ASTORIA REGIONAL AIRPORT

2024 MASTER PLAN

PORT OF ASTORIA

2024 MASTER PLAN

DECEMBER 2024

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CHAPTER 1

EXISTING CONDITIONS

CHAPTER 1 -
EXISTING CONDITIONS

This chapter provides an overview of the infrastructure, assets, services, and surrounding natural environment for the Port of Astoria who owns and operates the Astoria Regional Airport (AST). Information is based on airport records; information published by federal, state, and local agencies; and firsthand accounts from airport management, tenants, and users. The Existing Conditions chapter serves as the basis for assessments and recommendations described in the Airport Master Plan (AMP). The Existing Conditions Chapter includes the following sections:

- Airport Overview
- Aeronautical Facilities - Airside
- Aeronautical Facilities - Landside
- Non-aeronautical Facilities
- Auto Parking and Circulation
- Airport Utility Mapping
- Summary

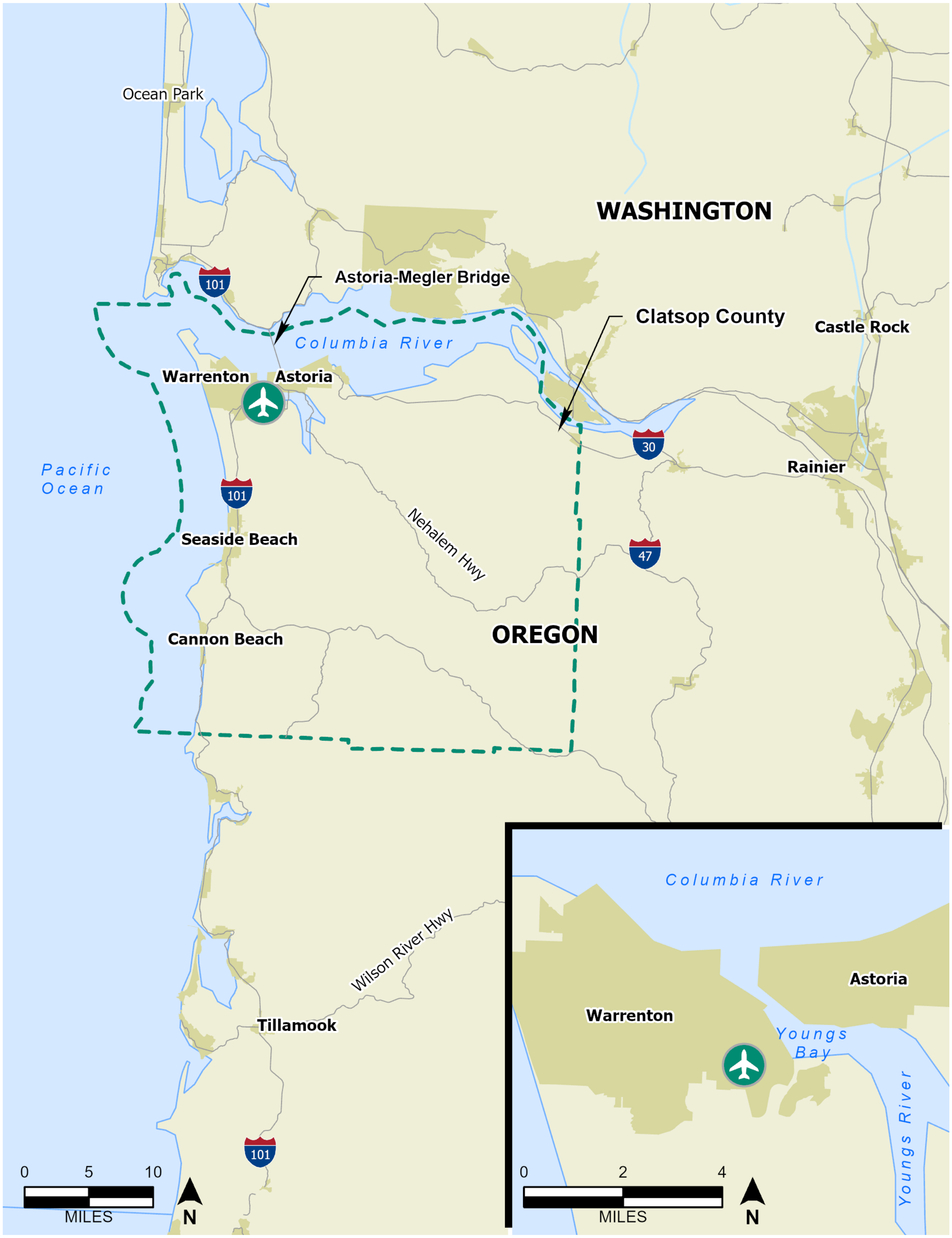
AIRPORT OVERVIEW

This section gives an overview of AST's location, history, role in the community, property interests, and components of airport operations. AST is a public-use airport owned and operated by the Port of Astoria. The Airport Manager oversees the daily operation and maintenance of the airport to ensure the safety and efficiency of operations.

Airport Location

AST is in Clatsop County, Oregon, in the City of Warrenton. AST is located near the opening of Youngs Bay. This waterway connects to the Columbia River, which empties into the Pacific Ocean. AST's location allows highway access from U.S. Highway 101 (US 101), which runs north to Washington, crossing the Astoria-Megler Bridge, and south to Oregon and California, running along the coastline near the Pacific Ocean. Travelers driving south from AST on US 101 pass through the communities of Seaside Beach, OR (14 miles) and Cannon Beach, OR (23 miles). AST is 1.5 miles from the City of Astoria, which is located to the northeast of the Airport across the New Young's Bay Bridge. **Figure 1-1** illustrates AST's location and surrounding areas.

Figure 1-1: AST Location



Source: Mead & Hunt

Airport Property and Role

AST property covers 870 acres. Airport property used for aviation purposes is classified as airside and landside. Airside functions facilitate aircraft movement and storage and include runways, taxiways, tie downs, and hangars. Landside areas include the Fixed Based Operator (FBO) terminal building, tenant facilities, and the automobile access and parking facilities. AST property includes non-aeronautical areas that are used for business development, such as the 26-acre Airport Industrial Park. The airport layout is shown in **Figure 1-2** AST serves as the central facility for the United States Coast Guard (USCG)Base Astoria and Air Station Astoria. The USCG provides an invaluable service to the area, controlling operations of HH-60 helicopters and motor lifeboat rescue stations located on the Oregon and Washington coasts.

AST is part of the Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems (NPIAS). The NPIAS is an inventory of the U.S. aviation infrastructure assets; it identifies airports that are significant to the national air transportation system. NPIAS airports qualify to receive federal grants under the FAA's Airport Improvement Program (AIP). The FAA uses the NPIAS to estimate the amount of AIP funding needed for infrastructure development projects. The 2023-2027 NPIAS classifies AST as a Public-Owned, General Aviation (GA) Airport, which serves a local role based on operations and activity measures. As such, AST qualifies to receive FAA AIP entitlement funds as well as discretionary funding consideration for airport planning, design, engineering, and construction projects as well as noise compatibility planning and assistance. The NPIAS designated role for small primary, reliever, and general aviation airports allows for the grants to cover a range of 90-95 percent of eligible costs, based on statutory requirements. **Table 1-1** provides a summary of the airport attributes.

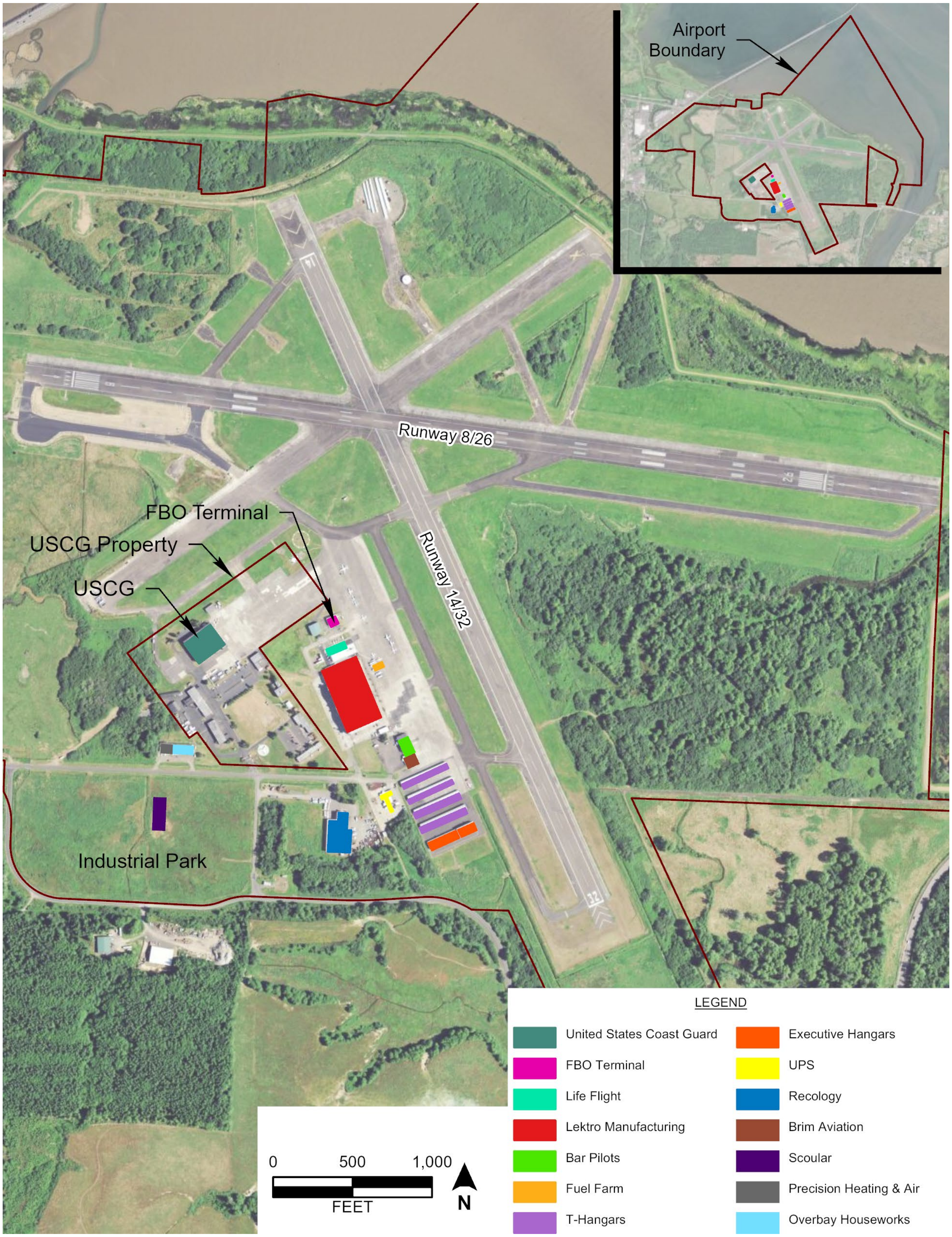
Table 1-1: AST Attributes

Airport Attributes	Description
Airport Owner	Port of Astoria
Owner Type - Facility Use	Public - Public
FAA NPIAS Classification	General Aviation
Airport Property	870 acres
Primary Runway	Runway 8/26 - 5,794 ft. x 100 ft.
Crosswind Runway	Runway 14/32 - 4,467 ft. x 100 ft.
Navigational Aids	VOR/DME, NDB, VORTAC, ILS (I-AST), Localizer, and Glideslope
Design Aircraft	B-II
Automated Weather Station	Automated Surface Observing System (ASOS)
Communications	UNICOM, CTAF: 122.8
Elevation	14.3 feet above sea level (ASL)
Air Traffic Control Tower (ATCT)	No

Note: See **Appendix F** for a list of abbreviations and acronyms.
Source: FAA Airport Data and Information Portal (ADIP)

The aviation activity conducted at AST is affected by surrounding airports, users' choice, and availability of services. Identifying the mutually supportive and competitive areas of the regional aviation market can support the future development efforts of AST to meet the needs of airport tenants and visitors. The socioeconomic and aviation activity will be covered in **Chapter 3 – Aviation Forecasts**.

Figure 1-2: **AST Property and Airfield Layout**



Source Maxar (ESRI (ESRI World Imagery basemap)

AERONAUTICAL FACILITIES - AIRSIDE

Aeronautical facilities consist of those areas of the airport that are accessible to aircraft. AST and the FAA continue to invest in the airport's facilities to maintain utility and function of the pavement surfaces and supporting infrastructure. **Figure 1-2** shows the aeronautical facilities that directly support aviation activity, including the following:

- Runway System
- Taxiway System
- Aircraft Parking and Transient Parking
- NAVAIDS, Lighting System, and Shelters
- Pavement Markings, Lighting, and Signage
- Air Cargo and Freight Facilities
- Aircraft Fuel Storage and Dispending Systems

Runway System

Runway Length and Strength

AST is equipped with two runways. Primary Runway 8/26 is 5,794 feet long by 100 feet wide. Runway End 8 has a displaced threshold of 300 feet, and Runway End 26 has a displaced threshold of 713 feet. Crosswind Runway 14/32 is 4,467 feet long by 100 feet wide. Both runways are used by general aviation, cargo, and military aircraft. Both runways are constructed of asphalt and have a gross weight bearing capacity of 60,000 pounds single-wheel, 76,000 pounds dual-wheel, and 119,000 pounds dual-tandem-wheel main landing gear. After review by the airport engineer, the Port allows operation by cargo, USCG, and military aircraft of 155,000 Gross Takeoff Weight (GTOW) such as a C-130 type aircraft.

Runway Lighting and Markings

Lighting

Runway 8/26 is equipped with Medium Intensity Edge Lights. Runway End 8 has Runway End Identifier Lights (REILs) and a four-light Visual Approach Slope Indicator lighting system (VASI), and Runway End 26 has a Medium Intensity Approach Light System with Runway Alignment indicator Lights (MALSR) as an approach lighting system (ALS). Runway 14/32 is equipped with Medium Intensity Edge Lights. Runway End 14 contains REILS and a VASI, and Runway End 32 contains a four-light Precision Approach Path Indicator lighting system (PAPI).

Markings

Runway markings are white, and their schematics depend on the approach category of the runway. The marking includes the runway designator, centerline, a threshold bar, aiming point, touchdown zone, and runway edge markings. **Table 1-2** summarizes the component systems for Runway 8/26 and Runway 14/32.

Table 1-2: AST Runway 8/26 and 14/32 Marking, Lighting, and Signage

Markings, Lighting and Signage	Runway 8/26		Runway 14/32	
	8	26	14	32
Runway Markings				
Aim Points	Yes		No	
Centerline	Yes		Yes	
Threshold Bars	Yes		Yes	
Runway Number and Edge Lines	Yes		Yes	
TDZ Distance Markers	No	No	No	
Runway Lighting				
MALSR	No	Yes	No	
Visual Approach Path Guidance	VASI	MASLR	VASI	PAPI
Runways and Taxiway Signage				
Distance Remaining Signs	Yes		NA	
Runway Entry Hold Sign	NA		NA	
Taxiway Location Signs	Yes		Yes	
Taxiway Directional Signs	Yes		Yes	

Source: AST Data and FAA Airport Data and Information Portal (ADIP)

Instrument Approach Procedures

Instrument Approach Procedures (IAPs) consist of a series of predetermined maneuvers for the orderly transfer of an aircraft under Instrument Flight Rules (IFR) conditions from the beginning of the initial approach to a landing, or to a point from which the landing can be made visually. IAP's are classified as a precision instrument approach with both horizontal and vertical guidance, non-precision with only horizontal guidance, and visual without positional guidance.

Runway End 26 is a Precision Instrument Runway (PIR) with an Instrument Landing System (ILS) (I-AST) Category I approach system that contains a Localizer and Glideslope. Runway End 26 also has an Area Navigation (RNAV) Global Positioning System (GPS) and localizer COPTER (LOC) IAPs, which identifies the approach procedures for helicopter-only approaches to an airport or heliport.

Runway End 8 also has an RNAV(GPS) approach that provides horizontal guidance, making it a non-precision approach. Runway End 8 includes a Very High Frequency Omni-Directional Range (VOR), which is a ground-based electronic system that provides azimuth information for high and low altitude routes and airport approaches. Runway End 8 also includes a COPTER VOR approach, which is an approach procedure for helicopter to airports in IFR conditions.

Runway 14/32 is a visual flight rules (VFR) runway and does not have IAPs. Runway 14/32 is a designated "circle to land" runway in several of the approaches. Circling to land is a procedure performed after conducting an instrument approach procedure (IAP) where the active runway isn't aligned with the approach being flown and the pilot visually flies at a low altitude down to the active runway. **Table 1-3** summarizes the IAPs.

Table 1-3: AST Instrument Approach Procedures

Approach Type	Runway End	Ceiling Minimums	Visibility Minimums
RNAV (GPS)	8	420 feet	1 mile
COPTER VOR	8	580 feet	¾ mile
VOR	8	660 feet	1 mile
ILS	26	264 feet	1 mile
RNAV (GPS)	26	264 feet	¾ mil
COPTER LOC	26	460 feet	¾ mile

Source: FAA Terminal Procedures Publication, AST August 11-September 7, 2022-2008 2019

Runway Protection Zones

The Runway Protection Zone (RPZ) is an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of the people and property on the ground. The FAA suggests that an airport operator maintain full control of an RPZ if feasible, avoid land uses that are potentially non-compatible within the RPZ, and comply with FAA guidance regarding land uses in RPZs. **Table 1-4** summarizes the RPZ dimensions at each runway end.

Table 1-4: AST Approach Runway Protection Zones

Existing RPZ	Width at Inner End	Length	Width at Outer End
Runway End 08	1,000 feet	2,500 feet	1,750 feet
Runway End 26	1,000 feet	2,500 feet	1,750 feet
Runway End 14	500 feet	1,000 feet	700 feet
Runway End 32	500 feet	1,000 feet	700 feet

Source: FAA AC 150/5300-13B, *Airport Design*, March 2022

Runway Design Surfaces

Airfield design decisions are driven by the requirements of the critical aircraft. The critical aircraft is the most demanding airplane, which is currently, or is planned to use a runway, taxiway, apron or other aeronautical facility on a regular basis. The weight, wingspan and performance characteristics of the airplane impact the design of the facility. Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing. Therefore, it is key that the AMP reflect the most up-to-date aircraft fleet mix. The critical aircraft will be evaluated in **Chapter 3 – Aviation Forecasts.**

FAA airport design surfaces provide clear areas and setbacks that are intended to maintain a safe and efficient airfield operating environment. **Table 1-5** summarizes the dimensions of the various runway design surfaces standards and existing conditions at AST.

Table 1-5: AST Runway Design Surfaces

Runway Design	Runway	
Runway	**8/26**	**14/32**
Runway Width	100 feet	100 feet
Runway Safety Area (RSA)		
Safety Area Width	300 feet	150 feet
Safety Area Length[1]	600 feet	300 feet
Object Free Area (OFA)		
OFA Width	800 feet	500 feet
OFA Length	600 feet	300 feet
Obstacle Free Zone (OFZ)		
OFZ Width	800 feet	300 feet
OFZ Length	200 feet	200 feet
Runway Center Line to:		
Hold line	250 feet	200 feet
Parallel Taxiway Centerline	300 feet	240 feet
Aircraft Parking Area	500 + feet	400 feet

Source: 2008 FAA AC 150/5300-13B, *Airport Design*, March 2022, and existing airport conditions.

Taxiway System

Taxiway Design Surfaces

The Taxiway Design Group (TDG) determines taxiway design standards. The TDG relates to the undercarriage dimensions of aircraft, based on the overall Main Gear Width and the Cockpit to Main Gear Distance. TDG also determines the taxiway edge safety margin and shoulder width of taxiways. The Airplane Design Group (ADG) of the critical design aircraft determines the dimensions of taxiway protection areas, taxiway separation, and required wingtip clearance for aircraft using the taxiways. Taxiway systems that serve Runways 8/26 and 14/32 are designed to accommodate TDG 2 aircraft.

Taxiway Lighting and Marking

The taxiways are equipped with medium-intensity taxiway edge lighting (MITL). Taxiway markings consist of yellow centerline and enhanced centerline markings and hold position signs painted with white inscriptions on red backgrounds. AST has eight runway holding position markings located at the Taxiway A connectors and Taxiway B connectors. Taxiway A contains an ILS hold line in front of the ILS antenna. **Table 1-6** summarizes the taxiway dimensions for AST.

Table 1-6: Taxiway System

Taxiway Segment	TWY A	TWY A2	TWY A3	TWY A4
Runway 8/26				
Type	Primary Parallel	Connector	Connector	Connector
Taxiway Design Group (TDG)	TDG2	TDG2	TDG2	TDG2
Dimension (Width)	35 feet	35 feet	35 feet	35 feet
Pavement Surface Course	Asphalt	Asphalt	Asphalt	Asphalt
Edge Lighting	MITL	MITL	MITL	MITL
Runway-Taxiway Center Line Separation	270 feet	-	-	-
Taxiway Signs	Yes	Yes	Yes	Yes
Taxiway Segment	**TWY B**	**TWY B2**	**TWY B3**	
Runway 14/32				
Type	Primary Parallel	Connector	Connector	
Taxiway Design Group (TDG)	TDG 2	TDG2	TDG2	
Dimension (Width)	35 feet	35 feet	35 feet	
Pavement Surface Course	Asphalt	Asphalt	Asphalt	
Edge Lighting	MITL	MITL	MITL	
Runway-Taxiway Center Line Separation	314 feet	-	-	
Taxiway Signs	Yes	Yes	Yes	

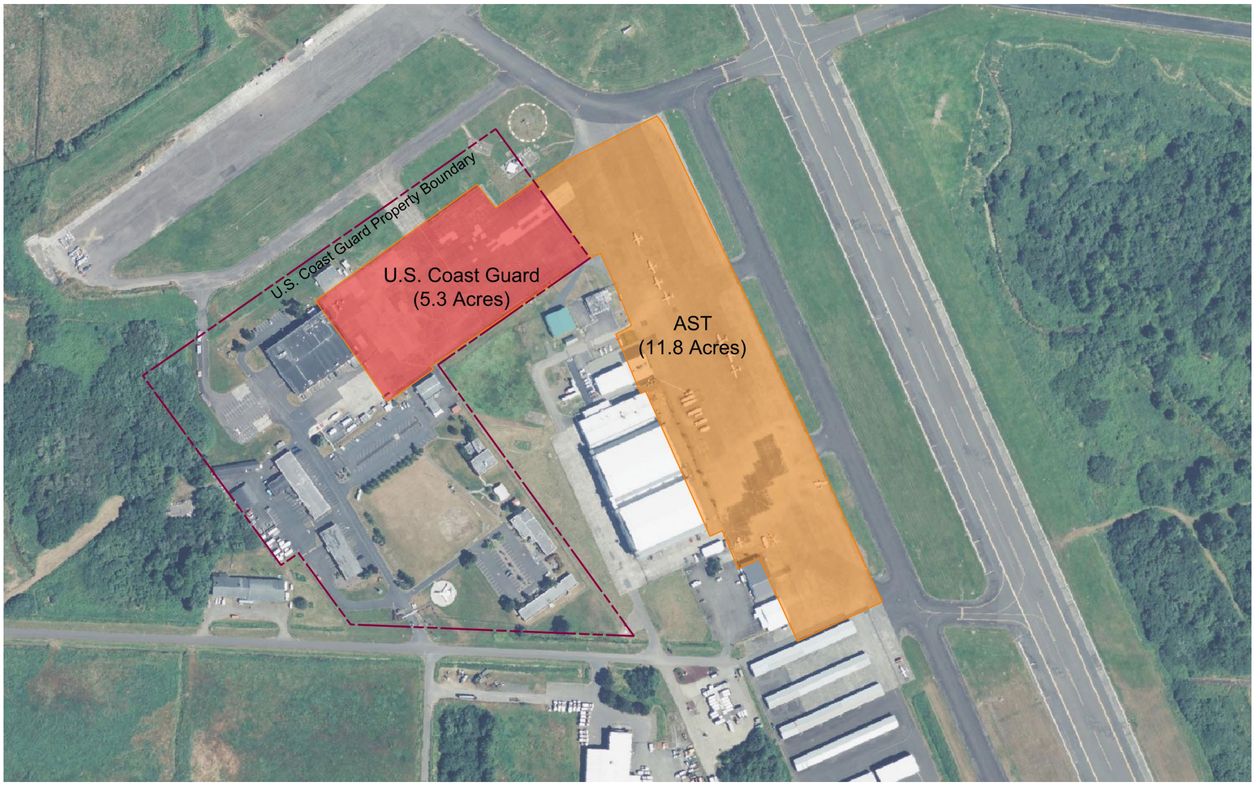
Note: See **Appendix F** for a list of abbreviations and acronyms.
Source: FAA AC 150/5300-13B, *Airport Design*, March 2022, and existing airport conditions.

Aircraft Parking and Transient Aprons

Aprons are used for the loading and unloading of aircraft, parking of aircraft, and aircraft storage. AST is equipped with an 11.8-acre apron located west of Runway 14/32 between the General Aviation facilities and Taxiway B. The transient tie-downs include 12 tie-down spots on the terminal ramp and five additional transient tie downs spots in front of the fuel farm (two large aircraft tie-down spots and two helipad parking spaces).

The apron located in front of the USCG facility is approximately five acres and provides four helicopter parking spaces to accommodate Sikorsky HH-60J Jayhawk Helicopters. **Figure 1-3** illustrates the AST and USCG aprons.

Figure 1-3: AST and USCG Aprons



Source: Microsoft Corporation (2022), Maxar (2022)

NAVAIDS, Lighting System, and Shelters

Navigational aids (NAVAIDs), which can be airborne or located on the ground and either visual or electronic, provide guidance and positional information to aircraft. NAVAIDs include ground-based electronic and visual systems and space-based global positioning system (GPS) satellites. Electronic NAVAIDs can transmit information to aircraft systems and allow pilots to navigate and operate in weather that has reduced visibility. Visual NAVAIDS assist pilots with airport location, runway orientation, approach, and navigating in the terminal environment under visual conditions. The FAA is implementing a modern air traffic control and management system called NextGen to decrease delay and increase capacity. NextGen uses GPS satellites rather than ground-based radio-NAVAIDs.

Visual NAVAIDS

Visual NAVAIDs include visual lights and wind indicators. AST's visual NAVAIDs include a segmented circle to show pattern direction, a lighted wind direction indicator, clear/green rotating beacon, the beacon is located on the top of the Lektro hangar. The runway system also has visual NAVAIDs, the MALSR, VASI, and PAPI, to help guide aircraft, this is identified in the **Runway System- Runway Lighting and Markings** section.

Electronic NAVAIDS

Reliance on sight limits the utility of visual NAVAIDs when visibility is poor. Electronic NAVAIDs require instruments onboard the aircraft and help pilots navigate, takeoff, and land when it is not possible to do so through visual cues alone. Electronic NAVAIDs include ground-based facilities and satellites that use GPS. NAVAIDs can be used during all flight conditions; however, they must be used when visibility and cloud ceilings are low enough to be considered instrument meteorological conditions (IMC).

The types of electronic NAVAIDs available for aircraft flying to and from AST include the Very-High-Frequency (VHF) Omni-directional Radio Range (VOR) Tactical Air Navigation (TACAN), which is a combined civil and military ground-based unit known as a VORTAC. There is also a Non-directional Beacon (NDB), Instrument Landing System (ILS), which includes a localizer signal that provides lateral course guidance for a pilot to maintain the aircraft's position relative to the runway's extended centerline. The Glide Slope (GS) antenna array is sited to the side of the runway touchdown zone. The GS provides vertical guidance through the ILS and provides deviation information from the optimum path of descent. The ASTORIA VOR is equipped with Distance Measuring Equipment (DME).

The ASTORIA VOR/DME is located on AST. The closest NDB to AST is 47.1 nm which is located southeast of the airport. **Table 1-7** summarizes the airport NAVAIDS.

Table 1-7: AST NAVAIDS

Type	Frequency	Distance from AST
VOR/DME	114 MHz	On Airport
NDB	356 MHz	47.1 nm
VORTAC	117.7 MHZ	48.7 nm
ILS (I-AST)	109.50	On Airport
Glide Slope	332.60	On Airport

Source: FAA Airport Data and Information Portal (ADIP), August 2022

Airspace Classification

Airspace administered by the FAA is classified as either "controlled" or "uncontrolled" and is defined by one of six classifications. Airspace designated as Class A, B, C, D, and E are controlled airspace, and Class G airspace is uncontrolled airspace. AST is located in Class E Surface Airspace depicted by a dashed magenta line in the Sectional Aeronautical Charts. **Figure 1-4** shows the sectional aeronautical chart for AST. Sectional Aeronautical Charts are the primary navigational reference medium used by pilots. The aeronautical information on Sectional Charts includes visual and radio aids to navigation, airports, controlled airspace, restricted areas, obstructions, and related data. It depicts all locations of Class E airspace with bases below 14,500 feet Mean Sea Level (MSL). In areas where charts do not depict a Class E base, Class E begins at 14,500 feet MSL. In most areas, the Class E airspace base is 1,200 feet Above Ground Level (AGL). In many other areas, the Class E airspace base is either the surface or 700 feet AGL. Some Class E airspace begins at an MSL altitude depicted on the charts, instead of an AGL altitude. There is no Air traffic Control Tower (ATCT) located at AST.

Figure 1-4: AST Sectional Aeronautical Chart

Source: FAA Seattle VFR Sectional Chart, Sept. 8, 2022.

Air Cargo and Freight Facilities

United Parcel Service (UPS) is a tenant at AST located south of the FBO, west of the T-hangars, and near Airport Road. UPS has an office space for shipping and logistics and a parking lot for the UPS trucks that transport cargo. FedEx (via their contract carrier Empire) uses the Airport; however, it has no on-site facilities.

Figure 1-5: AST Aircraft Fuel Storage

Source: M&H photo- site visit, August 2022.

Aircraft Fuel Storage and Dispensing Systems

AST is equipped with on-airport fuel storage facilities including two tanks. The fuel storage facility includes a 10,000-gallon Avgas tank and a 10,000-gallon Jet A fuel tank. 100LL is dispensed through a self-serve terminal adjacent to the farm tank. AST provides Jet A fuel with a 5,000-gallon fuel truck. The fuel demand at AST has been increasing, which justifies the addition of a supporting vehicle—another 5,000-gallon fuel truck. The fuel truck is anticipated to be obtained sometime in the summer of 2023 to meet seasonal demands. The fuel farm is located on the general aviation apron, south of the FBO. The Port of Astoria provides FBO services.

AERONAUTICAL FACILITIES – LANDSIDE

Airfield Communication Facilities and Equipment

The FAA's Air Traffic Organization (ATO), through their Air Traffic Services group, manages air traffic within the National Airspace System using a series of centers that have control and authority over different segments of airspace and airport movement areas. To transition in and out of this system, AST uses a Common Traffic Advisory Frequency (CTAF) 122.800, which is a designated frequency to safely coordinate arrivals and departures as well as provide position reports and acknowledge other aircraft in the airfield traffic pattern. Pilots self-report this information on the CTAF frequency to each other. CTAF may also be used to provide airport advisory information while operating aircraft to and from AST. AST does not have a Control Tower. AST provides Universal Communications or (UNICOM) on 122.800. UNICOM provides Air-to-ground and ground-to-air communications with arriving and departing aircraft. This communication is typically with airport operations and/or FBO services personnel about airfield conditions, weather, or services needed. UNICOM and CTAF use the same frequency at AST.

Airfield Vehicle Access Routes

AST has a service road that extends around the northwest interior of the Airport Operations Area (AOA) to provide access to the various NAVAIDs, approach lights, the weather observation system, and to transition between landside facilities. A second service road extends north from HWY 101 near the Lewis and Clark River to the approach end of Runway End 26 to provide access to ILS NAVAIDs and lighting systems.

Aircraft Hangars

AST provides Executive Hangars and T-hangars for lease that are owned by the Port of Astoria. General Aviation aircraft storage is located along the south end of the apron on the west side of Taxiway B. The existing hangars consist of 2 Box Hangars and 48 T-hangars.

Fencing/Gates/Security

AST has chain-link wildlife fencing around the airfield perimeter. Security gates provide access to GA hangars, and controlled movement areas on the airfield. There are two pedestrian gates with pin pads provide airside facilities access. There are two vehicle gates with pin pads that provide access to the GA hangars and are used by Airport staff to access the airport operations area (AOA). The USCG has a separate security staffed and gated entrance to access the USCG facilities from Airport Road/Southeast 12th Place. The FBO is accessible landside, outside of the security gates.

General Aviation Terminal Facilities

Fixed Based Operators (FBOs) support a wide range of General Aviation aeronautical activities, providing services to pilots and the traveling public. The Port of Astoria is the owner and operator of the AST Terminal and FBO. The FBO provides services that include aircraft fuel, aircraft support, UNICOM, and pilot and passenger facilities. The FBO is located southwest of the intersection of TWY A2 and TWY B. The current terminal building size and location will be evaluated in Chapter 4 Facility Requirements Analysis to determine if the terminal will need expansion or relocation based on the aviation demand at AST.

Other Airport Facilities

Tenant Facilities

AST has various companies, organizations, and individuals who lease land or hangars on Airport property in which they operate their company or organization. Tenant operations are both aviation and non-aviation related. Existing Airport tenants are listed below:

- Brim Aviation – Utility Helicopter Organization
- Columbia Bar Pilots- Pilot Transfer Services
- Overbay Houseworks - High end cabinetry, carpentry, and construction management projects.
- Lektro, Inc. - Aircraft Tug Manufacturer
- Life Flight Network- Air Medical Transportation Service
- Precision Heating and Indoor Air Quality - HVAC and Solar Solutions
- Recology – Maintenance Facility
- Scoular, Da Yang Seafood, and Bornstein Seafoods - Fishmeal processing center
- UPS Customer Center- Shipping and Mailing service
- Comcast – Telecommunications

Industrial Park

The Airport Industrial Park covers 26 acres and is located adjacent to AST on the south side of Airport Road/Southeast 12th Place and is enclosed by Southeast Airport Lane to the west and Southeast Flight Line Drive to the east. The Port of Astoria received a FAA Section 163 Determination for the Industrial Park property on January 7,2022, for approximately 24.5 acres. This determination identified acres no longer needed to directly support airport activity. FAA has also determined that a non-aeronautical use of such property will benefit civil aviation by producing an equal or greater benefit to the airport than continued retention of the aeronautical use. FAA also concluded that the release of the aeronautical use provision and use of such land for non-aeronautical purposes will not interfere with the operation, maintenance or future development of AST. The industrial park is zoned for General Industrial development. The Industrial Park property currently has a tenant that is leasing airport owned property (Scoular Companies). The Scoular Companies now operates a $20 million fishmeal processing center that opened in October 2022.The development of the Airport Industrial Park serves to generate revenue for AST as well as bring jobs to the community. The development of the Airport Industrial Park has been a catalyst for reconstructing AST's sewer infrastructure. New pressurized sewer and water infrastructure are all now readily available for businesses wishing to establish at the park. Infrastructure readiness serves as an incentive to future companies to develop in this area, and Scoular is a prime example of existing development possibilities. The Airport Industrial Park supports economic growth for AST, the City of Warrenton, the City of Astoria, and Clatsop County.

Figure 1-6: **AST Aeronautical Facilities**

Source: Maxar (ESRI World Imagery basemap)

Airport Climate Data

Weather conditions impact aircraft performance and influence airport design. Consideration is given to temperature, precipitation, visibility, and cloud ceiling heights. Wind patterns are an important meteorological factor in assessing runway utilization and for determining runway design requirements in accordance with FAA aircraft category standards.

Wind Patterns

The historical pattern of prevailing winds influences desirable runway orientation and runway usage. The FAA has determined that crosswinds pose a hazard to safe operations of aircraft, particularly to small and light aircraft; therefore, an airport's main runway should be aligned with the prevailing wind.

Wind coverage is the average percentage of time that a runway or grouping of runways is not subjected to crosswinds of magnitude greater than the allowable crosswind component for each runway. The FAA defines the desirable minimum wind coverage of an airport's runway configuration as 95 percent of wind velocity and direction observations over the most recent 10-year period. **Table 1-8**: shows the allowable crosswind component used to compute the wind coverage for a given runway based on the Runway Design Code (RDC) of the critical design aircraft expected to use the runway.

Table 1-8: Crosswind Components

Runway Design Code (RDC)	Allowable Crosswind Component
A-I[1] and B-I[1]	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III, D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, D-IV through D-VI	20 knots
E-I through E-VI	20 knots

Note: [1] These airport design standards pertain to facilities designed for small aircraft.
Source: FAA AC 150/5300-13B, *Airport Design*, March 2022

Wind data is collected by the National Oceanic and Atmospheric Administration (NOAA) by an Automated Surface Observing System (ASOS) located at AST. Wind data from 2011 to 2020 is grouped for three ceiling and visibility categories as presented in **Table 1-9**.

Table 1-9: Ceiling and Visibility Categories

Wind Coverage	Definition
All Weather	All wind observations.
Instrument Flight Rules (IFR)	Cloud ceiling less than 1,000 feet and/or visibility less than 3 miles, but cloud ceiling greater or equal to 200 feet and visibility greater than or equal to 0.5 miles
Visual Flight Rules (VFR)	Cloud ceiling greater than or equal to 1,000 feet and visibility greater than or equal to 3 miles.

Source: FAA Safety Handbook

Crosswind Coverages

The FAA's Airport Design software is used to determine the wind coverage for AST's runway orientation. The wind coverage data are shown in **Table 1-10** for the years 2011 to 2020.

Table 1-10: AST Crosswind Coverages

Runway	10.5 Knot Component	13 Knot Component	16 Knot Component	20 Knot Component
All Weather Wind Data Observations (percent coverage)				
Runway 8/26	89.28%	93.48%	96.89%	98.97%
Runway 14/32	89.49%	94.32%	98.45%	99.73%
All Runways	94.18%	97.59%	99.32%	99.91%
Instrument Wind Data Observations (percent coverage)				
Runway 8/26	85.71%	90.43%	94.83%	98.38%
Runway 14/32	85.73%	91.90%	97.50%	99.54%
All Runways	89.94%	95.28%	98.57%	99.81%
Visual Wind Data Observations (percent coverage)				
Runway 8/26	90.22%	94.31%	97.49%	99.14%
Runway 14/32	90.67%	95.10%	98.76%	99.79%
All Runways	95.45%	98.30%	99.56%	99.95%

Note: Crossway component computed using Runway True Bearings (8/26: 95 true heading), and (14/32: 154 true heading).
Source: National Oceanic and Atmospheric Administration (NOAA), FAA Airport Data and Information Portal (ADIP), and M&H table.

NON-AERONAUTICAL FACILITIES

AST is surrounded by a mixture of unimproved and rural land. There is a significant concentration of commercial activity along Highway 101 to the west, including major tenants such as Fred Meyer, Ross Dress for Less, Home Depot, Costco, and Walmart. The area also has a Shilo Inn and a car dealership. Most of the residential development is to the west of Highway 101 in Warrenton and across the bridge to the north in Astoria. Youngs Bay is to the north of the airport. **Figure 1-7**: illustrates the location of the AST.

Figure 1-7: Location of Warrenton Astoria Regional Airport

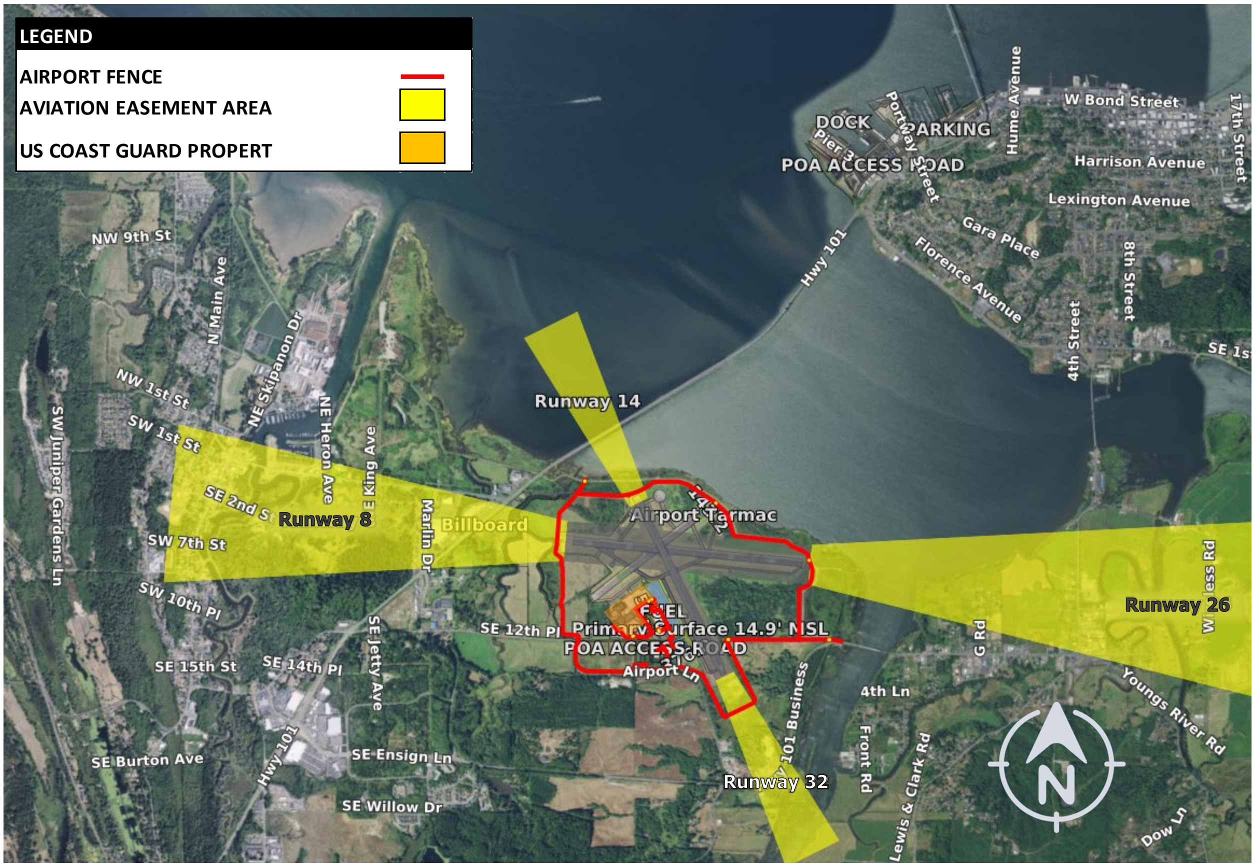


Figure Source: Port of Astoria GIS

The Port of Astoria (the Port) controls several parcels to the west of the fenced area of the Airport, extending to Highway 101. These parcels are well located for industrial and commercial development but have extensive development constraints, including the RWY 26 Runway Protection Zone. which can be overcome but at a cost. **Figure 1-8**: illustrates the location of the non-aeronautical properties included in the evaluation of this analysis.

Figure 1-8: **Location of Non-Aeronautical Properties - AST**

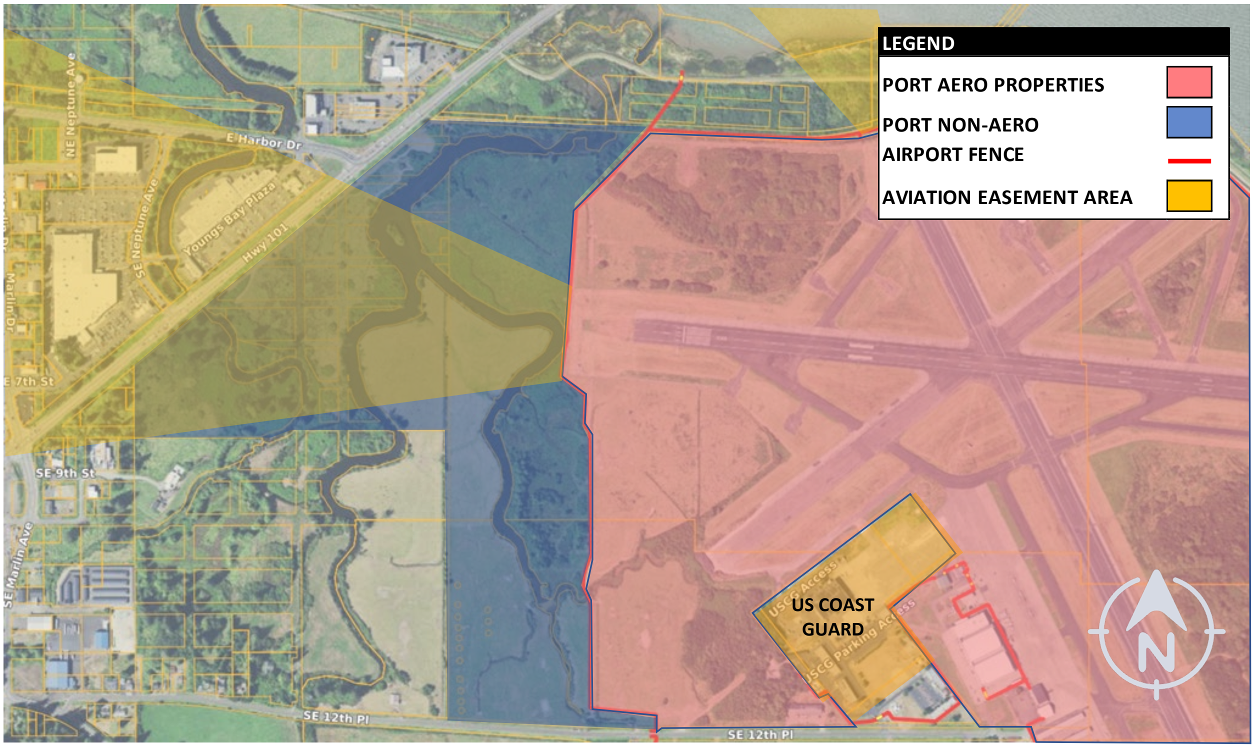


Figure Source: County GIS and Port of Astoria

The properties owned by the Port west of the Airport are heavily impacted by waterways, with Holbrook Slough, Adams Slough, and Vera Creek running north and south through the sites. The Port has been actively seeking to lease properties west of Adams Slough and Vera Creek. This area has been subdivided into a total of 26 parcels representing a total of 37.4 acres of property. The only existing tenant is a billboard lease on a small property with frontage along Highway 101. The overall area of this parcel is 54.7 acres, with significant loss in area associated with an extensive grid of dedicated right-of-way in the parcel. It is possible that multiple sites could be agglomerated, and the right of ways abandoned, which would increase the development yield and potentially the marketability of sites in this area. **Figure 1-9:** illustrates areas identified to be marketed for lease. A substantial portion of this red is subject to approach surface and RPZ functions. Substantially less than 54.7 acres is developable.

Figure 1-9: Areas Marketed for Lease - AST

Figure Source: County GIS and Port of Astoria

A roughly 76-acre site adjacent to and west of the airport fence is also available. It is bisected by Vera Creek over much of its area. Access to this site will be highly constrained except for SE 12th Place, which can only serve portions of this site. A substantial proportion of this area is subject to approach surface and RPZ functions, yielding substantially less than 76 acres developable.

Available mapping of wetlands, shown in **Figure 1-10:** and **Figure 1-11:** indicate that the sites have a number of locally significant wetlands. The United States Fish and Wildlife Service (USFW) identifies most of the properties as freshwater emergent wetlands. The local wetland inventory shows a series of wetlands on the sites, including a locally significant wetland on the sites fronting Highway 101.

Figure 1-10: Wetland Designations - AST

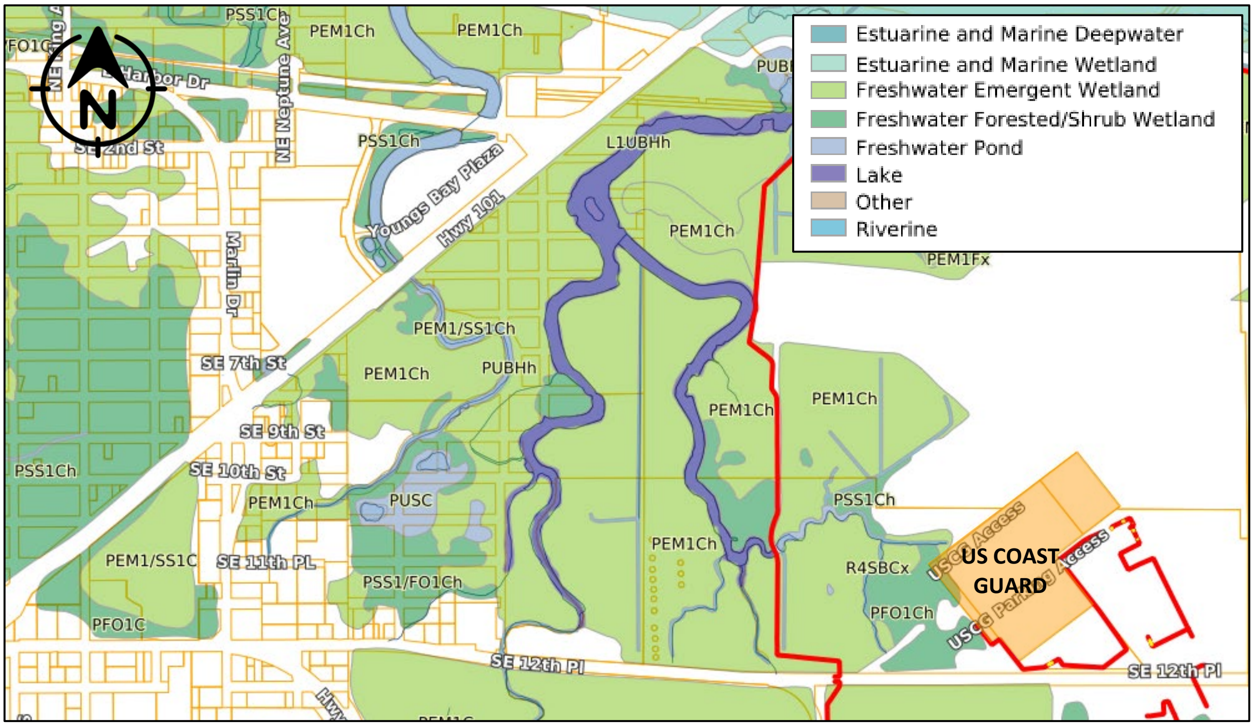


Figure Source: USFW, 2013 Wetland Designations

Figure 1-11: Local Wetland Inventory - AST

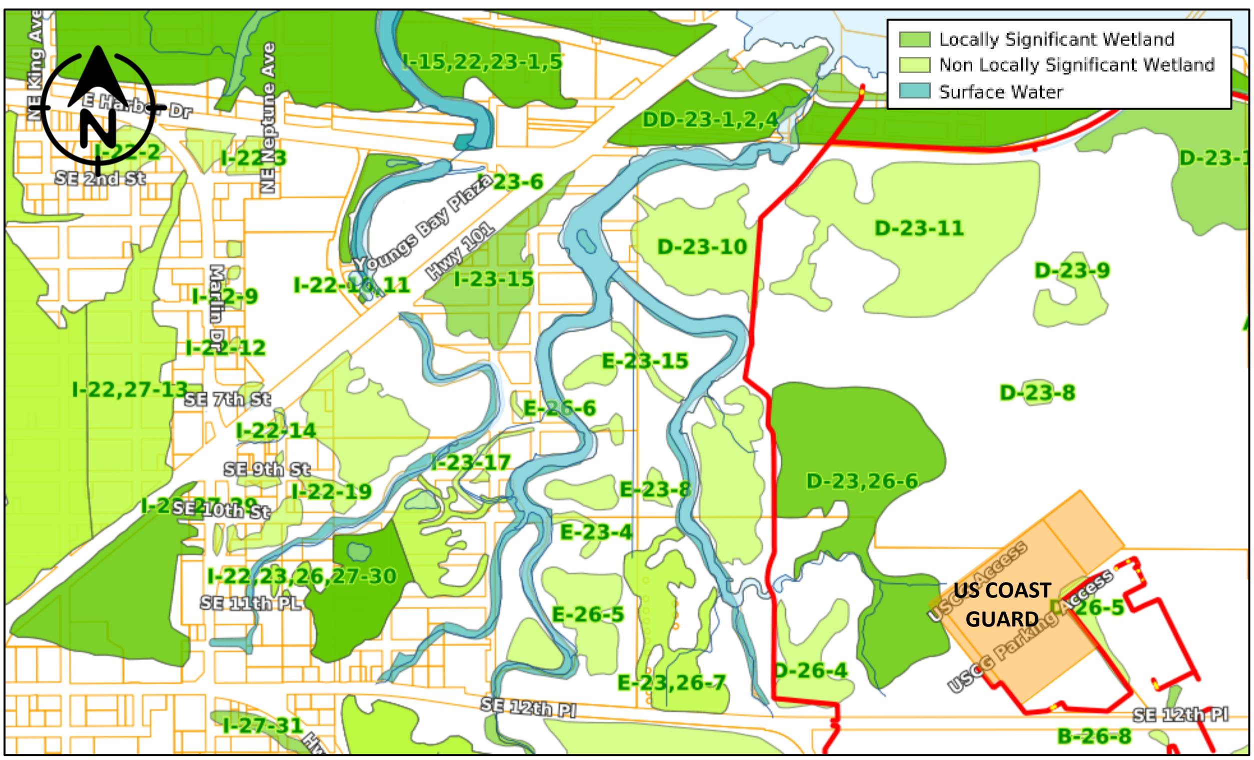


Figure Source: Port of Astoria GIS

The properties are zoned General Commercial C1 west of Adams Slough, and Institutional Zone (I1) to the east. The purpose of the General Commercial Zone is to allow a broad range of commercial uses providing products and services in the Warrenton downtown area, the Hammond business district and marina, and along the Highway 101 corridor. It allows a wide range of commercial uses, including almost all forms of retail and office. Medical and congregate care are also allowed uses, and residential uses are allowed with ground floor commercial space. The General Industrial Zone is intended to provide sites for light, heavy, and airport-related industrial activities in the City of Warrenton. These areas are suitable for uses involving manufacturing, fabrication, processing, transshipment, and bulk storage. General Industrial areas are near or adjacent to arterial transportation corridors. The sites are located in an enterprise zone, which provides tax benefits for targeted investments. **Figure 1-12**: illustrates the City of Warrenton Zoning Code as it relates to the identified properties.

Figure 1-12: Zoning of Non-Aeronautical Property

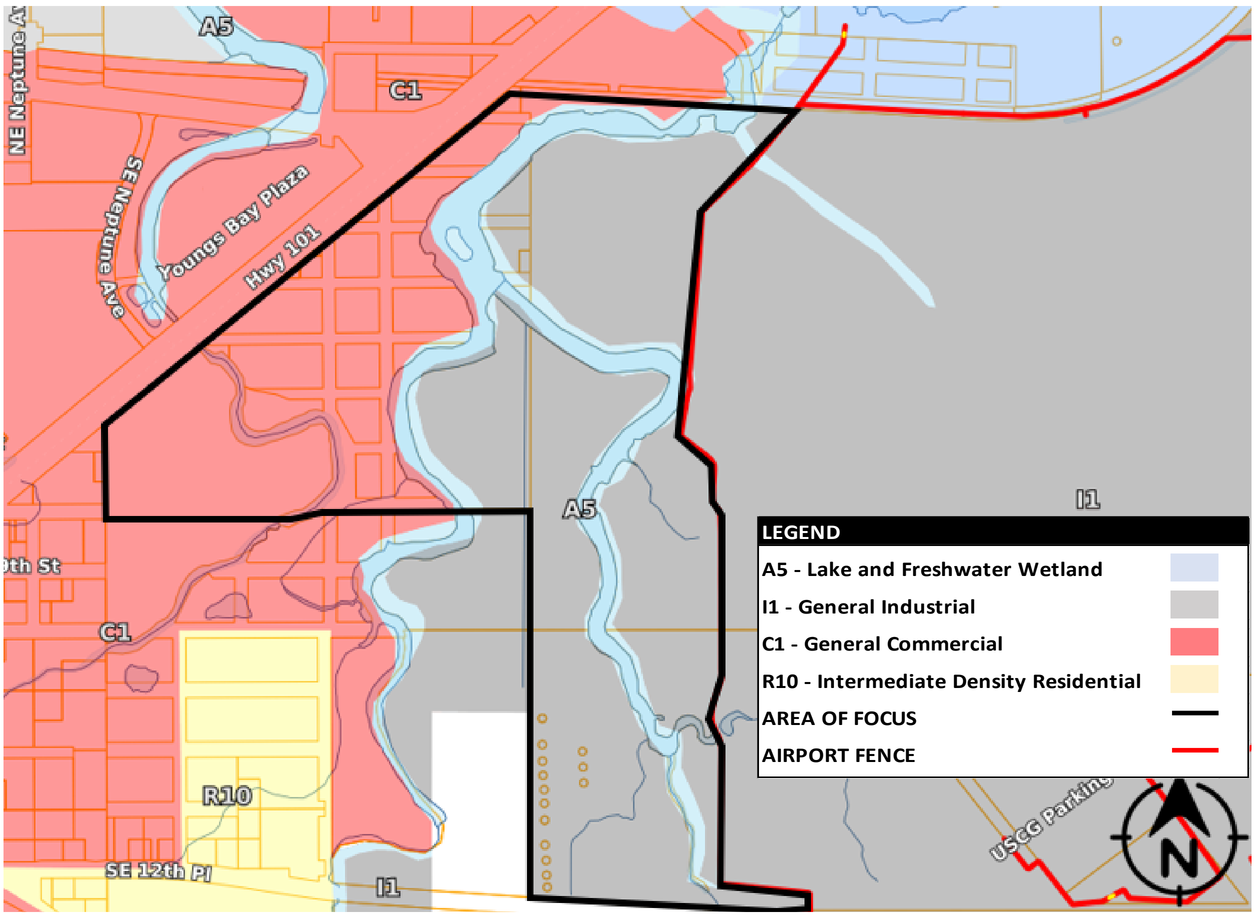


Figure Source: City of Warrenton Zoning Code

These zoning standards will create the parameters in which future non-aeronautical uses can be planned.

Transportation and Access: Access is via SE 12th Place and the Highway 101 Business Loop, with regional access via Highway 101 to the west of the site. The business loop has a full interchange with Highway 101 roughly one-half mile west of the airport's available non-aeronautical parcels.

Utilities: There are no identified limitations to utility access to the non-aeronautical lands around the Airport that would limit future feasibility. The Port has a force main sewer line as well as two water mains in SE 12th Place to serve the AST. Water, sewer, power, and telecom, illustrated in the **Utility Map** at the end of the chapter, already serve the airport and contained uses, with additional services available along the Highway 101 ROW.

AUTO PARKING AND CIRCULATION

This section describes how travelers, vendors, and employees access AST by automobile and where vehicles are parked while there. The inventory will help evaluate the future conceptual layout of parking and transportation design alternatives.

Roadway Access to AST

The main entrance road to the airport property is SE 12th Place. SE 12th Place can be accessed via Highway 101 Business and its connections to various streets, such as SE Airport Lane, SE Marlin Avenue, and SE Ensign Lane. **Figure 1-13** shows these access roadways. SE 12th Place is a two-lane roadway classified as a collector between Highway 101 Business and SE Airport Lane and varies between City of Warrenton and Clatsop County jurisdiction. East of SE Airport Lane, SE 12th Place enters the AST boundary and serves as the primary access roadway to the tenants within the airport complex. The terminal building is located on SE Flight Line Drive, which is a narrow two-lane roadway that extends north of the eastern terminus of SE 12th Place. SE Flight Line Drive also serves as the access road to private businesses Lektro, Inc. and Life Flight Network, who lease property from the Port of Astoria.

Automobile Circulation

There are no designated pick-up/drop-off facilities or designated turn-around areas provided at the AST terminal. Cars and trucks wishing to access the terminal must enter and leave via SE 12th Place and SE Flight Line Drive, sharing the road with local business traffic.

Access to FBO

The current FBO is located on the north end of SE Flight Line Dr. To access the existing FBO, you must drive north on a narrow lane two-lane road, past tenant facilities which does not provide direct access from SE 12th Place and wayfinding might become unclear. In the past the FBO was located adjacent to the south end of SE Flight Line Dr and the east end of SE 12th Place. The former location of the FBO, located on the south end of Lektro. Inc. hangar had a direct access from SE 12th Place, which made wayfinding more visual and apparent with the road circulation.

Transit Service

There are no public or private transit service stops at AST. The nearest transit routes travel US 101, SE Ensign Lane and roadways west of US 101, which is at least a two mile walk in the shoulder of the public roadway system.

Rental Car Operations

There are no rental car companies that operate on-site at AST; there are two rental car companies in the surrounding communities that serve AST, one each in the cities of Warrenton and Astoria. The rental car companies and locations are listed below:

- Lum's Toyota Rental – 1605 SE Ensign Ln, Warrenton, OR 97146
- Enterprise Rent-A-Car – 261 W Marine Dr, Astoria, OR 97103 (There are eight parking spaces at AST designated for Enterprise Rent-A-Car. Enterprise provides pick-up and drop-off services to and from FBO. The spaces are behind security gates near the FBO.)

Figure 1-13: Roadway Access Map

Source: David Evans and Associates, Inc., analysis; Port of Astoria, data.

Access to Developable Lands

AST has undeveloped parcels that could serve future development. The primary locations of these parcels are at the Airport Industrial Park and near the western AST boundary, just east of the intersection of US 101 at Neptune Drive.

Access to future development at the Airport Industrial Park site is likely to occur via driveways off SE 12th Place. Access to the western AST parcels will require the construction of a new roadway and probable construction of new structures to carry traffic over existing streams. This new road could extend north as a fourth leg at the intersection of SE 12th Place at Airport Lane. If a new state highway connection is desired at US 101 at Neptune Drive, this process will need to be coordinated with the Oregon Department of Transportation (ODOT). Any new development and associated roadways will also require approval from and coordination with the appropriate jurisdiction (ODOT, City of Warrenton and/or Clatsop County).

Bicycle and Pedestrian Circulation

Given the rural setting of the airport and the existing land uses, the presence of pedestrians and cyclists is limited. There are no designated bicycle or pedestrian facilities on the roadways accessing the terminal. There are also no documented bicycle parking or storage for occupants/employees or visitors.

Safety

Crash data along the access roadways was obtained from the ODOT Crash Analysis and Reporting Unit for the five most recent years of data (2016-2020). The data was analyzed to determine if there were any documented safety concerns with the terminal access roadways. There were no reported crashes on SE 12th Place, Airport Lane or SE Flight Line Drive for the five years of data.

In addition to reviewing the available crash data, the project team compiled observations from a site visit (August 18, 2022) to document areas that could become a safety concern if automobile traffic were to substantially increase through the area. The observations are summarized below:

- Roadways do not meet cross-section standards associated with functional classification
- Limited wayfinding/clear signage to the airport terminal
- No clear posted speed limit on SE 12th Place
- Vehicles observed traveling at high speeds on SE 12th Place

Automobile Traffic Volumes

Traffic volumes were compiled from available online databases and summarized in **Table 1-11**. Traffic volumes were not available for SE 12th Place, Airport Lane or Flight Line Drive, however observations from the site visit indicate there is ample capacity to serve the current traffic demand.

Table 1-11: Traffic Volumes on Access Roadways

Access Roadway	Average Annual Daily Traffic (vehicles/day)
SE Marlin Ave	3,736
Highway 101 Business (west of Marlin Ave)	468
Highway 101 Business (east of SE 12th Pl)	2,189
Highway 101 Business (east of Airport Ln)	6,162

Source: Oregon Department of Transportation (ODOT), 2021 data.
Note: Annual Average Daily Traffic (AADT) is the total annual volume of traffic passing a point in both directions divided by 365.

Parking Supply

Automobile parking at AST includes parking on paved and unpaved surfaces for both airport users and airport leasing tenants. The parking inventory was developed from aerial photos. For the purposes of this inventory, if parking stalls are delineated by pavement striping the parking is classified as "designated" parking. If there is no parking stall delineation, the parking is classified as "informal" parking.

There are approximately 24 parking spaces at the terminal building. None of the terminal parking is marked with signage to indicate specific users or time limits. During busy months, it is difficult for FBO to find parking for vehicles.

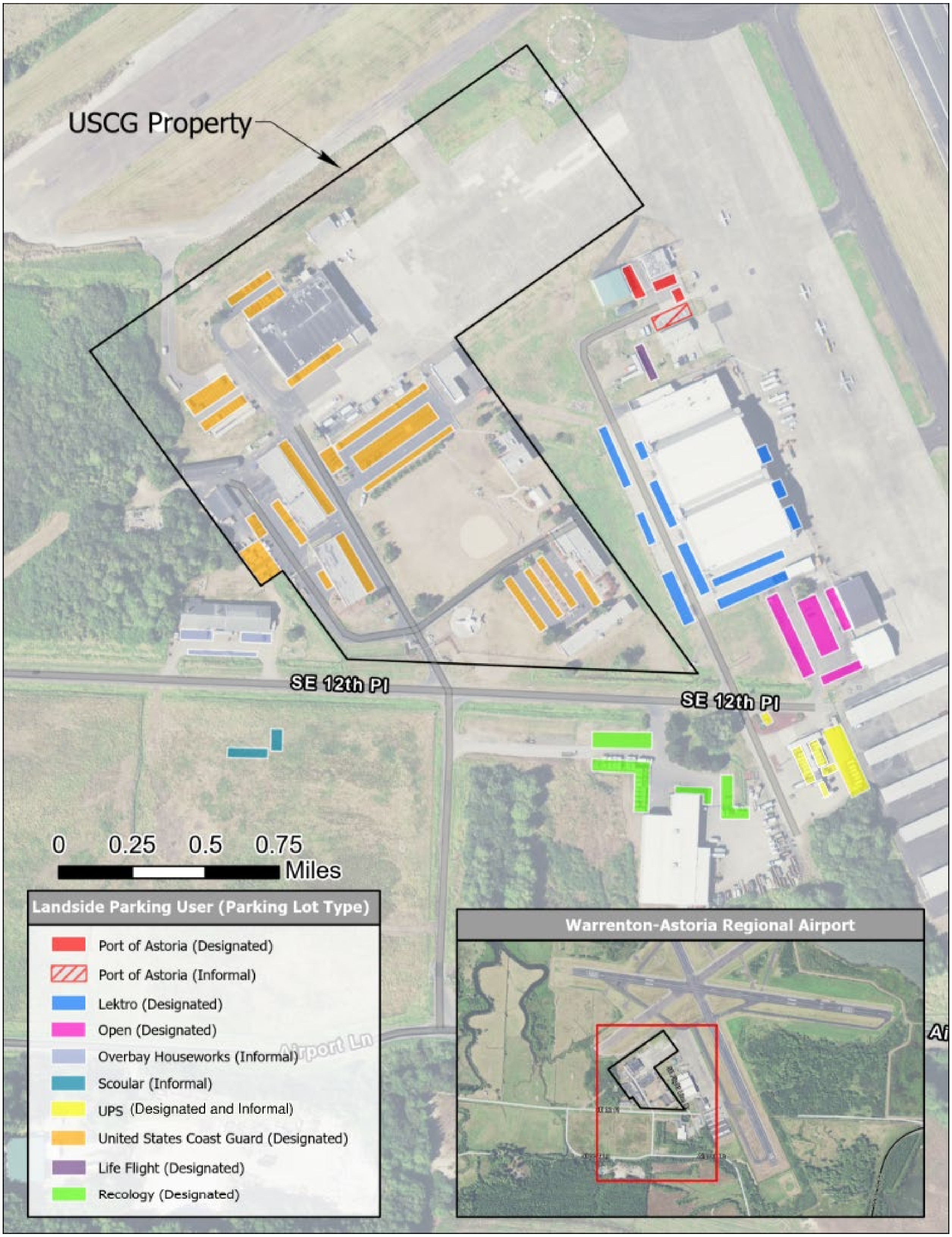
Separate from the terminal building parking lot, the AST complex has 481 total striped surface parking stalls and space for approximately 68 vehicles in informal parking areas. **Table 1-12** summarizes the current landside parking supply and **Figure 1-14** shows the location of the parking facilities.

Table 1-12: Landside Parking Supply for Designated and Informal Parking Areas

User	Number of Designated Parking Spaces[1]
Port of Astoria (Terminal)	8
Port of Astoria (Recology Western Oregon)	50
Lektro	116
Open	46
UPS	24
Life Flight	9
United States Coast Guard	260
User	**Informal Parking Estimated Capacity (Vehicles)[2]**
Port of Astoria (Terminal)	16
Overbay Houseworks	23
Scoular	28
UPS	17

Note 1: Parking stall delineated by pavement striping or loading dock. Note 2: Estimated parking capacity assumes parking stall width of 9 feet for 90-degree parking and a length of 25 feet for parallel parking.
Source: David Evans and Associates, Inc., analysis; Port of Astoria, data.

Figure 1-14: AST Landside Parking

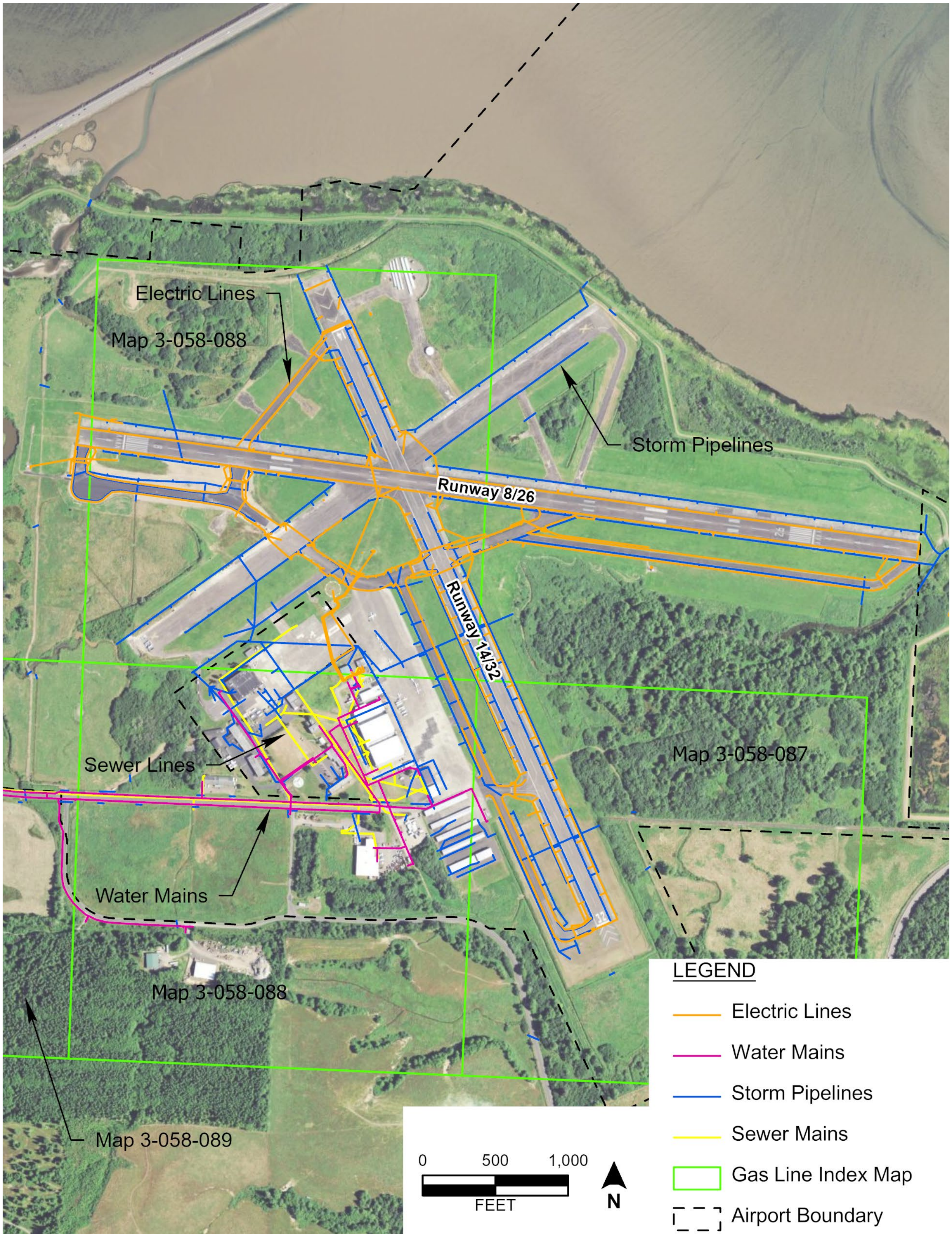


Source: David Evans and Associates, Inc., analysis; Port of Astoria, data.

AIRPORT UTILITY MAPPING

The utility infrastructure at AST is comprised of a network of electrical lines, water lines, storm pipes, and gas. **Figure 1-15** illustrates AST's utilities. Electrical is served by Pacific Power (Pacific Corp), water and sewer are served by the City of Warrenton, and natural gas utilities are served by Northwest Natural.

Figure 1-15: **AST Utility Map**



Source: Clatsop County GIS, 2022 data

SUMMARY

AST serves a wide variety of general aviation and USCG aviation users. AST and the FAA continue to invest in aviation facilities and airport improvements to support the current and future mission of AST. AST continues to serve both rotorcraft and fixed wing operations. Due to the unique location of the airport, adjacent to the Pacific Ocean and the Columbia River, AST serves as a valuable regional resource that supports the critical medical, safety, and emergency rescue mission of the USCG, Life Flight, and the Columbia River Bar Pilots.

This inventory of AST's existing conditions provides a general background, the operating environment, and the physical surroundings of the Airport. This chapter serves as the primary reference for the analysis and design process for the Environmental Considerations and Aviation Forecast chapters.

The **Environmental Considerations** Chapter will identify environmental factors pertaining to the ongoing operation and facility improvements of AST. Environmentally sensitive areas identified during the Environmental Considerations chapter will be used to screen future development alternatives.

The **Aviation Forecasts** chapter will evaluate current aircraft operation levels and the factors that affect aircraft activity level at AST. The aircraft fleet mix, potential changes to the designated critical aircraft category, and evaluation of the integration of electric aircraft and advanced air mobility (AAM) will be evaluated in Aviation Forecasts.

CHAPTER 2

ENVIRONMENTAL CONSIDERATIONS

CHAPTER 2 - ENVIRONMENTAL CONSIDERATIONS

This section identifies environmental considerations pertaining to the operation of and improvements at AST. Environmentally sensitive areas identified during the inventory will be used to screen future development. The following sections provide a baseline of the existing environmental conditions on and around the airport; the information presented is a high-level overview provided for planning purposes and is not intended to satisfy the requirements of the National Environmental Policy Act (NEPA).

The Environmental Overview provides an initial review of environmental resources that are known to occur on or near the airport. The intent of the initial review is to assist in the avoidance and minimization of environmental effects throughout the airport master planning process. Environmental conditions were assessed primarily through research of existing studies and documents, agency database searches, and local inquiry with limited field investigation and field coordination.

The analysis included these environmental categories:

- Air Quality
- Coastal Resources
- Department of Transportation Act, Section 4(f)
- Farmlands and Soils
- Threatened and Endangered Species
- Floodplains
- Historical and Cultural Resources
- Natural Resources and Energy Supply
- Socioeconomic, Environmental Justice, and Children's Environmental Health and Safety Risks
- Water Quality
- Wetlands
- Wild and Scenic Rivers

ENVIRONMENTAL OVERVIEW

Air Quality

The U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for a limited number of "criteria" pollutants with the enactment of the Clean Air Act (CAA) of 1970 and the Amendments of 1975 and 1977. Criteria pollutants are inhalable particulate matter, carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), lead (Pb), and sulfur dioxide (SO2). The NAAQS are defined in terms of maximum allowable concentrations of these criteria pollutants.

The CAA defines geographic regions that do not meet the NAAQS primary and secondary criteria for certain air pollutants as "non-attainment areas." Only two areas in Oregon are designated non-attainment areas: Klamath Falls and Oakridge. Several other metropolitan areas in Oregon that have a history of non-attainment, but are currently in attainment, are termed "maintenance areas."

No portions of Clatsop County are in a designated non-attainment or maintenance area; therefore, the General Conformity Rule (42 United States Code [USC] 7506(c)) does not apply. The Airport is in an attainment area that meets state and federal standards for all air pollutants regulated by the EPA.

Coastal Resources

The federal Coastal Zone Management Act of 1972 (CZMA) places responsibility with the states to develop land and water use programs to protect coastal zone resources. The CZMA requires that federal development projects and activities directly affecting the coastal zone "shall be conducted in a manner which is, to the maximum extent practicable, consistent with approved state management programs" (Section 307 (c)(1), (2)). This includes the state's federally approved Oregon Coastal Management Program (OCMP) (State of Oregon 2017).

Oregon's federally approved Coastal Zone encompasses almost all watersheds that drain to the Pacific Ocean. Nearly all of Clatsop County, including the location of the Airport property, is included within the Oregon Coastal Zone. As a result, any development at the Airport property is required to demonstrate consistency with statewide planning goals, local land use plans and ordinances, and other applicable regulatory programs and permitting requirements.

Section 4(f) Property

Section 4(f) of the Department of Transportation Act of 1966 prevents the use of a publicly owned park, recreation area, wildlife or waterfowl refuge, or public and private historical site for a transportation project unless there is no other feasible and prudent alternative and harm is minimized.

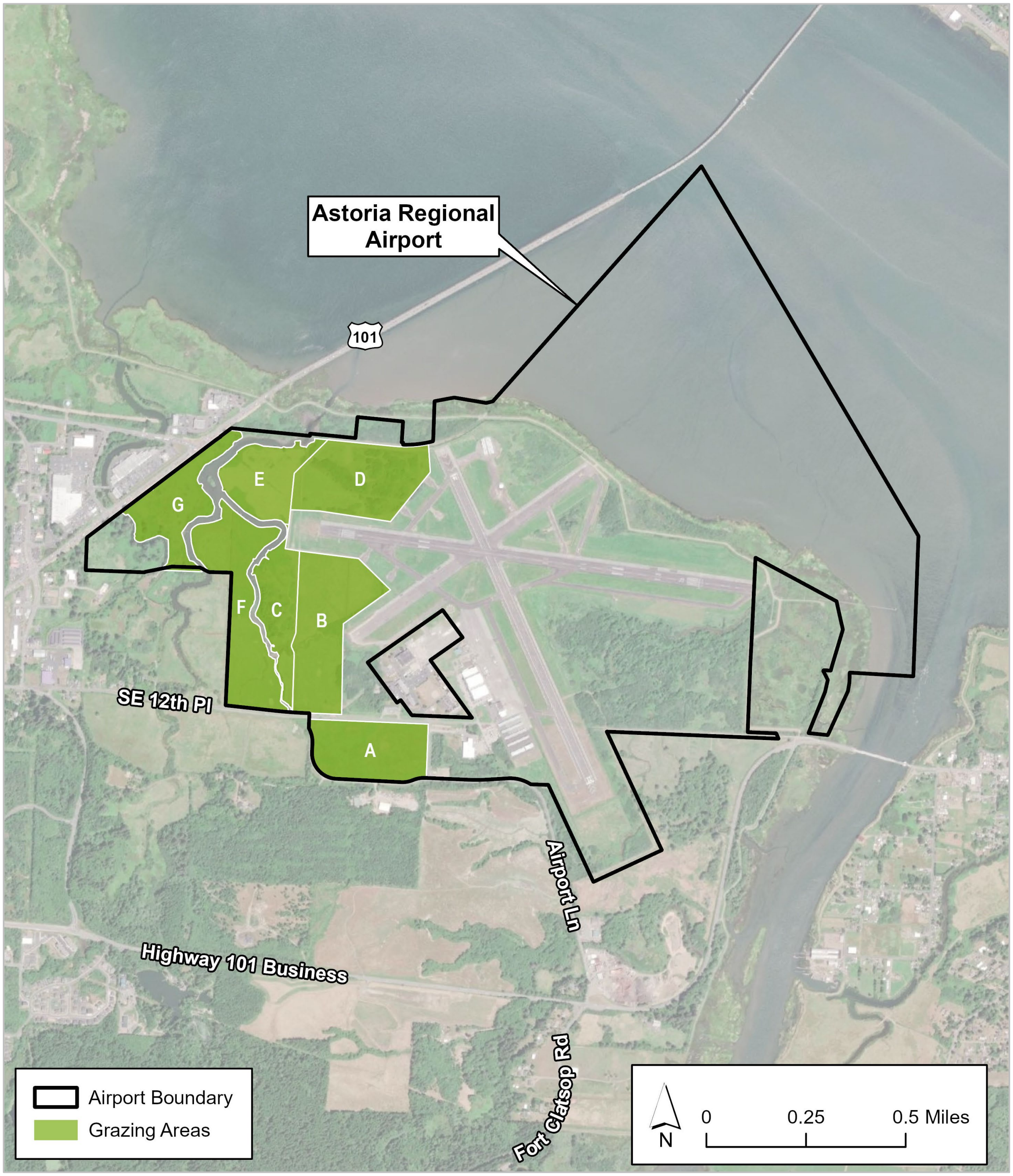
No such resources are situated on the Airport property or adjacent to the Airport. The nearest park and recreation area and the nearest historic site in the vicinity of the Airport property is the Fort Clatsop National Memorial, a unit of Lewis & Clark National and State Historical Parks. It is located approximately 1 mile south of the Airport property. No other parks are located within 1.75 miles of the Airport. Airport development is not expected to impact any Section 4(f) resources.

Farmlands and Soils

The Farmland Protection Policy Act (Public Law 97-98) (FPPA) is intended to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. The FPPA designates farmland as prime, unique, of statewide importance, and of local importance.

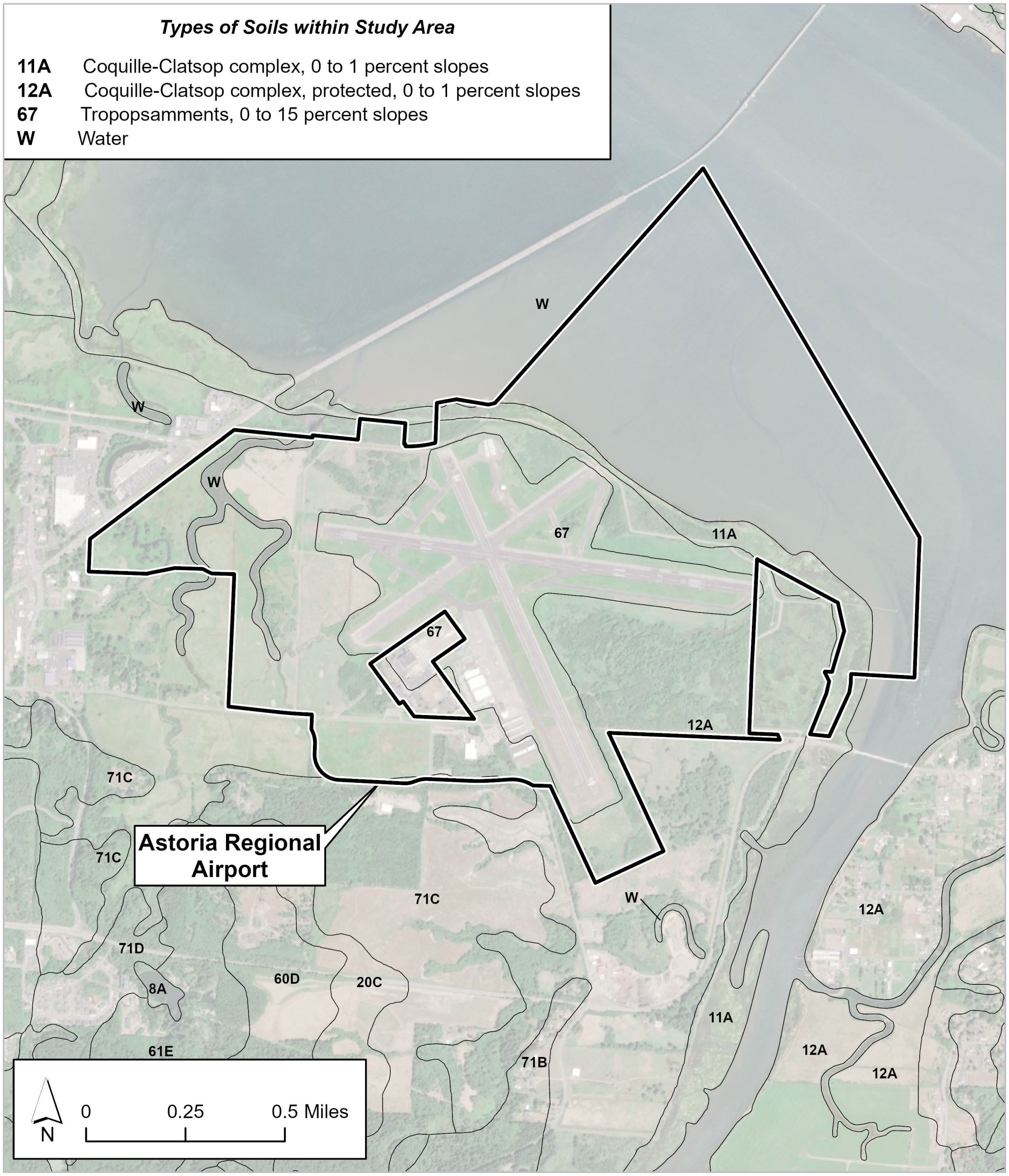
Agricultural uses in the vicinity of the Airport are limited to cattle grazing. This includes cattle grazing allotments within the Airport property (**Figure 2-1**). The Airport property includes two soil types according to the Natural Resources Conservation Service (NRCS) web soil survey illustrated in **Figure 2-2.** Tropopsamments soil type underlies most of the Airport runway safety area and other interior parts of the facility. Tropopsamments are characterized as very deep, excessively drained sandy soils. These soils originated as dredge spoils that were placed to fill the Airport site before the Airport was constructed in the 1930s, and are not considered prime farmland.

Figure 2-1: Grazing Areas



ESRI, ArcGIS Online, World Imagery.

Figure 2-2: **Soil Survey**



ESRI, ArcGIS Online, World Imagery.
Natural Resources Conservation Service (NRCS). 2013. Soil Survey Geographic (SSURRGO) database for Clatsop County, Oregon.

Outer areas of the Airport are underlain by Coquille-Clatsop soil complex, which is characterized as very deep, very poorly drained silt loam typically found on tidally influenced floodplains along bays and coastal streams. Where soils are protected by dikes or levees and drained, permanent pasture is the major use. The Coquille-Clatsop soil complex is not considered prime farmland, but it is considered farmland of statewide importance.

Although the Coquille-Clatsop soil type is relatively common in the surrounding area, a Farmland Conversion Impact Rating Form (NRCS Form AD-1006) may need to be completed for any proposed development that would result in a measurable change in the agricultural grazing use of land in and adjoining the Airport.

Threatened and Endangered Species

The Federal Endangered Species Act of 1973 (ESA) requires actions by federal agencies to not jeopardize the existence of listed threatened or endangered species. Federal agencies such as the FAA must consult with US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) when approving or funding actions that may affect such species.

Table 2-1 presents the occurrence of listed and proposed ESA species in Clatsop County and their documented and potential occurrence at the Airport. Published resources, including the USFWS Information for Planning and Consultation center and NMFS online resources, document the potential occurrence of listed species in Clatsop County. The Oregon Biodiversity Information Center (ORBIC) records documented occurrence of these species at specific locations.

A site-specific Biological Assessment documenting the occurrence of listed species and the effects of Taxiway A work was produced in 2017 (DEA 2017). This included on-site surveys for streaked horned lark conducted according to USFWS approved methods and in consultation with that agency. USFWS concurred with the conclusion that there was no occurrence or suitable habitat for any listed plants or wildlife within the Airport. A number of listed fish occur in the adjoining Columbia River and in Vera Slough, a small tidal channel in the southwest corner of the Airport to which parts of the facility drain.

These species may be affected by stormwater runoff from the Airport regardless of direct disturbance to the waterways. For Taxiway A, NMFS concurred with the conclusion that the work was not likely to adversely affect fish species in Vera Slough or the Columbia River and allowed the work to proceed. Any proposed Airport improvements involving federal authorization or funding will require assessment of stormwater runoff effects to aquatic species that are listed threatened or endangered at that time.

Table 2-1: Federally Listed and Proposed Species that May Potentially Occur in Clatsop County

Common Name/ESU*	Scientific Name	Agency with Jurisdiction	Federal Status	Known occurrence at the Warrenton-Astoria Airport
Fish				
Steelhead trout *Lower Columbia River* *Middle Columbia River* *Upper Columbia River* *Upper Willamette River* *Snake River*	*Oncorhynchus mykiss*	NMFS**	Threatened	Columbia River
Coho salmon *Lower Columbia*	*O. kisutch*	NMFS	Threatened	Vera Slough
Chinook salmon *Upper Columbia River Spring-run*	*O. tshawytcha*	NMFS	Endangered	Vera Slough
Chinook salmon *Snake River Spring/summer-run* *Snake River fall-run* *Upper Willamettte River* *Lower Columbia River*	*O. tshawytcha*	NMFS	Threatened	Vera Slough
Columbia River chum salmon	*O. keta*	NMFS	Threatened	Columbia River
Eulachon Southern DPS***	*Eulachon*	NMFS	Threatened	Columbia River
Green sturgeon Southern DPS	*Acipenser odoratum*	NMFS	Threatened	Columbia River
Bull trout *Columbia River*	*Salvelinus confluentus*	USFWS****	Threatened	None known to occur
Wildlife				
Marbled murrelet	*Brachyramphus marmoratus*	USFWS	Threatened	None; no potential habitat
Western snowy plover	*Charadrius alexandrinus nivosus*	USFWS	Threatened	None; no potential habitat
Streaked horned lark	*Eremophila alpestris strigata*	USFWS	Endangered	None; site-specific surveys revealed no larks and no suitable habitat
Northern spotted owl	*Strix occidentalis caurina*	USFWS	Threatened	None; no potential habitat

Notes: * ESU – Evolutionarily significant unit
** NMFS- National Marine Fisheries Service
*** DPS – Distinct Population Segment
**** USFWS – US Fish and Wildlife Service
Source: USFWS 2017

Floodplains

The Airport is located within a floodplain area that was filled with dredged material from the Columbia River before the Airport was constructed. The connectivity of the floodplain to the estuary has been altered by this fill and the construction of ditches and dikes. Airport drainage is separated from Youngs Bay and the Columbia River by tide gates. According to the Federal Emergency Management Agency Flood Insurance Rate Maps 41007C0217E, effective September 17, 2010, and 53049C0850D, effective May 18, 2015, the Airport is within Flood Hazard Zone AE and has a base flood elevation of 12 feet. Zone AE denotes areas subject to inundation by the one percent annual chance flood event.

Historical and Cultural Resources

Under Section 106 of the National Historic Preservation Act (NHPA) of 1966 (Public Law 89-665) (16 USC 470) and federal regulations (36 CFR 800), federal agencies must avoid adversely affecting properties that are included in or are eligible for inclusion in the National Register of Historic Places (NRHP). The NRHP identifies and documents districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture.

A site-specific cultural resources survey was performed by Archaeological Investigations Northwest (AINW) at the Airport in 2017 for work on Taxiway A (AINW 2017). The study covered approximately 22 acres in the western portion of the airport and included both on-site surveys and the results of previous studies in the vicinity. The investigation found no archaeological resources or high-probability areas within the Airport or the immediate vicinity. No historic buildings, historic structures, or cultural materials were discovered. The low-lying marshy area at the site remained undeveloped until the construction of the Airport in 1936. Although the Project Area is located within a region having a long history of human use and occupation, the investigation found the entire facility to contain up to a 13-foot depth of sandy dredge material fill, suggesting that there is a low probability of encountering historic, archaeological, or cultural resources.

Natural Resources and Energy Supply

A number of federal statutes, regulations, Executive Orders, and other requirements relate to natural resources and energy supply. These include the Energy Independence and Security Act (42 USC § 17001 et seq.); the Energy Policy Act (42 USC § 15801 et seq.); Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management (72 FR 3919, January 26, 2007); and Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance (74 FR 52117, October 8, 2009).

Airport operation and maintenance require the use of fuel to operate aircraft and maintenance vehicles and the use of electricity for the airport buildings, runway lights, and hangars. Airport tenant facilities on Airport property are metered separately from the Airport. In addition, the US Coast Guard (USCG) maintains its own fuel supply storage on Airport property, separate from the fuel used for Airport operations. FAA guidance assumes that airport improvements do not increase energy consumption to the point of significant impact unless it is found that the projects would cause energy demand to exceed supply.

Socioeconomic, Environmental Justice, and Children's Health and Safety Risks

Executive Order 12898, Environmental Justice, and the U.S. Department of Transportation (DOT) order on Environmental Justice require an assessment of potential inequitable distribution of negative effects to special population groups. Executive Order 13045, Protection of Children from Environmental Health Risks, directs federal agencies to prioritize identifying and assessing environmental health risks and safety risks that may disproportionately affect children.

Demographics

The population of Warrenton was approximately 5,635 in 2020, a 13 percent increase over the 2010 population of 4,989. The population of Astoria was approximately 9,929 in 2020, a 5 percent increase over the 2010 population of 9,477 (U.S. Census Bureau 2020). Overall, the demographic profile of the area is similar to that of Clatsop County and the State of Oregon as a whole, although the percentage of minority population is somewhat lower than the statewide level. The exception is that percentages of two or more races are higher in the region than the state, with Warrenton being double that of the state as a whole (**Table 2-2**: Poverty rates in the region are similar but lower than the state, with Warrenton's 5.9 percent less than half that of Oregon (14.1 percent)(US Census Bureau 2018).

Table 2-2: Demographic Data for the City of Warrenton and Comparison Geographies, 2020

	City of Warrenton	City of Astoria	Clatsop County	State of Oregon
Total Population	**5,635**	**9,929**	**39,656**	**3,939,233**
Ethnicity				
Hispanic or Latino of any race	7.8%	15.3%	8.7%	13.2%
Not Hispanic or Latino:				
White	81.1%	75.7%	83.3%	74.9%
Black or African American	0.3%	0.4%	0.8%	1.8%
American Indian and Alaska Native alone	0.2%	0.3%	0.5%	0.9%
Asian alone	1.3%	1.0%	1.1%	4.4%
Native Hawaiian and Other Pacific Islander alone	0.8%	0.2%	0.3%	0.4%
Some other race	0.0%	0.0%	0.0%	0.3%
Two or more races	8.5%	7.1%	5.4%	4.1%
Age				
Persons under 18 years	25.0%	19.6%	18.9%	20.8%
Persons 65 years and over	18.2%	19.6%	22.3%	17.6%

Source: U.S. Census Bureau 2020, American Community Survey 2016-2020 5-year estimates.

