries of each territory in the vicinity of a public airport. In addition, each public airport shall record the map prepared pursuant to subsection A in the office of the county recorded in each county that contains property in a territory in the vicinity of a public airport. **Exhibit F1** is the public disclosure map for H.A. Clark Memorial Field



NOTES:

1. This map has been prepared in accordance with the Arizona Revised Statutes, Section 28-8486, relating to Public Airport Disclosure.
2. Traffic Pattern Airspace Boundaries have been established in accordance with the guidelines provided in the FAA Order 7400.2G.
3. The Airport Noise Contours have been developed with the AEDT Noise Model (Version 3C) and are based on Total Annual Operations (Take-offs and Landings) of 6,500.
4. 1 Nautical mile = 6,080 feet or 1.1516 statute miles.
5. Base map derived from electronic USGS mapping

LEGEND:

- TRAFFIC PATTERN AIRSPACE
- 65 NOISE CONTOURS DAY NIGHT LEVEL (DNL)
- EXISTING AIRPORT PROPERTY LINE
- EXTENDED RUNWAY CENTERLINE

H. A. CLARK MEMORIAL FIELD

PUBLIC AIRPORT DISCLOSURE MAP

WILLIAMS, ARIZONA

PLANNED BY: Patrick Taylor
DETAILED BY: Maggie Beaver
APPROVED BY: Matt Quick

April 2022 SHEET 1 OF 1

Coffman Associates
Airport Consultants



Appendix G

Airport Layout Plans

H.A. Clark Memorial Field

Airport Master Plan

Appendix G
AIRPORT LAYOUT PLANS

As part of this master plan, the Federal Aviation Administration (FAA) requires the development of several technical drawings detailing specific parts of the airport and its environs. These drawings were created on a computer-aided drafting system (CAD) and serve as the official depiction of the current and planned condition of the airport. These drawings will be delivered to the FAA for their review and inspection. The FAA will critique the drawings from a technical perspective to be sure all applicable federal regulations are met. The FAA will use the CAD drawings as the basis and justification for funding decisions.

The FAA requires that any planned changes to the airfield (i.e., runway and taxiway system, etc.) be represented on the drawings. The landside configuration developed during this master planning process is also depicted on the drawings, but the FAA recognized that landside development is much more fluid and dependent upon developer needs. Thus, an updated drawing set is not typically necessary for minor landside alterations.

The following is a description of the CAD drawings included with this master plan. The set of technical drawings has been developed following guidance from FAA *Standard Operating Procedures 2.0 – Standard Procedures for FAA Review and Approval of Airport Layout Plans (ALPs).*

AIRPORT LAYOUT PLAN

The ALP is a scaled, graphical presentation of the existing and future airport facilities, their location on the airport campus, and pertinent clearance and dimensional information. The ALP is a major product of the Master Plan Update, which contains information used by the FAA to program future funding assistance and to monitor the airport's compliance with design standards and grant assurances. It also allows the FAA to anticipate budgetary and procedural needs, and to protect the airspace required for facility or aircraft approach procedure improvements. An up-to-date FAA-approved ALP that ensures the safety, utility, and efficiency of the airport is required for the airport to receive financial assistance.

An ALP, which is a public document that serves as a record of present and future aeronautical requirements, is a blueprint for airport development by which the airport sponsor – in this case, the sponsor is the Josephine County – can ensure that development remains consistent with airport design standards and safety requirements, as well as airport and community land use plans.

AIRPORT AIRSPACE DRAWING

Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*, was established by FAA for use by local authorities to define recommended airspace protection surfaces near airports. The airport airspace drawing included in this master plan is a graphic depiction of these protection surfaces. The airport airspace drawing is a tool to aid local authorities in determining if proposed development could present a hazard to aircraft using the airport. The airport airspace drawing can be a critical tool for the airport sponsor's use in reviewing proposed development in the vicinity of the airport.

The airport sponsor should do all in his/her power to ensure development stays below the FAR Part 77 surfaces to protect the role of the airport. The following discussion will describe those surfaces that make up the recommended FAR Part 77 surfaces at H.A. Clark Memorial Field.

The airport airspace drawing assigns three-dimensional imaginary surfaces associated with the airport. These imaginary surfaces emanate from the runway centerline(s) and are dimensioned according to the visibility minimums associated with instrument approaches to the runway end and size of aircraft to operate on the runway. The FAR Part 77 imaginary surfaces include the primary surface, approach surface, transitional surface, horizontal surface, and conical surface. Each surface is described as follows. The imaginary surfaces are established based on the planned future runway design code (i.e., B-II-4000).

Primary Surface

The primary surface is an imaginary surface longitudinally centered on the runway. The primary surface extends 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the elevation along the nearest associated point on the runway centerline. Under FAR Part 77 regulations, the primary surface for the runway at H.A. Clark Memorial Field is 500 feet wide currently. Once instrument approaches with visibility minimums of ¾-mile or less are implemented, the primary surface will be 1,000 feet wide and is planned to remain at that width.

Approach Surface

The approach surface is longitudinally centered on the extended runway centerline and extends outward and upward from each end of the primary surface. The dimensions of the approach surface leading to each runway end is based upon the type of approach (instrument or visual) planned and the type of runway (utility or other-than-utility). Utility runways generally have a pavement strength of 12,500 pounds or less and primarily serve smaller aircraft. The existing pavement strength is 15,000 (S) so the runway is classified as other-than-utility. Therefore, non-utility approach surface dimensions are applied at H.A. Clark Memorial Field.

Runway 18 is planned with instrument approach visibility minimums not lower than ¾-mile. Runway 36 visibility minimums are planed as not lower than 1-mile. The applicable approach surface dimensions to both ends of the runway extend from the end of the primary surface at a 34:1 slope for 10,000 feet and to a width of 4,000 feet.

Transitional Surface

The transitional surface begins at the outside edge of the primary surface at the same elevation as the runway. The transitional surface also connects with the approach surface. The transitional surface rises at a slope of 7:1, up to a height 150 feet above the highest runway elevation. At that point, the transitional surface is replaced by the horizontal surface.

Horizontal Surface

The horizontal surface is a plane 150 feet above the established airport elevation. Having no slope, the horizontal surface connects the transitional and approach surfaces to the conical surface 5,000 feet from the end of the primary surface.

Conical Surface

The conical surface begins at the outer edge of the horizontal surface, rising at a 20:1 slope to 4,000 feet. At 4,000 feet from the horizontal surface, the elevation of the conical surface is 350 feet above the airport elevation.

APPROACH SURFACE PROFILE DRAWINGS

The runway profile drawing presents the entirety of the FAR Part 77 approach surface to the runway ends. It also depicts the runway centerline profile with elevations. This drawing provides profile detail that the airport airspace drawing does not. The profile drawings also depict the existing and future threshold siting surface (obstacle clearance surface).

INNER APPROACH SURFACE DRAWINGS

The inner portion of the approach surface drawing contains the plan and profile view of the inner portion of the approach surface to the runway and a tabular listing of all surface penetrations. The drawing also contains the threshold siting surface (obstacle clearance surface). Detailed obstruction and facility data are provided to identify planned improvements and the disposition of obstructions. A drawing of each runway end is provided.

DEPARTURE SURFACE DRAWING

For runways supporting instrument operations, a separate drawing depicting the departure surface is required. The departure surface is defined in FAA Engineering Brief No. 99A, *Changes to Tables 3-2 and 3-4 of Advisory Circular 150/5300-13A, Airport Design*. Line No. 4 from Table 3-2 is applied to both ends of the runway. The departure surface is comprised of an inner element (Section 1 – OCS) and two wings (Section 2) which are situated on each side of Section 1. The departure surface (Section 1) begins at the stop end of the runway and the inner width is the width of the runway. It emanates from the runway end for 10,000 feet at a 40:1 slope.

There are three recommended methods to mitigate penetrations to this surface:

1. The object is removed or lowered.
2. The Takeoff Distance Available (TODA) is decreased (i.e., pilots are instructed to lift off prior to the runway end to avoid the obstruction.
3. Instrument departure minimums are raised.

TERMINAL AREA DRAWING

The terminal area drawing is a larger scale plan view drawing of existing and planned aprons, buildings, hangars, parking lots, and other landside facilities. It is prepared in accordance with FAA AC 150/5300-13A, *Airport Design*.

AIRPORT LAND USE DRAWING

The objective of the airport land use drawing is to coordinate uses of the airport property in a manner compatible with the functional design of the airport facility. Airport land use planning is important for orderly development and efficient use of available space. There are two primary considerations for airport land use planning: 1) To secure those areas essential to the safe and efficient operation of the airport; and 2) To determine compatible land uses for the balance of the property which would be most advantageous to the airport and community.

In the development of an airport land use plan for H.A. Clark Memorial Field, the airport property was broken into several large general tracts. Each tract was analyzed for specific site characteristics, such as tract size and shape, land characteristics, and existing land uses. The availability of utilities and the accessibility to various transportation modes were also considered. Limitations and constraints to development, such as height and noise restrictions, runway visibility zones, and contiguous land uses were analyzed next. Finally, the compatibility of various land uses in each tract was analyzed.

The depiction of on-airport land uses on this drawing is a recommendation based on the analysis of the highest and best use of airport property. Any airport land considered for non-aviation purposes will require FAA review and approval prior to implementation.

EXHIBIT A - AIRPORT PROPERTY MAP

The Exhibit A - Airport Property Map provides information on property under airport control and is, therefore, subject to FAA grant assurances. The various recorded deeds that make up the airport property are listed in tabular format. The primary purpose of the drawing is to provide information for analyzing the current and future aeronautical use of land acquired with federal funds. This drawing was developed following FAA *Standard Operating Procedures 3.0 – Standard Procedures for FAA Review of Exhibit 'A' Airport Property Inventory Maps*.

U.S. Department
of Transportation
Federal Aviation Administration

Western Pacific Region
Office of Airports
Phoenix Airports District Office

3800 N. Central Ave.
Suite 1025 10th Floor
Phoenix, AZ 85012

September 14, 2022

Tim Pettit
City of Williams
City Manager
113 S. 1st Street
Williams, AZ 86046

Sent via email: tpettit@williamsaz.gov

Dear Mr. Pettit:

The H.A Clark Memorial Field (CMR), Airport Layout Plan (ALP), prepared by your consultant, and bearing your signature, is approved. A signed copy of the Federal Aviation Administration (FAA) approved ALP is enclosed.

An aeronautical study (no. 2022-AWP-2009-NRA) was conducted on the proposed development. This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

In making this determination, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, the effects that existing or proposed manmade objects (on file with the FAA), and known natural objects within the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement or other means.

This ALP approval is conditioned on acknowledgement that any development on airport property requiring Federal environmental approval must receive such written approval from FAA prior to commencement of the subject development. This ALP approval is also conditioned on acceptance of the plan under local land use laws. We encourage appropriate agencies to adopt land use and height restrictive zoning based on the plan.

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration. When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

The FAA Reauthorization Act of 2018, section 163(d), has limited the FAA's review and approval authority for ALPs. The Act limits the FAA's authority to those portions of the ALP that:

- Materially impact the safe and efficient operation of aircraft at, to, or from the airport;
- Adversely affect the safety of people or property on the ground adjacent to the airport as a result of aircraft operations; or
- Adversely affect the value of prior Federal investments to a significant extent.

FAA's approval of this ALP is limited to existing facilities only (or those specific areas that FAA retains approval authority). The FAA has not made a determination on whether or not it retains review and approval authority for any proposed facilities depicted on the ALP associated with this letter. Under Title 49 U.S.C. § 47107(a)(16) (as revised per section 163(d) of Pub.L. 115-254), FAA will separately determine whether it retains approval authority for each individual proposed facility depicted on an ALP before construction occurs.

Although section 163(d) has limited the FAA's review and approval authority of proposed projects depicted on an ALP, airport sponsors must continue to maintain an up-to-date ALP in accordance with Federal law, 49 U.S.C. § 47107(a)(16).

Please attach this letter to the ALP and retain it in the airport. We wish you great success in your plans for the development of the airport. If we can be of further assistance, please do not hesitate to call Mr. Jared Raymond, Community Planner, at 602-792-1072.

Sincerely,

MICHAEL N WILLIAMS

Digitally signed by MICHAEL N WILLIAMS
Date: 2022.09.14 14:28:29 -07'00'

Mike N. Williams
Manager,
Phoenix Airports District Office

Attachment: Updated Airport Layout Plan

Cc: Aaron Anderson, Public Works Director, City of Williams
Patrick Taylor, Principal, Coffman Associates
Matt Quick, Principal, Coffman Associates
Sonia Pizano, Grant Manager, ADOT Aeronautics

AIRPORT LAYOUT PLAN

for the

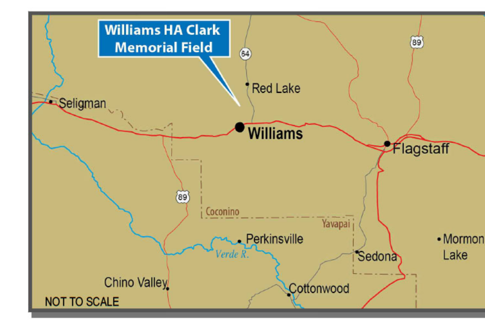
H. A. CLARK MEMORIAL FIELD

Williams, Arizona

Prepared for
the City of Williams , Arizona

LOCATION MAP

1. TITLE SHEET
2. AIRPORT DATA SHEET
3. AIRPORT LAYOUT PLAN DRAWING
4. AIRPORT AIRSPACE DRAWING
5. RUNWAYS 18-36 AIRPORT AIRSPACE APPROACH PROFILES
6. INNER PORTION OF THE APPROACH SURFACE DRAWING FOR RUNWAY 18
7. INNER PORTION OF THE APPROACH SURFACE DRAWING FOR RUNWAY 36
8. DEPARTURE SURFACE DRAWING RUNWAY 18-36
9. TERMINAL AREA DRAWING
10. LAND USE DRAWING
11. EXHIBIT "A" AIRPORT PROPERTY INVENTORY MAP



VICINITY MAP

COUNTY MAP

FOR APPROVAL BY CITY OF WILLIAMS, ARIZONA

[signature]

9-13-22

NO.	REVISIONS	DATE	BY	APP'D.

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

H. A. CLARK MEMORIAL FIELD

TITLE SHEET

WILLIAMS, ARIZONA

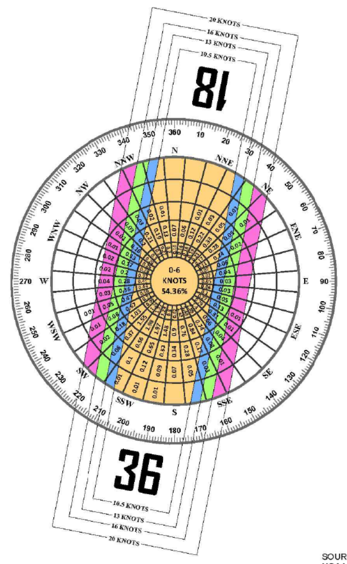
PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 1 OF 11

Coffman Associates
Airport Consultants
www.coffmanassociates.com

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18-36	95.87%	98.31%	99.68%	99.95%

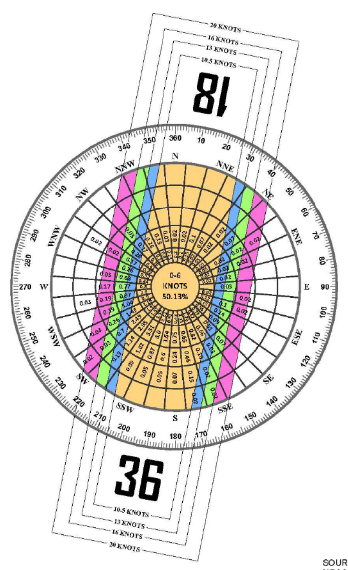


SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
HA Clark Memorial Field Airport
Williams, Arizona

OBSERVATIONS:
215,818 All Weather Observations
Jan. 1, 2010 - Dec. 31 2019

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 18-36	92.17%	96.45%	99.14%	99.86%



SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
HA Clark Memorial Field Airport
Williams, Arizona

OBSERVATIONS:
5,867 IFR Observations
Jan. 1, 2010 - Dec. 31 2019

RUNWAY 18-36

RUNWAY 18-36		EXISTING 18	EXISTING 36	ULTIMATE 18	ULTIMATE 36
Runway Identification		18	36	18	36
Runway Design Code (RDC)		B-II-VIS		B-II-4000	
Approach Reference Code (APRC)		D/IV/VIS and D/V/VIS		D/IV/4000 and D/V/4000	
Departure Reference Code (DPRC)		D/IV/ and D/V		D/IV and D/V	
Runway Surface Material		ASPHALT		SAME	
Runway Pavement Strength By Wheel Loading (in thousands of lbs.)		15(S)		30(S) 60(D)	
Runway Pavement Strength by PCN		NA		SAME	
Runway Surface Treatment		NONE		SAME	
Runway Effective Gradient		1.00%		SAME	
Runway Percent Wind Coverage	10.5 knots	95.87%		SAME	
	13 knots	98.31%		SAME	
	16 knots	99.68%		SAME	
	20 knots	99.95%		SAME	
Runway Dimensions (L x W)		6,000' x 100'		8,100' x 100'	
Runway End Coordinates	Latitude	35°18'48.931"N	35°17'50.633"N	35°19'11.33"N	35°17'52.59"N
	Longitude	112°11'32.952"W	112°11'46.347"W	112°11'27.81"W	112°11'45.90"W
Runway Displaced Threshold		NA	NA	620'	SAME
Runway Displaced Threshold Elevation		NA	NA	6,601'	SAME
Runway Displaced Threshold Coordinates	Latitude	NA	NA	35°19'05.30"N	SAME
	Longitude	NA	NA	112°11'29.19"W	SAME
Runway Safety Area Dimensions (width x length beyond end) - Design Std.		150'X300'	150'X300'	SAME	SAME
Runway Safety Area Dimensions (width x length beyond end) - Actual		150'X300'	150'X300'	SAME	SAME
Runway Lighting Type		MIRL		SAME	
Runway Protection Zone Dimensions		500'X700'X1,000'	500'X700'X1,000'	1,000'X1,510'X1,700'	500'X700'X1,000'
Runway Marking Type		NON-PRECISION		NON-PRECISION	
14 CFR Part 77 Approach Slope		20:1	20:1	34:1	34:1
14 CFR Part 77 Approach Type		VISUAL	VISUAL	NON-PRECISION	NON-PRECISION
Approach Visibility Minimums		VISUAL	VISUAL	≥ 1 MILE	≥ 3/4 MILE
Type of Aeronautical Survey Required for Approach		NVG	NVG	SAME	SAME
Departure Surface (Yes or N/A)		NA	NA	YES	YES
Runway Object Free Area Dimensions (width x length beyond end)		500'X300'	500'X300'	SAME	SAME
Runway Obstacle Free Zone Dimension (width x length beyond end)		400'X200'	400'X200'	SAME	SAME
Obstacle Clearance Surface (Table 3-2 post Engineering Brief #99)		#3	#3	#4	#4
Runway Visual and Instrument Navaids		PAPI-2 REIL SEGMENTED CIRCLE WINDCONES		PAPI-4 REIL SEGMENTED CIRCLE WINDCONES	
Touchdown Zone Elevation (TDZE)		6,660.4'	6,690.7'	6,601'	SAME
Taxiway Width		50'		35'	
Taxilane Width		35'		SAME	
Taxiway Safety Area Dimensions		79'		SAME	
Taxilane Safety Area Dimensions		79'		SAME	
Taxiway Object Free Area Dimensions		131'		SAME	
Taxilane Object Free Area Dimensions		115'		SAME	
Taxiway/Taxilane Lighting		MITL		SAME	
Vertical Datum		NAVD83		SAME	
Horizontal Datum		NAD83		SAME	