Employment

In 2016, the Airport contributed 896 jobs to the local economy, with 368 of those jobs directly generated by on-Airport activity; the remainder were generated indirectly within the local area through airport aviation-related activities and visitor spending. The Airport's total direct and indirect annual contribution to the local economy in 2016 consisted of $40,096,897 in payroll, $139,878,777 in on-airport annual sales/output, and $1,053,250 sales/output from visitor spending (Oregon Department of Aviation 2019).

Environmental and Children's Health and Safety Risk

The area immediately surrounding the Airport is characterized predominantly by industrial and agricultural uses. No residential population adjoins the Airport. The closest school is located 0.75 mile to the west. No other community facilities or childcare facilities are located within one mile of Airport property. Access to the Airport is by Southeast 12th Place and Southeast Airport Road from the west and by Southeast Airport Lane and Southeast Flightline Drive from the southeast.

These roads intersect with the Warrenton-Astoria Highway (U.S. Highway 101 Business Route) approximately one mile west and one mile southeast of the Airport property, respectively. With the exception of approximately ten residences located along Southeast Airport Road, ingress and egress to residential neighborhoods within one mile of the Airport are via roadways other than those used to access the Airport.

Water Quality

The Clean Water Act (CWA) (33 USC §§ 1251-1387) is the principal federal law regulating the protection of water quality in the United States. Section 303(d) of the CWA requires states to identify waters where current pollution control technologies alone cannot meet the water quality standards set for that waterbody.

No 303(d)-listed waterbodies are present within the Airport. The Oregon Department of Environmental Quality (DEQ) Integrated Water Quality Assessment Report for 2012 includes the Lewis and Clark River, which flows into Youngs Bay immediately east of the Airport property, as 303(d)-listed and water quality limited for dissolved oxygen and fecal coliform (DEQ 2012).

Wetlands

The U.S. Army Corps of Engineers (USACE) and Oregon Department of State Lands (DSL) regulate earthwork cut and fill within wetlands of the U.S. and the State under the federal Clean Water Act and the state Removal-Fill Act, respectively. Wetlands are present on the Airport, and developments that impact them may be constrained by these regulations. The Airport occupies a low area adjacent to the Columbia River and, historically, likely consisted of wetlands and mudflat habitats.

Published resources, as well as several site-specific studies, show the extent of wetlands within the Airport. The Clatsop County Soil Survey depicts the majority of the Airport as Tropopsamments soils, which are described as very deep, excessively drained sandy soils composed of river dredging spoils that were placed as fill along the Columbia River.

The Local Wetland Inventory (LWI) and the National Wetlands Inventory (NWI) each map out the general extent of potential wetlands. Both resources for this location depict wetlands occupying nearly the entire area surrounding the Airport and occupying many pockets within both developed and undeveloped areas of the Airport (**Figure 2-3** and **Figure 2-4**). The earliest available air photo was taken in 1939, as the airport was being constructed, and shows primarily sand or dredge spoils deposited among wetlands (**Figure 2-5**).

Three site-specific wetland delineation studies have been conducted within the Airport to map and confirm precise wetland boundaries for permitting purposes, as summarized in **Table 2-3**. As depicted in **Figure 2-6**Figure 2-6: , these delineations confirm that wetlands likely occupy a significant proportion of the Airport. Because Oregon DSL considers wetland delineations to be obsolete after five years, any development within the site is likely to require a fresh wetland delineation study. If wetland impacts are necessary for development, mitigation will be required.

A site-specific wetland mitigation bank was established in 1987 to make credits available for Airport projects, and several credits remain available to offset future wetland impacts. Mitigation for wetland impacts at the Airport may also be accomplished through purchase of credits at the Claremont Road Mitigation Bank, depending on credit availability at the time.

Table 2-3: Previous Wetland Delineation Studies

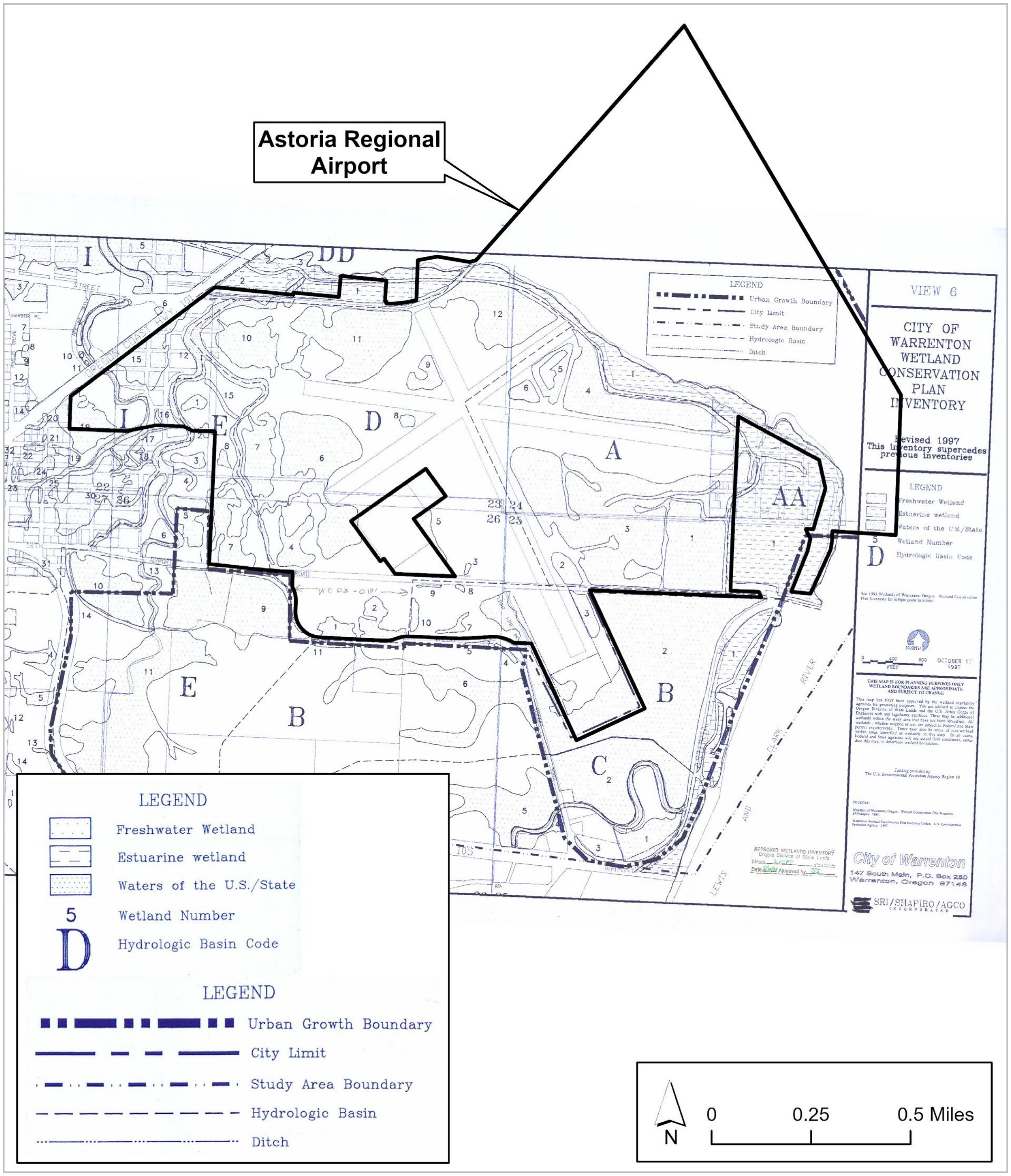
Study	Year	Study Area Acreage	Wetland Acreage	Regulated Stream /Ditch Acreage
Drainage Improvements Project	2014	48.0	9.08	0.0
Taxiway A Improvements	2017	14.80	5.60	0.0
Southwest Site Development	2017	10.30	3.31	0.43

Source: David Evans and Associates 2014, 2017a, and 2017b

Wild and Scenic Rivers

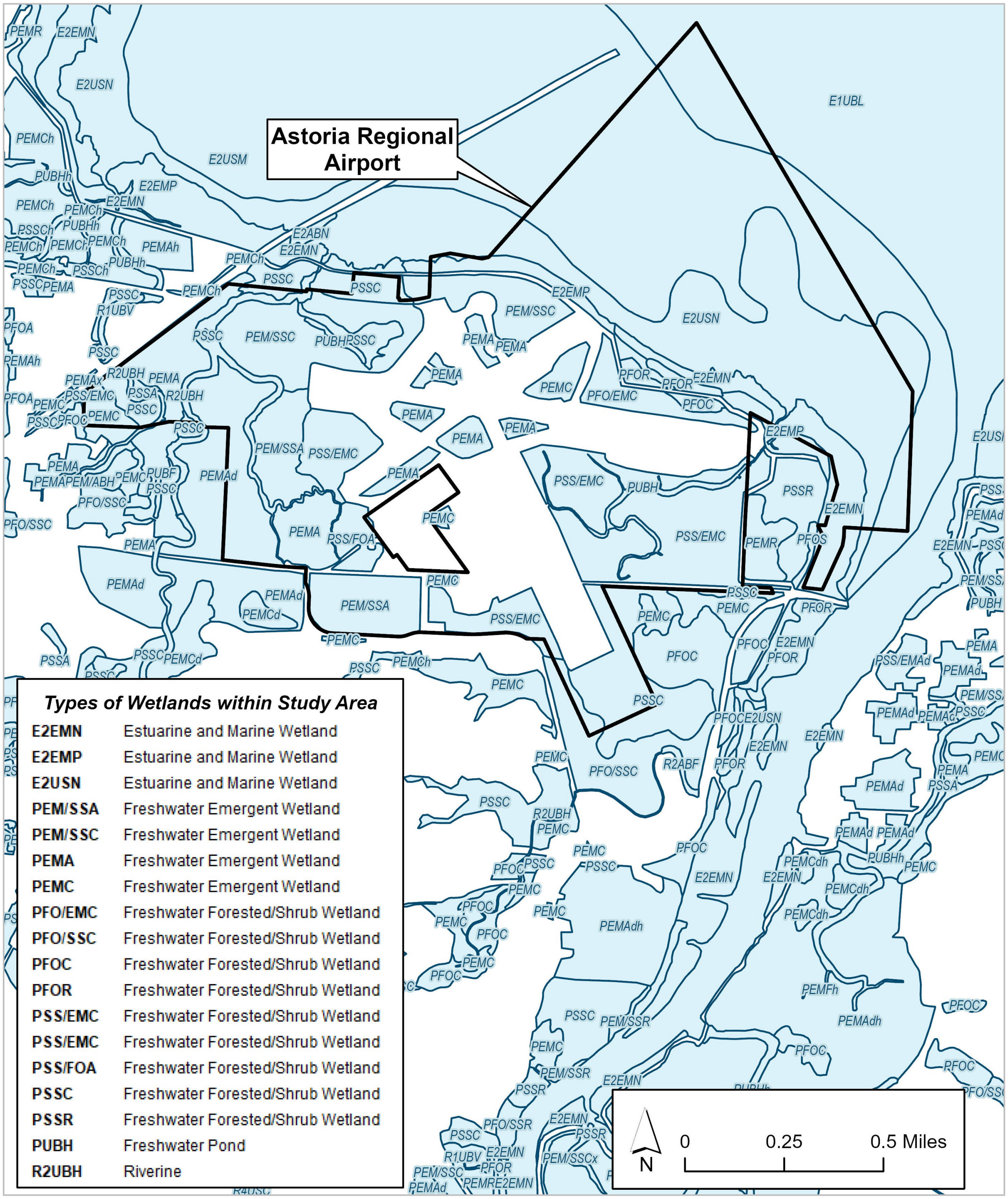
Wild and scenic rivers are protected by the 1986 Wild and Scenic Rivers Act and are managed by federal resource agencies that include the Bureau of Land Management and the U.S. Forest Service. There are no designated Wild and Scenic Rivers in the vicinity of the Airport. The nearest designated Wild and Scenic River is a reach of the upper Nestucca river, approximately 70 miles to the southeast.

Figure 2-3: Local Wetlands Inventory



City of Warrenton Wetland Conservation Plan Inventory. Warrenton, Oregon. Revised 1997.

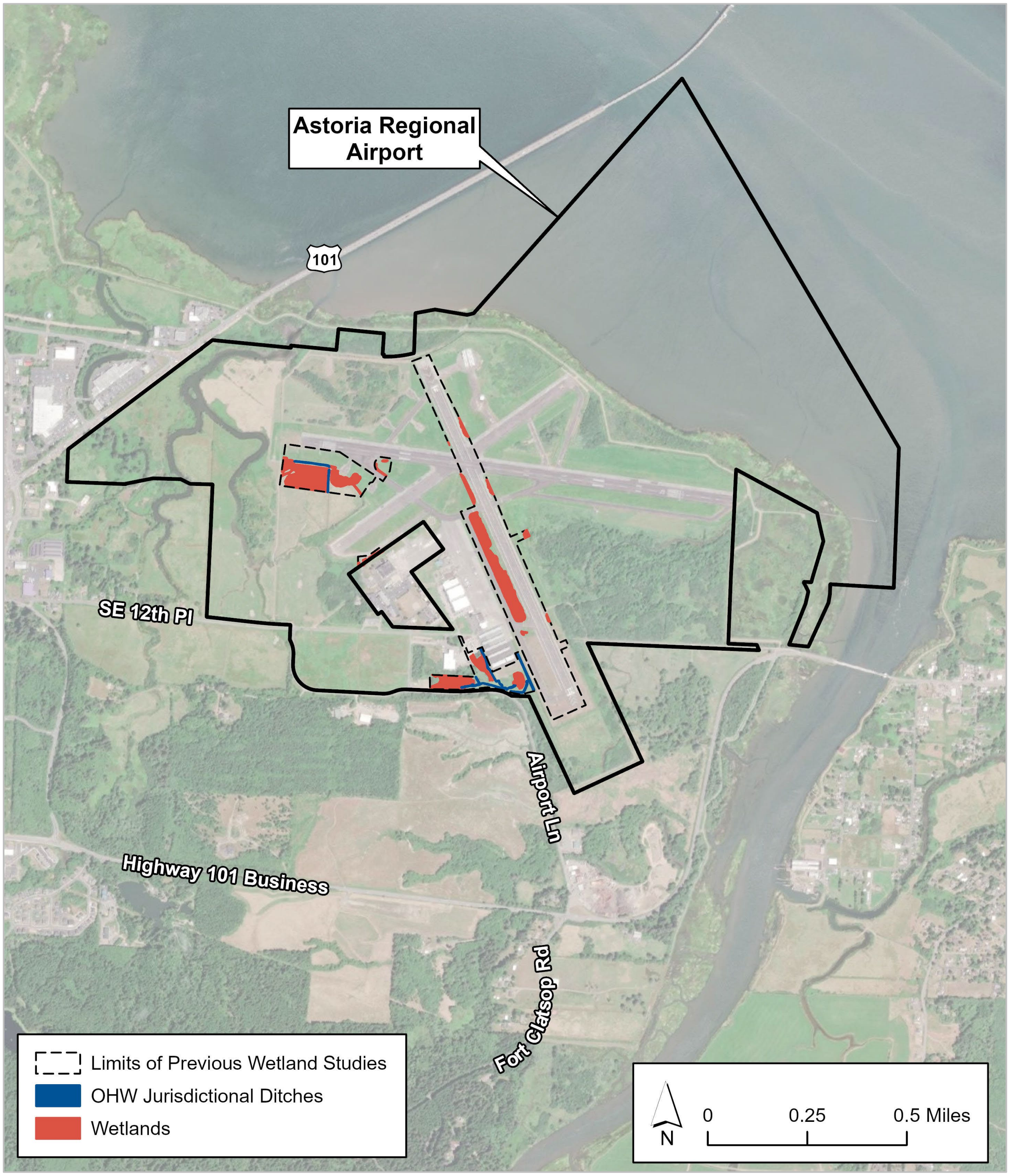
Figure 2-4: National Wetlands Inventory



ESRI, ArcGIS Online, USA Topographic Maps.
US Fish and Wildlife Service. 2010. National Wetlands Inventory (1997 to present).
Branch of Habitat Assessment.

Figure 2-5: 1939 Aerial Photograph

Figure 2-6: **Wetland Delineations**



ESRI, ArcGIS Online, World Imagery.

SUMMARY

Future Airport improvements and developments may require certain studies and permits to comply with environmental regulations.

- **Air Quality.** The Airport is in an attainment area that meets state and federal standards for all air pollutants regulated by EPA. No air quality permits or studies are likely to be required for aviation facility construction projects at the Airport. Some industrial developments may require their own specific operational air quality permits.
- **Coastal Resources.** Compliance with State and local land use and planning regulations will accomplish compliance with Oregon's Coastal Management Program.
- **Department of Transportation Act, Section 4(f).** Airport development is not expected to impact any Section 4(f) resources.
- **Farmlands and Soils.** Because the Coquille-Clatsop soil map unit is classified as "farmland of statewide importance," a Farmland Conversion Impact Rating Form (NRCS Form AD-1006) may need to be completed for any proposed development that would result in a measurable change in the agricultural use of land in and adjoining the Airport, including grazing.
- **Threatened and Endangered Species.** No listed plant or wildlife species are likely to occur within the Airport. However, NMFS will consider that stormwater runoff from Airport developments "may affect" a number of listed aquatic species in Youngs Bay and the Columbia River. Therefore, any proposed Airport improvements involving federal authorization or funding will require assessment of stormwater runoff effects to these aquatic species.
- **Floodplains.** The Airport is protected by a system of dikes and floodgates and is located in Flood Hazard Zone AE, within the one percent annual chance flood event.
- **Historical and Cultural Resources.** Previous investigations for Airport development projects have found no archaeological or historic resources. Their occurrence is unlikely because of the extensive deep fill underlying the Airport. Airport projects may, however, be required to document the absence of resources.
- **Natural Resources and Energy Supply.** Under FAA guidance criteria, it is highly unlikely that Airport development projects would increase energy consumption to the point of significant impact (i.e., cause energy demand to exceed supply).
- **Socioeconomic, Environmental Justice, and Children's Environmental Health and Safety Risks.** The lack of residential development in the immediate Airport vicinity makes it unlikely that Airport development projects will have significant impact in this category.
- **Water Quality.** The Lewis and Clark River and Youngs Bay are both 303(d)-listed as water quality impaired for several pollutants. To comply with Section 401 of the Clean Water Act and with the Endangered Species Act, any proposed developments that increase impervious surface or alter drainage patterns are likely to require a stormwater management plan and compliance with local and federal water quality treatment standards.
- **Wetlands.** Available resource documents as well as site-specific studies indicate that much of the Airport, including areas underlain by fill, are occupied by jurisdictional wetland. Any improvements that disturb previously unpaved areas will require a wetland delineation study and will likely require wetland mitigation.
- **Wild and Scenic Rivers.** There are no designated Wild and Scenic Rivers in the Airport vicinity.

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CHAPTER 3

AVIATION FORECASTS

CHAPTER 3 -
AVIATION FORECASTS

CHAPTER OVERVIEW

Chapter 3 – Aviation Forecasts provides a 20-year projection of aviation activity at the Warrenton-Astoria Regional Airport (AST or "the Airport"). Forecasts consist of future activity level estimates that help guide decision makers in planning airport development and improvement. The forecasts are used to determine facility demand requirements and the timing of demand-driven improvement projects. **Table 3-1** is a summary of the forecasts described in this chapter**.**

Table 3-1: AST Forecast Summary

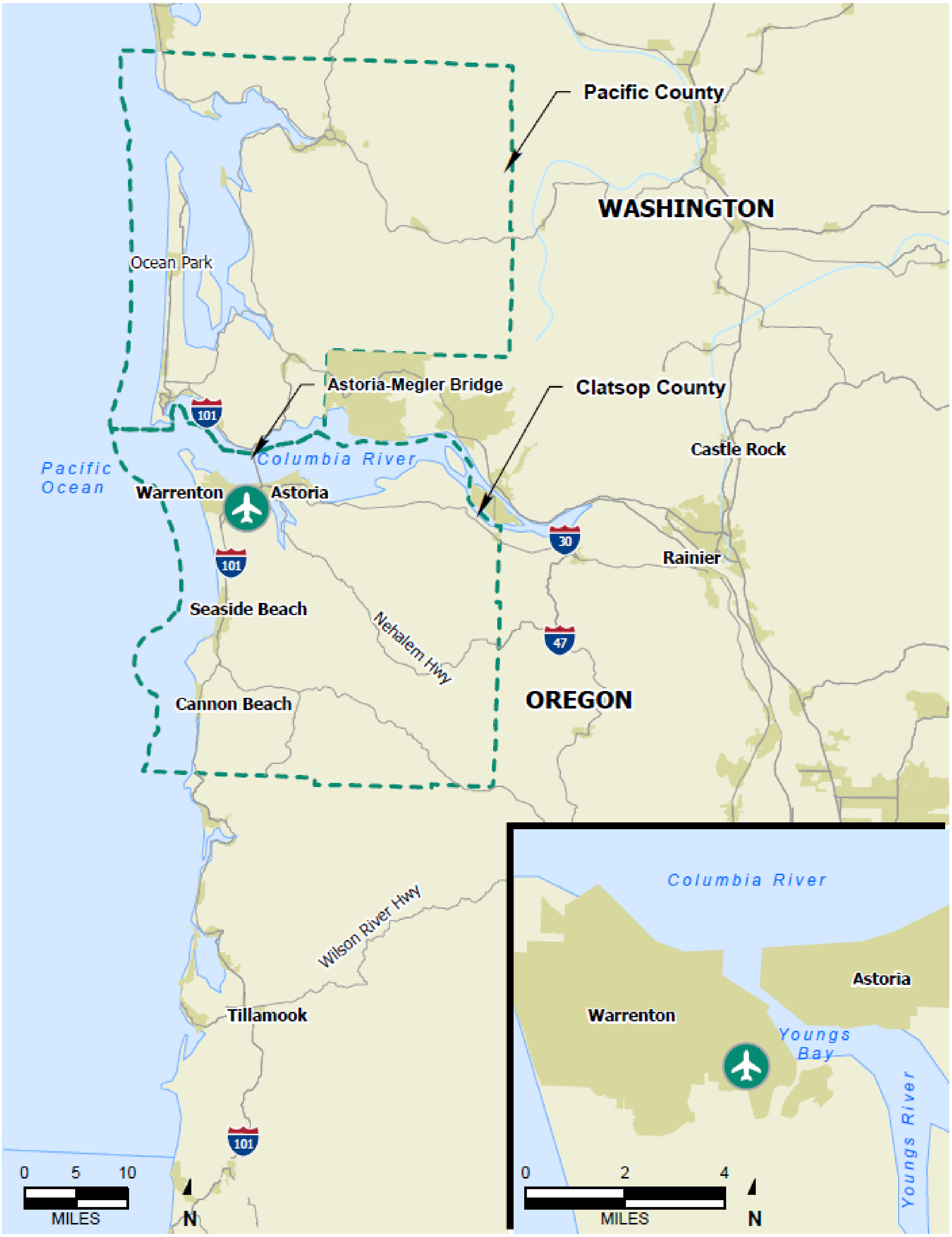
Fiscal Year	2011	2021	2031	2041	'21-'41 CAGR[1]
Operations	**42,667**	**36,897**	**40,100**	**45,900**	**0.4%**
Itinerant GA[2]	11,660	11,787	13,300	16,300	1.6%
Itinerant Military	14,000	13,700	13,700	13,700	N/A
Local GA[2]	17,007	11,410	13,100	15,900	1.7%
Local Military	0	0	0	0	N/A
Based Aircraft	**43**	**34**	**53**	**75**	**2.4%**
Single Engine	38	23	26	30	1.3%
Jet	-	-	2	3	-
Multi Engine	3	5	6	6	0.9%
Helicopter	2	3	7	10	6.2%
Other[3]	-	3	4	5	3.5%

1 CAGR: Compound Annual Growth Rate
2 GA: General Aviation
3 Other = Light sport aircraft, gliders, experimental aircraft, ultralights
Source: Based Aircraft = Preferred Forecasting Method Electrification; Itinerant GA = Preferred Forecasting Method Operations Per Based Aircraft; Local GA = Preferred Forecasting Method Operations Per Based Aircraft; Military Operations =TAF and data provided by United States Coast Guard

The aviation activity forecast considers the impact of socioeconomics in the aviation market, both regionally and nationally. The socioeconomic data was collected for Clatsop County, Oregon, and Pacific County, Washington, by Woods & Poole (W&P). **Figure 3-1** shows these areas covered by the W&P County data.

Clatsop County is located in the northwest corner of Oregon and is bound by the Columbia River to the north, and by the Pacific Ocean to the west. Astoria is the county seat. For the ten-year period between 2011 and 2021, County population has grown by an annual rate of 1.1 percent, and total retail sales have grown by an annual average rate of 3.2 percent. Woods & Poole forecasts that Clatsop County's population will continue growing at an average rate of 0.4 percent from 2021 to 2041. Economically, the County is recovering from the COVID-19 Pandemic and has since surpassed 2020 employment and gross regional product (GRP) levels. County GRP is projected to grow at an average of 1.7 percent over the next 20 years.

Figure 3-1: Map of Clatsop County, Oregon and Pacific County, Washington



INTRODUCTION TO FORECASTS

Aviation activity forecasts evaluate past aviation activity and project future demand at an airport. The AST forecasts use 2021 as the base year and use the Federal Aviation Administration (FAA) fiscal year (October-September). The forecast period is 20 years, and the first year forecasted is 2022. Data are reported annually. Each category is evaluated using multiple forecasting methods and is compared to the 2022 FAA Area Terminal Forecast (TAF), which was published in June 2022. Data from 2011 to 2021 is used as the basis of the historical trend analysis. This ten-year period includes periods of economic growth and contraction. This enables the forecasts to account for a wide range of economic conditions and insight into economic effects on aviation activity at AST. This chapter is organized into the following sections.

- Community Profile
- Aviation Activity Profile
- General Aviation Forecasts
- Peak Forecasts and Critical Aircraft
- Summary

Data sources used in the forecast are described in **Table 3-2.**

Table 3-2: Description of Data Sources

Source	Description
National/Sate	
FAA TAF	The FAA TAF, published in 2022, provides historical records and forecasts for passenger enplanements, aircraft operations, and based aircraft at AST. These forecasts serve as a basis of comparison for the forecast prepared as part of the planning effort. The TAF provides historical information on aircraft activity.
FAA Aerospace Forecast	The Aerospace Forecast (ASF) 2022-2042 is a national-level forecast examining different segments of the aviation industry. The ASF guides local forecasts by serving as a point of comparison between local and national trends.
FAA Traffic Flow Management System Counts (TFMSC)	The TFMSC includes data collected from flight plans. These operations are categorized by aircraft type and used to identify trends in the AST fleet mix. The advantage of the TFMSC data is its detail and insight into the itinerant users of AST. A disadvantage of TFMSC data is that it does not include local operations or operations that did not file a flight plan. Thus, the utility of TFMSC data is limited to larger aircraft, including scheduled commercial passenger, cargo, charter operations, and business jets.

Local	
Woods & Poole Economics, Inc. (W&P)	Socioeconomic data is provided by Woods & Poole Economics, Inc. (W&P). W&P provides data for gap years in the U.S. Census. The W&P dataset considers Clatsop and Pacific Counties. The dataset provides 124 data categories with records from 1970 to 2021 and forecasts through 2041. Data categories considered include total population, total employment, and gross regional product (GRP).
Stakeholder Interviews	The Consultant conducted interviews with stakeholders during site visits. Interviews included the United States Coast Guard, Airport tenants fixed based operators, Astoria -- Warrenton Area Chamber of Commerce, Airport Advisory Committee, the Port of Astoria, and the City of Warrenton.
Warrenton -Astoria Regional Airport	The Airport provided operations, passenger, and limited cargo data. FAA 5010 Forms, and Airport Master Record data.
Industry	
General Aviation Manufactures Association (GAMA)	The General Aviation Manufacturers Association (GAMA) provides the year-end of 2021 industry results for quarterly shipments and billings that shows an overview of the types of aircraft sold over the years.
FlightAware	FlightAware is a digital aviation company that provides flight tracking and operations data. The data provides the tail number, type of aircraft, origin, destination, departure time, and arrival time for aircraft coming to and from AST.

COMMUNITY PROFILE

Population

The W&P dataset considers the Clatsop County Metropolitan Statistical Area (MSA) and Pacific County MSA which coincide with the boundaries of Clatsop and Pacific Counties. Data categories include employment, earnings and income, and Gross Regional Product (GRP). The population forecast is based on historic and current trends. The population data produced by W&P is used by state, county, and local agencies for revenue sharing, funds allocation, and planning purposes.

Table 3-3 shows the historical data and forecast for Pacific County based on the data provided by W&P. 2021 is the forecast base year, and 2011 is the first year reported in the forecast.

Table 3-3: Pacific County Population

Calendar Year	Population	Percent Change
2011	20,937	N/A
2016	21,590	3.12%
2021	23,948	10.92%
2026	24,276	1.37%
2031	24,608	1.37%
2036	24,944	1.37%
2041	25,286	1.37%
'11-'21 CAGR	**1.4%**	**N/A**
'21-'41 CAGR	**0.3%**	**N/A**
1 CAGR = Compound Annual Growth Rate Source: W&P Economics, Inc.		

Table 3-4 shows the historical data and forecast for Clatsop County based on the data provided by W&P. 2021 is the forecast base year, and 2011 is the first year reported in the forecast.

Table 3-4: Clatsop County Population

Calendar Year	Population	Percent Change
2011	37,308	N/A
2016	39,132	4.89%
2021	41,810	6.84%
2026	42,637	1.98%
2031	43,480	1.98%
2036	44,341	1.98%
2041	45,217	1.98%
'11-'21 CAGR	**1.1%**	**N/A**
'21-'41 CAGR	**0.4%**	**N/A**
1 CAGR = Compound Annual Growth Rate Source: W&P Economics, Inc.		

Employment and Economic Development

Clatsop County's economy grew 1.1 percent from 2011 to 2021. W&P forecasts that employment will grow at an average annual rate of 1.2 percent from 2021 to 2041. Other growing industries in the County include real estate and rental/lease, professional and technology services, and administrative and waste services. According to Oregon Public Broadcasting, a limiting factor to economic growth is the lack of jobs and housing.

Pacific County's economy grew 1.0 percent from 2011 to 2021. W&P forecasts that employment will grow at an average annual rate of 0.6 percent from 2021 to 2041. Other growing industries in the County include construction, farm employment, and real estate.

Table 3-5 shows the historical and projected employment for Clatsop County for the next 20 years. **Table 3-6** shows the top industries by employment in thousands and sales in millions from 2011 to 2021. **Table 3-7** shows the top industries by employment and sales from 2021 to 2041.

Table 3-5: Clatsop County Employment Based on Woods & Poole

Calendar Year	Total Employment	Percent Change	Jobs per Capita
2011	22,645	N/A	0.61
2016	24,599	3.30%	0.63
2021	25,194	6.21%	0.60
2026	27,552	1.81%	0.65
2031	28,941	0.99%	0.67
2036	30,296	0.91%	0.69
2041	31,598	0.85%	0.70
2011-2021 CAGR	**1.1%**	**N/A**	**-0.1%**
2021-2041 CAGR	**1.2%**	**N/A**	**0.8%**

1 CAGR = Compound Annual Growth Rate
Source: W&P Economics, Inc.
*in thousands of jobs

Table 3-6: Clatsop County Top 5 Industries by Employment and Sales (2011-2021)

Top 5 Industries by Employment								
	2011		2016			2021		
Rank	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	Accommodation & Food Services	3,700	Accommodation & Food Services	4,400	18.5%	Accommodation & Food Services	4,800	9.8%
2	Retail Trade	3,000	Retail Trade	3,300	11.2%	Retail Trade	3,600	7.9%
3	Health Care & Social Assistance	2,500	Health Care & Social Assistance	2,700	6.5%	Health Care & Social Assistance	2,800	4.6%
4	State & Local Government	2,400	State & Local Government	2,500	3.4%	State & Local Government	2,400	-4.3%
5	Manufacturing	2,100	Manufacturing	2,100	0.7%	Manufacturing	2,000	-7.7%
Top 5 Industries by Retail Sales								
	2011		2016			2021		
Rank	Industry	Sales	Industry	Sales	Δ	Industry	Sales	Δ
1	Miscellaneous Store	$233	Miscellaneous Store	$234	0.5%	Miscellaneous Store	$258	9.9%
2	Health and Personal Care	$127	Eating and Drinking Places	$177	45.5%	Eating and Drinking Places	$233	31.9%
3	Eating and Drinking Places	$122	Motor Vehicles and Parts Dealers	$176	52.2%	Motor Vehicles and Parts Dealers	$222	26.3%
4	Motor Vehicles and Parts Dealers	$116	Health and Personal Care	$125	-1.7%	Health and Personal Care	$147	17.9%
5	Non-Store Retailers	$68	Food and Beverage Stores	$87	47.2%	Food and Beverage Stores	$122	40.3%

Table 3-7: Clatsop County Top 5 Industries by Employment and Sales (2026-2041)

Top 5 Industries by Employment								
	2026		2031			2041		
Rank	Industry	Jobs	Industry	Jobs	Δ	Industry	Jobs	Δ
1	Accommodation & Food Services	5,800	Accommodation & Food Services	6,400	9.6%	Accommodation & Food Services	7,600	18.2%
2	Retail Trade	3,700	Retail Trade	3,800	2.7%	Retail Trade	4,000	3.8%
3	Health Care & Social Assistance	3,000	Health Care & Social Assistance	3,300	7.6%	Health Care & Social Assistance	3,700	13.4%
4	State & Local Government	2,500	State & Local Government	2,500	0.4%	State & Local Government	2,500	0.5%
5	Manufacturing	1,900	Manufacturing	1,900	-1.4%	Manufacturing	1,800	-2.6%
Top 5 Industries by Retail Sales ($Millions)								
	2026		2031			2041		
Rank	Industry	Sales	Industry	Sales	Δ	Industry	Sales	Δ
1	Miscellaneous Store	$270	Miscellaneous Store	$288	6.4%	Eating and Drinking Places	$364	29.8%
2	Eating and Drinking Places	$248	Eating and Drinking Places	$280	13.2%	Miscellaneous Store	$318	10.5%
3	Motor Vehicles and Parts Dealers	$209	Motor Vehicles and Parts Dealers	$218	4.2%	Motor Vehicles and Parts Dealers	$233	6.7%
4	Health and Personal Care	$143	Health and Personal Care	$151	5.3%	Health and Personal Care	$165	9.3%
5	Food and Beverage Stores	$118	Food and Beverage Stores	$124	5.4%	Food and Beverage Stores	$133	7.3%

Table 3-8 shows the historical and projected employment for Pacific County for the next 20 years. **Table 3-9** shows the top industries by employment in thousands and sales in millions of dollars from 2011 to 2021. **Table 3-10** shows the top industries by employment and sales from 2021 to 2041.

Table 3-8: Pacific County Employment Based on Woods & Poole

Calendar Year	Total Employment	Percent Change	Jobs per Capita
2011	8,948	N/A	0.40
2016	10,028	12.07%	0.41
2021	9,887	-1.41%	0.39
2026	10,485	6.05%	0.38
2031	10,760	2.62%	0.37
2036	11,003	2.26%	0.36
2041	11,220	1.97%	0.36
2011-2021 CAGR	**1.0%**	**N/A**	**-0.1%**
2021-2041 CAGR	**0.6%**	**N/A**	**-0.5%**

1 CAGR = Compound Annual Growth Rate
Source: W&P Economics, Inc.
*in thousands of jobs

Table 3-9: Pacific County Top 5 Industries by Employment and Sales (2011-2021)

Top 5 Industries by Employment								
	2011		**2016**			**2021**		
Rank	**Industry**	**Jobs**	**Industry**	**Jobs**	**Δ**	**Industry**	**Jobs**	**Δ**
1	Retail Trade	910	Accommodation and Food Services	1,050	23.5%	Accommodation and Food Services	1,060	1.0%
2	Accommodation and Food Services	850	Retail Trade	900	-1.1%	Retail Trade	920	2.2%
3	Manufacturing	850	Manufacturing	880	3.5%	Forestry, Fishing, and Other	830	1.2%
4	Forestry, Fishing, and Other	800	Forestry, Fishing, and Other	820	2.5%	Manufacturing	710	-19.3%
5	Other Services	580	Health Care and Social Assistance	660	73.7%	Health Care and Social Assistance	690	4.5%
Top 5 Industries by Retail Sales								
	2011		**2016**			**2021**		
Rank	**Industry**	**Sales**	**Industry**	**Sales**	**Δ**	**Industry**	**Sales**	**Δ**
1	Food and Beverage Stores	$36	Eating and Drinking Places	$41	57.7%	Eating and Drinking Places	36.6%	$56
2	Eating and Drinking Places	$26	Food and Beverage Stores	$39	8.3%	Food and Beverage Stores	20.5%	$47
3	General Merchandise Stores	$25	Health and Personal Care	$17	6.3%	Gasoline Stations	43.8%	$23
4	Health and Personal Care	$16	Gasoline Stations	$16	33.3%	Health and Personal Care	11.8%	$19
5	Gasoline Stations	$12	General Merchandise Stores	$16	-36.0%	Motor Vehicles and Parts Dealers	30.8%	$17

Table 3-10: Pacific County Top 5 Industries by Employment and Sales (2026-2041)

Top 5 Industries by Employment								
	2026		2031			2041		
Rank	**Industry**	**Jobs**	**Industry**	**Jobs**	**Δ**	**Industry**	**Jobs**	**Δ**
1	Accommodation and Food Services	1,200	Accommodation and Food Services	1,220	1.7%	Accommodation and Food Services	1,260	3.3%
2	Retail Trade	930	Retail Trade	940	1.1%	Retail Trade	940	0.0%
3	Forestry, Fishing, and Other	820	Forestry, Fishing, and Other	820	0.0%	Forestry, Fishing, and Other	840	2.4%
4	Manufacturing	750	Health Care and Social Assistance	760	2.7%	Construction	780	13.0%
5	Health Care and Social Assistance	740	Manufacturing	750	0.0%	Health Care and Social Assistance	780	2.6%
Top 5 Industries by Retail Sales ($Millions)								
	2026		2031			2041		
Rank	**Industry**	**Sales**	**Industry**	**Sales**	**Δ**	**Industry**	**Sales**	**Δ**
1	Eating and Drinking Places	$59	Eating and Drinking Places	$66	11.9%	Eating and Drinking Places	$83	25.8%
2	Food and Beverage Stores	$46	Food and Beverage Stores	$47	2.2%	Food and Beverage Stores	$49	4.3%
3	Gasoline Stations	$22	Gasoline Stations	$23	4.5%	Health and Personal Care	$27	22.7%
4	Health and Personal Care	$20	Health and Personal Care	$22	10.0%	Gasoline Stations	$23	0.0%
5	Building Materials	$16	Building Materials	$17	6.3%	Building Materials	$17	0.0%

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Gross Regional Product

The GRP is the value of goods and services produced in the County and serves as an index for the health of the overall economy. GRP grows as industries increase production and produce higher value goods. Clatsop County's GRP is targeted to return to 2019 levels of 2,068,000 by 2036 and will continue to grow from 2021 to 2041.

Table 3-11 shows the Pacific County GRP from 2011 to 2021 and the forecasted GRP from 2026 to 2041. The GRP per capita decreased between 2016 and 2021.

Table 3-11: Pacific County Gross Regional Product

Calendar Year	Total GRP ($M)	Percent Change	GRP per Capita
2011	$580	N/A	$0.028
2016	$680	17.2%	$0.031
2021	$700	2.9%	$0.029
2026	$750	7.1%	$0.031
2031	$800	6.7%	$0.033
2036	$850	6.3%	$0.034
2041	$910	7.1%	$0.036
'11-'21 CAGR	**0.02%**	**N/A**	**N/A**
'21-'41 CAGR	**0.01%**	**N/A**	**N/A**

CAGR = Compound Average Growth Rate
Source: W&P Pacific County

Table 3-12 shows the Clatsop County GRP from 2011 to 2021 and the forecasted GRP from 2026 to 2041. The GRP per capita decreased between 2016 and 2021. However, the GRP per capita is projected to surpass the 2016 GRP per capita in 2026. The decrease is likely due to COVID-19. In 2019, the GRP was $2.1 billion dollars, and in 2020, the GRP was $2.0 billion dollars. The GRP increased annually from 2011 to 2019. After the decrease in 2020, the GRP returned to a growth pattern of roughly $2,000 in 2021. The GRP is forecasted to grow at a compound annual rate of 1.7 percent from 2021 to 2041. W&P projections show the GRP increasing at a faster rate than both the County population and County employment. This can be explained by the projected increase on the production of higher value goods and services. Hospitality and retail trade services sell higher value goods per capita relative to industries like non-store and ecommerce merchandise.

Table 3-12: Clatsop County Gross Regional Product

Calendar Year	Total GRP ($M)	Percent Change	GRP per Capita
2011	$1,700	N/A	$0.046
2016	$1,900	13.1%	$0.049
2021	$2,000	4.5%	$0.048
2026	$2,200	9.8%	$0.052
2031	$2,400	9.1%	$0.056
2036	$2,600	8.8%	$0.059
2041	$2,900	8.3%	$0.063
'11-'21 CAGR	**1.7%**	**N/A**	**N/A**
'21-'41 CAGR	**1.7%**	**N/A**	**N/A**

CAGR = Compound Average Growth Rate
Source: W&P Clatsop County

Nearby General Aviation Airports

General aviation (GA) airports within a two-hour drive of AST are considered in the demand forecasts because surrounding airports can influence the GA demand at AST. Communities with various airports will see demand spread across facilities, whereas communities with few airports will see concentrated demand. The airport catchment area is the area from which the airport draws passengers and users—it represents the local market. **Figure 3-2** shows the AST catchment area for GA users. The needs of GA users vary greatly, and aircraft owners tend to store their aircraft at the airport closest to their home or business, provided that it has adequate facilities.

The primary market of an airport reflects the availability of facilities and services that meet the needs of a specific market. For example, piston aircraft owners typically have fewer requirements compared to business jet owners. Business jets typically require longer runways to operate at a full payload and some need navigational aids (NAVAIDS) and instrument flight procedures to operate regardless of weather conditions. On the contrary, piston aircraft can operate on shorter runways, may or may not operate during low visibility conditions, and do not need Jet A fuel. According to information provided by AST, the Airport has handled Gulfstream G650 and the largest Global Expresses. AST's catchment area covers parts of both Southern Washington and Northern Oregon, and state-specific factors, such as taxes and fees, influence how users choose between GA airports. **Table 3-13** describes neighboring airports in the catchment area that are within two hours of driving distance, their primary markets, and their key facilities.

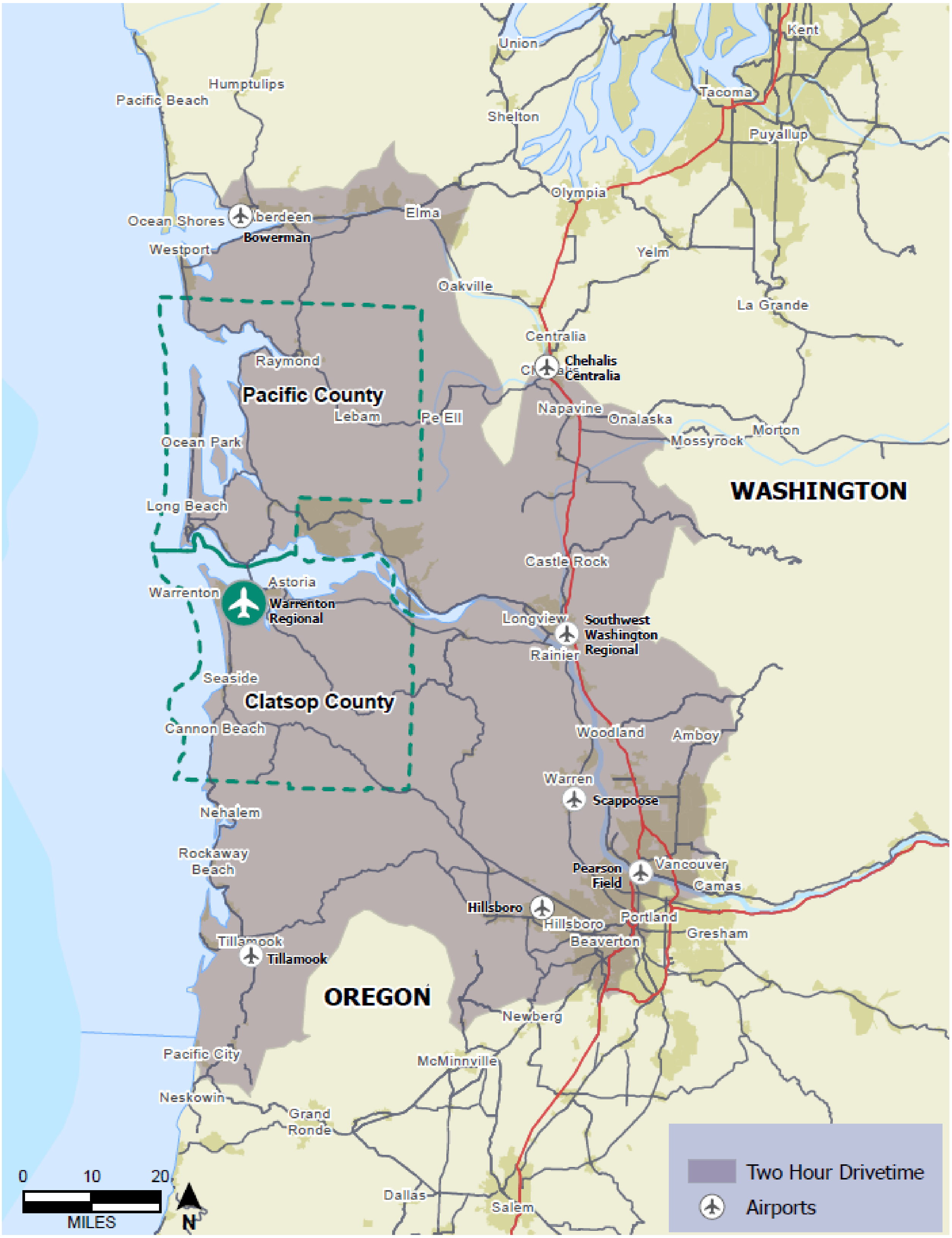
AST and Hillsboro Airport (HIO) are the only two airports with precision instrument approach procedures (IAPs), which offer lateral and vertical guidance (non-precision IAPs offer only lateral guidance). AST has a precision approach to Runway End 26, and HIO has a precision approach to Runway End 13. AST's precision approaches provide a high level of utility and accessibility for arriving aircraft in IFR conditions. In the event weather conditions do not meet the minimums for AST, pilots are likely to use HIO, KLS, TMK, SPB, CLS, or PDX as alternates. Hillsboro Airport (HIO) is the closest alternate with a precision approach.

Table 3-13: General Aviation Airports Within 2 Hour Driving Times From AST

	Characteristics			Primary Markets			
	Runway Length	IAP	Jet A	Large Jet	Small Jet	Turboprop	Piston
AST Warrenton-Astoria Regional Airport	5,794' (08/26)	Precision	Yes	No	Yes	Yes	Yes
HIO Hillsboro Airport	6,600' (13R/31L)	Precision	Yes	Yes	Yes	Yes	Yes
KLS Southwest Washington Regional Airport	4,391' (12/30)	Non-Precision	Yes	No	No	Yes	Yes
CLS Chehalis Centralia Airport	5,000' (16/34)	Non-Precision	Yes	No	Yes	Yes	Yes
VUO Pearson Field Airport	3,275' (08/23)	Circling	No	No	No	Yes	Yes
TMK Tillamook Airport	5,001' (13/31)	Non-Precision	Yes	No	Yes	Yes	Yes
SPB Scappoose Airport	5,100' (15/33)	Non-Precision	Yes	No	Yes	Yes	Yes

1) The longest runway is listed for airports with multiple runways. 2) IAP = Instrument Approach Procedure
Source: FAA Airport Facilities Directory; Garmin; Foreflight. Market determination based on based on instrumentation, runway length, and fuel availability.

Figure 3-2: **AST Catchment Area**



AVIATION ACTIVITY PROFILE

The aviation activity profile provides context for historical airport activity trends. The profile is the baseline for forecasts and includes information on passenger and air cargo airline service, general aviation, and military aviation activity.

AST does not have an Air Traffic Control Tower (ATCT). At non-towered airports, the actual number of aircraft operations can be difficult to ascertain with any degree of certainty. The only sources of historical data are the FAA Terminal Area Forecasts, FAA 5010 Forms, and Airport Master Record data. It is important to note that this information is estimated. Airport personnel or pilots that frequent an airport can supplement this data with operations estimates; however, this information also falls short of an operations count. The 2022 TAF historical data is used as a baseline for operations from 2021 to 2041.

Air Carrier Activity

The air carrier activity covers scheduled passenger and cargo flights and non-scheduled charter flights. **Appendix C** describes the air carrier profile, opportunities for additional air service, passenger enplanements, commercial operations, and air cargo service at AST. As of September 30, 2020, the National Plan of Integrated Airport Systems (NPIAS) has categorized AST as a General Aviation - Local airport based on enplanements, and currently has no service from scheduled passenger air carriers.

Historical Air Carrier Activity

West Coast Airlines, a scheduled passenger air carrier, served AST until 1975. SeaPort Airlines flew between AST and Portland International (PDX) from 2008 to 2010.

New eVTOL and Electric Air Service Opportunities

Urban air mobility (UAM) and airport electrification presents several opportunities for AST depending on the use case. Emerging aviation trends include the development of advanced air mobility, with the vision to safely develop an air transportation that moves people and good between areas that have historically been underserved. There is an opportunity to replace conventional aircraft with electric vertical take-off landing (eVTOL) and AAM. Based on industry trends and AST proximity to Portland and Seattle metropolitan areas, AST has potential to receive new regional AAM air service opportunities through regional air mobility (RAM). **Figure 3-3** shows the potential for AST to conduct RAM operations to in demand regions such as the Greater Seattle area.

Table 3-14 shows the ranges and potential markets electric aircraft will be able to reach according to different data provided by original equipment manufacturers (OEMs). Various emerging electric aircraft are being designed to have ranges between 50 and 250 nautical miles (NM). eVTOL aircraft are capable of taking off vertically. An example of an eVTOLs includes BETA Technology's ALIA-250c, which will be able to reach destination airports within 250 NM. Destination airports within a 150 NM radius will be reached using eVTOLs similar to the Pipistrel 801. eVTOLs such as Archer's Maker 101 have the capability to provide air service within the 50 NM range.

Electric conventional takeoff and landing (eCTOLS) aircraft are similar to eVTOLs, except they are designed to operate like conventional aircraft. They are fixed-wing aircraft with engines that create forward propulsion. According to records provided by AST, a Cessna 208 Caravan is operated by UPS for cargo operations. MagniX, an electric motor company, has successfully flown and converted a Cessna 208 Caravan into an eCTOL. The flight demonstrated the world's heaviest eCTOL aircraft flown to date, demonstrating UPS's capability to convert some of their fleet. While a switch to this powerplant for cargo operators for short legs may not generate any additional operations at AST, there may be demand or requests from cargo operators for new electric charging facilities to service these types of aircraft.

Figure 3-3 is derived from the AAM Reality Index (ARI), which is a rating tool that is derived from a formula that accounts for public information and expert knowledge. The formula considers funding a company receives, the company's leadership team, the readiness of the company technology, the certification process, and readiness for full-scale manufacturing. The greater the ARI value on a zero to ten scale, the greater probability that the company will be able to commercially mass produce their aircraft. A company who receives an ARI value of zero has little to no financing and is considering entering the market.

Figure 3-3: Potential Electric Aircraft Destinations from AST

APPROXIMATE DISTANCE (MILES*) TO LOCAL AREA AIRPORTS

Code	Airport Name	Drive	Fly	Code	Airport Name	Drive	Fly
KLS	Southwest Washington Regional Airport	60	41	RDM	Redmond Municipal Airport	203	125
TMK	Tillamook Municipal Airport	65	44	PAE	Paine Field Airport	240	162
HQM	Bowerman Airport	87	50	YYJ	Victoria International Airport	255	150
CLS	Chehalis-Centralia Airport	101	49	BLI	Bellingham International Airport	273	168
PDX	Portland International Airport	102	63	PSC	Tri-Cities Airport	309	197
SLE	Salem Municipal Airport	134	83	MWH	Grant County International Airport	343	198
SEA	Seattle-Tacoma International Airport	168	101	YVR	Vancouver International Airport	346	186
EUG	Eugene Airport	184	125	MFR	Rogue Valley International - Medford Airport	355	230

**Driving distance is shown as statute miles and flying distance is shown as nautical miles*

Table 3-14: **Advanced Air Mobility Examples**

eVTOL	Characteristics		
	Range (NM)	ARI	Wingspan
BETA (Alia-250c)	**250**	8	50'
Pipistrel (801)	**162**	7.2	45'
Archer (Maker 101)	**52**	7.4	40'

1. ARI = AAM Reality Index
2. Sources: FutureFlight, BETA Technologies, Archer, and AAM Reality Index

Itinerant Air Taxi Operations

According to the TAF from 2011 to 2021, there has been no scheduled cargo service at AST. However, according to records provided by AST, the United Parcel Service (UPS) operates a Cessna 208 Caravan, which is reflected in the TFMSC data. UPS has operations once on Monday morning and twice daily Tuesday through Friday. TFMSC data shows there is no change in the type of aircraft UPS operates. The 2022 TAF shows that air taxi operations are equivalent to air cargo operations at AST. According to 2021 FlightAware data, UPS's feeder is operated by Airpac. UPS has a consistent air cargo route between TMK, PDX, and AST. **Figure 3-4** shows the routes performed by UPS.

Figure 3-4: **UPS Air Cargo Route**

General Aviation

General aviation encompasses flight activities that do not include passenger operations, cargo operations, or military operations. General aviation activities include, but are not limited to, emergency response, law enforcement, flight training, recreational flying, private and corporate air transportation, and flight testing.

Itinerant Operations

Itinerant operations originate and terminate at different airports. Given the absence of variance in the TAF data, the Master Plan uses additional data sources to add context to the TAF numbers. This does not address the lack of annual operations variation in years past. **Table 3-15** shows the historical itinerant general aviation operations at AST from the 2022 TAF.

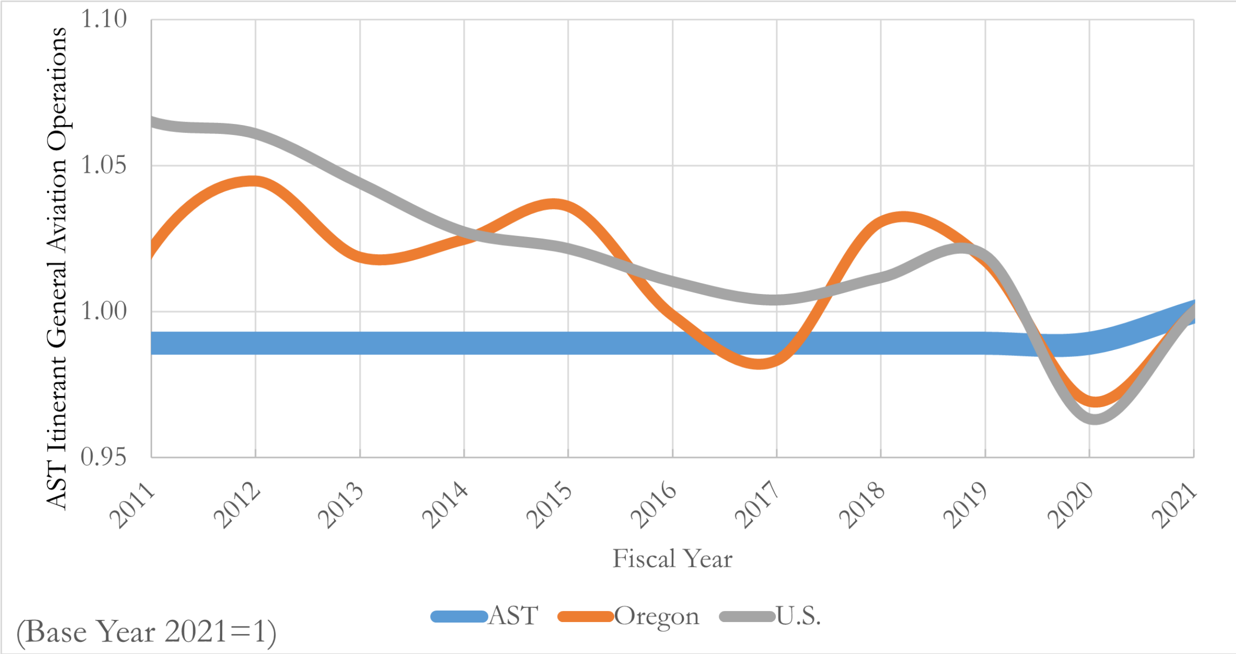
Table 3-15: Itinerant General Aviation Operations

Fiscal Year	AST	Percent Change	National (in thousands)	Percent Change
2011	11,660	N/A	14,528	N/A
2012	11,660	0%	14,522	-0.04%
2013	11,660	0%	14,117	-2.79%
2014	11,660	0%	13,979	-0.98%
2015	11,660	0%	13,887	-0.66%
2016	11,660	0%	13,905	0.13%
2017	11,660	0%	13,839	-0.47%
2018	11,660	0%	14,130	2.10%
2019	11,660	0%	14,245	0.81%
2020	11,660	0%	12,608	-11.49%
2021	11,787	1.09%	13,759	9.13%
CAGR	**0.1%**	**N/A**	**-0.70%**	**N/A**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast for National

Nationally, barring some sectors experiencing growth such as jets and helicopters, the overall general aviation market has been declining. The 2022 FAA Aerospace Forecast projects growth in turbine and experimental fleets, which will offset the decline of AST's fixed-wing piston fleet. While both AST and the national itinerant general aviation operations have grown in 2021 (relative to 2011), AST's operations are not strongly correlated with the National Aerospace Forecast due to flat TAF data. AST's itinerant operations have a moderately strong correlation with national itinerant operations numbers with a correlation coefficient of 0.68. The correlation coefficient is used to measure the strength of the linear relationship between variables with ±1.0, meaning a very strong relationship, while 0.0 means there is no relationship. A weaker correlation may be due to a slight decline in national general aviation activity. **Figure 3-5** compares the TAF's historical itinerant general aviation operations for AST, the State of Oregon, and the United States.

Figure 3-5: Historical Itinerant General Aviation Operations



Source: 2022 FAA Terminal Area Forecast

Local General Aviation Operations

Local general aviation operations are those that originate and terminate at the same airport. These operations are generally performed by pilots flying for leisure, practicing takeoffs and landings to maintain currency, and aircraft being flown for flight testing after a repair. Touch-and-go operations, where aircraft land, slow, and then accelerate to take off without leaving the runway, count as two operations and are included in local operations counts. Monthly and annual aircraft operation counts can be highly influenced by touch and go and flight training activity at an airport. An aircraft can perform more than six operations in an hour while practicing touch-and goes depending on volume of traffic in the traffic pattern. While AST does not have a formal flight training school or on airport flying clubs present at the Airport, some flight training along with currency training for local pilots occurs on a regular basis at AST. According to AST records provided by the Airport, a certified airframe and powerplant (A&P) owns a Cherokee that can be rented out by flight instructors. There are 2 to 3 certified flight instructors at AST. Additionally, licensed pilots routinely perform touch and go take offs and landings.

Local general aviation operations at AST have grown at a slower rate than the rest of the country. AST local general aviation operations show a correlation with national general aviation operations, with a correlation coefficient of 0.68. This may be due to the relative volatility of local operations with a smaller sample size compared to national operations with a sample size of the entire country. Overall, local operations at AST have declined since 2011; however, the TAF data becomes flat in 2015.

Figure 3-5: shows the index levels for historical itinerant general aviation operations. The index for the base year (2021) is equivalent to 1. Meaning that any year with an index greater than one has more total operations than the base year. Any year that is below the index of 1 show that there were less operations conducted than in the base year. An index is used to compare data with significantly different scales that measure similar activity, and it can be used to show growth trends.

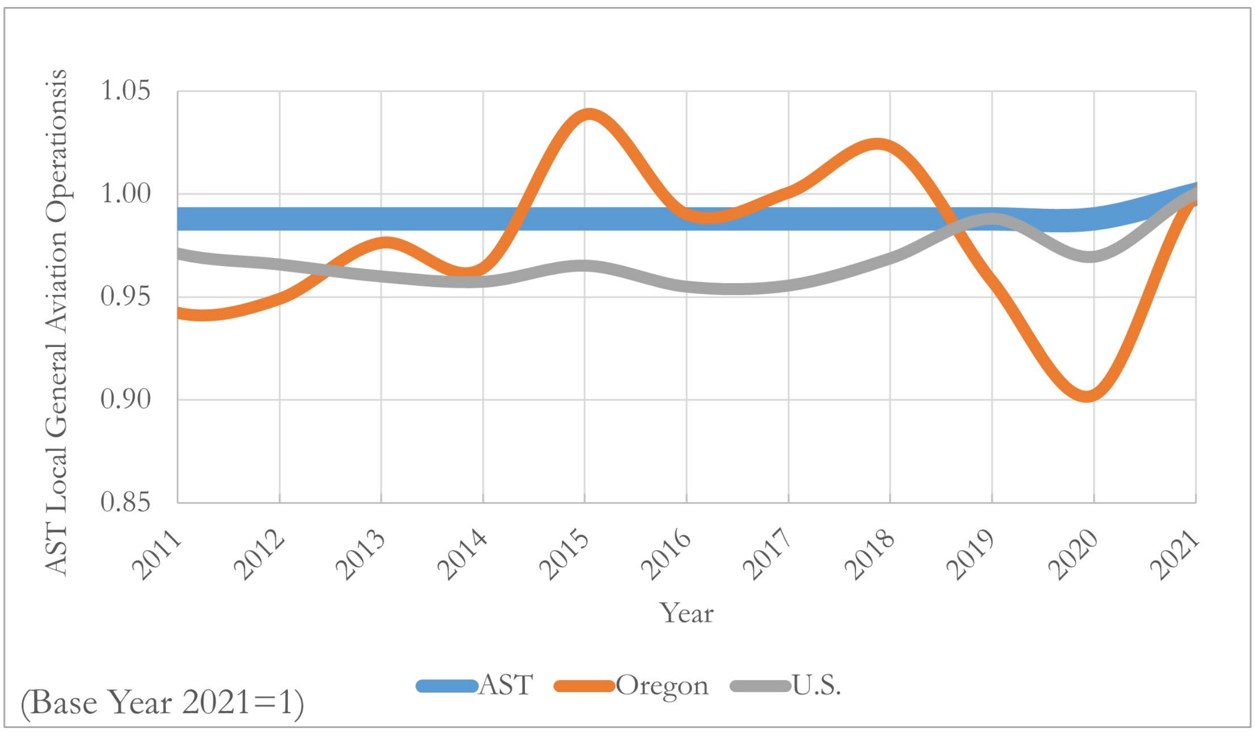
Local GA operations include Brim Aviation/Columbia River Bar Pilots with an estimated 10 operations per day and Life Flight with an estimated 4 operations per day. **Table 3-16** and **Figure 3-6** compare local general aviation operations at AST from 2011 to 2021 with national numbers provided by the FAA Aerospace Forecast.

Table 3-16: Local General Aviation Operations

Fiscal Year	AST	Percent Change	National (in thousands)	Percent Change
2011	11,410	N/A	11,437	N/A
2012	11,410	0%	11,608	1.50%
2013	11,410	0%	11,688	0.69%
2014	11,410	0%	11,675	-0.11%
2015	11,410	0%	11,691	0.14%
2016	11,410	0%	11,633	-0.50%
2017	11,410	0%	11,732	0.85%
2018	11,410	0%	12,354	5.30%
2019	11,410	0%	13,109	6.11%
2020	11,410	0%	12,333	-5.92%
2021	11,548	1.21%	13,441	8.98%
CAGR	**0.1%**	**N/A**	**1.30%**	**N/A**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast for National

Figure 3-6: Historical Local General Aviation Operations



Source: 2022 FAA Terminal Area Forecast

Based Aircraft

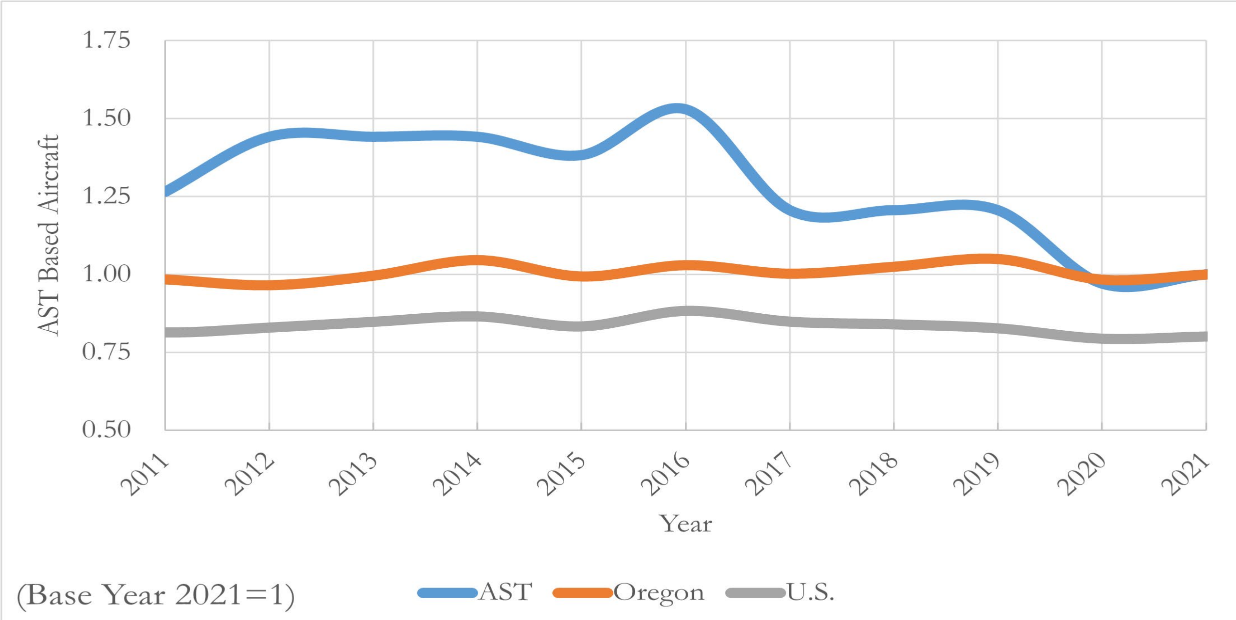
The FAA categorizes aircraft by the propulsion system, engine configuration, and weight, with the main categories being Single-Engine Piston (SEP), Multi-Engine Piston (MEP), Jets (includes turboprops and turbojets), Helicopters, and Other, which includes experimental, light sport, glider, and ultralight aircraft. Based aircraft are those stored at AST and do not include itinerant aircraft. Data for AST based aircraft are from the TAF and AST records. **Table 3-17** and **Figure 3-7** show the based aircraft at AST from 2011 to 2021. The Helicopter column does not include the USCG helicopters, and each year should be increased by 3.

Table 3-17: AST Based Aircraft

FY	SEP	Jet	MEP	Helicopter	Other	Total	% Change
2011	38	0	3	2	0	43	N/A
2012	39	0	3	2	5	49	14%
2013	39	0	3	2	5	49	0%
2014	39	0	3	2	5	49	0%
2015	42	0	4	1	0	47	-4%
2016	42	0	4	1	5	52	10%
2017	29	0	4	3	5	41	-21%
2018	29	0	4	3	5	41	0%
2019	29	0	4	3	5	41	0%
2020	23	0	4	3	3	33	-19%
2021	23	0	5	3	3	34	3%
CAGR	**-4.9%**	**0.0%**	**5.2%**	**4.1%**	**N/A**	**-2.3%**	**N/A**

FY: Fiscal Year, CAGR: Compound Annual Growth Rate, SEP: Single-Engine Piston, MEP: Multi-Engine Piston
Source: 2022 FAA Terminal Area Forecast for AST

Figure 3-7: AST Based Aircraft



Source: 2022 FAA Terminal Area Forecast

The total number of based aircraft at AST has declined within the last decade. The TMFSC shows that within the last ten years, the Nation's based aircraft has declined 1.95 percent on average annually, whereas AST's based aircraft has declined 2.32 percent on average annually.

According to records provided by AST, there are 43 total based aircraft: 34 SEP, 0 jets, 3 MEP, 3 helicopters, 3 military helicopters, and 0 experimental based aircraft. The information provided is a more accurate representation of the based aircraft at AST for base year 2021 than the data provided by the TAF.

United States Coast Guard and Military

In 1964, the U.S. Coast Guard (USCG) Air Station was established as a tenant at AST. No DoD aircraft – Army, Navy, Air Force, or Marines – are based at AST. Historically, military aircraft operated at AST primarily for Coast Guard operations and training purposes. Military activity is based on the demands of the United States Department of Defense and Department of Homeland Security rather than socioeconomic drivers; therefore, for planning purposes, military operations are projected to remain flat throughout the forecast period. The USCG was consulted as part of this planning process. Due to the Airport's close proximity to the Camp Rilea Armed Forces Training Area, the Airport occasionally hosts Department of Defense (DoD) aircraft from Joint Base Lewis McChord and other DoD facilities. Historical military operations are provided in **Table 3-18.**

Table 3-18: AST Military Operations

Fiscal Year	Itinerant	Local	Total	Percent Change
2011	14,000	0	14,000	N/A
2012	14,000	0	14,000	0.0%
2013	14,000	0	14,000	0.0%
2014	14,000	0	14,000	0.0%
2015	14,000	0	14,000	0.0%
2016	14,000	0	14,000	0.0%
2017	14,000	0	14,000	0.0%
2018	14,000	0	14,000	0.0%
2019	14,000	0	14,000	0.0%
2020	14,000	0	14,000	0.0%
2021	14,000	0	14,000	0.0%
CAGR	**0.0%**	**N/A**	**0.0%**	**N/A**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST

The USCG anticipates the addition of a fourth helicopter in 2024 and are currently anticipating the possibility addition of a fifth and/or sixth helicopter by 2026. According to information from the USCG, the construction of a larger hangar is anticipated around 2030 to replace the existing hangar, which could significantly boost operations.

The USCG provided information of what operations look like throughout the year. Three primary helicopters are used consistently, and one of the three is typically in heavy maintenance due to the corrosion from salt water. Weekly activity can range from 30 to 150 operations. Heavy seas and cliff terrain allow the USCG to train for hurricanes at Camp Rilea twice a year for a duration of 10 weeks per training season. Camp Rilea does not have a fuel storage/dispensing facility ~~pump~~, which generates additional operations to AST for fueling. On average, one helicopter consumes 500 gallons when refueling, creating reliable airport revenue for AST. The USCG has a reversion clause with the Airport in case helicopter operations discontinue.

FAA TAF

FAA Headquarters prepares the TAF – an official forecast published every fiscal year (October 1 to September 30) – for each airport included in the FAA NPIAS. The data included in the TAF uses a collection of data from the USDOT T-100 database, ATCT records, and FAA Form 5010, which airports submit annually to the FAA.

The TAF contains forecasts for passenger enplanements, operations, and based aircraft. It provides forecasts for operations by aircraft type, peak activity level, critical aircraft, and air cargo. The 2021 TAF used for this forecast was published in March 2022. **Table 3-19** summarizes the TAF at AST.

Table 3-19: AST TAF Summary

Fiscal Year	2021	2026	2031	2036	2041	'21-'41 CAGR
Operations	**37,335**	**37,663**	**26,966**	**40,746**	**42,243**	**0.6%**
Itinerant General Aviation	11,787	12,423	13,087	13,780	14,502	1.0%
Itinerant Military	14,000	14,000	14,000	14,000	14,000	0.0%
Local General Aviation	11,548	11,240	12,966	12,966	13,741	1.2%
Local Military	0	0	0	0	0	N/A
Based Aircraft	**34**	**38**	**43**	**48**	**53**	**2.2%**
Single Engine Piston	23	27	32	37	42	3.1%
Jet	0	0	0	0	0	N/A
Multi-Engine Piston	5	5	5	5	5	N/A
Helicopter	3	3	3	3	3	N/A
Other	3	3	3	3	3	N/A

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST Historical Data;

The FAA reviews master plan forecasts by comparing them to the TAF. Forecasts that are within 10 percent of the TAF over a five-year period and 15 percent within a ten-year period can be approved by the Airports District Offices (ADO). Forecasts outside of these tolerances may need to be reviewed by FAA Headquarters.

The most recent data trends may lag a year behind airport records. At AST, there are no air carrier operations, resulting in zero annual enplanements and zero air taxi operations. For this reason, there are no forecasts for passenger enplanements and air carrier operations.

GENERAL AVIATION FORECASTS

Itinerant General Aviation Operations

Methods

Itinerant general aviation operations were forecasted with the following methods:

- FAA Aerospace Forecast
- State of Oregon Growth Rate
- Operations per Based Aircraft
- Economic Forecast

The FAA Aerospace Forecast method uses the 2021 to 2031 CAGR from the 2022 FAA Aerospace Forecast. This method is not preferred because AST does not have an Air Traffic Control Tower to record itinerant operations.

The State of Oregon Growth Rate Forecast method uses the growth rate from the 2022 TAF for Oregon and applies it to 2021 base year operations to forecast the future itinerant general aviation operations. The Oregon State TAF projects an estimated CAGR from 2021 to 2041 of 1.45 percent annually. This method is not preferred because the data is not airport-specific and includes historical data from towered airports.

The Economic Forecast method uses the GRP from W&P data and applies the growth rate to the 2021 base year of the 2022 AST TAF. This method is not a preferred forecasting method because the local MSA GRP in millions of dollars and itinerant general aviation operations have a weak positive correlation coefficient of 0.28.

Table 3-20 and **Figure 3-8** present the four forecasting methods along with the 2022 TAF for comparison.

Figure 3-8: Itinerant General Aviation Operations Forecast

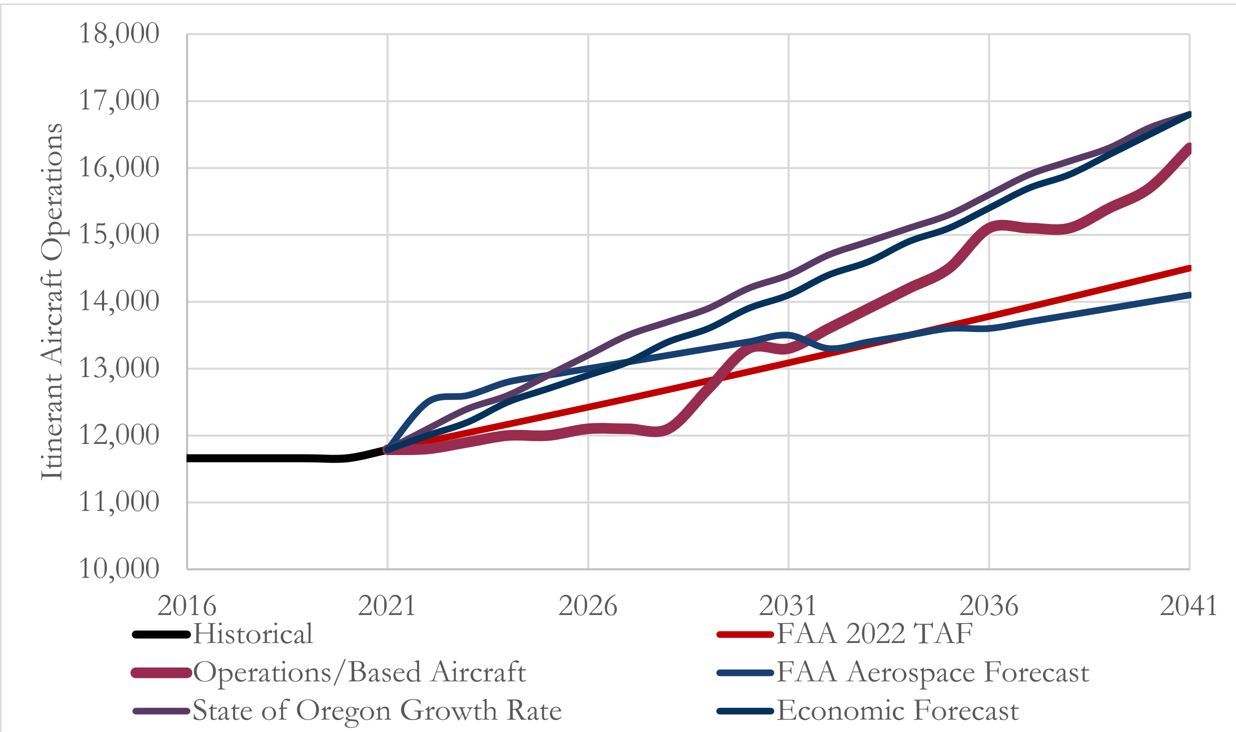


Table 3-20: Itinerant General Aviation Operations Forecast

Fiscal Year	Aerospace Forecast	Oregon Growth Rate	Operations/ Based Aircraft	Economic Forecast	2022 TAF
2021	11,800	11,800	11,800	11,800	11,800
2026	13,000	13,200	12,100	12,900	12,400
2031	13,500	14,400	13,300	14,100	13,100
2036	13,600	15,600	15,100	15,400	13,800
2041	14,100	16,800	16,300	16,800	14,500
‘21-‘41 CAGR	**0.9%**	**1.8%**	**1.6%**	**1.8%**	**1.0%**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast
*Operations rounded to the nearest hundredth

Preferred Method and TAF Comparison

The preferred forecast method for itinerant general aviation operations at AST is the operations per based aircraft method. Based multi-engine aircraft and helicopters at AST have grown since 2011. Experimental based aircraft at AST are projected to grow at an average annual rate of 1.6% within the next 20 years. This is likely due to the anticipated growth of multiple use cases of electric aircraft at AST. The forecasted growth of conventional and electric aircraft that will be stored in AST hangars and on tie-downs will lead to an increase in the number of itinerant general aviation operations. **Table 3-21** shows the preferred itinerant general aviation operations forecast compared to the 2022 TAF.

Table 3-21: Itinerant General Aviation Operations Forecast – TAF Comparison

Fiscal Year	Preferred Forecast	2022 TAF	Total Difference	Percent Difference
2021	11,800	11,800	0	0.0%
2026	12,100	12,400	300	2.5%
2031	13,300	13,100	200	1.5%
2036	15,100	13,800	1,300	8.6%
2041	16,300	14,500	1,800	11.0%
‘21-‘41 CAGR	**1.6%**	**1.0%**	**N/A**	**N/A**

Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast
*Operations rounded to the nearest hundredth

United States Coast Guard and Itinerant Military Operations

The 2022 TAF shows that there are 14,000 itinerant military operations annually at AST for the period 2021-2041. Based on conversations with the USCG, the Airport (AST) and the Consulting Team (Mead & Hunt, Inc.) believe that the TAF’s itinerant military operations count to be inaccurate. Data provided by the USCG was used as a basis for the itinerant military operations forecast; data provided by the USCG are educated estimates. According to the data the USCG provided, an additional based helicopter will be added to the fleet around 2026, with an estimated additional annual 2,200 annual operations. By 2030, the USCG plans on having a new hangar facility with capacity to hold an additional count of 2 based helicopters. **Table 3-22** compares the preferred itinerant military operations forecast with the 2022 TAF.

Table 3-22: United States Coast Guard and Itinerant Military Operations Forecast

Fiscal Year	Preferred Forecast	2022 TAF	Total Difference	Percent Difference
2021	7,000	14,000	7,000	100%
2026	9,300	14,000	4,700	50.5%
2031	13,700	14,000	300	2.2%
2036	13,700	14,000	300	2.2%
2041	13,700	14,000	300	2.2%
‘21-‘41 CAGR	**1.7%**	**N/A**	**N/A**	**N/A**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST
*Operations rounded to the nearest hundredth

Local General Aviation Operations

Methods

Local general aviation operations are forecasted using the following methods:

- FAA Aerospace Forecast
- State of Oregon Growth Rate
- Operations per Based Aircraft
- Economic Forecast

Local general aviation operations at AST did not show strong correlation with any of the socioeconomic variables and national aviation variables tested due to the lack of variation in the historical dataset. Therefore, no regression methods were used for forecasting.

The FAA Aerospace Forecast method applies the 2022 FAA Aerospace Forecast growth rate for local general aviation operations for the forecast period from 2021 to 2041. This method is not preferred because the FAA Aerospace Forecast provides data on the total combined aircraft operations at airports with FAA and contract control tower service. AST does not have an air traffic control tower. In addition, the correlation coefficient of national local general aviation operations and local general aviation operations at AST is 0.68, showing a weak positive correlation.

The State of Oregon Growth Rate method applies the growth rate from the 2022 TAF for Oregon. This method is not preferred because the 2022 Oregon TAF forecasts a CAGR from 2021 to 2041 of 1.45 percent. The state growth rate in size or market demand is not comparable to AST's growth rate. The Operations per Based Aircraft forecasting method uses the 2022 TAF's based aircraft data for 2021 future growth rate to forecast future based aircraft operations. The Economic Forecast method uses the W&P data and uses the Clatsop County GRP growth rate. The growth rate is applied to the 2021 base year data from the 2022 AST TAF. This method is not preferred because the MSP GRP in millions of dollars and local general aviation operations do not have a strong correlation. The two variables have a weak-positive correlation coefficient of 0.28.

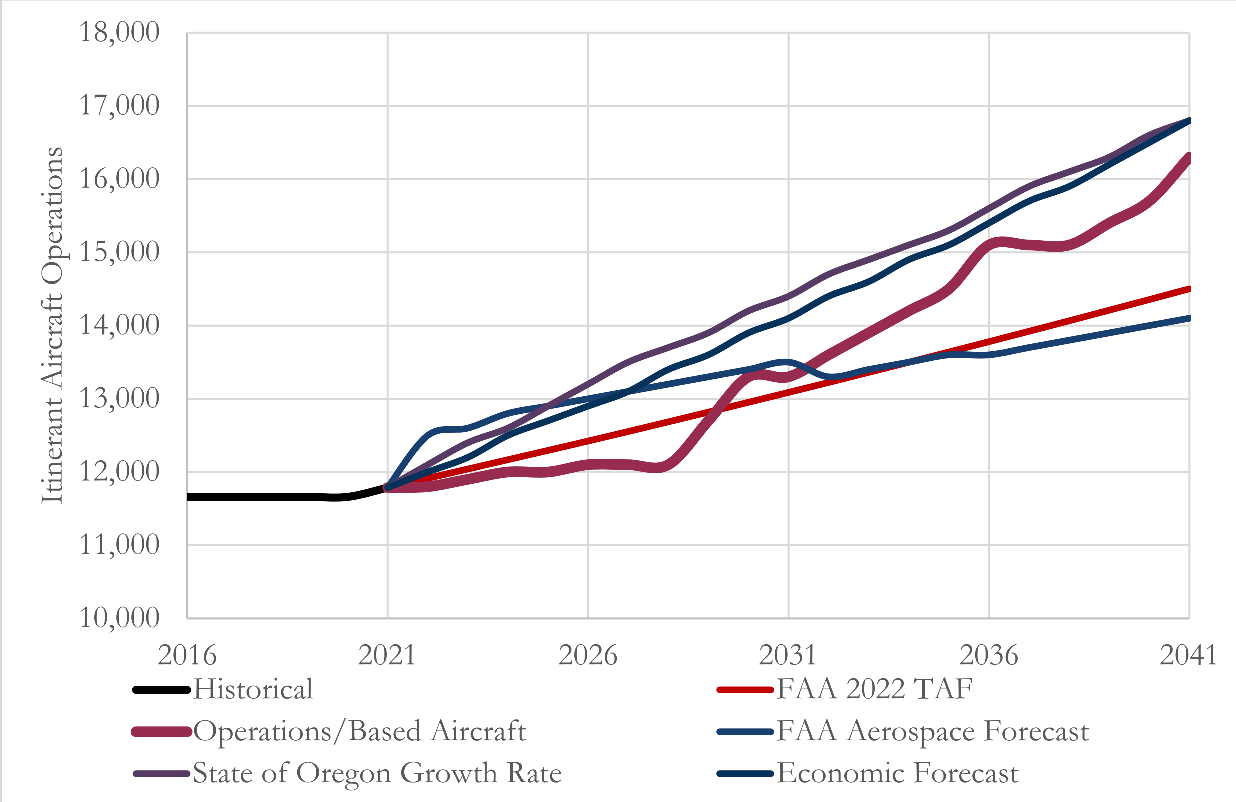
Table 3-23 and **Figure 3-9** present the four forecast methods along with the 2022 TAF for comparison.

Table 3-23: Local General Aviation Operations Forecast

Fiscal Year	Aerospace Forecast	State of Oregon Growth Rate	Operations/ Based Aircraft	Economic Forecast	2022 TAF
2021	11,410	11,410	11,410	11,410	11,410
2026	12,000	12,300	12,500	12,500	11,548
2031	12,700	13,100	14,500	13,700	12,240
2036	13,200	13,900	18,000	15,000	12,966
2041	13,700	14,700	20,900	16,300	13,741
'21-'41 CAGR	**0.9%**	**1.3%**	**1.7%**	**1.8%**	**0.9%**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast
*Operations rounded to the nearest hundredth

Figure 3-9: **Local General Aviation Operations Forecast**



Preferred Method and TAF Comparison

Operations per Based Aircraft is the preferred method for general aviation operations at AST. This method uses the 2021 base year data from the 2022 AST TAF and applies the growth rate to forecast the future based aircraft. This method is preferred because it accounts for the predicted growth of electric based aircraft within the next 20 years as AAM becomes integrated into the airspace. **Table 3-24** compares the preferred local general aviation operations forecast with the 2022 TAF.

Table 3-24: **Local General Aviation Operations Forecast – TAF Comparison**

Fiscal Year	Preferred Forecast	2022 TAF	Total Difference	Percent Difference
2021	11,400	11,400	0	0.0%
2026	11,900	11,500	400	3.4%
2031	13,000	12,200	800	6.2%
2036	14,800	13,000	1,800	12.2%
2041	15,900	13,700	2,200	13.8%
‘21-‘41 CAGR	**1.7%**	**0.9%**	**N/A**	**N/A**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST
*Operations rounded to the nearest hundredth

Based Aircraft

Methods

AST based aircraft numbers are forecasted using the following methods:

- FAA 2021 TAF Forecasting Method
- FAA Aerospace Forecasting Method
- State of Oregon Growth Rate Forecasting Method
- Electrification Forecasting Method

The FAA TAF Forecasting Method uses data from the 2022 TAF, which includes data from the 2021 base year data that other forecasting methods can compare data to.

The FAA Aerospace Forecasting (ASF) method applies the growth rate from the general aviation ASF to the 2021 based aircraft records. This method is not preferred because the average annual growth rate for the national general aviation fleet is predicted to grow at a slower rate than the preferred method, an annual growth rate of 0.4 percent for years 2021 to 2041.

The State of Oregon Growth Rate method applies the Oregon State based aircraft growth rate to 2021 based aircraft numbers. This method forecasts an annual growth rate of 1.3 percent from the years 2021 to 2041, but it is not preferred. The total based aircraft in Oregon state is not comparable to the total based aircraft at AST as not all airports in Oregon serve the same purpose.

The Electrification method uses a hybrid forecasting method for the future composition of based aircraft at AST. The forecasting method is specific to each aircraft type and applies an appropriate growth rate based on market trends.

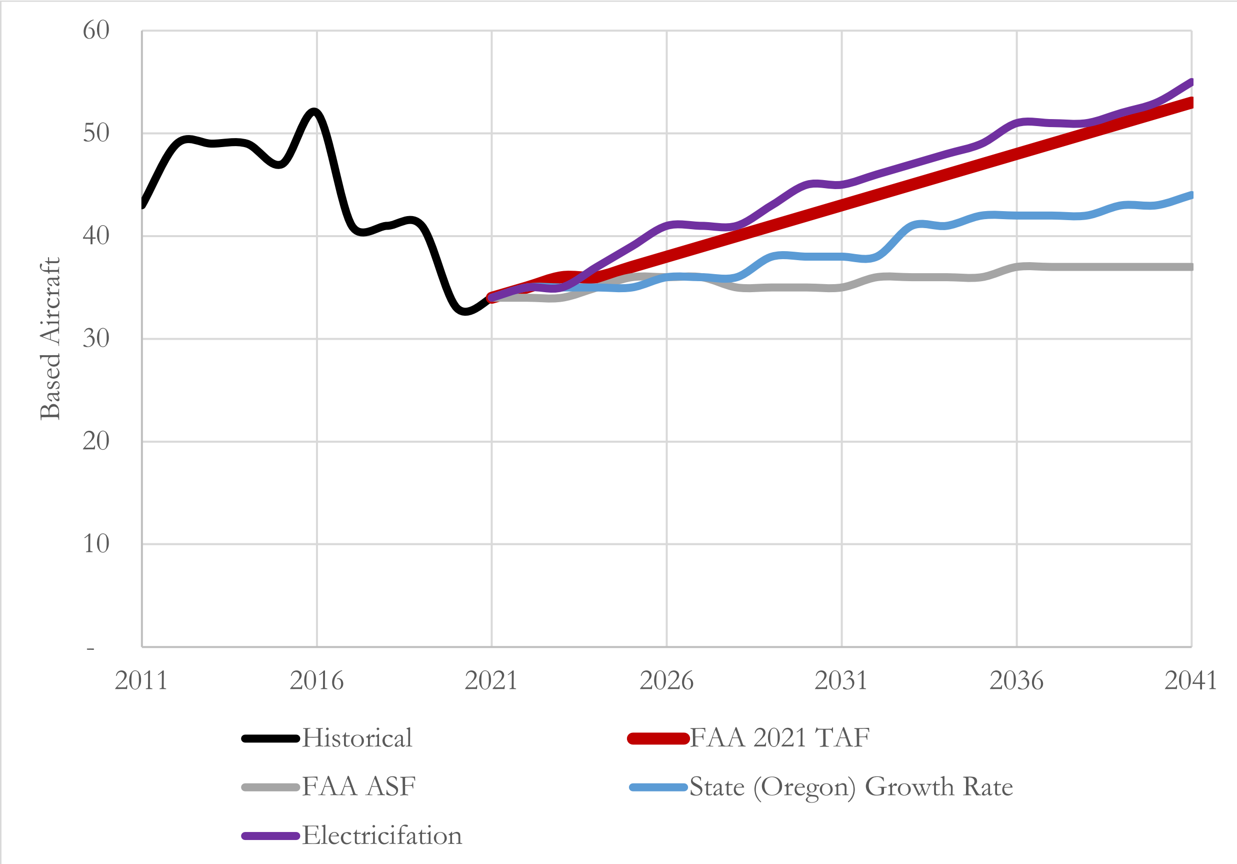
Table 3-25 and **Figure 3-10** present the four forecasting methods used along with a comparison to the 2022 TAF.

Table 3-25: Based Aviation Forecasts

Fiscal Year	Aerospace Forecast	State of Oregon Growth Rate	Electrification	2022 TAF
2021	34	34	34	34
2026	36	36	41	38
2031	35	38	45	43
2036	37	42	51	48
2041	37	44	55	53
‘21-‘41 CAGR	**0.4%**	**1.3%**	**2.4%**	**2.2%**

CAGR: Compound Annual Growth Rate
Source: 2022 FAA Terminal Area Forecast for AST; 2022 FAA Aerospace Forecast

Figure 3-10: Based Aircraft Forecasts



Preferred Method and TAF Comparison

The preferred forecast for based aircraft uses the Electrification method. The Electrification method is a hybrid of the 2021 TAF Forecasting method and the State (OR) Growth Rate method. A combination of these method is applied to the different types of based aircraft to reflect local trends more accurately.

- Single-engine aircraft use the FAA 2021 forecasting method to forecast an annual growth of 1.3 percent within the next 20 years; it is comparable to the 2022 Oregon State TAF's local trends.
- Jet aircraft are forecasted using the FAA Aerospace forecasting method due to lack of existing data from the TAF. The estimated annual growth rate for forecast period 2021 to 2041 for based jet aircraft at AST is not able to be forecasted because the TAF does not show any based aircraft in the base year 2021. However, based aircraft records provided by AST show there are two based jet aircraft. To add variance to the forecast, two jet aircraft were adjusted in 2024 and in 2036 the forecast shows a slight growth with the addition of one another jet based aircraft.
- MEP aircraft are forecasted using the State (OR) Growth Rate methodology with a CAGR of 0.9 percent within the forecast period. This method uses the State growth rate to represent AAM and local aviation trends.
- Helicopters are forecasted using the AST Growth Rate Method with a CAGR of 6.2 percent. Information provided by the United States Coast Guard shows that there is the potential for three additional helicopters to their fleet.

- Experimental aircraft were forecasted using the FAA Aerospace Method, which showed an estimated annual growth rate of 3.5 percent. The Aerospace Method applies the growth rate from the FAA Aerospace Forecast historical data to the future value of experimental aircraft, which reflects an increase in electric aircraft.

Overall, the Electrification forecasting method is the preferred forecasting method with an estimated annual percentage increase of 3.8 percent. Electric aircraft are going to be more cost efficient in comparison to operating a conventional aircraft. There may be a small decline in fuel sales within the next 20 years; however, it is important to note that the majority of based aircraft at AST will be conventional. There is the potential for approximately 20 electric aircraft to be added to the based aircraft fleet at AST, with some multi-engine piston aircraft being replaced.

PEAK FORECASTS AND CRITICAL AIRCRAFT

Peak Period Forecasts

Peak period forecasts estimate when airport facilities will be the busiest. Peak period information is used to determine the capacity needs for airfield and terminal facilities and determine the scope of improvement projects. Improvement projects are not typically designed for the busiest day of the year specifically, as such a design would lead to over-building. The peak period forecasts are based on examining the average day of the busiest month of the year, in accordance with *FAA Advisory Circular 150/5070-6B Change 2*. Based on the TFMSC, August is the peak month used for fiscal year 2021.