AIRPORT DATA

City: Williams, Arizona		County: Coconino	Owner:City of Williams
Airport Name & ID H. A. Clark Memorial Field (CMR)		EXISTING	ULTIMATE
Airport Reference Code (ARC)		B-II	SAME
Mean Maximum Temperature of Hottest Month		83.3° (JULY)	SAME
Airport Elevation (NAVD 88)		6,690'	SAME
Airport Navigational Aids		PAPI-2 REILs	PAPI-4 REILs GPS
Airport Reference Point (ARP) Coordinates	Latitude	35°18'19.8" N	35°18'30.99"N
	Longitude	112°11'39.7" W	112°11'37.08"W
Miscellaneous Facilities		AWOS SEGMENTED CIRCLE WINDCONES	SAME
Design Critical Aircraft		CESSNA CITATION III	SAME
Wingspan of Design Aircraft (Feet)		53.5'	SAME
Approach Speed of Design Aircraft (Knots)		114	SAME
Undercarriage Width of Design Aircraft (Feet)		9.04'	SAME
Magnetic Declination (Degrees)		10° 20' E ±0° 21'	
Declination Date		11/12/2021	
Declination Source		NOAA	
NPIAS Code		BASIC GA	
State System Plan Role		GA - RURAL	

ELECTRONIC AIRPORT NAVAID OWNERSHIP

NAVAID	OWNER
PAPI-2	AIRPORT
PAPI-4	AIRPORT

RUNWAY DECLARED DISTANCE	EXISTING 18	EXISTING 36	ULTIMATE 18	ULTIMATE 36
Takeoff Run Available (TORA)	6,000'	6,000'	8,100'	8,100
Takeoff Distance Available (TODA)	6,000'	6,000'	8,100'	8,100'
Accelerate-Stop Distance Available (ASDA)	6,000'	6,000'	8,100'	8,100'
Landing Distance Available (LDA)	6,000'	6,000'	7,480'	8,100'

DEVIATIONS TO FAA DESIGN STANDARDS TABLE

DESCRIPTION	STANDARD	PROPOSED MITIGATION
TREES WITHIN RUNWAY OBJECT FREE AREA	THE ROFA IS TO BE CLEAR OF ALL OBJECTS EXCEPT FOR OBJECTS THAT NEED TO BE LOCATED IN THE ROFA FOR AIR NAVIGATION OR AIRCRAFT GROUND MANEUVERING PURPOSES	REMOVE TREES WITHIN ROFA

MODIFICATIONS TO STANDARDS APPROVAL TABLE

APPROVAL DATE	AIRSPACE CASE NUMBER	STANDARD MODIFIED	DESCRIPTION
NONE REQUIRED			

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

AIRPORT DATA SHEET

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 2 OF 11

Coffman Associates
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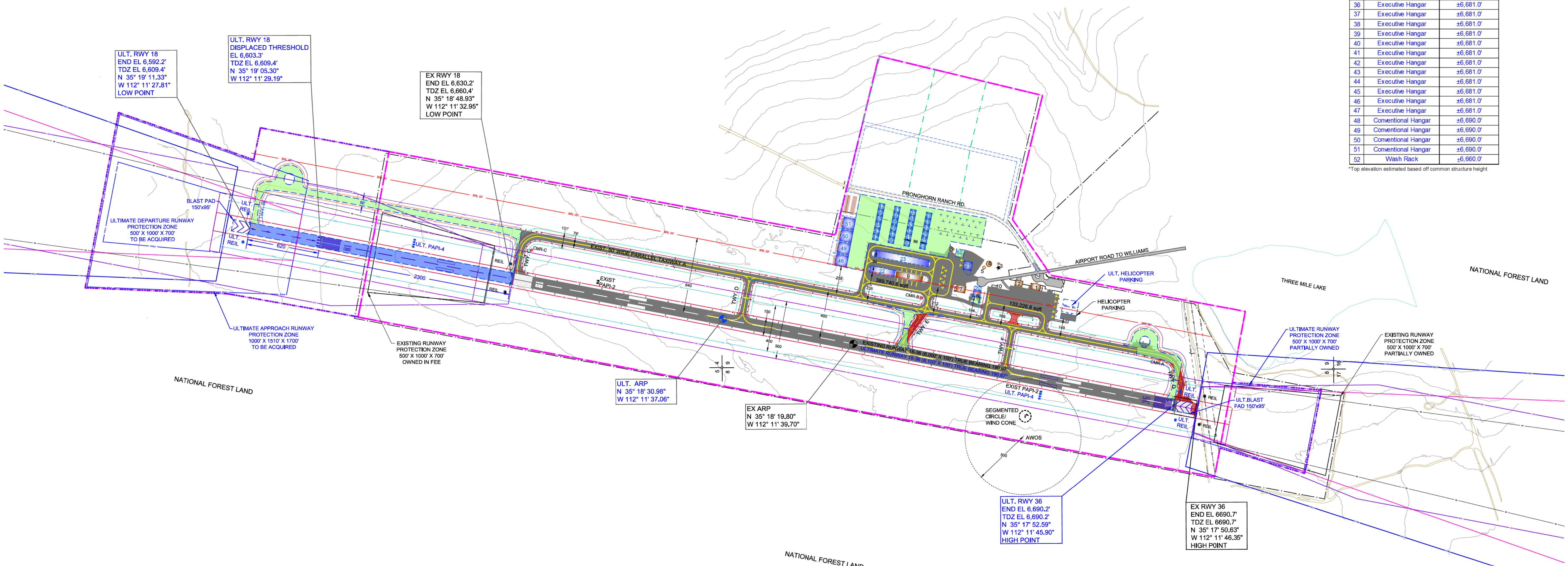
EXISTING AIRPORT FACILITIES		
#	Facility Name	Top Elevation ft. msl
1	Terminal	6,688.73'
2	Maintenance/Firefighting Building	6,693.97'
3	Rotating Beacon	6,715.43'
4	Water Tank	6,685.12'
5	Pump House	6,671.21'
6	City Storage Building	6,680.46'
7	Executive Box Hangar	6,689.12'
8	Box Hangar	6,676.29'
9	T-Hangars	6,676.77'
10	Fuel Farm	6,670.9'

ULTIMATE AIRPORT FACILITIES		
#	Facility Name	Top Elevation ft. msl*
20	Executive Hangar	±6,689.0'
21	Executive Hangar	±6,681.0'
22	T-Hangar	±6,672.0'
23	T-Hangar	±6,672.0'
24	Executive Hangar	±6,681.0'
25	Executive Hangar	±6,681.0'
26	Executive Hangar	±6,681.0'
27	Executive Hangar	±6,681.0'
28	Executive Hangar	±6,681.0'
29	Executive Hangar	±6,681.0'
30	Executive Hangar	±6,681.0'
31	Executive Hangar	±6,681.0'
32	Executive Hangar	±6,681.0'
33	Executive Hangar	±6,681.0'
34	Executive Hangar	±6,681.0'
35	Executive Hangar	±6,681.0'
36	Executive Hangar	±6,681.0'
37	Executive Hangar	±6,681.0'
38	Executive Hangar	±6,681.0'
39	Executive Hangar	±6,681.0'
40	Executive Hangar	±6,681.0'
41	Executive Hangar	±6,681.0'
42	Executive Hangar	±6,681.0'
43	Executive Hangar	±6,681.0'
44	Executive Hangar	±6,681.0'
45	Executive Hangar	±6,681.0'
46	Executive Hangar	±6,681.0'
47	Executive Hangar	±6,681.0'
48	Conventional Hangar	±6,690.0'
49	Conventional Hangar	±6,690.0'
50	Conventional Hangar	±6,690.0'
51	Conventional Hangar	±6,690.0'
52	Wash Rack	±6,660.0'

*Top elevation estimated based off common structure height



LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
BRL 20'		BUILDING RESTRICTION LINE (20')
		STRUCTURES ON AIRPORT
N/A		ABANDON/REMOVE STRUCTURE
N/A		ABANDON/REMOVE RUNWAY TWY APRON
		CRITICAL AREA
		RUNWAY PAVEMENT
		TAXIWAY APRON PAVEMENT
		FENCE LINE
		HOLD MARKING
		ROADS AND PARKING PAVEMENT
DESIGNATION		SURVEY MONUMENT WITH IDENTIFIER
OFA	OFA(U)	RUNWAY OBJECT FREE AREA
RSA	RSA(U)	RUNWAY SAFETY AREA
OFZ	OFZ(U)	RUNWAY OBSTACLE FREE ZONE
RPZ	RPZ(U)	RUNWAY PROTECTION ZONE
AS	AS(U)	PART 77 APPROACH
OCS	OCS(U)	OBSTACLE CLEARANCE SURFACE
TOFA	TOFA(U)	TAXIWAY OBJECT FREE AREA
TSA	TSA(U)	TAXIWAY SAFETY AREA
		RUNWAY END IDENTIFIER LIGHTS (REIL)
		TIE-DOWNS
		PAPIs
		WINDCONE
3660		TOPOGRAPHIC CONTOURS

PACS AND SACS STATIONS			
DESIGNATION	PERMANENT IDENTIFIER	LATITUDE	LONGITUDE
DK4562	CMR B	35° 18' 14.204" N	112° 11' 34.828" W
DK4563	CMR A	35° 17' 55.268" N	112° 11' 41.765" W
DK4564	CMR C	35° 18' 44.035" N	112° 11' 30.664" W

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.
3. Perimeter fence height: 7'.

FAA APPROVAL STAMP

Approved conditionally September 14, 2022

Subject to comments contained in our letter dated: 09-14-2022

FEDERAL AVIATION ADMINISTRATION

Western-Pacific Region

By MICHAEL N WILLIAMS

Digitally signed by MICHAEL N WILLIAMS
Date: 2022.09.14 14:24:31 -07'00'

FOR APPROVAL BY CITY OF WILLIAMS, ARIZONA

[signature]

9-13-22

MAGNETIC NORTH

NORTH

Magnetic Declination
10° 12' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, April 2021)

0 400 800
SCALE IN FEET

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

AIRPORT LAYOUT PLAN DRAWING

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 3 OF 11

Coffman Associates
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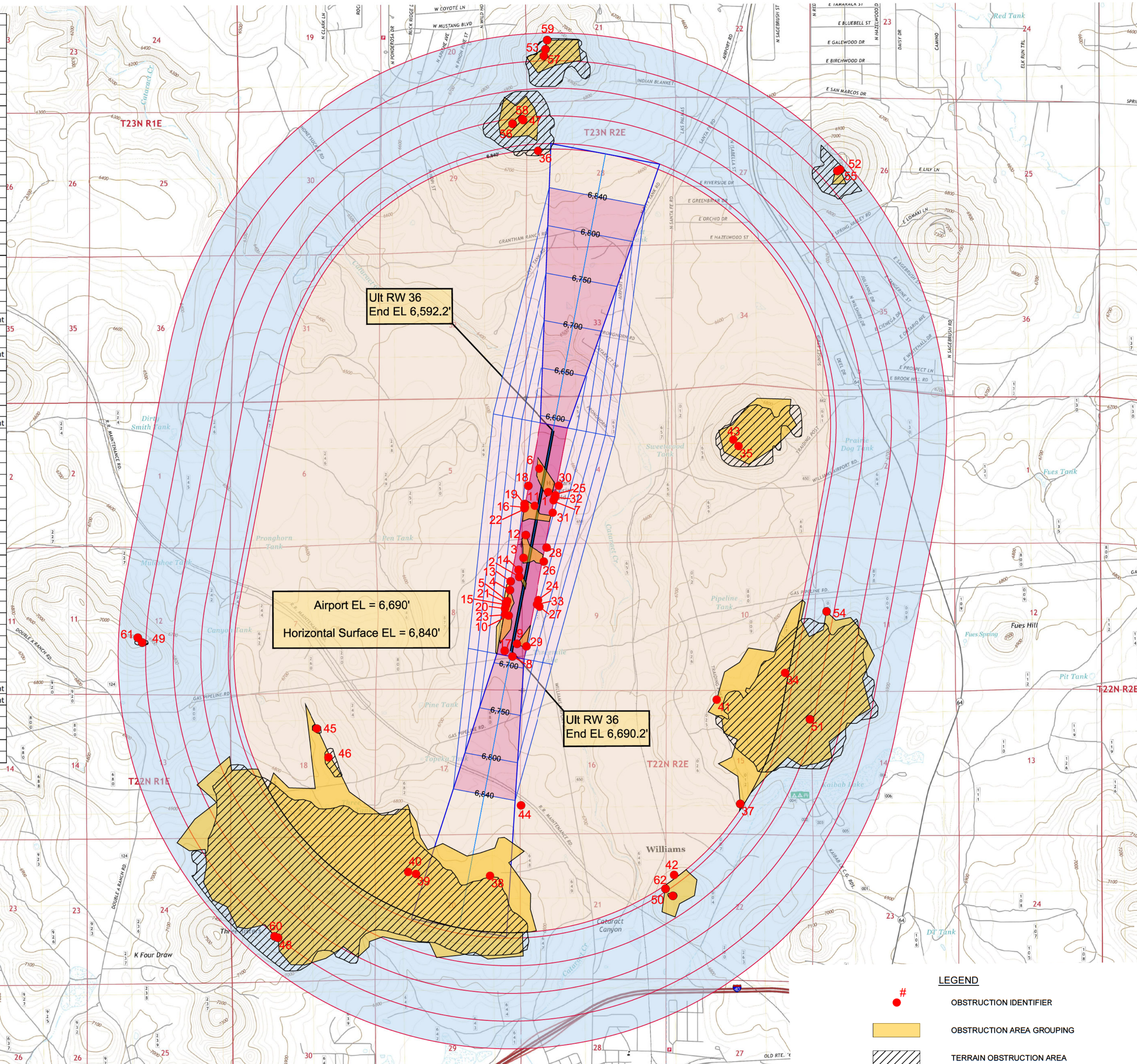
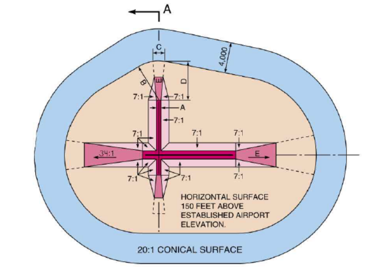
www.coffmanassociates.com

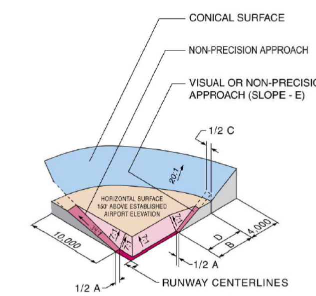
Part 77 Surface Obstructions						
ID	Feature	Ground Elevation (ft. msl)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Disposition
1	Terrain	6,631.19	N/A	Primary	3.19	Re-Grade
2	Terrain	6,664.35	N/A	Primary	2.95	Re-Grade
3	Terrain	6,659.85	N/A	Primary	4.08	Re-Grade
4	Terrain	6,672.41	N/A	Primary	7.19	Re-Grade
5	Terrain	6,680.22	N/A	Primary	13.33	Re-Grade
6	Tree	24.45	6,644.14	Primary	22.02	Trim/Remove
7	Terrain	6,632.44	N/A	Primary	0.56	Re-Grade
8	Bush	3.58	6,693.06	Primary	2.30	Trim/Remove
9	Windsock	12.52	6,691.21	Primary	8.86	To Remain
10	Lighted Wind Sock	22.37	6,699.00	Primary	29.66	To Remain
11	Windsock	12.14	6,644.67	Primary	9.73	To Remain
12	Tree	20.87	6,663.16	Primary	14.39	Trim/Remove
13	Tree	32.80	6,696.05	Primary	32.77	Trim/Remove
14	Tree	23.26	6,682.54	Primary	23.11	Trim/Remove
15	Tree	25.35	6,706.76	Primary	39.25	Trim/Remove
16	Tree	Unavailable	6,654.28	Primary	18.04	Trim/Remove
17	Tree	Unavailable	6,704.00	Primary	15.87	Trim/Remove
18	Tree	Unavailable	6,631.00	Transitional	0.45	Trim/Remove
19	Tree	Unavailable	6,646.14	Transitional	7.61	Trim/Remove
20	Tree	Unavailable	6,699.89	Transitional	29.59	Trim/Remove
21	Terrain	6,682.00	N/A	Transitional	13.62	Re-Grade
22	Tree	Unavailable	6,637.47	Transitional	0.42	Trim/Remove
23	AWOS Equipment	30.80	6,713.61	Transitional	44.18	To Remain
24	Building	28.24	6,689.13	Transitional	7.56	Add Obstruction Light
25	Tree	Unavailable	6,639.68	Transitional	8.27	Trim/Remove
26	Tree	Unavailable	6,665.24	Transitional	1.41	Trim/Remove
27	Pole	Unavailable	6,700.00	Transitional	3.80	Add Obstruction Light
28	Tree	Unavailable	6,666.99	Transitional	6.35	Trim/Remove
29	Tree	Unavailable	6,690.16	Transitional	7.48	Trim/Remove
30	Tree	Unavailable	6,644.64	Transitional	7.05	Trim/Remove
31	Tree	Unavailable	6,653.94	Transitional	11.32	Trim/Remove
32	Terrain	6,635.00	N/A	Transitional	1.60	Re-Grade
33	Building	Unavailable	6,680.46	Transitional	0.56	Add Obstruction Light
34	Terrain	7,083.31	N/A	Horizontal	243.31	To Remain
35	Terrain	7,071.10	N/A	Horizontal	231.10	To Remain
36	Terrain	6,886.05	N/A	Horizontal	46.05	To Remain
37	Tree	Unavailable	6,852.68	Horizontal	12.68	To Remain
38	Trail	Unavailable	6,840.78	Horizontal	0.78	To Remain
39	Terrain	7,164.67	N/A	Horizontal	324.67	To Remain
40	Tree	39.26	7,190.63	Horizontal	350.63	To Remain
41	Pole	Unavailable	6,867.48	Horizontal	27.48	To Remain
42	Tree	Unavailable	6,893.23	Horizontal	53.23	To Remain
43	Tree	18.49	7,090.23	Horizontal	250.23	To Remain
44	Tree	Unavailable	6,840.89	Horizontal	0.89	To Remain
45	Terrain	6,850.72	N/A	Horizontal	10.72	To Remain
46	Terrain	6,863.62	N/A	Horizontal	23.62	To Remain
47	Terrain	7,173.08	N/A	Conical	277.93	To Remain
48	Terrain	7,392.01	N/A	Conical	391.44	To Remain
49	Terrain	7,007.42	N/A	Conical	0.97	To Remain
50	Terrain	6,868.93	N/A	Conical	5.11	To Remain
51	Terrain	7,375.65	N/A	Conical	482.40	To Remain
52	Terrain	7,265.74	N/A	Conical	231.60	To Remain
53	Terrain	7,170.76	N/A	Conical	150.11	To Remain
54	Tree	Unavailable	6,893.35	Conical	6.70	To Remain
55	Tree	Unavailable	7,328.51	Conical	299.75	To Remain
56	Communication Tower	20.13	7,179.30	Conical	288.48	Add Obstruction Light
57	Building	Unavailable	7,201.93	Conical	193.26	Add Obstruction Light
58	Tree	12.82	7,177.31	Conical	280.02	To Remain
59	Tree	19.38	7,204.00	Conical	166.77	To Remain
60	Tree	Unavailable	7,428.89	Conical	426.29	To Remain
61	Tree	Unavailable	7,055.81	Conical	40.97	To Remain
62	Tree	Unavailable	6,886.00	Conical	40.46	To Remain





DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

LEGEND

- OBSTRUCTION IDENTIFIER
- OBSTRUCTION AREA GROUPING
- TERRAIN OBSTRUCTION AREA

Magnetic Declination
10° 12' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, April 2021)

0 2000 4000
SCALE IN FEET

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.
3. Terrain obstruction areas derived from intersection of ultimate Part 77 surfaces and a USGS 1/3 Arc Second NED.
4. Close in obstructions are depicted on the Inner Approach drawings (sheets 6 & 7 of this set).
5. Profile view features are depicted on the Approach Profile Drawing (sheet 5 of this set).
6. No local zoning ordinances or municipal codes are in place for airspace protection.