The method used to forecast future peak periods is based on historical record. Thus, peak forecasts should be reevaluated if changes in user or aircraft type occur. **Table 3-26** shows the forecasted peak periods for operations from 2021 to 2041. TFMSC data was used to forecast the peak month for AST, and 2021 FlightAware data was used to forecast the peak day and peak hour. This coincides with the summer holiday when weather conditions are most favorable for recreational flying. The peak hour occurs between 10 a.m. and 11 a.m.

Table 3-26: Peak Period Forecasts - Aircraft Operations

Period	Factor	2021	2026	2031	2036	2041
Annual	100%	39,000	40,600	43,400	47,800	51,500
Peak Month	14.3%	5,600	5,800	6,200	6,800	7,300
Peak Day	6.4%	360	370	400	440	470
Peak Hour*	13.8%	49	51	54	60	65

Peak hour operations will vary based on touch-and-go operations. Users that introduce touch-and-go operations will increase peak hour operations. Projected numbers over rounded to the nearest hundredth. Numbers over 10 and under 1,00 are rounded to the nearest 10.
Sources: 2021 FlightAware Data; Traffic Flow Management System Counts (TFMSC)

Critical Aircraft

The critical aircraft is defined as being the most demanding type or group of aircraft with more than 500 annual operations (not touch-and-go) at an airport. To determine the AST critical aircraft, operations data by aircraft type is provided by the Traffic Flow Management System Counts (TFMSC). The TMFSC only captures operations with filed flight plans, so aircraft used for flight training are not represented in the data set. According to management at AST, there are no flight schools, clubs, or flying associations at AST.

Aircraft type is defined by the Airport Reference Code (ARC), which consists of the Aircraft Approach Category (AAC) and the Airport Design Group (ADG). These categories are defined by the aircraft dimensions and approach speed. **Table 3-27** presents the 2021 operation count at AST by aircraft type. A breakdown of operations by aircraft type for each ARC is included in **Attachments 1 & 2.**

Table 3-27: AST FY 2021 Operations by Airport Reference Code

ARC	Civilian	Military	Total
A-I	1,074	0	1,074
A-II	125	3	128
Subtotal A	**1,199**	**3**	**1,202**
B-I	133	1	134
B-II	1,007	12	1,019
Subtotal B	**1,140**	**13**	**1,153**
C-I	43	0	43
C-II	29	0	29
C-IV	4	2	6
Subtotal C	**76**	**2**	**78**
D-I	2	0	2
D-II	2	0	2
D-III	4	3	7
D-IV	7	0	7
D-V	1	0	1
Subtotal D	**16**	**3**	**19**

Source: TFMSC. Detailed breakdown by aircraft included in Attachment 2.

The critical aircraft at AST is determined by looking at the highest AAC and ADG with more than 500 operations. Several single-aircraft with an ARC of B-II conducted more than 500 annual operations at AST. Additionally, AAC B aircraft (ADG's I and II) had 1,140 civilian operations in FY2021. ADG II had 1,019 total operations in FY 2021. Thus, the critical aircraft at AST are aircraft with ARC B-II. Having airport facilities that meet the ARC B-II design standard will help the airport accommodate forecasted aircraft. The representative aircrafts for ARC B-II at AST are the Cessna 208 Caravan, which conducted 668 operations, and the C680 – Cessna Citation Sovereign, which conducted 69 operations in FY 2021. **Figure 3-11** shows the representative aircraft for ARC B-II.

Figure 3-11: ARC B-II Representative Aircraft: C208 – Cessna 208 Caravan

The future fleet composition is unknown and based largely on Textron orders that are currently being fulfilled or are yet to be delivered since the majority of B-II aircraft at AST are manufactured by Textron. In addition, the demand for electric aircraft within the next 20 years is unknown as no AAM aircraft have been approved by the FAA, and those aircraft are yet to be mass manufactured. AAM aircraft are expected to replace a small number of experimental aircraft, so there should be no change to the B-II critical aircraft designation. There will still be experimental aircraft that are not going to be replaced by AAM.

FORECAST SUMMARY

The forecast summary is presented in **Figure 3-12** and **Figure 3-13.** Highlights of the forecast are below.

- The Clatsop County population is expected to continue growing at an average 0.4 percent annually.
- The Clatsop County economy is growing, with the GRP projected to grow an average of 1.7 percent annually.
- Itinerant general aviation operations are projected to increase an average 3.0 percent annually using the Operations per Based Aircraft forecast model.
- Based on the Operations per Based Aircraft forecast model, local general aviation operations at AST are forecasted to grow an average 3.1 percent annually.
- Based aircraft counts are projected using the Electrification hybrid method, with the experimental aircraft forecasts based on new AAM opportunities at AST compared to the 2021 baseline TAF.

  The based aircraft fleet as a whole is expected to increase 0.9 percent from 2021 to 2041. The SEP fleet is projected to grow at an average 1.3 percent and the MEP at 0.9 percent. Based jet aircraft is forecasted to grow by one jet due to the lack of data reported in the 2022 TAF for base year 2021. Helicopters are projected to grow at 6.2 percent based on information provided by the USCG, and experimental aircraft are expected to grow at 3.5 percent on average annually.
- Peak operations occur in August.
- The existing and forecast critical aircraft type is ARC B-II, such as the Cessna 208 cargo aircraft that operates at AST.

Figure 3-12: Forecast/TAF Comparison

AIRPORT NAME: Warrington-Astoria Regional Airport

	Year	Airport Forecast	TAF	AF/TAF (% Difference)
Passenger Enplanements				
Base yr.	2021	7	6	16.7%
Base yr. + 5yrs.	2026	0	7	-100.0%
Base yr. + 10yrs.	2031	0	7	-100.0%
Base yr. + 15yrs.	2036	0	7	-100.0%
Commercial Operations				
Base yr.	2021	1,651	1,651	0.0%
Base yr. + 5yrs.	2026	1,651	1,651	0.0%
Base yr. + 10yrs.	2031	1,651	1,651	0.0%
Base yr. + 15yrs.	2036	1,651	1,651	0.0%
Total Operations				
Base yr.	2021	38,986	38,986	0.0%
Base yr. + 5yrs.	2026	39,991	40,314	-0.8%
Base yr. + 10yrs.	2031	41,917	41,704	0.5%
Base yr. + 15yrs.	2036	44,492	43,172	3.1%

NOTES: TAF data is on a U.S. Government fiscal year basis (October through September).
AF/TAF (% Difference) column has embedded formulas.

Figure 3-13: TAF Forecast Worksheet

Template for Summarizing and Documenting Airport Planning Forecasts

A. Forecast Levels and Growth Rates

AIRPORT NAME: Warrington-Astoria Regional Airpoı **Specify base year:** 2021

	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.	Average Annual Compound Growth Rates: Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +15
Passenger Enplanements									
Air Carrier	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Commuter	7	0	0	0	0	-100.0%	-100.0%	-100.0%	-100.0%
TOTAL	7	0	0	0	0	-100.0%	-100.0%	-100.0%	-100.0%
Operations									
Itinerant									
Air carrier	0	0	0	0	0	N/A	N/A	N/A	N/A
Commuter/air taxi	1,651	1,651	1,651	1,651	1,651	0.0%	0.0%	0.0%	0.0%
Total Commercial Operations	1,651	1,651	1,651	1,651	1,651	0.0%	0.0%	0.0%	0.0%
General aviation	11,787	11,800	12,100	13,300	15,100	0.1%	0.5%	1.2%	1.7%
Military	14,000	14,000	14,000	14,000	14,000	0.0%	0.0%	0.0%	0.0%
Local									
General aviation	11,548	11,686	12,240	12,966	13,741	1.2%	1.2%	1.2%	1.2%
Military	0	0	0	0	0	N/A	N/A	N/A	N/A
TOTAL OPERATIONS	38,986	39,137	39,991	41,917	44,492	0.4%	0.5%	0.7%	0.9%
Instrument Operations	12,992	12,995	13,066	13,352	13,781	0.0%	0.1%	0.3%	0.4%
Peak Hour Operations	49	49	50	53	56	0.2%	0.5%	0.7%	0.9%
Cargo/mail (enplaned+deplaned tons)	0	0	0	0	0	N/A	N/A	N/A	N/A
Based Aircraft									
Single Engine (Nonjet)	23	24	25	26	28	4.3%	1.7%	1.2%	1.3%
Multi Engine (Nonjet)	5	5	5	6	6	0.0%	0.0%	1.8%	1.2%
Jet Engine	0	0	2	2	3	N/A	N/A	N/A	N/A
Helicopter	3	3	5	7	9	0.0%	10.8%	8.8%	7.6%
Other	3	3	4	4	5	0.0%	0.0%	0.0%	0.0%
TOTAL	34	35	41	45	51	2.9%	3.8%	2.8%	2.7%

B. Operational Factors

	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 15yrs.
Average aircraft size (seats)					
Air carrier	0.0	0.0	0.0	0.0	0.0
Commuter	N/A	0.0	0.0	0.0	50.0
Average enplaning load factor					
Air carrier	0.0%	0.0%	0.0%	0.0%	0.0%
Commuter	N/A	0.0%	0.0%	0.0%	0.0%
GA operations per based aircraft	686	671	594	584	566

PEAK DEMAND ANALYSIS

Peak demand analysis assesses when facilities at the Warrenton-Astoria Regional Airport (AST) are at their busiest based on their use by passengers and aircraft takeoffs and landings (operations). This information is used to determine facility requirements of the passenger terminal building, apron, and airfield pavements (the runways, taxiways, and aircraft parking aprons). Peak demand analysis considers the busiest months, days, and hours to determine the spread of the demand across time. Peaking trends will vary from airport to airport. Some airports have highly concentrated peaks, with most annual activity occurring during a particular time of year, day of the week, or part of the day, while other airports have more evenly distributed demands. Peak periods are calculated for aircraft operations and for passenger enplanements and deplanements.

The data used for the analysis includes operation counts from the FAA Traffic Flow Management Systems Counts (TFMSC), 2021 FlightAware data, and AST records regarding cargo operations. Based on historical data, the parking lots, terminal, parking aprons, fuel storage, and deicing facilities have felt little impact from AST's growth. According to correspondence with AST, one more fuel truck may be added to the fuel farm. Demand forecasts have a base year of 2021 (FAA fiscal year) as it is the most recent year that a complete data set is available. Complete data for FAA fiscal year 2022 is not available.

Peak Period Operations

Peak Month

Peak period operations examine how busy the runway system is throughout the year. The first step is determining the busiest month or months of activity at AST. Based on data shown in 2021 FlightAware data, the busiest month on average is August, with 14.3 percent of annual operations. This peak period corresponds with school summer vacation times and with fewer cloudy days. This means that general aviation pilots have more opportunities to fly for fun under visual flight rules (VFR) rather than rely on instrument flight rules (IFR). The least busy month on average has been February, with 3.8 percent of annual operations. **Table 3-28** displays the total operations at AST by arrivals and departures for each month in fiscal year 2021.

Table 3-28: AST Peak Month

Month	Departures	Arrivals	Total Operations
January	76	75	151
February	57	61	118
March	82	95	177
April	106	98	204
May	128	135	263
June	146	153	299
July	199	212	411
August	**211**	**229**	**440**
September	182	188	370
October	142	139	281
November	91	93	184
December	92	93	185
Source: FAA TMFSC for FY2021			

Peak Day

Peak day analysis is based on the results of the peak month analysis. Operation distribution is determined by examining operation records for every day of the peak month. The following list shows general trends that contributed to peak operation days in August 2021 at AST:

- Most operations in August occurred during the weekdays.
- General aviation operations at AST fluctuate throughout the week, likely due to AST having a large volume of recreational general aviation activities.

Peak day data is based on 2021 FlightAware data. FlightAware provides daily operations counts that are used to determine the ratio between arrivals and departures. This ratio is applied as the airport did not provide daily operation data. The peak day, August 31 of fiscal year 2021, had 6.4 percent of monthly operations. The 6.4 percent peak day is used for planning purposes. **Table 3-29** displays the total operations at AST by arrivals and departures for each day in August for fiscal year 2021.

Table 3-29: AST Peak Day

Day	Departures	Arrivals	Total Operations
1-Aug	11	10	21
2-Aug	10	10	20
3-Aug	13	12	25
4-Aug	11	18	29
5-Aug	15	16	31
6-Aug	14	16	30
7-Aug	6	7	13
8-Aug	13	15	28
9-Aug	20	19	39
10-Aug	22	25	47
11-Aug	17	20	37
12-Aug	26	30	56
13-Aug	16	17	33
14-Aug	12	12	24
15-Aug	10	11	21
16-Aug	8	10	18
17-Aug	17	18	35
18-Aug	15	14	29
19-Aug	26	26	52
20-Aug	23	27	50
21-Aug	7	12	19
22-Aug	13	13	26
23-Aug	16	21	37
24-Aug	18	18	36
25-Aug	12	18	30
26-Aug	14	12	26
27-Aug	17	15	32
28-Aug	22	24	46
29-Aug	13	13	26
30-Aug	10	14	24
31-Aug	**31**	**33**	**64**
Source: 2022 FlightAware for FY2021			

Peak Hour

Peak hour operations examine the time in the day flights arrive and depart from AST. Peak arrivals and departures have different impacts on airport facilities and are thus analyzed separately. For example, peak departures affect taxiway use as aircraft wait to take off, while peak arrivals affect the capacity of the passenger terminal gate. Peak hour analysis uses data from the 2021 FlightAware data. **Table 3-30** displays the total operations at AST by arrivals and departures per hour on August 31 of fiscal year 2021.

Table 3-30: AST Peak Hour

Hour	Departures	Arrivals	Total Operations
0:00	0	0	0
1:00	0	0	0
2:00	1	0	1
3:00	3	0	3
4:00	0	0	0
5:00	1	0	1
6:00	0	1	1
7:00	0	1	1
8:00	0	1	1
9:00	1	1	2
10:00	**6**	**2**	**8**
11:00	3	4	7
12:00	4	3	7
13:00	2	2	4
14:00	0	0	0
15:00	1	0	1
16:00	1	2	3
17:00	4	1	5
18:00	0	3	3
19:00	1	1	2
20:00	1	1	2
21:00	1	3	4
22:00	2	0	2
23:00	0	0	0
Source: 2022 FlightAware for FY2021			

ATTACHMENT 1 —
RUNWAY DESIGN CODE (RDC) B-II OPERATIONS BY AIRCRAFT TYPE

Critical Aircraft		FY2021 Operations
C208	Cessna 208 Caravan	668
C680	Cessna Citation Sovereign	69
C25C	Cessna Citation CJ4	54
FA50	Dassault Falcon/Mystère 50	34
C25B	Cessna Citation CJ3	24
B350	Beech Super King Air 350	20
E55P	Embraer Phenom 300	20
BE20	Beech 200 Super King	18
C550	Cessna Citation II/Bravo	18
C68A	Cessna Citation Latitude	18
C56X	Cessna Excel/XLS	16
C560	Cessna Citation V/Ultra/Encore	14
F900	Dassault Falcon 900	10
C441	Cessna Conquest	9
F2TH	Dassault Falcon 2000	6
BE9T	Beech F90 King Air	4
D328	Dornier 328 Series	4
AC95	Gulfstream Jetprop Commander 1000	2
B190	Beech 1900/C-12J	2
BE30	Raytheon 300 Super King Air	2
C650	Cessna III/VI/VII	2
HA4T	Hawker 4000	2
J328	Fairchild Dornier 328 Jet	2
SH33	Shorts 330	1

*Aircraft operated by the U.S. Department of Defense and other Federal Agencies cannot be used to support AIP eligibility. A total of 16 of the 1,019 B-II operations were conducted by Department of Defense aircraft.

ATTACHMENT 2 — RUNWAY DESIGN CODE (RDC) A-I OPERATIONS BY AIRCRAFT TYPE

Aircraft		FY2021 Operations
C172	Cessna Skyhawk 172/Cutlass	507
C182	Cessna Skylane 182	99
PA27	Piper Aztec	51
SR22	Cirrus SR 22	45
P28A	Piper Cherokee	44
T210	Cessna T210M	39
PA32	Piper Cherokee Six	21
SR20	Cirrus SR-20	21
BE35	Beech Bonanza 35	19
P46T	Piper Malibu Meridian	19
S22T	Cirrus SR-22 Turbo	17
M20P	Mooney M-20C Ranger	15
M20T	Turbo Mooney M20K	14
TBM9	Socata TBM	14
C210	Cessna 210 Centurion	11
P28B	Piper Turbo Dakota	10
BE36	Beech Bonanza 36	9
C82R	Cessna Skylane RG	8
BE33	Beech Bonanza 33	7
C152	Cessna 152	7
P28R	Cherokee Arrow/Turbo	7
PA44	Piper Seminole	7
PA46	Piper Malibu	7
BE55	Beech Baron 55	6
C177	Cessna 177 Cardinal	6
C240	Cessna TTx Model T240	6
DA40	Diamond Star DA40	6
C310	Cessna 310	5
AA5	American AA-5 Traveler	4
BE24	Beech 24 Sierra	4
COL3	Lancair LC-40 Columbia 400	4
DA42	Diamond Twin Star	4
EA50	Eclipse 500	4
PA24	Piper PA-24	4
TBM7	Socata TBM-7	4
C150	Cessna 150	3
MU2	Mitsubishi Marquise/Solitaire	3
BE23	Beech 23 Sundowner	2

E550	Embraer Legacy 500	2
KODI	Quest Kodiak	2
PA30	Piper PA-30	2
PA34	Piper PA-34 Seneca	2
P210	Riley Super P210	1
P32R	Piper 32	1
TBM8	Socata TBM-850	1
*Aircraft operated by the U.S. Department of Defense and other Federal Agencies cannot be used to support AIP eligibility. A total of 0 of the 1,074 A-I operations were conducted by the Department of Defense aircraft. Source: TFMSC for FAA Fiscal Year 2021		

CHAPTER 4

FACILITY REQUIREMENTS

CHAPTER 4 - FACILITY REQUIREMENTS

CHAPTER OVERVIEW

This chapter focuses on facility requirements at Astoria Regional Airport (AST). Airport facilities are generally divided into airside and landside facilities. Airside facilities include runways, taxiways, navigation aids, required clear areas, aircraft parking and aprons, support facilities and hangar areas. Landside facilities typically include other building (non-hangar) areas, roads, security, automobile access, and other airport property outside of aircraft movement areas.

Airport facility planning is largely driven by a combination of criteria and standards developed by the Federal Aviation Administration (FAA) that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure, demand for services, and the airport operator’s vision of its aviation and community roles.

This chapter is organized into the following sections:

- Aeronautical Facilities – Airside
- Aeronautical Facilities – Landside
- Electric Aircraft Facilities and Airspace
- Non-Aeronautical Facilities
- Auto Parking and Circulation
- Summary

These recommendations and requirements are developed in coordination with AST management, stakeholders, and guidance from the FAA. FAA guidance includes Advisory Circulars (AC) 150/5070-6B, *Airport Master Plans*; AC 150/5300-13b, *Airport Design*; and AC 150/5060-5, *Airport Capacity and Delay*. The FAA is responsible for the overall safety of civil aviation in the United States; therefore, FAA design standards and policy focus first on safety, with secondary goals including efficiency and utility. Design standards, which are presented in ACs, heavily influence the planning and design of airport facilities.

AC 5300-13B *Airport Design* uses a coding system to determine standards for designing airports based on the operational and physical characteristics of the aircraft that operate or intend to operate at an airport. Two categories yield the Airport Reference Code (ARC): the Aircraft Approach Category (AAC), which is based on aircraft approach speed, and Airplane Design Group (ADG), which is based on the wingspan and tail height. The Runway Design Code (RDC) adds a third component to the ARC based on runway approach visibility minimums and is expressed as Runway Visual Range (RVR). The RDC, which is the FAA classification for the airfield design, determines the scale and setbacks of airfield facilities based on the design aircraft. RDC coding classifications are shown in **Table 4-1**.

Table 4-1: Runway Design Code Designations

Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group		
Group Number	**Wingspan (in feet)**	**Tail Height (in feet)**
I	< 49’	< 20’
II	49’ - < 79’	20’ - < 30’
III	79’ - < 118’	30’ - < 45’
IV	118’ - < 171’	45’ - < 60’
V	171’ - < 214’	60’ - < 66’
VI	214’ - < 262’	66’ - < 80’
Approach Visibility Minimums		
RVR (Feet)	**Flight Visibility Category (statute miles)**	
VIS	Runways designed for visual approach use only	
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	

Source: FAA Advisory Circular 150/5300-13B

Critical Aircraft

Critical aircraft identified in the forecast chapter was a Cessna 208 Caravan. Since the approval of the forecast by the FAA, it was determined that the Cessna 208 Caravan is not an ARC B-II aircraft. However, the forecast still projects ARC B-II as the current and future designation. For the purposes of this facilities requirements chapter, the Cessna CJ3 (ARC B-II) is used as the representative aircraft.

The Airport is designed to B-II standards for the runway, taxiways, and other areas expected to be used by the Cessna Citation CJ3. Taxiways and aprons that are expected to exclusively serve smaller aircraft may use different design standards as appropriate, as the dimensional standards are defined by the Taxiway Design Group (TDG). TDG parameters are determined by aircraft landing gear.

AERONAUTICAL FACILITIES – AIRSIDE

Runway Design Standards

Runway design standards include safety areas (SA), object free areas (OFA), runway protection zones (RPZ), and setback distances for taxiways and other airport facilities. Runway length has additional design criteria and will be assessed in a separate section of this chapter. Runways 8/26 and 14/32 meet B-II design standards, as shown in **Table 4-2**

Table 4-2: Runway Design Standards Compliance

Runway Design	FAA Standards	Runway 8/26		Runway 14/32	
	B-II	8	26	14	32
Runway Width	75’	100’		100’	
Shoulder Width	10’	20’		25’	
Blast Pad Width	95’	N/A		190’	120’
Blast Pad Length	150’	N/A		300’	150’
Runway Protection					
Runway Safety Area (RSA)					
Length Beyond Departure End	300’	300’	300’	300’	300’
Length Prior to Threshold	300’	300’	300’	300’	300’
Width	150’	300’		150’	
Runway Object Free Area (ROFA)					
Length Beyond Departure End	300’	600’		300’	
Length Prior to Threshold	300’	300’		300’	
Width	500’	800’		500’	
Precision Obstacle Free Zone (POFZ)					
Length	N/A	200’		200’	
Width	N/A	400’		400’	
Runway Separation, Runway Centerline to:					
Holding Position	200’	250’		200’	
Parallel Taxiway	240’	300’		240’	
Aircraft Parking Area	-	500’+		400’	

Source: AC 150/5300-13B

Runway Protection Zone

The RPZ is a trapezoidal area at the end of the runway that serves to enhance safety for aircraft operations and for people and objects on the ground. Guidance for land use within an RPZ is included in the AC 150/5190-4B, *Airport Land Use Compatibility Planning.* Some potentially incompatible land uses defined in the AC 150/5190-4B include fuel storage, roads, and areas typically associated with high concentrations of people. The FAA recommends that an airport operator maintain full control of an RPZ through fee simple property acquisition or easement. **Figure 4-1** shows the RPZ for Runways 8/26 and 14/32 and the potentially non-compatible uses and structures that occur within the RPZ. The AC makes it clear that no action regarding land uses in the RPZ is required unless the runway end moves, the RPZ changes size, or a potentially non-compatible land use is introduced or modified in the RPZ. The FAA has not made any determinations on RPZ compatibility for any of the land uses presented in **Figure 4-1**.

Figure 4-1: Runway Protection Zones

A hiking trail, *Airport Dike Trail* crosses through the RPZ of Runway Ends 14 and 26, and Highway 101 crosses through the RPZ of Runway End 8. Neither the trail nor highway are currently considered potentially non-compatible. If the runway end moves, the highway moves, or the RPZ changes size, the FAA will request an evaluation. Actions that may trigger a review of potentially non-compatible uses in the RPZ will be evaluated in **Chapter 5 Alternatives Development and Evaluation**.

RPZ Recommendations: It is recommended that AST regularly coordinate and collaborate with the City of Warrenton and Clatsop County to avoid non-compatible land uses in the RPZ.

Runway Line of Sight

Line of sight standards make it so pilots can observe runways and taxiways to verify that they are clear of aircraft, vehicles, wildlife, and other hazards. Longitudinal (along the length of the runway) line of sight standards in AC 150/5300-13B state that any two points located 5 feet above the runway centerline must be mutually visible for the entire length of the runway. If the runway is served by a full-length parallel taxiway, this visibility requirement is reduced to one half the runway length. AST has a semi-parallel taxiway system, which serves each runway end. Taxiway A serves Runway 8/26, and Taxiway B serves Runway 14/32. The longitudinal profile evaluation from each end of Runway 8/26 and Runway 14/32 to the midpoint shows a clear line of sight, successfully meeting the line-of-sight requirement.

Runway Line of Sight Recommendation: It is recommended that future runway pavement projects maintain line of sight clearance.

Runway Pavement Strength

Pavement strength is designed for the mix of aircraft expected to use the runway. Pavement strength ratings do not exclude heavier aircraft from AST; however, pavement may wear prematurely following repeat use by aircraft heavier than it was designed for. The strength of Runways 8/26 and 14/32 are 60,000 pounds single-wheel configuration, 76,000 pounds dual-wheel gear, and 119,000 pounds dual-tandem-wheel main landing gear. The current future fleet mix is expected to remain ARC B-II as described in **Chapter 3 Aviation Forecasts**.

Pavement Strength Recommendation: It is recommended that AST maintain pavement strength to accommodate the current and forecasted fleet mix. AST should periodically evaluate size and frequency of aircraft larger than B-II utilizing AST runways, taxiways, and ramps to assure pavement strength is maintained. A limited number of aircraft up to C-130s could use the airport without deleterious effect. This would also apply to larger corporate aircraft like the Gulfstreams, Global Express',

Pavement Design & Maintenance

FAA standards, as defined in AC 150/5320-6G, *Airport Pavement Design and Evaluation*, are designed to protect the investments of the Port Authority and FAA by ensuring that pavement lasts as long as possible, with the least amount of maintenance. Each year, a significant amount of Airport Improvement Program (AIP) funds goes toward constructing or rehabilitation of runways, taxiways, and aprons. As part of future planning efforts, AST is anticipating the upcoming rehabilitation needs of Runway 8/26.

AST has noted a decrease in traffic on Runway 8/26, due to the safety concerns of the non-grooved pavement surface conditions. Grooving and other surface friction treatment for primary and secondary runways provide a skid resistant surface in all weather conditions. For certain fleet operators, it is standard operating procedures to avoid or restrict the use of airports without grooved runways.

Pavement Maintenance Recommendation: It is recommended that AST continue to use the Oregon Department of Aviation pavement management program, which prepares a formal pavement condition report every three years. Planning for upcoming project needs will ensure better funding opportunities.

It is recommended the Airport also groove the pavement for Runway 8/26 during the pavement rehabilitation. The forecast indicated turbo-jet operations that would support the pavement. Grooving the pavement will increase overall accessibility, safety, and drainage.

Taxiway Design and Standards

AC 150/5300-13B provides taxiway design concepts and methodologies, described below. This section identifies taxiway system recommendations to meet expected demand and FAA standards.

Pilot Awareness

Taxiway intersections should be simplified by utilizing the “three-path concept,” which means that a pilot is presented with no more than three choices at each intersection – ideally, left, right, and straight ahead. There are no intersections at AST where a pilot is presented with more than three choices for taxi direction. As an operational requirement, FAA suggests that the geometry of taxiways must be evaluated. Taxiway areas will be evaluated in **Chapter 5 Alternatives Development and Evaluation**.

Runway Crossings

Risk of error can be reduced by limiting runway crossings, especially within the middle third of runways. FAA guidance identifies the middle third of a runway as the place where pilots are least able to maneuver to avoid collision. Solutions to this situation will be evaluated in **Chapter 5 Alternatives Development and Evaluation**. Key considerations include the following.

- The west apron is currently the only option on the airfield to park large aircraft, and the ramp space is limited.
- AST has one runway crossing in the middle third of the runway, Taxiway A2, which serves the apron.
- The west apron has multiple access points, which prevent high energy intersections.

Runway Crossings Recommendation: It is recommended that AST limit runway crossings to the outer thirds of the runway to comply with FAA guidance. One hot spot, Taxiway A2, currently resides in the inner third of the runway and will require evaluation.

Visibility

Right-angle intersections provide the best visibility for a pilot. A right-angle turn at the end of the parallel taxiway clearly indicates the pilot is approaching a runway. The semi-parallel taxiway system at AST provides right-angle turns to access the runways.

Direct Access

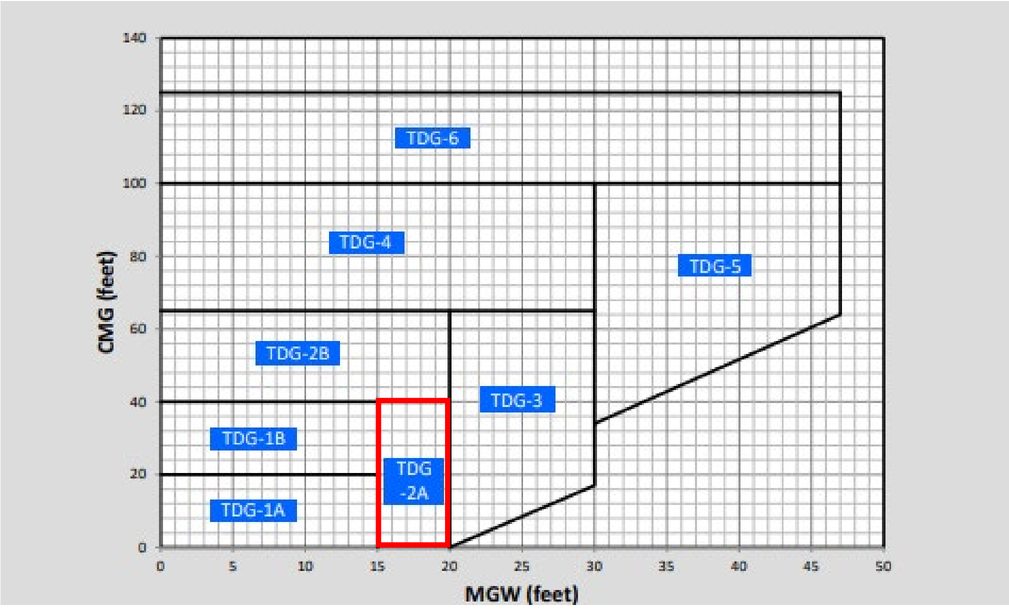
Taxiways should not lead directly from an apron to a runway without requiring a turn. Direct access from the apron to the runway may lead to runway incursions. Taxiways A2 and B2 provide straight-line access to a runway from the apron. Mitigation and relocation of direct access taxiways has been an FAA area of emphasis to reduce hot spots at airports and mitigate runway incursions.

Runway Crossings Recommendation: It is recommended that AST develop alternatives for relocating Taxiway A2 and B2. This will provide pilots and airport ground traffic with a higher level of safety while using the taxiway system. A preferred alternative should be noted in the Airport Layout Plan (ALP) for future development, and consideration for future funding should be evaluated. Mitigation and relocation of direct taxiway access to runways is FAA AIP-eligible.

Taxiway Design Group

The TDG criteria is defined in AC 150/5300-13B. The TDG considers the dimensions of the aircraft landing gear to determine taxiway widths and pavement fillets to be provided at taxiway intersections. The width of the main gear and wheelbase (the distance from nose gear to main gear) distinguishes the TDG classifications. TDG classifications are presented in **Figure 4-2**.

Figure 4-2: Taxiway Design Group



Note: Values in the graph are rounded to the nearest foot. 1 foot = 0.305 meters.
Source: Figure 1-1 from FAA AC 150/5300-13B

The existing TDG for all taxiways and taxiway connectors is TDG-2A, which accommodates the existing and future critical aircraft. The existing and future aircraft is a B-II with the representative aircraft being a Cessna Citation CJ3, which is TDG 2A.The comparison between FAA design standards and existing conditions for the taxiway system is shown in **Table 4-3**.

Table 4-3: Taxiway System Design Standards

Taxiway Segment	FAA Standards	Taxiway A	Taxiway B
Type		**Primary Parallel**	**Primary Parallel**
Taxiway Design Group	2A	2A	2A
Dimension (Width)	35’	50’	35’

Source: FAA AC 150/5300-13B, Table 4-2. Design Standards Based on Taxiway Group (TDG), and AST Existing Conditions

Taxiway and Taxilane Object Free Area (TOFA)

The TOFA is defined in the criteria in AC 150/5300-13B. This area should provide a separation distance from the taxiway centerline to an object. The Taxiway Safety Area (TSA) begins at the taxiway centerline out to the wing tip for clearance of the aircraft. The TOFA and TSA for Taxiways A and B are clear of any objects and meet the standards for separation distance from the taxiway centerline.

Taxiway Design Recommendations: It is recommended that AST maintain clearance of the TOFA and TSA until realignment can occur. Both Taxiway A and B are non-standard and will require the TOFA and TSA to be re-evaluated. Relocating of Taxiway A south 30 feet to meet the 300-foot center line separation requirements and relocation of glide slope. It is strongly encouraged that AST communicate with Air Traffic Organization (ATO) up to three years in advance of any federal navigation aids, including AST PAPI, being relocated.

While movement of Taxiway B has the potential to increase the size of the transient apron and needed safety areas. It is strongly encouraged that AST communicate with Air Traffic Organization (ATO) up to three years in advance of any federal navigation aids, including AST PAPI, being relocated.

Airfield Demand and Capacity

The purpose of the airfield demand and capacity analysis is to assess the capability of the airfield facilities to accommodate projected levels of aircraft operations. As outlined by the FAA in the AC 150/5060-5 *Airport Capacity and Delay*, there are two means of defining demand and capacity. Capacity can first be defined as the maximum number of aircraft operations that a specific configuration can accommodate during a specified time interval of continuous demand (i.e., an aircraft waiting to depart or land). Factors that can impact capacity are weather conditions, number and configuration of exiting taxiways, aircraft mix that use the facility, and the handling of air traffic control/airspace. Secondly, capacity is also defined by the number of aircraft operations that may occur during a specific time that corresponds with a tolerable aircraft delay. An important factor in the difference between both definitions is that one is defined by the terms of delay, while the other is not. Both demand and delay are relationally impacted on patterns of peak demand, which is unique to the airfield.

Capacity is evaluated by the following components:

- **Peak Hourly Capacity** – Maximum number of aircraft operations that a specific airfield configuration can accommodate during a period of continuous demand.
- **Annual Service Volume (ASV)** – Relative operating capacity, ASV is an estimate of the airport's annual capacity that accounts for differences in runway use, aircraft mix, and weather conditions that are encountered over a one-year period.
- **Aircraft Delay** – Average number of minutes an aircraft is delayed on the airfield and total hours of delay incurred within a one-year period.

Given that the Airport is non-towered, the data related to specific runway usage cannot be compiled, as the airport does not maintain records. Therefore, this capacity will only examine the peak hour capacity, which will provide an overview of the capacity at which the airport operates.

Peak Hour Capacity

FAA traffic counts indicate that the 2021 peak traffic month, August, had 5,500 operations. Averaging 360 operations per day with a peak demand of 49 operations per hour. Should activity remain similarly distributed in the future, there should be a peak hour demand of 65 operations in 2041.

Several assumptions are incorporated in capacity calculations:

- Arrivals equals departures
- Taxiway configuration is ample for airfield
- No airspace limitations

Table 4-4: Peak Hour Analysis

Capacity Components	2021	2026	2031	2036	2041
Annual Aircraft Operations (Existing & Forecasted)	39,000	40,300	41,700	43,200	44,700
Airport Operational Peaking					
Peak Month Operations*	5,500	5,800	6,200	6,800	7,400
Average Day Peak Month (ADPM) Operations**	360	370	400	440	470
Peak Hour Operations	49	51	54	60	65

* Rounded to the nearest hundredth
** Rounded to the nearest tenth
Source: TFMSC Data, FlightAware, and AST Records, 2021

Peak Hour Capacity Recommendation: It is recommended that AST continue to operate at a similar rate. If operations or aircraft type change, the airfield and capacity should be evaluated further.

Evaluation of Capacity

Based on forecasts defined from the base year 2021 in Chapter 3, it is expected that within 20 years, the airport will likely provide service to over 44,000 operations per year. Future development at the airport within this time will be necessary to accommodate this future demand. The following inputs are evaluated to derive an estimated airport capacity:

- Aircraft Mix
- Percent Arrivals
- Percent Touch-and-Go Operations
- Meteorological Conditions
- Flight Procedures and Navigational Aids (NAVAIDs)
- Airfield Alignment and Layout

Aircraft Mix

The type of aircraft operating at the airport can have a significant impact on the airfield's capacity. The aircraft mix index (a ratio of aircraft class serving the airport) is established by four categories that are classified by the maximum takeoff weight (MTOW). The size and operational frequency of aircraft determines the airport's fleet mix; the heavier the aircraft, the greater the in-flight path spacing between aircraft is needed to avoid wake turbulence. For aircraft mix, aircraft classes A and B are considered small single-engine and twin-engine aircraft, weighing 12,500 pounds or less. Class C and D are larger propeller or jet aircraft. **Table 4-5**: depicts aircraft capacity classifications, as defined in the AC 150/5060-5 *Airport Capacity and Delay.*

Table 4-5: Aircraft Capacity and Classification

Aircraft Class	MTOW (lbs)	Number of Engines	Wake Turbulence
A	<12,500	Single	Small (S)
B	<12,500	Multi	Small (S)
C	12,500-300,000	Multi	Large (L)
D	>300,000	Multi	Heavy (H)

Table Notes: AC 150/5060-5 Airport Capacity and Delay

The Airport is classified in the National Plan of Integrated Airport Systems (NPIAS) as a Local general aviation airport, based on enplanements, and has no scheduled service from passenger air carriers. Local operations are primarily general aviation in the A and B categories with some operations in the C category.

Percent Arrivals

Aircraft arrival percentages are relative to the airfield capacity. The higher the percentage of arrivals during peak periods of the day the greater the reduction in capacity. AST peak hour operations are spaced evenly during the day, with peak arrivals occurring between the hours of 06:00 to 21:00, with the busiest peak hour at 11:00. Peak departures occur between the hours of 10:00 to 17:00, with the busiest peak hour occurring at 10:00.

Percent Touch-and-Go Operations

A touch-and-go operation occurs when an aircraft lands and makes an immediate takeoff. The primary purpose of a touch-and-go is for takeoff and landing training of student pilots. These operations usually occur at smaller airports or airports with a larger flight school program. Touch-and-go operations count as two operations (takeoff and landing) and are included in the local operations counts. Local general aviation operations levels are highly sensitive to the amount of flight training occurring at an airport. An aircraft can perform more than six operations in an hour while practicing touch-and goes depending on the traffic pattern.

AST does not currently have any flight schools, flight clubs, or flying associations at the Airport. The Airport does, however, support training flights, as various flight schools in the Portland area fly into AST for pattern work and cross-country training. Beginning in 2021 and extending through the 20-year planning period, local operations are expected to increase slightly (up to approximately 14 percent of the total aircraft operations) due to continued training activity at the Airport.

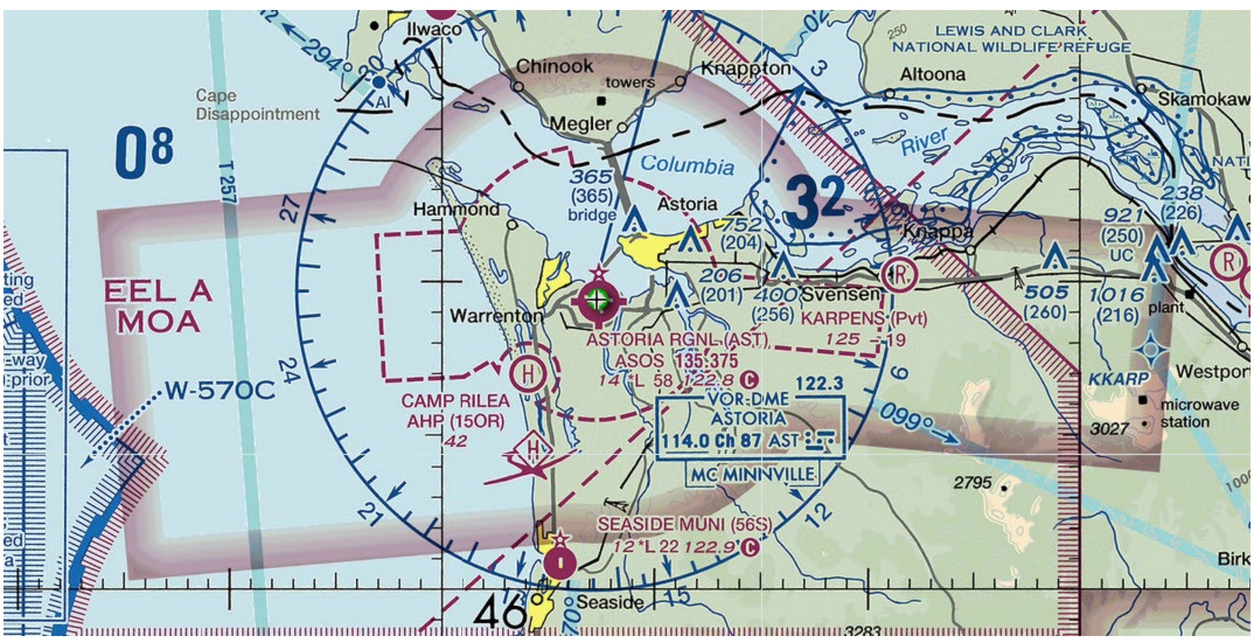
Meteorological Conditions

Typical weather conditions at the airport, on average, allow pilots to operate under Visual Flight Rules (VFR). VFR specifically refers to procedures for conducting flight under visual meteorological conditions (VMC), where pilots have sufficient visibility to navigate and avoid terrain and air traffic. Low cloud ceilings and reduced visibility typically lower airspace capacity. VFR conditions occur when the cloud ceiling is greater than or equal to 1,000 feet above ground level, and visibility is greater than or equal to three statute miles.

Air Traffic Control, Flight Procedures, and Navigational Aids (NAVAIDs)

AST is a non-towered airport in Class E controlled airspace. Primary air traffic control services are provided by FAA through Seattle Air Route Traffic Control Center (ARTCC) located in Auburn Washington. In Class E (Echo) airspace, aircraft flying under instrument flight rules (IFR) are controlled by air traffic controllers located in Air Traffic Control (ATC) Centers. ATC services for AST are provided by Seattle ARTCC through the Astoria Remote Communication Outlet (RCO).

Figure 4-3: AST Section Map



Source: FAA Sectional Aeronautical Charts, 2023

As AST is a non-towered airport, VFR traffic communicate air traffic positions and intentions through a Common Traffic Advisory Frequency (CTAF). Pilots use this frequency to communicate aircraft to aircraft and aircraft to ground regarding their position on airport and in the air as they approach or depart AST.

AST is serviced by various FAA maintained Instrument arrival and departure Flight Procedures. Electronic and visual approach procedures provide guidance to arriving aircraft and enhance the safety and capacity of the airfield. Instrument approaches are categorized as either precision or non-precision. Precision instrument approach aids with vertical guidance and horizontal guidance on final approach to the runway, while non-precision only provides horizontal guidance on approach. Most existing instrument approaches are either Global Positioning Systems (GPS) or Instrument Landing Systems (ILS).

ILS, GPS RNAV, VOR and COPTER Approach Procedures are in place at AST as well as the Astoria Three Obstacle Departure Procedure. ILS approach capabilities are used for Runway 26, with NAVAIDs including a localizer, glideslope antenna, Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). Runway 8 uses VOR and GPS instrument approaches. Runway End 32 has a Precision Approach Path Indicator lighting system (PAPI), The United States Coast Guard (USCG) is working to develop a short ILS helicopter approach in the near future. Both runways are equipped with Medium-Intensity Runway Lights (MIRL).

Table 4-6: Instrument Approach Procedures

Approach Type	Runway Designation	Ceiling Minimums	Visibility Minimums
ILS	26	292 Feet	Not less than ¾ Mile
VOR	8	660 Feet	1 Mile
GPS	8	600 Feet	1 Mile
COPTER LOC/DME	-	500 Feet	½ Mile

Source: FAA Terminal Procedures, 2023

Displaced Thresholds

For RDC B-II runways, when minimums are reduced from 3/4-mile to 1/2-mile, the width of the RSA increases from 150 ft to 300 ft, and the length prior to threshold/beyond departure end increases from 300 ft to 600 ft. The width of the ROFA increases from 500 ft to 800 ft, and the length prior to threshold/beyond departure end increases from 300 ft to 600 ft. Under existing conditions, the Runway 8 Accelerate-Stop Distance Available (ASDA) ends 113' beyond the Runway 26 Threshold and sets the point from where the RSA and ROFA extend. It is proposed to leave the conditions as-is since the future proposed conditions will require the declared distances as published currently. For existing conditions on the departure end of Runway 8, both the RSA and ROFA exceed standard. The future RSA and ROFA standards will be met for the 1/2 mile visibility condition provided that fences and roads would be relocated. This will ultimately protect the full runway length of 8/26 with the RSA and ROFA meeting standards without changing declared distances and will minimize disturbance to the environmental conditions near and around Runway End 26, as grading will not be needed.

Airfield Layout and Runway Alignment

AST is served by two runways, Runway 8/26, which serves as the primary and measures 5,796 feet in length with a width of 100 feet, and crosswind Runway 14/32, which measures 4,467 feet with a width of 100 feet. Both runways have direct access to parallel taxiways. Several exit and connector taxiways allow for increased capacity of the runway system and airside facilities, which are located to the west and south of Runway 14/32.

Primary runways are generally oriented to favor the prevailing wind, minimizing challenges associated with a secondary runway. Single-engine piston and light twin aircraft are more affected by crosswinds than larger, heavier turboprop and jet aircraft. FAA runway design criteria state that runway orientation must satisfy 95 percent wind coverage based on annual wind conditions. The analysis in **Chapter 1 Existing Conditions,** indicates that the combined wind coverage for Runway 8/26 and 14/32 exceeded 96 percent coverage for the 10.5-knot crosswind component.

As previously analyzed in the 2008 AST Master Plan, a comprehensive overview of the wind coverage at AST showed that Runway 26 offers the best wind coverage capabilities during IFR weather conditions. Runway 26 continues to be the preferential IFR runway. The 2008 wind coverage study is considered an accurate reflection of current wind conditions.

Figure 4-4: **Airfield Layout**

Figure Source: Mead & Hunt, 2023

Runway Length Analysis

This runway length analysis determines the length needed to meet existing and future aircraft demands at AST. The analysis considers the amount of annual activity and aircraft design characteristics. The assessment follows these steps:

- Identify the max take-off weight of the representative aircraft.
- Identify applicable design guidance using AC 150/5325-4B, *Runway Length Requirements for Airport Design* (AC 5325-4B).
- Perform analysis and identify the recommended runway length.

Applicable Design Guidance

The recommended runway length should be able to accommodate the takeoff and landing requirements of the design aircraft. The method for assessing runway length is determined by aircraft category in AC 150/5325-4B, *Runway Length Requirements for Airport Design*, which is based on based on aircraft max take-off weight (MTOW):

- Small aircraft (MTOW less than 12,500 pounds)
- Large aircraft (MTOW between 12,500 pounds and 60,000 pounds)
- Aircraft with MTOW greater than 60,000 pounds

Performance capabilities of individual aircraft are influenced by factors such as aircraft payload and fuel load, wind conditions, runway elevation, air temperature, and dew point. Aircraft performance information for small and large aircraft is determined by charts provided in AC 150/5325-4B. Aircraft with MTOW greater than 60,000 pounds have aircraft performance information provided by Airport Planning Manuals (APMs) produced by the aircraft manufacturers.

Runway Length Assessment Results

The runway length analysis includes B-II aircraft to assess the necessary runway length of the most demanding and commonly used aircraft at AST. The Cessna Citation CJ3 was considered for this runway length analysis as it is the most frequent and most demanding aircraft at AST.

The runway length analysis was completed in accordance with AC 150/5325-4B. The Cessna Citation CJ3 has a maximum take-off weight of 13,870-lbs and accordingly the methods specified in AC 150/5325-4B, Chapter 3 was applied to AST. AST has an airport elevation of 14.3 feet above mean sea level (AMSL) and an average summer high temperature of 61.3 degrees Fahrenheit. runway length for each aircraft considered is shown in **Table 4-7**:

Table 4-7: Runway Length Analysis

Aircraft: Cessna Citation CJ3	
60% Useful Load	**90% Useful Load**
4,600’	5,700’

Note: Based on AC 150-5325-4B in Accordance with Specified Method

Runway Length Recommendation: It is recommended that AST maintain the current runway lengths of 5,796 feet and 4,467 feet to accommodate existing and forecasted aircraft.

AERONAUTICAL FACILITIES – LANDSIDE

Pilot and Passenger Facilities

There are currently no commercial passenger terminal facilities at AST. Astoria Flight Center, the Airport’s Fixed Based Operator (FBO), operated by the Port of Astoria provides FBO services, such as fuel, aircraft support, passenger, and pilot facilities.

FBO Recommendation: The current FBO, constructed in 1972, no longer adequately serves the current or forecasted future needs and demands of the Port of Astoria and AST users. The current building is not Americans with Disability Act (ADA)-compliant and has several landside access issues, which are challenging in regard to accessibility, utility, and wayfinding. There is currently no designated pick up/drop off facilities or designated turn around areas at the terminal. Parking around the FBO is often limited. To remedy these challenges, two options are presented.

1) Plan for and program a new FBO facility in a new location with improved landside access; or
2) Enhance or replace FBO structure and facility in current location, as well as plan for additional landside access improvements.

Due to the favorable FBO airside access, visibility, and utility of the current FBO location, it is recommended that AST pursue Option 2. Option 2 will be further developed in the **Chapter 5 Alternatives Development and Evaluation**.

Aircraft Hangars and Parking

Fixed-Wing Aircraft Parking and Hangars

Tie-downs are provided for based and transient aircraft stored outside of hangars. AC 150/5300-13B, *Appendix 5 General Aviation Aprons and Hangars* states that tie-down aprons at general aviation (GA) airports usually are designed to accommodate aircraft in ADGs I and II. AST currently provides general aviation hangars (T-Hangars), which are located to the area south of the FBO. There are six units, which five consist of 46 T-Hangars, and one unit contains two box hangars. There are an additional two conventional hangars for storage and operations by the FBO (Astoria Flight Center). Hangar space is currently at full capacity with tenants, with a waitlist.

Chapter 3 indicated that potential growth of conventional and electric aircraft will increase the storage needs at AST. The FAA Terminal Area Forecast (TAF) forecasts an additional 19 conventional based aircraft by 2041. New electric aircraft, combined with the conventional aircraft could push that figure to 38 total aircraft needing hangar and parking options.

Hangar and Parking Recommendation: It is recommended that AST identify a location for siting a new hangar development. New hangars will increase the capacity at the airport and meet the needs of future demand.

Helicopter Parking and Storage

There are several users that currently maintain helicopters at AST, two civilian-based helicopters and three USCG helicopters. The AST apron currently has one parking location, with an additional four parking locations at the USCG apron.

Helicopters are forecasted to increase by 4.3 percent, according to the 20-year forecast. By 2041, it is estimated that a total of 9 helicopters will be based at AST. According to data from USCG, an additional based helicopter will be added to the fleet around 2026, which will add to additional operations taking place at the Airport. By 2030, the USCG plans to have a new hangar facility and additional helicopter, for a total of three helicopter additions in the forecasted period. The USCG has its own ramp with the current capacity to operate the existing three plus the three additional helicopters.

Helicopter Recommendation: It is recommended that AST plan to provide additional parking for civilian in the midterm to long-term planning period, as based helicopters are projected to increase.

Air Cargo

AST does not currently have a significant component of cargo activity. However, the United Parcel Service (UPS) operates a Cessna 208 Caravan daily, operating between Tillamook Airport (TMK), Portland International Airport (PDX), and AST. It is anticipated that the demand for air cargo will increase over the 20 years due to strong demand for online-purchased parcel delivery as well as advancements in aircraft electrification with lower cost delivery options.

Aircraft Rescue Firefighting (ARFF) Station

At this time, the Port of Astoria does not have a designated ARFF facility. In the event of an emergency, AST can call upon the City of Warrenton for emergency services. In the event that scheduled passenger service commences at the Airport the FAA will mandate ARFF operations be implemented. This requirement is based upon the Code of Federal Regulations (CFR) Part 139.17, where the ARFF and staff obligations are based on the length of the largest air carrier serving the Airport with five or more daily departures. An index is assigned to each FAA 139 certificate holder on a combination of air carrier length and number of departures during the day. The index determines the required number of ARFF vehicles and required extinguishing agents (Part 139.1317). **Attachment 2** provides an overview of the Part 139 certification process.

ARFF Recommendation: It is recommended that AST plan for certification requirements for ARFF, as this will be a requirement if, and when, scheduled passenger service returns to the Airport. AST should seek guidance in the Part 139 Handbook and speak with appropriate personnel for specific requirements.

Aircraft Fuel Storage and Dispensing Systems

Aircraft fuel storage and dispensing facilities are run by AST, which also operates as the FBO, and as such, it is the decision of the FBO to increase the volume of fuel storage on the Airport. AST has indicated the existing fuel storage is inadequate for their needs and plans to add capacity in 2023. Operations forecasts in **Chapter 3 i**ndicate that while the total number of flights is expected to remain stable, aircraft size is expected to increase.

Fuel Storage Recommendation: It is recommended that AST plan to develop a fuel farm that would provide an additional 10,000- or 12,000-gallon Jet A fuel tank. For long-term planning we recommend that the Jet A tanks fuel farm be relocated off the airside ramp apron and moved to separate location landside.

ELECTRIC AIRCRAFT FACILITIES AND AIRSPACE

Advanced Air Mobility

The vision for Advanced Air Mobility (AAM) is to safely transform aviation markets into a unified transportation system that can move people and goods to and from previously underserved markets through the utilization of electric aircraft. Some aircraft have completely new designs; others replace the fuel tanks and gas motors in an existing aircraft with fuel cells and an electric motor. Concepts in design include vertical takeoff and landing (VTOL), and conventional takeoff and landing (CTOL) aircraft.

Experimental based aircraft at AST are projected to grow at an average of 3.5% within the next 20 years. This is likely due to the anticipated growth of multiple cases of electric aircraft at AST.

Electric Vertical Takeoff and Landing (eVTOL)

eVTOLs will operate similarly to helicopters in the sense that both takeoff and land vertically. In September 2022, the FAA published an updated document that provides design guidance for vertiports – *Engineering Brief No. 105, Vertiport Design.* The document describes in-path lighting, markings, recommendations for vertiport dimensions based on aircraft wingspan, and current airspace designations and requirements.

Electric Conventional Takeoff and Landing (eCTOL)

eCTOLs will function similarly to conventional aircraft; meaning, the aircraft will taxi and use existing runways as conventional aircraft. Examples include Cessna 208 Caravans and de Havilland Canada DHC-2s that have been fitted with batteries and electric motors, which are classified within AST's critical aircraft ARC B-II. As noted in Chapter 3, UPS currently operates a Cessna 208 Caravan at AST. MagniX, an electric motor company, has successfully converted and flown a Cessna 208 Caravan into an eCTOL. The flight demonstrated the world's heaviest eCTOL aircraft flown to date, demonstrating UPS's capability to convert some of the aircraft in their fleet.

AAM Considerations for ARC B-II

Since there is no expected change in ARC B-II at AST from 2021 to 2041, it is unlikely that facilities will change keeping in mind AAM. The infrastructure for power supply will need to be considered for the future of sustainable aircraft.

Power Supply

AAM focuses on powering eVTOLs and eCTOLs with electricity as a fuel source for electric aircraft. However, other emerging VTOL and CTOL markets are focusing on designing aircraft that operate on fuel sources other than electricity. Airport infrastructure needed to support electric aircraft will vary widely based on what the intensity and mission of electric aircraft are at each airport. Some airports may consider installing a charger on the transient apron. Others may want to provide conduit and size electrical lines appropriately when building new hangars.

Other potential fuel sources include sustainable aviation fuel (SAF), hydrogen, and a combination of conventional fuel and electricity (hybrid electricity). Fueling these sustainable aircraft could be done various ways. For example, hydrogen powered aircraft could potentially be fueled similarly to conventional GA aircraft – via hydrogen fuel truck.

Electric Aircraft Facilities and Airspace Recommendation: It is recommended that AST plan for the infrastructure needs of electric aircraft within the planning period. As noted in the forecast, there is a potential for approximately 20 electric aircraft to be added to the based aircraft fleet mix at AST, with some multi-engine piston aircraft being replaced. AST should plan the for electric aircraft infrastructure and make necessary upgrades. Airport facilities will require an appropriate site and dispenser, charging station, and increased power supply. Technical and design standards are applicable for electric aircraft for airside facility planning and design and should be considered when developing airside requirements.

NON- AERONAUTICAL FACILITIES

This section addresses and summarizes an assessment of market opportunities for Non-Aeronautical Facilities. It looks at economic and demographic trends in the area, site characteristics, and potential supportable uses. This assessment is intended to assist decision makers and stakeholders to assess value as well as consider future development and market opportunities for Port properties with non-aviation development potential. Properties available for non-aeronautical uses are west of the airport fence and in the industrial park to the south.

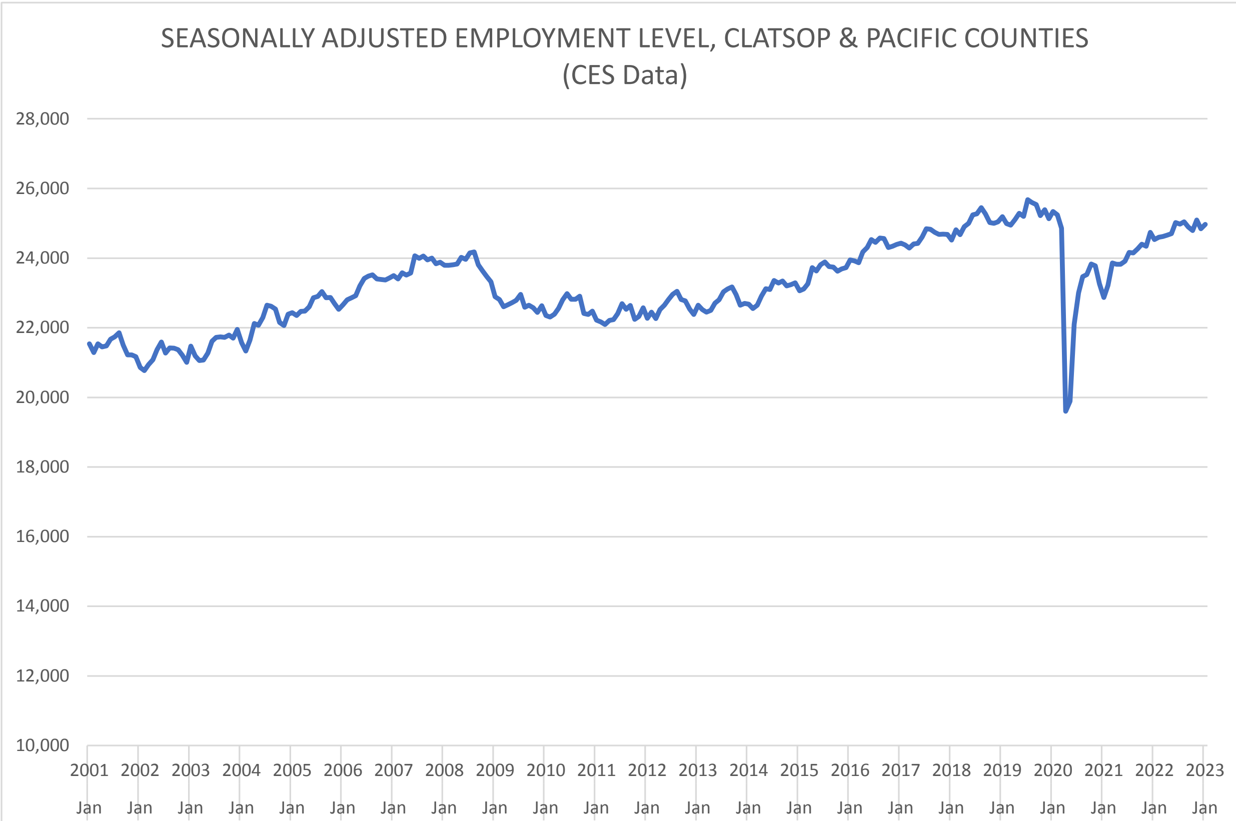
Economic and Demographic Context

Employment levels in Clatsop and Pacific Counties rose steadily from 2011 through 2019 but suffered a steep decline in 2020 as a result of the pandemic. Total employment in 2020 was at the lowest level since 2014 then bounced back to close to 25,000 by 2022. The most current estimate of employment indicates that the two counties remain below their pre-pandemic levels, nevertheless growth has been positive.

Clatsop and Pacific counties added an estimated 1,480 jobs in 2021 and 2022, representing 70 percent of the employment losses reported in 2020. The fastest growing industries in the two counties from 2011 through 2021 were educational services, construction, and professional and business services. Gains in these industries were offset by declines in natural resources and mining, information, and other services. Government jobs at all levels are also below 2011 levels.

The State of Oregon produces forecasts for the combined employment region of Benton, Clatsop, Columbia, Lincoln, and Tillamook counties. When applying the growth rate of the combined counties to Clatsop County, a forecast for employment growth of Clatsop County can be derived. The county is expected to add almost 2,800 jobs from 2020 through 2030, reflecting a 16 percent expansion in the local employment base. The industries expected to see the most growth in the next decade are leisure and hospitality, private education and health services, and trade, transportation, and utilities. [Pacific County]

Figure 4-5: Seasonally Adjusted Employment Level Clatsop County



Source: Oregon Employment Division, Washington ESD, CES Data Series

Figure 4-6: Net Employment Change by Year, Clatsop and Pacific Counties

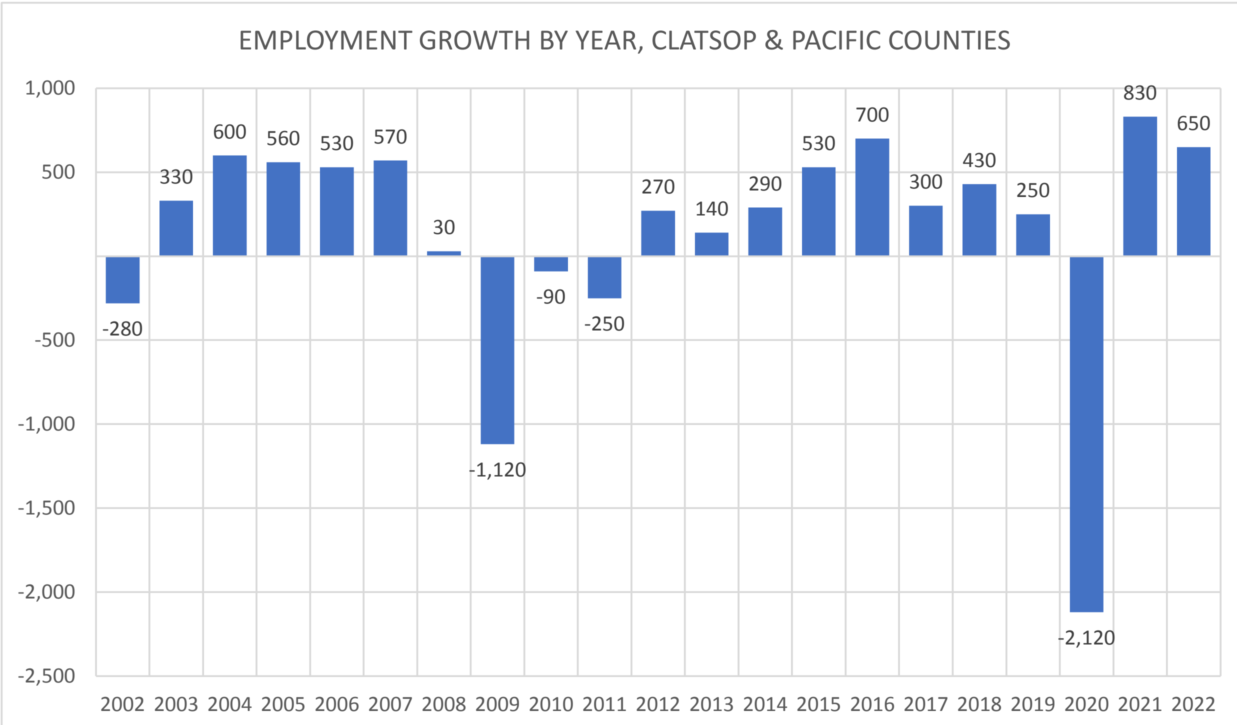


Table 4-8: Employment Growth by Industry, Clatsop and Pacific Counties, 2011-21

INDUSTRIES	2011	2021	AAGR 2011-2021
Total all ownerships	22,260	24,444	0.94%
Total private coverage	17,673	20,206	1.35%
Natural resources and mining	950	1,060	1.10%
Construction	822	1,316	4.82%
Manufacturing	2,663	2,318	-1.38%
Trade, transportation and utilities	3,518	4,334	2.11%
Wholesale trade	201	238	1.70%
Retail trade (44-45)	2,989	3,738	2.26%
Transportation, warehousing & utilities (48-49,22)	327	358	0.91%
Information	213	171	-2.17%
Financial activities	638	672	0.52%
Finance and insurance	334	354	0.58%
Real estate and rental and leasing	270	304	1.19%
Professional and business services	732	1,001	3.18%
Education and health services	2,084	2,473	1.73%
Educational services	44	82	6.42%
Health care and social assistance	2,340	2,969	2.41%
Leisure and hospitality	4,480	5,345	1.78%
Arts, entertainment, and recreation	293	338	1.44%
Accommodation and food services	4,187	5,006	1.80%
Other services	1,111	672	-4.90%
Total federal government	297	246	-1.87%
Total state government	687	483	-3.46%
Total local government	3,603	3,508	-0.27%

Source: Oregon Quarterly Census of Employment and Wages (QCEW) Program, State of Oregon, Washington ESD

Table 4-9: Industry Employment Projections, Benton, Clatsop, Columbia, Lincoln, and Tillamook Counties, 2020-2030

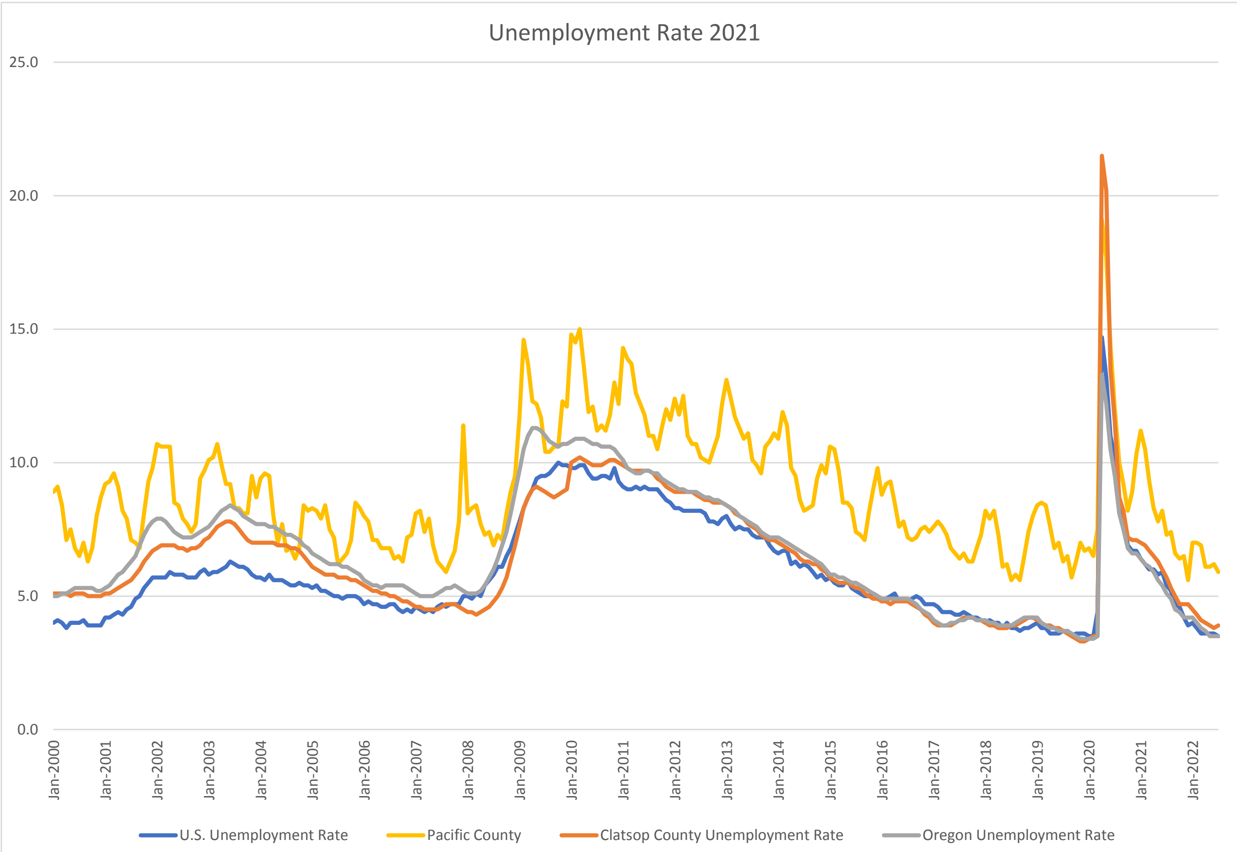
Industry Employment Projections, 2020-2030 Benton, Clatsop, Columbia, Lincoln, and Tillamook Counties							
Industries	2020	2030	Change	% Change	Clatsop 2020	Clatsop 2030 Forecast	Change
Total employment	**102,590**	**118,790**	**16,200**	**16%**	17,370	20,149	2,779
Total private	72,580	86,460	13,880	19%	14,906	17,738	2,832
Natural resources and mining	3,450	3,570	120	3%	318	328	10
Construction	4,050	4,620	570	14%	1,012	1,154	142
Manufacturing	8,650	9,200	550	6%	1,765	1,871	106
Trade, transportation, and utilities	14,570	16,370	1,800	12%	3,375	3,780	405
Wholesale trade	980	1,090	110	11%	176	195	19
Retail trade	11,670	13,130	1,460	13%	2,925	3,305	380
Transportation, warehousing, and utiliti	1,910	2,150	240	13%	274	310	36
Information	910	990	80	9%	131	143	12
Financial activities	3,670	3,900	230	6%	564	598	34
Professional and business services	7,080	8,660	1,580	22%	722	881	159
Professional and technical services	3,300	3,830	530	16%	263	305	42
Private educational and health services	13,850	16,380	2,530	18%	2,436	2,874	438
Leisure and hospitality	13,300	19,180	5,880	44%	4,001	5,761	1,760
Accommodation and food services	12,470	17,900	5,430	44%	3,754	5,406	1,652
Other services	3,050	3,590	540	18%	577	681	104
Government	24,110	26,000	1,890	8%	2,463	2,660	197
Federal government	1,270	1,270	0	0%	206	206	0
State government	1,350	1,450	100	7%	330	353	23
Local government	21,490	23,280	1,790	8%	1,928	2,082	154

Source: Oregon Employment Department, Workforce and Economic Research Division

The unemployment rate of Clatsop County has historically been lower than the State of Oregon. However, during 2020 Clatsop County experienced an unemployment rate of 22 percent, significantly higher than that of the nation or the state. The county's high concentration of tourist-related industries was disproportionately impacted by the pandemic. Like the rest of the country, Clatsop County's unemployment rate returned to more normal numbers in 2021 and 2022. The unemployment rate is higher than the nation or the state, but by a very small margin. The unemployment rate in Pacific County has been consistently higher than that in Clatsop County, a pattern that has continued after the pandemic.

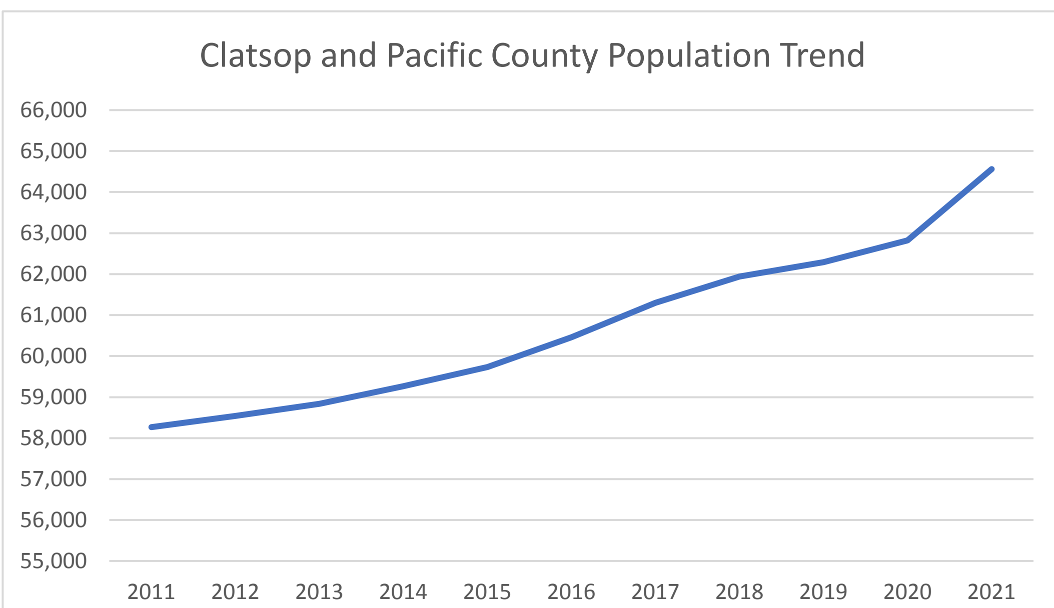
Clatsop and Pacific Counties experienced steady population growth from 2013 through 2018. Population growth was modest from 2018 to 2020, with a jump in population reported in 2020 and 2021. The rate of population growth in Pacific County has been more consistent, while patterns in Clatsop County have been positive but highly variable. The recent growth could be partially attributable to an increase in remote employment during the pandemic, which decreased the need to live near a large metropolitan area. For many industries, this pattern appears to be resilient and a significant level of remote employment and/or hybrid work options that allow for limited commuting is expected to be persistent.

Figure 4-7: Unemployment Rate Trends



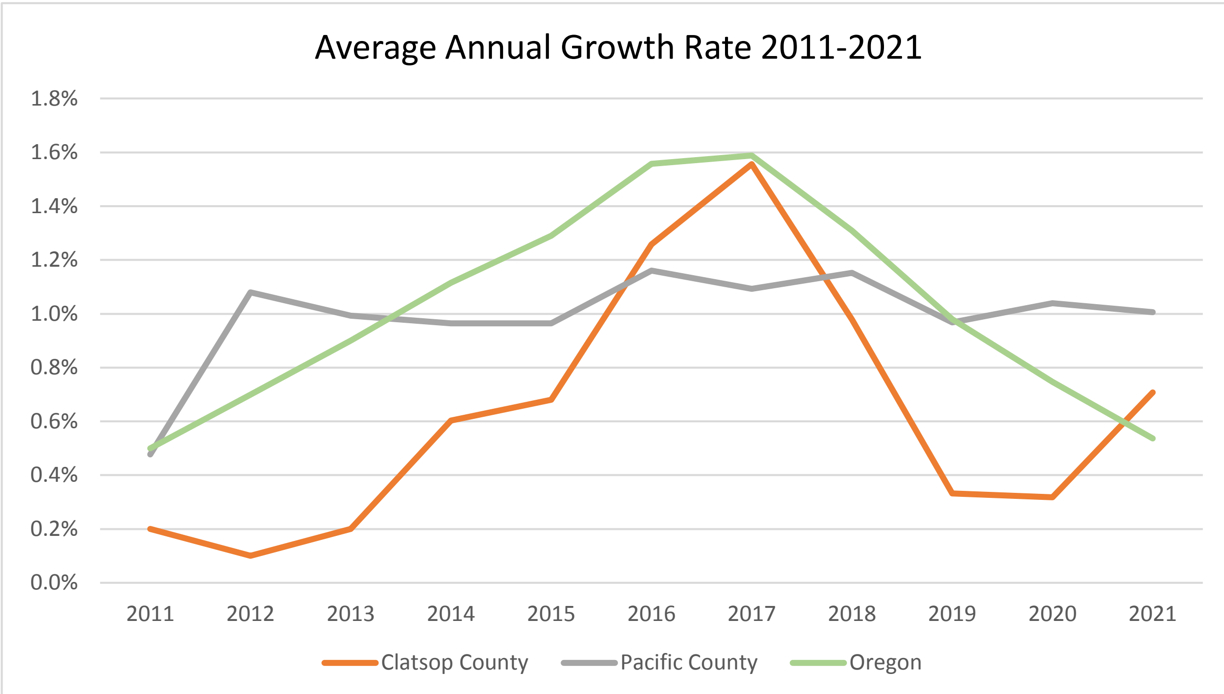
Source: Oregon Employment Department

Figure 4-8: Population Level, Clatsop County



Source: US Census Bureau

Figure 4-9: **Annual Rate of Population Growth**



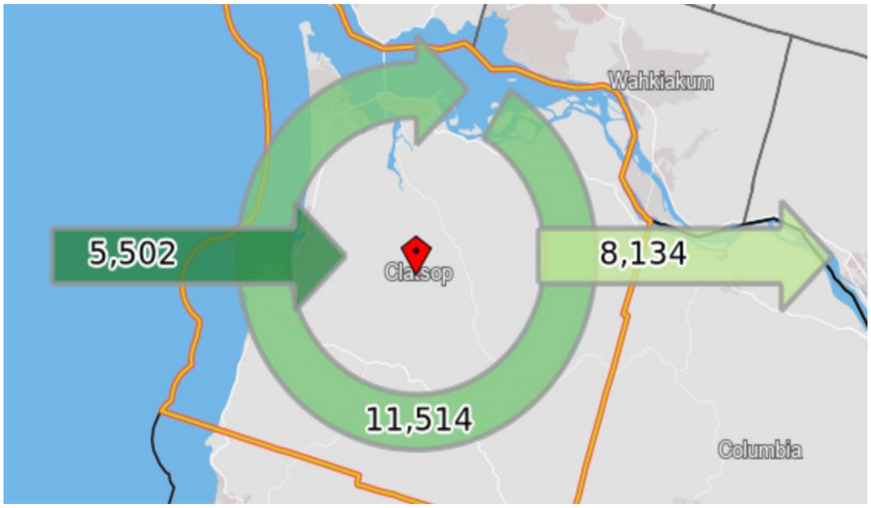
Source: US Census Bureau

The average annual growth rate for the State of Oregon steadily increased from 2011 through 2016 before plateauing for a year. The rate of growth has remained positive but decreased over the last four years. Clatsop County has consistently had population growth below the statewide rate but passed the State of Oregon for the first time in over a decade in 2021.

Clatsop County is a relatively balanced county in terms of commuting. The County had an estimated 17,000 jobs in 2019, of which over two thirds were filled by local residents. An estimated 8,134 local residents commute to employment opportunities outside of the county (41 percent), while over 5,500 workers commute into the county for employment.

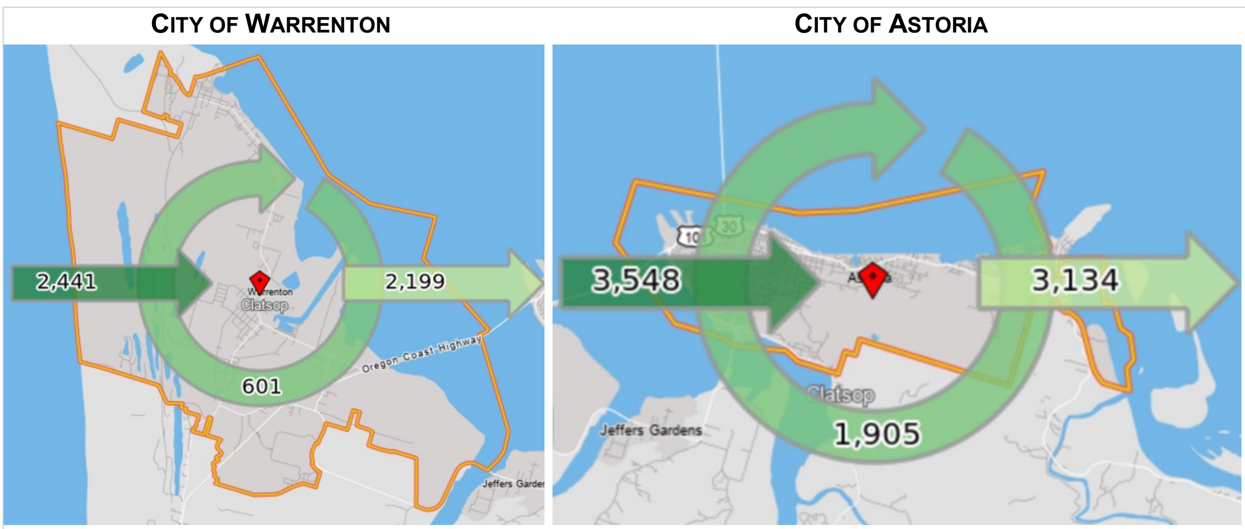
More locally, the City of Warrenton imports 2,441 laborers and exports 2,199 laborers, making it a modest importer of labor. With only 601 people both living and working in Warrenton, the vast majority of the Warrenton workforce lives outside the city. The City of Astoria imports 3,548 laborers and exports 3,134 laborers. That makes Astoria also an importer of labor. An estimated 1,905 people both live and work in Astoria, so the majority of those who work in Astoria live elsewhere.

Figure 4-10: Net Inflow and Outflow of Labor Force, Clatsop County, 2019 Estimate



Source: US Census Bureau LEHD Database

Figure 4-11: Net Inflow and Outflow of Labor Force, Warrenton and Astoria, 2019 Estimate



Source: US Census Bureau LEHD Database

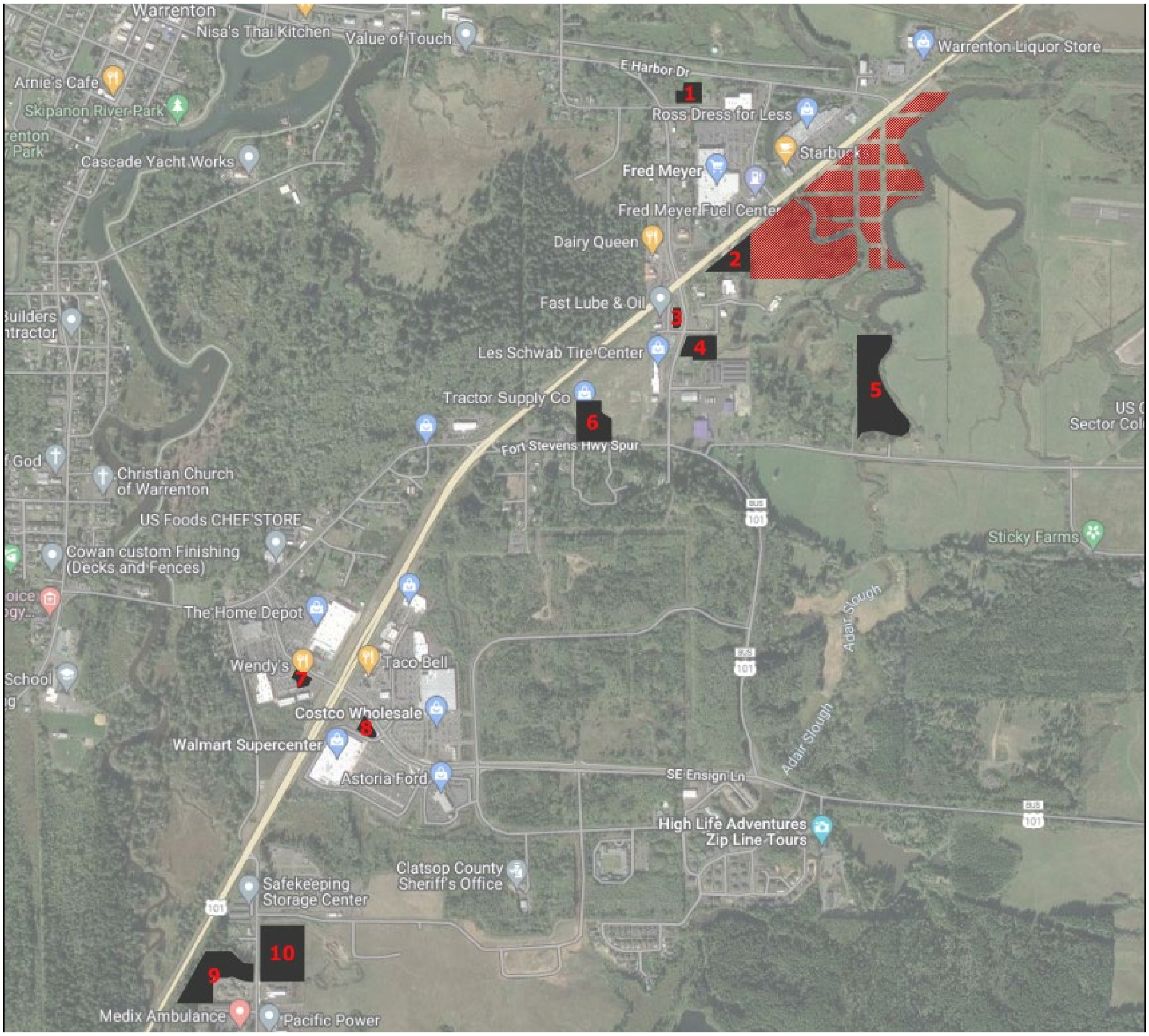
Market Analysis

Land Sales Analysis

Comparable Sales

In order to provide reference points for achievable land lease rates for non-aeronautical properties controlled by the airport, a survey was conducted on recent sales transactions in the Highway 101 corridor. Based on assessor records and data from CoStar, a total of 10 transactions over five years were identified involving land zoned or planned for commercial or light-industrial use. The sites are mapped in the following figure. Details on the transactions are provided on the following figures, followed by a summary and an analysis of achievable pricing at the subject site.

Figure 4-12: Surveyed Land Transactions



Source: Clatsop County, CoStar, JOHNSON ECONOMICS

Figure 4-13: Summary of Comparable Sales

1) VAZQUEZ
SE 2nd St, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	1.02
Net buildable:	1.02
Planned use:	Unknown
Sold date:	5/31/2022
Sold price:	$142,000
Adjusted price:	$142,000
Price/acre (net):	$139,216
Price/SF (net):	$3.20

Notes: East of Marlin Ave, north of 2nd St, south of Harbor Dr. Three parcels: 31409-11.

2) PDK HOTELS
Hwy 101, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	1.84
Net buildable:	1.84
Planned use:	Hotel
Sold date:	5/13/2022
Sold price:	$37,001
Adjusted price:	$37,001
Price/acre (net):	$20,109
Price/SF (net):	$0.46

Notes: W of Hwy 101 across from Fred Meyer. Four parcels: 31508-11.

3) TUSSING
931 SE Marlin Ave, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	0.36
Net buildable:	0.36
Planned use:	Unknown
Sold date:	10/3/2018
Sold price:	$144,000
Adjusted price:	$144,000
Price/acre (net):	$400,000
Price/SF (net):	$9.18

Notes: NWC of SE Marlin Ave and 10th St. Parcel 55852. Espresso cart placed on site since sale.

4) HALL
1360 SE 10th St, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	1.66
Net buildable:	1.66
Planned use:	Unknown
Sold date:	3/19/2021
Sold price:	$350,000
Adjusted price:	$350,000
Price/acre (net):	$210,843
Price/SF (net):	$4.84

Notes: SEC of SE Marlin Ave & 10th St. Five parcels: 31541-6.

5) MASUDUR
1215 SE Pacific Ave, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	7.15
Net buildable:	Unknown
Planned use:	Unknown
Sold date:	9/30/2022
Sold price:	$600,000
Adjusted price:	$600,000
Price/acre (net):	$83,916
Price/SF (net):	$1.93

Notes: North of SE 12th Pl/Airport Rd, west of Adams Slough. No frontage on 12th Pl. Parcel 31779.

6) TRACTOR SUPPLY
1123 Hwy 101 Alt, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	2.71
Net buildable:	2.71
Planned use:	Big box retail
Sold date:	3/1/2019
Sold price:	$684,276
Adjusted price:	$684,276
Price/acre (net):	$252,500
Price/SF (net):	$5.80

Notes: North of Fort Stevens Hwy Spur, east of Hwy 101. Access via Marlin Ave. Parcel 31902.

Source: Clatsop County, CoStar, Johnson Economics

Figure 4-14: Summary of Comparable Sales (Continued)

7) WENDY'S
1659 SE Ensign Ln, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	0.47
Net buildable:	0.47
Planned use:	Fast food w/drive-thru
Sold date:	10/31/2018
Sold price:	$601,000
Adjusted price:	$601,000
Price/acre (net):	$1,278,723
Price/SF (net):	$29.36

Notes: SWC of Ensign Ln and Hwy 101. Prime outparcel in Petco/Dollar Tree anchored center. Parcel 58392.

8) POPEYE'S
1781 SE Ensign Ln, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	0.5
Net buildable:	0.5
Planned use:	Fast food w/drive-thru
Sold date:	1/21/2022
Sold price:	$425,000
Adjusted price:	$425,000
Price/acre (net):	$850,000
Price/SF (net):	$19.51

Notes: N of Walmart, across from Panda Express. Prime outparcel in Walmart-anchored center. Parcel 60195.

9) OSBURN PLUMBING
2077 SE Dolphin Ave, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	4.47
Net buildable:	3.11
Planned use:	Warehouse/office
Sold date:	12/30/2020
Sold price:	$575,000
Adjusted price:	$575,000
Price/acre (net):	$184,887
Price/SF (net):	$4.24

Notes: West of Dolphin Ave, north of Clatsop Care Memory Community. 4 bldgs with 40,000 SF planned. Parcel 59661.

10) NW NATURAL
2150 SE Dolphin Ave, Warrenton, OR

Jurisdiction:	City of Warrenton
Zoning:	C1 (Gen. Com.)
Acres (gross):	5.32
Net buildable:	3.83
Planned use:	Office/warehouse
Sold date:	10/22/2018
Sold price:	$686,000
Adjusted price:	$686,000
Price/acre (net):	$179,094
Price/SF (net):	$4.11

Notes: East of Dolphin Ave, north of Oregon State Police. Parcel 51755.

Source: Clatsop County, CoStar, Johnson Economics

Summary of Observations

- All of the properties are located in the General Commercial (C1) zone. No relevant land sales involving land in industrial zones in this area were identified. However, transactions 9 and 10 (Osburn Plumbing and NW Natural) represent light-industrial uses, and thus provide reference points for industrial land pricing.

- The highest prices are for fast food outparcel pads on Ensign Lane. These are pads with entitlements and utilities in place, sized to accommodate fast food restaurants with drive-thru. Major anchor tenants are Walmart, Costco, and Home Depot. The pad on the west side of Highway 101, which has the best visibility from the highway, captured nearly $1.3 million per acre in late 2018. It was subsequently built out for Wendy's. A similar pad for Popeye's on the east side of the highway sold for $850,000 an acre in early 2022.

- The lowest observed price is $20,000 an acre for a two-acre site on the east side of Highway 101, across from Fred Meyer. This does not represent market pricing and may not be an arms-length transaction. Apart from this anomaly, the lowest price is $84,000 an acre for a seven-acre site roughly half a mile east of Highway 101. Wetlands likely reduce the usable portion of the site, thus indicating a higher price per net acre. Due to the lack of road frontage and the distance to Highway 101, the site is without potential for traditional commercial use.

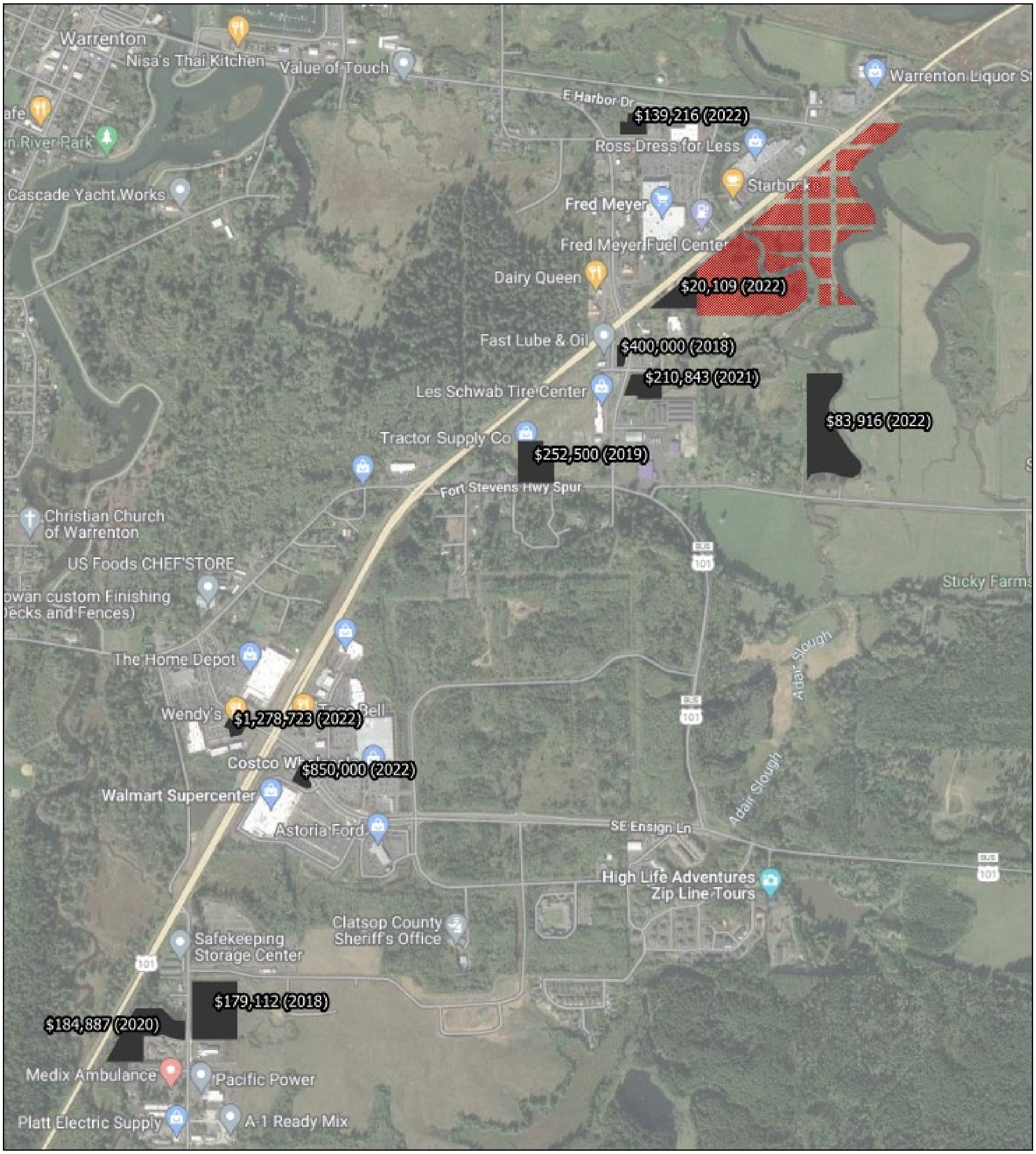
- Six sites have sold at between $140,000 and $400,000 per acre. These represent varying degrees of commercial potential. In the high end is a relatively high-exposure site near the intersection of Marlin Avenue and Highway 101. In the low end is a site with very limited traffic exposure on 2nd Avenue, north of Fred Meyer. Two sites intended for light-industrial use sold at around $180,000 an acre on Dolphin Avenue, detached from the two major retail areas.