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

AIRPORT AIRSPACE DRAWING

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 4 OF 11

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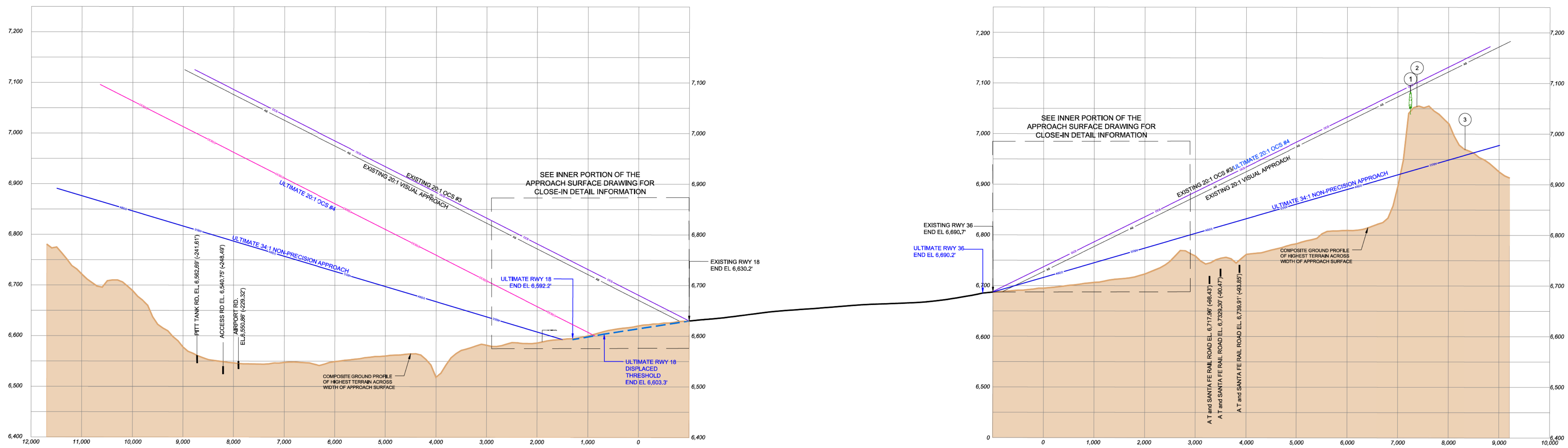


RUNWAY 18-36

HORIZONTAL SCALE IN FEET (0, 1000, 2000)

VERTICAL SCALE IN FEET (0, 100, 200)

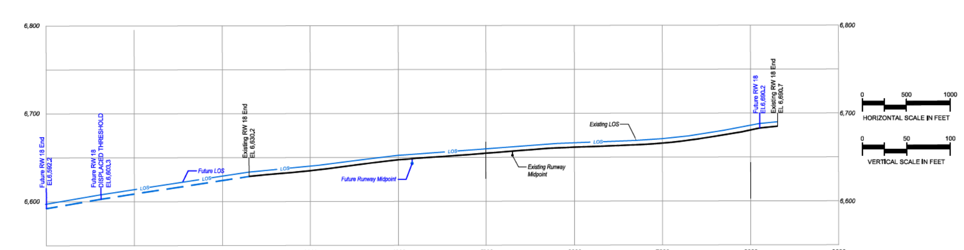
Runway 18 Obstructions

ID	Feature	Ground Elevation (ft. msl)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Disposition
No Obstructions						

Runway 36 Obstructions

ID	Feature	Ground Elevation (ft. msl)	Top Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Disposition
1	Tree	Unavailable	7,090.25	Ultimate Approach	156.87	Trim/Remove
2	Terrain	7,074.44	N/A	Ultimate Approach	137.91	To Remain
3	Terrain	6,967.94	N/A	Ultimate Approach	2.87	To Remain

(000) Obstruction Callout



RUNWAY 18-36 PROFILE

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.

2. Survey completed by Woolpert on 10/6/2020

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

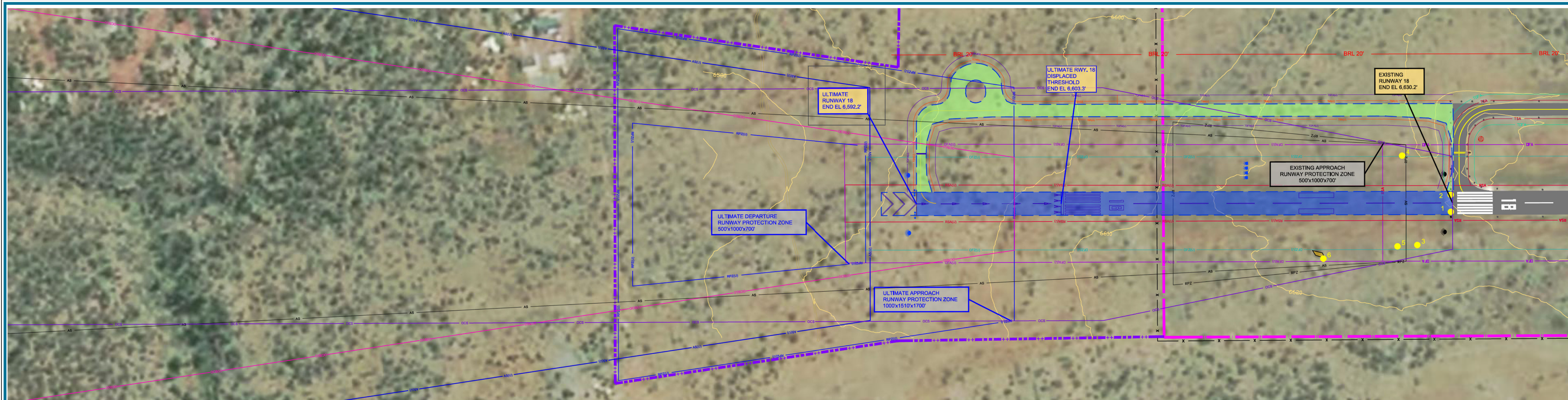
AIRPORT AIRSPACE APPROACH PROFILE RUNWAY 18-36

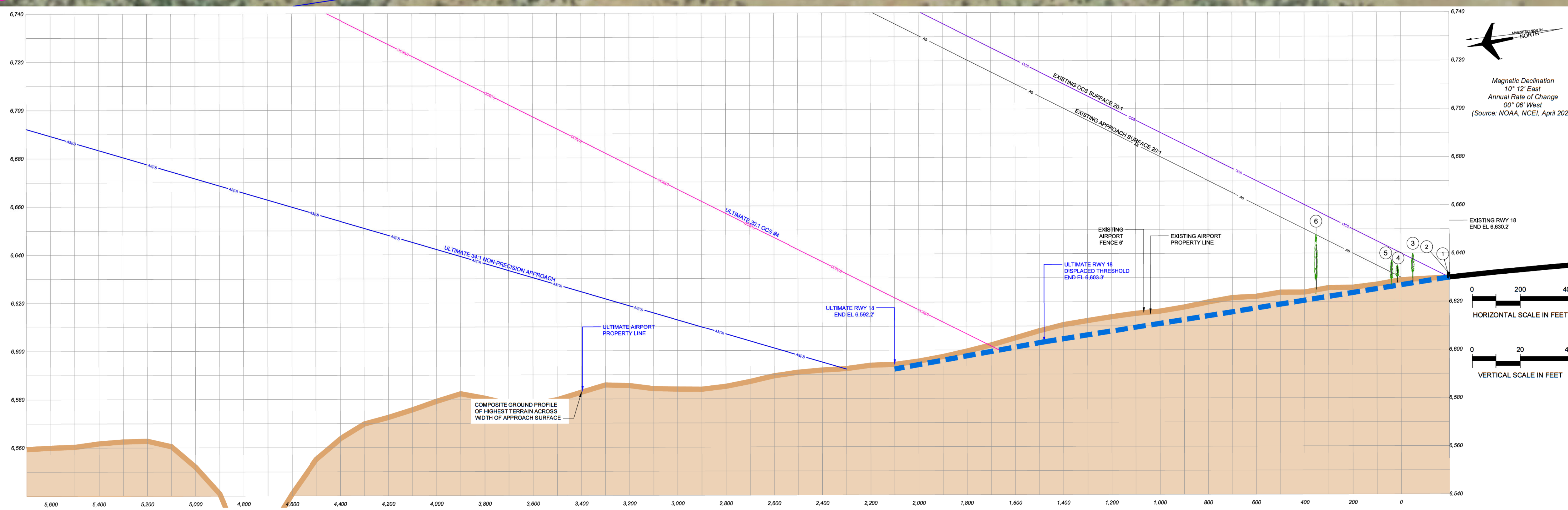
WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 5 OF 11

Coffman Associates Airport Consultants www.coffmanassociates.com





ID	Feature	Top Elevation (ft. msl.)	Penetration Value (ft.) Existing 20:1 Approach	Existing 20:1 OCS #3	Ultimate 34:1 Approach	Ultimate 20:1 OCS #4	Remediation
1	Airfield Light	6,631.84	N/A	1.27	N/A	N/A	To Remain
2	Airfield Light	6,632.29	N/A	1.68	N/A	N/A	To Remain
3	Tree	6,640.00	N/A	2.19	N/A	N/A	Trim/Remove
4	Tree	6,635.11	4.4	N/A	N/A	N/A	Trim/Remove
5	Tree	6,637.12	5.73	N/A	N/A	N/A	Trim/Remove
6	Tree	6,643.53	2.93	N/A	N/A	N/A	Trim/Remove

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.