Table 4-10: Summary of Land Sales Transactions

#	Buyer	Address	Jurisdiction	Zoning	Ac. (gr.)	Ac. (net)	Date	Price	Price/Ac.	Price/SF
1	Vazquez	SE 2nd St	Warrenton	Com (C1)	1.02	1.02	5/31/2022	$142,000	$139,216	$3.20
2	PDK Hotels	Hwy 101	Warrenton	Com (C1)	1.84	1.84	5/13/2022	$37,001	$20,109	$0.46
3	Tussing	931 SE Marlin Ave	Warrenton	Com (C1)	0.36	0.36	10/3/2018	$144,000	$400,000	$9.18
4	Hall	1360 SE 10th St	Warrenton	Com (C1)	1.66	1.66	3/19/2021	$350,000	$210,843	$4.84
5	Masudur	1215 SE Pacific Ave	Warrenton	Com (C1)	7.15		9/30/2022	$600,000	$83,916	$1.93
6	Tractor Supply	1123 Hwy 101 Alt	Warrenton	Com (C1)	2.71	2.71	3/1/2019	$684,276	$252,500	$5.80
7	Wendy's	1659 SE Ensign Ln	Warrenton	Com (C1)	0.47	0.47	10/31/2018	$601,000	$1,278,723	$29.36
8	Popeye's	1781 SE Ensign Ln	Warrenton	Com (C1)	0.5	0.5	1/21/2022	$425,000	$850,000	$19.51
9	Osburn Plumbing	2077 SE Dolphin Ave	Warrenton	Com (C1)	4.47	3.11	12/30/2020	$575,000	$184,887	$4.24
10	NW Natural	2150 SE Dolphin Ave	Warrenton	Com (C1)	5.32	3.83	10/22/2018	$686,000	$179,112	$4.11

Source: Clatsop County, CoStar, JOHNSON ECONOMICS

Figure 4-15: Price per Net Acre, Mapped



Source: Clatsop County, CoStar, Johnson Economics

Achievable Pricing

For airport-owned properties between Highway 101 and the Adams Slough, relatively high values for sites along the highway are expected, as these would represent strong highway access and exposure. Lower prices can be expected on sites backing the Adams Slough. Usually, highest prices from a retail center anchored by a large format store are anticipated. In today's market, the largest of these retailers will often pay around $500,000 an acre for around 15 acres in locations like these (Walmart on Ensign Avenue paid nearly $300,000/ac. in 2014), with outparcel pads selling for up to $1.0 million an acre – or even higher in certain circumstances, as shown by the Wendy's transaction. The wetlands on these sites may prohibit a big box anchor of this format. Moreover, with Walmart, Costco, Fred Meyer, and Home Depot already established in this area, there are few retailers with similar anchor power left to court. Thus, a more likely scenario would be a smaller tract of land absorbed by an anchor, resulting in more land with secondary traffic exposure and lower land values.

The following table summarizes our estimates of achievable pricing for various types of sites in today's market. The estimates assume that the sites are development-ready and without off-site infrastructure costs.

Table 4-11: Achievable Sales Price (2023)

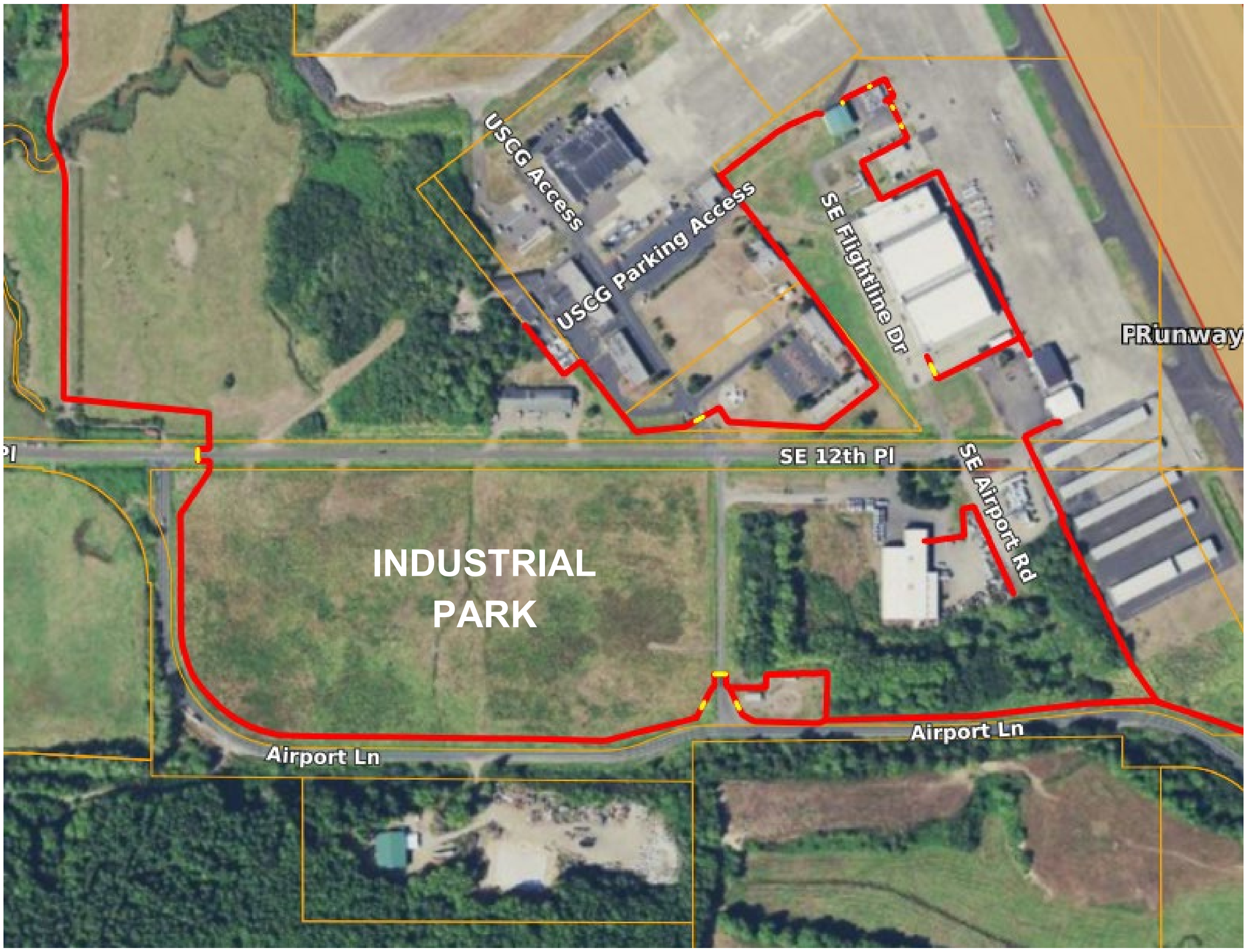
	LAND (ACRES)		VALUE/ACRE (2023 DOLLARS)			$/PSF		
	Medium	Large	Low	High	Average	Low	High	Avg
Anchor site	5.0	10.0	$400,000	$500,000	$450,000	$9.18	$11.48	$10.33
Strip mall/outparcel sites	3.0	5.0	$500,000	$700,000	$600,000	$11.48	$16.07	$13.77
Prime outparcel fast food	0.5	1.5	$700,000	$800,000	$750,000	$16.07	$18.37	$17.22
Secondary exposure	7.0	3.0	$200,000	$300,000	$250,000	$4.59	$6.89	$5.74
Rear location/light industrial	11.2	7.2	$150,000	$250,000	$200,000	$3.44	$5.74	$4.59
Total	***26.7***	***26.7***	***$6,930,000***	***$12,400,000***	***$9,665,000***			
Per acre			*$259,551*	*$464,419*	*$361,985*			

Source: Johnson Economics

The properties to the east of Adams Slough and west of the airport fence are less marketable, as they lack the visibility and access of the parcels closer to Highway 101. The parcels are irregular in shape, with the primary access likely from the south via SE 12th Place. This parcel would most likely be limited in marketability, with supportable land values likely below $150,000 per acre, with the portions adjacent to SE 12th Place considered the most marketable.

The Astoria Regional Airport Industrial Park is a 45-acre site inside the current airport fence line. The site is available and marketed for industrial development or logistics warehouse uses. The Park has access via SE 12th Place. The Scoular fishmeal processing plant, a $17.5 million facility, was recently completed at the park. This location has limited visibility, with future uses likely limited to industrial. The park has infrastructure in place, and current land values in the market are expected to be consistent with light industrial uses.

Figure 4-16: Astoria Regional Airport Industrial Park



Source: Clatsop County, CoStar, JOHNSON ECONOMICS

Non-Aeronautical Facilities Recommendation: It is recommended that AST leverage and analyze land lease rates for non-aeronautical properties, in order to better assess the market opportunities and land lease options in the surrounding area.

AUTO PARKING AND CIRCULATION

Access to the Airport by vehicle consists of connecting roadways that enable users to enter and exit the landside facilities and parking facilities. The vehicle parking at AST can be divided into three principal user groups: public parking, rental car parking, and employee parking. This section analyzes the Airport's vehicle access and parking needs throughout the planning period.

Circulation and Access

Users access AST FBO, hangars, and aprons from SE Flight Line Drive at the east end of SE 12th Place. Entrance roads off SE 12th Place serve as access points to individual businesses. Access to the airside facilities is controlled by gates.

Off-Airport Access

Facility requirements for off-airport access involve a determination of capacity levels associated with the primary means to and from AST. The primary means of ground travel to AST consists of personal automobiles or rental cars; there is no current or planned public mass transit service available at AST.

Off-airport roadways are maintained by either the City of Warrenton, Clatsop County, or the Oregon Department of Transportation (ODOT). Capacity of the adjacent off-airport access roads is considered to be adequate throughout the 20-year planning period. This includes SE 12th Place and SE Airport Lane. The City of Warrenton Transportation System Plan (TSP), adopted in 2019, summarizes anticipated transportation conditions through the year 2040 and identifies needs and potential projects. The TSP notes that the signalized intersections on US 101 within the City of Warrenton are expected to experience congestion during the evening peak hour. ODOT does not anticipate being able to add capacity to alleviate the congestion in the peak tourism months so a level of congestion should be expected along US 101 through the 20-year planning period.

Access to Developable Lands

The parcel of potentially developable land near the western AST boundary would likely be accessed via off-airport roads. Access to future development of the western AST parcels will require the construction of a new roadway and probable construction of new structures to carry traffic over existing streams. This new road could extend north as a fourth leg at the intersection of SE 12th Place at Airport Lane, outside the AST fence. If a new state highway connection is desired at US 101 at Neptune Drive, this process will need to be coordinated with the ODOT and would likely require completion of an Application Form for State Highway Approach (ODOT form number 734-2680). Any new development and associated roadways will also require approval from and coordination with the appropriate jurisdiction (ODOT, City of Warrenton and/or Clatsop County).

The Oregon Highway Plan adopted alternative mobility targets at the intersections of US 101 at SE Neptune Drive, Harbor Drive, Marine Drive and SE Ensign Lane. If a land use application requires a traffic impact study, the following mobility target applies for those intersections: a volume-to-capacity ratio of 0.85 for the average annual weekday peak hour condition.

Much of the potentially developable land near the western AST boundary is within the AST RPZ, which severely limits the type of uses that are permissible.

Wayfinding and Signage

Wayfinding for vehicular access to AST includes signage. The existing signage is located along off-airport roads. The existing signage along off-airport access roads is considered sufficient.

On-Airport Access

On-airport access roadways are subdivided into two categories: public and restricted access roadways. Public roads are, as the name indicates, roadways that are available for public use and provide access to GA, landside facilities, and commercial services facilities. Restricted access roadways are located on airport property and generally provide access to on airport facilities, such as NAVAIDs, perimeter fencing, aprons, and all airside facilities that cannot be accessed by the general public.

General Public Access

Access to the GA, non-aviation, and USCG facilities is provided by SE 12th Place, which is a two-lane, paved street-oriented east-west. SE 12th Place has adequate capacity the majority of the day; however, vehicles have been known to queue back at certain times of day when employees arrive at the same time.

Access to the FBO, employee parking, and public parking is provided by Flight Line Drive, which extends north from the eastern end of SE 12th Place. The two-way, two-lane road travels through a business parking lot and terminates in front of the FBO and there is no designated turn around route. Flight Line Drive also extends south from SE 12th Place to connect SE 12th Place and SE Airport Lane. This segment of road is narrow, and the pavement condition is considered fair.

The on-airport general public access roads are currently adequate to serve demand; however, roadway improvements to enhance circulation, access, and wayfinding for FBO facilities are recommended and will be addressed in **Chapter 5 Alternatives Development and Evaluation**.

Access to Developable Lands

Access to future development at the Airport Industrial Complex site is likely to occur via driveways off SE 12th Place. Any future land use application will require approval from, and coordination with, the City of Warrenton and is subject to the Warrenton Development Code zoning and design standards.

As new development occurs in the Industrial Park it may become necessary to modify access roads to accommodate new tenants and their specific needs. The potential improvements may include pavement or road rehabilitation to accommodate increased truck traffic and provide adequate space for turning maneuvers.

Wayfinding and Signage

There are limited signage along on-airport access roads to provide wayfinding information to the FBO. The only existing signage is for the airport industrial park, located just outside the AST fence line in the southeast quadrant of the intersection of SE 12th Place at Airport Lane. The sign is mounted on a standalone brick wall. New wayfinding signage along SE 12th Place and Flight Line Drive to direct visitors to the location of the FBO would be beneficial to aid in enhancing the approach to the FBO. Additionally, wayfinding signage to the various businesses within the AST fence line could improve the visitor experience.

Parking

Parking needs at AST are attributable to locally based users, airport employees, and visitors. Current planning standards suggest dedicated vehicle parking lots or spaces be made available to hangar owners/occupants, where feasible. This has the positive effect of removing vehicular traffic from aircraft movement areas.

The existing street names can also introduce confusion for visitors to AST. There is a Flight Line Drive that extends from Airport Lane to SE 12th Place across from the USCG entrance. Approximately 650 west of the USCG entrance, another Flight Line Drive extends north from SE 12th Place to access the FBO while the south leg of this intersection is named SE Airport Road.

Vehicle parking needs for locally based aircraft operators are estimated at half of the total number of based aircraft. The 2041 forecast for based aircraft is 75, which suggests approximately 38 parking spaces would be needed for local aircraft owners.

There are approximately 24 parking spaces at the terminal building. None of the terminal parking is marked with signage to indicate specific users or time limits. The FBO has vehicle parking needs for visitors, employees, and rental car spaces as well. A modest 1.0 percent annual growth rate was applied to the existing number of airport parking spaces to estimate the number of spaces needed for visitors, employees, and rental car users. The combination of these users provides an estimated need for 5 additional vehicle parking spaces.

The combined parking needs for locally based users, airport employees, and visitors total approximately 43 additional spaces.

Auto Circulation and Parking Recommendation: It is recommended that AST consider providing a dedicated public access to the FBO that does not travel through a business parking lot. To further improve the visitor experience, wayfinding signage to the various businesses within the AST fence line and renaming roads to eliminate duplicate road names is recommended. The Airport should also consider that ongoing development in the areas adjacent to the Airport may prompt a need to modify access roads to accommodate new tenants and their specific needs. These potential improvements may include pavement or road rehabilitation to accommodate increased truck traffic and provide adequate space for turning maneuvers.

SUMMARY

The chapter evaluated the facility development needs to accommodate the forecast growth at AST. Certain identified facilities will need further analysis based on the recommended development alternatives. Key conclusions from the facilities requirements analysis include:

Airfield Runways

- Future runway pavement projects maintain line of sight clearance.
- Maintain pavement strength to accommodate the current and forecasted fleet mix.
- Limit runway crossings to the outer thirds of the runway to comply with FAA guidance.
- Groove pavement on Runway 8/26 during pavement rehabilitation construction. Grooving of runway pavement will increase overall safety and drainage.
- Proceed with the Runway 8/26 Pavement Rehabilitation, which is planned for 2024.

Airfield Taxiways

- Maintain clearance of the TOFA and TSA.
- Realign the taxiway system at Runway End 8 by extending Taxiway B, thus squaring up Taxiway B to the runway.

- Relocate Taxiway A to eliminate the direct access to the runway inside the middle third of the airfield.

Aircraft Storage Facilities

- Identify future hangar development locations in order to increase the capacity at the airport and meet the needs of the future demand.
- Anticipate additional parking needs for civilian as based helicopters are projected to increase.

Aviation Support Services

- Consider Part 139 certification to accommodate future air carrier aircraft.
- Expand, upgrade, or relocate FBO facilities and improve FBO landside access and wayfinding.
- Plan for certification requirements for ARFF if scheduled passenger service returns to the Airport.
- Prepare the airport for the infrastructure needs of electric aircraft.

Property and Transportation

- AST should regularly coordinate and collaborate with the City of Warrenton and Clatsop County to avoid non-compatible land uses in the RPZ.
- Leverage and analyze achievable land lease rates data for non-aeronautical properties to better assess market opportunities and land lease options.
- Installation of wayfinding signage to the various businesses within the AST fence line to improve visitor experience.
- Planning for modifications to access roads to accommodate new tenants and their specific needs.
- It is recommended that AST consider providing a dedicated public access to the FBO that does not travel through a business parking lot.

CHAPTER 5

ALTERNATIVES DEVELOPMENT

CHAPTER 5 - ALTERNATIVES DEVELOPMENT

CHAPTER OVERVIEW

This chapter documents improvement alternatives and the recommended development plan to satisfy the facility requirements described in **Chapter 4** for Astoria Regional Airport (AST). A description of the various factors, influences, concepts, and issues that will form the basis for the ultimate plan and program is provided in the following sections:

- Aeronautical Facilities
- Non-Aeronautical Facilities
- Aviation Related Development
- Auto Parking and Circulation
- Summary

The alternatives presented in this chapter relate to the Airport's runway, taxiways, general aviation development, vehicle parking, support facilities, and non-aeronautical development. The alternative analysis is based on four criteria: alignment with operational performance, environmental considerations, financial feasibility, and stakeholder feedback. Feedback was collected throughout the planning process from an involved collaborative effort with the Planning Advisory Committee (PAC) and the public. The PAC is a group of local agencies, tenant and user groups, and state and federal agencies. The PAC's role in the Master Plan is to help shape the document to ensure it reflects community goals and interests while satisfying Federal Aviation Administration (FAA) requirements.

The outcome of the alternatives analysis, PAC input, and public feedback is the selection of the Preferred Alternative. The Preferred Alternative is carried forward into the Airport Capital Improvement Program, as described in **Chapter 6, Capital Improvement Program**, and the Airport Layout Plan (ALP) as described in **Appendix D, Airport layout Plan**. When the FAA approves an ALP, that indicates that the existing facilities and proposed development depicted on the ALP conform to the FAA airport design standards and that the proposed development is safe and efficient. Furthermore, proposed development shown on an FAA-approved ALP is considered the first test for eligibility to receive Airport Improvement Program (AIP) funding.

Alternatives Approach

Alternatives are systematically evaluated so that a Preferred Alternative can be selected. The Preferred Alternatives will make up the 20-year development plan for AST. The process used to develop, evaluate, refine, and select the Preferred Alternative and key considerations is described in the methodology.

Methodology

The alternatives will be developed and evaluated for meeting demand and facility requirement needs in accordance with Federal Aviation Administration (FAA) design standards. The alternatives were evaluated based on operational performance, construction feasibility, and environmental considerations. The Preferred Alternative will reflect the results of the alternative evaluation, airport development goals, and best planning practices.

The process of defining and evaluating alternatives is iterative, beginning with a comprehensive range of possibilities. The possible alternatives are then refined based on evaluation criteria and AST development goals. The different functional areas of AST may have unique screening criteria during evaluation that reflect the appropriate purpose and considerations for each area.

The analysis of the alternatives follows these steps:

- Compliance with FAA Design standards
- Assessment criteria and Level of Service (LOS) factors
  - Operational capabilities and performance requirement benchmarks
  - Consideration of environmental impacts for Runway and Taxiway Improvements
  - Consideration of airspace protection and land use compatibility
- Quantitative and qualitative evaluation/ranking – elimination of alternatives
- Alternative refinement
- Selection of preferred alternative, which will go on the Capital Improvement Plan (CIP) and Airport Layout Plan (ALP).

AERONAUTICAL FACILITIES

Airside Alternatives

Airside and landside alternatives address the needs identified in **Chapter 4 Facility Requirements**. This section explains the analysis of the proposed improvements and recommendations. Aeronautical improvements discussed in this section include addressing runway crossings to comply with FAA guidance, runway pavement improvements, taxiway improvements, and infrastructure that supports the current and future forecasted aircraft fleet mix as well as electric aircraft.

Runway Improvements

Runway improvements discussed in **Chapter 4- Facility Requirements Analysis**, have been identified as items that should be addressed when considering new pavement development projects. The items identified below are a list of recommendations for AST to consider to be compliant if AST intends to pursue federal funding through the Capital Improvement Program (CIP).

- Maintain line of sight clearance on future runway pavement projects.
- Maintain pavement strength to accommodate the current and forecasted fleet mix.
- Limit runway crossings to the outer thirds of the runway to comply with FAA guidance.

AST is programmed for runway improvements, which are planned for 2025. These improvements include a pavement rehabilitation that will repair and replace the pavement to a higher Pavement Conditions Index (PCI). It is recommended that when design and construction begin, the construction process should include grooving the pavement. Grooving the runway will enhance the safety and function of the runway pavement surface by providing grooves crossing the runway. The grooves under aircraft tires greatly enhance water drainage as well as improve friction and breaking action on both wet and dry pavements, which reduces the risk of sliding and skids.

The items identified below will enhance runway operational capabilities as well as meet standard operating procedures for turboprop and jet aircraft that frequently require these improvements to operate at an airport.

- Proceed with the Runway 8/26 Pavement Rehabilitation (2025)
  - Groove pavement to support turboprop activity on Runway 8/26 during pavement rehabilitation construction

Taxiway Improvements

The proposed layout for the taxiway improvement alternative is operationally efficient, meets FAA design standards, improves circulation, and addresses needs identified in **Chapter 4 Facility Requirements**.

FAA Advisory Circular (AC) 15/5300-13B, *Airport Design*, requires that a taxiway should limit runway crossings in the middle third of the runway. The runway crossing in this location could cause confusion to a pilot who normally expects a parallel taxiway but instead encounters a runway. The AC also notes design considerations for direct runway access from the apron, as it introduces safety risks related to runway incursions. Focus areas for taxiway improvements based on FAA safety and geometry requirements at AST include the following:

- Relocating Taxiway A to the south by 25 feet to lower the visibility minimums below ¾ mile, to better accommodate jet traffic.
- Eliminating direct access to the runway inside the middle third of the airfield at taxiway connector B2 and A2 by closing and relocating connectors.
- Improving airfield geometry in the northwest quadrant of the airfield by extending Taxiway B and A4, which will allow for better access to Runway 8.
- Relocate Taxiway B3 to improve geometry and create 90-degree connections for safety purposes.
- Relocating Taxilane centerline for future hangar development to the southwest to allow for ADG II separation.
- Adding green paint to identify overwide expansion of pavement on the north end of the apron, east of the USCG apron.
- Removing Taxiway A2 connectors to prevent direct access from Taxiway B.

Taxiway Design Standardization

AST has several angled taxiway connections to the runway that pose safety concerns. Taxiway A2 is located in the middle third of the airfield. Taxiway B3 to the northwest of Runway 14/32, has angled connections to both Runway End 14 and Runway End 8 as well as Taxiway B2, which is currently angled at Runway End 26. Removing Taxiway B3's acute angle crossings will improve visibility for pilots and reduce the risk of potential incidents. Connector Taxiway B2, proposed for relocation, provides service between the apron and the east end of Runway 8/26.

Taxiway A & Glideslope Relocation

AST plans to lower the visibility minimums to ¾ mile at Runway End 26. Lowering the visibility minimum will improve airfield reliability and attract jet traffic. In order to accommodate the change in minimum, the Airport will be required to shift Taxiway A 25 feet to the south, in order to meet required separation. This shift will likely affect the current location of the glideslope. The Airport should plan to relocate the glideslope in order to accommodate for the separation requirements needed from the centerline to the equipment. The Runway Safety Area requirements will also need increased which will need to be addresses prior to the new approach.

Eliminate Direct Runway Access

Currently, Taxiway A2 crosses Runway 14/32 in the middle third of the runway's length, it is within the northern 300-400 feet of the center of section 14/32. Per FAA AC 5300-13B, it is recommended to limit Runway crossings to the outer thirds of the runway as keeping the middle third clear allows pilots to maneuver safely. Additionally, Taxiway A2 also provides direct access from the junction of the USCG apron and GA apron to Runway 14/32.

Alternatives will explore the options for relocating and addressing Taxiway A2 to aid in providing a higher level of safety while using the taxiway system.

Taxiway B Extension

Taxiway B is a partial parallel taxiway that extends past the length of the GA apron. Alternatives will explore how a connection to Taxiway B can be made to improve efficiency on the airfield. Connection improvements to Taxiway B have the potential to provide better access to the west side of the Airport.

Taxiway Improvements Alternative One

Alternative one, shown in **Figure 5-1**, provides an optimized layout to address each focus area noted above. Taxiway A is designed to be a full parallel taxiway and is shifted 25- feet to allow for changes of the visibility minimum. The ¾ mile shift will allow for visibility minimums to be lowered, but has the potential to affect the placement of the glideslope equipment. The equipment will likely need to be relocated to meet the safety area requirements.

Direct access issues at both Taxiway A2 and B2 will be resolved by eliminating the existing pavement. Taxiway B2 currently provides direct access from the apron to Runway 32 at an angle, and it is proposed that a new B2 connection be constructed to the northwest of the existing pavement, connecting Taxiway B2 to the runway at a 90-degree connection.

Taxiway A2 has a similar direct access case from the apron to the runway. It is proposed that the Airport eliminate the direct access by closing the segment of pavement between the northwest portion of the GA apron and Taxiway B, moving the connector taxiway to the south, and closing the northern portion of Taxiway A2 at the angled connection to Runway 8/26. Green pavement markings are also proposed on the north apron to limit cross taxiing off the taxiway centerline. This is proposed as an interim step as Taxiway A3 is replaced and the connection between the apron and Taxiway A2 is closed. Each of these changes will greatly improve airfield geometry and safety.

Several new taxiway configurations are proposed in the northwest portion of the Airport. In an effort to improve airfield geometry, closure of Taxiway A3 between the apron and Taxiway A3 is proposed. Removal of Taxiway A3 will be replaced with a new taxiway connection from Taxiway B to Taxiway A3. The portion of Taxiway B3 located between Runway End 14 and 8 will be reconfigured to update the connections at the runway to 90 degrees to improve safety. Closure of existing taxiway connector from the USCG facility to Taxiway A3, will be necessary to accommodate the reconfiguration. A new connection from the USCG to the new taxiway configuration is proposed using the existing pavement of the closed runway.

The current USCG facility is a through-the-fence (TTF) operation. TTF operations occur when then an airport sponsor gives ground access permission to another party (i.e. USCG) so that the user can access an airport's airside infrastructure. The FAA, USCG and AST should coordinate efforts regarding eligibilities for the land and plan for any potential growth.

Table 5-1: Advantages and Disadvantages of Taxiway Improvements Alternative One

Advantages	Disadvantages
▸ Shifting Taxiway A by 25-feet allows for the visibility minimum to be lowered at Runway End 26. Creates new B2 connector taxiway that resides outside of the inner third of the airfield. ▸ Green pavement markings on north apron to limit cross taxiing off taxiway centerline to enhance safety and efficiency. ▸ Addresses Taxiway B3 connection at Runway Ends 32 and 26 by creating 90-degree angle connections for safety. ▸ Closure of Taxiway A2 between the apron and Taxiway B resolves the direct access issue and alignment concern. ▸ Additional taxiway extension in the southwest portion of the airfield allows for future hangar development.	▸ Higher cost associated with construction of new pavement. ▸ Project phasing may be necessary due to overall cost. ▸ Moderate environmental impacts with proposed taxiway extension for the southwest hangar development area as well as the construction of several new taxiways.

Taxiway Improvements Alternative Two

Alternative two, shown in **Figure 5-2**, provides an optimized layout to address each focus area noted above. Taxiway A is designed to be a full parallel taxiway and is shifted 25- feet to allow for changes of the visibility minimum. The ¾ mile shift will allow for visibility minimums to be lowered, but has the potential to affect the placement of the glideslope equipment. The equipment will likely need to be relocated to meet the safety area requirements.

Extending Taxiway B to a full parallel taxiway will allow for a connection to be made to Runway End 14, allowing pilots to have more direct access to the other side of the airfield. Direct access issues at Taxiways A2 and B2 will be resolved by eliminating the existing pavement at Taxiway B2, reconstructing the connector at a 90-degree angle, removing the A2 taxiway in its entirety, and aligning Taxiway A. Taxiway A3 would be removed to allow for future development.

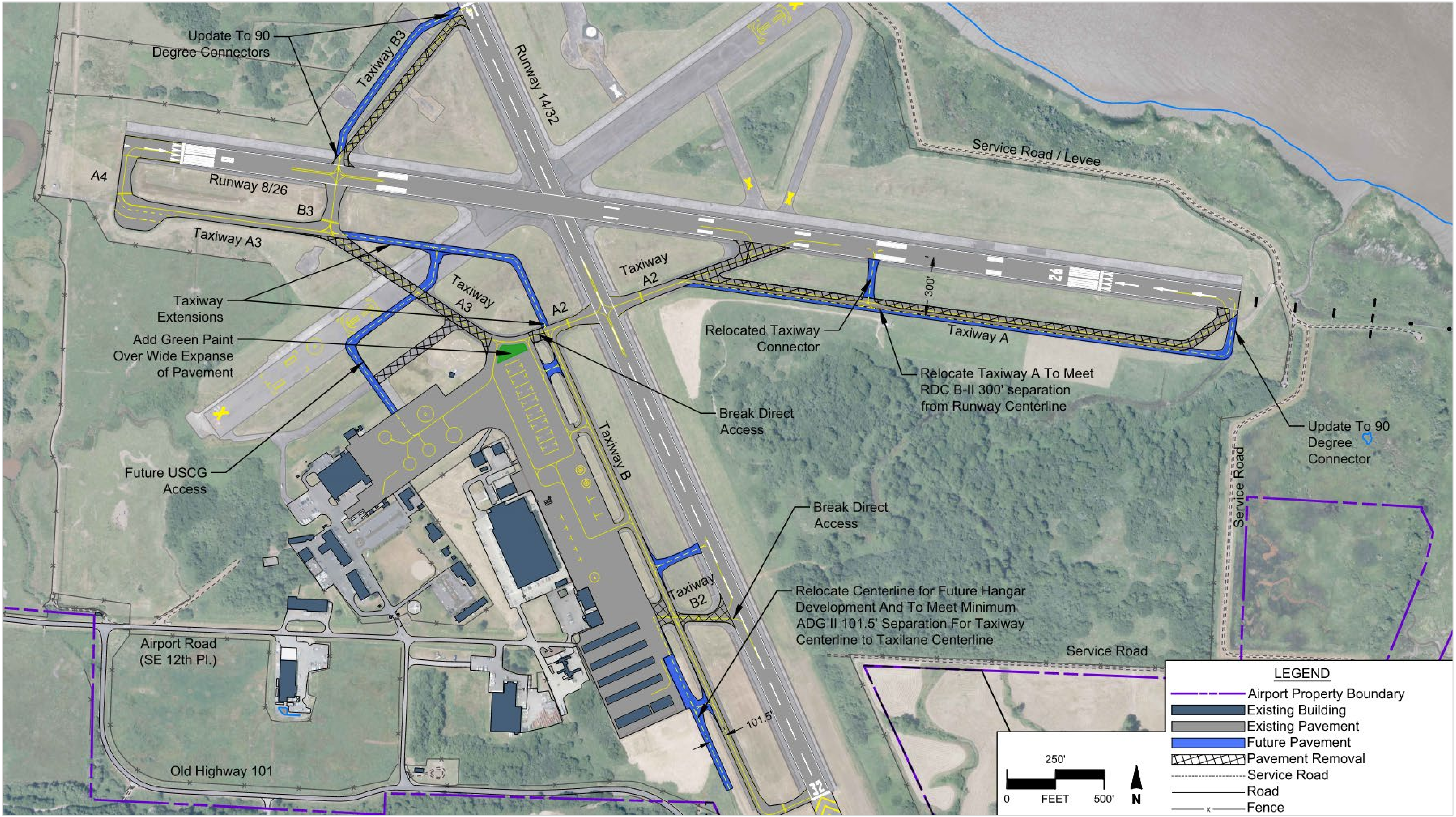
Table 5-2: Advantages and Disadvantages of Taxiway Improvements Alternative Two

Advantages	Disadvantages
• Shifting Taxiway A by 25-feet allows for the visibility minimum to be lowered at Runway End 26. • Creates new B2 connector taxiway that resides outside of the inner third of the airfield. • Removes A3 taxiway to increase available land for future development. • Addresses Taxiway B3 connection at the end of Runway 32 by creating a 90-degree angle connection for safety. • Removal of Taxiway A2 resolves the direct access issue and alignment concern. • Additional taxiway extension in the southwest portion of the airfield allows for future hangar development.	• Taxiway A3 is used by the USCG – removal of the taxiway could limit overall airfield access from this area. • Removal of Taxiway A3 will make Taxiway B the primary means of entering and exiting the USCG facility. • High environmental impacts with proposed taxiway extension for the southwest hangar development area as well as construction of several new taxiways. • Higher cost associated with the construction of new pavement. • Project phasing may be necessary due to overall cost.

Taxiway Preferred Alternative

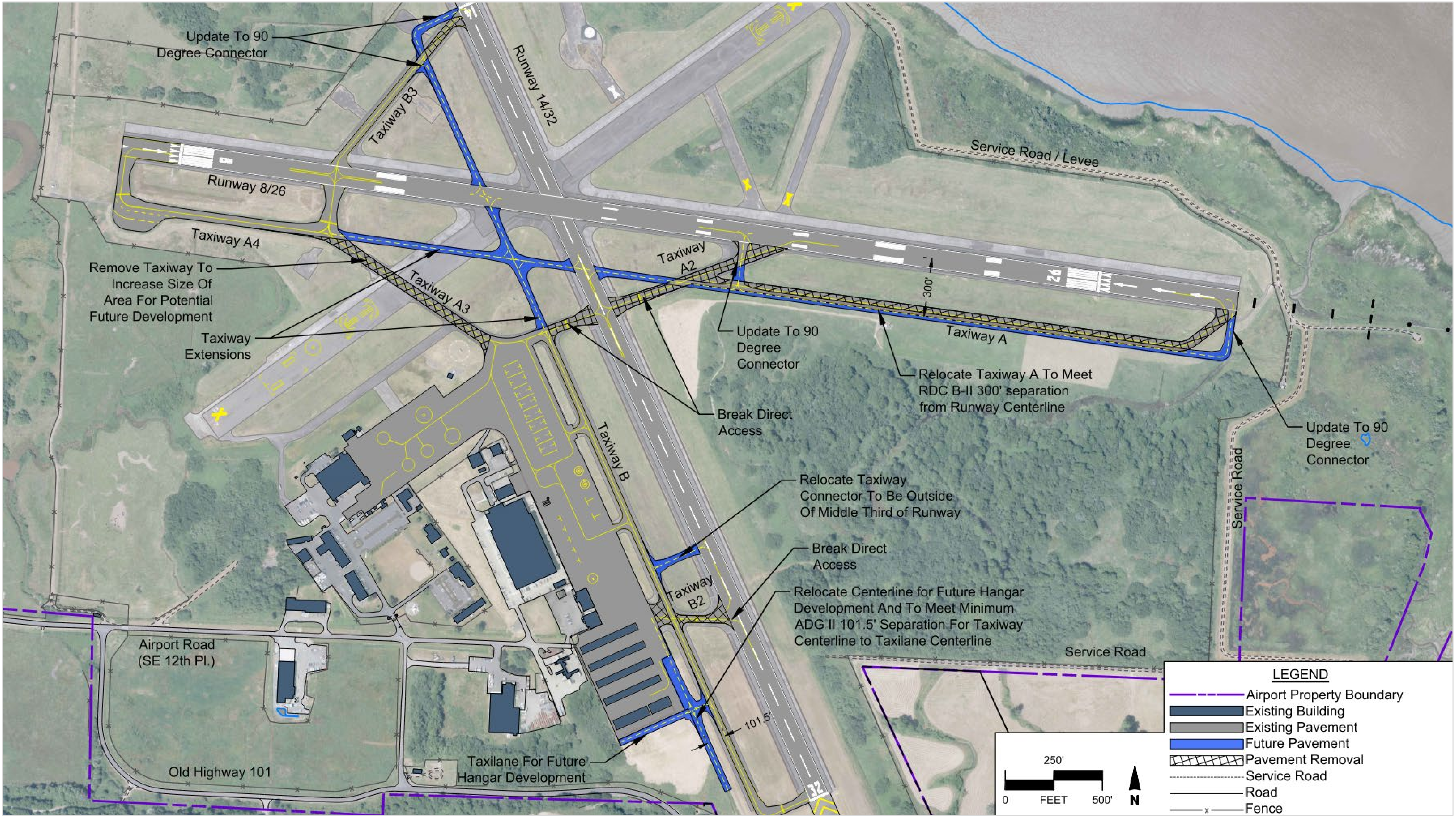
Alternative One was selected as the preferred alternative by airport staff. This alternative provided the most impactful solutions to the taxiway improvements needing to be addressed. Each component of the alternative addressed the priority issues of taxiway design standardization and alignment, separation of Taxiway A and the glideslope relocation, elimination of direct access, and provides a connection with Taxiway A3 to Taxiway B.

Figure 5-1: Taxiway Improvements - Alternative One



Source: Mead & Hunt

Figure 5-2: Taxiway Improvements - Alternative Two



Source: Mead & Hunt

Apron and Helicopter Operations Area

Currently, two civilian-based helicopters and three USCG helicopter operate on the airfield. The AST apron currently has three civilian helo parking locations and an additional four parking locations at the USCG apron for guard use. Helicopters are forecasted to increase according to the 20-year forecast. By 2041, it is estimated that a total of 6 helicopters will be based at AST. According to data from USCG, an additional based helicopter will be added to the fleet around 2026, which will add additional operations taking place at the Airport. By 2030, the USCG plans to have a new hangar facility and an additional helicopter, a total of two helicopter additions in the forecasted period.

Defining a helicopter operations area will support continued airport use by the U.S. Coast Guard, Life Flight, and the Bar Pilots Association, make efficient use of existing pavement, and help improve separation between fixed wing and rotor aircraft. A comparison of all hangar alternatives is shown in **Table 5-6**.

Helicopter Operations Area Alternative One

Alternative one, shown in **Figure 5-3**, provides an optimized layout to increase helicopter parking locations. Located adjacent to the USCG facility, this alternative provides up to five additional helicopter parking locations and takes into consideration a planned expansion of a new hangar by the USCG, this area is noted in the red hatch on **Figure 5-3** and is approximately 450' long by 120' wide. The USCG would handle all planning efforts and no work would proceed until an agreement with the Port on land acquisition is formalized.

One additional civilian helicopter spot and relocated helicopter spot (moved from the TOFA for taxiway access) can be accommodated on the GA Apron, which can be quickly accessed by the Bar Pilots Association (BPA).

Table 5-3: Advantages and Disadvantages of Helicopter Operations Area Alternative One

Advantages	Disadvantages
• Coast Guard can expand operations and construct new hangar. • An additional five (5) new helicopter parking spots can be designated. • Airport will gain additional portion of apron parcel in expansion of USCG. Which would eliminate congestion on the Airport ramp near the FBO, provide direct USCG access and overall provide a better layout for the USGC expansion	• Existing helicopter spot on the GA apron is located in the TOFA and will require relocation. • The environmental concerns are significant. Almost anywhere that is not paved will have the potential of being classified as a wetland.

Helicopter Operations Area Alternative Two

Alternative two, shown in **Figure 5-4**, provides an optimized layout to increase helicopter parking locations. Located adjacent to the USCG facility, this alternative provides up to five additional helicopter parking locations and takes into consideration a planned expansion of a new hangar by the USCG. Under the expansion of the USCG, an agreement with the Port would need to take place for the area noted in the red hatch on **Figure 5-4**, which is approximately 450’ long by 120’ wide. The areas designated for expansion for the USCG will require the USCG to complete their own planning. The tenant user will be required to provide planning prior to the beginning of the project.

Table 5-4: Advantages and Disadvantages of Helicopter Operations Area Alternative Two

Advantages	Disadvantages
‣ Coast Guard can expand operations and construct new hangar. ‣ An additional five (5) new helicopter parking spots can be designated. ‣ Airport will gain additional portion of apron parcel in expansion of USCG expansion. ‣ Operationally, the fixed wing and helicopter spots are in two separate areas for parking.	‣ The maximum parking allotted is five (5) fixed wing aircraft and/or helicopters in the spots to the east of the new hangar on the apron. ‣ Overall environmental impacts are significant.

Helicopter Operations Area Alternative Three

Alternative three, shown in **Figure 5-5**, provides an optimized layout to increase helicopter parking locations. Located adjacent to the USCG facility, this alternative provides up to five additional helicopter parking locations and takes into consideration a planned expansion of a new hangar by the USCG. Under the expansion of the USCG, an agreement with the Port would need to take place for the area noted in the red hatch on **Figure 5-5**, which is approximately 450’ long by 120’ wide.

Alternative three takes into consideration the proposed closure of Taxiway A2 and A3 to accommodate to the preferred alternative for taxiway improvements. The future taxilane from the USCG apron also utilizes existing pavement of the closed runway and helicopters maintain the ability to move around the airfield.

Table 5-5: Advantages and Disadvantages of Helicopter Operations Area Alternative Three

Advantages	Disadvantages
▸ Coast Guard can expand operations and construct new hangar. ▸ An additional five (5) new helicopter parking spots can be designated. ▸ Airport will gain additional portion of apron parcel in expansion of USCG expansion. ▸ Operationally, the fixed-wing and helicopter spots are in two separate areas for parking. ▸ USCG can access the proposed Taxiway A via new connector taxiway on existing pavement of the closed runway.	▸ Reconfigures current USCG access to airfield by removing Taxiway A3. ▸ Overall environmental impacts are significant.

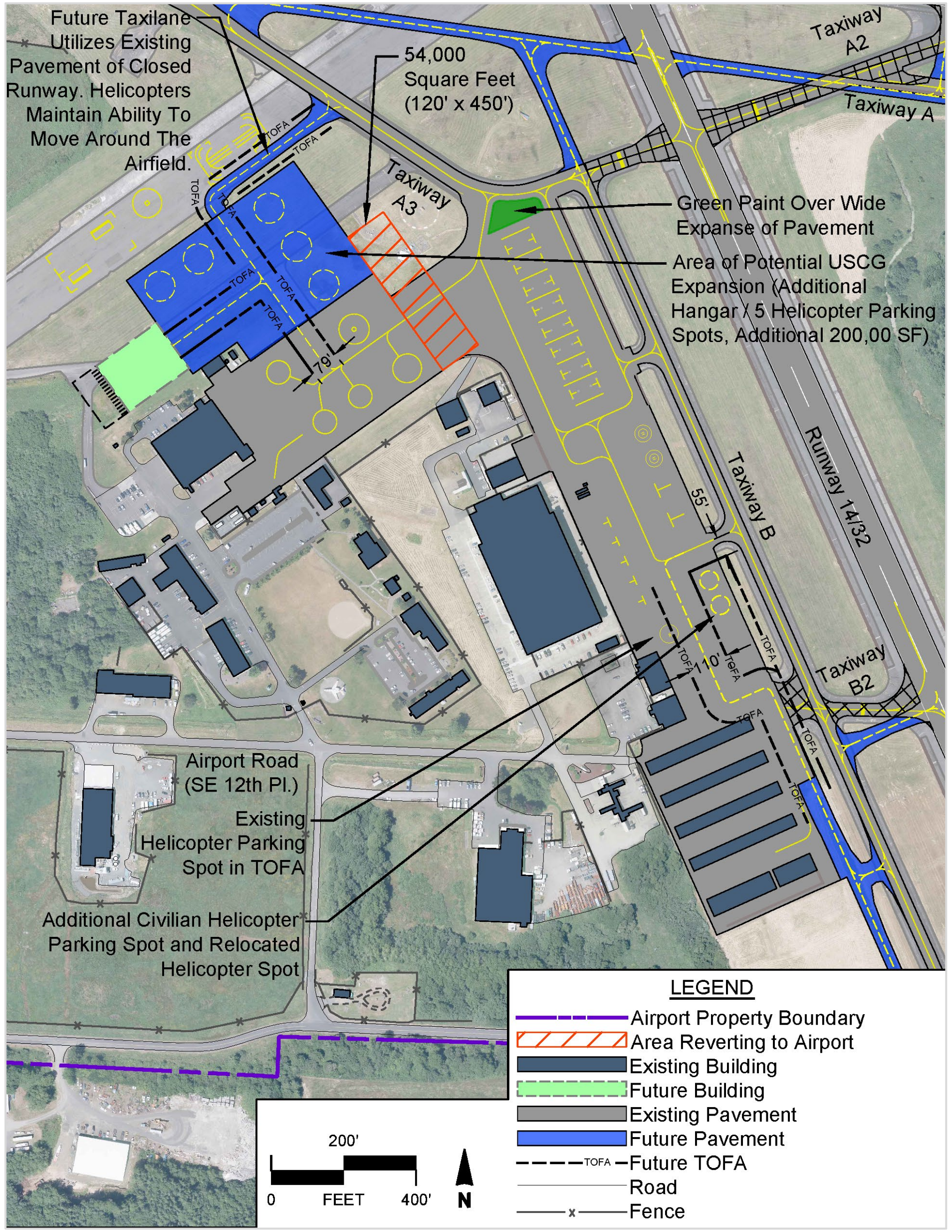
Helicopter Operations Area Preferred Alternative

Alternative Three was selected as the preferred alternative by airport staff. The alternative allows for additional expansion for USCG to the north, additional civilian parking space, and supports the realignment of Taxiway B. Expansion of the USCG area, with additional helicopter space, will also lessen the usage of the GA apron by the USCG.

Table 5-6: Helicopter Development Alternative Matrix

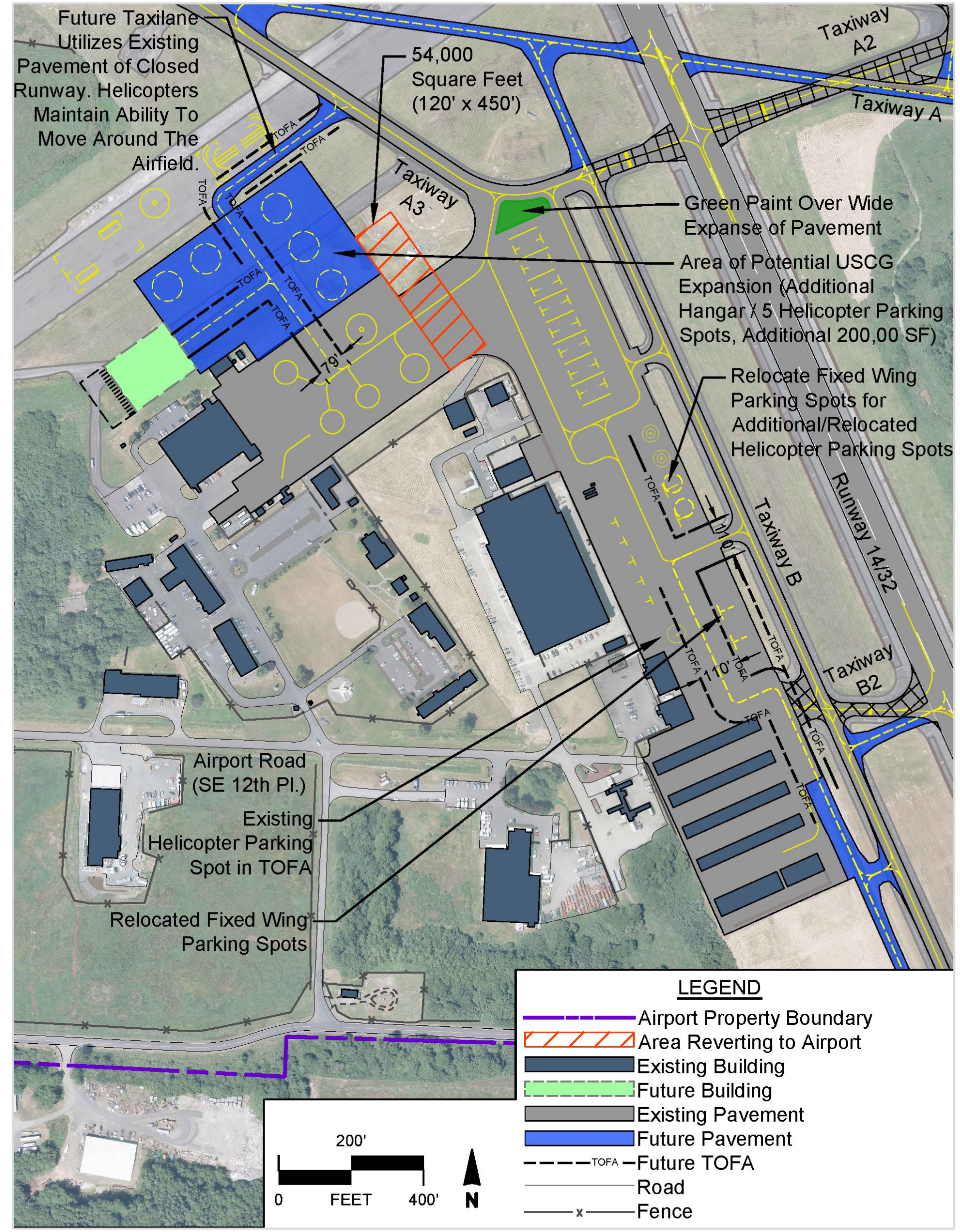
Criteria	Alternative One	Alternative Two	Alternative Three
Pros	▸ USCG can expand operations and construct new hangar. ▸ An additional five (5) helicopter spots are added on the USCG parcel. ▸ Airport will gain a back a portion of the USCG parcel in the expansion.	▸ USCG can expand operations and construct new hangar. ▸ An additional five (5) helicopter spots are added to the USCG parcel. ▸ Airport will gain a back a portion of the USCG parcel in the expansion. ▸ Fixed-wing and helicopter spots are in two separate areas for parking.	▸ USCG can expand operations and construct new hangar. ▸ An additional five (5) helicopter spots are added to the USCG parcel. ▸ Airport will gain a back a portion of the USCG parcel in the expansion. ▸ Fixed wing and helicopter spots are in two separate areas for parking. ▸ USCG can access the proposed Taxiway A via new connector taxiway on existing pavement of closed runway.
Cons	▸ Existing helicopter in spot on the GA apron will need to be relocated, as it resides in the TOFA. ▸ Overall environmental impacts are significant.	▸ Maximum parking allotted would be five (5) fixed-wing and/or helicopters in the spots to the east of the new hangar on the apron. ▸ Overall environmental impacts are significant.	▸ Reconfigures current USCG access to airfield by removing Taxiway A3. ▸ Overall environmental impacts are significant.

Figure 5-3: Helicopter Operations Area - Alternative One



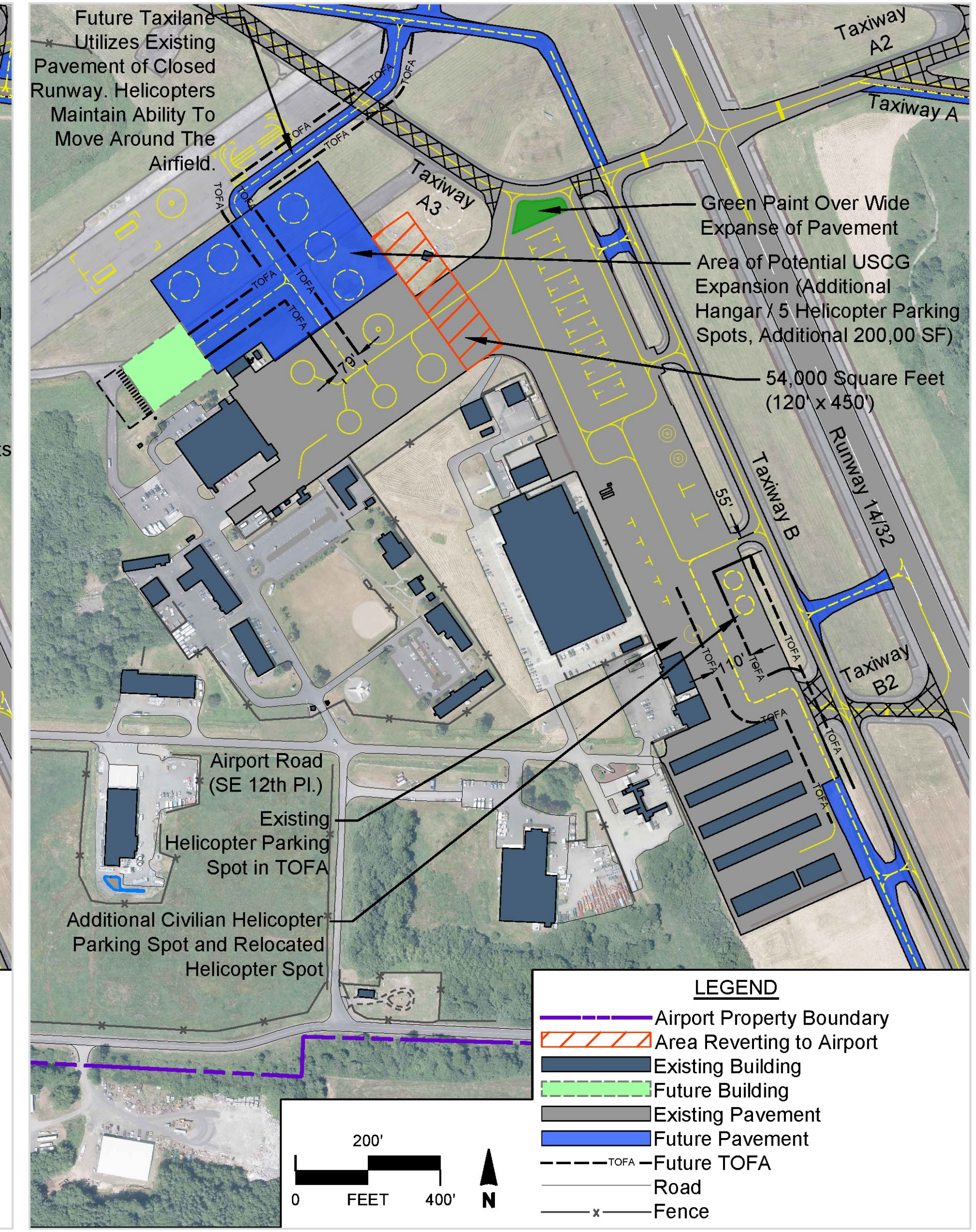
Source: Mead & Hunt

Figure 5-4: Helicopter Operations Area - Alternative Two



Source: Mead & Hunt

Figure 5-5: Helicopter Operations Area - Alternative Three



Source: Mead & Hunt

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Hangar Development Area

Aircraft based at AST are currently stored on ramp tiedowns or within T-hangars or conventional hangars located in the southwest portion of the airfield. There are currently six storage units, five units consist of 48 T-Hangars and one unit contains two box hangars. There are also two additional conventional hangars for storage and operations by the FBO (Astoria Flight Center). Hangar facilities remain in high demand at the Airport as adverse weather conditions make outdoor storage less desirable by users.

Chapter 3 indicated that potential growth of conventional and electric aircraft will increase the storage needs at AST. The FAA Terminal Area Forecast (TAF) forecasts an additional 19 conventional based aircraft by 2041. New electric aircraft, combined with the conventional aircraft, could push that figure to 75 total aircraft needing hangar and parking options.

In an effort to plan for future aviation needs, it is recommended that the Airport consider various alternatives for siting new hangar development. Sizing and position of hangars will vary dependent on the developer. A comparison of all hangar alternatives is shown in **Table 5-10**.

Hangar Development Area Alternative One

Alternative one, shown in **Figure 5-6**, provides an alternative option for the development of additional hangar facilities. In this scenario, space designated for hangar development can accommodate up to three additional box hangars adjacent to the USCG apron (see **Figure 5-6** for approximate hangar sizing). This will accommodate smaller GA aircraft. Apron space in front of Lektro can be utilized to accommodate two additional box hangars, and additional T-hangars can be developed to the southwest quadrant near the existing T-hangars. Due to apron space being utilized, AST will need to confirm that the tie down areas are still satisfactory.

Alternative one incorporates the preferred taxiway alternative option and shows the preferred connections from the GA apron to Taxiway B and the Taxiway B connection to Runway 14/32.

Table 5-7: Advantages and Disadvantages of Hangar Development Area Alternative One

Advantages	Disadvantages
‣ Forecasted demand will be met. ‣ Total of 20 new T-hangars and 8 new box hangars. ‣ Development is clear of phone/power lines. ‣ All on property is within the fence line. ‣ Taxiway separation going to hangars is safe for user access and meets FAA TOFA requirements. ‣ Future hangars are clear of Part 77.	‣ Box hangars located adjacent to USCG can only accommodate ADG-1 aircraft. ‣ Proposed hangar development on apron near Lektro will impact 4 fixed-wing and one helicopter parking position. Helicopter position within TOFA will need to be relocated as well. ‣ High environmental impact in the southwest proposed development area.

Hangar Development Area Alternative Two

Alternative two, shown in **Figure 5-7**, provides an alternative option for the development of additional hangar facilities. In this scenario, space designated for hangar development can accommodate up to three additional box hangars adjacent to the USCG apron (see **Figure 5-7** for approximate hangar sizing). This will accommodate smaller GA aircraft. Additional T-hangars can be developed to the southwest quadrant near the existing T-hangars.

Table 5-8: Advantages and Disadvantages of Hangar Development Area Alternative Two

Advantages	Disadvantages
• Forecasted demand is met. • Total of 22 new T-hangars and 6 new box hangars. • Development resides within the fence line. • Minimizes environmental impact in the southwest development area. • Taxiway separation going to hangars is safe for user access and meets FAA TOFA requirements. • Future hangars are clear of Part 77 surfaces.	• Box hangars located adjacent to USCG can only accommodate ADG-1 aircraft and will have challenging ingress and egress issues. • Southwest hangar development will impact phone/power lines.

Hangar Development Area Alternative Three

Alternative three, shown in **Figure 5-8**, provides an alternative option for the development of additional hangar facilities. In addition to the proposed box hangars adjacent to USCG, an additional development to the north is proposed for USCG apron expansion and hangar development for AST.

Table 5-9: Advantages and Disadvantages of Hangar Development Area Alternative Three

Advantages	Disadvantages
• Northern Hangar Development – Meets forecasted demand for hangar facilities. – GA development adjacent to USCG expansion can accommodate up to six GA hangars and two corporate hangars, with apron expansion and ADG II taxilane from Taxiway A3. – GA apron and hangar expansion would allow for a variety of users, including GA and corporate aircraft. – Development area directly adjacent to USCG apron and FBO can accommodate up to three additional box hangars. – USCG expansion expands the guard area, creating a new entry, additional helicopter space, and new hangar area with roadway access.	• If Taxiway Alternative 2 is selected, with the removal of Taxiway A3, this alternative will require the USCG to navigate through the GA apron at the north end. • Impacts electric aircraft alternative one. • Moderate environmental impacts near the hangars/roadway end.

– Proposed USCG and GA development have separate fence line. Both are clear of building restriction line (BRL) and Part 77 airspace. – Development utilizes existing decommissioned runway pavement. ▸ Southwest Hangar Development – Space designated for up to 20 additional T-hangars in the southwest quadrant near the existing T-hangars. – ADG I and ADG II taxilane can accommodate various users. – Southwest hangar development can be built upon previously disturbed land, minimizing environmental impact.	

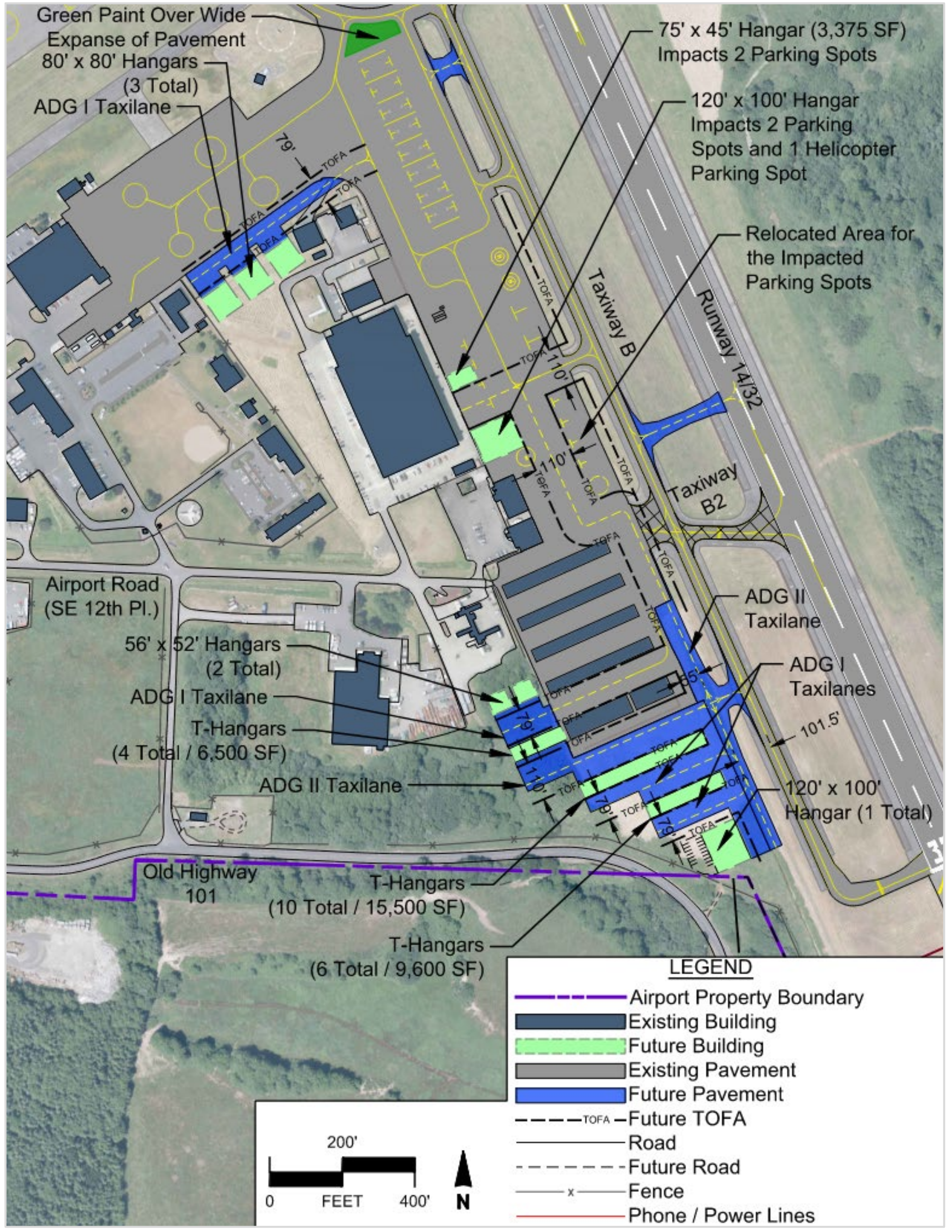
Hangar Development Preferred Alternative

Alternative One was selected as the preferred alternative by airport staff. This alternative meets the forecasted demand of new hangar space while providing several types of hangar configurations for users. The proposed hangars can be built on airport property in the southwest development while using the GA apron and adjacent FBO lots for box hangars.

Table 5-10: Hangar Development Alternative Matrix

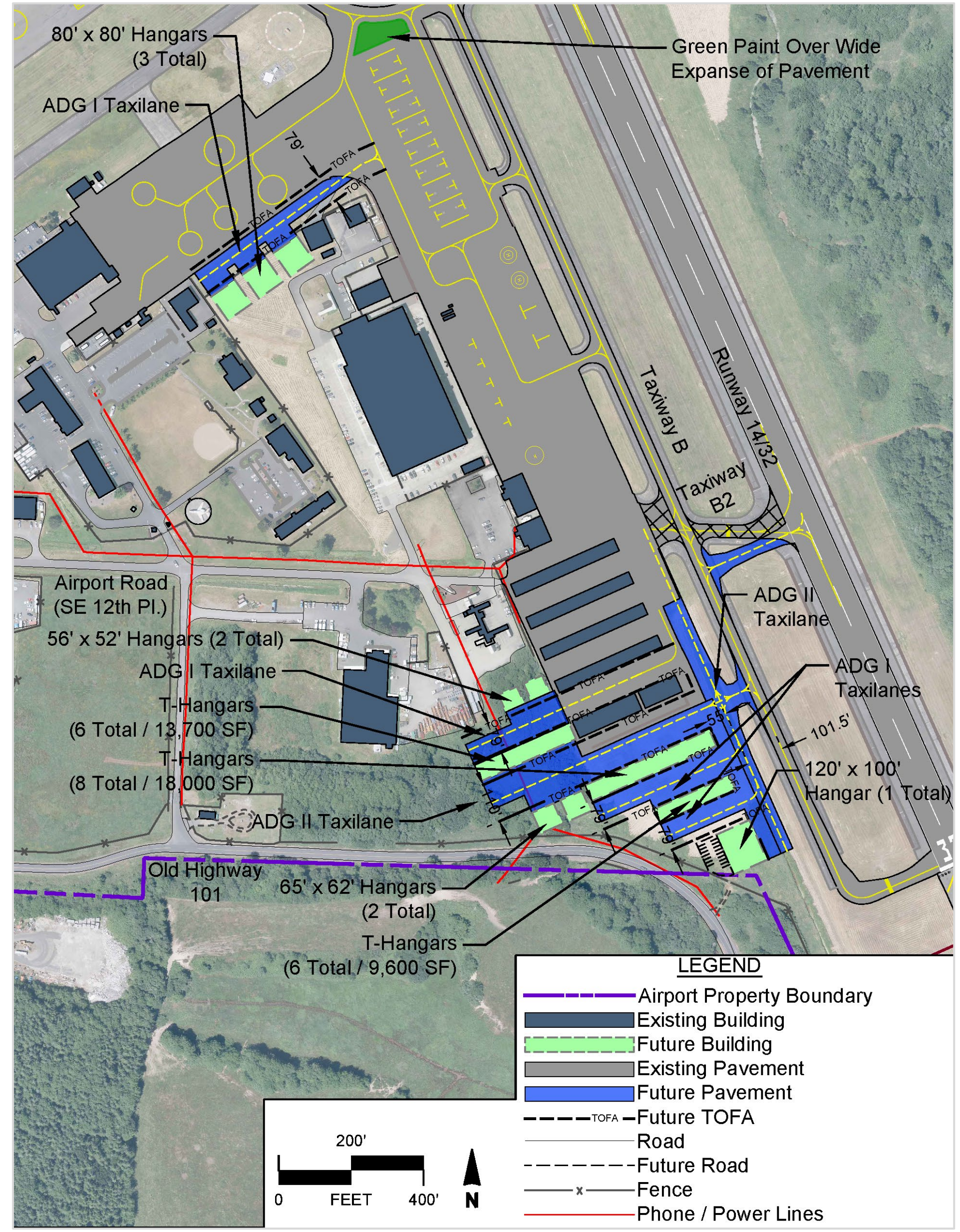
Criteria	Alternative One	Alternative Two	Alternative Three
Pros	• Mets demand with 20 new T-hangars and 8 box hangars. • Hangar development resides within airport property. • Hangar type allows for diverse group of tenants. • Taxiway separation in southwest development allows for diverse user access.	• Mets the demand with 22 new T-hangars and 8 new box hangars. • Development resides within airport property. • Hangar type allows for a diverse group of tenants. • Taxiway separation in southwest development allows for diverse user access.	• Mets the demand with 20 new T-hangars and 8 box hangars, with the option for 3 additional box hangars (if needed). • Development resides within airport property. • Hangar type allows for diverse group of tenants. • Allows for USCG expansion area, creating an entry, new hangar facility, and additional helicopter space. • North development utilizes decommissioned runway.
Cons	• Ingress and egress issues for box hangars adjacent to USCG. • Box hangars located adjacent to USCG will require USCG approval. • Impact to four (4) fixed-wing and one (1) helicopter parking spot; helicopter position within TOFA will need to be relocated. • Moderate environmental impact.	• Ingress and egress issues for box hangars adjacent to USCG. • Box hangars located adjacent to USCG will require USCG approval. • Southwest hangar development will affect existing utility lines. • Moderate environmental impact.	• Will not work with Taxiway Alternative Two with the removal of Taxiway A3. USCG will be required to navigate through GA apron at the north end. • Impacts Electric Aircraft Alternative One • Moderate environmental impact.

Figure 5-6: Hangar Development Area - Alternative One



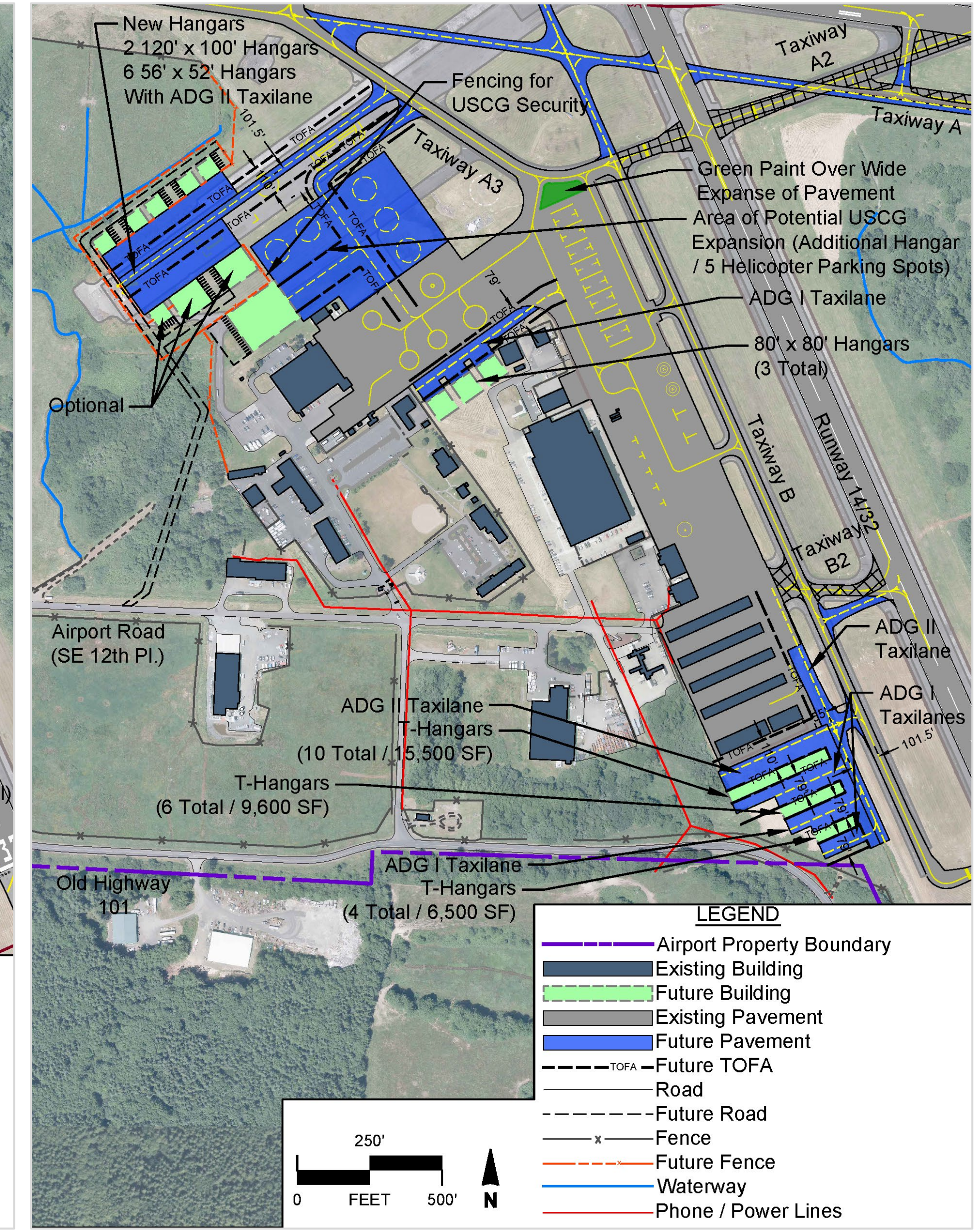
Source: Mead & Hunt

Figure 5-7: Hangar Development Area - Alternative Two



Source: Mead & Hunt

Figure 5-8: Hangar Development Area - Alternative Three



Source: Mead & Hunt

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FBO Location Alternatives

Astoria Flight Center, the Airport's Fixed Base Operator (FBO), provides FBO services such as fuel, aircraft support, and passenger and pilot facilities. Located at the east end of SE 12th place, the building provides favorable airside access and visibility of the airfield. Due to aging of the building, which was built in 1972, the current building requires upgrades and renovation to meet the current needs and forecasted future demands of the Port of Astoria and airfield users. In an effort to plan for future aviation needs, it is recommended that the Airport consider either renovation and expansion of the existing FBO structure or plan to relocate back to the original FBO building, which is currently occupied by the Bar Pilot's Association.

FBO Location Alternative One

Alternative one, shown in **Figure 5-9**, provides an option for expanding the existing FBO location. The current building, which is in a central location on the airfield, has room for expansion on the eastern side of the building. By expanding the building where the current porch resides, the FBO can gain an additional 1000 square feet of space and remain within the fence line.

Table 5-11: Advantages and Disadvantages of FBO Location Alternative One

Advantages	Disadvantages
‣ Increase in building square footage. ‣ Parking lot adjacent to the building. ‣ Quick access for airport users. ‣ Allows for existing building structure to be reused and expanded.	‣ Potential cost for expansion and renovation on an older building. ‣ Additions and renovations will need to meet current building code requirements. ‣ Well-equipped to support commercial passenger traffic if commercial service is initiated.

FBO Location Alternative Two

Alternative two, shown in **Figure 5-10**, provides an option for relocating the FBO to its original location, which the Bar Pilots Association currently occupies. This alternative will require the Bar Pilots Association to relocate to the current FBO building or lease space elsewhere on the property.

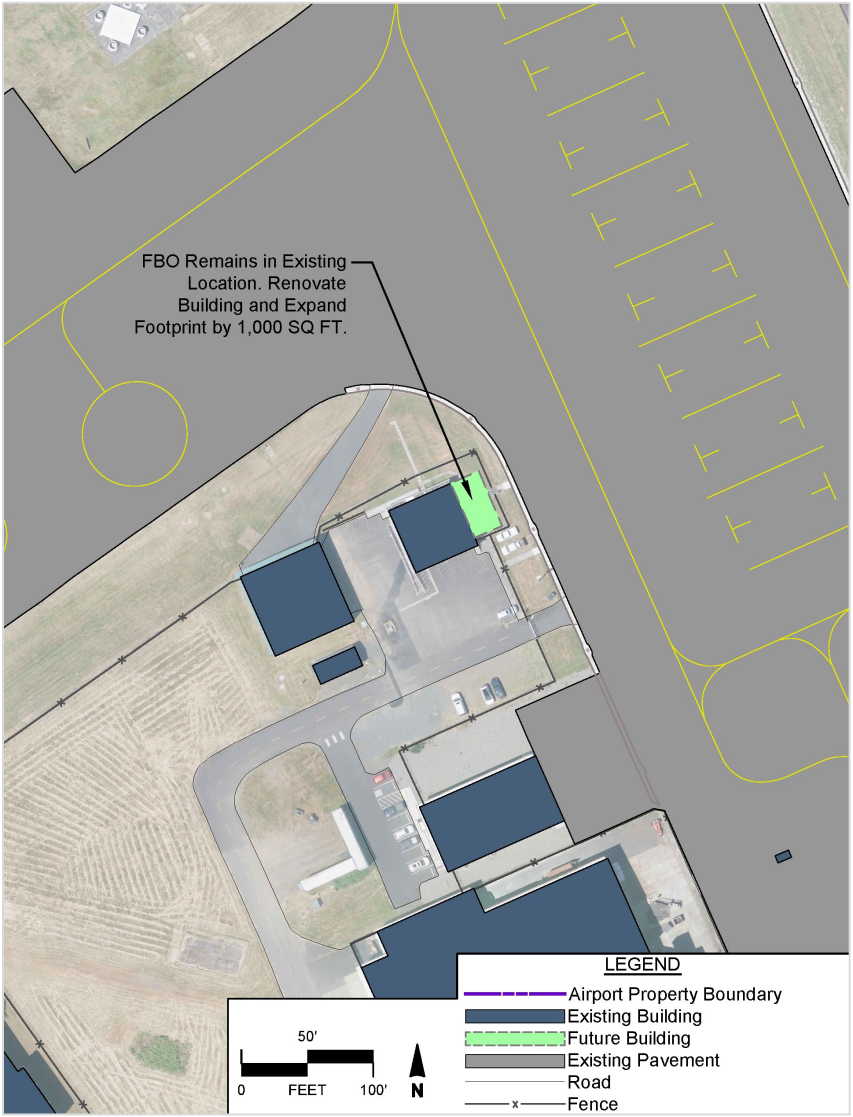
Table 5-12: Advantages and Disadvantages of FBO Location Alternative Two

Advantages	Disadvantages
‣ Larger, updated building. ‣ Potential for commercial service accommodations. ‣ Designated parking area. ‣ Best landside access for users and visitors to the airfield. ‣ Good visibility to airfield.	‣ Bar Pilots Association will lose leased space and will need to relocate. ‣ Limited room to expand beyond building footprint. ‣ Available apron space is limited due to proximity to Lektro. ‣ Ramp location for transient aircraft operators is less central than Alternative One.

FBO Location Preferred Alternative

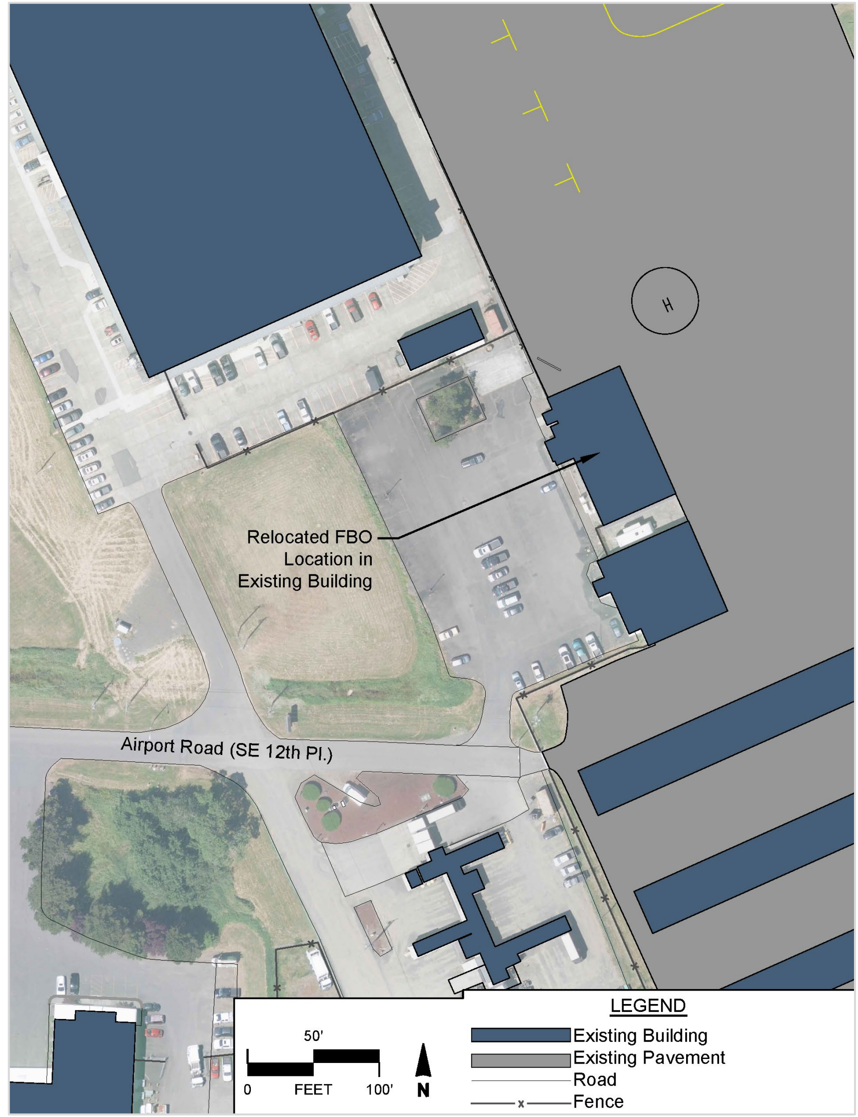
Alternative One was selected as the preferred alternative by airport staff. The current FBO has several benefits as it's currently being remodeled, provides parking options for users and staff, and has an ideal location/proximity to the airfield arrival /departure and transient parking area. The location is the most suitable for pilots in terms of walking distance and access and the space also offers additional room for storage and ground equipment. Alternative two currently has a tenant lease and is not suitable.

Figure 5-9: FBO Location – Alternative One



Source: Mead & Hunt

Figure 5-10: FBO Location – Alternative Two



Source: Mead & Hunt

Fuel Farm Alternatives

Based on the Airport's future development and current fueling facility capacity, a fuel farm expansion is recommended. The Airport currently has two double-walled, above-ground 12,000-gallon tanks for storage of AvGas and Jet-A fuel. These fuel tanks are located north of the terminal building on the GA aircraft apron. It was noted that the Airport had to notify customers of fuel shortages several times during the past three years. In an effort to plan for future aviation needs, it is recommended that the Airport construct an additional fuel farm facility.

Fuel Farm Alternative One

Alternative one, shown in **Figure 5-11**, provides an option for the construction of an additional fuel farm. The proposed location, along Airport Road, can accommodate up to four (4) 35' x 10' tanks for 100LL and Jet-A fuel. The fuel farm, which will be secured with fencing, will allow fuel trucks to use the gate to access fuel and remain in the secured area until fueling is complete. Fuel delivery can also be accessed from the main roadway with ample room to navigate. This alternative clears the 150-foot clearance from surrounding structures and can allow for future expansion, if needed. Site location is dependent on a site survey and non-aeronautical planning considerations for development. **Figure 5-11** is intended to demonstrate the acreage and property needs to accommodate the landside fuel farm.

Table 5-13: Advantages and Disadvantages of Fuel Farm Location Alternative One

Advantages	Disadvantages
▸ Located on the main roadway, ideal for access. ▸ Above-ground tanks, which will provide better access when maintenance and testing is needed. ▸ Visual monitoring of above ground tanks for leaks. ▸ Central location. ▸ Less disruptive to aircraft operations, as the location is off-site.	▸ Not located on apron. ▸ Fuel trucks required to transport, not self-serve. ▸ Tree removal required for preparation of site. ▸ Uses lands available for non-aeronautical land use. ▸ Moderate environmental impact.

Fuel Farm Alternative Two

Alternative two, shown in **Figure 5-12**, provides an option for the construction of an additional fuel tank. The proposed location, on the apron adjacent to the existing fuel tanks, can accommodate a 10,000-gallon tank for Jet-A fuel. The additional will occupy apron space, but will not affect the aircraft parking and tie down areas.

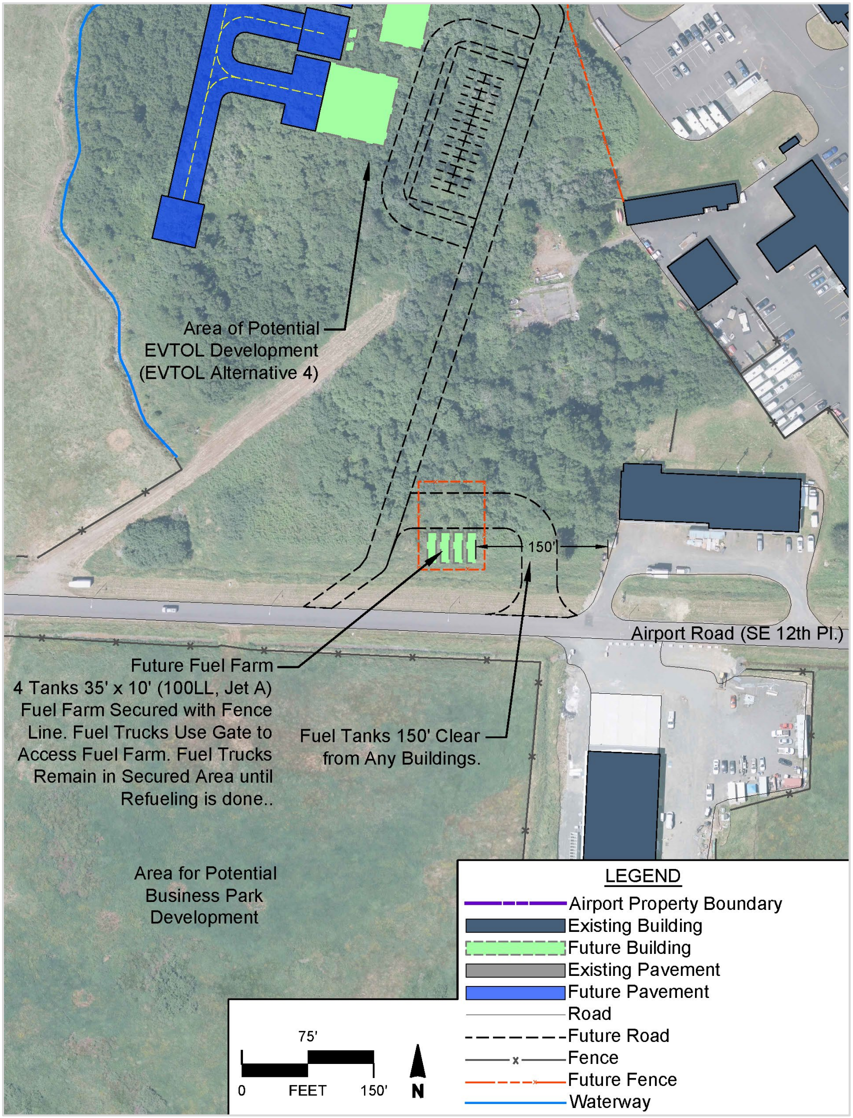
Table 5-14: Advantages and Disadvantages of Fuel Farm Location Alternative Two

Advantages	Disadvantages
▸ Located directly on the airfield. ▸ Above-ground tanks, which will provide better access when maintenance and testing is needed. ▸ Visual monitoring of above ground tanks for leaks. ▸ Central location.	▸ Apron provides limited space for future expansion. ▸ Fuel truck required to drive onto the airfield to access. ▸ Additional tank will only accommodate one fuel type.

Fuel Farm Preferred Alternative

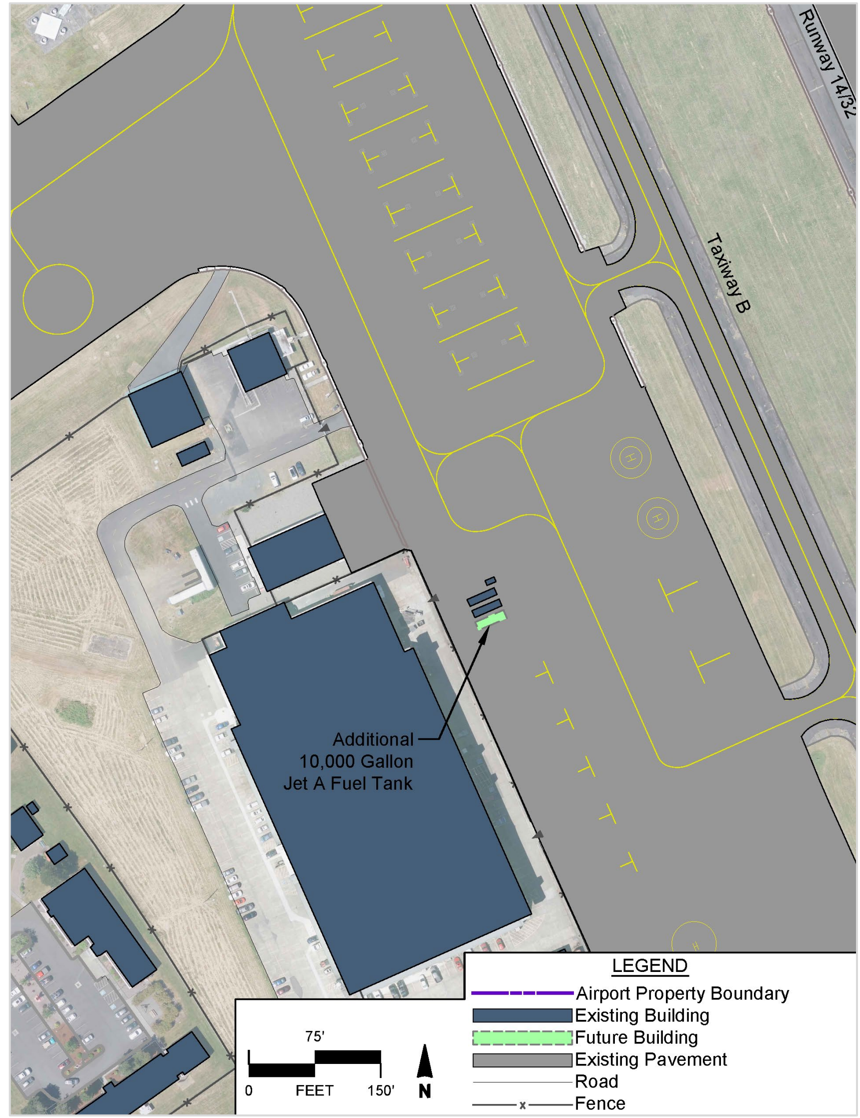
Alternative Two was selected as the preferred alternative by airport staff. As existing tanks are already on the apron, this alternative was the most suitable. Fuel trucks can remain on the airfield and provide additional capacity for Jet-A fuel.

Figure 5-11: Fuel Farm Location – Alternative One



Source: Mead & Hunt

Figure 5-12: Fuel Farm Location – Alternative Two



Source: Mead & Hunt

Electric Aircraft Development Alternatives

The purpose of these initial electric aircraft development alternative concepts is to explore alternative layouts and configurations for aircraft charging stations, aircraft parking, takeoff and landing requirements, and safety regulations and requirements. The goal of these concepts is to address the pinch points in order to plan for the potential fleet of electric aircraft within the planning period – 2021 to 2041. The alternative concepts delineate targeted areas for electric aircraft charging infrastructure and electric aircraft parking.

It is also important to note that various components of these concepts can be mixed and matched to develop the preferred electric aircraft development concept. The preferred concept will be developed in the following chapter of the Airport Master Plan and will provide additional details and refinements to the concept that is carried forward.

Other alternatives were considered during the planning process, but due to the disadvantageous nature these were less feasible of these alternatives, they were not considered in the final selection.

Electric Aircraft Alternative One

Alternative one, shown in Figure 5-13: , provides an option for the integration of electric aircraft on the GA ramp. This integration allows for direct access to the existing FBO building, for both passengers and staff. As the airport is lightly staffed for its size, keeping the electric charging station in an accessible location is beneficial for staff members assisting future customers. Additionally, starting with one charging station on the ramp will allow the airport to gauge the interest in using the infrastructure and plan for future expansion if needed.

Table 5-15: Advantages and Disadvantages of Electric Aircraft Alternative One

Advantages	Disadvantages
▸ Located on the GA apron for easier access and monitoring. ▸ Allows Airport to gauge interest in the electric infrastructure before a complete build-out of a future facility with multiple charging stations.	▸ Can only accommodate one charging station; expansion in this location will not be feasible. ▸ Dependent on electric supply access in this location.

Electric Aircraft Alternative Two

Alternative two, shown in Figure 5-14: , provides an option for the integration of electric aircraft directly adjacent to the FBO, while still providing the electric configuration on the GA ramp. The proposed EVTOL parking/charging station can be added in the area that is reverting back to the Airport from the USCG expansion. The placement of the charging stations is clear of the taxiway object free area (TOFA), and provides direct access to the existing FBO building, for both passengers and staff.

Table 5-16: Advantages and Disadvantages of Electric Aircraft Alternative Two

Advantages	Disadvantages
▸ Located on the GA apron for easier access and monitoring. ▸ Utilizes the apron space that will be reverting back to the Airport from the USCG. ▸ Proposed location is clear of safety areas ▸ Allows Airport to gauge interest in the electric infrastructure before a complete build-out of a future facility with multiple charging stations.	▸ The GA apron location can only accommodate one charging station; expansion in this location will not be feasible. ▸ Charging stations will be placed in two separate areas near the FBO. ▸ Dependent on electric supply access in this location.