000 OBS # OBSTRUCTION

OBSTRUCTION GROUPING

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

INNER PORTION OF THE APPROACH SURFACE DRAWING FOR RUNWAY 18

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 6 OF 11

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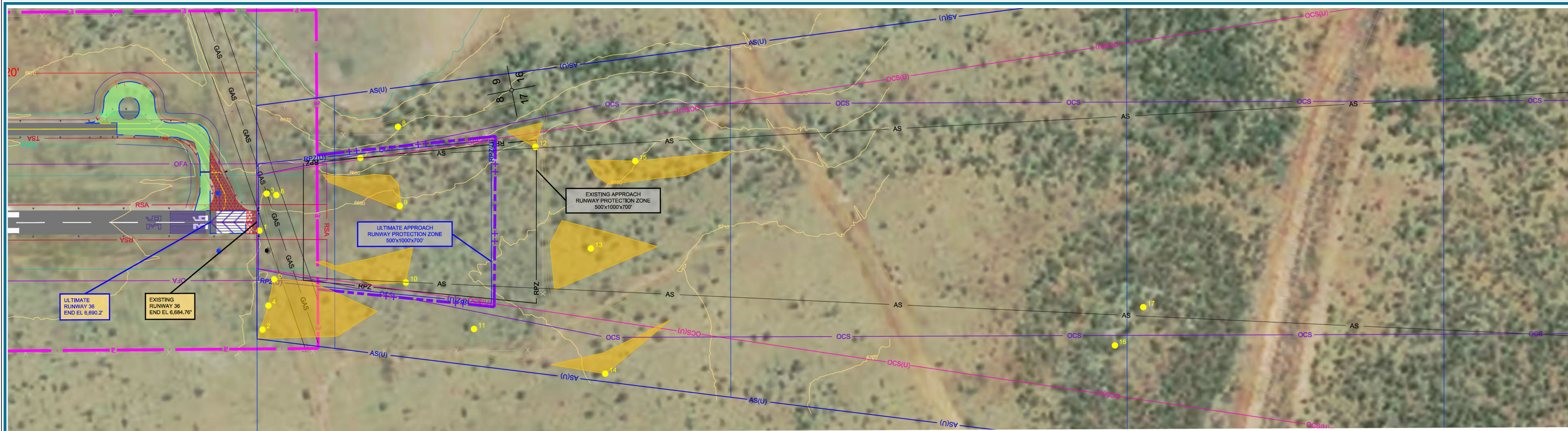
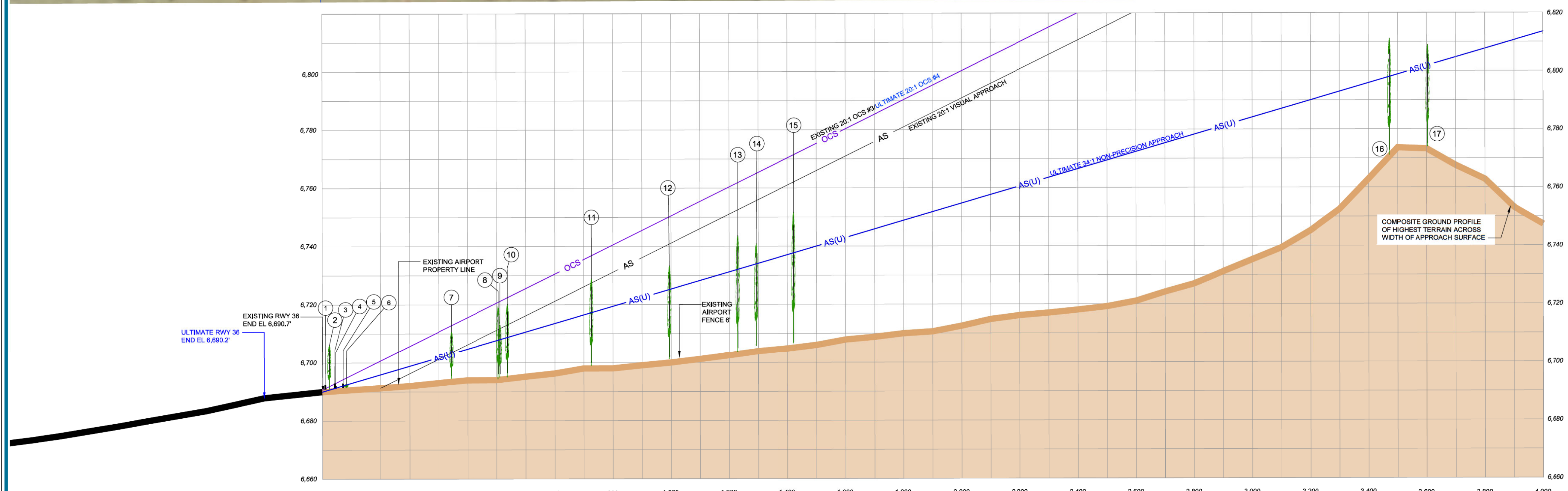
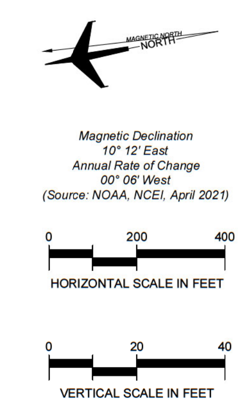




ID	Feature	Top Elevation (ft. msl.)	Penetration Value (ft.)				Remediation
			Existing 20:1 Approach	Existing 20:1 OCS #3	Ultimate 34:1 Approach	Ultimate 20:1 OCS #4	
1	Airfield Light	6692.274	N/A	1.08	1.84	1.68	To Remain
2	Tree	6706	N/A	N/A	15.15	N/A	Trim/Remove
3	Airfield Light	6692.921	N/A	0.09	1.53	0.69	To Remain
4	Terrain	6692.137	N/A	N/A	0.66	N/A	Re-Grade
5	Terrain	6692.804	N/A	N/A	0.55	N/A	Re-Grade
6	Bush	6692.683	N/A	N/A	0.1	N/A	Trim/Remove
7	Tree	6710.606	N/A	N/A	7.37	N/A	Trim/Remove
8	Tree	6719.333	N/A	N/A	11.36	N/A	Trim/Remove
9	Tree	6713	1.53	N/A	4.86	N/A	Trim/Remove
10	Tree	6720.02	7.27	N/A	11.12	N/A	Trim/Remove
11	Tree	6728.887	N/A	N/A	11.49	N/A	Trim/Remove
12	Tree	6733.26	N/A	N/A	7.98	N/A	Trim/Remove
13	Tree	6743.613	N/A	N/A	11.41	N/A	Trim/Remove
14	Tree	6740.787	N/A	N/A	6.73	N/A	Trim/Remove
15	Tree	6751.578	N/A	N/A	13.74	N/A	Trim/Remove
16	Tree	6811.041	N/A	N/A	12.88	N/A	Trim/Remove
17	Tree	6808.878	N/A	N/A	6.84	N/A	Trim/Remove



(000) OBS # OBSTRUCTION

OBSTRUCTION GROUPING

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.

2. Survey completed by Woolpert on 10/6/2020.

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

INNER PORTION OF THE APPROACH SURFACE DRAWING FOR RUNWAY 36

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 7 OF 11

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Airport Consultants
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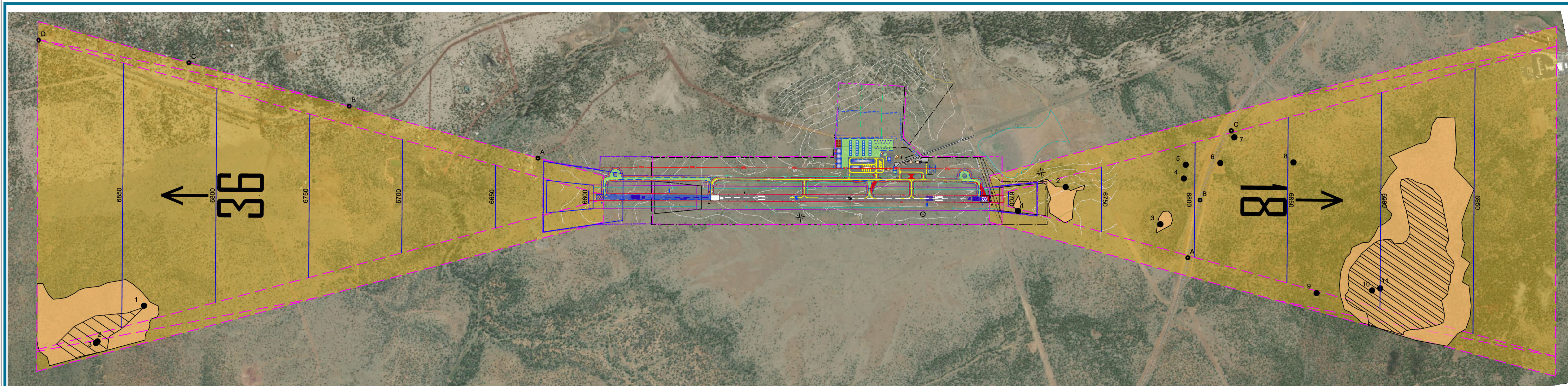