Electric Aircraft Alternative Three

Alternative two, shown in Figure 5-15: , provides an option to create a vertiport facility to support future electric aircraft. The vertiport facility, which can support a terminal, launch pad, several charging stations, parking lot, and maintenance facility, is proposed on developable land to the west of the USCG hangar. The facility can be accessed from Airport Road via a proposed roadway connection.

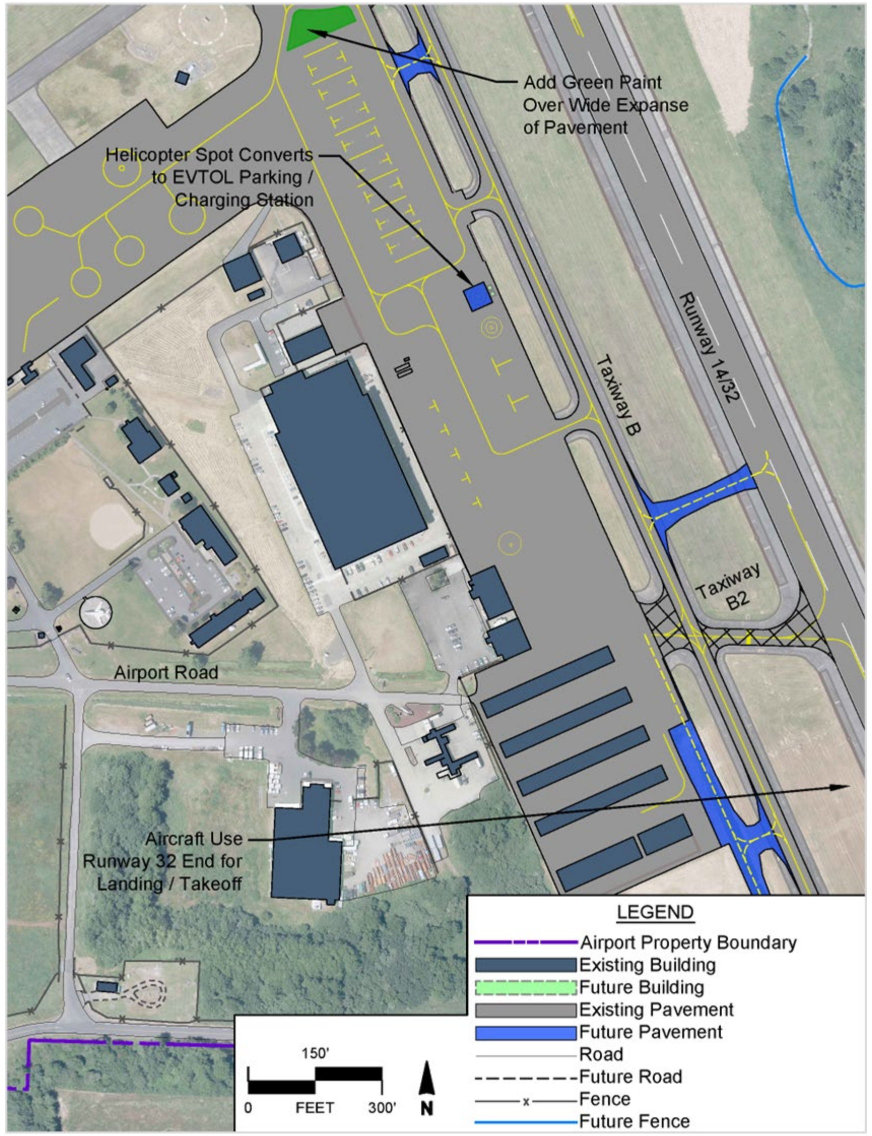
Table 5-17: Advantages and Disadvantages of Electric Aircraft Alternative Two

Advantages	Disadvantages
▸ Located in a dedicated facility, electric operations can operate separately from airfield operations. ▸ Can accommodate several charging stations; expansion in this location is feasible. ▸ Separate access road to accommodate traffic.	▸ High environmental impact as site preparation will require removal of dense tree cover. ▸ Dependent on electric supply access in this location. ▸ Cost associated with infrastructure is high. ▸ Helicopter traffic patterns may present an issue.

Electric Aircraft Location Preferred Alternative

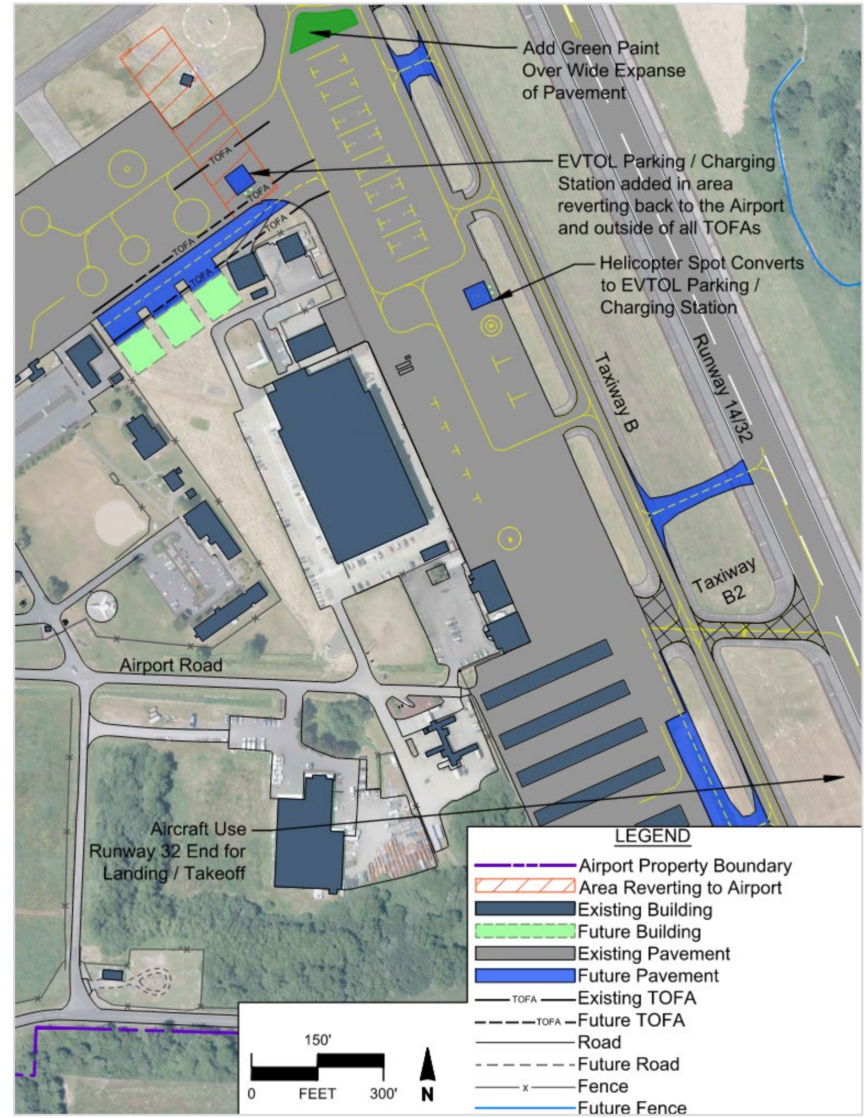
Alternative Two was selected as the preferred alternative by airport staff. This option remains on the airfield and utilizes current GA space and the space that the USCG is reverting back to the Airport. The site is easily navigated to and from the FBO.

Figure 5-13: Electric Aircraft Location – Alternative One



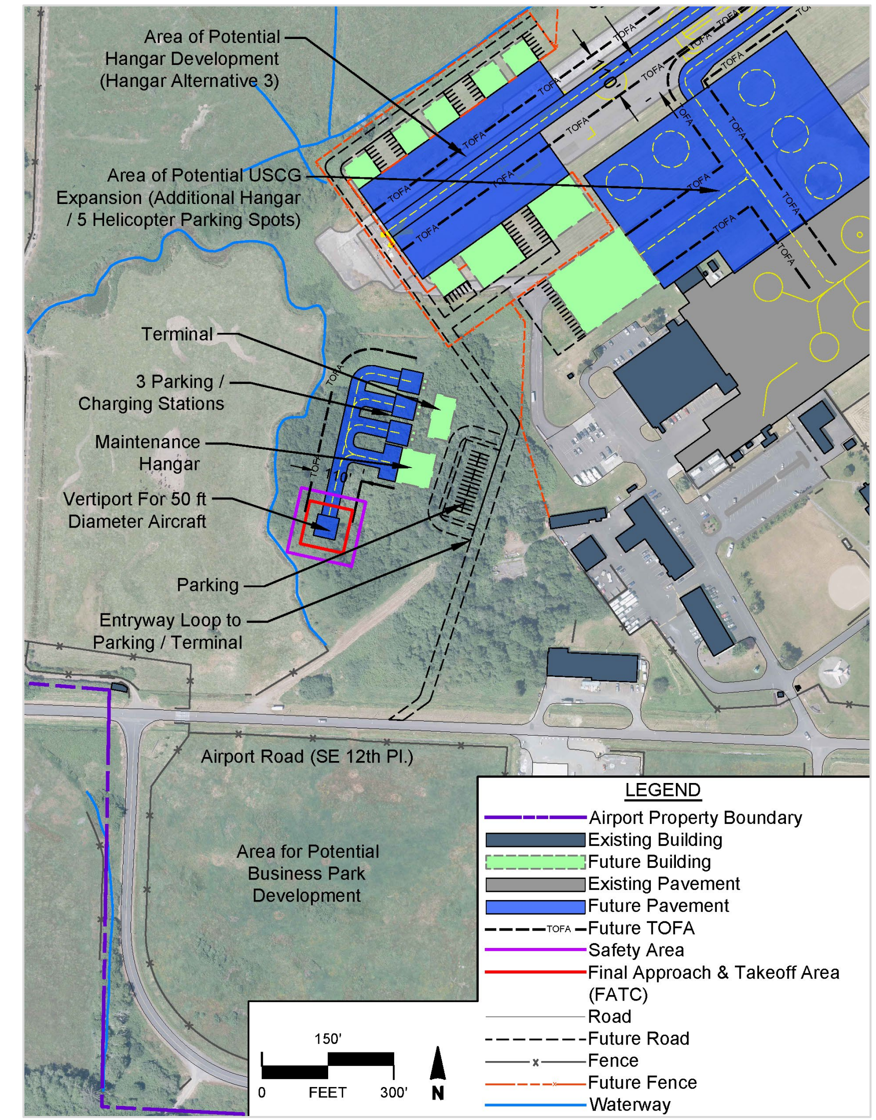
Source: Mead & Hunt

Figure 5-14: Electric Aircraft Location – Alternative Two



Source: Mead & Hunt

Figure 5-15: Electric Aircraft Location – Alternative Three



Source: Mead & Hunt

NON- AERONAUTICAL FACILITIES

This section discusses market opportunities on airport-owned properties and areas of concern for the FAA. A detailed analysis for this section describing the site specifics of each parcel is provided in **Chapter 4**. This section will evaluate the market poten-tial for these parcels and will address FAA areas of concern related to protecting federal investment, maintaining sufficient property for aeronautical development, and land use compatibility.

Non-Aeronautical Sites Evaluated

The outlined alternatives are not expected to substantively impact the development potential of non-aeronautical properties controlled by the Airport. New investments are largely related to more efficient functions of the aeronautical activities at the airport. These will likely result in a marginal increase in the marketability and utilization of the facilities, which may also result in greater exposure to non-aeronautical facilities. There are no major offsite infrastructure improvements, changes in access, or flight path impacts that would result in a change in the anticipated highest and best use development pattern at these facilities.

Three non-aeronautical sites were evaluated:

- Airport-owned properties between Highway 101 and the Adams Slough – Commercial
- Astoria Regional Airport Industrial Park – Industrial
- Properties east of Adams Slough and west of the Airport fence – Commercial/light industrial

These parcels are predominantly zoned for either commercial or industrial uses. The Industrial Park Parcel is within the airport fence line.

Non-Aeronautical Site Alternatives

The site analysis for achievable pricing (see **Chapter 4**) indicates that the Airport-owned properties between Highway 101 and the Adams Slough as well as the Industrial Park are the most marketable sites. Given the recent development at the Industrial Park and current infrastructure in place, a potential site plan was only developed for the Airport-owned properties between Highway 101 and the Adams Slough.

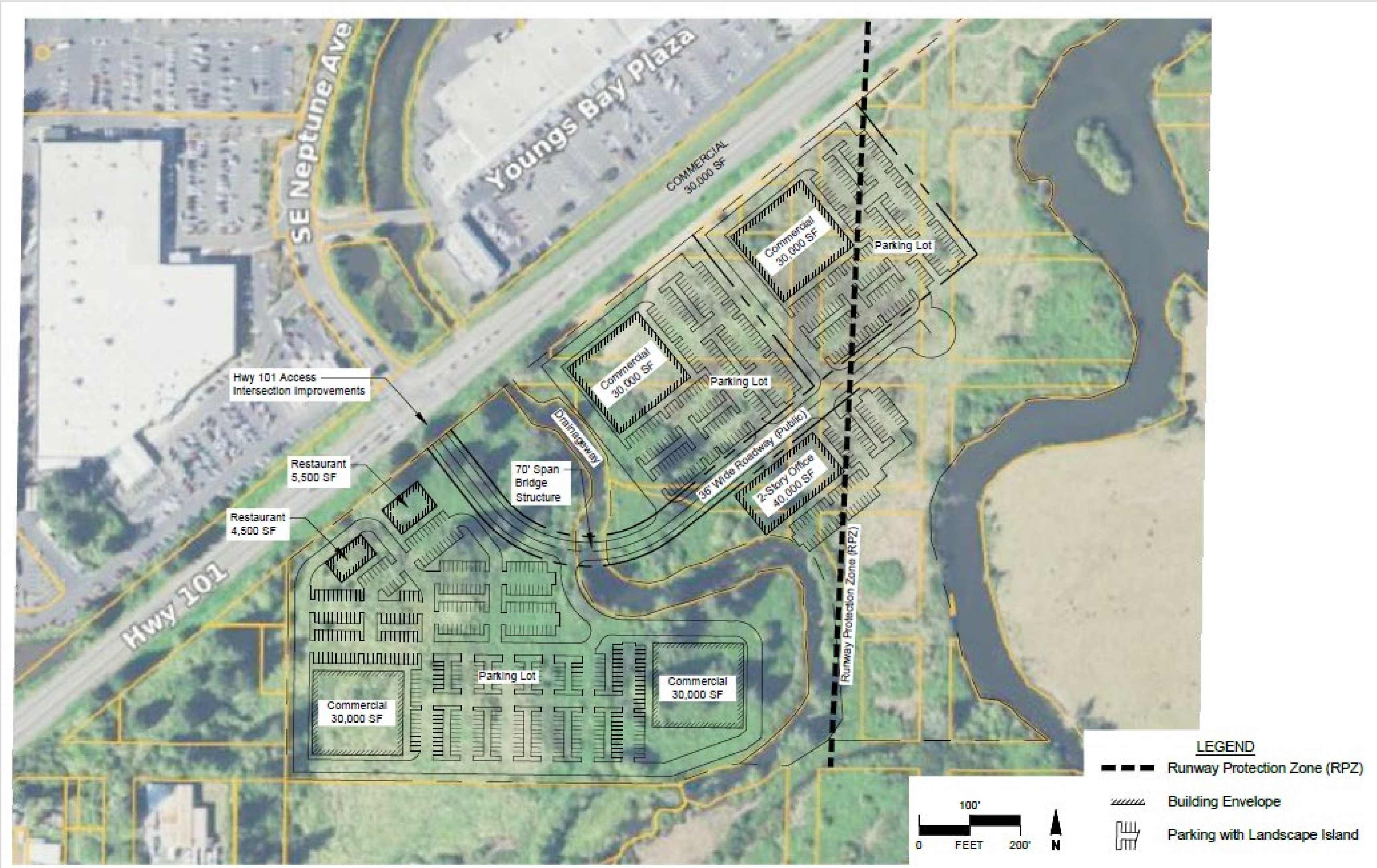
Alternative 1

Alternative 1, shown in **Figure 5-16**, identifies a mix of commercial uses and the necessary road and building infrastructure to support it. The proposed layout includes parking lots within the existing RPZ with buildings abutting it. As shown in **Figure 5-16**, the development would need to connect to US 101 at the existing signalized intersection of US 101 and SE Neptune Avenue. In order to traverse the existing topography and waterways, a roadway structure is necessary.

Alternative 2

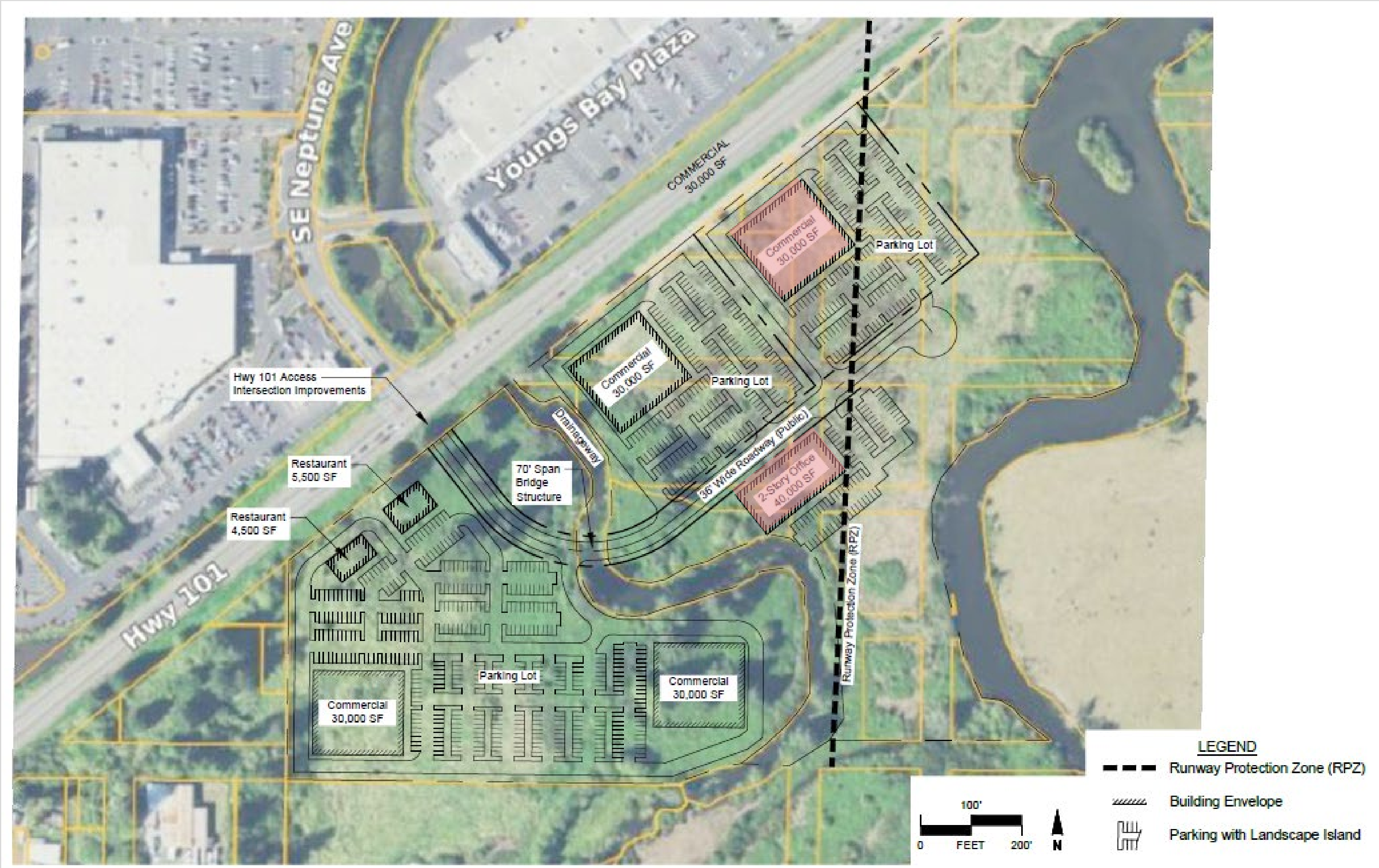
Alternative 2 is identical to Alternative 1 (shown in Figure 5-17:) but with the removal of the two structures closest to the RPZ. This would ultimately reduce potential conflict with the proximity to the RPZ, but it would also reduce the amount of achievable pricing. This alternative is shown in **Figure 5-17**

Figure 5-16: Non-Aeronautical – Alternative One



Source: Mead & Hunt

Figure 5-17: Non-Aeronautical– Alternative Two



Source: Mead & Hunt

AUTO PARKING AND CIRCULATION

In analyzing ground transportation and parking requirements at AST, requirements were compared to existing facilities and alternatives were developed where gaps appeared. Alternatives scenarios and/or recommendations have been developed for two alternatives to address deficiencies in the following areas:

- Public parking facilities
- Circulation, Roadway, and Wayfinding

Alternative 1

Alternative One expands parking supply via a new surface parking lot and re-striping of existing lots, as shown in **Figure 5-18**. The new parking lot is built southwest of the existing FBO and includes a 6-foot-wide sidewalk to connect to the FBO. It includes 34 spaces that can be used for employees and visitors. A portion of these parking spaces could also be allocated to rental car parking.

The remaining surface lot parking includes the following changes:

- Repaving the existing FBO parking lot and expanding it to include the unpaved area on the southern edge of the FBO parcel.
- Restriping to accommodate 33 parking spaces (23 head-in, 6 pull-through, and 4 parallel) and adding six new motorcycle parking spaces.
- Maintaining driveway access to the airside facilities.
- Striping a pedestrian walkway to connect to a new sidewalk.

In all, the new parking supply under Alternative One is 67 spaces. As discussed previously, the projected total parking space need in 2041 is 67 spaces. As such, Alternative One meets the anticipated need and also includes motorcycle parking.

Alternative 2

Alternative Two also expands parking supply via a new surface parking lot and re-striping of existing lots, as shown in **Figure 5-19**. The new parking lot is built west of the existing FBO and includes 55 spaces that can be used for employees and visitors. A portion of these parking spaces could also be allocated to rental car parking.

The remaining surface lot parking includes the following changes:

- Repaving the existing FBO parking lot and expanding it to include the unpaved area on the southern edge of the FBO parcel.
- Restriping to accommodate 29 parking spaces (head-in).
- Maintaining driveway access to the airside facilities.
- Striping a pedestrian walkway to provide pedestrian walkways and circulation for the existing FBO parking area.

In all, the new parking supply under Alternative Two is 84 spaces. As discussed previously, the projected total parking space need in 2041 is 67 spaces. As such, Alternative Two meets the anticipated need and includes a surplus of 17 parking spaces.

Circulation, Roadway, and Wayfinding Considerations

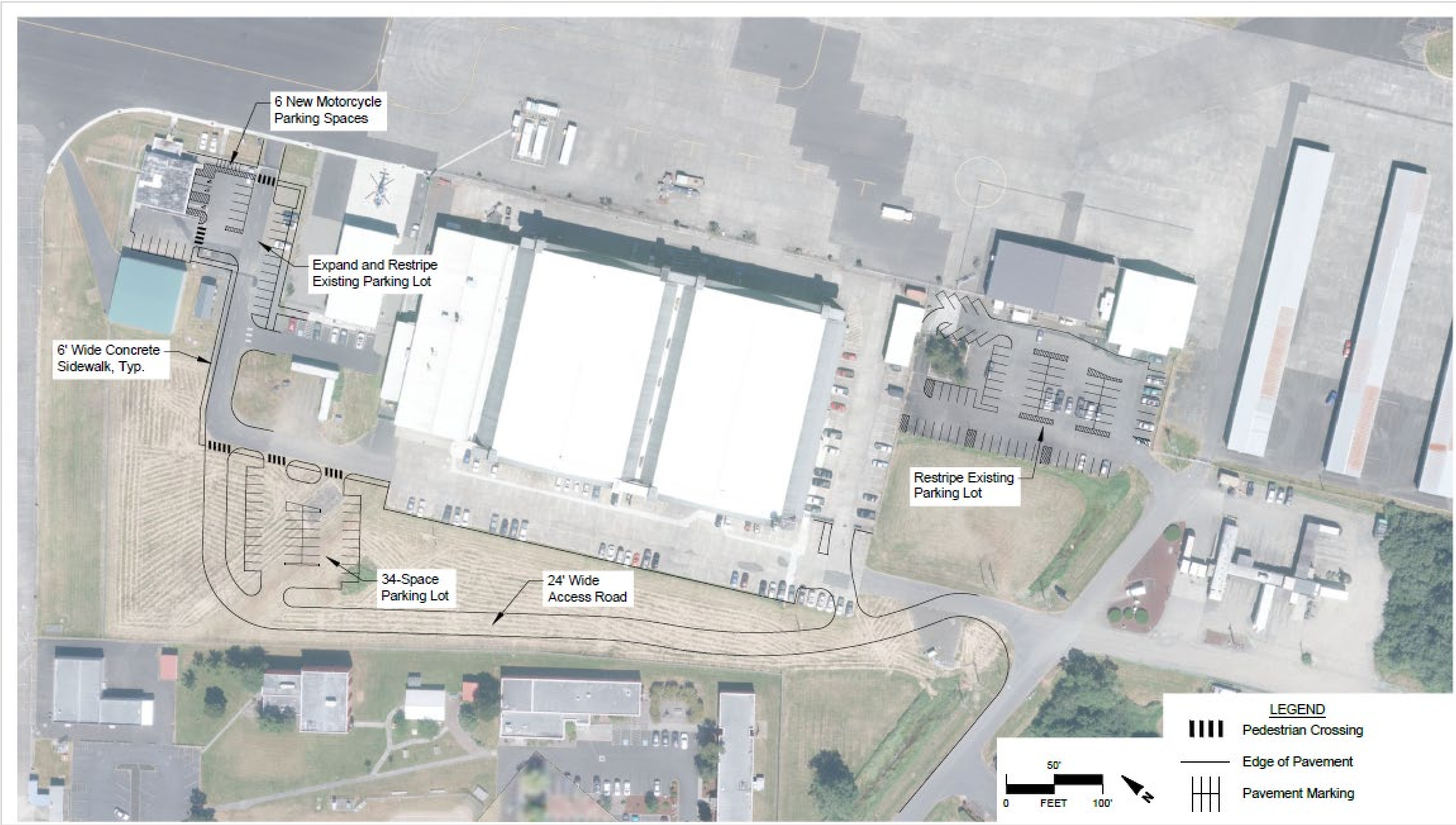
Based on prior analysis, no additional lane capacity is needed for SE Flight Line Drive, SE Airport Lane, or SE 12th Place to accommodate 2041 traffic levels. Ongoing development in the areas adjacent to the Airport may prompt a need to modify access roads to accommodate new tenants and their specific needs, which may include pavement or road rehabilitation to accommodate increased truck traffic and/or to provide adequate space for turning maneuvers. Improvements will be determined as development occurs.

To provide dedicated public access to the FBO that does not travel through an existing business parking lot, each of the aforementioned parking supply alternatives includes a 24-foot-wide public access road that provides dedicated public access to the FBO and proposed parking lots. New wayfinding signage along SE 12th Place and Flight Line Drive to direct visitors to the location of the FBO would be beneficial to aid in enhancing the approach to the FBO.

Parking Supply Alternatives Comparison

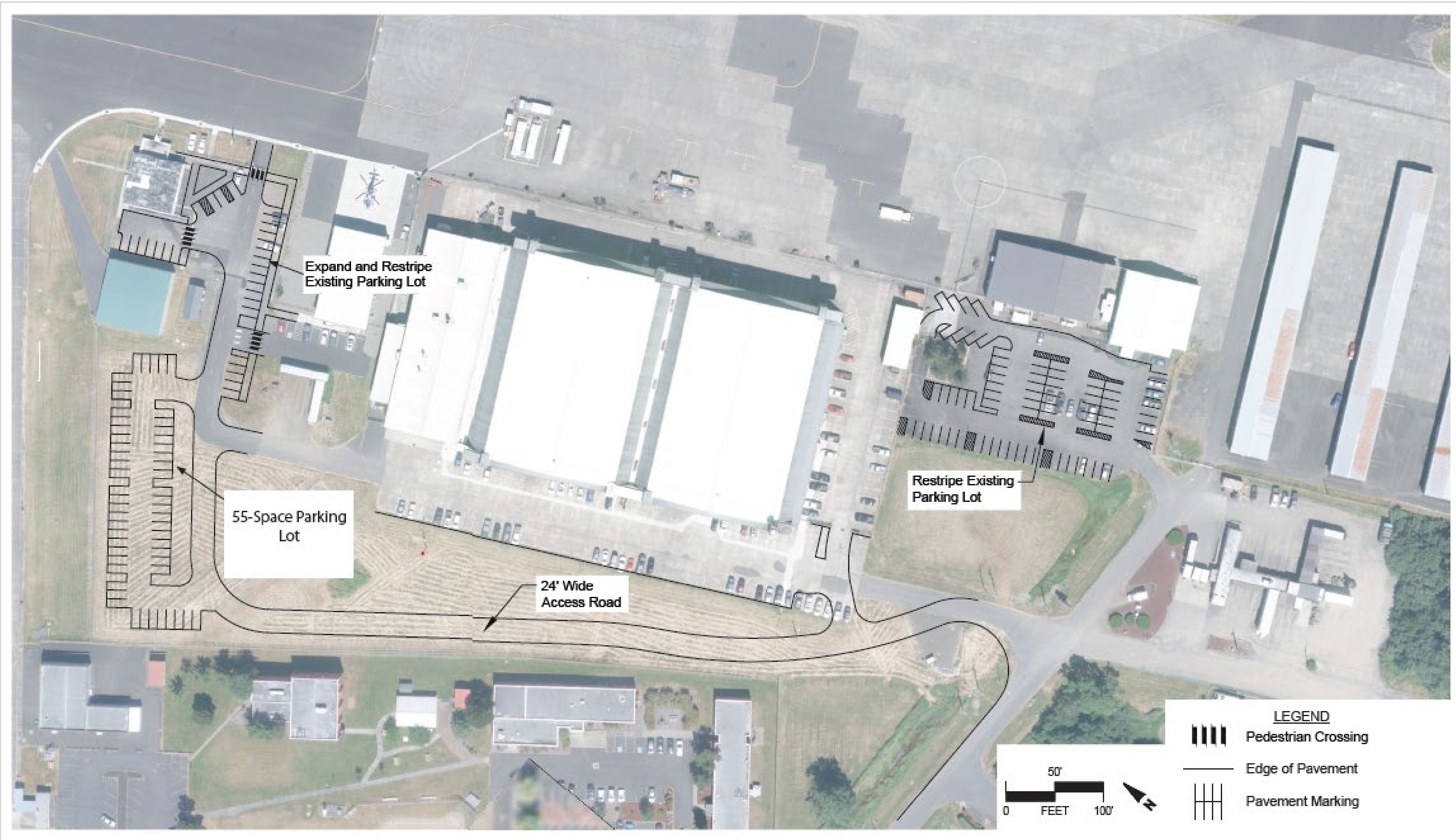
Both alternatives presented above accomplish the supply objective, which is to expand capacity to meet the projected parking needs under future conditions in 2041. Both alternatives are also scalable if growth occurs more rapidly or slowly than projected. The major components (paving and restriping the existing parking lot, new access road, and new surface lot) could all be designed to be constructed independently of each other. The two alternatives are not mutually exclusive, meaning that AST could combine elements and features of each. In general, the relative weighing of each option depends on which airside alternatives are preferred – Alternative One is least likely to conflict with airside alternatives due to the location of the new surface parking lot.

Figure 5-18: Auto Parking and Circulation– Alternative One



Source: Mead & Hunt

Figure 5-19: Auto Parking and Circulation– Alternative Two



Source: Mead & Hunt

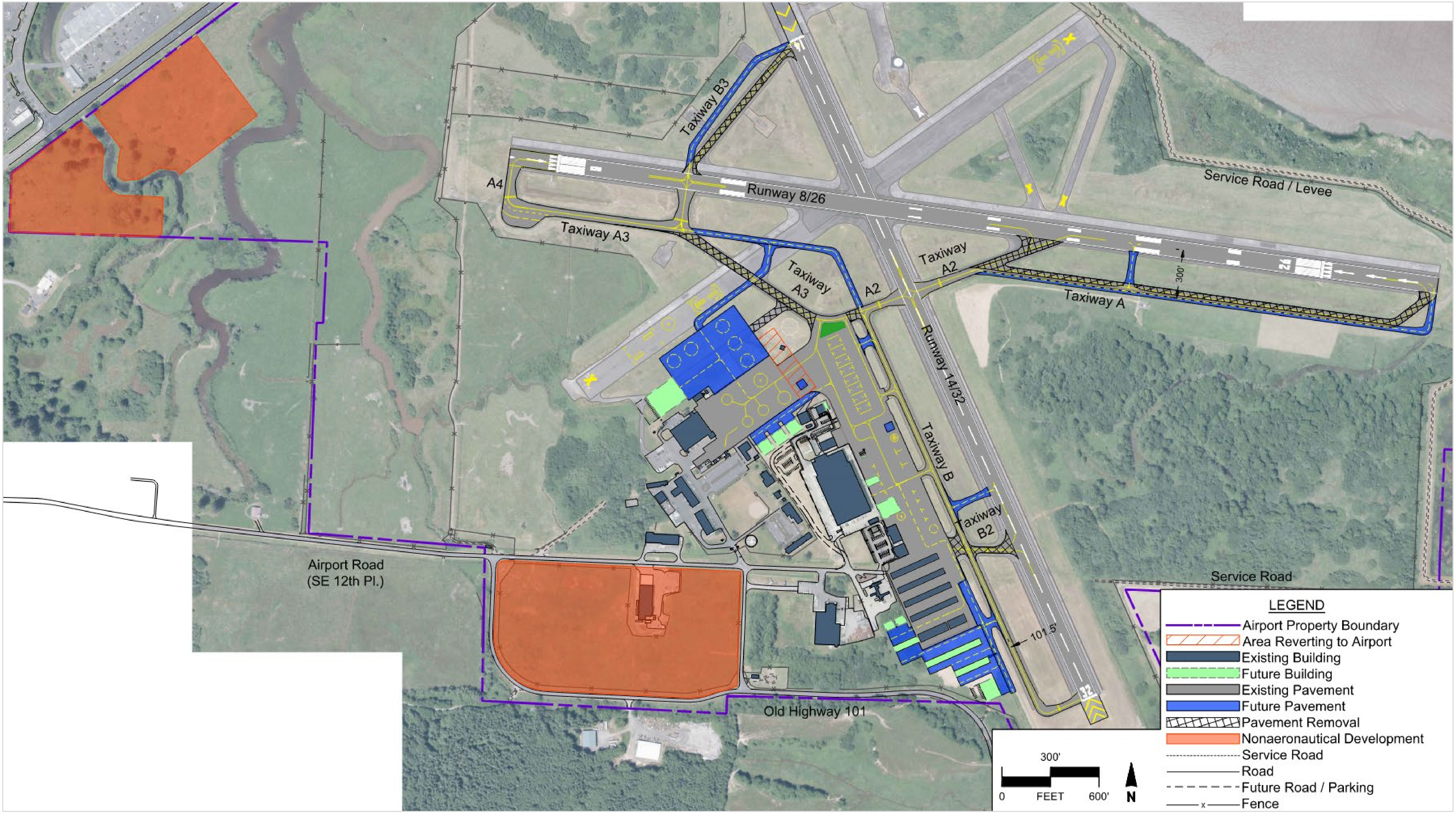
SUMMARY

The improvement alternatives assessment evaluates ways that AST can meet the 20-year facility requirements through capital projects. The preferred improvement alternatives will be used for land use analysis, the capital improvement plan, and the ALP. A summary of the preferred improvement alternatives is summarized below.

- Taxiway Alternative One
- Helicopter Operations Area Alternative Three
- Hangar Development Alternative One
- FBO Alternative One
- Fuel Farm Alternative Two
- Electric Aircraft Alterative One
- Non-Aeronautical Alternative One
- Parking & Circulation Alternative One

The preferred development concept, shown in Figure 5-20: , depicts the projects that will be carried forward onto the capital improvement plan, the implementation plan, and the airport layout plan. Challenges associated with implementation, such as environmental permitting and funding constraints, will be addressed in these sections.

Figure 5-20: Preferred Development Concept



Source: Mead & Hunt, Inc.

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CHAPTER 6

FINANCIAL FEASIBILITY

CHAPTER 6 -
FINANCIAL FEASIBILTY

INTRODUCTION

This chapter documents the strategy to implement, fund, and finance the recommended 20-year project improvements for the Astoria Regional Airport (AST). The Capital Improvement Plan (CIP) provides guidance for continued maintenance, upgrade, and expansion of AST facilities in a fiscally responsible manner and within realistic Airport financial capabilities. The analysis also supports AST's local budgeting process through the Port of Astoria financial process, and federal and state airport in-aid programming. This chapter is prepared per FAA Order 5100.38D, *AIP Handbook*, and FAA Order 5100.39A, *Airports Improvement Plan*, guidance, and procedural requirement. This chapter is arranged in the following sections: Capital Improvement Plan, Implementation Plan, and Summary.

Capital Improvement Plan

The CIP identifies and prioritizes financial needs for planning and development at AST. Projects included in this CIP were identified using FAA criteria. Some are immediately justified and eligible, while others may become justified as activity changes in the future. The CIP is intended to provide a framework for phasing of CIP projects while providing flexibility to move projects based on new priorities and financial considerations. Projects that receive Federal Aviation Administration (FAA) funding will need to meet FAA design standards, are justified based on FAA criteria, and undergo an environmental review pursuant to the requirements of the National Environmental Policy Act (NEPA), as amended. While FAA funding may be available, eligibility will be determined based on the project and funding is not guaranteed.

Capital Improvement Plan Approach

The CIP identifies the overall airport development objectives, individual project costs, and anticipated funding by planning period: short-term (1-5 years), intermediate term, (6-10 years), long term (11-20 years), and ultimate (20+ years). The CIP projects are based on the needs identified in **Chapter 5 - Alternatives Development and Evaluation,** the most recently approved 5-year CIP, and planning and pavement maintenance projects. The following considerations influenced project priority:

- Ability to meet user demand and desired level of service.
- Ability to enhance efficiency and meet FAA design standards.
- Ability to repair and upgrade facilities reaching the end of useful life.

Projects reflect AST preference and ability to facilitate an orderly sequence of improvements while considering economic and environmental factors. Projects are sequenced with regards to strategic vision, forecast demand triggers, and funding considerations. Short-term projects are sequenced in year-by-year format, while mid-term, long-term, and ultimate projects are identified in priority order without year distinction.

Projects identified in the AST Overall Project List **(Table 6-1**: **)** as potentially funded by the FAA are eligible projects according to the AIP Handbook and AST will pursue through the FAA AIP grant-aid program. It is anticipated that these projects will be funded mainly through AIP funds with a match from AST.

Table 6-1: AST Overall Projects

Project	Potential Funding Source[1]
Short-Term	
Runway 8/26 Maintenance (Crack Seal, Seal Coat, And Grooving) Environmental	FAA/AST
Runway 8/26 Maintenance (Crack Seal, Seal Coat, and Grooving) Design and Construction	FAA/AST
Reconstruct Apron Phase III	FAA/AST
Fuel Truck (Lease)	AST
Mid-Term	
Runway 8/26 - Obstruction Removal – Environmental	FAA/AST
Runway 8/26 - Obstruction Removal – Design and Construction	FAA/AST
FBO Expansion Phase I – Environmental	FAA/AST
FBO Expansion Phase II – Design and Construction	FAA/AST
Fuel Tank - Jet A 10,000 gallon – Environmental	FAA/AST
Fuel Tank - Jet A 10,000 gallon – Design and Construction	FAA/AST
Taxiway A and B – Phase I-Pre-Design	FAA/AST
Airfield Pavement Rehabilitation (Taxiway A and Taxiway B)	FAA/AST
Taxiway A and B - Phase II – Design and Construction	FAA/AST
Hangar Development 120 ft x100 ft	AST/Other
Hangar Development 75 ft x 60 ft	AST/Other
Hangar Development 3 total (80 feet x 80 feet each)	AST/Other
Long-Term	
Relocate Taxiway A- 30 feet to the South – Environmental	FAA/AST
Relocate Taxiway A- 30 feet to the South – Design and Construction	FAA/AST
Taxiway B2 Relocation – Environmental	FAA/AST
Taxiway B2 Relocation – Design and Construction	FAA/AST
Taxiway B3 Realignment – Environmental	FAA/AST
Taxiway B3 Realignment – Design and Construction	FAA/AST
Taxiway A2 Relocation – Environmental	FAA/AST
Taxiway A2 Relocation – Design and Construction	FAA/AST
Ultimate-Term	
Pavement Markings USCG Taxilane Centerline	Other[2]
Taxilane for North Apron – GA Hangar Access	Other
Parking Alternative – Roadway	Other
Electric Aircraft Charging Station, Setbacks and Markings	Other
North Apron Expansion – USCG Area	Other[2]
South GA Taxilanes – Phase I – Environmental	Other
South GA Taxilanes – Phase II – Design and Construction	Other
South GA Hangar Development – Phase I	Other
South GA Hangar Development – Phase II	Other

Parking Alternative – Neptune	Other

1 Distinguishes projects that are eligible for FAA funding from those that may be funded by other sources including city, state, and other government or private entities.

2 USCG intends obtain this property through an agreement for the exchange of lands or lease the property for expansion. The property currently belongs to AST.

Projects identified as *Other* are not eligible for AIP funding. However, these projects are a necessary contribution to the quality and overall development potential of the Airport. These projects could be funded through multiple sources such as the Port of Astoria, the State of Oregon, other governmental agencies, or private funding.

Table 6-1: provides AST with an overview of all projects potentially needed in the planning process period regardless of AIP eligibility.

Facilities and expansion that are not shared with the public and solely support The United States Coast Guard (USCG) operations are not eligible under the FAA AIP grant program. AST will need to coordinate with USCG to negotiate a land lease or land exchange agreement for development on the proposed land. Once the USCG has obtained the land for development, the USCG will fund the future development projects through their own funding sources.

In order to retain land for the benefit of the airport, the USCG is required to provide a plan for expansion prior to any new construction. Any expansions plans should consider the goals and objectives presented in this master plan.

PROJECT COST ESTIMATES

Cost estimates help AST and the FAA understand potential cost obligations. The cost estimates are developed for FAA-eligible projects, ultimate projects and non-AIP eligible projects.

Professional engineers and architects have developed cost estimates for each project contained in the 20-year CIP based on 2023 dollars. For projects occurring beyond 2023, the estimators adjusted costs with an annual inflation rate of three percent. Project costs have contingencies added to account for unknowns at the planning level of design. The contingency amount varies by project but is generally set between 35 to 40 percent depending on the term in which the projects are located. Costs for planning, environmental review, design, and construction management are included as appropriate. **Table 6-2**: shows each project's estimated costs.

Table 6-2: Summary of Project Cost Estimates

Project Improvements	Estimated Cost (2023 Dollars)
Short-Term	
Runway 8/26 Maintenance (Crack Seal, Seal Coat, and Grooving) – Environmental	$50,000
Runway 8/26 Maintenance (Crack Seal, Seal Coat, and Grooving) - Design and Construction	$2,040,000
Reconstruct Apron Phase III	$2,300,000

(2023-2028) Short-Term Total	**$4,390,000**
Mid-Term	
Runway 8/26 – Obstruction Removal – Environmental	$333,333
Runway 8/26 – Obstruction Removal – Design and Construction	$200,000[1]
Fuel Tank – Jet A 10,000 gallon – Environmental and Design	$300,000
Fuel Tank – Jet A 10,000 gallon – Construction	$950,000
Taxiway A and B – Pre-Design	$400,000
Taxiway A and B - Airfield Pavement Rehabilitation	$483,333[1]
Taxiway A and B — Design and Construction	$4,500,000
Hangar Development – 120 ft x 100 ft	$1,080,000
Hangar Development – 75 ft x 60 ft	$405,000
Hangar Development (x3) 80 ft x 80 ft	$1,728,000
FBO Expansion Phase I – Environmental and Design	$195,000
FBO Expansion Phase II – Construction	$650,000
(2029-2033) Mid-Term Total	**$11,224,666**
Long-Term	
Relocate Taxiway A – 30 feet to the South – Environmental	$300,000
Relocate Taxiway A – 30 feet to the South – Design and Construction	$5,950,000
Taxiway B2 Relocation – Environmental	$300,000
Taxiway B2 Relocation – Design and Construction	450,000
Taxiway B3 Realignment – Environmental	$300,000
Taxiway B3 Realignment – Design and Construction	$1,150,000
Taxiway A2 Relocation – Environmental	$300,000
Taxiway A2 Relocation – Design and Construction	$150,000
(2034-2043) Long-Term	**$8,900,000**
Ultimate-Term	
Pavement Markings USCG Taxilane Centerline	$20,000[3]
Taxilane for North Apron – GA Hangar Access	$800,000[3]
Parking Alternative – Roadway	$1,143,470
Electric Aircraft Charging Station, Setbacks and Markings	$1,800,000
North Apron Expansion – USCG area	$5,000,000[3]
South GA Taxilanes – Phase I – Environmental	$300,000
South GA Taxilanes – Phase II – Design and Construction	$4,200,000
South GA Hangar Development – Phase I	$300,000
South GA Hangar Development – Phase II	$5,300,000
Parking Alternative – Neptune	$58,752,998[2]
(2044+) Ultimate-Term	**$77,616,468**
Overall Project Costs	**$102,131,134**

1 Distinguishes projects that are eligible for FAA funding and have been approved on the FAA 2023 CIP.

2 The Parking alternative includes a mix of commercial uses and the necessary road and building infrastructure to support it. The proposed layout includes parking lots within the existing RPZ with buildings abutting it. The development would need to connect to US 101 at the existing signalized intersection of US 101 and SE Neptune Avenue. In order to traverse the existing topography and waterways, a roadway structure is necessary.

3 The Facilities and expansion that are not shared with the public and solely support The United States Coast Guard (USCG) operations are not eligible under the FAA AIP grant program. AST will need to coordinate with USCG to negotiate a land lease or land exchange agreement for development on the proposed land. Once the USCG has obtained the land for development, the USCG will fund the future development projects through their own funding sources.

PROJECT PHASING

Project phasing is a prioritization of projects that are identified with a priority ranking system based on development needs. The FAA gives highest CIP priority to projects that currently do not meet FAA standards and must be constructed in order to meet standards to maintain safety, security, and efficiency of the airport. Projects in higher priority categories are considered to have more urgency and are placed in earlier terms, while projects with lower priorities are placed in latter terms. Several projects identified in this CIP can be phased over multiple years. This approach helps distribute capital costs more evenly and allows AST to implement improvements commensurate with demand.

Future demands for airport facilities are difficult to predict accurately, especially during the latter stages of the 20-year planning period. Therefore, emphasis is placed on short-term and mid-term planning periods. In these phases, projections are more definable, and the magnitude of program accomplishments is more pronounced.

The CIP project phasing is comprised of projects identified as eligible for AIP funding. Ineligible projects will be paid for with local money or through other non-AIP sources. The components of each period of the CIP are described in the following sections:

- Short-Term Projects – (2023-2028)
- Mid-Term Projects – (2029-2033)
- Long-Term Projects – (2034-2043)
- Ultimate-Term Projects – (2044 and beyond)

Estimated project costs are shown in **Table 6-3** and illustrations for each term are shown in **Figures 6-1** through **6-4**.

Short-Term Projects

Short-term projects are projects that are anticipated to happen within a five-year period from the 2023 base year. For AIP eligible projects, FAA and AST coordinate to develop an ongoing 5-year CIP with FAA that is updated yearly. Projects include Runway 8/26 maintenance, which includes a crack seal, seal coat and grooving.

Mid-Term Projects

The mid-term CIP project Runway 8/26 obstruction removal has been approved by FAA in the 2023 CIP. This project is a safety concern and has the opportunity to move up into the short-term projects depending on available FAA funding. Additionally, adding a fuel tank to the existing fuel farm will allow AST to address fuel capacity issues which the Airport has been dealing with for the last five years. Taxiway A and B, as well as the airfield pavement projects, have also been approved on the 2023 FAA CIP. These projects are critical to maintaining the upkeep of existing airfield pavements. The hangar development and FBO projects are considered revenue generating opportunities for the airport. New development and expansion will lead to land leases for the airport and both developments will make AST more attractive to future users. Expanding the FBO would also allow for leasing space which may be desirable for rental car agencies or other interested parties.

Long-Term Projects

The long-term projects are future projects that update the geometry of multiple taxiways on the airfield. Taxiway A relocation will allow AST to lower their approach visibility minimums to lower than ¾ of a mile. The Taxiway B2 and B3 realignments will improve pilot safety by reducing difficult angles and crossings and provide direct access.

Ultimate Projects

The ultimate-term projects are identified as contingent projects that are anticipated for implementation beyond the 20-year planning period. Most of these projects include hangar development that will most likely be funded by AST or through private funding.

Table 6-3: Improvement Projects

Term	Project No.	Fiscal Year	Project Improvements	Estimated Cost 2023	Estimate Cost 3% Annual Inflation	AIP Funding	Local Funding
SHORT	**1**	**2025**	Runway 8/26 Maintenance – Environmental	$50,000	$53,000	$47,700	$5,300
	2	**2025**	Runway 8/26 Maintenance -Design and Construction	$2,040,000	$2,146,200	$1,947,780	$261,420
	3	**2026**	Reconstruct Apron Phase III	$2,300,000	$2,513,300	$2,261,970	251,330
			Short-Term Total	**$4,390,000**	**$4,730,500**	**$4,257,450**	**$473,050**
MID	**4**	**2029-2033**	Runway 8/26 Obstruction Removal Environmental	$333,333	$398,000	$358,200	$39,800
	5		Runway 8/26 – Obstruction Removal – Design and Construction	$200,000	$238,800	$214,920	$23,880
	6		Fuel Tank – Jet A 10,000 gallon – Environmental / Design	$300,000	$358,200	$322,380	$35,820
	7		Fuel Tank – Jet A 10,000 gallon – Construction	$950,000	$1,168,400	$1,051,560	$116,840
	8		Taxiway A and B – Phase I Pre-Design	$400,000	$491,900	$442,710	$49,190
	9		Airfield Pavement Rehabilitation (Taxiway A and Taxiway B)	$483,333	$612,300	$551,070	$61,230
	10		Taxiway A and B – Phase II – Design and Construction	$4,500,000	$5,700,500	$5,130,450	$570,050
	11		Hangar Development – 120 ft x 100 ft	$1,080,000	$1,409,200	$0	$1,409,200
	12		Hangar Development – 75ft x 60 ft	$405,000	$528,400	$0	$528,400
	13		Hangar Development (x3) 80 ft x 80 ft	$1,728,000	$2,322,300	$0	$2,322,300
	14		FBO Expansion Phase I – Design	$195,000	$262,100	$0	$262,100
	15		FBO Expansion Phase II – Construction	$650,000	$873,500	$0	$873,500
			Mid-Term Totals	**$11,224,666**	**$14,363,600**	**$8,071,290**	**$6,292,310**
LONG	**16**	**2034-2041**	Relocate Taxiway A – 30 feet to the South – Environmental	$300,000	$415,300	$373,770	$41,530
	17		Relocate Taxiway A – 30 feet to the South – Design and Construction	$5,950,000	$8,483,300	$7,634,970	$848,330
	18		Taxiway B Relocation – Environmental	$300,000	$440,600	$396,540	$44,060
	19		Taxiway B Relocation – Design and Construction	$450,000	$680,700	$612,630	$68,070
	20		Taxiway B3 Realignment – Environmental	$300,000	$467,400	$420,660	$46,740
	21		Taxiway B3 Realignment – Design	$1,150,000	$1,791,700	$1,612,530	$179,170
	22		Taxiway A2 Relocation – Environmental	$300,000	$495,900	$446,310	$49,590
	23		Taxiway A2 Relocation – Design and Construction	$150,000	$255,400	$229,860	$25,540
			Long-Term Totals	**$8,900,000**	**$13,030,300**	**$11,727,270**	**$1,303,030**
ULT	**24**	**2041+**	Pavement Markings USCG Taxilane Centerline	$20,000[1]	$37,200[1]	$0	$0
	25		Taxilane for North Apron – GA Hangar Access	$800,000	$1,488,200[1]	$1,339,380	$148,820
	26		Parking Alternative – Roadway	$1,143,470	$2,191,000	$0	$2,191,000
	27		Electric Aircraft Charging Station, Setbacks and Markings	$1,800,000	$3,449,000	$0	$3,449,000
	28		North Apron Expansion – USCG area	$5,000,000[1]	$9,867,900[1]	$0	$0
	29		South GA Taxilanes – Phase I – Environmental	$300,000	$592,100	$532,890	$59,210
	30		South GA Taxilanes – Phase II – Design and Construction	$4,200,000	$8,537,700	$7,683,930	$853,770
	31		South GA Hangar Development – Phase I	$300,000	$609,800	$0	$609,800
	32		South GA Hangar Development – Phase II	$5,300,000	$11,097,000	$0	$11,097,000
	33		Parking Alternative – Neptune	$58,752,998	$123,015,700	$0	$123,015,700
			Ultimate Term Totals	**$77,616,468**	**$160,885,600**	**$9,556,200**	**$141,424,300**

Note: AIP funding makes up FAA match, AST Non- Primary Entitlements (NPE), and FAA Discretionary Funds. Discretionary funds are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants.

[1] Facilities and expansion that are not shared with the public and solely support The United States Coast Guard (USCG) operations are not eligible under the FAA AIP grant program. AST will need to coordinate with USCG to negotiate a land lease or land exchange agreement for development on the proposed land. Once the USCG has obtained the land for development, the USCG will fund the future development projects through their own funding sources.

Figure 6-1: Short-Term (0-5 years) Improvement Projects

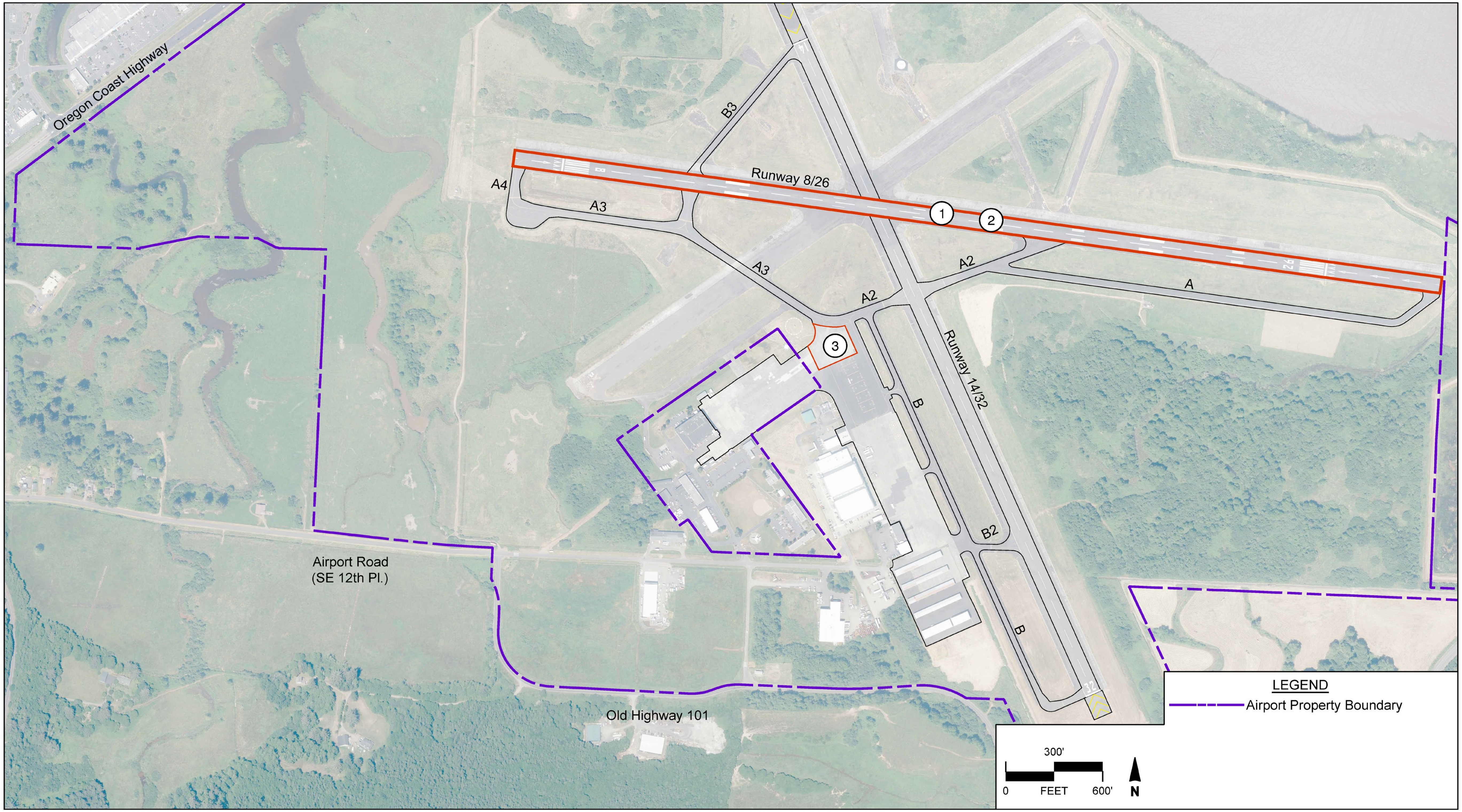


Figure 6-2: Mid-Term (6-10 years) Improvement Projects

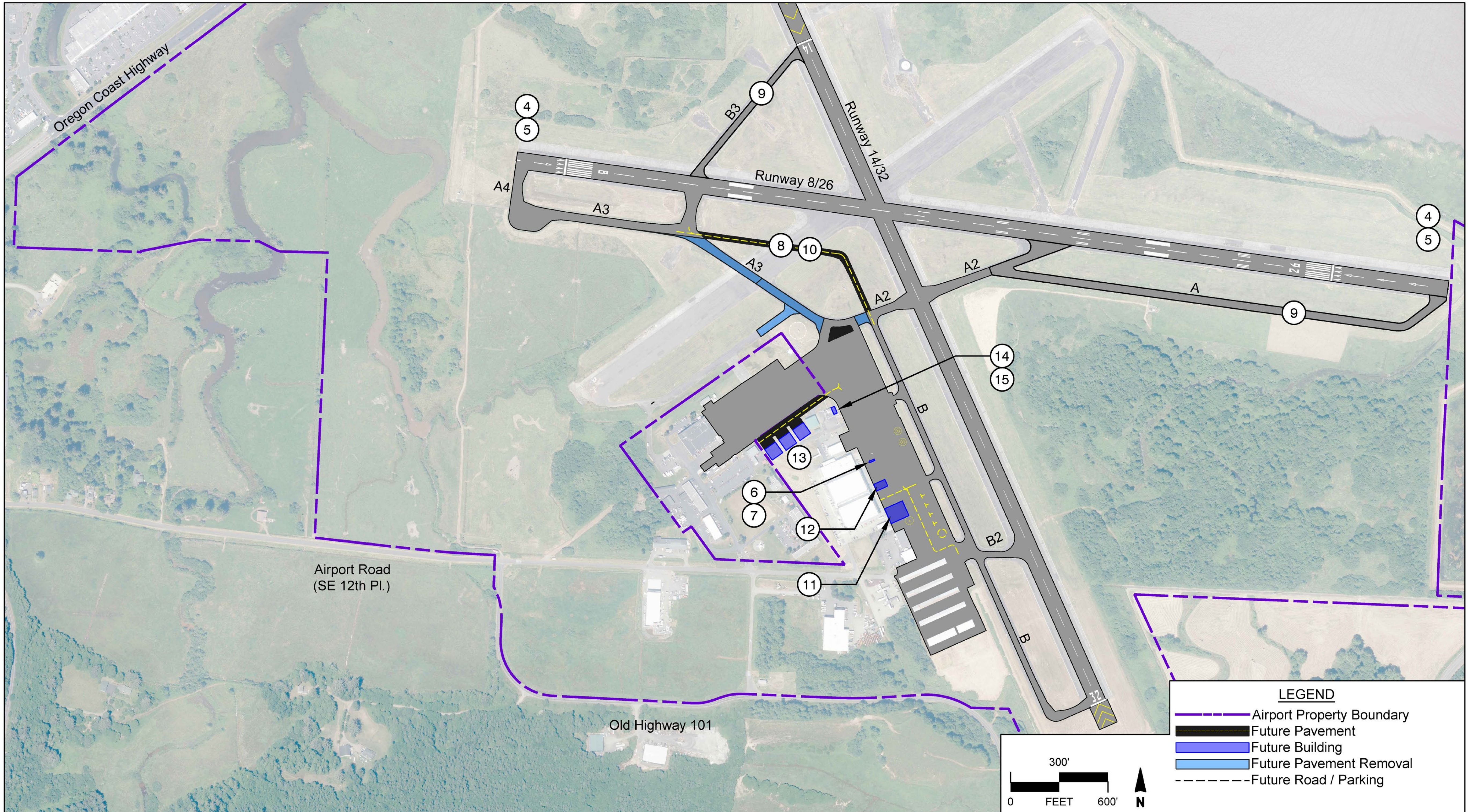


Figure 6-3: **Long Term (11-20 years) Improvement Projects**

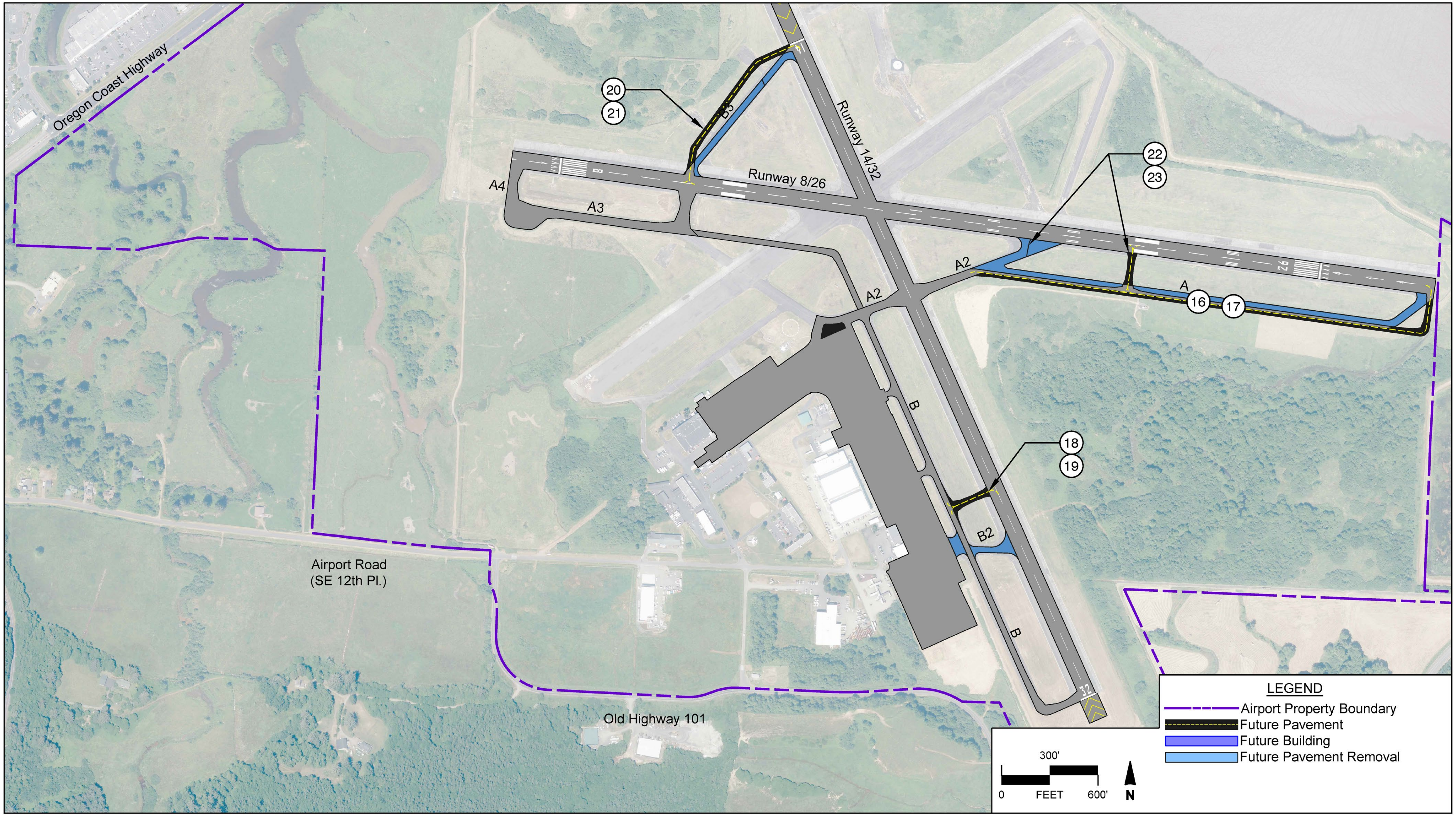
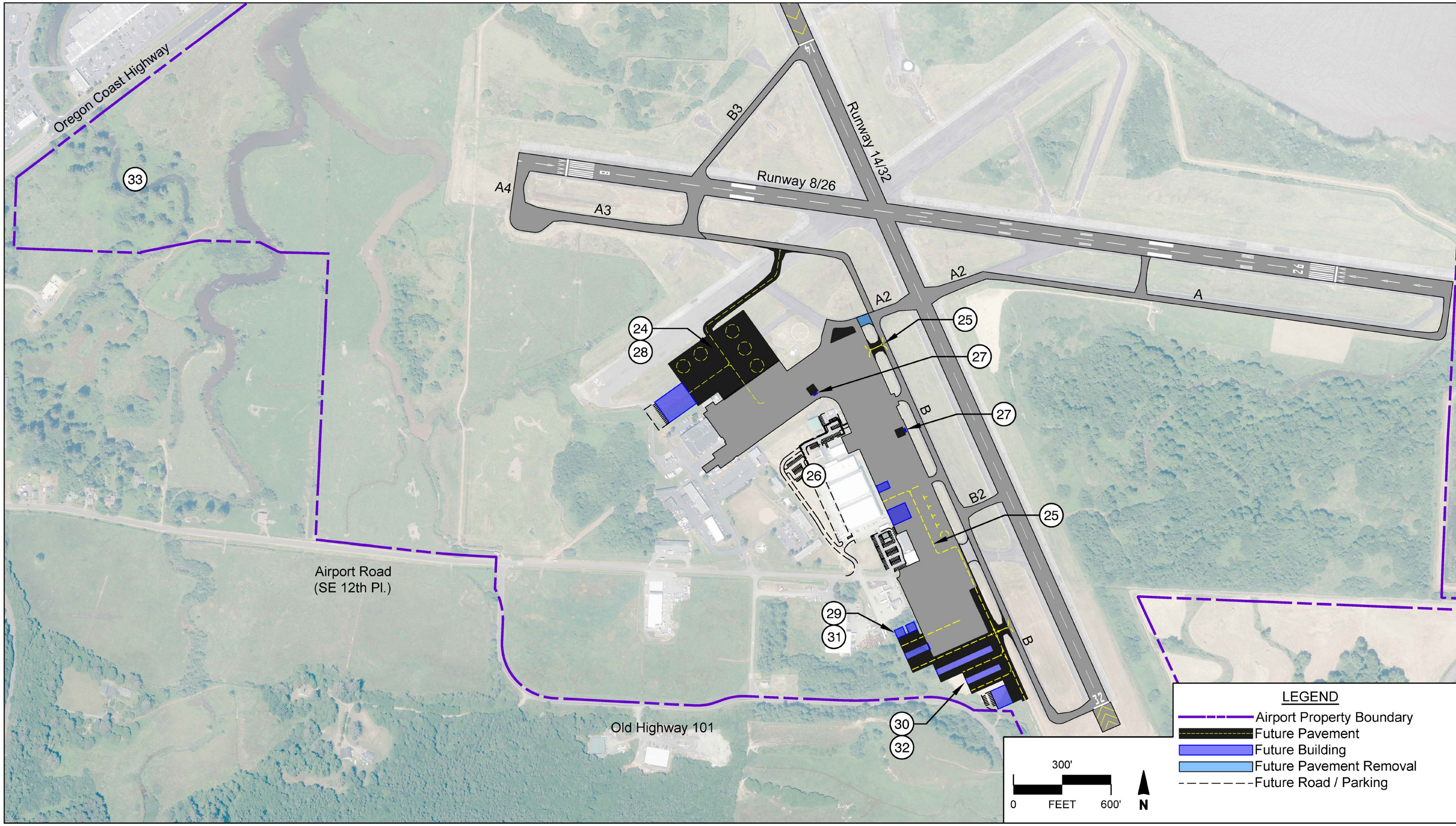


Figure 6-4: 20+ Years Improvement Projects



CIP Summary

The CIP aids AST with budgeting and programming processes. The short-term typically constitutes the FAA and the Oregon Department of Aviation (ODA) Airport Capital Improvement Program (ACIP) to assist AST in providing justification and funding strategies for projects under the FAA and ODA grant-in-aid-programs. This will assist AST in implementing CIP projects as necessary to meet federal and state grant assurances.

Table 6-4: Capital Improvement Plan Project Summary

Project Term	Cost 2023 Dollars	Project Cost Totals (includes 3% inflation)	AIP Funding	Local Funding
Short-Term	$4,390,000	$4,730,500	$4,257,450	$473,050
Mid-Term	$11,224,666	$14,363,600	$8,071,290	$6,292,310
Long-Term	$8,900,000	$13,030,300	$11,727,270	$1,303,030
Ultimate-Term	$77,616,468	$160,885,600	$9,556,200	$141,275,480
Totals	**$102,131,134**	**$193,010,000**	**$33,612,210**	**$149,492,690**

FUNDING SOURCES

Funding sources for future development projects depend on a variety of factors that include AIP eligibility, the ultimate type and use of facilities to be developed, debt capacity of AST, and the priorities for scheduling project completion. For planning purposes, assumptions have been made related to the funding sources of each project. The following funding sources provide background and context when reviewing the financial feasibility of proposed improvements – Federal, State, Local, and Other.

Federal

The FAA provides funding for airport improvements through the Aviation Trust Fund (ATF), which is financed by aviation system user fees and taxes (e.g., airline passenger tax, aircraft parts taxes, fuel taxes, and aircraft registration fees). The AIP provides the mechanism to reinvest the ATF at FAA-eligible airports. FAA Order 5100.38D, *Airport Improvement Program Handbook* (AIP Handbook), describes AIP funding eligibility. The formula provides for an FAA contribution of 90 percent. The AIP grants require AST to contribute a local match of 10 percent.

The FAA's most recent version (2022) of the National Plan of Integrated Airport Systems (NPIAS) for the years (2023-2027) classifies AST as a public use (PU) which indicates the ownership, general aviation (GA) which refers to the service level and the type of service the airport provides to the community. Facilities serving mostly GA operations such as AST are categorized on activity measures. The NPIAS identifies airports eligible for AIP funding and estimates the amount of AIP funds needed for projects that will update airports to current FAA standards and increase capacity as needed. FAA AIP funds are classified as non-primary entitlement and discretionary. The Federal NPIAS development plan anticipates $7.3 M in development needs from 2023-2027.

Entitlements

General aviation airports are eligible for annual non-primary entitlement funding under the AIP. The total amount of non-primary entitlement funding is governed by congressional appropriations to the AIP. The AIP Handbook defines how the FAA calculates non-primary entitlement for general aviation airports to receive lesser of the following:

- 150,000 or
- One-fifth of the estimated five-year costs for airport development for each of the airports as listed in the most recent NPIAS.

The FAA makes the project decisions on the use of the funds in consultation with the state of Oregon. AST is assumed to receive $150,000 in non-primary entitlements when evaluating project organization and coordination during this planning process. The FAA distributes AIP entitlement funding annually, and AST can save the entitlement funds for up to three years.

Discretionary

Projects eligible for AIP funding may receive discretionary funding if the total cost exceeds costs covered by entitlement funds. Discretionary funds are not guaranteed, and their approval is established through a project priority ranking methodology used by the FAA to award grants, at their prerogative, based upon a project's importance to the National Airport System (NAS). Discretionary funds are generally provided for projects that have placed high in priority towards enhancing safety, security, and capacity and would be difficult to fund otherwise. Dollar amounts vary and can be significant compared to non-primary entitlement funds. The amount dedicated to any one airport is determined by its demonstrated and documented need compared to the needs at other airports within the NPIAS.

State

The Oregon Department of Aviation (ODA) administers all state aviation grant programs. The Statewide Capital Improvement Plan (SCIP) is a partnership with FAA and AST to assist with the following funding options:

- Maintaining the five-year CIP,
- Capturing yearly and projected needs,
- Coordinating Joint Planning Conferences (JPC), and
- Managing the software to track FAA funding for statewide aviation needs.

The Aviation System Action Program (ASAP) is used to invest in public airports statewide through the use of fuel tax which provides funding for grants. Funding programs include the Critical Oregon Airport Relief (COAR). AST is eligible to apply for the COAR grant, and the maximum amount that can be requested is $150,000. The grants are determined by category that is associated with the Oregon Aviation Plan, similar to the FAA's categorization with the NPIAS. The State-Owned Airports Reserve (SOAR) receives 25 percent of the ASAP fuel tax funds to support Oregon airports with grants to improve safety, and support infrastructure projects.

Local

Local funds include, but are not limited to, airport revenues from leases, fuel surcharges, landing fees, property taxes, and grant funding. Local funds can also include bonds issued by the Port of Astoria. AST uses local funds to provide the ten percent match on AIP-eligible projects and to pay for projects that are not eligible for or do not compete well for AIP funding.

Other

Certain on-airport development projects may be funded through other capital contributions from the airport's governing body or other federal, state, and private third-party entities.

Third Party

This is frequently the case for general aviation or private use development where a third party will assume the capital development costs of a hangar, and in exchange, the Airport receives rent through a ground lease.

FINANCIAL IMPLEMENTATION PLAN

The Implementation Plan is intended to provide AST with a range of considerations that should be considered as the preferred development projects move from concept to construction. The Implementation Guide will focus on the next 10 years of capital projects beyond the 2023 CIP.

Table 6-5: Considerations

Category	Runway 8/26 Maintenance	Runway 8/26 Obstruction Removal	Fuel Tank – Jet A 10,000 Gallon Tank	Taxiway A and B – Design and Construction	Airfield Pavement Rehabilitation	Hangar Development	FBO Expansion
Administrative	AST is required to provide a CIP project list including cost estimates for the five-year CIP to the FAA. FAA must approve funding requests for AIP projects before implementation. The project must be included in the FAA approved ALP.	This project is included on the five-year CIP but due to budget constraints, has been shifted to the mid-term timing and budget plan. FAA must approve funding requests for AIP projects before implementation. The project must be included in the FAA approved ALP.	This project is included on the five-year CIP. Capacity issues for fuel at AST may require this project to become a priority project. AST is required to provide a CIP project list including cost estimates for the five- year CIP to the FAA. FAA must approve funding for AIP projects before implementation. The project must be included in the FAA approved ALP.	This project is included on the five-year CIP but due to budget constraints, has been shifted to the mid-term timing and budget plan. FAA must approve funding requests for AIP projects before implementation. The project must be included in the FAA approved ALP.	This project is included on the five-year CIP but due to budget constraints, has been shifted to the mid-term timing and budget plan. FAA must approve funding requests for AIP projects before implementation. The project must be included in the FAA approved ALP.	This project is included on the ten-year CIP. It is unlikely FAA will fund this project; however, it must be included in the FAA approved ALP.	This project is included on the ten-year CIP. It is unlikely FAA will fund this project; however, it must be included in the FAA approved ALP.
Planning and Zoning	The project is programmed as a maintenance project scheduled for FY2025. The project conforms to the existing zoning.	The project is programmed as an obstruction project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.	The project is programmed as a capacity project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.	The project is programmed as a maintenance issue project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.	The project is programmed as a pavement maintenance project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.	The project is programmed as a hangar project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.	The project is programmed as a capacity project scheduled for mid-term (2029-2033). The project conforms to the existing zoning.
Environmental	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.	Environmental is anticipated to be a Categorical Exclusion (CATEX). No further action is needed with environmental requirements.
Design	Design includes crack seal, seal coat and grooving.	Design includes obstruction removal on Runway End 26.	10,000 Gallon Jet A tank installation design and groundwork.	Extend A portion of Taxiway A parallel to Runway 8/26 and a portion of Taxiway B parallel to Runway 14/32.	Rehabilitation of various pavements (Taxiway A and Taxiway B)	Design of five hangars on AST property: (120 ft x 100 ft), (75ft x 60 ft), ((x3) 80 ft x 80 ft)	Design of FBO expansion by 1,000 square feet.
Funding	Funding is anticipated to be provided through the FAA AIP grant program and local match. The project cost is $2.2 million. AST can apply for the COAR grant to help fund this project. The remaining amount will be paid by AST.	Funding is anticipated to be provided through the FAA AIP grant program and local match. The project cost is $630,000. AST can apply for the COAR grant to help fund this project. The remaining amount will be paid by AST.	Funding is anticipated to be provided through the FAA AIP grant program and local match. The project cost is $1.5 million. AST can apply for the COAR grant to help fund this project. The remaining amount will be paid by AST.	Funding is anticipated to be provided through the FAA AIP grant program and local match. The project cost is $6.1 million dollars. AST can apply for the COAR grant to help fund this project. The remaining amount will be paid by AST.	Funding is anticipated to be provided through the BIL fund project and local match. The project cost is $600,000. AST can apply for the COAR grant to help fund this project. The remaining amount will be paid by AST.	Funding is anticipated to be provided through the AST and / or third-party funding.	Funding is anticipated to be provided through the AST and ODA. As operations increase, it is possible that AST could receive grant funding for ADA compliance.

Category	Runway 8/26 Maintenance	Runway 8/26 Obstruction Removal	Fuel Tank – Jet A 10,000 Gallon Tank	Taxiway A and B – Design and Construction	Airfield Pavement Rehabilitation	Hangar Development	FBO Expansion
Construction	The construction is anticipated to begin and end in FY2025. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.	The construction is anticipated to begin and end in midterm FY2029. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.	The construction is anticipated to begin and end in midterm FY2030. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant	The construction is anticipated to begin and end in midterm FY2031. Main work elements of the project are anticipated to include construction of taxiway pavement, pavement removal, drainage improvements, electrical improvements, and pavement marking. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.	The construction is anticipated to begin and end in midterm FY2031. Construction will include crack sealing, fog sealing, isolated full-depth pavement dugout repair and pavement markings. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.	The construction is anticipated to begin and end in midterm FY2032. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.	The construction is anticipated to begin and end in midterm FY2033. During construction AST will provide NOTAMS during construction periods. The design and construction efforts are provided by AST's engineering consultant.
Operation and Maintenance	The pavement is evaluated periodically by the airport every three years through the Pavement Management Program (PMP). The pavement is maintained and updated when it reaches a Pavement Condition Index (PCI) of 70 or below or has another circumstance in which the pavement needs to be addressed sooner.	The obstructions are evaluated periodically by the airport to ensure safety for pilots. Obstruction evaluation refers to aeronautical studies conducted by the Federal Aviation Administration (FAA) for any object that may affect the national airspace, air navigation facilities, or airport capacity. Aeronautical studies are coordinated by FAA's Obstruction Evaluation Group (OEG).	To address capacity issues at AST, the airport will lease a fuel truck in the near-term.	Completing a full parallel taxiway system for both Runways will be a multi-phased effort over time. Improving the taxiway configuration will increase safety and efficiency at the Airport as operational demands increase over the long term.	Minor rehabilitation of various airfield pavements to increase longevity of existing pavement sections.	Continuous hangar maintenance and upkeep.	Routine maintenance similar to what is provided for existing terminal.

Non-Aeronautical Facilities

Auto Parking and Circulation

This section presents an overview of the anticipated impact of future parking demand growth and construction of the parking and circulation preferred alternative on the financial performance of the AST parking system. Given the existing parking conditions and the anticipated growth, improvements to the existing parking lot at the FBO should be implemented in the short term to make more efficient use of the space. AST will require additional parking capacity by the year 2031 as the number of based aircraft increases. The preferred alternative provides additional capacity (43 spaces) in the restriped FBO parking lot and a new surface parking lot built on AST property southwest of the current FBO. The cost estimates for these auto parking and circulation improvements are summarized in the table below.

Table 6-6: Auto Parking and Circulation Improvement Project Cost Estimates

Heading	Total Estimated Project Cost (2023 Dollars)
Short-Term	
FBO Existing Parking Lot Improvements	$154,000
Long-Term	
New Auxiliary Surface Parking Lot	$338,000
FBO Access Road	$653,000

Table Source: David Evans and Associates, Inc.

Historical Data

Historical data provided by AST has been used as a baseline to develop assumptions for future parking and circulation revenues, construction cost and maintenance at AST. The assumptions are broken down for the preferred parking alternative and new FBO access road.

Data provided by AST indicated that the only parking revenue is from agreements for long term parking. AST does not charge visitors or users for parking and therefore there is no historical revenue from visitors parking at the FBO.

FBO Surface Parking Lots

Revenue

Unless AST implements a pay-to-park system, the revenue from parking will only come from fees imposed on users to lease parking spaces and overnight parking.

Construction Cost and Financing

The cost of constructing the proposed preferred parking lot alternative is approximately $492,000 in 2023 dollars, which breaks down to approximately $4,665 per space in the existing parking lot and approximately $9,945 per space for the new surface parking lot. Costs include estimated contractor soft costs and a 25 percent contingency.

Capital Repair and Maintenance

The pavement used in surface parking requires periodic ongoing maintenance in order to keep the facilities in good working condition and to maximize their useful lives. Funds should be set aside each year for periodic repair and maintenance projects.

Based on industry best practices for parking facilities in similar climates to AST, it has been assumed that $100 per surface lot space, per year should be set aside for future repair and replacement of these facilities. These figures are presented in 2023 dollars.

New FBO Access Road

Revenue

The proposed access road is not expected to generate revenue.

Construction Cost and Financing

The cost of constructing the proposed access road is approximately $653,000 in 2023 dollars. The cost includes estimated contractor soft costs and a 25 percent contingency.

Capital Repair and Maintenance

Similar to the parking lots, the new access road will require periodic maintenance to maintain a state of good repair. The access road is projected as a long-term improvement, and thus the future repair and maintenance cost is likely to be incurred beyond this study's planning horizon. Once constructed, the AST should plan to account for ongoing pavement maintenance and repair in their capital expense budget.

Non-Aeronautical Facilities, Sites Evaluated

This section discusses market opportunities on the currently available or prospective properties, reflecting site conditions, market dynamics for different real estate use types, and the financial characteristics of prospective development programs. It also includes a plan for implementation.

The properties evaluated can be split into four significant property holdings:

- Site 1: Property east of Highway 101 and south of Holbrook Slough.
- Site 2: Property North of SE 12th Place and west of the airport fence line
- Site 3: Airport Industrial Park, South of SE 12th Place and the airport
- Site 4: Area East of Highway 101 and north of Holbrook Slough.

Figure 6-5: Warrenton Astoria Regional Airport, Non-Aeronautical Sites Map

SOURCE: Clatsop County GIS

Non-Aeronautical Facilities, Preferred Alternatives

Johnson Economics has prepared a financial evaluation of potential redevelopment options for the sites. These are built upon assumptions of market land values for various uses developed in Chapter 4.

Development Prototypes

When evaluating the viability and likely form of development, we assess the development program representing the highest and best use of each site. The sites vary significantly in terms of access, visibility, scale, entitlements, and barriers to development.

A total of five prototypical developments were evaluated that were viewed as prospective options for the non-aeronautical sites. The following is a summary of the prototypes evaluated:

Table 6-7: Prototypes Evaluated

Prototype	Comments
Anchor Retail Site	This is a large format retailer with a regional draw, such as Fred Meyer or Costco, both of which are already in the local market. These users will require visibility, access, and typically large site areas.
Strip Mall / Outparcel Sites	Single story retail, usually with multiple tenants. Outparcel sites are smaller retailers that may locate in a detached location by themselves or proximate to an anchor retail site.
Prime Outparcel Fast Food	This use will be close to Highway 101 with visibility, with a drive through configuration likely.
Secondary Exposure	This type of use is retail and / or service commercial space with a lower level of exposure and less marketable.
Light Industrial	Often purpose-built structures for a specific manufacturing process, or can be multi-tenant flex space (single story concrete tilt-up structures, often with at-grade dock doors)

The commercial uses tend to support higher residual land values, while the industrial uses generally support lower land values. The commercial uses have a higher level of locational requirements, most notably a high level of access and visibility. As a result, commercial properties with appropriate characteristics are expected to command higher pricing relative to industrial properties.

While the market analysis provides guidance relative to market values based on fee simple ownership of the property, we assume that a land lease is going to be the preferred disposition option for the airport-owned properties. Lease rates were assumed to range from 5.0% to 9.5% of the assumed market value of the properties. The appropriate rate of return is highly volatile in the current environment as interest rates have been moving significantly.

Site Specific Conclusions

The following is an overview of the four sites evaluated, including a likely development program and associated prospective revenue impacts. The financial returns on the sites will also be a function of any additional infrastructure investments and site preparation necessary to facilitate development.

Site One

Site One is a roughly 11.6-acre property east of Highway 101. The site has excellent visibility, and access could be strong if a signalized intersection was permitted at SE Neptune Avenue. Without this improvement access would largely be limited and preclude significant retail development. The property has a jurisdictional wetland in the northern portion, which may increase the difficulty and / or cost of developing the intersection.

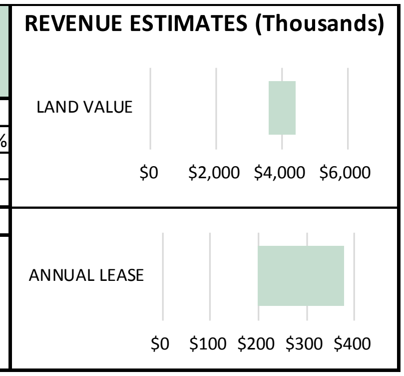
The site is zoned C-1, and the developable portion is largely flat and well configured. The site is impacted by the Runway Protection Zone (RPZ), which will limit prospective uses and building dimensions on the site.

The site is viewed as the most viable location for anchor retail and prime outparcels, although the net developable area is expected to represent only 70% of the total site once the wetland area and interchange right of way is dedicated. The land values in the current market would range from $10 to $17 per square foot assuming acquisition of the property. These values assume that public infrastructure and roadways are in place to support the development program, which would be the case in this instance. If land-leased, the property is likely to appeal to a more limited market, with the value likely discounted in the market vis-à-vis properties available for sale.

Figure 6-6: Site One

Table 6-8: Summary of Indicated Values and Potential Revenues – Site One

	Anchor Retail Site	Strip Mall / Outparcel Sites	Prime Outparcel Fast Food	Secondary Exposure	Light Industrial
Site Size (SF)	503,554	503,554	503,554	503,554	503,554
% of Site	55%	10%	5%	0%	0%
Building Square Feet	69,239	12,589	6,294	-	-
Residual Property Value	$2,860,940	$693,393	$433,560	$0	$0
RPV/SF	**$10.33**	**$13.77**	**$17.22**	**$5.74**	**$4.59**
Annual Land Lease @ Alt. Rates of Return					
5.0%	$143,047	$34,670	$21,678	$0	$0
6.5%	$185,961	$45,071	$28,181	$0	$0
8.0%	$228,875	$55,471	$34,685	$0	$0
9.5%	$271,789	$65,872	$41,188	$0	$0



SOURCE: Johnson Economics

The expected annual lease rate for the property would range from $200,000 to $370,000 if fully utilized. The cost to bring the land to market will be significant due to the need for wetland delineation, potential mitigation, and contributions towards an interchange with Highway 101. Contributions are likely to include property dedication.

Table 6-9: Site One, Implementation Matrix

Category	Considerations
Administrative	The purpose for this project would be to generate a sustainable revenue stream from this property
Planning and Zoning	The anticipated use would be consistent with existing entitlements
Environmental	Delineation of wetlands
Design	Commercial development of the site would likely require development of a signalized interchange at SE Neptune, an ODOT facility.
Funding	Disposition of this site through a land lease will likely require wetland delineation, coordination with ODOT, ROW grants, and funding for signalization. If leased, the property is expected to yield between $200,000 to $370,000 annually in 2023 dollars.
Operation and Maintenance	Ongoing costs will be limited to maintenance prior to disposition, with costs after disposition related to managing the lease.
Other	The site could be released to the market immediately. The marketing time would be highly uncertain. The Warrenton area has a significant inventory of available land, and a land lease option will likely meet some market resistance.

Site Two

Site Two is a large parcel west of the airport fence. The site is significantly impacted by Vera Creek, and the only access point is from SE 12th Place to the south. The preponderance of wetlands and open waterways on the site likely limits development potential to the southern portion of the site. Development on this site will still necessitate some wetland mitigation, the cost of which may preclude viable development of the property.

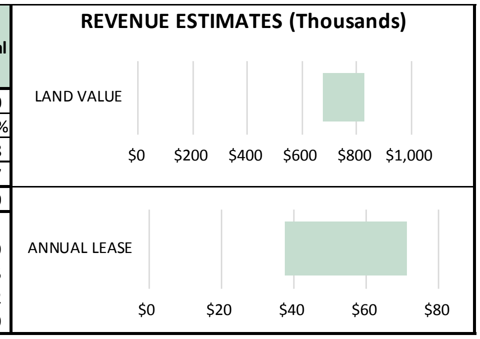
The site does not enjoy much visibility, and access is limited and indirect. This site is viewed as only marginally developable, and the nearby business park provides much more marketable parcels. The expected use of this site if developed would be light industrial, with only 3 to 5 acres assumed to be developable. The value of the remainder may be in some type of mitigation bank, which could assist in the development of remaining parcels in the area.

Figure 6-7: **Site Two**

Assuming the site was developed for approximately 40,000 square feet of light industrial space, the anticipated revenue generation would be from $37,000 to $71,000 per year in current dollars. Our expectation is that this site would not see any development interest until after the Airport Industrial Park was fully developed. The development potential at this site, as well as Site 4, could be significantly impacted by potential Vera Slough tide gate changes. The Port is currently studying feasible tide gate designs which may reduce water levels at the airport and free up additional property.

Table 6-10: Summary of Indicated Values and Potential Revenues – Site Two

	Anchor Retail Site	Strip Mall / Outparcel Sites	Prime Outparcel Fast Food	Secondary Exposure	Light Industrial
Site Size (SF)	653,400	653,400	653,400	653,400	653,400
% of Site	0%	0%	0%	0%	25%
Building Square Feet	-	-	-	-	40,838
Residual Property Value	$0	$0	$0	$0	$749,777
RPV/SF	**$10.33**	**$13.77**	**$17.22**	**$5.74**	**$4.59**
Annual Land Lease @ Alt. Rates of Return					
5.0%	$0	$0	$0	$0	$37,489
6.5%	$0	$0	$0	$0	$48,735
8.0%	$0	$0	$0	$0	$59,982
9.5%	$0	$0	$0	$0	$71,229



SOURCE: Johnson Economics

Site Two is an irregularly shaped parcel approximately 15.0-acres in size. The site is zoned as I-L (light industrial), which allows for industrial and office development.

Table 6-11: Site Two, Implementation Matrix

Category	Considerations
Administrative	The purpose for this project would be to generate a sustainable revenue stream from this property
Planning and Zoning	The anticipated use would be consistent with existing entitlements
Environmental	The area is heavily impacted with environmental constraints
Design	Development of this site is not dependent upon any off-site improvements.
Funding	If leased, the property is expected to yield between $37,000 to $71,000 annually in 2023 dollars, but likely at the lower end of that range due to configuration.
Operation and Maintenance	Ongoing costs will be limited to maintenance prior to disposition, with costs after disposition related to managing the lease.
Other	The site could be released to the market immediately, but the marketing time would be expected to be considerable.

Site Three

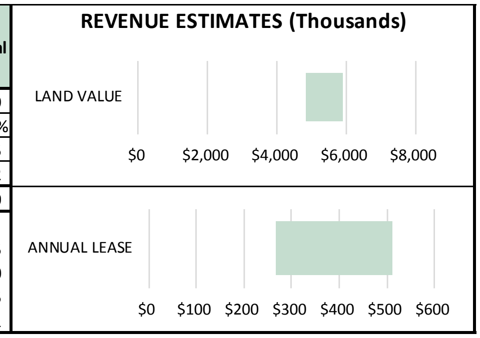
Site Three is a roughly 27-acre parcel that is part of the Warrenton-Astoria Regional Airport Industrial Park. The site is bound by SE 12th Place to the north, Airport Lane to the west and south, and SE Flight Drive to the east. Zoning is I1, General Industrial. The site has limited visibility but adequate access for most industrial uses. The area's isolation from residential areas can be viewed as supportive of many industrial uses. The site is largely flat with the ability to offer well configured parcels. The recent development of the Scoular fishmeal processing plant in 2021-2022 served as the first tenant in the park, a 14,400 square foot facility and $17.5 million investment.

The estimated market value of the site ranges from $4.5 to $6.0 million for the remainder of the site, reflecting an initial annual revenue stream from a land lease of $270,000 to $510,000 per year, depending upon the rate of return and use type. The property is likely to appeal to a more limited market if available only for lease, with the value likely discounted in the market vis-à-vis properties available for sale.

Figure 6-8: Site Three

Table 6-12: Summary of Indicated Values and Potential Revenues – Site Three

	Anchor Retail Site	Strip Mall / Outparcel Sites	Prime Outparcel Fast Food	Secondary Exposure	Light Industrial
Site Size (SF)	1,170,739	1,170,739	1,170,739	1,170,739	1,170,739
% of Site	0%	0%	0%	0%	100%
Building Square Feet	-	-	-	-	292,685
Residual Property Value	$0	$0	$0	$0	$5,373,692
RPV/SF	**$10.33**	**$13.77**	**$17.22**	**$5.74**	**$4.59**
Annual Land Lease @ Alt. Rates of Return					
5.0%	$0	$0	$0	$0	$268,685
6.5%	$0	$0	$0	$0	$349,290
8.0%	$0	$0	$0	$0	$429,895
9.5%	$0	$0	$0	$0	$510,501



SOURCE: Johnson Economics

Table 6-13: Site Three, Implementation Matrix

Category	Considerations
Administrative	The purpose for this project would be to generate a sustainable revenue stream from this property
Planning and Zoning	The anticipated use would be consistent with existing entitlements
Environmental	No environmental reviews or mitigation measures are expected
Design	Development of this site is not dependent upon any off-site improvements.
Funding	Disposition of this site through a land lease would not require any significant funding. If fully leased, the property is expected to yield between $268,000 to $510,000 annually in 2023 dollars.
Operation and Maintenance	Ongoing costs will be limited to maintenance prior to disposition, with costs after disposition related to managing the lease.
Other	The site has been actively marketed, with the Scoular plant as the initial tenant. The airport would have the ability to be aggressive in pricing to spur quicker absorption of the site and / or to attract a highly desirable tenant.