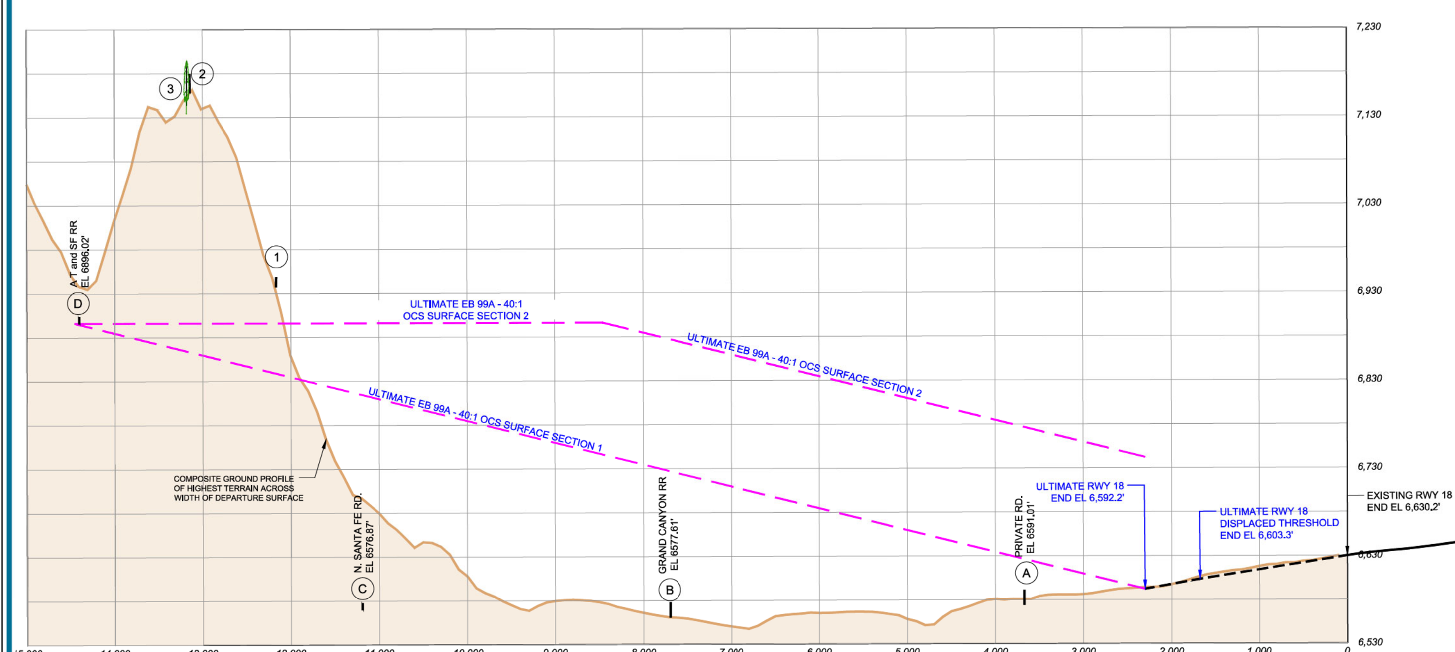

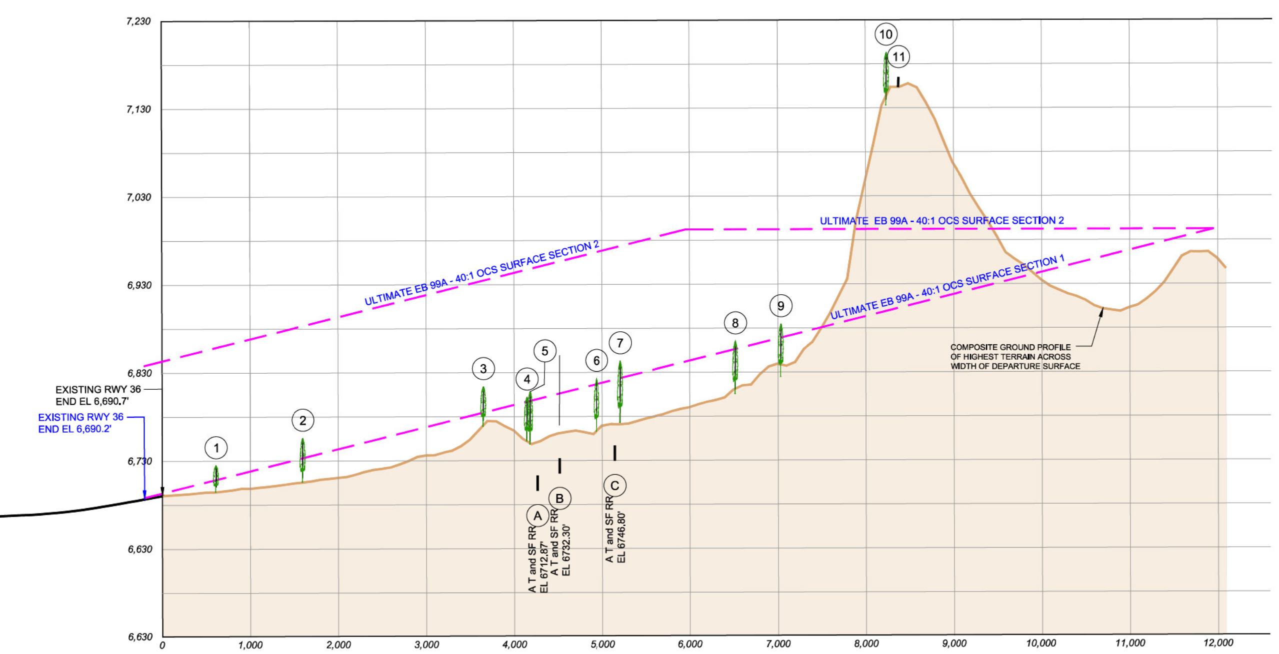

Runway 18 End Departure Surface Obstructions					
ID	Feature	Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Disposition
1	Terrain	6,886.05	Ultimate 18 End Departure Section 1	47.51	To Remain
2	Terrain	7,173.08	Ultimate 18 End Departure Section 2	276.88	To Remain
3	Tree	7,177.31	Ultimate 18 End Departure Section 2	281.11	Trim/Remove

Runway 36 End Departure Surface Obstructions					
ID	Feature	Elevation (ft. msl.)	Surface Obstructed	Penetration Value (ft.)	Disposition
1	Tree	6,720.02	Ultimate 36 End Departure Section 1	8.93	Trim/Remove
2	Tree	6,751.58	Ultimate 36 End Departure Section 1	15.88	Trim/Remove
3	Tree	6,811.04	Ultimate 36 End Departure Section 1	24.07	Trim/Remove
4	Tree	6,799.37	Ultimate 36 End Departure Section 1	0.05	Trim/Remove
5	Tree	6,805.89	Ultimate 36 End Departure Section 1	5.67	Trim/Remove
6	Tree	6,820.78	Ultimate 36 End Departure Section 1	1.72	Trim/Remove
7	Tree	6,840.89	Ultimate 36 End Departure Section 1	15.12	Trim/Remove
8	Tree	6,864.00	Ultimate 36 End Departure Section 1	5.48	Trim/Remove
9	Tree	6,883.68	Ultimate 36 End Departure Section 1	12.28	Trim/Remove
10	Tree	7,192.80	Ultimate 36 End Departure Section 1	291.76	Trim/Remove
11	Terrain	7,164.67	Ultimate 36 End Departure Section 1	260.15	To Remain

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.
3. Departure surface depicted from updated Engineering Brief released 07/2020. See EB No. 99A for detailed description of departure surface.
4. Terrain obstruction areas derived from intersection of ultimate Part 77 surfaces and a USGS 1/3 Arc Second NED.

MAGNETIC NORTH
NORTH

Magnetic Declination
10° 12' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, April 2021)

0 1000 2000
HORIZONTAL SCALE IN FEET

0 100 200
VERTICAL SCALE IN FEET

A — ROAD AND RAIL ROAD IDENTIFIER
1 — OBSTRUCTION IDENTIFIER
DEPARTURE SURFACE
OBSTRUCTION AREA GROUPING
TERRAIN OBSTRUCTION AREA

NO.	REVISIONS	DATE	BY	APP'D.

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H. A. CLARK MEMORIAL FIELD

RUNWAY 18-36
DEPARTURE SURFACE DRAWING

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 8 OF 11

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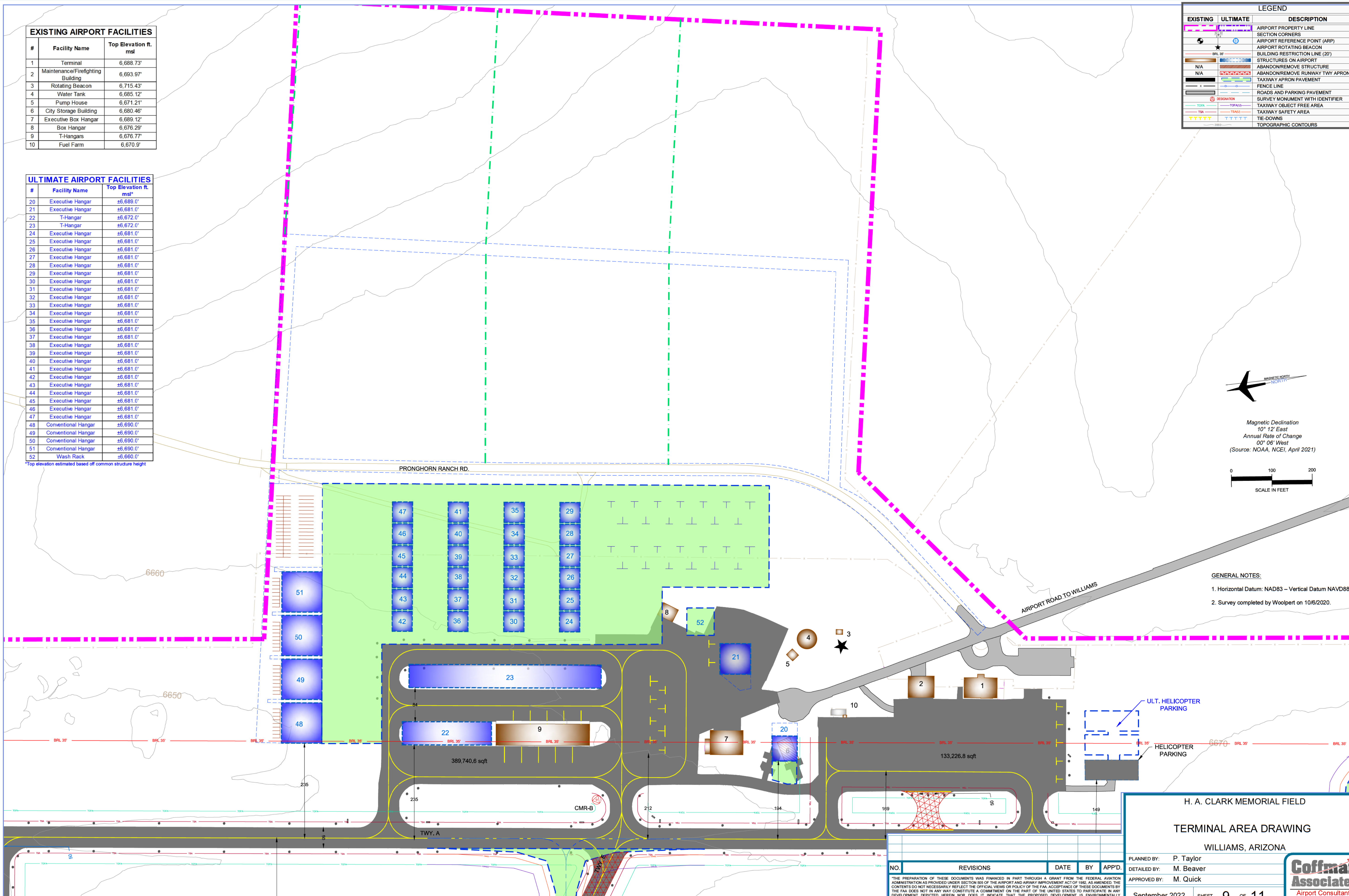