Site Four

This site is roughly 15-acres in size and is zoned C-1 commercial. The site has outstanding visibility with an extended frontage along Highway 101 but is heavily impacted by wetlands. It is bounded by Adams Slough to the east and Holbrook Slough to the south and has been divided in the past into several parcels. While enjoying exposure to Highway 101 there is no opportunity for a signalized intersection on the site and the development constraints are likely too significant to feasibly overcome.

Due to the development constraints on the site, we do not expect there to be any effective use of the property for development. The exposure may be capitalized on to accommodate signage targeting Highway 101 traffic. Alternative uses may involve utilization in mitigation.

Figure 6-9: Site Four

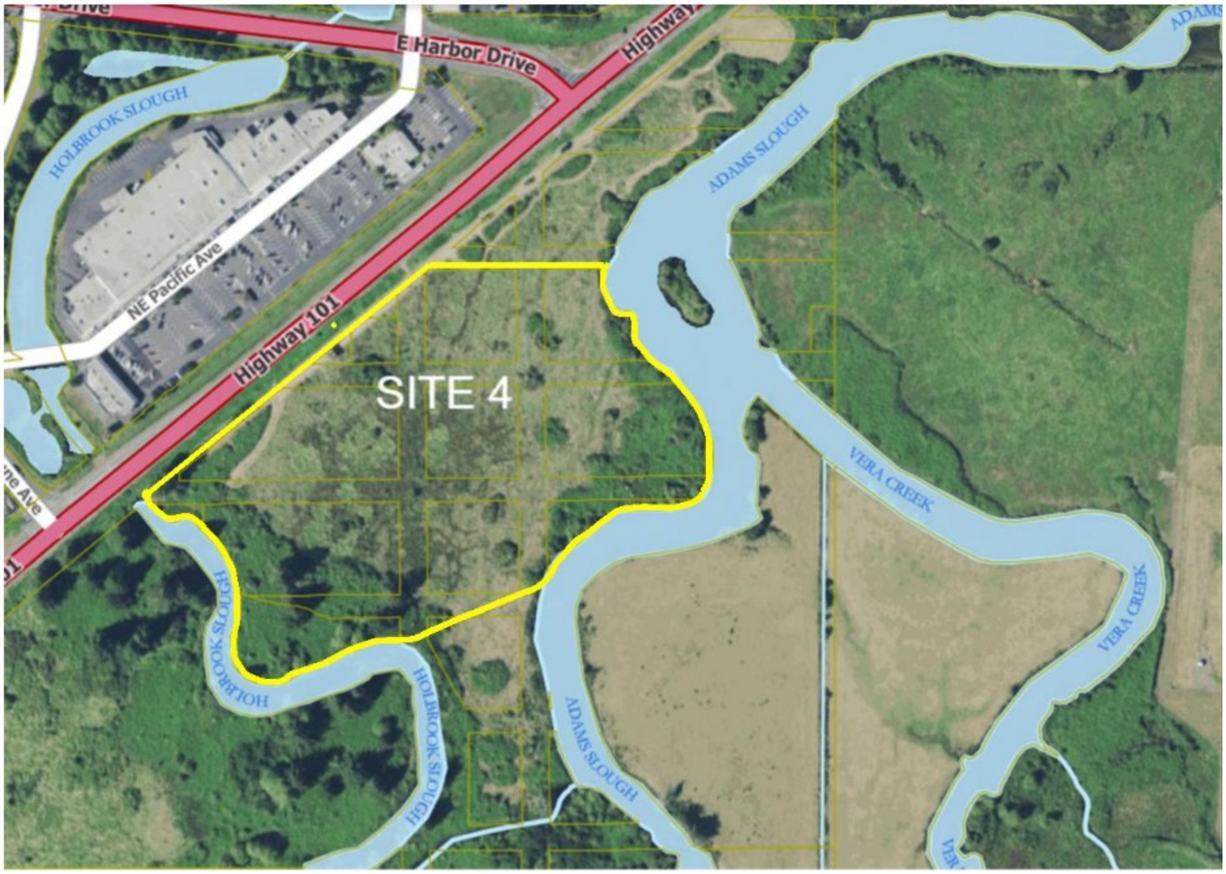


Table 6-14: Site Four, Implementation Matrix

Category	Considerations
Administrative	The purpose for this project would be to generate a sustainable revenue stream from this property
Planning and Zoning	The anticipated use would be consistent with existing entitlements
Environmental	Any development of the site would entail considerable environmental reviews.
Design	There is likely limited ability to design this site cost effectively under the current environmental constraints
Funding	There is limited if any revenue generation potential from this site, except for potential signage leases capitalizing on the site's exposure.
Operation and Maintenance	Ongoing costs will be limited to maintenance.

Summary of Site Alternatives

The four sites evaluated represent less than 70 acres of property for non-aeronautical uses, with zoning that is largely commercial and industrial. The combined estimated supportable market value for the land ranges from $9.1 to $11.9 million, assuming the sites are available for fee simple purchase.

Estimated land values were converted to annual lease rates using a return on value approach. Assumed rates of return were estimated based on a range of assumptions from 5.0% to 9.5%. The rate of return on a land lease should generally reflect the cost of debt, which has been quite low in the last decade but has risen sharply in the last year. This assessment indicates initial annual land lease revenues for the portfolio evaluated ranging from $455,000 to $791,000 if fully utilized.

Table 6-15: Summary of Indicated Values and Potential Revenues – All Non- Aeronautical Sites

			Residual Land Value		Initial Annual Lease	
	Acres	Zoning	Low	High	Low	High
Site 1	11.6	CI	$3,589,103	$5,184,261	$179,500	$151,500
Site 2	15.0	I1	$674,799	$824,754	$33,700	$78,400
Site 3	26.9	I1	$4,836,323	$5,911,061	$241,800	$561,600
Site 4	14.9	C1	$0	$0	$0	$0
Total	68.3		$9,100,225	$11,920,076	$455,000	$791,500

Source: Johnson Economics

Absorption of the properties is likely to take many years, with short term opportunities more likely in the Airport Industrial Park.

Limiting property disposition to a land lease can sharply limit the market that will have interest in these properties. It is important that any lessee has the ability to control the property for an adequate time to cover amortization and generate an adequate return on their investment if the full value of the property is to be realized. In general, land leased property tends to trade at a discount vis-à-vis traditional fee simple land as a result of a limited market and the truncated return period.

SUMMARY

The 20-year CIP project costs, including inflation, are expected to total approximately $30 million with AST contributing approximately $8 million through the planning period. The development plan for AST is aggressive; the monetary commitments are significant. However, it is a solid plan that represents AST's best opportunity for meeting its current and future obligations. The plan also represents a series of choices and alternatives for the Airport. The ultimate success of AST does not rely upon the completion of every single project contained in the development plan. To meet realistic funding expectations, it may be necessary to weigh the projects in a thoughtful and economical manner, as funding is not guaranteed. In other words, to keep from being short-sighted in its choices, the Port of Astoria may be required to selectively implement the projects. Knowing the full scope of development possibilities enables the Port to capitalize on opportunities, respond to financial realities, and select projects that are in harmony with the Airport's overall development plan and strategic vision. The project improvements are depicted on the ALP so that AST can respond to changing demand quickly and illustrate to the FAA that should the need for a particular facility arise earlier than expected, its size and location have been considered in relation to the rest of the Airport.

If aviation demand continues to indicate that improvements are required, and if the proposed improvements prove to be environmentally acceptable, the financial implications presented here are likely to be acceptable for the FAA, ODA, and the Port of Astoria. However, this is a programming analysis and not a financial commitment on the part of any entity (i.e., the FAA, ODA, or the Port). If the cost of an improvement project is not considered financially feasible at the time, it should not be pursued.

CHAPTER 7

LAND USE COMPATIBILITY

CHAPTER 7 -
LAND USE COMPATIBILITY

CHAPTER OVERVIEW

Incompatible land uses are one of the largest issues facing airports today. Development that is incompatible threatens the utility of airports and aircraft operations, and results in conflicts between airports and their communities. The Federal Aviation Administration (FAA), state aviation departments, airport sponsors, and local jurisdictions can work cooperatively to encourage compatible land uses around airports to protect these important transportation and economic assets.

This chapter describes existing and planned land use patterns around the Astoria Regional Airport (AST) and the local, state, and national guidance pertaining to airport land use compatibility. An assessment of potential compatibility impacts associated with the recommended development plan for AST is also summarized. A set of recommended actions by AST management, Clatsop County, and the City of Warrenton appear at the end of the chapter. These recommendations include modifications to local regulations to maintain airport land use compatibility.

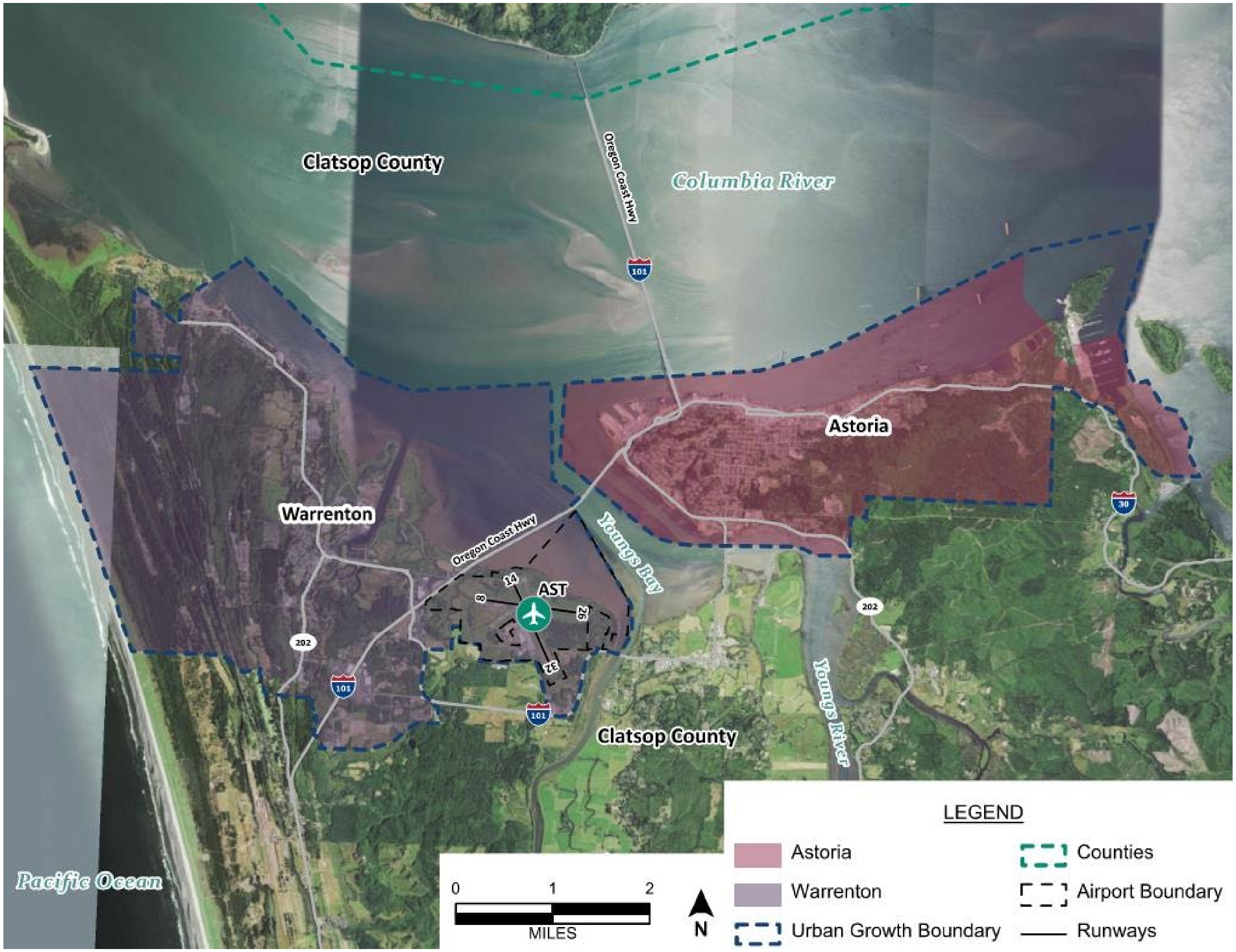
COMPATIBILITY CONTEXT

Land Use Setting

Airport Environs

While owned and operated by the Port of Astoria, AST is located in the southeastern limits of the City of Warrenton. Warrenton is a small, but rapidly growing, coastal city located in northwest Oregon, within Clatsop County. Unincorporated County lands exist north of the Airport up to the Oregon Washington border, and south of the Airport. AST is located near Highway 101 which allows for travel to Washington, approximately 6 miles north of AST or into southern Oregon. Other major nearby highways allow for travel into eastern Oregon. The City of Astoria, also located in Clatsop County, is located to the northeast, on the opposite side of Youngs Bay, and the Columbia River is located north of the Airport. See **Figure 7-1, Neighboring Jurisdictions**.

Figure 7-1: Neighboring Jurisdictions



Existing Land Uses

The City of Warrenton is the jurisdiction that has land use authority around AST. Youngs Bay is located directly north and east of AST, where it feeds into the Lewis and Clark River. To the south there are undeveloped agriculture forest lands, which include the Lewis and Clark National Historic Park. The area west of the Airport is considered general commercial land, which is developed and includes a shopping center directly across from the Oregon Coast Highway which borders the Airport boundary. Existing land use patterns for these two jurisdictions are described below and depicted in the **Figures 7-2** and **7-3**.

Clatsop County

AST is located within the northwest portion of Clatsop County. Clatsop County has land use authority for the areas located north, east, and south of AST. Land uses north of AST consists of aquatic conservation. Uses east of AST include aquatic conservation, aquatic natural, marine industrial, exclusive farm use, and rural community residential. Uses to the south consist of agriculture forest and residential agriculture. (See **Figure 7-2**)

City of Warrenton

AST is in the southeastern portion of the City of Warrenton. The area north of AST contains aquatic natural, lake and freshwater wetland, and general commercial land uses. The area east contains aquatic natural land use. The area to the west contains lake and freshwater wetland, industrial, general commercial, and intermediate density residential land uses. (See **Figure 7-3**).

Figure 7-2: **Clatsop County Zoning**

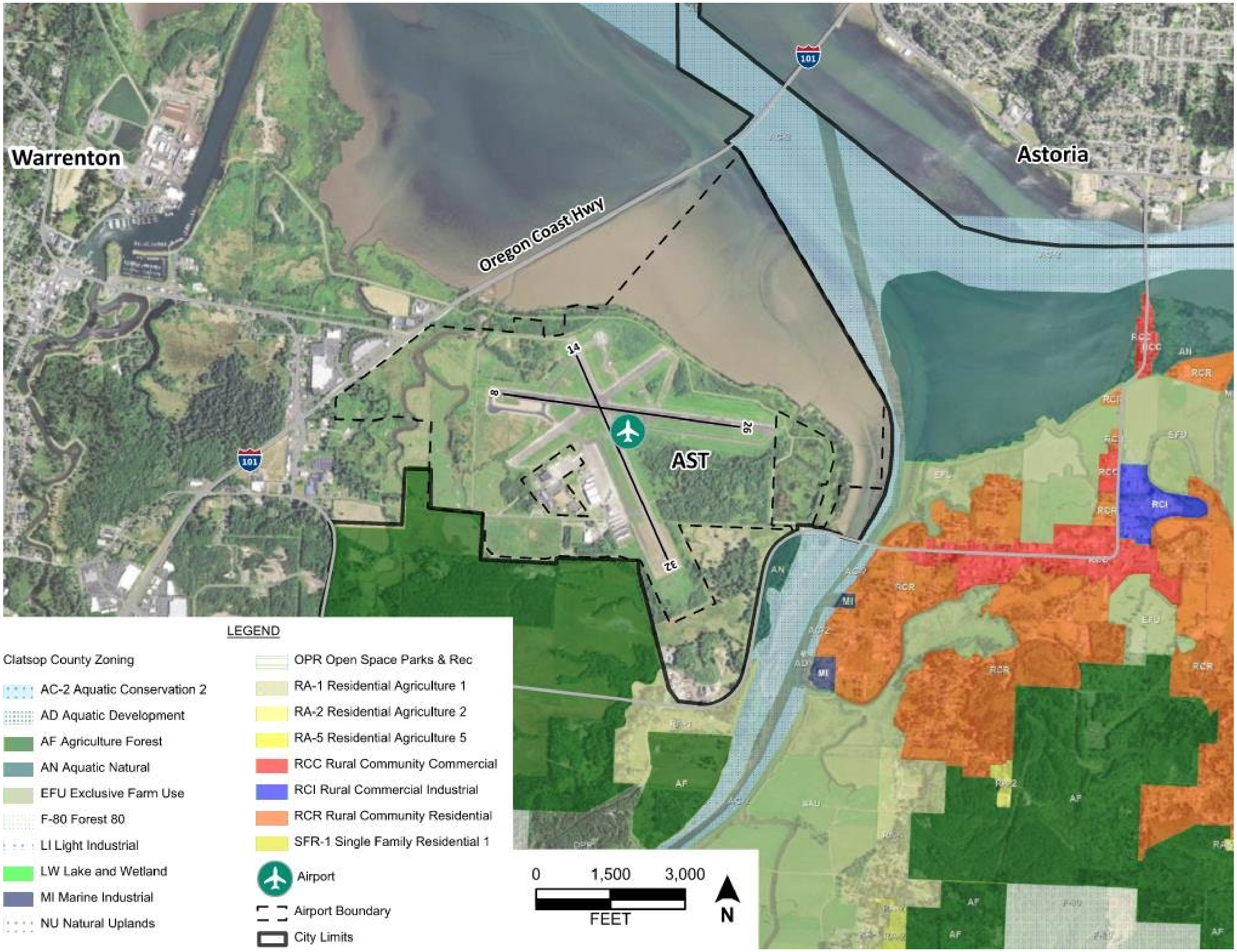
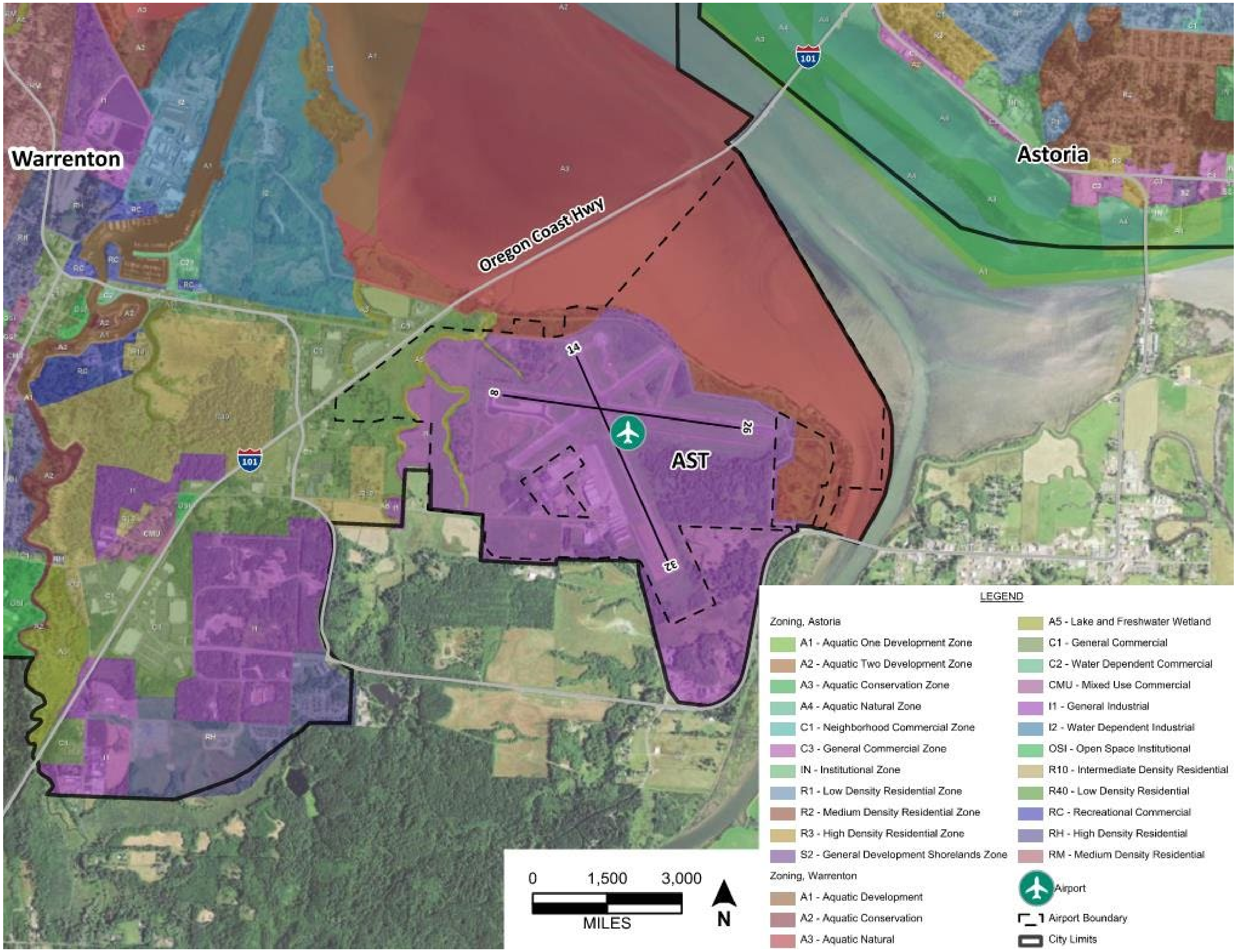


Figure 7-3: **Cities of Warrenton and Astoria Zoning**



Regulatory Framework

Federal Airport Compatibility Regulations and Guidance

The FAA does not have authority to regulate off-airport land uses. However, the FAA does have a technical advisory role based on its interest in protecting its financial investment in airport facilities and the airspace associated with an airport as part of the national airspace system. The FAA plays a part in regulating on-airport land use through approval of the Airport Layout Plan (ALP). In fulfilling that role, the FAA requires that airport sponsors comply with FAA Airport Improvement Program (AIP) grant assurances to fulfill funding obligations. The assurances include measures to maintain, to the extent reasonable, off-airport land use compatibility and to protect the aeronautical function of an airport by restricting the location of non-aviation land uses on and off-airport.

Table 7-1 summarizes key federal regulations and guidance. These key regulations were considered in the compatibility assessment for AST summarized below.

Table 7-1: Federal Regulations and Guidance for Compatible Land Use

Grant Assurances
Grant assurances 20 and 21 pertain to compatible land use around airports and will influence proposed future development. These grant assurances require airport sponsors to take reasonable action to protect the airspace and restrict land uses in the immediate vicinity to those compatible with airport operations. 20. Hazard Removal and Mitigation. Airport sponsor will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operation to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards. 21. Compatible Land Use. Airport sponsor will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.
14 CFR Part 77
Title 14 of the Code of Federal Regulations Part 77 (14 CFR Part 77), *Safe, Efficient Use and Preservation of the Navigable Airspace*, establishes standards to protect the airspace surrounding airports from natural or constructed obstructions that could constitute a hazard to landing aircraft. The FAA has the authority to review proposed construction on- and off-airport through FAA Form 7460-1, *Notice of Construction or Alteration process*. The FAA's aeronautical review addresses compatibility both on- and off-airport based on the potential for creating a "hazard to air navigation" that is associated with obstructions / penetrations in defined airspace. FAA airspace reviews include 14 CFR Part 77 surfaces, Terminal Instrument Procedures (TERPS) surfaces, visual runway traffic patterns, and protected airspace for visual navigational aids (e.g., visual approach slope indicator [VASI] lights and a precision approach path indicator [PAPI]). When a proposed structure penetrates navigable airspace, the FAA will issue a Notice of Presumed Hazard, which is a letter objecting to the proposed action (determination of presumed hazard to air navigation) for the consideration of local authorities. When proposed actions do not represent a hazard to air navigation, a "no hazard" determination

is issued. However, the FAA's analysis is based solely on FAA obstruction criteria and does not address other land use compatibility concerns nor is the evaluation coordinated with the airport sponsor and local agencies. Therefore, a proposed action receiving a no hazard determination from the FAA may still be considered incompatible with airport operations.

The FAA recommends that local jurisdictions include the following language in their development codes: "Nothing in this chapter shall diminish the responsibility of project proponents to submit a Notice of Construction or Alteration to the FAA if required in accordance with 14 CFR Part 77."

FAA Advisory Circular 150/5190-4B, *Airport Land Use Compatibility Planning*

In September 2022, the FAA published the AC 150/5190-4B, *Airport Land Use Compatibility Planning*, cancelling the AC 150/5190-4A, *A Model Zoning Ordinance to Limit Height of Objects around Airports* (1987) and FAA Memorandum, *Interim Guidance on Land Uses Within a Runway Protection Zone* (2012). AC 150/5190-4B describes the effects of land use on the safety and utility of airport operations, and identifies compatible land use development tools, resources, and techniques to protect surrounding communities from adverse effects associated with airport operations. The AC describes the types of land uses that conflict with or are impacted by operations at local public-use airports and, thus, deemed to be incompatible (e.g., residential uses within airport noise contours; airspace obstructions and hazards; land uses that attract birds and other hazardous wildlife; and land uses with concentrations of people within airport runway protection zones). The guidance in the AC does not replace any local land use regulations that may be in place.

FAA Advisory Circular 150/5020-1, *Noise Control and Compatibility Planning for Airports*

14 CFR, Part 150, *Airport Noise Compatibility Planning* (Part 150), is the primary federal regulation guiding and controlling planning for aviation noise compatibility on and around public-use airports. AC 150/5020-1 provides guidance to airport sponsors preparing airport noise contour maps and airport noise compatibility programs for Part 150 submissions. The purpose of the Part 150 study is to mitigate the noise impacts of airports upon their neighbors while protecting or increasing airport access and capacity, as well as maintaining the efficiency of the national aviation system. Although the regulations contained in the Part 150 study are voluntary, the approved Part 150 noise compatibility program is the primary vehicle for gaining approval of applications for federal grants for noise abatement projects and provides the required analyses for evaluating the impacts of any proposed constraints upon an airport's operations. The Part 150 study also identifies those land uses that are normally compatible with various levels of exposure to noise by individuals.

FAA Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports*

14 CFR, Part 139, Certification of Airports, Subpart D (Part 139) requires airport sponsors to comply with maintaining a safe operating environment that includes conducting Wildlife Hazard Assessments and Wildlife Hazard Management Plans. AC 150/5200-33B provides guidance on the types of land uses that have the potential to attract wildlife on or near public-use airports. Land uses considered to be potentially hazardous wildlife attractants include waste disposal operations (e.g., landfills), water management facilities (e.g., wastewater and storm water facilities), wetlands, dredge spoil containment areas, specific agricultural activities (e.g., livestock), golf courses, and certain landscaping practices. When considering proposed land uses, the potential of increasing wildlife hazards must be considered. Separation criteria between the Airport Operations Area (AOA) and the hazardous wildlife attractants are provided. The separation distances are as follows:

- 5,000 feet from the nearest AOA for airports serving piston-powered aircraft
- 10,000 feet from the nearest AOA for airports serving turbine-powered aircraft

State Airport Compatibility Regulations and Guidance

Oregon Revised Statutes (ORS)

The 2021 Oregon State Revised Statutes (ORS) are the most recent edition of state laws that are in effect through early 2021. Land use planning and airport land use compatibility planning laws addressing mainly airspace protection and safety are included in various volumes of the statutes listed below.

- Chapter 197, Comprehensive Land Use Planning I
- Chapter 197A, Comprehensive Land Use Planning II
- Chapter 215, County Planning; Zoning; Housing Codes
- Chapter 227, City Planning and Zoning
- Chapter 836, Airports and Landing Fields

Oregon Administrative Rules (OAR)

Chapter 660, Division 13, Airport Planning, encourages and supports the operation and vitality of Oregon's airports. The rules are intended to promote a convenient and economic system of airports in the state and for land use planning to reduce risks to aircraft operations and nearby land uses. State law requires local governments to adopt an Airport Safety Overlay Zone to protect airspace surfaces as well as adopt airport compatibility requirements addressing safety and noise compatibility issues.

- OAR, Chapter 660, Division 13, Airport Planning
- OAR, Chapter 738, Division 70, Physical Hazards to Air Navigation

Oregon Department of Aviation

The Oregon Department of Aviation (ODA) provides infrastructure, financial resources, and expertise to ensure a safe and efficient transportation system. The ODA ensures a fiscally stable agency, increases advocacy and awareness for state aviation, and provides proactive oversight of Oregon's aviation system. The ODA uses the *Airport Land Use Compatibility Guidebook* 2003 as a comprehensive source of information to preserve aviation facilities and to provide safety to individuals near airports through implementation of compatible land uses. The Guidebook provides the necessary information for local jurisdictions and airports to conform to statewide planning goals, statutes, and rules applicable to airport planning.

Clatsop County Airport Compatibility Regulations

The Clatsop County Land Use Planning division serves the citizens of Clatsop County. Their services include reviewing and processing land use development proposals to see that they conform with the County's Comprehensive Plan and other County policies and regulations. A summary of airport compatibility-related policies from the County's Comprehensive Plan and development regulations follows.

Clatsop County Comprehensive Plan Update (in progress): Based on Statewide Planning Goals, the original Comprehensive Plan (adopted 1979) will be updated and will consider growth over a 20-year planning period, up to 2040.

This plan establishes general land use planning policies and allocates land uses into resource, residential, commercial, and industrial categories. The plan serves as the basis for the coordinated development of physical resources, and the development or redevelopment of the County based on physical, social, economic, and environmental factors.

Clatsop County Title 16, Land and Water Development and Use Code, Article 5. Special Districts: of Article 5, Special Districts, Section 5.5300, Airport Overlay Zone (AO) has been established to "prevent the establishment of airspace obstructions in airport approaches and surrounding areas through height restrictions and other land use controls as deemed essential to protect the health, safety, and welfare of people of the (city / county)." Article 5 defines permitted and conditional uses within the Runway Approach Zone (RAZ). City or County Planning authority must notify the owner of the airport and Aeronautics Section on land use permits or zone changes within 5,000 feet of a visual, and 10,000 feet of an instrument airport to comply with OAR Chapter 738, Division 100 requirements.

City of Warrenton Airport Compatibility Regulations

City of Warrenton Comprehensive Plan (Adopted 2011): The City of Warrenton Comprehensive Plan is an extensive document that states the City's adopted goals and policies regarding land use. These goals and policies establish a framework upon which to base decisions and actions related to the use of land. Section 4.360 addresses Air Quality and Noise and requires any proposed major development within the Airport's 55 day-night average sound level (Ldn) noise boundary identify their location within an airport noise impact area. Section 4.360 also states that the City will develop a hazard overlay zone based on the Airport's noise contour projections.

Section 8.350, Multi-Mode Transportation (3) states: "Efforts will be made to protect the airport from incompatible land uses. This will involve trying to avoid hazards resulting from the height of structures, smoke, glare from buildings, lights which shine upward, radio interference from transmission lines and similar uses in the approach zones. Residential uses will be excluded from locations where aviation noise and the potential for aviation accidents is a serious threat to safety or livability. The Oregon Department of Transportation and the Port of Astoria will be allowed to review building permits for construction within the Airport Hazard Overlay Zone."

City of Warrenton Comprehensive Plan Land Use Map (adopted 2005): According to the Comprehensive Plan Map, the Airport is classified as Urban Development (Other Shorelands). The land north and east of AST is classified as Natural Land. The land west of AST is identified as Conservation Land. Land to the south is beyond Warrenton city limits.

City of Warrenton Zoning Designations (August 2019): Figure 7-3 above shows Warrenton's zoning designations, with the Airport zoned as General Industrial (I1). Land north and east of the airport is zoned as Aquatic Natural (A3) Land west of airport property is zoned as General Commercial (C1). Land to the south is beyond Warrenton city limits.

City of Warrenton, Oregon Municipal Code, Title 16, Division 2, Land Use Districts, Chapter 16.92 Airport Operations Overlay District: The City of Warrenton has established the Airport Operations Zone (AOZ) to encourage and support operation and vitality of AST by allowing certain airport-related commercial, recreational, and industrial uses. The AOZ prevents the establishment of airspace obstructions in the airport approaches and surrounding areas through restrictions and other land use controls to protect health, safety, and welfare. Chapter 16.92 presents uses permitted outright within the airport imaginary surfaces, uses subject to the acceptance of the Port, uses permitted under prescribed conditions within the airport imaginary surfaces, and uses permitted under prescribed conditions acceptable to the Port. The table below summarizes uses covered by Airport Operations Overlay District.

The Conditional Use Procedure for applicants seeking a conditional use permit must include the following:

- Property boundary lines as they relate to the airport imaginary surfaces.
- Location and height of all existing and proposed buildings, structures, utility lines, and roads.
- Statement from the Oregon Aeronautics Division that indicates the proposed use will not interfere with the operation of the landing facility.

Conditional Use Standards include the following for acceptance of a conditional use permit:

- No object of natural growth or terrain, nor any structure, equipment, or materials shall be permitted to extend above the applicable airport imaginary surface without a determination from the FAA and ODA and supported by the airport sponsor that such object, structure, equipment, or materials would not pose a hazard to air navigation.
- No place of public assembly shall be permitted in the approach surface.
- No structure or building shall be allowed within the clear surface.
- Whenever there is a conflict in height limitations prescribed by this overlay zone and the primary zoning district, the lowest height limitation fixed shall govern, provided, however, that the height limitations here imposed shall not apply to such structures customarily employed for aeronautical purposes.
- No glare producing material shall be used on the exterior of any structure located within the approach surface.
- In noise sensitive areas (within 1,500 feet of an airport or within established noise contour boundaries of 55 Ldn and above for identified airports) where noise levels are a concern, a declaration of anticipated noise levels shall be attached to any building permit or development approval. In areas where the noise level is anticipated to be 55 Ldn and above, prior to issuance of a building permit for construction of noise sensitive land use (real property normally used for sleeping or normally used as schools, churches, hospitals, or public libraries) the permit applicant shall be required to demonstrate that a noise abatement strategy will be incorporated into the building design which will achieve an indoor level equal to or less than 55 Ldn. The planning and building department will review building permits for noise sensitive developments.

The City shall require the owner of any object of natural growth, terrain, structure, equipment, or materials to install, operate, and maintain, at the owner's expense, such marking and lightings as recommended or required by the Federal Aviation Administration and the Oregon Department of Aviation as a condition of any permit or land use approval.

AIRPORT COMPATIBILITY ASSESSMENT

This section evaluates potential land use compatibility conflicts between the contemplated AST expansion plans and existing and planned land uses. The land use compatibility assessment herein addresses four types of compatibility concerns:

- **Noise**: Locations exposed to potentially disruptive levels of aircraft noise
- **Overflight**: Locations where aircraft overflights can be intrusive and annoying to many people
- **Safety**: Areas where the risk of an aircraft accident poses heightened safety concerns for people and property on the ground
- **Airspace Protection**: Places where height and certain other land use characteristics need to be restricted to protect the airspace required for operation of aircraft to and from the airport.

AST Future Expansion

Chapter 4 Improvement Alternatives presents the preferred development concepts to enable AST to meet FAA design standards, meet the 20-year facility requirements, and user demand for expanded services. This airport compatibility assessment reflects the Master Plan's preferred development plan. The preferred alternatives are not expected to increase airport land use compatibility conflicts, as no significant changes are proposed to the runways. Rather, the preferred development plan includes the following projects:

- **Taxiway Improvements (Alternative One).** Taxiway A is designed to be a full parallel taxiway and will be shifted 30 feet south to allow for the RDC standard 300 feet to be met. The shift will allow for visibility minimums to be lowered but will affect the placement of the glideslope equipment. The equipment will likely need to be relocated to meet the safety area requirements.
- **Helicopter Operations Area (Alternative Three).** This alternative provides an optimized layout to increase helicopter parking locations. Located adjacent to the USGC facility, this alternative provides up to five additional helicopter parking locations and takes into consideration a planned expansion of a new hangar by the USGC. Under the expansion of the USGC, it has been agreed upon that a portion of the parcel would be swapped with the airport as part of the expansion, this area is approximately 450 feet long by 120 feet wide.
- **Hangar Development Area (Alternative One).** This alternative provides an alternative option for the development of additional hangar facilities. In this scenario, space designated for hangar development can accommodate up to three additional box hangars adjacent to the USGC apron. This will accommodate smaller GA aircraft. Apron space in front of Lektro can be utilized to accommodate two additional box hangars, and additional T-hangars can be developed to the southwest quadrant near the existing T-hangars.
- **FBO Location (Alternative One).** This alternative provides an option for expanding the existing FBO location. The current building, which is in a central location on the airfield, has room for expansion on the eastern side of the building. By expanding the building where the current porch resides, the FBO can gain an additional 1000 square feet of space and remain within the fence line.
- **Fuel Farm (Alternative Two).** This alternative provides an option for the construction of an additional fuel tank. The proposed location, on the apron adjacent to the existing fuel tanks, can accommodate a 10,000-gallon tank for Jet-A fuel.

- **Electric Aircraft Development (Alternative Two).** This alternative provides an option for the integration of electric aircraft directly adjacent to the FBO, while still providing the electric configuration on the GA ramp. The proposed EVTOL parking / charging station can be added in the area that is reverting back to the Airport from the USGC expansion. The placement of the charging stations is clear of the taxiway object free area (TOFA), and provides direct access to the existing FBO building, for both passengers and staff.

Noise

Aircraft noise exposure is often a major concern for communities surrounding an airport. Therefore, noise compatibility is an important factor to consider when evaluating future airport expansion plans with existing and planned land uses around AST. Proactive land use planning and protection can help minimize airport noise impacts on the surrounding community.

This section addresses aircraft noise exposure and describes the methodology used to analyze the aircraft noise environment, the metrics used to quantify aircraft noise exposure levels, and the resultant noise contours used to visually depict the noise levels extending from the Airport. The following subsections provide a generalized description of the existing noise exposure at AST based on the base year operations for 2021 and the forecasted 2041 activity levels.

Aircraft Noise

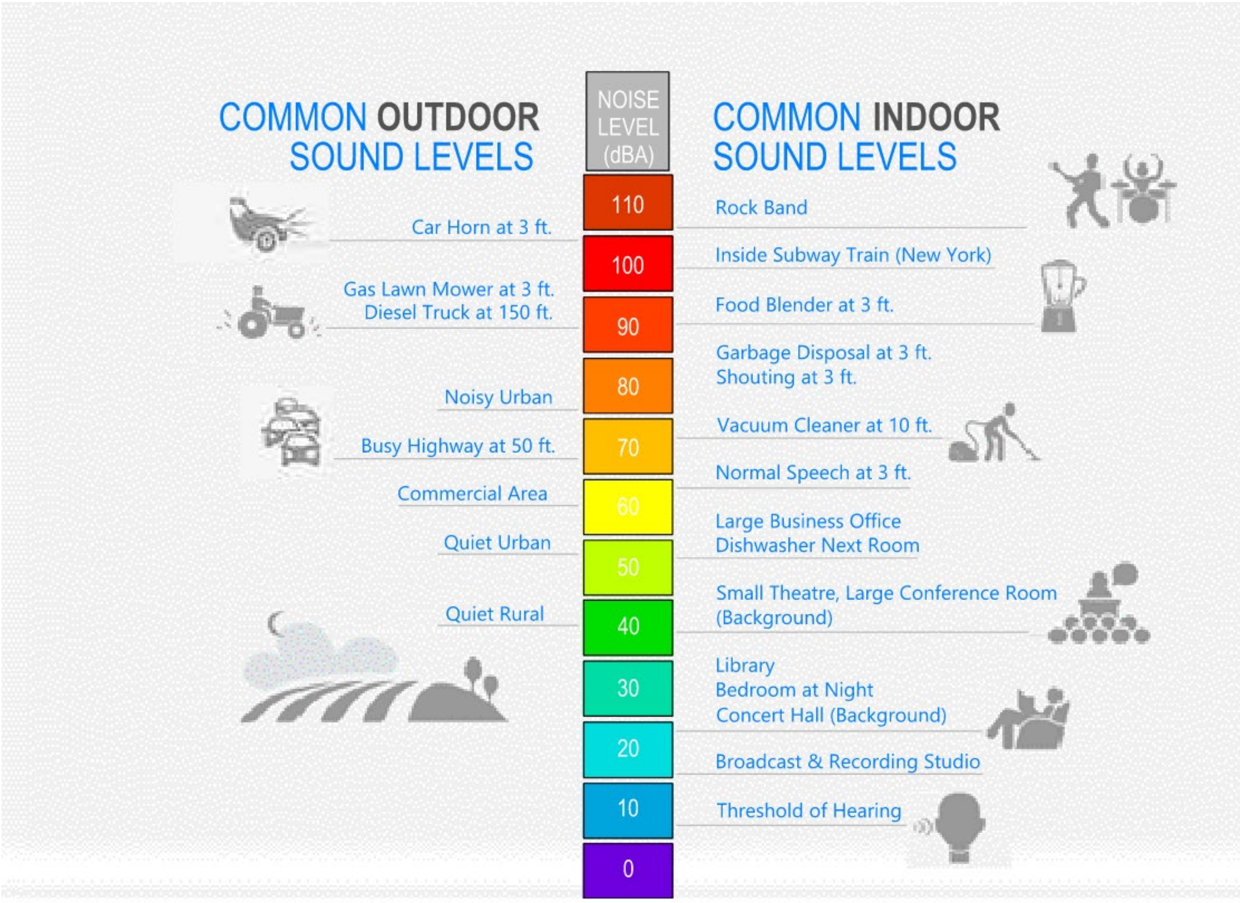
To understand airport noise and its effects on people, it is important to understand the characteristics of sound. Sound is a type of energy that travels in the form of a wave. Sound waves create minute pressure differences in the air that are recognized by the human ear or microphones. Sound waves can be measured using decibels (dB) to measure the amplitude or strength of the wave and Hertz (Hz) to measure the frequency or pitch of the wave.

The strength, or loudness, of a sound wave is measured using decibels on a logarithmic scale. The range of audibility of a human ear is 0 dB (threshold of hearing) to 120 dB (threshold of pain). The use of a logarithmic scale often confuses people because it does not directly correspond to the perception of relative loudness. A common misconception is that if two noise events occur at the same time, the result will be twice as loud. Realistically, the event doubles the sound energy, but only results in a 3 dB increase in magnitude. In person, a sound event needs to be 10 dB higher to be observed as twice as loud as another.

Scientific studies have shown that people do not interpret sound the same way a microphone does. For example, humans are biased and sensitive to tones within a certain frequency range. The A-weighted decibel scale was developed to correlate sound tones with the sensitivity of the human ear. The A-weighted decibel (dBA) is a “frequency dependent” rating scale that emphasizes the sound components within the frequency range where most speech occurs. A comparative sound scale for the A-weighted decibel (dBA) is illustrated in **Figure 7-4**, which lists typical sound levels of common indoor and outdoor sound sources.

Figure 7-4: Comparative Noise Levels (dBA)

Source: FAA Fundamentals of Noise and Sound; https://www.faa.gov/regulations_policies/policy_guidance/noise/basics/#contours



When sound becomes annoying to people, it is generally referred to as noise. A common definition of noise is any sound that is undesirable or interferes with people's ability to hear other sounds. One person may find higher levels of noise bearable while others do not. Studies have also shown that a person will react differently to the same noise depending on that person's activity at the time the noise is recognized, e.g., when that person is sleeping.

Noise Metrics

Noise metrics can be categorized as cumulative metrics and single event metrics. Cumulative noise metrics have been developed to assess community response to noise. They are useful because these scales attempt to include the loudness and duration of the noise, the total number of noise events, and the time of day these events occur into one rating scale. Day-night average sound level (DNL), expressed in decibels (dB), is the standard federal metric[1] for determining cumulative exposure of individuals to noise. The DNL is the annual, 24-hour average sound level, obtained from the accumulation of all noise events, with the addition of a 10-decibel penalty factor to the sound level for each nighttime operation occurring from 10:00 p.m. to 7:00 a.m. The 10 dB weighting of nighttime events accounts for the fact that noise events at night are more intrusive when ambient levels are lower, and people are trying to sleep. The 24-hour DNL is

[1] In 1981, the FAA formally adopted the DNL as the primary measure for determining exposure of individuals to airport noise.

annualized to reflect noise generated by aircraft operations for an entire year and is identified by noise contours showing levels of aircraft noise.

Single event metrics describe noise from individual events, such as an aircraft flyover. An example of this kind of metric is the Lmax, which identifies the highest noise level reached during a single event.

Airport Noise Regulations

Federal: The FAA evaluates airport noise impacts using the day-night average sound level (DNL), which is measured in decibels (dB). The DNL represents average noise levels during a 24-hour period, adjusted to account for lower tolerances to noise during nighttime periods relative to the daytime. The FAA uses the 65 dB DNL as the threshold of significance for assessing noise impacts. This threshold is defined in the FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Attachment A, paragraph 14.3.

State: Chapter 340, Division 35 of the Oregon Administrative Rules (OAR) outlines the parameters set by the Department of Environmental Quality (DEQ)'s for the state's Airport Noise Abatement Program. OAR 340-035-0045 states that airports with a Noise Impact Boundary that covers Noise Sensitive Property is required to submit an Airport Noise Abatement Program for approval. The Noise Impact Boundary is defined as 55 dBA (also referred to as 55 DNL), while Noise Sensitive Property means property normally used for "sleeping, schools, churches, hospitals, or public libraries." The OAR also identifies situations of exemption, monitoring provisions, and noise abatement strategies such as soundproofing, acquisition of land within 55, 60, and 65 DNL contours, etc. The goal of the program is to ensure that airports have methods to reduce airport noise impacts at noise sensitive properties and to encourage future planning to account for compatible land uses.

Clatsop County: The Airport Overlay Zone requires a declaration of anticipated noise levels be attached to any building permit, land division appeal, deed, or mortgage record in any noise sensitive areas (within 1,500 feet of an airport or within established noise contour boundaries of 55 DNL and above for identified airports). Before a building permit for construction can be issued in areas where the noise level is anticipated to be above 55 DNL, the permit application will be required to demonstrate that noise abatement design features will be incorporated in proposed buildings to achieve an indoor noise level equal to or less than 55 DNL.

City of Warrenton: The City of Warrenton Municipal Code 16.92 Airport Operations Overlay District requires a declaration of anticipated noise levels be attached to any building permit or development approval in noise sensitive areas (within 1,500 feet of an airport or within established noise contour boundaries of 55 Ldn and above for identified airports). Before a building permit for construction can be issued in areas where the noise level is anticipated to be above 55 Ldn, the permit application will be required to demonstrate that noise abatement design features will be incorporated in proposed building to achieve an indoor noise level equal to or less than 55 Ldn.

Compatible Land Use

Studies by governmental agencies and private researchers, in particular those by the U.S. Department of Housing and Urban Development (HUD) and the FAA, have defined the compatibility of land uses with varying noise levels. The compatibility of various land uses with specific DNL thresholds is summarized in

Table 7-2 and is based on guidelines from the FAA's Federal Aviation Regulation (FAR) (now codified as Code of Federal Regulations [CFR]) Part 150, "Airport Noise Compatibility Planning."

The compatible land uses illustrated for varying sound levels within **Table 7-2** are only guidelines. Part 150 explicitly states that determinations of noise compatibility and regulation of land use are purely local responsibilities. The 65 DNL noise contour is normally considered the threshold for which federal funding can be made available for noise problem airports and where land use restrictions for sensitive noise receptors should be implemented; however, consistent with state regulations, Clatsop County and the City of Warrenton identify the 55 DNL as the threshold for AST. Areas located outside the 55 DNL contour are typically not land use restricted, as **Table 7-2** illustrates. It should be noted that the FAA will not normally fund sound mitigation for structures located outside the 65 DNL contour.

The noise contours generated in the following sections will be used to analyze potential compatible land use impacts associated with the existing and forecasted airport operations and development.

Table 7-2: Land Use Compatibility* with Yearly Day-Night Average Sound Levels

	Yearly Day-Night Average Sound Level (DNL) in Decibels					
Land Use	Below 65	65-70	70-75	75-80	80-85	Over 85
RESIDENTIAL						
Residential homes	Y	N (1)	N (1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N (1)	N (1)	N (1)	N	N
PUBLIC USE						
Schools	Y	N (1)	N (1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y (2)	Y (3)	Y (4)	Y (4)
Parking	Y	Y	Y (2)	Y (3)	Y (4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale / retail - bldg. materials / hardware / farm equip.	Y	Y	Y (2)	Y (3)	Y (4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing - general	Y	Y	Y (2)	Y (3)	Y (4)	N
Photographic and optical	Y	Y	25	30	N	N
Agricultural (except livestock) and forestry	Y	Y (6)	Y (7)	Y (8)	Y (8)	Y (8)
Livestock farming and breeding	Y	Y (6)	Y (7)	N	N	N
Mining and fishing	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y (5)	Y (5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

*The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under FAR Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key: Y (yes) = Land use and related structures compatible without restrictions.
N (no) = Land use and related structures are not compatible and should be prohibited.
25, 30, 35 = Land use and related structures generally compatible; measures to achieve Noise Level Reduction of 25, 30, 35 dB must be incorporated into design and construction of structure.

See following page for notes and source.

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

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

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

(4) = Measures to achieve NLR 325 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

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

(6) = Residential buildings require an NRL of 25.

(7) = Residential buildings require an NRL of 30.

(8) = Residential building not permitted.

Source: FAR Part 150, *Airport Noise Compatibility Planning,* Appendix A, Table 1.

AST Noise Modeling

Existing aircraft noise environments for AST were determined through computer modeling using the FAA's Aviation Environmental Design Tool (AEDT), version 3e. The following sub-sections explain the methodology and inputs used to generate the cumulative Day-Night Noise Level (DNL) contours and some single-event Maximum Noise Level (Lmax) contours. Both the cumulative DNL contours and the individual single-event Lmax contours were developed from the AEDT model.

Operational data used to generate the existing noise contours was derived from the **Chapter 3 Aviation Forecasts**, which provide the information on operations by aircraft category at AST. The forecasted operation counts for each aircraft type is then broken down by operation type, representative aircraft, runway utilization, and track utilization.

Computer Modeling

Computer modeling generates maps or tabular data of an airport's noise environment expressed in the applicable metric, such as DNL. Computer models are most useful in developing contours that depict areas of equal noise exposure, similar to elevation contours on a topography map. Accurate noise contours are largely dependent on the use of reliable, validated, and updated noise models and collection of accurate aircraft operational data.

The AEDT software used to determine existing and future aircraft noise environments for AST models civilian and military aviation operations and is required by FAA to be used for 14 CFR Part 150 Study aircraft noise analysis as well as NEPA noise analysis. The program includes standard aircraft noise and performance data for hundreds of aircraft types that can be tailored to the characteristics of specific individual airports. AEDT 3e is the most recent version of the software and was used for AST noise models.

FAA Order 1050.1F requires a noise analysis that includes noise exposure maps for projects at airports with 90,000 annual propeller-powered aircraft operations or 700 annual jet-powered aircraft operations that involve runway relocation, runway strengthening, or a major runway expansion. The number of operations at AST in 2023 is projected to be 94,997 total operations, with 69,121 annual propeller-powered aircraft operations and 25,876 jet-powered aircraft operations. Thus, the annual total for jet-powered aircraft operations exceeds the FAA Order 1050.1F threshold.

The AEDT model was used to generate existing noise contours. AEDT Version 3e was used to model the noise exposure contours at AST using the 2021 baseline operations and the 2041 forecasted operation levels. Results are indicated by a series of contour lines overlaid on a map of the airport and its environs.

Noise Model Inputs

The AEDT model requires a variety of operational data to model the noise environment around an airport. These inputs include the following bulleted data categories that are presented and discussed in more detail within the following sections and tables.

- Aircraft Activity Levels
- Aircraft Fleet Mix
- Runway Utilization
- Time of Day
- Surrounding Terrain
- Flight Tracks

Airport Activity Levels and Fleet Mix

The operation counts entered AEDT are divided by aircraft models. The number of operations per aircraft is based on the historical and projected activity levels provided in the forecast. The fleet mix is based on the FAA's TFMSC database and information provided by the airport manager. The C-27J and MH-65 used by the coast guard are modeled as having no operations in 2041 due to the airport providing information that such aircraft are being replaced. **Tables 7-3** to **7-5** show the operational inputs used in the AEDT model.

Table 7-3: Itinerant Operations by Representative Aircraft

Itinerant General Aviation			
Aircraft	**Operation Group**	**2021**	**2041**
C172 - Cessna Skyhawk 172 / Cutlass	Single Piston	2,000	2,200
C182 - Cessna Skylane 182	Single Piston	2,000	2,200
SR22 - Cirrus SR 22	Single Piston	2,000	2,200
P28A - Piper Cherokee	Single Piston	2,000	2,200
T210 - Cessna T210M	Single Piston	2,000	2,200
C208 - Cessna 208 Caravan	Single Turbine	44	767
PC12 - Pilatus PC-12	Single Turbine	44	767
PA27 - Piper Aztec	Twin Piston	44	767
BE58 - Beech 58	Twin Piston	44	767
B350 - Beech Super King Air 350	Twin Turbine	602	832

BE20 - Beech 200 Super King	Twin Turbine	541	749
C550 - Cessna Citation II / Bravo	Jet	30	41
C68A - Cessna Citation Latitude	Jet	30	41
E55P - Embraer Phenom 300	Jet	33	46
C25B - Cessna Citation CJ3	Jet	40	55
FA50 - Dassault Falcon / Mystère 50	Jet	56	78
C525 - Cessna Citation Jet/CJ1	Jet	78	108
C25C - Cessna Citation CJ4	Jet	89	124
C680 - Cessna Citation Sovereign	Jet	114	158
	Total Itinerant General Aviation	11,787	16,300

Source: FAA TFMSC, AST Master Plan

Table 7-4: Itinerant Military Operations by Representative Aircraft

Itinerant Military Operations			
Aircraft	**Operation Group**	**2021**	**2041**
C130 - Lockheed 130 Hercules	Fixed Wing	69	0
C27J - Alenia C-27J Spartan	Fixed Wing	69	137
H60 - Sikorsky SH-60 Seahawk	Helicopter	12,330	13,563
MH-65 (Eurocopter MH-65 Dolphin)	Helicopter	1,233	0
	Total Itinerant Military	13,700	13,700

Source: FAA TFMSC, AST provided data, AST Master Plan
Note: USCG replacing all C-130s for the C-27J so all operations in the future are assigned to the C-27J, with the assumption that the C-130s would be retired by 2041.

Table 7-5: Local General Aviation Operations by Representative Aircraft

Touch and Go Operations			
Aircraft	**Operation Group**	**2021**	**2041**
C172 - Cessna Skyhawk 172 / Cutlass	Single Piston	2,258	3,156
C182 - Cessna Skylane 182	Single Piston	2,258	3,156
SR22 - Cirrus SR 22	Single Piston	2,258	3,156
P28A - Piper Cherokee	Single Piston	2,258	3,156
T210 - Cessna T210M	Single Piston	2,258	3,156
MH-60	Helicopter	120	120
	Total Touch and Go Operations	11,410	15,900

Source: FAA TFMSC, AST provided data, AST Master Plan
Note: MH-60 is averaged to be 10 T&G operations per month over the year and with no mention of an expected increase.

Runway Utilization

Determining the frequency each runway is used is important to generating accurate noise contours. **Table 7-6** illustrates the aircraft groups used for the noise contour model. These grouping categories were developed to determine the percentages for runway utilization, time of day for operations, and track utilization. Aircraft were categorized into these groups based on the aircraft type found in the TFMSC database. Jets were further categorized into air carrier and commuter, based on the number of seats with air carrier aircraft having more than 60 seats while commuters have less than 60 seats. Helicopter operations are modeled as general aviation itinerant operations. Helicopters were modeled operating from the helipad outside of the Coast Guard apron area on the airfield.

Table 7-6: Runway Utilization by Aircraft Type

Runway	8	26	14	32	Total
Jet	18%	57%	2%	23%	100%
Turboprops	18%	57%	2%	23%	100%
Single and Twin Piston / Turbine	18%	57%	2%	23%	100%
Flight Training Itinerant	19%	52%	2%	27%	100%
Touch and Go	19%	52%	2%	27%	100%

Source: AST provided data

Operations by Time of Day

The time of day or night that aircraft operate is an important component to the AEDT model. Every aircraft operation that occurs between 10 p.m. and 7 a.m. has 10 dB added to the aircraft noise level. This effectively doubles the noise level signifying that noise is more intrusive at night.

Airport management provided the ratio between daytime and nighttime activity. Ninety-six percent of all operations occur during the day with the remaining four percent at night.

Flight Tracks

Flight paths represent where aircraft fly in relation to the ground. Aircraft do not fly exact or precise “tracks” associated with general aviation airports, but rather a wider “path” that represents some dispersion due to several factors, including weather (temperature, wind, barometric pressure), pilot proficiency, aircraft performance, other air traffic, and separation requirements.

In the case of AST, the departures and arrivals by both fixed wing aircraft and helicopters were modeled as straight in and out and with left-turn traffic patterns. The percentage of tracks used per runway end by fixed wing aircraft is therefore equal to the runway utilization shown in **Tables 7-7**.

Table 7-7: Fixed Wing Aircraft Track Utilization

Track Utilization	Runway 8		Runway 26		Runway 14		Runway 32	
Arrival Tracks	**Straight In**	**Left Traffic**	**Straight In**	**Left Traffic**	**Straight In**	**Left Traffic**	**Straight In**	**Left Traffic**
Jet	95%	5%	95%	5%	95%	5%	75%	25%
Turboprops	95%	5%	95%	5%	75%	25%	75%	25%
Single Engine Piston	50%	50%	50%	50%	30%	70%	50%	50%
Departure Tracks	**Straight Out**	**Left Traffic**	**Straight Out**	**Left Traffic**	**Straight Out**	**Left Traffic**	**Straight Out**	**Left Traffic**
Jet	90%	10%	90%	10%	95%	5%	95%	5%
Turboprops	75%	25%	75%	25%	95%	5%	95%	5%
Single Engine Piston	50%	50%	50%	50%	50%	50%	50%	50%

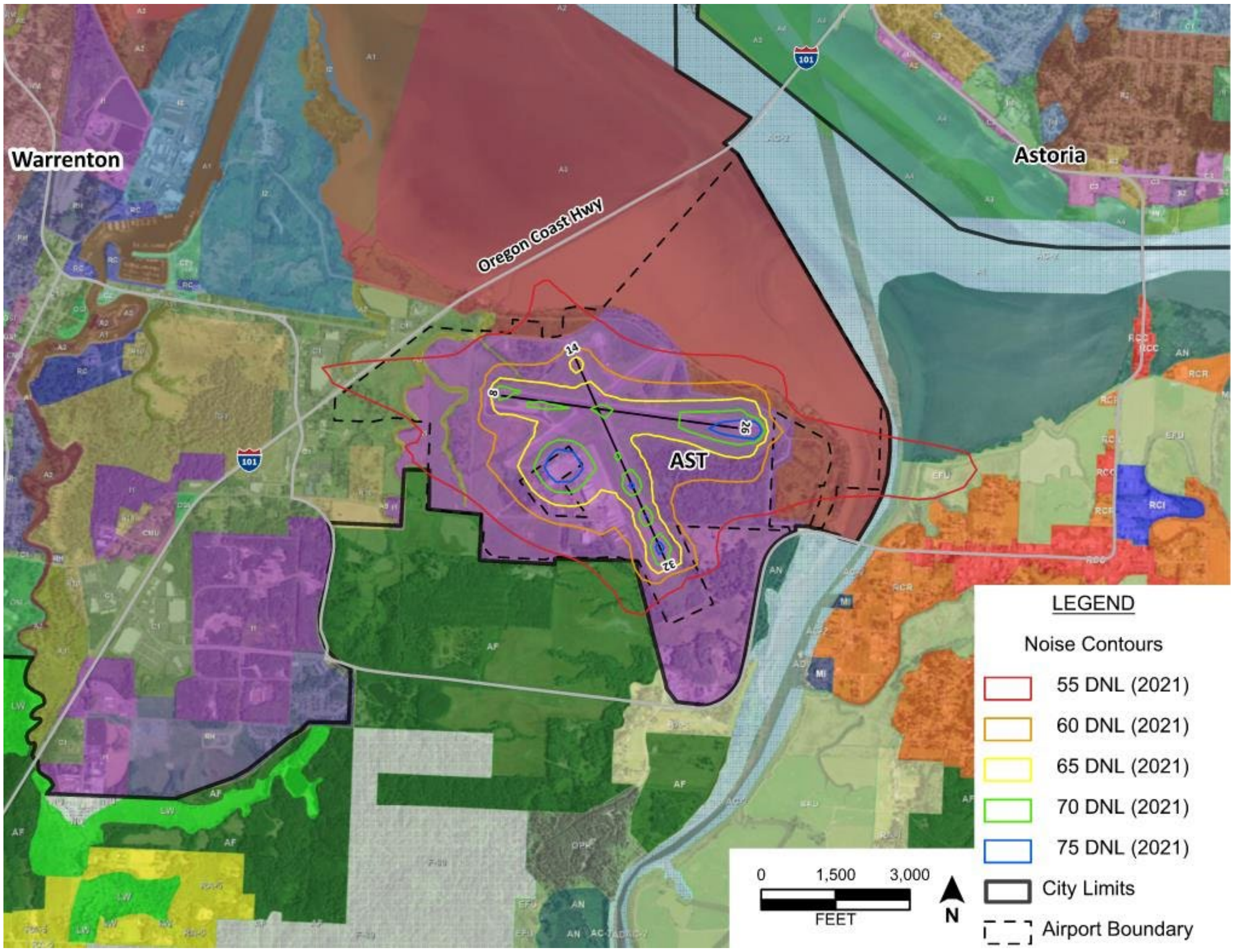
Current (2021) Cumulative (DNL) Noise Contours

The DNL noise contours were modeled based on the most conservative assumptions; in other words, all local general aviation operations were modeled as if they were all in the pattern performing touch-and-go operations. The majority of jet and turbo powered aircraft were modeled as straight in arrivals and departures, thus putting the loudest aircraft directly over the residents west and east of the Airport. These two assumptions tended to concentrate aircraft, which in turn tend to result in louder noise contours.

The weighted DNL metric is used to statistically predict the cumulative noise exposure levels in relationship to the land uses surrounding the Airport. A person does not “hear” a DNL due to the methodology of defining the DNL metric. As such, single event noise contours for some of the more demanding aircraft that use AST were also developed and are presented in the following sections.

The lower the contour dB, the quieter the represented noise level; the 60 DNL is quieter than the 65 DNL. As discussed in earlier sections, the 65 DNL contour is the federally defined threshold for land use compatibility; however, local guidance identifies the 55 DNL as the threshold. **Figure 7-5** shows the existing (2021) noise contours at AST. The contours shown on the figure represent the 55, 60, 65, 70 and 75 DNL contours. The 55 DNL noise contour is partially outside of AST property, while 60 to 75 contours are entirely within the AST property boundary.

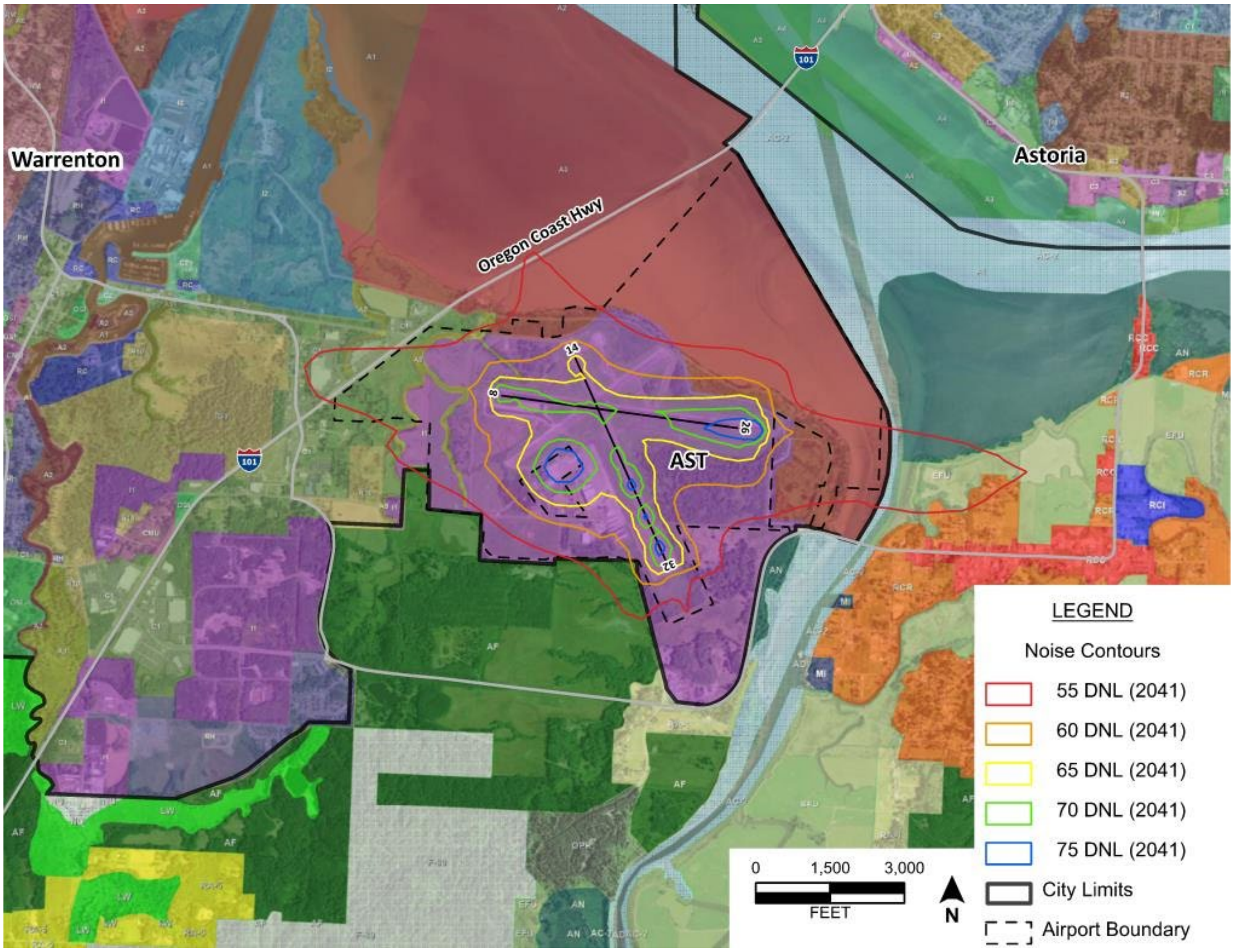
Figure 7-5: **Existing (2021) Noise Contours**



Forecasted (2041) Noise Contours

The forecasted noise analysis uses the projected operations and fleet mix changes for 2041. The AEDT input for the forecasted contours features changes in operation counts by each aircraft type, with the fleet mix assumed to remain consistent through the forecast period. The operation count and fleet mix projections are taken from the forecast found in **Chapter 3**. **Figure 7-6** shows the future (2041) noise contours at AST. The contours shown on the figure represent the 55, 60, 65, 70 and 75 DNL contours. The 55 DNL noise contour is partially outside of AST property, while 60 to 75 contours are entirely within the AST property boundary.

Figure 7-6: Future (2041) Noise Contours



Noise Assessment

In general, the contours for the forecasted operations on the runway layout are similar to the existing noise contours. The 55 DNL and 60 DNL for both existing and future extend beyond Airport property, as shown in **Figures 7-5 and 7-6,** and encompass the following land uses within each jurisdiction:

- **Clatsop County (South, Southeast):** The area of Clatsop County located within the 55 DNL contour includes a mix of agriculture forest, aquatic natural, exclusive farm use, and rural community residential land uses. A declaration of anticipated noise level is required for any building permit, land division appeal, deed, or mortgage record. Current county noise regulations require noise abatement design features as part of the permit application.
- **City of Warrenton (North, East, West):** The areas immediately north and east of AST within the 55 DNL contour are designated for aquatic natural uses. Areas to the west of AST within the 55 DNL contour are designated for lake and freshwater wetland and general commercial land uses. Current city noise regulations require a declaration of anticipated noise levels to be attached to any building permit or development approval in noise sensitive areas, and also requires noise abatement designs to be incorporated.

Safety

The intent of land use safety compatibility policies is to minimize the risks associated with an off-airport aircraft accident or emergency landing. Safety policies focus on reducing the potential consequences of such events should they occur and consider risks both to people and property.

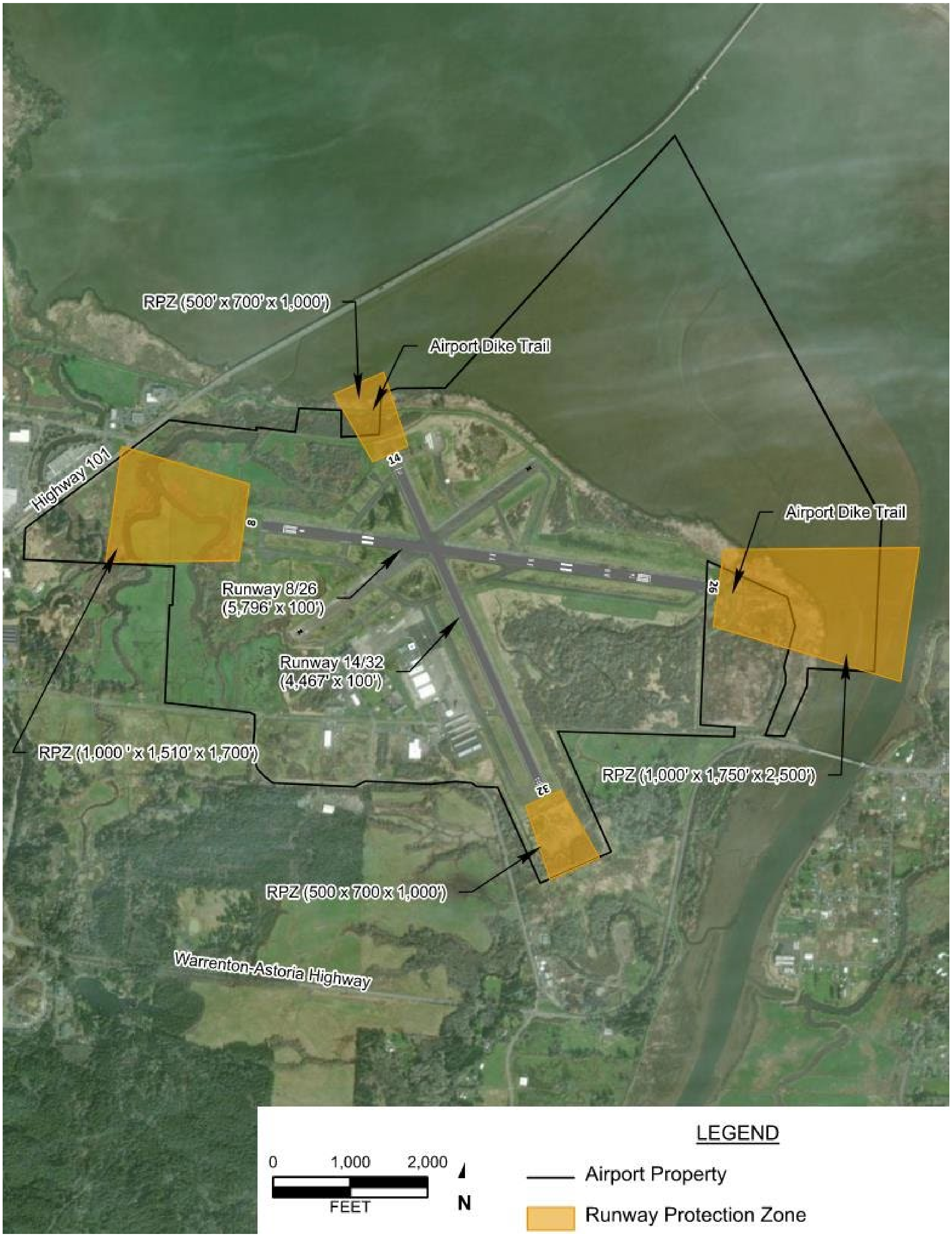
FAA Implications

FAA policy requires FAA review of certain land uses (e.g., buildings, roads, water treatment facilities, above-ground utility infrastructure) that would enter the limits of a future RPZ. Although the FAA has no land use authority, it can deny an airport's proposal to expand airport facilities if the proposal would significantly increase encroachment of incompatible development within the RPZ. Alternatively, the FAA may direct the airport owner to work with local agencies to address compatibility concerns.

AST RPZs

Consistent with FAA and ODA guidance, the critical safety zone for land use compatibility planning is the RPZ. The RPZ enhances protection of people and property on the ground. FAA policy is to have the entire RPZ under the control of the airport owner and clear of all above-ground objects, including roads. As part of this Master Plan, the RPZs are expected to remain in the same location and stay the same size. **Figure 7-7, AST Runway Protection Zones** depicts the existing RPZs.

Figure 7-7: AST Runway Protection Zones (RPZs)



RPZ Assessment

As depicted in **Figure 7-7,** portions of the existing and future RPZs extend beyond the AST property and encompass lands within the city of Warrenton. The following land uses are encompassed with the existing and future RPZs:

Table 7-8: Off-Airport Areas in AST RPZs

Location	Jurisdiction	RPZ Acreage Off-Airport	Off-Airport Land Use Classification
Runway 14 RPZ	Warrenton and Clatsop County (north)	7.75	Aquatic natural. Area undevelopable due to land use classification. A hiking trail, Airport Dike Trail crosses through the RPZ.
Runway 26 RPZ	Warrenton (east)	32.59	Aquatic natural and general industrial. Portions of the area are undevelopable due to land use classification. A hiking trail, Airport Dike Trail crosses through the RPZ.
Runway 8	Warrenton (west)	0.19	General commercial, encompasses a portion of Highway 101. Area undevelopable due to land use classification.

Local Agency Implications

A summary of local safety compatibility regulations is provided below.

- **Clatsop County**: Within the RPZ, the Airport Overlay Zone establishes restrictions on underlying land uses. The regulations prohibit places of public assembly, structures or buildings, glare producing materials, or any development that attracts or sustains hazardous bird movements within the Airport Overlay Zone. The AOZ also establishes height limitations, and the need for a declaration of anticipated noise levels to be attached to any building permit, land division appeal, deed, and mortgage records, as well as demonstration that noise abatement strategies will be incorporated into building designs in areas where noise is anticipated to be 55 DNL and above.
- **Warrenton**: Within the RPZ, safety compatibility regulations prohibit objects of natural growth or terrain, structure, equipment, or materials above the airport imaginary surface without a determination from the FAA an Oregon Department of Aviation, places of public assembly in the approach surface, no structure or building within the clear surface, and no glare producing material within the approach surface. The Airport Operations Overlay District also establishes the need for a declaration of anticipated noise levels to be attached to any building permit or development approval, as well as demonstration that noise abatement strategies will be incorporated into building designs in areas where noise is anticipated to be 55 DNL and above.

Recommendation: This Master Plan recommends that both local agencies amend their respective overlay zoning maps to reflect and protect for the RPZs defined by this Master Plan.

Airspace Protection

Airspace protection seeks to prevent the creation of land use features that can be hazards to the airspace required by aircraft in flight and have the potential for causing an aircraft accident. Airspace hazards fall into three categories: physical (e.g., tall structures, bird attractants, thermal plumes), visual (e.g., lights, sources of glare, dust, team), and electronic (e.g., interference with aircraft communications and navigation). As described above, 14 CFR Part 77 establishes standards to protect the airspace surrounding airports from natural or constructed obstructions that could constitute a hazard to flying aircraft.

AST Part 77 Airspace Surfaces

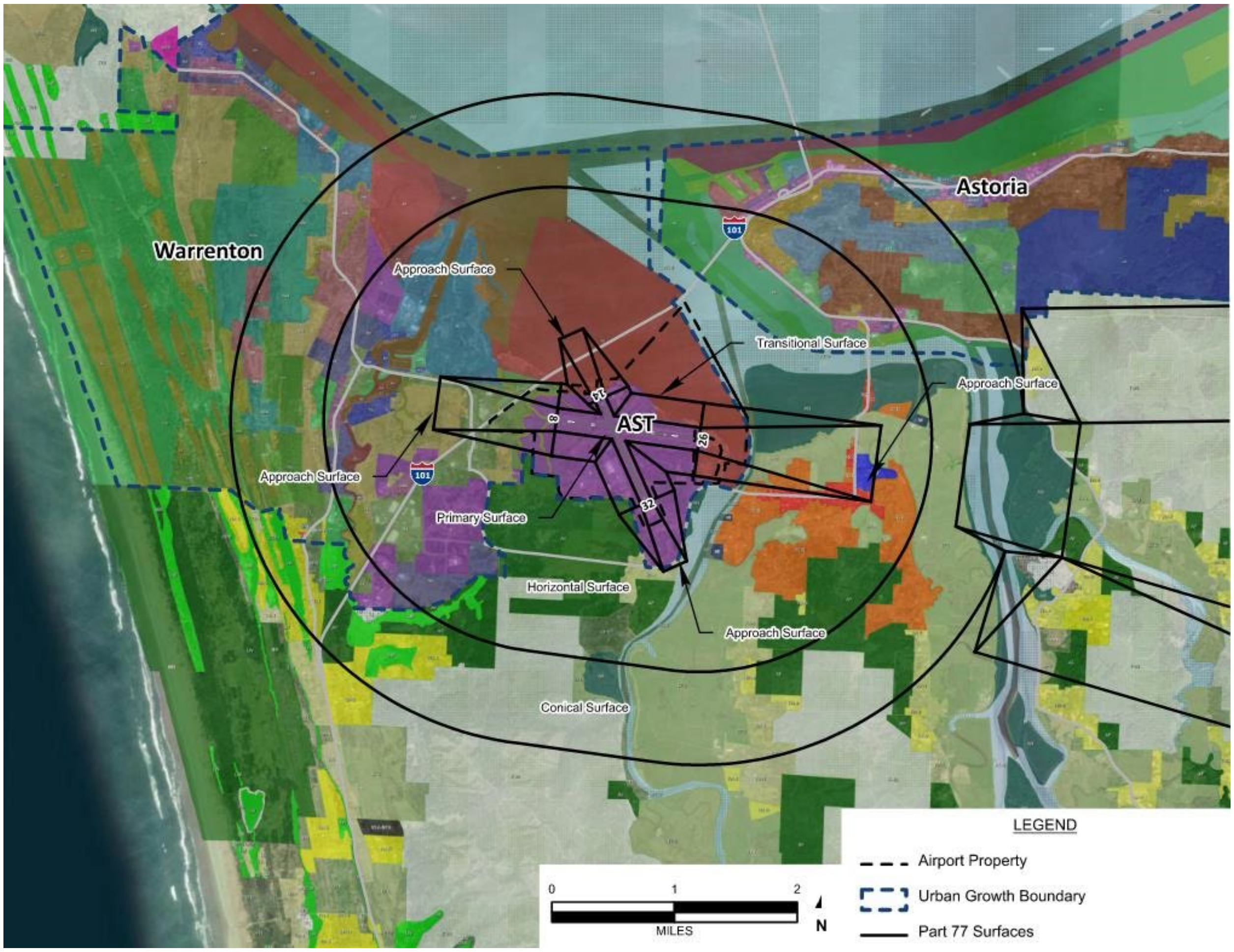
Figure 7-9 depicts the 14 CFR Part 77 airspace surfaces and reflects existing precision instrument approach surfaces for Runways 8/26 and 14/32. Comparison of the height limits established by 14 CFR Part 77 and the underlying ground elevation determines the allowable heights for natural and constructed objects. The Airspace Plan for AST is included as part of the Airport Layout Plan set approved by the FAA. This Airspace Plan depicts the approach, primary, horizontal, transitional, and conical surfaces for AST.

Airspace Compatibility Assessment

The areas subject to height limits of 35 feet or less remain on AST property. For areas beyond airport property, County and City regulations prohibit structures or natural growth to obstruct the 14 CFR Part 77 airspace surfaces. A local government may adopt height exceptions or approve a height variance when supported by the airport sponsor, the ODA, and the FAA.

Recommendation: For Clatsop County and City of Warrenton, current airspace compatibility regulations adequately protect AST's Part 77 surfaces from physical, visual, and electronic hazards. The recommendation is that both jurisdictions use the Part 77 surfaces defined by this Master Plan update and reflect them in local land use maps.

Figure 7-8: **AST Part 77 Surfaces**



Overflight

Aircraft flying overhead can be perceived as a single noise event intrusion or annoyance to residents living outside of the noise contours. Sensitivity to aircraft overflights varies from person to person. The means to address these sensitivities are overflight policies. The basic intent of overflight policies is to advise people that are considering purchasing or leasing property near an airport of the presence of aircraft so that they can make informed decisions regarding the acquisition or lease of property within the airport influence area. It is AST's responsibility to share flight patterns with the City and County. The City and County should incorporate overflight into their land use plans. Overflight policies do not restrict the way land can be developed or used.

AST Traffic Patterns

Runway 8/26 is the primary runway at AST and is equipped with visual and instrument approach aids with a standard left traffic pattern. Runway 8 is a non-precision approach runway that that utilizes an RNAV(GPS) and Very High Frequency Omni-Directional Range (VOR) approach. Runway 8 also utilizes Runway End Identifier Lights (REIL) and a Visual Approach Slope Indicator (VASI) lighting system. Runway 26 is a precision approach runway with an Instrument Landing System (ILS) that contains a localizer and glideslope. Runway End 26 also has a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR).

Runway 14/32 is a visual flight rule (VFR) runway with a standard left traffic pattern that does not have instrument approach procedures (IAPs). Runway 14 has a REIL and four-box VASI and Runway 32 has a four-light Precision Approach Path Indicator (PAPI) lighting system. Runway 14/32 is designated as “circle to land” in several approaches.

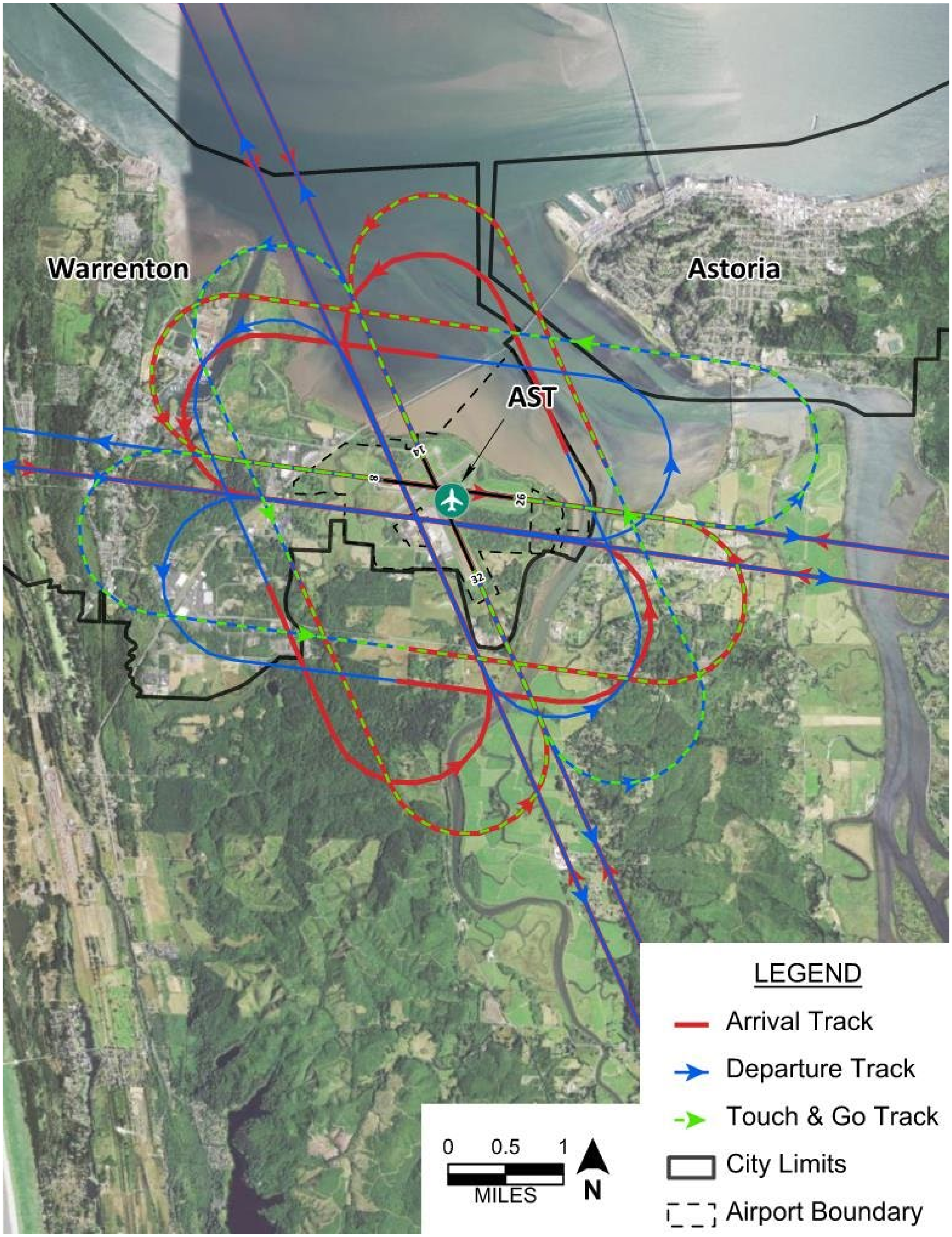
Overflight Assessment

Aircraft flight patterns extend over the City of Warrenton, the southern area of Astoria, and through Clatsop County, as shown in **Figure 7-7**. The overflight policies for each jurisdiction are summarized below.

- **Clatsop County**: Within the Airport Overlay Zone, a declaration of anticipated noise levels must be attached to any building permit, land division appeal, deed, or mortgage record in any noise sensitive area. Any construction within a noise level anticipated to be above 55 DNL must incorporate noise abatement design features.
- **Warrenton**: Within the City’s Airport Operations Overlay District, a declaration of anticipated noise levels must be attached to any building permit or development approval in noise sensitive areas. Any construction within a noise level anticipated to be above 55 DNL must incorporate noise abatement design features.

Recommendation: The intent of overflight policies is to inform prospective buyers of residential property that the property is in proximity of an airport and may be subject to annoyances and inconveniences associated with aircraft operations (e.g., noise, vibration, overflight, or odors). This Master Plan recommends using the outer limits of the Part 77 Conical Surface to define the area that is commonly overflown by low-altitude aircraft of 1,000 feet or less above the runway. Within this boundary, the recommendation is to require as a condition of approval of building permits, land division appeal, deed, mortgage record, or development approval, a declaration of anticipated noise level and the incorporation of noise abatement design features.

Figure 7-9: **AST Traffic Patterns**



RECOMMENDED ACTIONS

The objective of airport compatibility planning is to guide off-airport land use development to be compatible with existing and future airport operations and to maintain quality of life for airport neighbors. The principal objective of this Master Plan is to protect the long-term viability of AST so that it may continue to serve the region's residents, businesses, and visitors. As such, this Master Plan recommends that certain actions be taken by AST management, Clatsop County and the City of Warrenton to protect AST from encroachment of incompatible land uses and to protect residents from airport impacts. Recommended actions for each agency are listed below.

Astoria Regional Airport

- Airport should work with other entities to acquire title or easement for portions of the RPZs that extend off-airport (approximately 40.5 acres).
- Provide GIS files of Master Plan compatibility factors (e.g., noise contours, RPZs, Part 77 surfaces) for use by local jurisdictions in updating their respective Airport Overlay Districts for AST.

Clatsop County

- Update the overlay zoning boundaries on the Clatsop Interactive Map to reflect the following:
  - Future 55 DNL contour to define the areas wherein the County's noise compatibility regulations apply.
  - Part 77 airspace surfaces for the existing runways
- Amend the airport overlay zoning regulations to include the following:
  - Discourage the development of new noise-sensitive land uses (e.g., residences, churches, and children's school) in the 55 DNL contour.
  - Require avigation easements, in lieu of deed declarations, as a condition of approval of building permits within the 55 DNL, RPZs, and approach surface up to 1,000 feet above.
  - Establish the airport overlay boundary, which is defined by the outer limits of the Part 77 surfaces.

City of Warrenton

- Add the 55 DNL contour to the airport overlay to define the areas wherein the City's noise compatibility regulations apply.
- Add a policy that discourages development of new noise-sensitive land uses (e.g., churches and children's school) within the 55 DNL contour.
- Modify airport overlay policy to require an avigation easement as a condition of project approval of noise-sensitive uses.
- Modify airport overlay policy to expand the list of prohibited uses within the RPZ to include all new structures that are not set by aeronautical function.

SUMMARY

The long-term viability of AST is dependent upon the successful cooperation and participation of local agencies to ward off incompatible land uses around the airport. AST serves a vital commercial passenger service role to the economy of northwestern Oregon. AST benefits from the support of the surrounding municipalities, as well as local industry and residents. Clatsop County and the City of Warrenton have adopted airport overlay zoning districts and compatibility regulations to protect AST from encroachment.

This chapter documents the potential land use compatibility conflicts between the contemplated AST expansion plans and existing and planned land uses. A set of recommended compatibility measures that will encourage compatible development within the vicinity of AST and minimize future airport land use compatibility conflicts that would hinder AST's long-term viability are also provided and summarized here.

Compatibility Findings and Recommendations

- **Noise**: The 2041 activity forecast of 45,900 annual based operations produces a future 55 DNL contour that extends beyond on AST property and encompasses various land uses. ODA defines the 55 DNL contour as the noise impact area for noise-sensitive land uses (e.g., schools, hospitals). County and City regulations require soundproofing of noise-sensitive land uses in the 55 DNL contour. This Master Plan recommends that Clatsop County and the City of Warrenton use the updated forecast 55 DNL contour for implementation of the Airport Overlay Zone noise policies.
- **Safety**: Although this Master Plan does not include any changes to the size or location of the RPZs, portions of the RPZ extending off AST property do encompass existing roads and development. This Master Plan recommends that Clatsop County and the City of Warrenton adopt regulations to prohibit all new structures that are not set by aeronautical function within the RPZs.
- **Airspace**: Part 77 surfaces for the existing runways are adequately protected by the County's Airport Overlay Zone and City's Airport Operations Overlay District regulations.
- **Overflight**: Potential overflight annoyance may exist for the surrounding communities. This Master Plan recommends that Clatsop County and the City of Warrenton adopt an avigation easement requirement, as a condition of project approval of noise-sensitive uses.
- **Other Recommendations**: All agencies are encouraged to reference this Master Plan by name and date to clarify the basis of the airport overlay zone boundaries. Other agency-specific recommendations are detailed above in the section entitled "Recommended Actions."

APPENDICES

APPENDIX A

STAKEHOLDER ENGAGEMENT SUMMARY

APPENDIX A - STAKEHOLDER ENGAGEMENT SUMMARY

The purpose of this summary is to document stakeholder engagement activities completed during the AST Master Plan process. These activities largely included:

- Planning Advisory Committee (PAC) meetings with aviation and non-aviation constituents
- Public engagement meetings with community members
- An online open house website for broader outreach
- Port Commissioners meetings for direction and updates

INTRODUCTION AND BACKGROUND

The AST Master Plan evaluates the Airport's needs over a 20-year planning period, for airfield, airspace, terminal areas, and landside facilities. The goal is to document the orderly development of facilities essential to meeting AST needs, in accordance with Federal Aviation Administration (FAA) standards, and in a manner complementary with community interests. The Plan will result in a 20-year development that supports a financially resilient facility that reflects the updated Airport Capital Improvement Plan (CIP) and graphically depicted Airport Layout Plan (ALP) drawings. The approved Plan will show how AST will satisfy FAA design standards and seek project funding eligible under the respective federal and state Airport Aid Programs.

STAKEHOLDER ENGAGEMENT ACTIVITIES

Planning Advisory Committee

The Port of Astoria convened the Planning Advisory Committee (PAC), which consisted of aviation and non-aviation stakeholders selected to provide well-rounded perspectives on the airport master plan. The PAC members served an advisory role to collectively review airport master plan recommendations and provide feedback to Port of Astoria and the Consultant staff.

Port of Astoria representatives participated in PAC discussions as ex-officio members. The FAA Seattle Regional Airports Division and District Office (ADO) and the Oregon Department of Aviation (ODA) were kept informed of the PAC meetings and invited to attend as ex-officio observers. More details about PAC procedures are included in the PAC Charter.

PAC members included:

- Port of Astoria (ex-officio)
- City of Warrenton
- Clatsop County
- Astoria-Warrenton Chamber of Commerce
- U.S. Coast Guard (airport tenant)
- Lektro, Inc.
- Columbia River Bar Pilots
- United Parcel Service
- Federal Aviation Administration (ex-officio observer)
- Oregon Department of Aviation (ex-officio observer)
- Oregon Department of Transportation

Meeting / Date	Objectives	Outcomes
Meeting #1 / Dec. 7, 2022	• Provide overview of airport master plan objectives • Introduce information for airport inventory, environmental considerations and aviation forecasts	• PAC members became familiarized with the master planning process, airport facilities, and airport tenants.
Meeting #2 / June 7, 2023	• Collect comments on airport inventory, environmental considerations and aviation forecasts. • Introduce information for facility requirements and alternatives development	• PAC members were able to comment on Inventory and Forecast Chapters. PAC became familiar with the growth rate of the airport operations and based aircraft.
Meeting #3 / Oct. 4, 2023	• Provided overview of Alternatives analysis and preferred alternatives. Provided Land Use Compatibility & Noise Analysis. Introduced the Financial Feasibility and CIP funding methodology and project list.	• PAC members were able to provide input on the alternatives. Pac members had comments on the implemented noise levels for the City of Warrenton.

Port Commissioner Meetings

Port of Astoria staff and Consultant staff provided updates on the master plan process at Port Commissioner meetings.

Meeting / Date	Objectives	Outcomes
Meeting #1 / Dec. 6, 2022	• Provide overview of airport master plan objectives • Provide update on airport inventory, environmental considerations, and aviation forecasts	• Commissioners had questions and comments regarding FAA's guidance on the critical aircraft, which requires 500 annual operations.
Meeting #2 / June 6, 2023	• Provide update on facility requirements and alternatives development	• Commissioners had comments on grant funding.
Meeting #3 / Oct. 3, 2023	• Provide update on Capital Improvement Plan and Airport Layout Plan	• Commissioners had comments bringing in a larger aircraft to try increase operations.

Public Information Activities and Online Open House

Port of Astoria and Consultant staff hosted public information activities to share updates about the airport master plan and collect comments from community members.

Activity / Date	Objectives	Outcomes
Meeting #1 / June 7, 2023	• Collect comments on airport inventory, environmental considerations and aviation forecasts. • Introduce information for facility requirements and alternatives development	• About 10 participants
AST Fly-in / Aug. 17, 2023	• Increase awareness of airport master plan activities	• Exposure to community members
Meeting #2 / Oct. 4, 2023	• Collect comments on airport inventory, environmental considerations, aviation forecasts facility requirements and alternatives development	• No participants
Online Open House / Oct. 5-16, 2023	• Collect comments on airport inventory, environmental considerations, aviation forecasts facility requirements and alternatives development	• Over 170 devices visited the website • No comments received

APPENDIX B

AIRPORT RECYCLING PLAN

APPENDIX B - AIRPORT RECYCLING PLAN

Guided by the desire to be a responsible steward of the environment and the local community, the Port of Astoria (Port) is striving to implement strategies related to economic viability, operational efficiency, natural resource conservation, and social responsibility at Warrenton-Astoria Regional Airport (AST or the Airport). In accordance with the Federal Aviation Administration (FAA) Modernization and Reauthorization Act of 2012 (FMRA) requirements, an airport's master plan must include considerations related to airport solid waste and recycling. In support of Port priorities and in compliance with the FMRA requirements, the Port is developing this Airport Recycling Plan (the Plan) for AST.

AST currently follows the Port's recycling program, which includes recycling and disposal of several materials in Airport buildings and other areas on Airport property that are under the control of the Port. Airport stakeholders also practice recycling and other waste reduction strategies in areas that they lease or operate. Based on facility walk-throughs, a visual waste composition study, interviews with AST staff, and discussions with various Airport tenants, existing practices were documented and potential opportunities to increase waste diversion, the concept of avoiding and/or managing waste to evade landfill disposal, were identified. This information, in combination with information about internal and external factors, formed the basis for key recommendations in the plan to improve waste management at AST. **Attachment B-1** details site visit observations and serves as a quick reference guide for initial steps to address waste diversion in each physical area and department of the Airport.

Highlights of the recommendations and waste reduction plan include:

- Establishing waste diversion goals and objectives;
- Collecting and donating eligible food, beverages, and toiletries;
- Expanding waste diversion to additional areas;
- Educating employees, tenants, and contractors on waste diversion; and
- Improving contracts, leases, and purchasing policies.

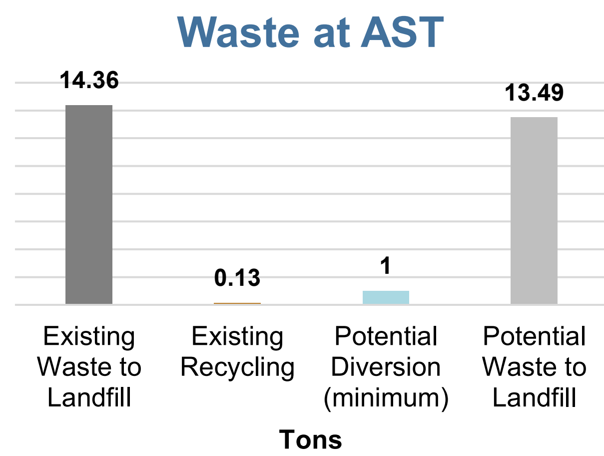
This range of recommendations gives the Port and program stakeholders the flexibility to implement those strategies that are most compatible with changing conditions and available resources (such as labor and space) and progressively increase landfill diversion over time through a phased program of waste reduction, reuse, and recycling.

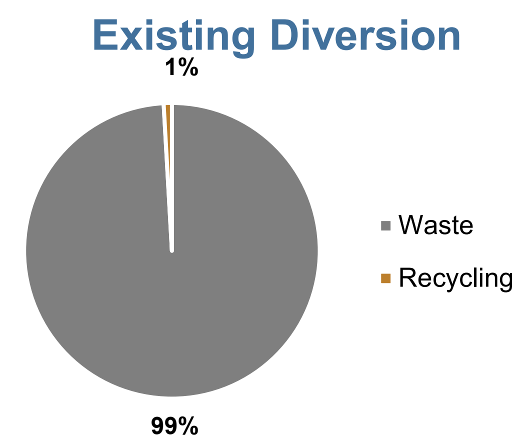
The existing program at AST generates approximately 14.36 tons of landfill-bound waste annually, as well as an additional 0.55 tons of comingled recycling. The following four key recommended strategies have the near-term potential to divert at least 1 ton of general materials from the landfill per year. AST can reduce waste generation and increase landfill diversion by:

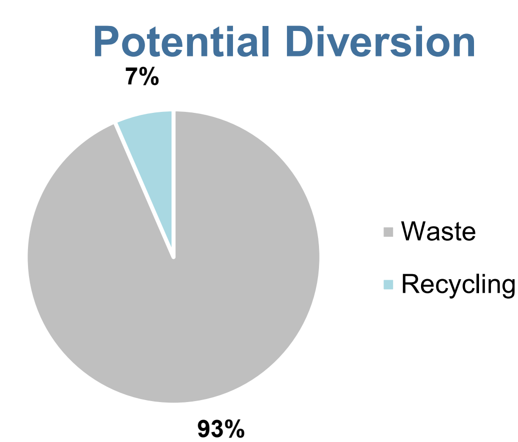
- Integrating waste diversion practices into airport operations.
- Reviewing and updating purchasing to reduce disposable items and encourage reusing supplies.
- Enhancing the existing recycling program.
- Tracking and voluntarily reporting waste metrics and diversion progress.

Efforts to reduce waste generation and increase landfill diversion align with the Port's goal of operating AST in a sustainable, responsible manner.

Planning for solid waste and recycling under the terminal area plan fulfills AST's federal obligation under the FAA Modernization and Reauthorization Act of 2012, FAA Reauthorization Act of 2018, and associated guidance.







KEY RECOMMENDATIONS

The following key recommendations are immediate solutions to improve waste management at AST through strategies that include waste reduction, reuse, and recycling. Evaluation for each recommendation considered estimated relative cost and diversion potential, benefits to the Airport and its stakeholders, and noted alignment with best practices or Total Resource Use and Efficiency (TRUE) Certification, a program that supports zero-waste goal setting with considerations for resource life cycles.

For quick comparison, an impact overview section has been included at the beginning of each recommendation on diversion (see **Table B-1** for symbol significance). In a later section, additional key recommendations, the plan to minimize solid waste generation, and considerations for a phased and comprehensive planning approach to waste diversion improvements at AST are provided.

Table B-1: Recommendation Overview Key

Item	Icons	Significance
Relative Cost	$	Low cost
	$ $	Medium cost
	$ $ $	High cost
Estimated Diversion Potential		Low diversion potential
		Medium diversion potential
		High diversion potential
Benefits		Reduced Environmental Impact(s) *(For example, Reduced Resource Consumption, Emissions, and/or Pollution)*
		Cost Savings
		Support Community / Build Relationships
Alignment	BMP	Best Management Practice
	TRUE	BMP and **TRUE** Certification program element

Key Recommendation 1: Integrate Waste Diversion

Relative Cost	Estimated Diversion	Benefits	Alignment
			BMP

Description

Waste management at AST should include avoiding and managing waste to prevent landfill disposal throughout all Airport operations that generate waste and recyclable materials. Waste diversion strategies include practices such as reduction, reuse, donation, sustainable procurement, recycling, and composting. These strategies offer various levels of fiscal, environmental, and social benefits.

Action

It is recommended that AST integrate waste diversion concepts and practices into existing policies and operations, such as maintenance operations, purchasing practices, and tenant requirements.

Justification

Most of the municipal solid waste generated at AST is disposed of at Recology Western Oregon (see **Current Waste Management Program** section). Recycling sorting takes place at the Recology Astoria Transfer Station. Waste diversion would reduce the volume of waste sent to the landfill as well as reduce the financial and social impacts of waste.

Information Needed

- Communication tools to reach AST staff and tenants.
- Waste diversion information from the Port and/or hauler.

Action Plan

- Emphasize importance of waste diversion to AST staff and tenants.
- Adopt a waste diversion policy or integrate in existing guidance documents, including tenant lease language or contractor guidance (see **Review of Waste Management Contracts and Tenant Leases** section).
- Documented policy should include planning considerations, staffing, equipment (type and source), training for staff and volunteers, and metrics for analysis.
- Align with the local and state efforts to meet the 52% materials recovery goal.
- Identify sources of waste and promote strategies to avoid, reduce, or divert these materials.
- Continue existing practices such as double-sided printing, digital documentation, and water bottle filling stations.

Key Recommendation 2: Review and Update Purchasing

Relative Cost	Estimated Diversion	Benefits	Alignment
$ $ $			BMP

Description

To reduce the facility's volume of waste sent to the landfill, AST should reduce waste generation by starting with the source of the materials. AST's existing purchasing practices may generate waste in the form of single-use and/or disposable items and supplies. Tracking of these items could reveal opportunities for reduction and reuse.

Action

It is recommended that AST adopt a purchasing policy prioritizing durable (versus disposable) items and supplies that are reusable, recyclable, compostable, and/or made from recycled content. It is also recommended that AST identify supplies and materials that can be avoided, reused on site, or donated to a third party.

Justification

Waste reduction is the most environmentally preferred waste management strategy as determined by the Environmental Protection Agency (EPA). Reduction and reuse simultaneously lower waste program costs by producing a smaller material stream.

Information Needed

- Purchasing records.
- Waste stream information.

Action Plan

- Adjust practices that generate waste (e.g., printing/physical media, housekeeping).
- Substitute durable alternatives for single-use or disposable items in areas such as the administration office and staff areas.
- Reuse items and materials where possible and encourage reuse by employees, tenants, and contractors.
- Consider purchasing branded reusable items and discontinuing the purchase of bottled water and disposable beverage containers.
- Review feasibility of sustainable alternatives for existing items such as coreless toilet paper, towels, and toilet paper.
- Implement an environmentally preferred purchasing (EPP) policy (i.e., buy in bulk, buy products with minimal packaging, use supplier/manufacturer take-back programs for items such as toner cartridges).

Key Recommendation 3: Enhance Existing Recycling Program

Relative Cost	Estimated Diversion	Benefits	Alignment
$ $ $			TRUE

Description

To reduce the facility's volume of waste sent to the landfill, AST should emphasize efforts to recycle materials that cannot be reused or avoided. While recycling does already take place, a program with clearly defined goals and objectives would organize efforts to educate all stakeholders and plan for maximizing diversion.

Action

It is recommended that AST enhance its existing recycling program and supplement current practices with improved receptacles, additional signage, and an education campaign for all stakeholders. It is also recommended that AST expand its recycling program to include all materials accepted by Clatsop County (see **Review of Recycling Feasibility**).

Justification

Convenient receptacles, effective signage, and educational campaigns have been shown to increase participation and improve compliance with a recycling program. Recycling bins should be readily visible, and instructional recycling signage would greatly increase the effectivity of recycling efforts. An awareness campaign for employees, tenants, and visitors further compounds the program's effectiveness.

Information Needed

- Inventory of related signage and areas of significant waste generation.
- Protocol for communicating program to employees, tenants, and visitors.
- Input from custodial staff and contractors regarding current practices and program effectivity.

Action Plan

- Re-invigorate recycling program with a focus on recycling correctly and the identification of accepted materials.
- Convert surplus garbage bins into recycling bins with labeling.
- Collocate all recycling and garbage bins into pairs throughout facility, especially in exterior areas, offices, and tenant spaces.
- Right-size and standardize bins and bin liners to match capacity needs.
- Install color-coded, graphic instructional signage in public areas, such as Recycle Across America standardized recycling labels (see **Attachment B-2** for more details).
- Develop a promotional campaign to communicate information about recycling program to staff and tenants.
- Monitor and adjust recycling program using feedback from AST tenants and staff.

Key Recommendation 4: Implement Tracking and Reporting

Relative Cost	Estimated Diversion	Benefits	Alignment
$ $ $			TRUE

Description

Monitoring waste metrics provides feedback on the efficiency of diversion efforts. Sharing this information with stakeholders has been shown to increase participation in diversion practices.

Action

It is recommended that AST begin to regularly estimate and track the volume of waste sent to the landfill and the volume diverted through reduction, reuse, donation, recycling, or other strategies. Sharing the total costs and cost savings associated with these services is also recommended. Additionally, AST should discuss these trends with the waste hauler and program stakeholders (AST staff and tenants).

Justification

AST does not currently track or monitor internal metrics associated with its waste or recycling. However, these metrics are being recorded and sent to Clatsop County by the Airport's hauler and they directly impact the amount that is charged for annual user fees. Trends associated with AST's waste generation, landfill volume, diversion volume, and associated costs could indicate opportunities for improvement.

Information Needed

- Waste generation, disposal, and cost estimates.
- Simple tracking tool (spreadsheet).
- Estimates for volume of waste diverted by various strategies and avoided costs.
- Mechanism for communicating progress to stakeholders.

Action Plan

- Collaborate with Recology Western Oregon to track waste disposal and recycling tonnage.
- Obtain estimate of associated user fees from Clatsop County and determine savings from waste diversion.
- As strategies are implemented, update the tracking tool to reflect waste avoided or diverted and their associated costs.
- Evaluate data for additional opportunities to set and pursue waste diversion goals.
- Share and celebrate progress with stakeholders.

Additional Key Recommendations for Consideration

In addition to the primary recommendations stated previously, several other key strategies should be implemented at AST in the near-term. These supplementary recommendations are found in **Table B-2.**

Table B-2: Additional Key Recommendations for AST Waste Diversion Plan

Additional Key Recommendations
Objectives and Targets
▸ Create a vision for the AST waste management program. Example vision language: "The Port is committed to environmental stewardship, supporting the local community, and operating efficiently by: – Working with our stakeholders to increase diversion of solid waste from the landfill. – Prioritizing donations, source reduction, and reuse to avoid creating waste. – Supporting our staff, tenants, and the local community in their efforts to reduce waste and divert material from the landfill." ▸ Set specific, measurable, achievable, realistic, and time-bound (SMART) goals for AST's waste program.
Additional Facilities and New Development
▸ Consider waste diversion and management in the design and construction process of future airport projects. ▸ Require waste data from construction contractors. Establish data collection protocol. ▸ Implement best practices for C&D waste diversion.
Continuous Improvement
▸ Maintain and improve the recycling and waste program per the Plan-Do-Check-Act cycle. – **Plan:** The recommended strategies and supporting references make up the "plan" portion of the process. Defining success, establishing materials and areas of focus, collecting baseline information and identifying strategies are all part of planning. In the future, additional areas of focus, baseline measurements, and goals will likely be needed. – **Do:** Implementation of strategies included in this plan represents the "do" portion of the process. This involves implementing the recommendations in this plan and making progress toward achieving the goals. – **Check:** As strategies are implemented, the "check" portion of the process involves reporting that requires regularly tracking and checking the progress toward meeting the goals. Develop and use tools for measuring success and identifying areas for improvement, including a mechanism for feedback and process for reviewing suggestions. – **Act:** The "act" portion of the process encompasses taking what has been learned in the previous stages and actively responding. It can be helpful to ask, "What did we learn?" and, "How can we do better next time?" ▸ Continuously improve the waste diversion program. Re-evaluate the program on a regular basis (at least annually) and adjust to accommodate program performance, stakeholder feedback, changes in the market, and technology advancements.

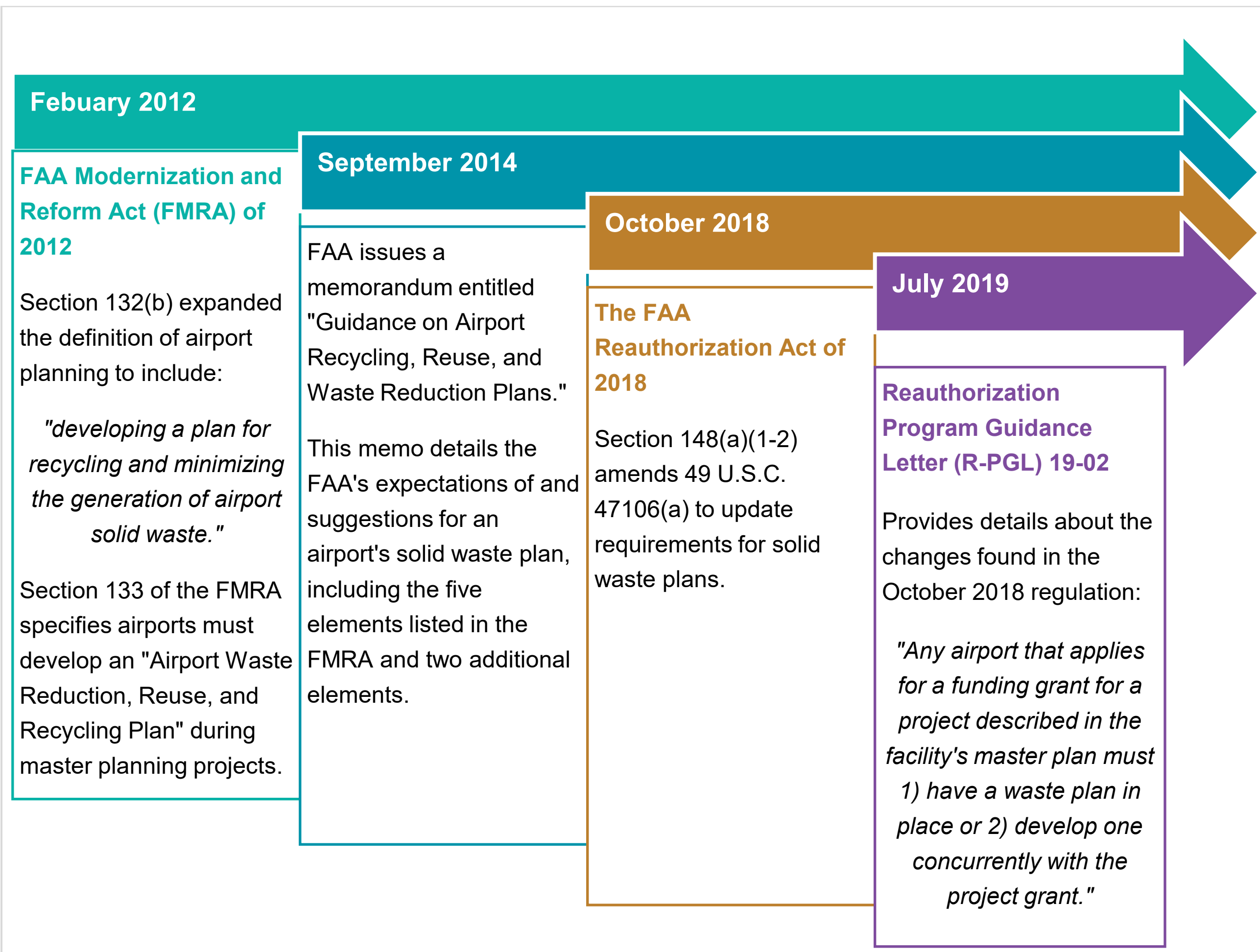
AIRPORT WASTE DIVERSION PLAN

In compliance with FMRA and in accordance with the FAA's guidance memo, this Plan was developed for AST as part of the Master Plan Update. The Plan documents and assesses AST's existing waste diversion program based on the factors and variables listed above and provides recommendations for improvement. The content of this Plan was governed by the extent and accuracy of available information.

Regulatory Background

Figure B-1 outlines the introduction timeline and specifics of the FAA's waste planning requirement. The FAA provides content guidance for airport waste plans in the September 2014 memo on the topic (available on the FAA's website).

Figure B-1: **FAA Solid Waste Recycling Planning Requirement Timeline and Details**



Source: FAA.

Figure B-2 details the elements that are required for a solid waste recycling plan per the FMRA (marked with an asterisk, *) or suggested for inclusion in a plan per the FAA Memo (marked with two asterisks, **). **Figure B-3** lists the factors influencing the scope and nature of an airport's waste program, as described in the FAA memo.

Figure B-2: Elements of Airport Solid Waste Management

Source: FAA.

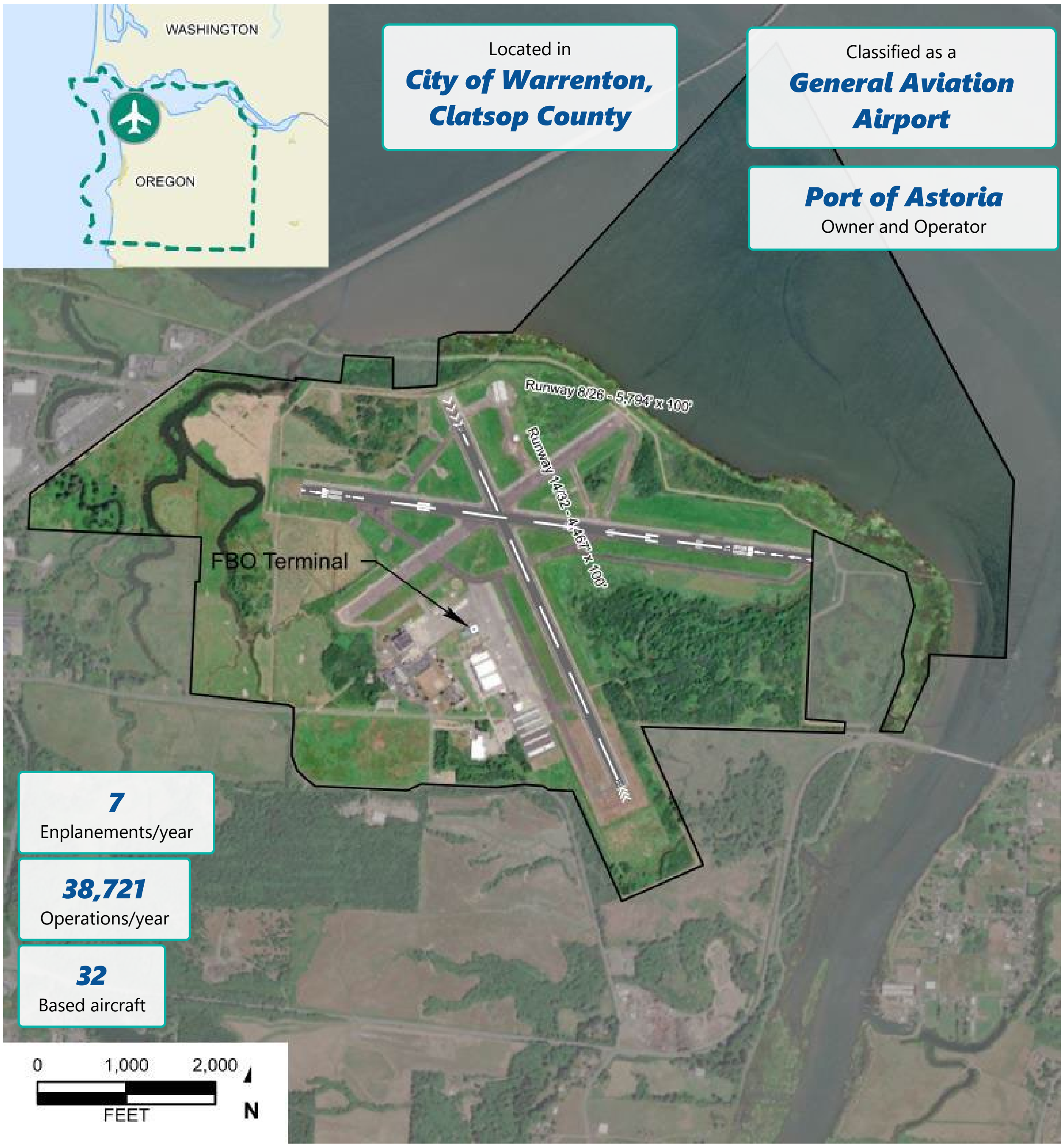
Figure B-3: Factors Influencing Airport Solid Waste Management Programs

Source: FAA.

Airport Information

Figure B-4 shows a summary of background information about AST, including its layout, location, operations, classification, governance, and air carrier.

Figure B-4: AST Background Information



Sources: AirportIQ 5010, 2022; FAA Terminal Area Forecast, 2021; Mead & Hunt, Inc.

Plan Scope

Municipal Solid Waste (MSW) consists of everyday items that are used and then discarded. This plan focuses on the management of MSW and other materials that may be recycled or disposed of in a municipal solid waste landfill. There are five primary types of MSW generated at airports: general MSW, food waste, green waste (yard waste), and construction and demolition (C&D) waste. This plan does not address the management of other waste types regulated by federal, state, or local laws, specifically: hazardous, universal, or industrial waste; waste from international flights; or C&D waste that is subject to special requirements/handling.

Facilities at AST include buildings and areas that the Port has varying degrees of control or influence over regarding waste management practices. Some areas fall under direct control of the Port and its staff, while in others the Port has influence but not direct control. According to FAA guidance, areas over which the Port has direct control or influence should be included in the Airport Waste Diversion Plan; areas outside the Port's control or influence may be excluded.

Table B-3 shows a breakdown of the areas the Port controls, influences, and neither controls nor influences.

Table B-3: Waste Management Areas at AST

Management Level	Facility
Areas under direct control	▸ Public Terminal Areas ▸ Fixed Base Operator
Areas under influence	▸ Tenants ▸ Hangar tenants
Areas not under control or influence	▸ United States Coast Guard

Source: AST.

Current Waste Management Program

The waste program at AST is maintained by Airport staff. Recology directly manages waste and recycling collection using garbage trucks to collect materials from AST's dumpsters and compactors. Recycling dumpsters are provided by Recology for use by AST facilities.

Figure B-5 shows the materials collected by Clatsop County in AST's existing recycling program.

Figure B-5: Items Currently Collected for Comingled Recycling at AST

Source: Recology, Clatsop County

AST's maintenance staff are responsible for custodial activities in buildings and areas directly managed by the Airport, such as the public terminal and administration areas. Janitorial staff collect waste and recyclables from bins and transfer these materials to the appropriate dumpsters.

AST's tenants are responsible for custodial activities in their areas, including transferring waste to the appropriate dumpsters. FBO, hangar tenants, and other aviation-related businesses at the airport are responsible for individual housekeeping and contracting for their own waste dumpsters and recycling services.

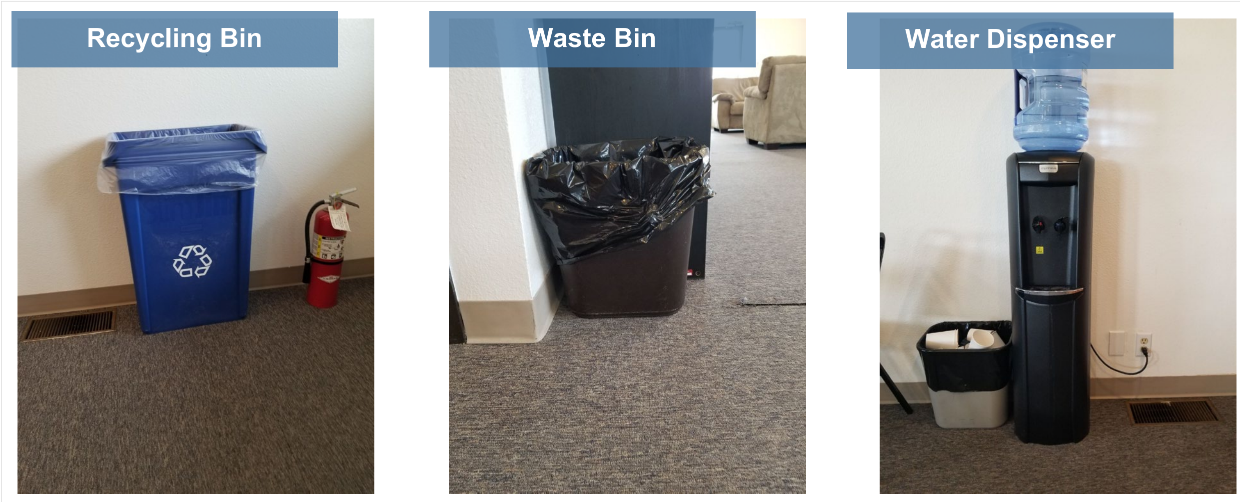
Infrastructure

The objective of the waste and recycling infrastructure is to help relieve and mitigate issues from the current program by planning for optimized waste diversion with the appropriate infrastructure to help improve waste collection and diversion efforts. The goals of the waste and recycling infrastructure at AST are to:

- Increase the proper recovery of recyclable materials.
- Minimize costs of waste management and diversion.
- Create an aesthetically appealing set of waste infrastructure options.
- Provide the public, employees, and tenants with educational messaging about the importance of proper waste management.
- Enhance the plan required by the FAA.

Figure B-6 shows the existing terminal building infrastructure in place at AST.

Figure B-6: **Existing Terminal Building Infrastructure**



Waste Audit

An evaluation of AST's information and records, as well as aviation industry waste and recycling trends, supported efforts to identify the source, composition, and quantity of waste generated at AST, including areas under AST's direct control or influence. This information then served as a foundation to identify opportunities to improve and monitor program effectiveness.

Quantity

14	**0.1**
Annual tons of MSW	Annual tons of Recycling

These volumes are based upon the capacity and frequency of collection service for each of the facility's receptacles and the EPA's volume-to-weight conversion factors for MSW.

Additional details about the logistics and parameters of the AST waste program can be found in **Attachment B-3**, the Airport Waste and Recycling Data Request.

Purchases

AST Procurement Staff currently track the quantity and type of disposable items and supplies purchased for the facility. This information provides insight on some of the materials coming into the Airport that will go back out as waste (other materials are brought on-site by visitors, employees, tenants, and vendors).

Identifying and tracking the type and quantity of all disposable items purchased will allow AST to identify opportunities to reduce outgoing waste, including:

- Some items that could be eliminated:
  - Single-use plastic and paper items.
  - Plastic water bottles for staff and guests.
  - Unwanted mail.
  - Failing/aged infrastructure (replace with more energy and product efficient options).
- Items that have reusable or recyclable alternatives:
  - Repair and reuse pallets, crates, boxes, buckets.
  - Donate or compost excess food.
  - Use reusable cups, water bottles, plates, flatware.
  - Replace trash can with a mini-bin to encourage recycling.
  - Installation of a water bottle filling station to reduce single-use items and quantify the number of single-use water bottles that may have otherwise ended up in the waste stream.

Sources and Composition

Based on the activities taking place at AST, a varied waste stream can be expected. **Table B-4 l**ists each area included in the scope of this Plan and the type(s) of waste likely generated there. A formal waste sort could also be used to identify opportunities to improve the composition of the waste stream (by item substitution, improving recycling to reduce the volume of waste, etc.).

A physical waste composition study could provide more detailed information about the specific composition of waste at AST. This information may include:

- Types of items included in each general category.
- Contamination rate of the recycling stream (items that are not recyclable in the recycling bins).
- Recovery rate for recycling (the proportion of recyclable items that are segregated properly).

Table B-4: AST Waste by Area and Material

Area | Material	Office Paper	Newspapers	Magazines	Plastic	Aluminum	Cardboard	Glass	Food Waste	Paper Products	Liquids	Toiletries	Packaging	Styrofoam	Metals	Green Waste	C & D Waste
Public areas		x	x	x	x	x	x	x	x	x	x	x		x		
Fixed Base Operator	x	x	x	x	x	x			x			x		x		
Tenant areas	x	x	x	x	x	x			x			x				
Hangar tenant areas	x	x	x	x	x	x			x			x		x		

Source: AST.

Review of Recycling Feasibility

There are several factors that influence the feasibility of recycling and other waste diversion strategies at an airport. These factors were assessed for influence at AST.

Guidelines and Policies

To evaluate AST's existing diversion plan in the context of national, state, and local requirements, federal, Oregon State, and local-level waste and recycling regulations, policies, and factors were reviewed.

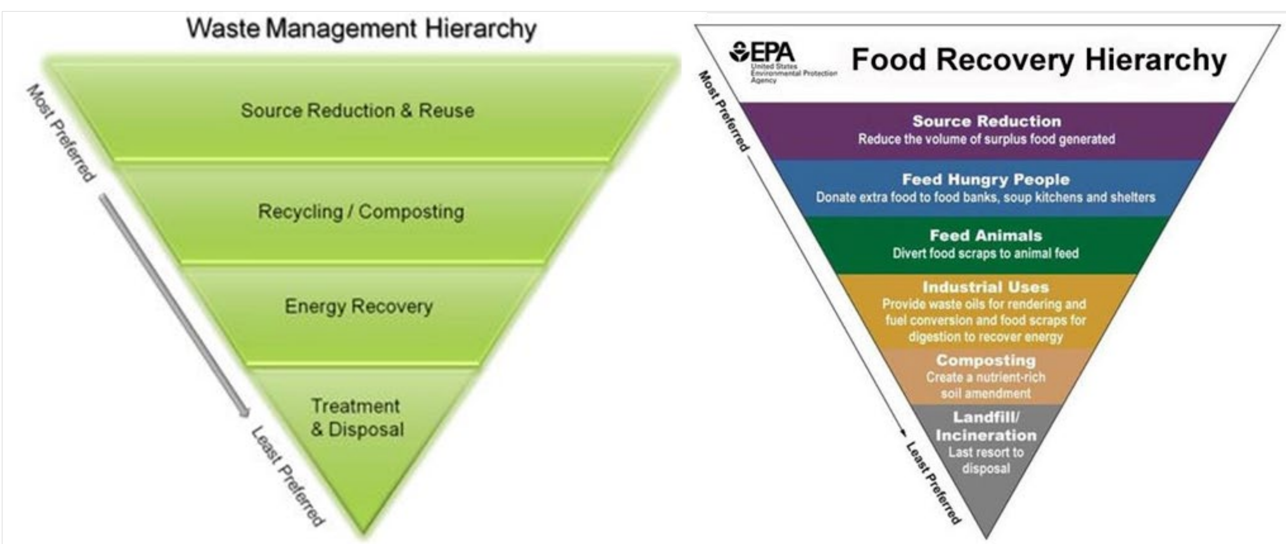
Federal

As described in the **Regulatory Background** section, the FAA's definition of airport planning includes planning for recycling and waste minimization.

The United States Environmental Protection Agency (EPA) is responsible for developing a solid waste management program under the Resource Conservation and Recovery Act (RCRA) and related policies and guidance. RCRA provides the framework for management of hazardous and non-hazardous waste. All generators of hazardous waste, including airports, are required to comply with RCRA and all other federal waste laws and regulations.

Figure B-7 shows a hierarchy of waste management strategies developed by the EPA. The hierarchy on the left ranks these strategies from most- to least-environmentally preferred and places emphasis on reducing, reusing, and recycling. In addition to the general waste management hierarchy, the EPA has also developed a preference ranking of management strategies for food waste, as shown in the figure below.

Figure B-7: **Waste Management and Food Recovery Hierarchies**



Source: United States Environmental Protection Agency.

State

The State of Oregon's 1971 Bottle Bill, administered by the Oregon Liquor Control Commission, was the first of its kind in the country designed to reduce litter. Outside of the Bottle Bill, the base recycling law is the Opportunity to Recycle Act, first passed in 1983 and last amended in 2015. The Oregon Department of Environmental Quality (DEQ) establishes Recycling and Waste Reduction administrative rules to elaborate on the Act and is responsible for regulating cities, counties, and other local governments regarding waste. The DEQ has developed a policy and integrated plan for managing waste materials, *Materials Management in Oregon: 2050 Vision and Framework for Action.* The Opportunity to Recycle Act prioritizes certain waste management strategies over others in alignment with the hierarchy promoted by the EPA.

The State of Oregon (the State) set its material recovery rate goal to 52 percent for 2020 and 55 percent for 2025. In addition, the state's recovery rate goals for food waste, plastic waste, and carpet waste are all 25 percent by 2020. Each county (and some metropolitan areas) set their own voluntary recovery goals by statute. To make progress under the 2050 Vision, cities of a certain size or within a certain region must implement three to five listed reduction and reuse elements. All other cities must implement a minimum number of recycling program elements, based on their size and location, chosen from the thirteen options listed in Senate Bill 263. The State's laws and plans allow the local units to implement programs to meet the statewide mandatory and individual voluntary goals.

The State requires local governments to implement recycling programs, and in some jurisdictions, it requires waste prevention and reuse programs. The following are the State's recycling goals:

- Reduce the amount of solid waste generated.
- Reuse material for the purpose for which it was originally intended.
- Recycle material that cannot be reused.
- Compost material that cannot be reused or recycled.
- Recover energy from solid waste that cannot be reused, recycled, or composted so long as the energy recovery facility preserves the quality of air, water, and land resources.
- Dispose of solid waste that cannot be reused, recycled, composted or from which energy cannot be recovered by landfilling or other method approved by the DEQ.

Local

Solid Waste Management is governed by Oregon Revised Statutes Chapter 459 and 459A. Clatsop County fulfills the State of Oregon's requirements by implementing the Clatsop County Code of Regulations, Title 8 Health and Safety, Chapter 8.24 Solid Waste Control. Chapter 8.24 states:

> *To protect the health, safety and welfare of the people of the County, the Board has determined the necessity of providing a coordinated countywide program for the safe, economical and efficient collection, storage, transportation and disposal of wastes and solid wastes, and to ensure adequate standards of service for said collection, storage, transportation and disposal of wastes and solid wastes, and this chapter shall be liberally construed for the accomplishment of these purposes. (Ord. 2021-06 § 6)*

The City and County codes do not appear to include waste reduction or recycling goals; however, it is assumed the City and surrounding governmental jurisdictions follow the waste management goals and efforts stated within the *Materials Management in Oregon: 2050 Vision and Framework Action.* The City hosts several recycling events throughout the year to help residents dispose of electronics, hazardous waste, and other large items in the proper manner.

The Clatsop County recycling program accepts all recyclable materials listed in **Table B-5**.

Table B-5: Accepted Recyclable Items in Clatsop County

Curbside			
Aerosol cans (empty)	Aluminum cans	Cardboard (must be flattened)	Mixed paper: (office paper, envelopes, junk mail, cards, books, paper bags, wrapping paper, newspaper, inserts, magazines)
Telephone books	Plastic, bottles and containers ONLY	Tin cans	Paperboard: (shoe boxes, gift boxes, soda boxes, food boxes, paper towel rolls, paper egg cartons)
Drop-Off			
Aluminum cans	Cardboard	Tires	Paperboard: (shoe boxes, gift boxes, soda boxes, food boxes, paper towel rolls, paper egg cartons)
Antifreeze	Glass, jars and bottles	Plastic, bottles and containers ONLY	Used motor oil, filters and bottles (leave caps on)
Yard waste	Propane tanks (no caps)	Appliances, large (refrigerators, washers, dryers)	Hazardous household materials (See a complete list of items accepted.)
Scrap metal	Bulbs (CFL light bulbs, fluorescent tubes)	Batteries, lead-acid (car, truck, boat), NiCad	Household electronics (televisions, computers, computer monitors, printers)
Telephone books	Paint (oil and latex)	Tin cans	Mixed paper: (office paper, envelopes, junk mail, cards, books, paper bags, wrapping paper, magazines)

Source: Recology Western Oregon

Drivers and Constraints

Many factors affect waste diversion feasibility at AST. Such factors include both opportunities for growth, such as local commitments to environmental sustainability, and challenges to the implementation of a recycling plan, such as the availability of region-wide recycling infrastructure.

Airport Policy, Commitment, and Support

The willingness of AST staff, contractors, and tenants to support the Airport's waste diversion plan is critical to the program's success. Without committing resources such as funding, labor and time, space, and access to secure areas, a waste diversion program could struggle.

AST's staff remain committed to the existing recycling program and wish to oversee its expansion into additional areas. They assert that recycling and waste reduction represent opportunities for energy and cost savings, as well as providing a genuine service to the community. This Plan will serve as a means for AST to be proactive in their future airport-wide sustainability planning efforts.

Local Dedications

Based on the resources allocated to local recycling programs, Clatsop County appears to generally support waste diversion, responsible waste management, and sustainable operations. Based on the availability of residential and commercial recycling, this plan assumes the residents of the communities surrounding AST, and therefore its employees and visitors, have been exposed to recycling, receive on-going messaging about its importance, and are generally supportive of recycling efforts.

Local Markets, Logistics, and Infrastructure

Markets for recycled materials fluctuate based on many factors and interactions. Local waste haulers typically accept materials that can be recycled cost-effectively in the area; however, rebates are not lucrative without significant volume and minimal contamination. Manufacturers purchasing recycled material want it to be predictable and ready for use; therefore, recycling facilities are discriminatory about what materials they accept. They almost unilaterally prefer materials that are of high value, clean, and easy to separate.

The drop-off location for MSW in Warrenton is the Astoria Transfer Station. This facility is located roughly 2.5 miles northwest of AST, and it has adequate capacity to serve AST and the local area for the foreseeable future. Recycling is coordinated through sorting efforts at the facility where materials are sent out to the respective commodity markets unless a load is contaminated. Loads that are unable to be processed for recycling are sent to the landfill.

Partnerships

AST has internal, on-airport, and community stakeholders that are critical to the success of waste diversion efforts and planning. As the Airport creates strategies to address optimizing waste management, building and discovering synergies with Airport stakeholders will ultimately lead to the best outcomes.

Airport staff can be influenced by the vision and enthusiasm of Port leadership. It is imperative to illustrate the importance of the waste diversion program and how it contributes to overall environmental and social sustainability.
In addition, the Warrenton/Clatsop community is involved when it comes to sustainability and social support, so there is a great conduit for AST to contribute to community stewardship.

Aligning the AST program with stakeholder practices, like those of the entities that operate at the Airport, provides opportunities for mutually beneficial agreements. The Airport can reduce its environmental impact and, by helping stakeholders reduce their impact, generate goodwill between AST and the local community.

Costs

Airport staff strive to operate AST to be as self-sustaining as is feasible; therefore, it is imperative that programs implemented and maintained at AST, including recycling and other waste diversion strategies, are as cost-effective as possible.

Operation and Maintenance (O&M) Requirements

There are currently not any documented, official operations and maintenance requirements at the Airport. AST is set up to recycle commingled materials in public and office spaces. There are efforts to separate material by airport staff, contractors, and tenants, but not all efforts are done properly. There is a concern that materials are ending up in the landfill due to logistical issues with the receiving recycling material recovery facility.

There are standard waste collection practices in place at AST. Waste is collected from the public and office spaces by AST maintenance staff and taken to the commercial trash dumpster or recycling dumpster. Each airport tenant is responsible for taking their own trash and recycling to the same dumpsters. These trash and recycling dumpsters are located by the FBO office. Recyclable materials and trash are removed from Airport property by Recology.

Review of Waste Management Contracts and Tenant Leases

The FAA memorandum titled “Guidance on Airport Recycling, Reuse, and Waste Reduction Plans” explains that the purpose of reviewing waste management contracts is to “identify opportunities for improving (waste) program scope and efficiency, as well as identify constraints.” By reviewing contracts and tenant leases for language pertaining to waste management practices, the waste plan may appropriately identify opportunities to encourage responsible waste management for all levels of Airport activity.

Contracts typically detail general housekeeping requirements and related expectations for managing trash/recycling. Waste management contracts and tenant leases were not reviewed for provisions related to waste management as part of this study.

Contracts should include language to mandate or incentivize recycling and prescribed waste management strategies of the Plan by requiring conformance with or support of any future Airport-related waste diversion efforts. Contracts are a vehicle through which the Port can influence tenant behavior, including waste diversion.

As contracts and leases expire, extend, or renew, it is recommended that AST consider revising the new contract language to include waste management requirements or preferences, such as support of the recycling program. This could be a general clause stating a preference that tenants reduce, reuse, and recycle where practicable or specific information about recycling, reuse, or waste reduction objectives and requirements.

Some sample contract provisions to be considered include the following:

- Utilize technology to be responsive to waste challenges including logistics and staff training.
- Require dilution control systems to help reduce wasted packaging.
- Plan for reduced purchases of chemicals by purchasing in bulk.
- Reduce paper consumption using strategies like digital work orders and electronic procurement documents.
- Require documentation showing compliance with all waste diversion requirements.

It is important to customize waste diversion language in contracts as the program at AST evolves. Standard waste management language should be included in all tenant standards. Several example provisions include:

- "Tenant finishes shall contain [x%] recycled content and shall be chosen with their life cycle impacts in mind."
- "Tenant areas shall provide receptacles in public areas that meet the following criteria:
  - Three streams, with flexible signage and lids for future compost option
  - Conjoined or connected containers
  - Consistent configuration throughout the space
  - Restrictive, color-coded lids
  - Made from recycled content
  - Comfortable to service and maintain"
- "Tenants shall allocate back-of-house space for bins to collect two streams (comingled recycling and landfill waste). Tenants shall indicate the allocated footprint on their build-out plans/submittals."

Attachment B-4 provides sample environmental clauses and provisions that are provided by the US General Services Administration (GSA) Sustainable Facilities Tool (SFTool) for use in janitorial contracts. These examples can be customized for use in tenant contracts in order to influence alignment with the Airport's goals and objectives for waste diversion.

Financial Analysis - Potential for Cost Savings or Revenue Generation

According to the FAA memo "Guidance on Airport Recycling, Reuse, and Waste Reduction Plans," an analysis of the financial aspects of waste management assists airport sponsors in determining the cost versus benefit of all existing and proposed enhancements to an airport's practices and should include capital costs, physical infrastructure, transport, and labor.

A financial analysis of the cost for waste management at AST was not conducted for this plan. It is anticipated that reducing and diverting waste generated at AST would reduce costs through adjustments to the waste collection schedule and size of waste dumpsters required at the facility.

CONCLUSION

The Port currently has a simple waste program in place for AST that includes basic elements and has the potential to be expanded in phases to further reduce the facility's environmental impact. This document has described the existing program and outlined recommended improvements that will allow AST to potentially increase both landfill diversion and recycling volumes. In addition, this plan documents and supports AST's compliance with the FMRA of 2012 and FAA guidance for recycling, reuse, and waste reduction.

WASTE GLOSSARY

(Sorted by chronology)

FAA Modernization and Reform Act of 2012 (FMRA) – legislation that seeks to improve aviation safety and capacity of the national airspace system and provide a stable funding system.

FAA Reauthorization Act of 2018 – reauthorization of FMRA 2012 to extend funding and administrative authority to the FAA.

Waste Diversion - avoiding and/or managing waste to evade landfill disposal through strategies including refusal, reduction, reuse, and recycling.

Total Resource Use and Efficiency (TRUE) – Zero waste certification program administered by the Green Business Certification Inc. (GBCI).

Environmental Protection Agency (EPA) – independent agency of the US government that establishes policies that protect the natural environment.

Reauthorization Program Guidance Letter (R-PGL) 19-02 – implements provisions to FAA Reauthorization Act of 2018 that changed project eligibility, scope, or funding under 49 U.S.C., Chapter 471.

Municipal Solid Waste (MSW) – everyday items that are used and then discarded. There are five primary types of MSW generated at airports:

- **General MSW** – common inorganic waste, such as product packaging, disposable utensils, plates and cups, bottles, and newspaper. Less common items, such as furniture and clothing, are also considered general MSW.
- **Food waste** – either food that is not consumed or the waste generated and discarded during food preparation. Food waste and green waste make up a waste stream known as compostable waste.
- **Green waste (yard waste)** – tree, shrub and grass clippings, leaves, weeds, small branches, seeds, pods, and similar debris generated by landscape maintenance activities. Food waste and green waste make up a waste stream known as compostable waste.
- **Construction and demolition (C&D) waste** – any non-hazardous solid waste from land clearing, excavation, and/or the construction, demolition, renovation or repair of structures, roads, and utilities. C&D waste commonly includes concrete, wood, metals, drywall, carpet, plastic, pipes, land clearing debris, cardboard, and salvaged building components.

Resource Conservation and Recovery Act (RCRA) – federal law of the US governing the disposal of solid or hazardous waste.

State of Oregon Department of Environmental Quality (DEQ) – Oregon state body dedicated "restoring, maintaining and enhancing the quality of Oregon's air, land and water."

CHS WASTE PLAN SITE VISIT OBSERVATIONS

August 18, 2022
Mead & Hunt, Inc.

General Observations

- AST is not currently tracking nor reporting waste/recycling
- Provide language for contracts that will mandate compliance with the airport's diversion objectives
- Use of water cooler cups; consider reusable water bottles for maintenance staff
- "Consistency" is the theme of the waste diversion plan including infrastructure and procedures
- Need for more recycling bins for convenience

Goals and Recommendations

- Implement tracking and reporting of volume of waste sent to the landfill and volume diverted through recycling practices
- Improve contracts, leases, and purchasing policies
- Consider purchasing reusable items
- Educate employees, tenants, and contractors on waste diversion

RECYCLE ACROSS AMERICA LABELS

Recycle Across America (RAA) is a non-profit organization whose sole mission is to standardize the labeling for collection containers to reduce confusion and fight contamination. Their solution is color-coded, photo centric, standardized labels that accommodate programs with different acceptable materials while displaying messaging and a format that is consistent. Recycle Across America labels are visible in airport applications around the country. RAA provided data from studies conducted by Leave No Trace that showed up to 100 percent increases in recycling quantities and contamination levels significantly reduced to minimal or no detection.

CHS's existing recycling and trash cans are the primary tool for communicating with visitors about the program. They are currently labeled "recycling" and "trash." This demarcation does not indicate all materials are acceptable for recycling. Because recycling programs vary from location to location, clear instructional bin labeling has been shown to increase program participation and reduce recycling contamination. Prioritizing specific items based on feedback from the County material recovery facility should result in an update of current bin labeling as the containers are only labeled for bottles and cans without acknowledgement for the rest of the accepted materials.

The Recycle Across America labeling system offers two options for containers for landfill-bound waste: "landfill" or "trash." Labeling the bins as "landfill" may encourage "wishcycling" (placing items in recycling instead of the trash in hopes it can be recycled or will not go to the landfill). The Recycle Across America organization will have insight on this choice. Recycle Across America limits customization of the labels (because significant changes would defeat the principle of standardization) but can accommodate changes such as adding logos. The Authority could consider adding the CHS logo and/or displaying the name(s) of local organizations such as Keep Charleston Beautiful that would support the labeling effort.

Graphic labeling is especially important in an environment like CHS that serves an incredibly diverse group of users. Recycle Across America sells standardized labels that would improve the Airport's diversion program by providing clear instructions and aligning with other airport facilities. The following pages provide examples of RAA label options and guidance.

Sample Recycle Across America Labels

AST - AIRPORT RECYCLING, REUSE, AND WASTE REDUCTION PLAN

Information Request and Data Collection Form

Background: The purpose of this request is to collect information pertinent to the development of an airport recycling, reuse, and waste reduction plan to support the development and expansion of AST. This builds on the information contained within your Master Plan (as required by FAA) and gives us the data needed to make recommendations on the infrastructure, operations, and facilities that can increase diversion with the proposed changes.

By compiling and analyzing the information outlined in this document, the airport will have sufficient information to make informed waste management decisions with the upcoming improvements, as well as create a sustainable waste infrastructure to support future efforts. Big changes, such as terminal enhancements, are the perfect time to make changes to practices as it can build in the proper setting, operations, infrastructure needed to increase diversion. Additionally, with new spaces, it is easier to change behavior because people are not relying on changing existing behavior within previous facilities. If changes to the waste program are not technically or economically feasible at this time, this information will help an airport determine when such adjustments make sense.

Instructions: Please review this information request. Text has not been provided for every section, and more information may be needed. Mead & Hunt will also provide supplemental information based on industry trends and research. Some elements may not be applicable to every facility; the more information that is provided, the better we can dial in the recommendations to increase diversion.

1. Airport Background Information:

1. ☐ a) Airport Name: Warrenton-Astoria Regional Airport
2. ☐ b) Airport Address: 1110 SE Flight Line Drive, Warrenton, OR 97146

☐ c) Airport Classification: General Aviation

☐ d) Airport Owner: Port of Astoria

☐ e) Airport Operator: Port of Astoria

☐ f) Annual Enplanements:

☐ g) Annual Operations: 38,721

☐ h) Based Aircraft: 32

☐ i) Carriers serving the Airport: N/A

2. Waste/Recycling Program Scope:

☐ Please review the following table:

Facilities over which the Airport has direct control of waste management	Areas over which the airport has no direct control, but may have influence	Areas over which the Airport has no direct control or influence
Ex: passenger terminal public areas and concourses, Airport offices and airfield Terminal Building (Public and Sterile Side), Police Annex Building, CCAA Office Spaces FBO/Terminal	*Ex: tenant facilities using rented space and deplaned waste* Tenant Offices/ Spaces, Remote Rental Car Lots Tenants that lease property from the AST.	*Ex: off-airport properties or fully independent tenants* General aviation/FBO, ARFF United States Coast Guard (USCG)
These areas will be included in the plan.		These areas will be excluded from the plan.

3. Current Waste Management Program:

☐ *a) Please describe the Airport's current waste management program*

☐ *Does the Airport recycle? If so, which materials and since when (if known)? What areas?*

The airport is set up to recycle aluminum, plastic water bottles, and paper in the FBO offices. There are efforts to separate material by airport staff; however, there is a concern that materials are ending up in the landfill due to the low number of recycling bins available.

☐ *What is the role of a janitorial/custodial contractor? How does waste move through the facility?*

Waste is collected from the FBO offices by the AST maintenance staff and taken to the commercial trash dumpster located outside of the FBO offices. Hangar tenants are responsible for taking their own trash to the same dumpsters. Recycling is collected by AST maintenance staff and taken to Recology Astoria Transfer Station.

☐ *What is the role of the waste hauler(s)?*

- Recology removes waste from AST. Recycling sorting takes place at the Recology Astoria Transfer Station after being dropped off.

☐ *Do any of the Airport's tenants use their own system or hauler?*

- No.

☐ b) Please provide a copy of maps depicting Airport recycling and waste collection areas (if applicable).

- Port of Astoria has a recycling program that AST follows.

Site visit observations

☐ Waste Reduction:
- Switched from water bottles to large 5-gallon water dispenser

☐ Material Reuse:
- None observed.

☐ Recycling:
- Facility is set up for waste and recycling in interior spaces. Dumpster for recycling
- Recycling is removed by Recology

☐ Composting:
- No composting at this time

☐ d) Please review the following table with information about waste management within different Airport areas.

Description (tenants)	**Who manages waste from this area; how is it invoiced?** (The Airport or other; contract bill)	**What types of waste/recycling are generated?**
<u>Public Areas</u> • **FBO Offices**	Recology (contractor) removes trash/recycling from public areas.	General MSW
<u>Other Tenants</u> • **Hangar Tenants**	Recology (contractor) removes trash/recycling from public areas.	General MSW
Operation/Maintenance Activities		
Waste collection / transfer (from bin to landfill)	Hauler – Recology	[redacted]
Data collection / reporting / tracking	N/A	[redacted]
Contract management, program logistics	Port of Astoria	[redacted]
Maintenance of waste and recycling equipment	Port of Astoria	[redacted]
Management of construction and demolition waste	N/A	[redacted]

☐ *e) List any separate tenant efforts (if applicable or known).*

4. Waste Infrastructure

☐ *Please review the following table. This information will be used to estimate annual waste and recycling quantities if exact numbers are unknown (see **Waste Audit** below for known quantities). Estimates will use conversion factors from the US EPA.*

	Approximate Number and Size(s)	Type(s) of Material	Frequency of Pickup and Fill Factor	Location(s)
Waste bins	8 small bins x 3 gal	General waste	Bi-weekly	In every office and common area
Recycling bins / recycling cans	1 blue business recycling bin x 10 gal	Paper, plastic, and aluminum	Bi-weekly	Common area
Waste dumpsters	1 dumpster x 5 yards	General waste	1 x/week, half full	Outside of FBO offices
Waste or recycling transport equipment	Port of Astoria service/maintenance vehicle			

5. Waste Audit

☐ *a) What is the total annual quantity/composition of waste or recycling generated at the Airport (if known)?*

- AST is not currently tracking

☐ *b) Are there disposable or recyclable items purchased by the Airport?*

(paper towel, napkins, printer paper, office supplies. "What comes in must go out.")

- Paper towels, printer paper, office supplies, water cooler cups, trash can liners.

6. Recycling Feasibility

☐ *a) Any known technical and economic factors that affect the airport's ability to recycle? (local infrastructure, contractual issues, costs, etc.)*

- N/A

☐ *b) List the Federal, State, or local guidelines related to recycling and waste management. Do these aid or hinder recycling at the airport?*

- The State has a waste goal of 52% materials recovery goal

☐ c) *Other incentives for implementing / maintaining recycling program*

(Airline programs, community culture, etc.)

- N/A

☐ d) Please describe any logistical considerations for recycling at the Airport:

☐ *Space:*

- N/A

☐ *Layout:*

- N/A

☐ *Access (secure/sterile areas):*

- N/A

7. Drivers for implementing/maintaining a waste/recycling program.

☐ a) Are there drivers for introducing recycling/diversion at the Airport?

- To ensure proper disposal of waste and proper recycling of recyclable materials.

☐ *b) Does the Airport have any recycling, reuse, and waste reduction goals?*

- Not currently, but can utilize the 52% goal for the State

☐ *c) Does the Airport track/report indicators related to waste or recycling?*

- Not currently

☐ *d) Are there any community outreach/stakeholder efforts?*

- N/A

☐ *e) What are challenges and barriers to recycling, reuse, or waste reduction at the Airport?*

- Signage and infrastructure
- Communication of targets and objectives

8. Review of Waste Management Contracts

☐ *Please provide samples of the following (if available):*

(This information will be examined for general language to assess feasibility)

☐ *Waste/recycling contracts (collection/waste hauler)*

- N/A

☐ *Housekeeping contracts (if external)*

- N/A

☐ *Tenant leases (if external)*

- N/A

9. Financial Considerations

a) How is the waste program funded?

- N/A

b) Please provide copies of waste and recycling invoices (calendar years 2017, 2018, and 2019).

(From waste hauler, custodial staff, and/or tenants (if available))

- N/A

Additional Comments/Considerations:

APPENDIX C

AIR SERVICE MARKET FEASIBILITY ASSESSMENT

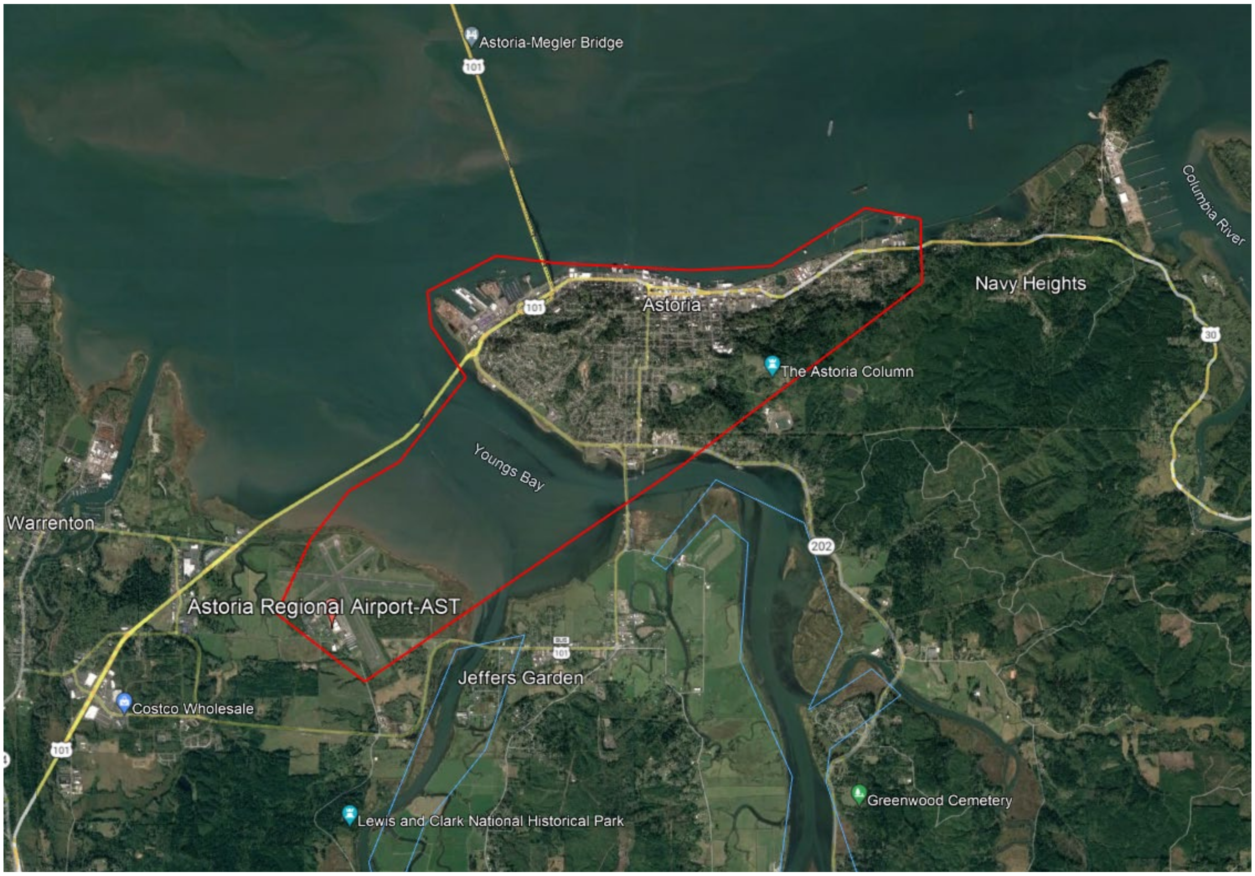
APPENDIX C - AIR SERVICE MARKET FEASIBILITY ASSESSMENT

The scheduled air service market feasibility assessment uses Mead & Hunt, Inc. location-based data from zip codes from Clatsop County, Oregon and Pacific County, Washington to assess the air travel market for the region. The information can be used to identify the circumstances under which scheduled commercial passenger service would be viable at AST.

Commercial passenger service encompasses Federal Aviation Regulation (FAR) Part 121 conventional regional airlines, commuter carriers operating under FAR Part 135, FAR Part 380 Public Charters, and the potential for electric aircraft start-ups.

Figure C-1 shows the global positioning system (GPS) data that identifies visitors visiting the study area when traveling to Astoria, Oregon located within Clatsop County. Using all modes of transportation, including but not limited to travel via planes, buses, cruise ships, and automobiles.

Figure C-1: GPS Data Study Area



Visitors include people coming to Astoria for business/and or leisure that have stayed longer than 150 minutes in the study area, The GPS data study area includes fiscal year 2021 data, and the Scheduled Air Service Market Feasibility Assessment primarily reviews visitors that traveled from an origination point within 250 miles based on zip code.

Table C-1 summarizes the estimated number of visitors originating from Oregon and Washington within 50 nautical miles of the study area in fiscal year 2021. The top 20 zip codes that generated the greatest number of visitors to the GPS data study area are represented in the table.

Overall, in fiscal year 2021, the study area had roughly 30,789 visitors from Oregon and roughly 24,750 visitors from Washington. The majority of visitors originating within 50 nautical miles from Oregon primarily came from Astoria, Seaside, and Warrenton. The majority of visitors originating within 50 nautical miles from Washington primarily came from Longview, Kelso, and Ocean Park.

Table C-1: Oregon and Washington State Visitation – Less than 50 NM

Oregon			
NM	**City**	**Zip Code**	**Visitors**
10	Astoria	97103	8,774
13	Seaside	97138	6,181
7	Warrenton	97146	4,496
28	Clatskanie	97016	2,964
49	Tillamook	97141	1,316
49	Forest Grove	97116	1,242
46	Saint Helens	97051	1,014
4	Hammond	97121	982
19	Cannon Beach	97110	656
33	Rainier	97048	560
47	Scappoose	97056	550
40	Bay City	97107	332
43	Banks	97106	259
29	Nehalem	97131	224
46	Warren	97053	217
34	Vernonia	97064	210
43	North Plains	97133	210
34	Rockaway Beach	97136	168
46	Columbia City	97018	144
38	Garibaldi	97118	91
Total Oregon Visitors			**30,789**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Washington			
NM	**City**	**Zip Code**	**Visitors**
35	Longview	98632	5,638
39	Kelso	98626	2,196
19	Ocean Park	98640	2,037
14	Long Beach	98631	1,430
11	Naselle	98638	1,370
11	Ilwaco	98624	1,303
22	Raymond	98577	1,044
50	Centralia	98531	1,025
50	Woodland	98674	899
46	Chehalis	98532	874
40	Castle Rock	98611	872
48	Aberdeen	98520	617
43	Kalama	98625	528
48	Hoquiam	98550	510
28	South Bend	98586	456
14	Grays River	98621	435
13	Seaview	98644	430
19	Cathlamet	98612	396
8	Chinook	98614	390
10	Rosburg	98643	384
Total Washington Visitors			**24,750**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Table C-2 summarizes the estimated number of visitors originating from Oregon and from Washington within 50 to 150 nautical miles of the study area in fiscal year 2021. The top 20 zip codes that generated the greatest number of visitors to the GPS data study area are represented in the table.

Overall, in fiscal year 2021, the study area had roughly 98,404 visitors from Oregon and roughly 70,197 visitors from Washington. The majority of visitors originating within 50 to 150 nautical miles from Oregon primarily came from Beaverton, Portland, and Hillsboro. The majority of visitors originating within 50 to 150 nautical miles from Washington primarily came from Vancouver, Battle Ground, and Camas.

Table C-2: Oregon and Washington State Visitation – 50 to 150 NM¶

Oregon			
NM	City	Zip Code	Visitors
61	Beaverton	97007	3,273
56	Beaverton	97006	2,259
62	Portland	97211	2,184
56	Hillsboro	97123	2,181
67	Portland	97206	2,015
64	Portland	97223	1,985
53	Hillsboro	97124	1,862
64	Portland	97219	1,791
73	Oregon City	97045	1,778
64	Portland	97213	1,672
69	Portland	97267	1,637
62	Portland	97212	1,630
63	Newberg	97132	1,620
60	Portland	97217	1,569
68	Portland	97233	1,540
70	Gresham	97030	1,527
68	Portland	97266	1,525
62	Portland	97209	1,499
63	Mcminnville	97128	1,493
64	Portland	97224	1,472
Total Oregon Visitors			**98,404**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Washington			
NM	City	Zip Code	Visitors
62	Vancouver	98682	2,145
59	Battle Ground	98604	1,971
68	Camas	98607	1,687
62	Vancouver	98661	1,289
60	Vancouver	98662	1,229
65	Vancouver	98684	1,221
65	Vancouver	98683	1,104
77	Washougal	98671	992
64	Olympia	98501	980
63	Olympia	98502	957
109	Seattle	98103	925
54	Vancouver	98685	899
51	Ridgefield	98642	874
102	White Salmon	98672	825
58	Vancouver	98665	793
58	Vancouver	98686	780
115	Edmonds	98026	726
62	Vancouver	98664	720
62	Olympia	98512	703
115	Lynnwood	98036	659
Total Washington Visitors			**70,197**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Table C-3 summarizes the estimated number of visitors originating from Oregon and from Washington within 150 to 250 nautical miles of the study area in fiscal year 2021. The top 20 zip codes that generated the greatest number of visitors to the GPS data study area are represented in the table.

Overall, in fiscal year 2021, the study area had roughly 8,521 visitors from Oregon and roughly 7,318 visitors from Washington. The majority of visitors originating within 150 to 250 nautical miles from Oregon primarily came from Bend, Coos Bay, and Redmond. The majority of visitors originating within 150 to 250 nautical miles from Washington primarily came from Pasco, Bellingham, and Richland.

Table C-3: Oregon and Washington State Visitation – 150 to 250 NM

Oregon			
NM	**City**	**Zip Code**	**Visitors**
161	Bend	97701	1,400
172	Coos Bay	97420	1,099
169	Bend	97702	960
153	Redmond	97756	925
213	Pendleton	97801	408
169	Prineville	97754	396
178	Roseburg	97470	330
170	Sutherlin	97479	230
188	Umatilla	97882	225
168	North Bend	97459	189
184	Roseburg	97471	189
169	Powell Butte	97753	186
166	Ione	97843	184
171	Bend	97707	161
176	Glide	97443	158
204	Sixes	97476	151
198	Powers	97466	132
173	Boardman	97818	120
178	La Pine	97739	114
158	Lakeside	97449	88
Total Oregon Visitors			**8,521**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Washington			
NM	**City**	**Zip Code**	**Visitors**
191	Pasco	99301	795
164	Bellingham	98225	560
189	Richland	99354	528
190	Richland	99352	462
195	Kennewick	99337	396
198	Moses Lake	98837	356
163	Bellingham	98229	340
191	Kennewick	99336	290
165	Bellingham	98226	273
189	Ephrata	98823	264
163	East Wenatchee	98802	255
174	Everson	98247	243
162	Wenatchee	98801	230
168	Ferndale	98248	212
159	Sunnyside	98944	168
151	Granger	98932	166
189	Kennewick	99338	161
185	Plymouth	99346	150
186	West Richland	99353	150
181	Manson	98831	141
Total Washington Visitors			**7,318**

*Only the top 20 cities that generated the most visitors to the GPS data study area are shown in the table

Table C-4 summarizes the estimated number of visitors originating from Washington and Oregon within 250 nautical miles of the study area in fiscal year 2021. Overall, in fiscal year 2021, the study area had the most visitors from both Oregon and Washington within the 50 to 150 NM range. The study area had the least number of visitors from Washington within the 150 to 250 NM range. Most visitors originated from Oregon within 50 to 150 NM of the Airport.

Table C-4: Summary of Visitation to Study Area from Washington and Oregon

Range (NM)	Oregon Visitors	Washington Visitors	Total
≤50	30,789	24,750	55,539
50-150	98,404	70,197	168,601
150-250	8,521	7,318	15,839
		Grand Total	**239,979**

Summary of Air Service Market Feasibility Assessment

Based on Mead & Hunt, Inc. location-based data, there were 239,979 visitors to Astoria, including seasonal travel, demonstrating that scheduled commercial passenger service may be viable at AST. Communities similar to AST with strong leisure travel interest have been successful in attracting niche airlines who seek to link larger markets with underserved and/or unique leisure travel destinations. Airlines in this category include Breeze, Avelo, and Allegiant to name a few. Some of these airlines operate smaller aircraft that may have the ability to operate at AST. Other air carriers that operate under FAR Part 121, FAR Part 135 and/or FAR Part 380 provide regular scheduled service to communities similar to AST include Surf Air, Boutique Air, JSX, and Cape Air.

Fiscal year 2023's scheduled air service market is challenged by COVID-19 recovery, pilot, air crews, maintenance, and air traffic control labor shortages. The labor shortage has affected air service providers ability at all levels to provide service at airports. Unfortunately, the ability of air carriers to provide regular scheduled air service to communities such as AST are highly affected by these factors. To assist communities in capturing and retaining regular scheduled air service the FAA provides various Air Service Development Plan (ASD) grant programs including the Small Community Air Service Development Program (SCASDP) and the Essential Air Service Program. As AST and the greater Astoria community further define schedule air service goals for the region, a detailed ASD Plan is recommended to further strategize who target carriers are and how to attract, capture, and sustain air services at AST.

In addition to traditional air service providers, there is the potential for start-up companies using electric aircraft like Supernal and Eviation to operate at AST. Both original equipment manufacturers (OEM) have air taxi use cases and have presence along the West Coast and specifically in the Greater Seattle area. Airport Management at AST noted that the Airport is looking at potential air service opportunities to the Greater Seattle area, since most passengers in the Portland area drive to Astoria, Oregon.

When comparing three potential advanced air mobility (AAM) aircraft, three ranges were explored – 50, 150, and 250 nautical miles. AAM aircraft like BETA Technologies' Alia 250, show that air service to the Greater Seattle area can be reached via AAM. Original equipment manufacturers like Eviation could easily operate aircraft similar to the Alia 250.

Eviation has three hangars at Arlington Municipal Airport (AWO), which is located within an hour driving distance just north of Seattle. In 2018 Eviation operated a full scale unmanned aerial vehicle, which demonstrated the aerodynamics and flight controls of their aircraft – Alice. The Advanced Air Mobility Reality Index (ARI) displays the likelihood of an OEM's aircraft to be certified and enter the market on a scale of 1 (least realistic) to 10 (most realistic). Eviation has an ARI of 5.9, showing that air service is possible in the future to the Greater Seattle Area from AST around 2030.

APPENDIX D

AIRPORT LAYOUT PLAN

APPENDIX E

SUPPORTING DOCUMENTS

APPENDIX E1

PART 139 – AIRPORT CERTIFICATION PROCESS

Certification Process – Part 139 Airport Certification

Any airport operator that desires to serve air carrier operations specified in Part 139 must comply with the requirements. The actions required by an airport operator to comply will vary depending on the type of air carrier operations served.

Airport Certification Manual

The ACM is a written document that details how the airport operator will comply with the requirements of Part 139. Airport operators that currently hold a Part 139 Airport Operating Certificate already have an ACM. Airport operators that currently hold a Part 139 Limited Airport Operating Certificate have a modified version on an ACM, known as an Airport Certification Specifications (ACS). Under the revised rule, all ACSs must be converted to ACMs. Airport operators applying for an AOC will need to develop an ACM and submit it with the AOC application.

Airport operators wanting to apply for an Airport Operating Certificate (AOC) must initiate the application process, as prescribed in § 139.103. Typically, the AOC application process is as follows:

- The airport operator wanting to apply for an Airport Operating Certificate (AOC) contacts the appropriate FAA Regional Airports Division Office to initiate the application process.
- The Regional Airports Division Office interviews the airport operator to obtain information about the airport and air carrier operations served (or anticipated to be served).
- If FAA determines that a certificate is necessary, FAA staff will provide the airport operator with an application for certification (FAA Form 5280-1, Application for Certificate) and guidance materials.
- The airport operator submits a completed application (as specified under § 139.103) to the Regional Airports Division Office for approval. The application package must include two copies of the airport's proposed ACM and written documentation as to when air carrier service will begin.Any requests for exemptions should be submitted at this time (as specified under § 139.111).
- The FAA reviews the application and associated documentation to ensure they are complete and might conduct an inspection of the airport for compliance with the requirements of Part 139. The FAA will work with the airport operator to tailor the ACM to ensure compliance with revised rule and might request changes to the ACM and any procedures it describes.
- As FAA reviews the application and ACM, FAA staff will contact the airport operator to discuss whether additional action is needed and to what extent air carrier operations can continue until an AOC is issued.

- The FAA will issue an AOC if the application and other required documentation meets the provisions of Part 139 and any inspection shows the airport operator is in compliance with Part 139. The certificate may include other provisions FAA finds necessary to ensure safety in air transportation.

Process for Certification

- **Pre-inspection review** of office airport files and airport certification manual.
- **In-briefing with airport management.** Organize inspection time schedule, meet with different airport personnel.
- **Administrative inspection of airport files, paperwork, etc.** Also includes updating the Airport Master Record (FAA Form 5010) and review of the Airport Certification Manual/Specifications (ACM/ACS), Notices to Airmen (NOTAM), airfield self-inspection forms, etc.
- **Movement area inspection.** Check the approach slopes of each runway end; inspect movement areas to find out condition of pavement, markings, lighting, signs, abutting shoulders, and safety areas; watch ground vehicle operations; ensure the public is protected against inadvertent entry and jet or propeller blast; check for the presence of any wildlife; check the traffic and wind direction indicators.
- **Aircraft rescue and fire fighting inspection.** Conduct a timed-response drill; review aircraft rescue and firefighting personnel training records, including annual live-fire drill and documentation of basic emergency medical care training; check equipment and protective clothing for operation, condition, and availability.
- **Fueling facilities inspection.** Inspection of fuel farm and mobile fuelers; check airport files for documentation of their quarterly inspections of the fueling facility; review certification from each tenant fueling agent about completion of fire safety training.
- **Night inspection.** Evaluate runway/taxiway and apron lighting and signage, pavement marking, airport beacon, wind cone, lighting, and obstruction lighting for compliance with Part 139 and the ACM/ACS. A night inspection is conducted if air carrier operations are conducted or expected to be conducted at an airport at night or the airport has an instrument approach.
- **Post inspection briefing with airport management.** Discuss findings; issue Letter of Correction noting violations and/or discrepancies if any are found; agree on a reasonable date for correcting any violations, and give safety recommendations.

APPENDIX E2

APPROVAL LETTER

U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
2200 S. 216th Street
Des Moines, WA 98198

January 7, 2022

Mr. Will Isom
Executive Director
Port of Astoria
422 Gateway Ave., Ste. 100
Astoria, OR 97103

**Determination on:
Request for Release of Aeronautical Use Provisions
Federal Surplus Property Obligations
Astoria Regional Airport
Astoria, Oregon**

Dear Mr. Isom:

This is in response to your request to release parcels, or a portion thereof depicted on the Airport's current Exhibit "A" Airport Property Map and further described in your July 12, 2021 submittal to the Seattle Airports District Office.

Based upon the information in your request, we have concluded that the approximate 24.5 acres of a portion of Parcel 27 is no longer needed to directly support airport activity. Further we have determined that a non-aeronautical use of such property will benefit civil aviation by producing an equal or greater benefit to the airport than continued retention of the aeronautical use. We have also concluded that the release of the aeronautical use provision and use of such land for non-aeronautical purposes will not interfere with the operation, maintenance or future development of the airport.

Under 49 U.S.C. §47153(c), FAA is required to publish the proposed release of the aeronautical use provision and ask for public comment on the proposal in the Federal Register for a period of 30 days prior to FAA approval of the release. The Federal Register Notice was published on October 28, 2021. No comments were received.

By accepting this release, the Port of Astoria agrees to update the Airport Layout Plan and Exhibit "A" Property Map within 30 days of acceptance of the release to reflect the change in use.

If you have any questions regarding this decision, please contact Mandi Lesauis at (206) 231-4140.

Sincerely,

Warren D. Ferrell
Acting Manager
Seattle Airports District Office

APPENDIX E3

AST ALP PEN & INK CHANGE OCTOBER 2, 2018

U.S. Department
of Transportation
**Federal Aviation
Administration**

Northwest Mountain Region
Seattle Airports District Office
2200 S. 216th Street
Des Moines, Washington 98198

October 2, 2018

Gary Kobes
Astoria Regional Airport
10 Pier 1 Building, Suite 308
Astoria, Oregon 97103

Re: Astoria Regional Airport (AST), Astoria, OR
"Pen & Ink" Change to the Airport Layout Plan

Dear Mr. Kobesd:

This office has reviewed your request for a "pen & ink" change to the Airport Layout Plan (ALP) for Astoria Regional Airport to depict the construction of a 60' x 100' hangar.

Pursuant to the FAA Seattle Airports District Office's review of this request, we hereby approve the "pen & ink" change to the ALP. Approval of the change 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.

Aeronautical study 2018-ANM-2225-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, and 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. A separate notice to the FAA is required for any construction equipment, such as temporary cranes, whose working limits would exceed the height and lateral dimensions of your proposal.

Furthermore, a finding was made that the proposed development is exempt from the requirement to prepare an environmental assessment and is categorically excluded pursuant to FAA Order 1050.1F Environmental Impacts: Policies and Procedures, Paragraphs 5-6.4 (f).

Please attach this approval letter, along with the enclosed drawing depicting the "pen & ink" change, to the approved Airport Layout Plan and retain it in the airport.

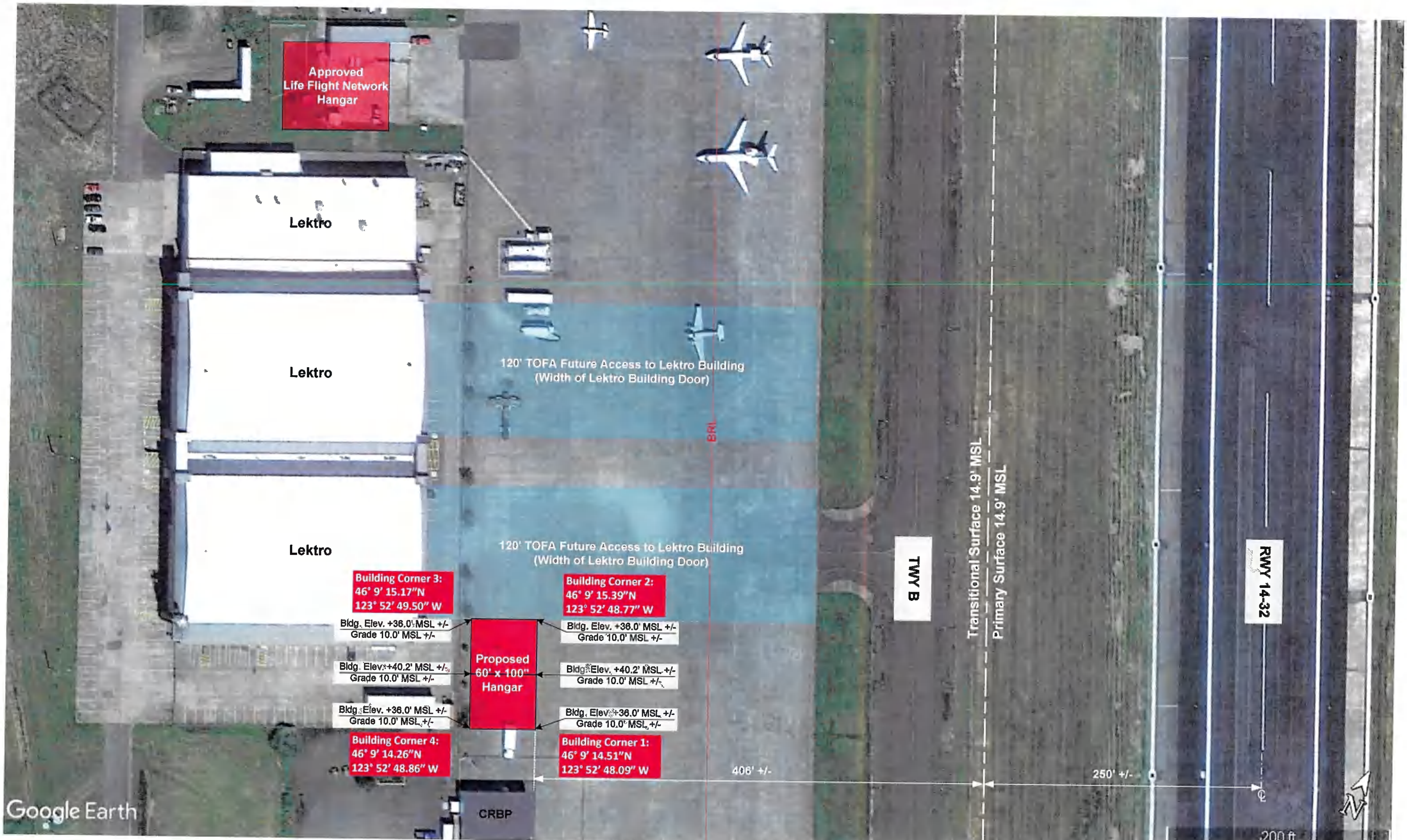
Should you have any questions, please contact Valerie Thorsen at (206) 231-4139.

Sincerely,

Joelle Briggs

Joelle Briggs
Manager, FAA Seattle Airports District Office

Enclosure



PROPOSED HANGAR, KAST HANGARS LLC

PORT OF ASTORIA REGIONAL AIRPORT

APPENDIX E4

WILDFIRE HAZARD MANAGEMENT PLAN FOR ASTORIA REGIONAL AIRPORT, MARCH 2023

Wildlife Hazard Management Plan for Astoria Regional Airport Warrenton, Oregon

Prepared for:

The Port of Astoria
422 Gateway Avenue, Suite 100
Astoria, Oregon 97103

Prepared by:

Mead & Hunt
www.meadhunt.com

March 2023

SIGNATURE

The following Wildlife Hazard Management Plan for the Astoria Regional Airport was prepared for the Port of Astoria. The WHMP was reviewed and accepted by the Federal Aviation Administration. This document will be become effective with the following signature:

____ __________________

Matthew McGrath, Deputy Director, Port of Astoria Date

Executive Summary

The Port of Astoria owns and operates the Astoria Regional Airport (AST, or "the Airport"). The Port prepared this Wildlife Hazard Management Plan (WHMP) in accordance with the requirements set forth in Title 14 of the Code of Federal Regulations (CFR) Part 139.337, *Wildlife Hazard Management* (14 CFR Part 139). The Port prepared a WHMP in 2005 that was based on the results of an FAA-accepted Wildlife Hazard Assessment (WHA). The following document is the first revision to the 2005 WHMP.

The Port undertook a Wildlife Hazard Site Visit (WHSV) in 2022 to identify changes to the surrounding environment and wildlife behavior that have occurred since 2005. An FAA-Qualified Airport Wildlife Biologist, in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5200-36, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports,* conducted a two-day site visit from July 7 to 8, 2022. The observations and data gathered during the WHSV were compared to the site conditions described in the 2005 WHMP and were considered during the preparation of the 2022 WHMP. The results of the WHSV are presented as **Appendix A**.

The WHMP outlines the roles and responsibilities of the Airport Manager, who serves as the Airport Wildlife Coordinator (AWC), and other Port employees involved in wildlife management at AST. It identifies the protocol for monitoring, documenting, and reporting potential wildlife hazards, implementing procedures, and reporting wildlife strikes at AST. As described in the WHMP, AST staff will identify and respond in a timely manner to hazardous wildlife and hazardous situations that are identified or reported to the AWC. Designated AST staff will be trained by an FAA-qualified Airport Wildlife Biologist (QAWB) to identify hazardous wildlife and to use wildlife control and management equipment safely and efficiently.

The WHMP outlines and prioritizes airport-specific wildlife hazard management measures and includes target dates for their completion. The AST Airport Manager/AWC will oversee wildlife hazard management activities and monitor the habitat on and near the airfield on Port-owned property in a manner that will discourage hazardous wildlife. Designated AST staff will disperse hazardous wildlife when it is observed within the Airport perimeter fence or on Port-owned property. In addition, designated AST staff will provide advisories to pilots, and implement operational changes as necessary to address the presence of hazardous wildlife.

To implement the WHMP, designated AST staff will maintain equipment to disperse hazardous wildlife and perform non-lethal wildlife control as warranted. The Port will enter into an agreement with the United States Department of Agriculture, Wildlife Services (USDA-WS) or another qualified contractor to provide support when lethal control and other wildlife hazard management support services are necessary. AST must obtain federal- and state-issued permits to control most wildlife species and update or renew these permits annually. The WHMP identifies the laws and regulations governing the take or harassment of particular hazardous wildlife species and recommends that the Port obtain a federal depredation permit for the species identified as posing the greatest risks to aircraft operations. Following procurement, a copy of any federal- or state-issued depredation permit, wildlife control documentation, and wildlife hazard management training records must be included as an appendix to the WHMP (see **Appendix E**).

Ongoing Review and Evaluation

Pursuant to FAA regulations, the Port will convene a Wildlife Hazard Working Group (WHWG) every 12 consecutive calendar months at a minimum, or following a triggering event as described in 14 CFR part 139.337 (f)(6).

A triggering event is defined as:

- An air carrier aircraft experiences multiple wildlife strikes;
- An air carrier aircraft experiences substantial damage from striking wildlife; or
- An air carrier aircraft experiences an engine ingestion of wildlife.

Although the Port does not support air-carrier aircraft, it will review the WHMP every 12 consecutive months or as circumstances warrant when an aircraft experiences multiple wildlife strikes, substantial damage, or an engine ingestion. The Port will conduct the review using FAA guidance set forth in Appendix F of FAA AC 150/5200-38, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans*. The evaluation forms were excerpted from the AC and are presented in **Appendix D.** Proposed changes to the WHMP will be sent to the designated Environmental Protection Specialist at the FAA Seattle Airports District Office (ADO) for review and acceptance.

The foundation for these evaluations is not only the documentation of wildlife strikes, but also the maintenance of consistent records of wildlife surveys, observations, and wildlife control activities. Changes to the WHMP must be documented and made available during FAA inspection. WHMP changes and evaluations shall be documented in the following tables:

RECORD OF CHANGES

Change Number	Date of Change	Date Entered	Posted by (Name):

RECORD OF ANNUAL REVIEW

Reviewed By	Date Reviewed	Remarks

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Section 1 - Introduction

1.1 Project Background

The Port of Astoria (Port) prepared a Wildlife Hazard Management Plan (WHMP) for the Astoria Regional Airport (AST or "Airport) in 2005 with the assistance of the United States Department of Agriculture (USDA). The primary objective of the WHMP was to identify a defined set of policies, goals, and standards that would be implemented to reduce wildlife hazards at AST. The WHMP was prepared in accordance with FAA Guidance set forth in Title 14 of the Code of Federal Regulations Part 139.337 (14 CFR Part 139), *Wildlife Hazard Management,* and included all necessary components identified in the regulation.

Part 139.337 requires airport operators to review their WHMP documents at least every 12 consecutive months. The review is performed to:

- Review the wildlife strike history during the previous year and compare that strike history with summaries of wildlife management/control efforts;
- Document the progress/completion of specific wildlife management measures identified in the WHMP;
- Compare wildlife presence, use, and behavior at the airfield before and after habitat modification measures have been implemented; and
- Determine whether the management measures in the plan require changes or adaptation to better address wildlife hazards.

FAA guidance pertaining to wildlife management is set forth in Title 14 CFR Part 139.337, which aims to reduce the potential for wildlife strikes and enhance safety. Although AST is a general aviation (GA) airport, the Port does not hold an airport operating certificate from the FAA in accordance with 14 CFR Part 139; AST is a federally obligated airport for which the Port receives FAA funds to undertake capital improvements.

To accept federal funding, the Port must agree to certain terms and conditions, known as grant assurances. Grant Assurance No. 19 states that airports "shall be operated at all times in a safe and serviceable condition." Wildlife management is a safety issue. The WHMP will help the Port comply with Grant Assurance No. 19 by enhancing safety during airport operations.

The WHMP has not been reviewed or modified since its completion in 2005.

1.2 Wildlife Hazard Site Visit

To supplement the data used to prepare the WHMP, the Port undertook a two-day site reconnaissance visit at AST from July 7 to 8, 2022. The WHSV was conducted by an FAA-qualified Airport Wildlife Biologist (QAWB) in accordance with FAA AC 150/5200-36B, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports.*

The purpose of the site visit was to compare the site conditions described in the 2005 WHMP with current site conditions. During the site visit, the QAWB conducted an interview with AST staff members to confirm the following:

- Current wildlife hazard management roles and responsibilities,
- Current wildlife management practices, and
- Potential wildlife hazards observed by staff or tenants during aircraft operations.

The observations and attractants are documented in the WHSV Site Report presented in **Appendix A** and were considered during the review and development of the wildlife hazard management recommendations set forth in the WHMP.

The WHMP will be reviewed by a Wildlife Hazard Working Group (WHWG) every 12 consecutive calendar months to identify any changes in site conditions or wildlife behavior. If the WHWG determines that revisions are necessary, the plan will be updated and submitted to the FAA for acceptance. When potential changes are solely the result of updates, changes, and revisions to FAA ACs or CertAlerts, changes to the WHMP are not necessary unless requested by the FAA.

1.3 Project Objectives

This WHMP review and update was conducted in accordance with 14 CFR Part 139.337 and applicable FAA guidance. The overall objectives of this WHMP are to:

- Identify key participants and individuals associated with the WHMP at AST and their responsibilities;
- Identify priorities and actions to avoid or mitigate wildlife hazards at AST; and
- Identify guidelines by which the wildlife control program will be conducted and evaluated.

1.4 Airport Background

1.4.1 Facilities

The 870-acre Airport is a non-towered, public-use airport located in Warrenton, Clatsop County, Oregon. The Airport is home to the U.S. Coast Guard (USCG) Air Station Astoria and more than 30 based aircraft, and it supports approximately 38,000 annual operations (FAA 2023). Slightly more than one-third of the annual operations are military operations (FAA 2023).

The Airport includes two runways:

- Primary Runway 8/26, which is 5,794 feet long and 100 feet wide.
- Crosswind Runway14/32, which is 4,467 feet long and 100 feet wide.

The Port has completed the following airport improvements since it completed its initial WHMP in 2005:

- Rehabilitated Runway 13/31 (now Runway 14/32),
- Installed an Airport perimeter fence,
- Realigned Taxiway A-3,
- Constructed a new taxiway and a new connector with Taxiway B3, and
- Conducted ramp rehabilitation.

1.4.2 Location and Features

The Airport is located on the southwest side of Youngs Bay and adjacent to the west side of the Lewis and Clark River at its confluence with Youngs Bay. The Oregon-Coast Highway passes west and north of the Airport and provides connection with the City of Astoria. The Columbia River is located immediately north of Young's Bay, and the Lewis and Clark National Wildlife Refuge occurs east of the City of Astoria. The airport is located within 5 miles of the Pacific Ocean (see **Figure 1**).

Several wildlife attractants/habitats were observed on and near AST during the WHSV. In addition to the adjacent rivers and tidal waters, the Airport property includes a portion of Vera Slough, which flows into Youngs Bay, as well as unnamed streams, ditches/canals, ponds, and wetlands. Portions of on-site drainage have been channelized and placed in culverts. Standing water frequently accumulates on and adjacent to AST. The extensive amount of open water is attractive to a variety of resident and migratory avian wildlife.

The airport maintains a grazing lease in the western portion of the airport (outside the airfield) around the south side, west end, and north side of Runway 8. Turf/grass dominates the infield along the runways, taxiways, and aprons and dense shrubby vegetation dominates the airport's perimeter fence and along ditch areas (see **Figure 2**).