EXISTING AIRPORT FACILITIES		
#	Facility Name	Top Elevation ft. msl
1	Terminal	6,688.73'
2	Maintenance/Firefighting Building	6,693.97'
3	Rotating Beacon	6,715.43'
4	Water Tank	6,685.12'
5	Pump House	6,671.21'
6	City Storage Building	6,680.46'
7	Executive Box Hangar	6,689.12'
8	Box Hangar	6,676.29'
9	T-Hangars	6,676.77'
10	Fuel Farm	6,670.9'

ULTIMATE AIRPORT FACILITIES		
#	Facility Name	Top Elevation ft. msl*
20	Executive Hangar	±6,689.0'
21	Executive Hangar	±6,681.0'
22	T-Hangar	±6,672.0'
23	T-Hangar	±6,672.0'
24	Executive Hangar	±6,681.0'
25	Executive Hangar	±6,681.0'
26	Executive Hangar	±6,681.0'
27	Executive Hangar	±6,681.0'
28	Executive Hangar	±6,681.0'
29	Executive Hangar	±6,681.0'
30	Executive Hangar	±6,681.0'
31	Executive Hangar	±6,681.0'
32	Executive Hangar	±6,681.0'
33	Executive Hangar	±6,681.0'
34	Executive Hangar	±6,681.0'
35	Executive Hangar	±6,681.0'
36	Executive Hangar	±6,681.0'
37	Executive Hangar	±6,681.0'
38	Executive Hangar	±6,681.0'
39	Executive Hangar	±6,681.0'
40	Executive Hangar	±6,681.0'
41	Executive Hangar	±6,681.0'
42	Executive Hangar	±6,681.0'
43	Executive Hangar	±6,681.0'
44	Executive Hangar	±6,681.0'
45	Executive Hangar	±6,681.0'
46	Executive Hangar	±6,681.0'
47	Executive Hangar	±6,681.0'
48	Conventional Hangar	±6,690.0'
49	Conventional Hangar	±6,690.0'
50	Conventional Hangar	±6,690.0'
51	Conventional Hangar	±6,690.0'
52	Wash Rack	±6,660.0'

*Top elevation estimated based off common structure height

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
32 33 5 4		SECTION CORNERS
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
BRL 35'		BUILDING RESTRICTION LINE (20')
		STRUCTURES ON AIRPORT
N/A		ABANDON/REMOVE STRUCTURE
N/A		ABANDON/REMOVE RUNWAY TWY APRON
		TAXIWAY APRON PAVEMENT
		FENCE LINE
		ROADS AND PARKING PAVEMENT
DESIGNATION		SURVEY MONUMENT WITH IDENTIFIER
TOFA	TOFA(U)	TAXIWAY OBJECT FREE AREA
TSA	TSA(U)	TAXIWAY SAFETY AREA
		TIE-DOWNS
3660		TOPOGRAPHIC CONTOURS

Magnetic Declination
10° 12' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, April 2021)

GENERAL NOTES:

1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.

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H. A. CLARK MEMORIAL FIELD

TERMINAL AREA DRAWING

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 9 OF 11

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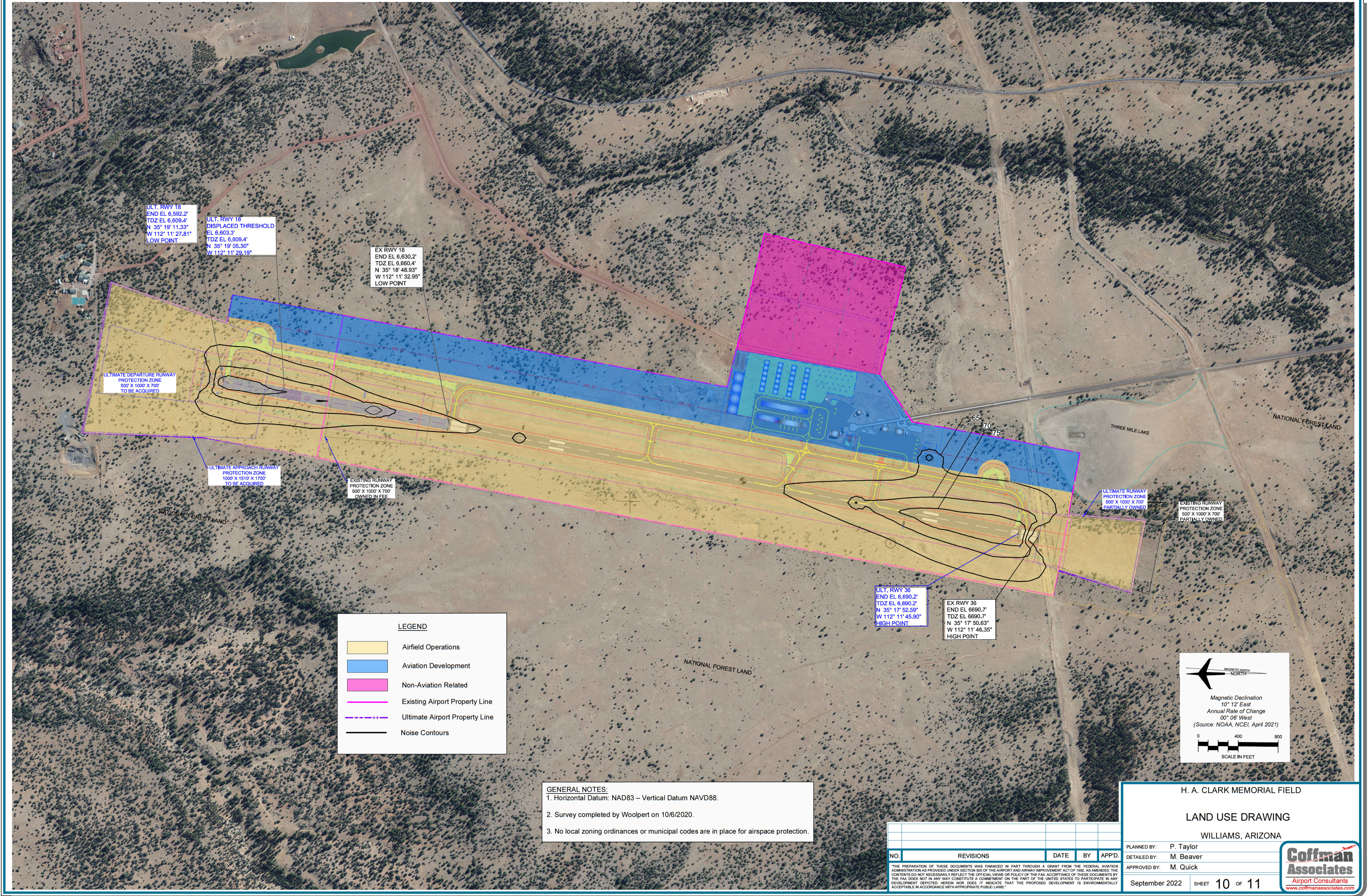

GENERAL NOTES:
1. Horizontal Datum: NAD83 – Vertical Datum NAVD88.
2. Survey completed by Woolpert on 10/6/2020.
3. No local zoning ordinances or municipal codes are in place for airspace protection.

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H. A. CLARK MEMORIAL FIELD

LAND USE DRAWING

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
DETAILED BY: M. Beaver
APPROVED BY: M. Quick

September 2022 SHEET 10 OF 11

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Property Table

Tract ID	Parcel Number	Grantor	Grantee	Interest Type	Acreage*	Instrument	Book	Page	Grant Number	Easement Type	Date	Purpose
1	20231001A	United States of America	City of Williams/Coconino County	Fee Simple	403	Deed	7	182	N/A	N/A	8/13/1948	Airport Use
2	N/A	City of Williams/Coconino County	United States of America	Fee Simple	-99.762	Reconveyance	Unk	Unk	N/A	N/A	3/14/1968	Reconveyance
3	20231001A	City of Williams	El Paso Natural Gas	Fee Simple	4.12	Warranty Deed	1245	802	N/A	ROW Easement	10/17/1988	Pipeline Access

Acreage for Tract ID 1 includes the 4.12 acres of Tract ID 3. The 4.12 acres of Tract ID 3 only accounts for the portion of the easement on airport property.

Property To Be Acquired

Tract ID	Parcel Number	Acreage
A	20232001C/Forest Service Land	76.08
B	Forest Service Land	11.45

PROPERTY LEGEND

- Ultimate Property Line
- Existing Property Line
- Ultimate Airport Property
- Existing Airport Property
- Parcel Boundary
- Existing Easement Boundary
- Existing ROW Easement

Magnetic Declination
10° 12' East
Annual Rate of Change
00° 06' West
(Source: NOAA, NCEI, April 2021)

0 400 800
SCALE IN FEET

GENERAL NOTES:

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H. A. CLARK MEMORIAL FIELD

EXHIBIT "A" PROPERTY INVENTORY MAP

WILLIAMS, ARIZONA

PLANNED BY: P. Taylor
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