Although the Port does not hold an operating permit for AST and does not support air-carrier operations, it has prepared the WHMP in accordance with the FAA regulations set forth in 14 CFR Part 193.337. Pursuant to FAA guidance, the WHMP addresses wildlife attractants within the critical zone for wildlife hazards. Pursuant to Advisory Circular 15,05200-33C, *Wildlife Hazard Attractants on and Near Airports*, a 5,000-foot separation is recommended between the Airport Operations Area (AOA) and the nearest attractant to potentially hazardous wildlife species at airports that support piston-powered aircraft, a distance of 10,000 feet is recommended for airports that support turbine-powered aircraft (see **Figure 2**). Since the Port sells Jet-A fuel at AST, a 10,000-foot separation is appropriate. For all airports, a separation distance of 5 miles within approach/departure corridors is recommended (see **Figure 2**).

Figure 1: FAA Critical Zone (10,000 feet Separation Distance)

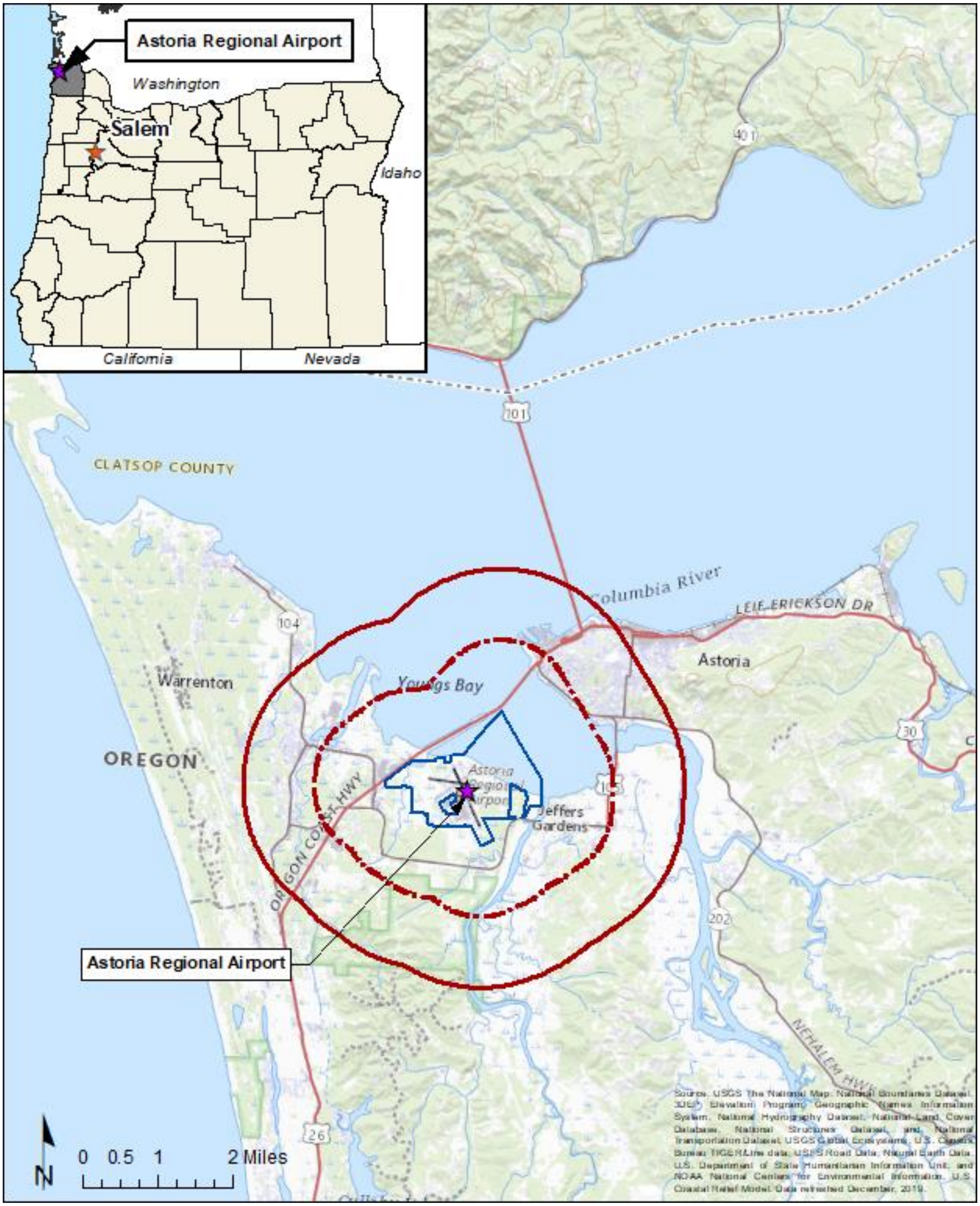
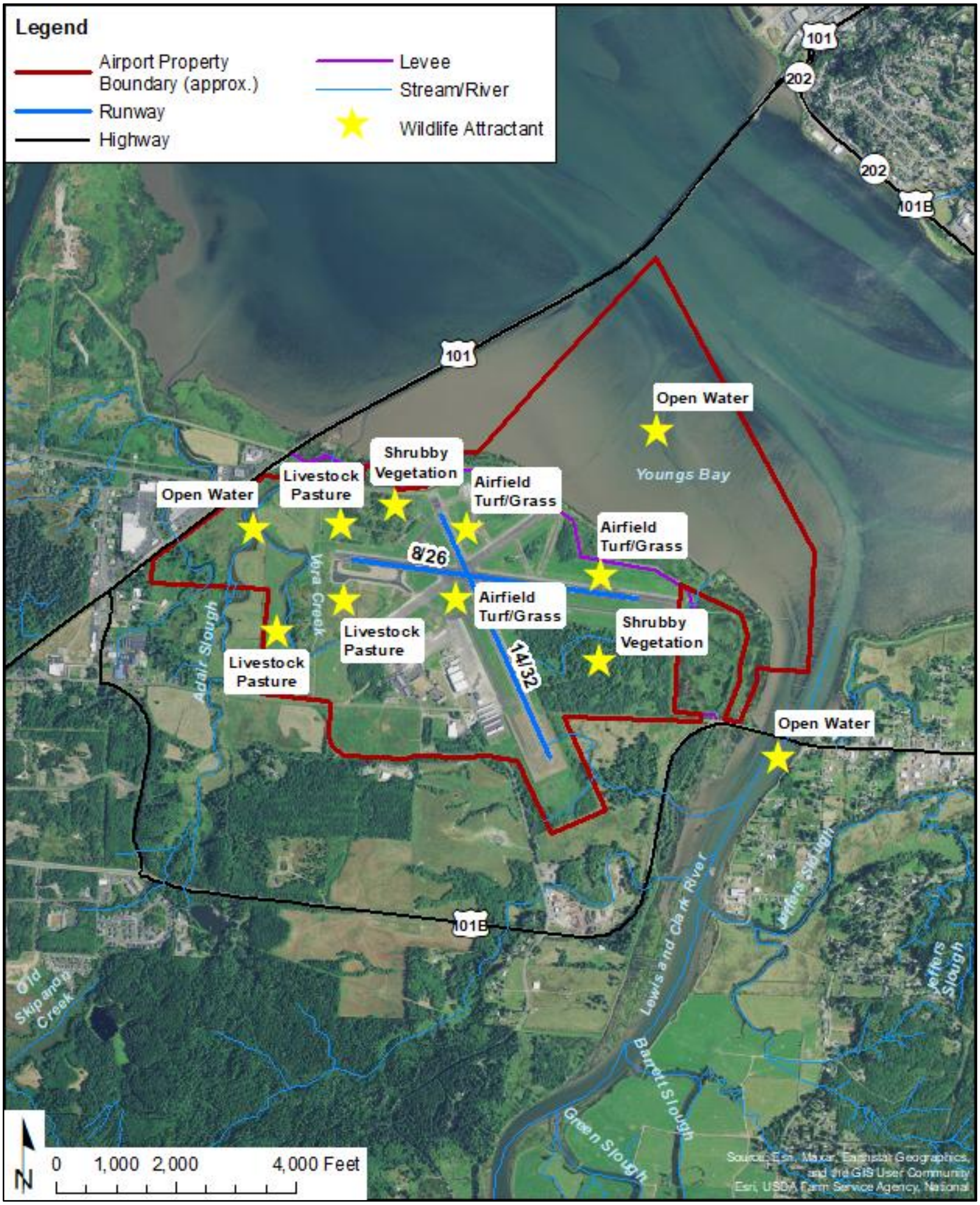


Figure 2: Wildlife Attractants



1.5 WHSV Wildlife Observations

During the 2022 WHSV, the QAWB established six monitoring points within the airfield and recorded wildlife observations to identify wildlife presence, abundance, and behavior. The QAWB also drove a transect along the airport levee road to observe wildlife presence, abundance, and behavior in Youngs Bay. The on-site monitoring locations were established to provide visual coverage of the AOA, including the runway and taxiway, ramps, infield turf areas, buildings, and structures. Points 5 and 6 also provided visual coverage of adjacent livestock pasture (see **Table 1** and **Figure 3**).

Table 1: Summary of Wildlife Hazard Site Visit Monitoring Locations

On-Site Monitoring Locations, Astoria Regional Airport	
Monitoring Point	**Location / View**
1	View of Runway End 32, taxiways, approach/departure corridor, infield turf/grass, adjacent trees, hangars/buildings, and Lewis and Clark River south of the airfield.
2	View of Runways 8/26 and 14/32, taxiways, apron, infield turf/grass, hangars/buildings, and surrounding habitats.
3	View of Runway End 26, taxiways, shrubby vegetation, infield turf/grass, Young's Bay, Lewis and Clark River, levee, and surrounding habitats.
4	View of Runway Ends 14 and 26, taxiways, shrubby vegetation, infield turf/grass, Young's Bay, Lewis and Clark River, levee, and surrounding habitats.
5	View of Runway Ends 14 and 26, taxiways, livestock pasture lands, Young's Bay and open water, shrubby vegetation, infield turf/grass.
6	View of hangars and buildings, apron areas, livestock pasture, infield turf/grass, and surrounding habitats on the west side of the airport

During the WHSV, a total of 39 bird species from twelve avian guilds (i.e., groups of species with similar characteristics) and one mammal species were observed. Several species within these guilds have the potential to cause damaging wildlife strikes due to their size (body mass), flocking behavior, or abundance. A site visit memorandum is included as **Appendix A**.

Figure 3: Wildlife Monitoring Locations

1.5.2 Wildlife Species Observed

The most frequently observed avian guilds identified included waterfowl (46%); sparrows, finches, and warblers (12%); swallows (8%); gulls (8%); songbirds (6%); corvids (6%); shorebirds (5%); raptors (4%) blackbirds and starlings (3%); and waterbirds (<2%); doves and pigeons (<2%); and other birds (<2%). The species associated with these guilds must be addressed during wildlife management activities due to the potential hazards they pose to aviation based on their size, behavior, and location relative to aircraft operations and phase of flight. Refer to the WHSV Report in **Appendix A.**

According to Port staff, the most abundant birds on the airport are Canada geese and ducks of various species including, mallards, pintails, and scaups, as well as killdeer and sandpipers. Waterfowl were observed most frequently, but nearly all individuals were observed from the levee overlooking Young's Bay and the Lewis and Clark River.

The only mammals observed during the site visit were coyotes; however, Port staff reported that given the amount of wooded area on the airfield, there are several places where the deer can hide, and deer have been observed to inhabit areas within the perimeter fence. Staff also reported the presence of beavers.

Based on the data obtained during the site visit and information from Port staff, the most hazardous species observed at AST include:

- Deer
- Canada goose
- Bald Eagles
- Mallards
- Gulls
- Barn swallows
- Killdeer
- Sandpipers
- European starlings
- Coyotes
- Elk
- Cows/cattle, should they gain access to the AOA.

1.5.3 Wildlife Attractants Observed

Open water areas are a potential wildlife attractant for Canada geese, bald eagles, waterfowl, gulls, ducks, and shorebirds that are both resident and migratory. Airport staff commented that the triangle formed by Runways 8 and 14 and Taxiway B3 floods during winter months and attracts a large number of ducks and geese. These larger birds and pose risks to aircraft as they arrive or depart from the adjacent bay and pass through approach/departure corridors or fly above or loaf within the AOA.

Food sources (e.g., small mammals and terrestrial invertebrates) within the airfield provide the strongest attractant for hazardous wildlife.

- **Turf/grass,** which dominates the infield, can provide hazardous wildlife (e.g., Canada geese, songbirds, blackbirds, waterfowl, shorebirds, and insect-eating birds) with shelter for nesting, loafing, roosting, and/or protection from predators or various weather conditions. Deer are also known to occur in areas of the airfield turf/grass.

- **Dense shrubby vegetation,** which dominates the area adjacent to the perimeter fence and along ditches, provides shelter for nesting, loafing, roosting, and/or cover from predators or various weather conditions.
- **Airfield equipment/structures/buildings** provide perch opportunities for eagles, raptors, crows, and European starlings. Buildings can also provide structure for birds (e.g., swallows) to nest within or outside of them.
- **Livestock Pastures (e.g., cattle grazing),** which occur in the western portion of the airport property (outside the airfield) and at the south side, west end, and north side of Runway 8, attract a variety of potentially hazardous bird species (e.g., egrets, Canada geese, and blackbirds). These birds can leave these pastures and fly across the airfield or enter AST airspace within approach and departure corridors.

The observations made during the WHSV supplement data obtained previously during the 2005 WHA and represent only a snapshot of the wildlife that have the potential to occur on or near the airport.

1.6 Wildlife Strike History

The FAA's National Wildlife Strike Database was reviewed in December 2022. According to the FAA database, 14 wildlife strikes have been reported at AST (**Table 2**).

As shown on **Table 2**, 13 of the 14 wildlife strikes records for AST were associated with avian species. Two strikes were associated with Canada geese and one with a Western grebe, and one strike with a gull resulted in minor damage. Prior to the avian strikes, a single strike with multiple elk completely destroyed a Learjet in 2002.

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Table 1: Wildlife Strike Records, Astoria Regional Airport (AST)

Date	Aircraft	Species	Damage	Number Struck	Size	Comments from Database
10/4/2021	AW 109	Killdeer	N	2-10	Small	Note: Owner/ Operator= Saddle Mountain Inc/ Brim Aviation
11/15/2020	MH-60	Mallard	N	1	Medium	Reported aircraft as a MH-60T.
9/10/2020	EC135	Unknown bird-small	N	1	Small	None.
9/4/2020	BE-350 Super King	Unknown bird-small	N	2-10	Small	Owner/ operator= Wheels Up Partners LLC/ Wheels Up - Gama Aviation.
1/22/2020	C-27	Dunlin	N	11-100	Small	At least 8 bird strikes on the aircraft with no resulting damage. Bird parts were removed from within the #1 (left-engine) nacelle. FOD was also noted on the intake guide vanes / compressor section. The engine was subsequently bore-scoped before final sign-off. After strike immediately notified airfield manager who swept the approach-end and numbers on runway 08. The airfield manager noted 16 birds in and around the Touch Down Zone area. Aircraft inspection and removed bird parts from inside #1 Engine Nacelle.HC-27J.
10/23/2019	AW 109	Unknown bird	N	1		Owner/Operator = Brim Aviation
10/13/2017	AW 109	Gulls	N	1	Medium	The paint on the radome is cracked, there was bird remains on the windscreen and the red main rotor blade.
1/17/2017	AW 109	Gulls	M?	1	Medium	Seagull struck nose of helicopter. The nose and radar inside the nose compartment were damaged. 3.5 NM final RW 08 at KAST
10/20/2015	C-560	Canada goose	M	2-10	Large	Damage to right side landing gears reported. Jet deemed safe to fly and taken to Salem for repair with its landing gear down for fear it might malfunction if raised.
10/19/2015	C-560	Canada goose	M	11-100	Large	Damage to right main landing gear, landing gear door and landing light.
1/25/2012	PA-31 NAVAJO	Western grebe	M	1	Medium	One prop boot cut
2/17/2011	Unknown	Unknown bird - medium	U	1	Medium	Evid of birdstrike located on Runway 8 at about 3000 ft marker. 1030 am day.

Date	Aircraft	Species	Damage	Number Struck	Size	Comments from Database
2/16/2011	Unknown	Unknown bird - small	U	1	Small	Evid of suspect birdstrike on Taxiway A2 @ Runway 13/31. 1140 am day.
12/3/2002	LEARJET-36	Wapiti (elk)	D	2-10	Large	Aircraft was destroyed after colliding with multiple elk by impact and post-crash fire. Pilot applied brakes and deployed the drag chute but the plane continued off the departure end of runway and came to rest in a marshy bog about 50' beyond the departure threshold. 4 people, no injuries. Flames extended 1000' down the rwy behind the plane. Crew believes a piece of elk was ingested and caught fire. Another source who works for the company said the fire department helicopter fanned some burning fuel into the aircraft after it had been evacuated which caused the plane to burn. Airport was closed after the strike. A 10' fence was installed around most of the Airport last year and is seeking permits from the Army Corp of Engineers to allow for work in wetlands to complete the fence. Aircraft cost $5.14 million new in 1997.

Key:
D - Destroyed
M – Minor damage to civil aircraft
M?– Uncertain level of damage to civil aircraft.
N – No damage to civil aircraft reported/ No damage or damage less than $50,000 for military aircraft reported.
U – Extent of damage not reported.

Source:
FAA Wildlife Strike Database, accessed December 2022. Available at: http://wildlife.faa.gov/database.aspx

Section 2 - Authority and Responsibility for Wildlife Management

The Airport Manager has the primary authority over the wildlife management program at AST. Safety is the primary goal of the WHMP, and safety will continue to take precedence over other potentially competing interests associated with wildlife hazard management. The goal of all the actions and responsibilities outlined in this WHMP is to enhance safety as AST by reducing the presence of potentially hazardous wildlife on the airport and decreasing the likelihood of wildlife strikes for aircraft traveling to and from AST.

Two groups of people are responsible for enacting the WHMP: those with direct responsibility for implementing this plan at AST, and those engaged in the WHWG, which is responsible for providing oversight and suggestions for improving the WHMP.

2.1 Airport Manager / Airport Wildlife Coordinator

The Airport Manager serves as the AWC and is responsible for implementing the WHMP and supervising activities associated with wildlife hazard management. The Airport Manager/AWC is responsible for daily wildlife hazard management activities and maintaining records of wildlife hazard management actions and events. The AWC also serves as a liaison to other Port departments, staff, and regulatory agencies for issues and activities associated with wildlife management. The responsibilities of the AWC are summarized in **Table 3**.

2.2 Wildlife Patrols

The AWC will identify airport staff to serve as a Wildlife Patrol, which will include staff members assigned to conduct regular wildlife hazard management activities at the airport and maintain a wildlife monitoring log (see **Appendix C**). The Wildlife Patrol members will be responsible for conducting or assisting the Wildlife Coordinator with the activities identified in **Table 3**.

The Wildlife Patrol will consist of the Operations Supervisor, Airport attendant, and on-duty AST maintenance personnel or Port of Astoria security personnel who have received necessary training as required by the FAA and as identified on Federal and State permits. Each person conducting wildlife control actions must carry a copy of these permits.

2.3 Wildlife Hazard Working Group

The persons responsible for reviewing the WHMP are referred to collectively as the WHWG. The overall purpose of the WHWG is to increase awareness about wildlife hazards and the WHMP and to gain necessary assistance by those outside the airport staff to reduce wildlife hazards at AST. Recommended WHWG members are presented in **Table 4**.

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Table 2: Duties of the Airport Manager/Airport Wildlife Coordinator

Role	Supporting Responsibilities
Prepare and Implement the WHMP	1. Oversee WHMP preparation. 2. Coordinate and convene a WHWG, which is responsible for reviewing, evaluating, and recommending changes to the WHMP every 12 consecutive calendar months or more frequently, if needed. The WHWG may include representatives from the following organizations: • FAA Airport District Office • Airport Operations Staff • Fixed-Base Operators/Airport Tenants • Pilots • Clatsop County Community Development Department • City of Warrenton Community and Economic Development Department • FAA-Qualified Airport Wildlife Biologist (QAWB) 3. Update the WHMP every 12 consecutive calendar months or more frequently as needed.
Supervise, coordinate, and monitor wildlife control activities identified in the WHMP	1. Provide resources for ongoing wildlife hazard management activities described in the WHMP. 2. Conduct daily runway and AOA physical inspections of areas critical to wildlife hazard management. 3. Harass hazardous wildlife from critical areas when appropriate. 4. Perform habitat maintenance/modification, non-lethal control, fence/gate repair, and other wildlife control and management activities as necessary. 5. Obtain permits and perform services for lethal control when warranted. 6. Respond to wildlife hazards/hazardous conditions during airport operations and document any control action that is taken in the airport's wildlife control database. 7. Alleviate imminent hazards and, if necessary, coordinate runway closure to remedy wildlife hazards. 8. Issue a Notice to Air Mission (NOTAM) when wildlife cannot be removed or otherwise mitigated. 9. Conduct routine inspections of areas critical to wildlife hazard management and maintain a record of the necessary control actions. If routine inspections indicate that actions are necessary to reduce and minimize hazards, confirm that the documented actions are undertaken in a timely manner.
Obtain and provide wildlife hazard management training to other Port staff	1. Ensure staff members responsible for wildlife control in the AOA are properly trained in accordance with FAA regulations at 14 CFR Part 139 and guidance set forth at AC 150/5200-36. Such training must be obtained by a QAWB and address such items as: radio communications, driving on the AOA, and the safe use of firearms and pyrotechnics. 2. Maintain inspection and training records related to wildlife control and management training.

Role	Supporting Responsibilities
Obtain/maintain wildlife control permits and perform agency coordination	1. Obtain equipment and maintain depredation permits necessary to control migratory birds, game, and non-game animals from federal or state wildlife agencies. 2. Work with the United States Department of Agriculture, Wildlife Services (USDA-WS) to provide support for the non-lethal and lethal control of deer, coyote, beaver, and other mammals as necessary. If the USDA-WS or another contractor is unavailable to conduct control work, then secure Federal wildlife control permits for wildlife control operations, including obtaining State of Oregon tags for airfield deer culls.
Maintain a record of wildlife management efforts	Establish a wildlife control log/database to record: 1. Wildlife observations, 2. Control actions, 3. Strike data, and 4. Other pertinent wildlife control information.
Obtain and Maintain Permits	1. Obtain permits to conduct lethal control as warranted. 2. Submit annual reports of wildlife management activities to USFWS or state agencies as required by permits. 3. Renew permits as needed.
Record Wildlife Strikes	1. Report wildlife strikes to the FAA National Wildlife Strike database and record in the airport wildlife log. 2. Ensure that AST personnel and pilots understand wildlife strike requirements and procedures for reporting strikes directly to the FAA Wildlife Strike Database and/or make wildlife strike report forms (FAA Form 5200-7) readily available to staff and airport users.
Work with tenants to discourage wildlife on-site	1. Develop and enforce a “No Feeding” policy on the Airport. 2. Implement leash laws within airport boundaries. 3. Remove trash and instruct tenants to remove trash promptly. 4. Remove swallow nests from tenant hangars in accordance with federal requirements.
Work with Pilots	1. Encourage pilots to report wildlife hazards. 2. Encourage pilots to issue pilot reports (PIREPS) associated with wildlife hazards they may observe on or near the airport.

Role	Supporting Responsibilities
Serve as a liaison to provide coordination, public outreach and education, and public relations support for wildlife control activities	1. Work with City of Warrenton and the Clatsop County Community Development Departments to monitor proposed off-site projects and land-use changes and provide technical assistance to address issues and concerns associated with wildlife hazard management during permit submission and review. 2. Work with City of Astoria Community Development Department to review proposed projects within the critical zone for wildlife hazard management (e.g., fish meal plant). Review designs to identify potential opportunities for nesting and perching, and review landscape designs for their potential to provide food or open water sources. 3. Work with other City, County, and Port entities to monitor proposed off-site projects and land-use changes and provide technical assistance to address issues and concerns associated with wildlife hazard management.

Table 3: Summary of Wildlife Hazard Working Group Supporting Members and Responsibilities for Astoria Regional Airport

WHWG Supporting Member	Responsibilities
Federal Aviation Administration, Seattle Airports District Office	1. Assist the AWC in reviewing proposed construction plans for their potential to create new wildlife attractants or other activities that could pose hazards to aircraft operations. 2. Review funding requests for capital improvements associated with wildlife hazard management.
Fixed-Base Operators/Airport Tenants	1. Inform pilots and other personnel of reporting all wildlife strikes and wildlife hazards to the Airport Manager / AWC through appropriate AST procedures. 2. Notify the Airport Manager / AWC of any hazardous wildlife or attractants. 3. Participate in and enforce the airport's "No Feeding" policy. 4. Notify the AWC when nests are identified in hangars or structures (especially swallows).
Local Pilots	1. Issue a Pilot Report (PIREP) if a potential strike hazard occurs. 2. Report potentially hazardous wildlife to the AWC. 3. Report wildlife strikes online or using FAA Form 5200-7, and alert the Airport Manager of wildlife strikes.
U.S. Coast Guard	1. Issue a PIREP if a potential strike hazard occurs. 2. Report potentially hazardous wildlife to the AWC. 3. Report wildlife strikes online or using FAA Form 5200-7.
Oregon Department of Aviation	1. Assist the AWC in reviewing any new construction plans for potential wildlife hazards to aircraft. 2. Review changes and review the WHMP every 12 consecutive calendar months or as needed.
Clatsop County Community Development Agency	1. Participate in WHWG meetings upon request. 2. Notify and coordinate county land use changes with the Airport Manager / AWC.
City of Warrenton Community and Economic Development	1. Participate in WHWG meetings upon request. 2. Notify and coordinate county land use changes with the Airport Manager / AWC.

WHWG Supporting Member	Responsibilities
FAA-Qualified Airport Wildlife Biologist	1. Participate in WHWG meetings as requested. 2. Continue to perform wildlife monitoring and management at the airport, as requested by Airport Manager / AWC. 3. Inform and advise the AWC of new or improved wildlife hazard management techniques and tools. 4. Provide advice to Wildlife Patrol regarding wildlife species identification, proper use of control techniques, and wildlife strike reporting. 5. As requested by the AWC, provide training to wildlife control personnel or others involved in airport wildlife management. Training will address such topics as: Identifying wildlife hazards at airports, bird identification, the safe handling and proper use of wildlife dispersal methods and equipment, and various exclusion methods. 6. Provide assistance in preparing, reviewing, and evaluating the WHMP every 12 consecutive months or as necessary.

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Section 3 - Management Actions

Airport wildlife hazard management usually includes the development and implementation of an integrated wildlife management program. An integrated wildlife hazard management program is a science-based program that includes:

- Ongoing administrative and technical measures;
- Short-term operational measures to reduce immediate or critical risks when they are observed; and
- Long-term measures to reduce risks over time.

An integrated airport wildlife hazard management program must include both on-site and off-site habitat modification measures to address the specific features that were identified to attract potentially hazardous wildlife to the airport and its critical airspace, as well as the use of targeted harassment and population-management measures to address individuals or species that do not respond to habitat modification or pose an imminent or critical threat to aircraft operations.

3.1 Manage On-Site Wildlife Populations

The Port, as the airport operator, will implement an adaptive and integrated wildlife control and management program at AST. In general, the program will consist of the measures identified in this section of the WHMP and the methods described in several Airport Cooperative Research Program (ACRP) technical reports (see **Attachment B**):

1. Effective habitat management and modification measures are described in ACRP Synthesis 52, *Habitat Management to Deter Wildlife at Airports* and ACRP 125 *Balancing Airport Stormwater and Bird Hazard Management* (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_052.pdf).
2. Non-lethal wildlife control measures (e.g., harassment, deterrence, and exclusion) are described in ACRP Synthesis 23*: Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airports* (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf).
3. Lethal wildlife control (trapping, toxicants/fumigants, and shooting) is described in ACRP Synthesis 39: *Airport Wildlife Population Management* (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf).
4. ACRP Report 32: *Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports* provides additional guidance for non-certificated airports (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_032.pdf).

3.1.1 Prey / Predator Management

Indirect prey/predator hazards to airport operations must be managed – both avian and mammal predators are attracted by prey wildlife such as:

- Small mammals such as voles, mice, rats, lagomorphs (rabbits);
- Mesomammals such as cats, skunks, opossums, and raccoons; and
- Invertebrates such as insects and earthworms.

The implementation of appropriate vegetation management measures, such as maintaining grass at a height of 6 to 12 inches, can provide cover for small mammals and invertebrates so that they are not visible to predators, thereby discouraging predators from foraging at the airport.

Mammals / Mesomammals

The Airport Manager / AWC will continue to monitor prey populations and implement appropriate measures to control these species should they become more abundant and attract additional wildlife to AST and its vicinity. Such measures include:

- Recording the presence of raptors, foxes, and other wildlife feeding in the Wildlife Management Log based on the presence of small mammals or animal carcasses;
- Taking specific actions when increased numbers of predators, such as raptors, foxes, or coyotes, are observed at the Airport; and
- Implementing targeted control measures to reduce the prey base and overall attractiveness of the airfield.

Prey and predator population management measures are described in ACRP Synthesis 39: *Airport Wildlife Population Management.*

Invertebrates

Earthworms are often brought to the surface following heavy rains and attract avian species, particularly gulls, shorebirds, starlings, and blackbirds. Appropriate vegetation management can help to control most of this prey population; however, airport personnel will continue to monitor earthworm populations and remove/sweep earthworms from paved surfaces following storms. If earthworms appear to attract potentially hazardous species, then additional measures (chemical applications) will be taken as described in ACRP Synthesis 39: *Airport Wildlife Population Management.*

Insects can attract wildlife species to turf/grass areas, particularly swallows, shorebirds, killdeer, blackbirds, songbirds, and starlings. The Airport Manager/AWC and Wildlife Patrol will monitor insect populations to determine whether a targeted control action is warranted. Targeted measures include maintaining on-site turf at the FAA-recommended height of 6 to 12 inches and mowing turf prior to seeding will reduce the number of insects and discourage turf use by killdeer and starlings, which prefer short grass habitat.

If grass management is observed to disturb insects and attract potentially hazardous bird species, the Wildlife Coordinator may need to halt or delay mowing operations until Wildlife Control personnel abate the hazard. If pesticide applications are warranted, the Oregon Department of Agriculture Pesticides and Fertilizer Program can assist in selection of the best pesticide and/or control method.

3.1.2 Implement a Zero-Tolerance Policy

Port staff will adopt and maintain a “zero-tolerance” policy for hazardous wildlife species in the airport environment. A zero-tolerance designation denotes a species that poses an unacceptably high risk to aircraft operations. The presence of wildlife species that pose a risk to aircraft operations warrants an immediate management action to remove them from the AOA using appropriate techniques (e.g., harassment, lethal take, and capture/relocate).

A zero-tolerance policy should be applied to the hazardous bird species (particularly large or flocking species) and mammals (especially large mammals) that have been observed within the AOA.

Such species include, but are not limited to:

- Deer
- Canada goose
- Bald Eagles
- Gulls
- Barn swallows
- Killdeer
- Sandpipers
- European starlings
- Coyotes
- Elk
- Cows/cattle (if they are allowed access to the AOA)

Specific details of wildlife and wildlife attractants observed on and near AST are described in the WHSV memorandum included as **Appendix A**. The remainder of this section of the WHMP provides the Airport Manager/AWC with specific actions pertinent to each wildlife control and management area. **Table 5** summarizes proposed wildlife management measures and their priority to reduce the presence and hazards posed by wildlife at AST.

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Table 4: AST Wildlife Management Measures and Priority

Management Area	Priority	Target Date	Completion
Habitat Management Measures – Vegetation and Turf			
Continue to maintain airfield turf/grass at an intermediate height of 6 12 inches.	Critical	Current	Ongoing
Ensure that turf consists of desirable grass species that do not produce large seeds and promotes a dense and uniform turf per FAA guidance set forth in CertAlert 98-05 (https://www.faa.gov/airports/airport_safety/certalerts/media/cert9805.pdf).	Critical	Current	Ongoing
Landscaping			
Replace unnecessary trees, shrubs, and weeds with non-seeding or small-seeded turf grass.	High	Fall 2023	Ongoing
Minimize and maintain ornamental vegetation to reduce habitat for nesting and feeding birds.	High	Fall 2023	Ongoing
Review proposed on-site landscaping plans and plant materials proposed to prevent the creation of new Wildlife attractants	Medium	Fall 2023	Ongoing
Determine if measures need to be taken to remove or use exclusion devices on perches and potential nesting areas, as determined by the Wildlife Coordinator.	Low	Current	Ongoing
Fill in areas that accumulate standing water (i.e., non-wetlands) with coarse gravel to facilitate proper drainage while preventing accumulation.	High	Fall 2023	Ongoing
Water Management			
Conduct more frequent wildlife monitoring and harassment when standing water is present within the AOA and wildlife is observed.	High	Fall 2023	Ongoing
Provide improved drainage or structural improvement in areas of persistent standing water or on-site wetlands that attract potentially hazardous wildlife (Permits may be required).	Medium	Fall 2033	N/A
Airport Infrastructure			
Monitor and disperse wildlife from airfield structures using non-lethal controls.	Critical	Current	Ongoing
Remove nests and discourage nesting on or in airfield structures in accordance with Federal or State permits and authorizations. Treat structures to prevent future nesting.	High	Current	
Equip airfield structures with anti-perching devices to discourage perching or use by hazardous wildlife.	Low	Current	Ongoing

Management Area	Priority	Target Date	Completion
Review construction plans for their potential to create temporary or permanent wildlife attractants (e.g., detention basins, inappropriate plantings, and soil stabilization mixes, etc.).	Medium	Fall 2023	Ongoing
Create policies for lease agreements and tenants pertaining to wildlife management and monitor tenant facilities for compliance (e.g., trash storage and pick up, no-feeding policies for wildlife, and pets).	High	Fall 2023	Ongoing
Exclusion			
To exclude wildlife, monitor the airport fence regularly, and repair holes and burrows promptly.	Critical	Current	Ongoing
Remove shrubs and vegetation along perimeter fence to provide visual inspection access for wildlife patrols.	High	Current	Ongoing
Improve access for monitoring and removing vegetation along the perimeter fence (e.g., construct a perimeter road to facilitate fence access and inspection as funding becomes available).	Medium	2033	N/A
Monitor the livestock fences to ensure that they are in good condition to prevent cattle from accessing the AOA.	High	Current	Ongoing
Lethal and Non-Lethal Wildlife Control Measures			
Use appropriate repellents or deterrents as recommended in ACRP Synthesis 23: *Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airports* (see **Appendix B** for link to this resource).	Medium	As needed	N/A
Conduct Harassment using vehicles, pyrotechnics, or other devices when hazardous wildlife occupies aircraft movement areas, cattle grazing areas, or appears in undesirable numbers in accordance with ACRP Synthesis 23: *Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airports* (see **Appendix B** for link to this resource) and local regulations.	Critical	Current	Ongoing
Use Toxicants/Fumigants as warranted to manage populations of small mammals in the AOA, with special emphasis on the Runway Safety Area (RSA).	Low	Fall 2023	Ongoing
Continue to use contractors to capture and remove beavers or other problematic wildlife from airport property as necessary in accordance with ACRP Synthesis 39.	High	Current	Ongoing
Continue the use of controlled deer hunts (shooting) from October to December to remove deer from the AOA in accordance with the Oregon Department of Fish and Wildlife regulations.	Critical	Fall 2023	Ongoing
Incorporate shooting with firearms as a measure of last resort in accordance with federal, state, and local regulations or engage the USDA or other entities as necessary to conduct lethal removal.	High	Fall 2023	Ongoing

Management Area	Priority	Target Date	Completion
Off-site Facilities/Proposed Land Use Changes			
Monitor the fish meal plant and other off-site facilities for their potential to attract hazardous wildlife. If necessary, reach out to property owners/managers to discourage or disperse wildlife using non-lethal controls.	Medium	Fall 2023	Ongoing
Monitor and review proposed land use decisions within the Critical Zone.	Medium	Fall 2023	Ongoing
Coordinate with Clatsop County, the City of Warrenton, and the City of Astoria planning and zoning authorities to assist with coordination when new development is proposed in the critical zone.	Medium	Fall 2023	Ongoing
Monitoring and Wildlife Patrols			
Review Proposed Projects and Land Use Changes within the Critical Zone for Wildlife Hazards.	Medium	Fall 2023	Ongoing
Monitor Off-site Facilities that Attract Hazardous Wildlife to the Airport Vicinity and Airspace of the Airport Fish Meal Plant that is located south of the Airport and on Port owned property.	Medium	Fall 2023	Ongoing
Monitor grazing areas and disperse hazardous wildlife when observed.	High	Current	Ongoing
Monitor and dispose of animal carcasses when observed.	High	Current	Ongoing
Administrative Measures			
Designate the Airport Manager as the Airport Wildlife Coordinator (AWC) and designate staff to comprise a Wildlife Patrol to conduct daily inspections and harassment as necessary.	High	Fall 2023	Ongoing
Obtain Wildlife Control Training for the AWC and designated Airport Personnel.	High	Fall 2023	Annually
Record all Wildlife Strikes in the FAA National Wildlife Strike Database.	Critical	Current	Ongoing
Convene a Wildlife Hazard Working Group.	Moderate	Fall 2023	N/A
Obtain Federal and State Depredation Permits for specific species (see **Section 4**).	Critical	Fall 2023	Ongoing
Procure necessary wildlife hazard management resources as supplies (see **Section 5**).	Critical	Fall 2023	Ongoing
Establish a Communications Protocol (see **Section 6**).	High	Fall 2023	Ongoing
Conduct WHMP Annual Review using guidance set forth in FAA AC 150/5200-39 (see **Appendix B** for a link to this resource).	High	January 2024	Annually

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3.2 Habitat Management

Habitat management includes the physical manipulation, exclusion, and/or removal of areas that attract wildlife. The primary goal of habitat management is to modify and maintain the airport property so that the environment is fairly uniform and generally unattractive to hazardous species. Although the potential secondary effects and permitting requirements must be considered, habitat modification often provides the most effective long-term solution for excluding or discouraging wildlife populations from the airport.

The AWC will implement the following habitat management measures, as warranted, and monitor the modified habitats to ensure they do not create new or different wildlife attractants. Data pertaining to habit modification methods and measures is available in ACRP Synthesis 52 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_052.pdf).

3.2.1 Vegetation Management

Vegetation provides food and cover for wildlife. The habitats of greatest concern identified during the July 2022 site visit include turf/grass, shrubby vegetation, and agricultural uses such as haying operations and livestock grazing.

Turf/Grass

Turf/grass dominates the infield along the runways, taxiways, and aprons and provides natural cover to hazardous wildlife. Cover refers to any type of vegetation that provides wildlife (e.g., Canada geese, songbirds, blackbirds, waterfowl, shorebirds, and insect-eating birds) with shelter for nesting, loafing, roosting, and/or protection from predators or various weather conditions. Deer are also known to occur in areas of the airfield turf/grass.

The Port strives to maintain on-site turf at the FAA-recommended intermediate height of 6 to 12 inches. Intermediate heights are considered optimal because they provide cover to small mammals, thereby discouraging raptors and interrupting communication among flocking birds, and they do not provide sufficient cover for larger mammals.

Shrubby Vegetation

Dense shrubby vegetation dominates the airport's perimeter fence and along ditch areas. Shrubs in general provide shelter for nesting, loafing, roosting, and/or cover from predators or various weather conditions. The dense shrubs prevent airport personnel from inspecting the perimeter fence for holes, gaps, and wildlife digs under the fence. Deer are also known to use the shrubby vegetation as cover.

Haying Operations and Livestock Pastures

Haying operations occur in areas adjacent to the runways, and livestock pastures are located in the western, southern, and northern areas of the airport (north of Runway 8). The airport maintains a grazing lease. While most of the leased area is outside of security fence, a portion is inside the security fence. Barbed-wire cattle fence is used to separate cattle from aircraft movement areas. Various species of birds (e.g., egrets, Canada geese, and blackbirds) that are hazardous to aircraft have been observed to loaf and forage within livestock pastures. These birds can fly across the airfield and or nearby airspace within approach and departure corridors.

Although the Port understands that on-site agriculture practices, such as crop production and cattle grazing, can attract hazardous wildlife, it has leased portions of Airport property to support hay production and grazing operations. Canada geese are attracted to the short grass remaining in grazed areas. Egrets, herons, and blackbirds are attracted to cattle grazing area because cattle expose insects/invertebrates upon which they prey. Due to their size, Canada geese are especially hazardous and will not be tolerated on-site. The wildlife patrol will monitor grazing areas and disperse geese and other hazardous wildlife attracted to the pasture areas. Cattle that graze in on-site pastures have the potential to access the AOA, including runway and taxiway areas.

Recommendations

The type and diversity of vegetation, as well its height, are important factors that can affect the extent to which wildlife is attracted to an area. FAA CertAlert No. 98-05, *Grasses Attractive to Hazardous Wildlife* (https://www.faa.gov/airports/airport_safety/certalerts/media/cert9805.pdf) states, “airport operators should ensure that grass species and other varieties of plants attractive to hazardous wildlife are not used on the airport.” In addition, “grasses that produce large seeds and are known to be attractive to wildlife will be avoided when planting new areas.”

Vegetation throughout the airfield will be managed and maintained in accordance with FAA AC 150/5200-33 (current series), *Hazardous Wildlife Attractants On or Near Airports* (https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-33C.pdf). Grass throughout the AOA will be maintained at an intermediate height of less than 12 inches. Prioritization should be given to the AOA, RSAs, and runway arrival/departure corridors.

To manage vegetation at AST, staff members will:

- Continue to maintain airfield turf/grass at an intermediate height of 6 to 12 inches.
- Ensure that turf consists of desirable grass species that do not produce large seeds and promotes a dense and uniform turf per FAA guidance set forth in CertAlert 98-05 (https://www.faa.gov/airports/airport_safety/certalerts/media/cert9805.pdf).

3.2.2 Landscaping

Landscaping at an airport can contribute to the overall impression that an area has on visitors; however, landscaping can also provide habitat. Raptors, corvids, songbirds, and mammals frequently use shrubs and trees as hunting perches, roost/nest areas, or shelter. Landscaping must coincide with an airport operator’s greater responsibility of safety.

Recommendations

The Airport Manager/AWC will implement the following measures to reduce potential wildlife attractants in the AOA:

- Remove all unnecessary trees, shrubs, and weeds and establish a non-seeding or small-seeded endophytic stand of grass. Minimize the use of ornamental trees and bushes, and prune or remove ornamental trees and shrubs that attract nesting or feeding birds.
- When identifying new landscaping materials, include plant species and cultivars that are not attractive to hazardous wildlife.
- Space individual trees or shrubs so crowns do not overlap at maturity.

- Offset rows of vegetation to allow wind to circulate between individual plants and reduce thermal cover, roosting structure, and nesting habitat for potentially hazardous wildlife species.
- Trim the interior branches of the trees every five years to reduce potential roosting sites and restrict thermal roosting cover.
- To prevent the creation of new wildlife attractants, the AWC will review or consult with a QAWB to review proposed landscaping plans and plant materials.

3.3 Water Management

Open water is attractive to a variety of wildlife species. Naturally occurring areas of open water, standing water, and poorly drained areas can create habitat to attract large-bodied birds (waterfowl and shorebirds) and flocking birds. The airport is adjacent to the mouth of the Lewis and Clark River and Youngs Bay, and numerous canals, ditches, and other areas that contain or accumulate standing water are present on and near AST. Airport property is managed and drained through the use of five tide gates and is subject to retained outflow for two six-hour periods daily.

In addition to open water, standing water accumulates within the airfield during and following rain events. Airfield turf grass along the edges of the two runways collects the greatest amount of temporary standing water and is the dominant attractant to hazardous wildlife during and following storms (e.g., Canada geese, bald eagles, and waterfowl). Staff have reported the presence of beavers, which can create standing water, in the AOA. The Port engages a licensed trapper and conducts an annual trapping program for beavers. If evidence of damming is observed, the Port removes the dam.

Recommendations

To address hazards associated with standing water and drainage on and within the critical zone, the AWC and Wildlife Patrol will perform the following as necessary:

- Increase wildlife dispersal activities when wildlife is observed on areas of standing water.
- If feasible, fill in areas of standing water (e.g., non-wetlands) that are deemed hazardous, with coarse gravel to facilitate proper drainage of water, thus preventing temporary standing water.
- In areas of persistent standing water on on-site wetlands that are observed to attract hazardous wildlife, construct ditches or other drainage improvements to disperse standing water. Culverts should be installed to cover to mask open water ditches/conveyance channels to discourage wildlife. Permits will be required to undertake this measure.
- Trap and relocate/remove beavers found in the AOA.

3.4 Airport Infrastructure

Wildlife can use airport structures and equipment for roosting, nesting, and perching. Existing buildings and other structures should be evaluated to determine whether they provide nesting, perching, or roosting opportunities for birds or other wildlife. If crevices or holes are observed that would attract or provide access to shelter for wildlife, the structures will be repaired/retrofitted to exclude small mammals, such as rodents.

Anti-perching devices, netting, and other deterrents should be installed, if needed, to discourage wildlife use. In addition, the Airport Manager/AWC will review proposed building designs to consider their potential to attract or harbor wildlife and alert project proponents of potential conflicts to avoid potential retrofits or control measures following construction.

AST contains numerous structures that can offer perching, roosting, and nesting opportunities for eagles, raptors, crows, and European starlings including:

- Terminal and hangars,
- Aviation support structures,
- Runway and taxiway signs and lights,
- Utility lines,
- Navigation aids, and
- Fences.

Buildings can provide structure for birds (e.g., swallows) to nest within or outside of them. Staff reported that hangars attract nesting swallows yearly.

Recommendations

The AWC will implement the following, as warranted, to prevent or exclude wildlife from airport structures:

- Monitor all airport structures for wildlife use and attraction. If necessary, take appropriate measures to modify structures and appropriate non-lethal control.
- Discourage the nesting of hazardous birds by screening off roof crevices and performing active harassment techniques in accordance with federal and state permits or authorizations.
- Remove nests and treat structure surfaces with paint or products containing Teflon or Kynar to prevent future nesting efforts.
- Obtain a federal depredation permit for barn and cliff swallows, which would address nest removal.
- Install anti-perching devices on permanent structures that routinely attract hazardous wildlife. Equip structures that routinely attract birds with barrier products such as tension wires, electrified wires, spikes, coils, or porcupine wire.

3.4.1 Construction Activities

On-site construction activities have the potential to attract hazardous wildlife through the creation of litter/trash, the creation of temporary sedimentation ponds, and the use of inappropriate seed mixtures for soil stabilization.

Recommendations

To prevent the creation of wildlife attractants during construction, AST staff will:

- Review and evaluate construction plans for their potential to create wildlife attractants, such as the use of sediment traps that will create open water.
- Revegetate bare areas exposed during construction activities with an appropriate ground cover or turf grass that will not attract potentially hazardous wildlife.
- Establish specifications to be used for on-site construction projects to address the presence of open water, soil stabilization measures (including seed mixtures), and trash generated during construction activities.

3.4.2 Leased Facilities

The Port leases facilities and property for both aeronautical and non-aeronautical uses. Such uses have the potential to create wildlife attractants.

Recommendations

To prevent tenants from creating inadvertent wildlife hazards during leasehold construction or subsequent operations, the Airport Manager / AWC will perform the following as warranted:

- Formulate policies for lease agreements pertaining to wildlife hazard management, such as policies associated with refuse management, outdoor break areas, etc., for inclusion in lease agreements.
- Monitor all leased hangars and facilities for wildlife use and attractants. If necessary, take appropriate action (exclusion, harassment, and deterrence).

  Refer to ACRP Synthesis 23 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf) and ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf).
- Establish and enforce trash management policies that require all tenants to store trash in closed receptacles and empty trash regularly.

3.4.3 Garbage/Trash Handling and Storage

Trash and debris can attract numerous bird species, especially gulls, pigeons, corvids, blackbirds, and starlings. These wildlife attractants may include garbage dumpsters, human handouts, and bird/mammal carcasses.

Recommendations

The Airport Manager/AWC will conduct the following to prevent the creation of wildlife attractants associated with refuse collection and storage:

- Establish trash handling and storage policies that require personnel and tenants to store trash and recyclables in covered receptacles that remain closed and incorporate such policies into lease agreements.
- Monitor site facilities to ensure that garbage/trash receptacle areas remain close and are emptied regularly.

3.4.4 Feeding Wildlife/Handouts/Pets

Domestic animals and the unauthorized feeding of wildlife can pose hazards to aircraft operations.

Recommendations

AST staff will perform the following, as warranted, to reduce potential wildlife hazards:

- Establish and enforce a “No Feeding” policy on the airport. Post signs and inform tenants and airport users about the policy, especially near outdoor break areas.
- Prohibit the use bird feeders of all kinds.
- Establish and enforce a leash-only policy for dogs throughout the airport. Dogs can easily stray onto the AOA when chasing potential prey, such as jackrabbits, ground squirrels, and other small species.
- Consider a fenced-in area for pet use if such a facility is requested by airport tenants.

3.5 Exclusion

AST is enclosed by a 4.3-mile-long, 8-foot-high perimeter fence that surrounds the airport, but wildlife (e.g., deer, cattle, and coyotes) can easily gain access to the AOA through open gates, gaps and holes, and by burrowing beneath the fence. Two cattle guards were installed at the public access points to prevent the cattle on grazing areas from entering the airfield. Since its construction, the fence has been effective in keeping the elk off the airport. However, several deer have been observed and culled within the fence since its installation.

Several shrubby and wooded areas are located on the airport where the deer can hide. The Port conducts deer culls on the airport property regularly to remove deer, and tenants are asked notify Port personnel if/when they spot any deer within the airport boundaries. Exclusion measures, such as a secure perimeter fence, can prevent wildlife from entering the airport property. Other exclusion measures can be implemented to make airport structures unsuitable for behaviors (perching and roosting) through the installation of anti-perching devices or nets. Specific details are provided in ACRP Synthesis 23 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf).

Recommendations

AST staff will perform the following measures to exclude wildlife:

- Monitor the current fence and repair holes or burrows promptly.
- Perform a full perimeter inspection at least semi-annually. The frequency of fence inspections should increase if mammals are persistent in their efforts to gain entry to the airport.
- Identify animal encroachment locations (burrows) beneath the perimeter fence and fill or repair the burrows.
- Ensure that all fence gates are closed and maintain a gap of 6 inches or less between the gate and the ground. If it is not possible to maintain a gap of 6 inches or less, take action to lower fence gates or install speed bumps or gate brushes to remove the gaps.
- Remove vegetation on and near the perimeter fence, as warranted, to provide a clear view of the fence base.
- Clear fence lines and manage shrubs along perimeter fence to provide inspection access for wildlife patrols. Enhance fence access for inspection and maintenance through the creation of a perimeter road that provides access to the perimeter fence.
- Control broadleaf weedy vegetation within the AOA, particularly along the perimeter fence.
- Require the Wildlife Patrol to monitor livestock fences to ensure that the fence is in good condition and that cattle cannot enter the AOA. Disperse hazardous wildlife observed.
- Monitor grazing areas and disperse geese and other hazardous wildlife observed in these areas.

3.6 Lethal and Non-Lethal Wildlife Management Measures

In addition to the habitat modification and management measures, an effective wildlife control program must also include non-lethal and lethal control measures to manage specific species, guilds, and individuals that pose hazards to aviation.

3.6.1 Repellents/Deterrents

Repellent methods are used to address specific wildlife that is abundant or occupies specific locations on the airport. Primary repellents cause involuntary withdrawal or escape behavior in animals through taste, odor, or irritation. Secondary repellents induce an undesirable physiological effect such as gastric malaise. Guilds often managed through the use of repellents include blackbirds, starlings, waterfowl, gulls, and corvids. Repellents are not usually cost-effective and are used only in unusual circumstances. Specific details are provided in ACRP Synthesis 23 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf).

Recommendations

AST staff will perform the following in accordance with the Oregon Department of Agriculture.

- Use appropriate repellents/deterrents per ACRP Synthesis 23, as necessary.
- Ensure that repellent/deterrence use does not result in effects on non-target wildlife.

3.6.2 Harassment

Harassment methods, such as the use of vehicles, pyrotechnics, propane gas cannons, and bioacoustics, are used when hazardous wildlife occupies aircraft movement areas or when wildlife is present in undesirable numbers. The goal of such measures is to manipulate the behavior of birds and other wildlife in an effort to disperse them from an area or resource. Specific details are provided in ACRP Synthesis 23 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf).

Recommendations

The Airport Manager/AWC will perform the following:

- Obtain appropriate training for the AWC and designated staff members (i.e., Wildlife Patrol) to perform harassment.
- Procure and maintain hand-held pyrotechnics launchers and a variety of screamers, bangers, and shell crackers.
- Use pyrotechnics, when necessary, in accordance with the guidance set forth in ACRP Synthesis 23.

3.6.3 Toxicants/Fumigants

Toxicants and fumigants are used to manage specific species or guilds that pose a hazard to aviation, and they are used most frequently to reduce populations of prey species. Specific details are provided in ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf).

Recommendations

As warranted, AST staff will make arrangements to:

- Use appropriate lethal methods to remove problematic wildlife (birds, mammals, rodents) per ACRP Synthesis 39: *Airport Wildlife Population Management* (see **Appendix B** for a link to this document)
- Ensure that chemical applications comply with regulations promulgated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and by the Clatsop County Agricultural Commissioner.

3.6.4 Capture

Capture or trapping includes both non-lethal measures (capture and relocate) and lethal measures, such as the use of snap-trap snares or the use of live traps followed by euthanasia. Capture methods are used to target individuals, such as a deer or coyote, or to reduce prey populations, such as rodents and mesomammals. Specific details associated with capture methods are provided in ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf). The U.S. Department of Agriculture may also provide assistance with trapping and relocation at airports.

Recommendations

AST staff will perform the following in the event that capture methods are determined to be necessary:

- Consult with USDA-WS.
- Use appropriate lethal and non-lethal trapping methods to remove problematic wildlife (raptors and mammals) per ACRP Synthesis 39, as necessary.
- Follow recommended snap and live-trap protocols consistent with Oregon Department of Fish and Wildlife (ODFW) regulations.
- Continue to use contractors to trap and remove beavers that are located on airport property.

3.6.5 Shooting

Shooting with live ammunition is a measure of last resort. However, this form of lethal management may be necessary to address hazardous wildlife identified as “zero tolerance” species and when an imminent hazard is present, such as deer on the airfield. In addition, lethal management may be required when wildlife does not respond to non-lethal measures or as a supplemental measure to reinforce non-lethal control methods. All shooting must be conducted in a manner that complies with applicable federal, state, and local regulations. Specific details are provided in ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf).

Only appropriately trained personnel will perform this lethal control in accordance with the federal Migratory Bird Treaty Act (MBTA) and in accordance with federal- and state-issued depredation permit conditions to remove problematic game and non-game wildlife. Additional details are provided in ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf).

Recommendations

AST staff will perform the following in the event that shooting is determined to be necessary:

- Use appropriate shooting methods to remove problematic wildlife (raptors and mammals) per ACRP Synthesis 39: *Airport Wildlife Population Management*, as necessary.
- The Port will enter into a contract with USDA-WS or another appropriate entity to provide support when shooting is necessary to remove hazardous wildlife.
- Continue the use of controlled deer hunts from October to December to remove deer from the AOA. These controlled deer hunts will be completed in accordance with the Oregon Department of Fish and Wildlife.

3.7 Off-Site Facilities

Wildlife hazard management must address both on-site and off-site facilities located within FAA-required separation distances. For AST, separation distances include the areas within 10,000 feet of aircraft movement areas and the area within 5 miles of approach/departure corridors.

At the time of the WHSV, a fish meal processing facility was under construction in the Airport Industrial Park approximately 2,500 feet south of Runway 8/26. The processing plant will convert waste material from two local seafood processors to protein powder. Raw materials will be trucked into the site in covered tote bins and then processed and dried into protein powder. The finished product will be bagged and removed from the site by truck. The plant is expected to operate six to eight months of the year to coincide with the commercial fishing seasons.

Recommendations

The Airport Manager/AWC will monitor the fish meal plant for wildlife use and hazardous bird attraction. If necessary, work with site managers to incorporate the use of appropriate non-lethal controls.

3.8 Training for Airport Personnel

Effective wildlife control and management plans include constant and consistent communication among all airport users, including airport staff, FBOs, pilots, and other airport users and stakeholders. It is paramount that all users acknowledge the importance of reducing wildlife hazards and communicate wildlife hazards when they are observed.

Recommendations

Airport Operations personnel involved in wildlife management and control must receive wildlife control training annually and document such efforts (specific actions in this area are addressed in **Sections 6** through **8** of the WHMP.

3.9 Proposed Land Use Changes

Incompatible land uses are described in FAA AC 150/5200-33 (current series), *Hazardous Wildlife Attractants On or Near Airports* (https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-33C.pdf). Such uses include, but are not limited to, putrescible waste landfills (and in some instances, transfer stations and other solid waste disposal facilities), wetlands, agriculture, water reservoirs, sewage ponds, parks with artificial ponds, golf courses, hunting leases, sludge disposal sites, feed lots and slaughterhouses, and wildlife refuges, sanctuaries, and production areas.

The Airport Manager/AWC should actively monitor and participate in proposed land use decisions within the critical zone that may inadvertently create or increase wildlife hazards to aircraft operations. When warranted, the Airport Manager/AWC will provide technical and/or operational assistance to Clatsop County, City of Warrenton, and City of Astoria staff to address issues or concerns associated with a proposed project or land use change.

The Safety and Standards Branch of the FAA Northwest Mountain Region and the local Airports District Office (ADO) can provide technical guidance to airport operators in addressing land use compatibility issues. Proposed projects that would likely increase wildlife presence within flight zones (general and critical) will be discouraged when the authority to do so is available. These types of land use changes will be monitored and addressed by working with the local zoning and planning authorities prior to discretionary approvals.

Clatsop County and the cities of Warrenton and Astoria are responsible for implementing policies and ordinances associated with land use changes and development projects. Policy implementation and project analyses include establishing conformance to local goals for development, adopted growth management goals, open space and agricultural preservation, and identifying environmental consequences. They should serve as the liaison between AST, other Port departments, and city and county Planning Commissions to review proposed projects that have the potential to affect land use on the airport and within the critical zone and to prevent the development of new or inadvertent wildlife attractants.

Recommendations

The Airport Manager/AWC will perform the following:

- Monitor land use changes on the airport and in the surrounding area and evaluate effects on wildlife attraction per FAA AC 150/5200-33. If changes result in increased wildlife hazards, determine measures to prevent an increase in wildlife attraction.
- Coordinate with Clatsop County and the City of Warrenton and City of Astoria planning and zoning authorities and nearby landowners in the critical zone, as necessary, to minimize wildlife attraction due to habitat changes or human activity.
- Coordinate with the FAA, as needed, to request agency support if proposed projects have the potential to attract potentially hazardous wildlife to the airport vicinity.

Section 4 - Requirements for Federal, State, and Local Wildlife Control Permits

4.1 Depredation Permits

Depredation permits are required for species that are afforded federal and state protection. Such permits must be obtained and updated annually.

4.1.1 Federal Depredation Permit for Migratory Birds

The federal Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the U.S. Fish and Wildlife Services (USFWS).

The USFWS acknowledges that large populations of certain bird species can cause damage to aircraft and threaten human safety, and it provides regulations and permits to perform the controlled take of certain species in specific areas and at specified times, including the control of migratory birds at airports.

The Port does not currently hold a USFWS Migratory Bird Depredation Permit to lethally manage migratory birds. A federal depredation permit would allow USDA-WS or another authorized agent of the Port to lethally control or “take” migratory birds, their eggs, parts, and active nests. USFWS requires permit holders to identify the specific species that require management. The Port could obtain a federal depredation permit to address the following species:

- Canada goose
- Mallards
- Gulls
- Barn swallows
- Killdeer
- Sandpipers

Additional details associated with federal depredation permits for airports are presented in in FAA CertAlert No. 13-01, *Federal and State Depredation Permit Assistance* (http://www.faa.gov/airports/airport_safety/certalerts/media/cert1301.pdf).

Some species of migratory birds, including resident Canada geese at public-use airports, are also covered by USFWS federal depredation orders or control orders. These orders are discussed in 50 Code of Federal Regulations Part 21 and on the USFWS website, and they allow some specific migratory birds to be taken under the depredation order instead of specific migratory bird permits as long as all requirements of state law are also followed.

Recommendations

To enable the Port to manage the species identified, the AWC will:

- Obtain a federal depredation permit from the USFWS, renew annually, and revise its conditions to address additional species identified in the WHA (FAA CertAlert No. 13-01).
- Consult with the USFWS, USDA-WS, and QAWB to identify the species and number of individuals that can be taken in association with the depredation permit.

4.1.2 State-Issued Depredation Permit for Game and Non-Game Species

The ODFW implements Chapter 635 of the Oregon Administrative Rules pertaining to fish and wildlife. Pursuant to Chapter 635, Division 435, the ODFW requires that a wildlife control operator (WCO) permit be issued to control furbearers or unprotected mammals causing damage, creating a public nuisance, or posing a public health or safety concern in incorporated city limits and associated urban development areas. A WCO permit is not required for the onsite capture and euthanasia of species defined as “predatory animals,” which includes coyotes, rabbits, rodents, feral swine, starling, house sparrows, and Eurasian collared doves. Additionally, federal employees of the USDA-WS and, County or municipality employees, working in their official capacity, are exempt from this requirement.

State wildlife laws administered by the ODFW include jurisdiction over game and non-game species to include resident and migratory birds, mammals, reptiles, amphibians, and state-listed threatened or endangered species in Oregon that necessitate obtaining an Oregon state-issued permit for depredation. Wildlife categories (**Table 6**) include migratory and resident, game and non-game, and threatened and endangered species. Please note that most of these species were not identified during field surveys, but they may be present. Wildlife management personnel will understand the category for the species that require management to determine the applicable laws and permit requirements.

4.2 Pesticide Use

4.2.1 Federal Regulations

Any person using restricted-use pesticides, applying any pesticides to the land of another, or applying any pesticides for hire must be a chartered or permitted applicator or work under the direct supervision of such, and then only use pesticides covered by the charter or permit. For example, if AST uses a rodenticide to manage rodents or herbicides to manage vegetation, then AST and its contractor must comply with FIFRA.

Recommendations

If the use of pesticides is deemed necessary, AST staff will:

- Comply with FIFRA requirements and responsibilities for pesticide use.
- Comply with FIFRA requirements for pesticide storage.

4.2.2 State Regulations

In Oregon, the Department of Agriculture (ODA) is responsible for the enforcement of federal pesticide laws including the licensing and certification of pesticide applicators. The ODA registers pesticide products, enforces pesticide label compliance, trains and licenses professional applicators and other prospective users of certain pesticides, and assesses the potential impact of agricultural chemicals.

Only licensed pesticide operators will be allowed to apply restricted-use pesticides to manage populations of blackbirds, starlings, rodents, rabbits, insects, and earthworms and to manage weeds. To obtain the necessary license for pesticide application, a person must pass an ODA-administered exam. All personnel that use restricted-use chemicals will obtain a pesticide applicator's charter or permit or be under the direct supervision of an applicator. Personnel responsible for using pesticides must strictly adhere to the pesticide label and will follow U.S. Environmental Protection Agency (EPA) and ODA regulations and guidance.

4.3 County and Local Regulations

Wildlife control activities must also comply with applicable County and local regulations and guidelines, such as those required for the use of firearms, as pyrotechnical devices (bangers and screamers) can be considered firearms or explosive devices.

Recommendations

To comply with County and Local regulations, the AWC will:

- Understand County and local regulations and guidelines.
- Coordinate wildlife control and management activities with these entities.
- Obtain any local permits, if required, to comply with local regulations.

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Table 5: Wildlife Categories in Oregon

Category	Species	State Permit or Endorsement		Federal Permit or Endorsement	
		Required	Obtained	Required	Obtained
Resident Non-game birds	Starlings, House Sparrow	No	Not applicable	No	Not applicable
Resident Game Birds	Quail, Turkey, Ring-Necked Pheasant, Grouse, Partridge, Chukar	Yes	Not applicable	No	Not applicable
Migratory Game Birds	Ducks, Geese, Coots, Mourning Doves, Band-Tailed Pigeon	No	Not applicable	Yes	No
Migratory Non-game Birds	All species except game birds, resident nongame birds, and domestic and exotic birds	No	Not applicable	Yes	No
Depredation Order Birds[(1)]	American Crow, Magpies, Blackbirds, Cowbirds	No	Not applicable	No	Not applicable
Domestic Birds	Rock doves	No	Not applicable	No	Not applicable
Furbearers	Beaver, Bobcat, Fisher, Marten, Mink, Muskrat, Otter, Raccoon, Red Fox, and Gray Fox.	Yes	Not applicable	No	Not applicable
Unprotected Non-Game Mammals	Badger, Coyote, Gophers (*Thomomys bottae, T. Bulbivorus, T. mazama, T. talpoides and T. townsendii*), Moles (*Scapanus townsendii, S. orarius and S. latimanus*), Mountain Beaver (*Apolodontia rufa*), Yellowbellied Marmots (*Marmota flaviventris*), Nutria, Opossum, Porcupine, Spotted Skunk, Striped Skunk, and Weasel.	No	Not applicable	No	Not applicable
Predatory Mammals	Bobcat, coyote, feral pig, rabbits, rodents (including beaver and silver-gray squirrels)	No	Not applicable	No	Not applicable
Game Mammals	Deer, Elk, Antelope, Bear, Mountain Lion, Silver-gray Squirrel	Yes	Not applicable	No	Not applicable
Feral Domestic Mammals	Dogs, Cats, Livestock	No - Call local Animal Control Department	Not applicable	No	Not applicable
Fully Protected Wildlife[(2)]	Threatened and Endangered Species	Yes	No	Permit	No

Notes:
1 May be taken without permits "when concentrated in such numbers and manner as to constitute a health hazard or other nuisance" (50 CFR §21.43).
2 Any person may take threatened or endangered wildlife in defense of his life or the life of others.

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Section 5 - Resources for Plan Implementation

Wildlife control and management supplies and equipment can be purchased from numerous vendors. The Port will maintain an adequate supply of equipment for wildlife control and management so that it can be used by trained personnel.

The AWC will ensure that vehicles used for wildlife response are equipped with the supplies necessary to facilitate a timely response. Personnel responding to wildlife hazards will maintain radio communications with aircraft during normal business hours and use UNICOM or the common traffic advisory frequency (CTAF). Wildlife control patrols must operate within the movement areas according to FAA regulations and guidance. Basic supplies to be maintained in wildlife control vehicles are summarized in **Table 7**.

Table 6: Supplies to be Maintained in Wildlife Control Vehicle

Category	Supplies
Identification	Field guides for wildlife identification
	Binoculars
Wildlife Control	Pyrotechnic launchers
	Pyrotechnic ammunition (e.g., screamers, bangers, etc.) and firing caps
	Air pellet pistol/rifle and ammunition (non-lead)
	Rat/mouse snap traps
	Bird strike collection kit
Safety Equipment	First-aid Kit
	Hearing and eye protection
	Fire extinguisher
	Shovels and buckets
	Latex gloves
	Alcohol wipes
	Garbage and plastic bags
Reporting	Airport Wildlife Observation and Wildlife Hazard Continual Monitoring and Report Checklist
	FAA Form 5200-7, Bird/Other Wildlife Strike Report
	Guidebooks for addressing aircraft/wildlife hazards at airports (ACRP Synthesis 23, ACRP Synthesis 39, ACRP Synthesis 52, ACRP Report 125)
	Copies of Federal and State depredation permits

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Section 6 - Procedures to be Followed During Aircraft Operations

6.1 Personnel Responsible for Implementing Procedures

Personnel involved in wildlife control and management include:

- The AWC, and
- Other County staff trained in wildlife control techniques, wildlife identification, and safe airport operations.

These individuals will monitor and respond to wildlife hazards on the airfield to the extent practicable while maintaining a secure environment for safe aircraft operations. All personnel will be equipped with radios and will maintain clear radio communications with other airport staff.

As part of the daily protocol, Airport Operations personnel will be responsible for conducting all physical inspections of movement areas, visible portions of the airport fence, and other areas critical to wildlife hazard management.

6.2 Physical Inspections of Movement Area and Other Areas Critical to Wildlife Hazard Management

The AWC and designated AST staff members will monitor the AOA for the presence of hazardous wildlife and wildlife attractants, and they will record the presence of hazardous wildlife observed and any wildlife control and management actions performed. The AWC will record this data in an airport wildlife control database.

The AWC will:

- Monitor for the presence of hazardous wildlife during routine runway, airport, and security inspections.
- Regularly monitor the airport perimeter fence and livestock fences surrounding the grazing lease to ensure that cattle cannot enter the AOA.
- Undertake control actions as required.
- Record pertinent wildlife observations and wildlife control actions on appropriate forms so the AWC can record the data in the airport wildlife control database.

In addition, the AWC will provide for vegetation/habitat management, perimeter fence repair, and garbage removal as needed to minimize wildlife attractions.

6.3 Wildlife Hazard Control Measures

The AWC will identify each wildlife hazard and formulate a practical solution. In most cases, the initial response will include non-lethal measures (harassment, deterrence, habitat management, and exclusion) as described in ACRP Synthesis 23 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_023.pdf). When such measures are determined to be ineffective, they will be supplemented or reinforced through the use of lethal measures (shooting and chemicals) as described in ACRP Synthesis 39 (http://onlinepubs.trb.org/onlinepubs/acrp/acrp_syn_039.pdf.

Persistence and innovation are central to a successful wildlife management and control program. The AWC and designated airport personnel will select and implement wildlife control techniques according to their biological, sociological, economical, and political effectiveness. In general:

- Wildlife control techniques are most effective when they are used infrequently and in conjunction with other methods.
- The wildlife control method or measure selected in a specific situation will depend largely on the situation and the species involved.

The AWC will perform the following routine wildlife hazard management duties in accordance with applicable FAA regulations and guidance:

- Conduct runway sweeps at least once per day when staff members are on duty.
- Document wildlife that is observed or other wildlife-related activities (notable hazards, animals killed or dispersed, and unusual wildlife behavior) on the Airport Wildlife Observation Log. A sample Wildlife Log is presented in **Appendix C**.
- Remove any dead animals or carcasses and record the presence of animals that could be associated with a wildlife strike online or using FAA Form 5200-7.

The AWC will ensure that a radio-equipped vehicle is available to perform these duties and ensure that adequate wildlife control materials are available to conduct wildlife hazard management activities (see **Table 7**). In addition, the AWC and designated staff involved in direct wildlife control will be aware of potential diseases wildlife can carry and take appropriate precautions.

6.4 Communication between Wildlife Control Personnel and Local Air Traffic

Effective communication between airport personnel and air traffic is essential for the safe implementation of the WHMP. All airport personnel conducting wildlife control and management should carry radios and receive proper training in monitoring and transmitting messages using CTAF.

If a wildlife hazard exists poses an immediate threat to air traffic, the AWC or designated staff member will communicate with arriving or departing air traffic until the threat is removed. Generic or blanket advisories concerning wildlife will not be issued in lieu of specific hazard advisories.

The communications protocol at AST should include the following:

- Procedures for the AWC or designated staff to alert pilots of potential hazards prior to takeoff and landing. Prior to the initiation of any wildlife control measure, wildlife control staff will coordinate all wildlife control activities through CTAF to ensure that actions do not affect flight safety.
- Procedures for alerting the AWC to address hazards that require immediate attention.
- Procedures for airport personnel to notify the AWC of pertinent wildlife-related information for inclusion in a specific NOTAM when persistent wildlife cannot be removed or otherwise mitigated in accordance with FAA AC 150/5200-28 (current series), *Notices to Air Missions (NOTAMs) for Airport Operators* (https://www.faa.gov/documentlibrary/media/advisory_circular/150-5200-28f.pdf).
- Communication procedures through which the Airport Manager/AWC can alert local pilots regarding any wildlife strikes or observations of wildlife activity at the airfield.

Section 7 - Evaluation and Review of the Wildlife Hazard Management Plan

7.1 Effectiveness of the Plan

The Airport Manager will evaluate the WHMP and its effectiveness in accordance with 14 CFR Part 139.337. The WHMP will be reviewed every 12 consecutive calendar months, at a minimum, and any time a triggering event occurs as defined in CFR Part 139.337(b)(1–3). Although a triggering event is identified as an activity involving an air-carrier aircraft, the same events will be considered triggering events at AST when they occur in association with a military or GA aircraft. The WHMP review and evaluation should include representatives from all airport departments involved in wildlife control and management efforts (see **Section 2**).

It is recommended that the QAWB associated with the WHA be involved in the review process. In most cases, the WHWG will review the WHMP to evaluate its implementation and effectiveness and to provide recommendations for refinements or modification.

7.2 Aspects of the Wildlife Hazards for Evaluation

The WHMP, existing wildlife hazards, and wildlife control and management actions and strategies should be examined annually for their effectiveness. To do so, the AWC should, at a minimum, review the plan in accordance with FAA AC 150/5200-38, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans.* A copy of the protocol is provided in **Appendix D**.

To support WHMP evaluation, the AWC or a designated staff member should:

- Review wildlife observations and evaluate the effectiveness of wildlife control and management activities documented on the Airport Wildlife Observation Log (**Appendix C**).
- Review wildlife strike records to determine their location and potential attractants. After this evaluation, make recommendations to incorporate measures to remove or mitigate the wildlife attractant and include the recommendation in the WHMP.
- Consider the species involved in wildlife strikes or observed most frequently and determine whether additional measures or permits are needed to address these species.
- Evaluate overall wildlife hazard control and management plan effectiveness, adjust strategies as necessary to minimize hazards, and incorporate revised strategies into the WHMP, as warranted.

Accurate and consistent reporting are critical to determining the effectiveness of a WHMP. This WHMP underscores the need for staff commitment to the documentation of all wildlife strikes that occur within the separation distances as described in Sections 1-2 and 1-3 of FAA AC 150/5200-33 (current series) *Hazardous Wildlife Attractants On or Near Airports* (https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-33C.pdf) to better identify, understand, and reduce threats to aviation.

7.3 Reporting Wildlife Strikes

The AWC will report all wildlife strikes to the National Wildlife Strike Database at https://wildlife.faa.gov/home, which includes a link for online reporting and for a strike reporting form. If the AWC or designated staff member cannot identify the remains, then wildlife remains will be sent to the Smithsonian Institute for specific wildlife identification (FAA AC 150/5200-32) (see http://www.faa.gov/airports/airport_safety/wildlife/smithsonian/ for methods). Fees for this service are paid for by the FAA and are provided at no cost to the airport.

The remains should be accompanied by FAA Form 5200-7 and/or the completed online Bird Strike Report and contact information. Remains should be sent to the following address using overnight or next day delivery options to preserve the integrity of the remains:

Feather Identification Lab
Smithsonian Institution
NHB, E600, MRC 116
10th & Constitution Ave, NW
Washington, D.C. 20560-0116

Section 8 - Wildlife Control Training Program for Airport Personnel

Airport personnel must be provided with the knowledge and skills needed to implement the measures identified in the WHMP. The Airport Manager/AWC will participate in a wildlife control training program and/or training the AWC deems appropriate every 12 consecutive calendar months. The training can be conducted by a QAWB or certified airport “train the trainer” staff. Recurrent training requirements as described in 14 CFR 139.303 should equip personnel actively involved in wildlife hazard control and management with sufficient resources needed to comply with the requirements in this WHMP. In addition, pesticide user training and certification must also comply with regulations administered by the ODA.

To comply with these requirements, the Airport Manager/AWC will:

- Ensure all wildlife control and management personnel receive the required training from a QAWB or airport “train the trainer” staff.
- Perform recurrent training in-house with qualified personnel or by using a QAWB annually.
- Document and maintain training completion as part of the WHMP. Training records will be maintained in **Appendix E**.

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Section 9 - Federal- and State-Listed Threatened and Endangered Species, and Species of Special Concern

The Endangered Species Act (ESA) directs all federal agencies to work together to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which federal agencies ensure that their actions, including those actions they fund or authorize, do not jeopardize the existence of listed species. Section 7 of the Act also describes procedures for responding to requests by state wildlife agencies to facilitate and encourage habitats for state-listed threatened and endangered species or species of special concern that occur on airports and may pose a threat to aviation safety. The FAA decision to require an airport operator to develop, submit for approval, and implement a WHMP is considered a federal action, as defined in the ESA, and it is subject to Section 7 consultation with the USFWS if federally listed threatened or endangered species are present.

The USFWS (https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=OR&stateName=Oregon&statusCategory=Listed) and ODFW (https://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_species.asp) maintain updated lists of endangered, threatened, and species of concern at both the federal and state levels (see **Sections 9.1 and 9.2**). The ESA and ODFW protect animal and plant species potentially threatened with extinction. These acts classify species as endangered or threatened:

- An endangered species is defined as "any species or subspecies that is in danger of extinction throughout all or a significant portion of its range."
- A threatened species is defined as "any species or subspecies that is in danger of becoming an endangered species within the foreseeable future throughout or over a significant portion of its range."

Once listed, a threatened or endangered species or their habitat cannot be taken or harassed without a special permit. AST Airport Operations personnel should be familiar with these species and their potential occurrence at the airport. Several protected birds are known to exist in the airport vicinity; however, none were observed during the site reconnaissance visit. Transient or migratory protected individuals may present hazards to air traffic at AST, and permits are required prior to the implementation of wildlife control measures against these species.

In most cases, regulatory agencies will not issue permits or authorize the lethal removal of federal- or state-listed threatened and endangered species (see FAA Cert Alert 13-01, *Federal and State Depredation Permit Assistance,* at http://www.faa.gov/airports/airport_safety/certalerts/media/cert1301.pdf). The regional USFWS and ODFW office can provide additional information as necessary. Airport operations personnel will be able to identify protected species, and AST will maintain the appropriate permits to conduct wildlife hazard management actions when necessary.

Critical habitat for listed species is also regulated by the USFWS, the U.S. Forest Service (USFS), and ODFW, and these regulations and can affect proposed habitat modification measures.

9.1 Procedures for Managing Federally Listed Species on Airports

Section 7 of the ESA, as amended, applies to federal agency actions and sets forth requirements for consultation to determine if the proposed action may "affect" an endangered or threatened species. If an agency determines that an action may "affect" a threatened or endangered species, then Section 7(a)(2) requires each agency, generally the lead agency, to consult with the USFWS and/or the National Marine Fisheries Service (NMFS), as appropriate, to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species or result in the destruction or adverse modification of critical habitat. The effects on fish, wildlife, and plants include the destruction or alteration of habitat and the disturbance or elimination of fish, wildlife, or plant populations.

If a species has been proposed for federal listing as threatened or endangered, or a critical habitat has been proposed, Section 7(a) (4) states that each agency shall confer with the USFWS and/or NMFS. (Refer to the USFWS and NMFS document, Endangered Species Consultation Handbook: "Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act," March 1998 (https://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf).

Section 9 of the ESA prohibits a federal agency from taking, without an incidental take permit, any endangered species. Where a conservation plan has been developed pursuant to a Section 10 permit (incidental take permit), the FAA must ensure an impact analysis is conducted in accordance with the National Environmental Policy Act of 1969 (NEPA) and ensure that the analysis is consistent with the predicted impacts described in the conservation plan. Under the Magnuson-Stevens Act, federal agencies must consult with the NMFS with regard to any action authorized, funded, or undertaken that may adversely affect any essential fish habitat identified under the Act. The consultation procedures are generally similar to ESA consultation requirements.

To comply with federal and state requirements, the Airport Manager/AWC will perform the following as warranted:

- Contact the USFWS office regarding the presence of federally listed or proposed species or designated or proposed critical habitat occurring on or near the airport.
- Provide training to the Airport Manager/AWC responsible for wildlife control activities to identify listed species when they are present on or near the airport.
- Alert the proper authorities if any federally listed threatened or endangered species is noted during daily runway sweeps, other airfield activities, or observed within the critical zone.

9.2 Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports

The AOA is an artificial environment that is created and maintained specifically to support aircraft operations. Because an AOA can be markedly different from the surrounding native landscapes, it may attract wildlife species that do not normally occur in an area or occur only infrequently. Some wildlife species may occur on the airport in higher numbers than the number that occur naturally in the region because the airport offers habitat features that the species prefer. Such species could include state-designated threatened and endangered species or species of special concern.

Many state wildlife agencies have requested that airport operators facilitate and encourage habitat on airports for state-listed threatened and endangered species or species of special concern. Managing the on-airport environment to facilitate or encourage the presence of hazardous wildlife species can create conditions that are incompatible with, or pose a threat to, aviation safety. Airport operators should not promote the presence of these species or their habitats on airport property if their presence would pose hazards to aircraft operations. FAA CertAlert 06-07, *Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports* (http://www.faa.gov/airports/airport_safety/certalerts/media/cert0607.pdf), addresses this issue.

To comply with these requirements, the Airport Manager / AWC will:

- Voluntarily comply with FAA CertAlert 06-07 as warranted (see **Appendix B** for a link to this document).
- Routinely maintain the airport property with aviation safety as a priority and prevent the creation of habitat for or presence of state-listed species.

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Section 10 - National Environmental Policy Act Review

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, identifies the WHMP approval as eligible for a categorical exemption pursuant to the National Environmental Policy Act of 1969 (NEPA) in the absence of extraordinary circumstances.

Since AST is not a certificated airport in accordance with FAR Part 139, the FAA will not approve the WHMP; therefore, it is not a Federal Action. The FAA will review and accept the report to indicate that it is acceptable in accordance with FAA regulations and guidance. Nevertheless, individual measures included in the plan may be subject to NEPA review prior to implementation should they trigger an extraordinary circumstance, require federal funding, or require other federal agency approvals. If specific measures included in this plan require federal funding or federal agency approvals, the County may be required to prepare an environmental evaluation in accordance with NEPA.

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APPENDICES

Appendix A. 2022 Wildlife Hazard Site Visit Report

Technical Memorandum

To:

From: Rick Jones, FAA-Qualified Airport Wildlife Biologist

Date:

Subject: July 7-8, 2022 Wildlife Site Reconnaissance Visit at Warrenton-Astoria Regional Airport (AST)

Background

The Warrenton-Astoria Regional Airport (AST) is a General Aviation (GA) airport located in Warrenton, Clatsop County, Oregon. The Airport is owned and operated by the Port of Astoria (Port) and is home to the U.S. Coast Guard Air Station Astoria and more than 30 based aircraft (**Figures 1 and 2**).

The Port prepared a Wildlife Hazard Management Plan (WHMP) in 2005 with the assistance of the United States Department of Agriculture (USDA). The primary objective of the WHMP was to identify a defined set of policies, goals, and standards that could be implemented to reduce wildlife hazards at AST. The WHMP was prepared in accordance with FAA guidance set forth in Title 14 of the Code of Federal Regulations (CFR) Part 139.337, Wildlife Hazard Management, and the WHMP includes all necessary components identified in the regulation. In accordance with Federal Aviation Guidance regulations at 14 CFR part 139.337 and subsequent guidance, an airport operator should review and evaluate its WHMP every 12 consecutive months, at a minimum, record the date of the review in the WHMP, and provide necessary updates as necessary. The Port's WHMP indicates that the plan has not been reviewed or modified since its completion.

The Port conducted a Wildlife Hazard Site Visit (WHSV) using FAA guidance set forth in Advisory Circular (AC) 150/5200-38, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans. A WHSV includes on-site wildlife observations for a one- to three-day period*, and the results can be used to determine whether the data used to prepare an WHMP needs to be updated, or the WHMP data can serve as the basis for WHMP development at non-certificated airports. Based on the data presented in this technical memorandum, additional or revised wildlife hazard management recommendations were incorporated into the WHMP.

Mead & Hunt conducted a two-day site reconnaissance visit at AST to compare the site conditions described in the 2005 WHMP with current site conditions. The site reconnaissance visit was conducted from July 7 to July 8, 2022, by a Qualified Airport Wildlife Biologist (QAWB) who has received FAA-approved training in wildlife hazard management. In accordance with AC 150/5200-38, fixed-point surveys were conducted to document wildlife presence on the airfield.

Site Reconnaissance Visit

Background Research

The project team reviewed pertinent background information to gain familiarity with the environmental conditions, site features and wildlife species that are likely to occur on and within the airport vicinity. Aerial photographs were reviewed to consider the airport property in relation to nearby features or facilities that had the potential to attract hazardous wildlife, such as wetlands, forests, open water, and livestock fields. The research results were used to identify survey locations and to inform the interviews conducted with Port and airport personnel.

Wildlife Surveys

During the two-day site visit, the QAWB toured the Airport property to inspect property boundaries, identify monitoring locations, and document existing site conditions. Weather conditions during the two-day site visit were similar. The evening survey on first day included partly cloudy skies with light winds and temperatures in mid-60s (°F). The morning survey on the second day of the visit was cloudy with light winds and temperatures in the high 50s (°F).

The QAWB established six monitoring points within the airfield and conducted surveys at these points during the two-day site visit to observe wildlife presence, abundance, and behavior (**Figure 3**). The QAWB also drove a transect along the airport levee road to observe wildlife presence, abundance, and behavior in Youngs Bay. Six on-site monitoring locations were established to provide visual coverage of the AOA, including the runway and taxiway, ramps, infield turf areas, buildings, and structures. Points 5 and 6 also provided visual coverage of adjacent livestock pasture.

The QAWB conducted one morning and one evening survey during the two-day period. The morning survey began at dawn and the evening survey begins approximately two hours before sunset. During each survey, the QAWB recorded the species observed from each monitoring location during a five-minute interval. A supplemental survey was conducted on the levee along Youngs Bay to identify birds attracted to the bay/open water environment.

In addition to data obtained at the monitoring points, the QAWB also noted general observations pertaining to the presence or evidence of wildlife (e.g., scat, tracks) that were not associated with a fixed point. General observations included wildlife identified while traveling between monitoring locations, near or in hangars/buildings, adjacent to the airport, or elsewhere on airport property.

Habitat Observations

The QAWB identified habitats and biological communities present on and near the airport property that could attract or support wildlife (e.g., vegetation, turf grass, woodlands, bays, lakes, ponds, creeks, wetlands, shrubs, trees, structures, buildings, hangars, etc.).

Additional Data Collection

The QAWB conducted interviews with Gary Kobes, Former Airport Manager/Operations Contractor/Consultant, Brent Gilland, Operations Supervisor, Chris Gibbs, Airport Attendant, and Matt McGrath, Deputy Director / Interim Airport Manager. The interviews were conducted to discuss wildlife observations, known wildlife strikes, and to gain insights and understanding of known management practices. The QAWB also provided a wildlife hazard management questionnaire to the staff listed above to gain more detailed wildlife hazard management information than was gained in the interviews. A copy of the questionnaire is included as **Attachment A**.

Wildlife Observations

Wildlife observations summarizes the wildlife and habitats observed during the two-day site visit; however, it is important to note that Airports and wildlife are dynamic, and the use of the airport property and facilities by wildlife may change over time as a result of seasonal and daily variations in site conditions, weather conditions, and movement/migration patterns. The site visit data provides only a snapshot of the wildlife presence and behavior on and near the airport.

The data presented in this report should not be viewed as a definitive representation of wildlife populations and behavior at AST; rather, the data should serve a data point to compare the site conditions described in the 2005 WHMP with current site conditions.

Summary of Wildlife Surveys

A total of 39 bird species from twelve avian guilds (i.e., groups of similar species) and one mammal species were observed during the two-day site visit. **Table 1** presents each wildlife species and the number of individuals observed.

To facilitate an analysis of the wildlife observation data, the species presented in **Table 1** were organized into twelve guilds or species groups based on similar behavior and/or habitat preferences. While guild members may vary taxonomically or have different diets, they are typically found in similar habitats or pose similar risks to aircraft operations. Birds that exhibit similar behavior tend to respond in a similar way to wildlife control methods, such as habitat modification, exclusion, or hazing with pyrotechnics.

The species richness observed at AST was typical for the region during the summer season. The most frequently observed bird species during the survey were Canada geese, gulls, and barn swallows. According to Port staff, the most abundant birds on the airport are Canada geese, ducks of various speciesm including mallards, pintails, and scaups, as well as killdeer, and sandpipers. Staff members reported that bird strikes occur primarily with migratory waterfowl. Staff also report that hangars attract nesting swallows annually. The airport is adjacent to open water (Youngs Bay) on the north side, the Lewis and Clark River on the east side, and numerous creeks and ditches and are present on and adjacent to the Airport. Airfield drainage is managed using five tide gates; therefore, outflow is detailed on site daily for two six-hour periods. Port staff members also report that woods and on-site areas of the airport provide cover for deer, and deer have been observed to inhabit areas within the perimeter fence. No deer were observed on the airport during the site visit.

Table 1
Species Observed during Standardized Wildlife Surveys at AST
July 7-8, 2022

Guilds and Species Observed	*Scientific Name*	Abundance	Percent of Abundance
Waterbirds		**1**	**0.1%**
American White Pelican	*Pelecanus erythrorhynchos*	1	100.0%
Waterfowl		**341**	**45.6%**
Canada Goose	*Branta canadensis*	336	98.5%
Mallard	*Anas platyrhynchos*	5	1.5%
Gulls		**62**	**8.3%**
Unidentified Gull	*Larus (sp)*	62	18.1%
Blackbirds and Starlings		**21**	**2.8%**
Brown-headed Cowbird	*Molothrus ater*	2	9.5%
Brewer's Blackbird	*Euphagus cyanocephalus*	2	9.5%
European Starling	*Sturnus vulgaris*	17	81.0%
Doves and Pigeons		**8**	**1.1%**
Eurasian Collared-Dove	*Streptopelia decaocto*	8	100.0%
Swallows		**62**	**8.3%**
Barn Swallow	*Hirundo rustica*	62	100.0%
Shorebirds		**39**	**5.2%**
Great Blue Heron	*Ardea herodias*	4	10.3%
Killdeer	*Charadrius vociferus*	26	66.7%
Unidentified Shorebird		9	23.1%
Sparrows, finches, and warblers		**94**	**12.6%**
American Goldfinch	*Spinus tristis*	19	20.2%
Common Yellowthroat	*Geothlypis trichas*	10	10.6%
Lazuli Bunting	*Passerina amoena*	1	1.1%
Orange-crowned Warber	*Vermivora celata*	1	1.1%
Purple Finch	*Haemorhous purpureus*	1	1.1%
Red Crossbill	*Loxia curvirostra*	2	2.1%
Savannah Sparrow	*Passerculus sandwichensis*	25	26.6%
Song Sparrow	*Melospiza melodia*	19	20.2%
Warbling Vireo	*Vireo gilvus*	2	2.1%
White-crowned Sparrow	*Zonotrichia leucophrys*	4	4.3%
Yellow Warbler	*Setophaga petechia*	8	8.5%
Yellow-rumped Warbler	*Setophaga coronata*	2	2.1%
Corvids		**44**	**5.9%**
American Crow	*Corvus brachyrhynchos*	42	95.5%
Common Raven	*Corvus corax*	2	4.5%
Raptors		**27**	**3.6%**
Bald Eagle	*Haliaeetus leucocephalus*	13	48.1%
Cooper's Hawk	*Accipiter cooperii*	1	3.7%
Northern Harrier	*Circus cyaneus*	4	14.8%
Osprey	*Pandion haliaetus*	5	18.5%
Red-tailed Hawk	*Buteo jamaicensis*	3	11.1%
Turkey Vulture	*Cathartes aura*	1	3.7%

Songbirds		**44**	**5.9%**
American Robin	*Turdus migratorius*	37	84.1%
Cedar Waxwing	*Bombycilla cedrorum*	2	4.5%
Pacific-slope Flycatcher	*Empidonax difficilis*	1	2.3%
Swainson's Thrush	*Catharus ustulatus*	3	6.8%
Willow Flycatcher	*Empidonax traillii*	1	2.3%
Other		**2**	**0.3%**
Black-capped Chickadee	*Poecile atricapillus*	1	50.0%
Marsh Wren	*Cistothorus palustris*	1	50.0%
Mammals		**2**	**0.3%**
Coyote	*Canis latrans*	2	100.0%
Total Number of Species: 40		**Total Individuals: 747**	

Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) identifies seven federally listed species with the potential to occur on or near AST as summarized in **Table 2**.

Table 2
Federally Listed Threatened, Endangered, and Candidate Species at AST

Species	Scientific Name	Status
Birds		
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened
Streaked Horned Lark	*Eremophila alpestris strigata*	Threatened
Western Snowy Plover	*Charadrius nivosus nivosus*	Threatened
Mammals		
Pacific Marten, Coastal Distinct Population Segment	*Martes caurina*	Threatened
Red Tree Vole	*Arborimus lonngicaudus*	Candidate
Insects		
Monarch Butterfly	*Danaus plexippus*	Candidate

Source: US Fish and Wildlife Service (USFWS). 2022. IPaC Information for Planning and Consultation. Warrenton-Astoria Regional Airport (AST). Available online at: https://ecos.fws.gov/ipac/. Accessed August 2, 2022.

The USFWS list also identified 24 migratory bird species, but none were observed during the site reconnaissance visit. The USFWS species list for AST is included in **Attachment B**.

The Oregon Department of Fish and Wildlife (ODFW) identifies and maintains a state list of threatened and endangered species which includes 39 species listed as threatened or endangered in the state of Oregon (8 fish, 4 amphibians and reptiles, 6 birds, and 11 mammals). None of the state-listed species it was observed during the site reconnaissance visit. The ODFW species list for Oregon is included in **Attachment C**.

Wildlife Attractants

Several wildlife attractants were observed on and near the Airport. The following discussion identifies the wildlife observed in association with these attractants.

On-site Wildlife Attractants

Temporary Standing Water. Standing water that occurs within the airfield during and following rain showers but remains or a short periods is referred to as temporary standing water. Airfield turf grass along the edges of both runways collects the most amount of temporary standing water and is attractive to hazardous wildlife (e.g. Canada geese and waterfowl).

Airfield Turf/Grass. Turf/grass dominates the infield along the runways, taxiways, and aprons. Turf/grass that is located throughout the infield provides natural cover available to hazardous wildlife. Cover refers to any type of vegetation that provides wildlife (e.g. Canada geese, songbirds, blackbirds, waterfowl, shorebirds, and insect-eating birds) with shelter for nesting, loafing, roosting, and/or protection from predators or various weather conditions. Deer are also known to occur in areas of the airfield turf/grass.

Shrubby Vegetation. Dense shrubby vegetation dominates the airport's perimeter fence and along ditch areas. Shrubs in general provide shelter for nesting, loafing, roosting, and/or predator from predators or various weather conditions. The dense shrubs prevent airport personnel from inspecting the perimeter fence for holes, gaps, and wildlife digs under the fence. Deer are also known to use the shrubby vegetation as cover.

Airfield Equipment/Structures/Buildings. Airfield equipment/structures/buildings provide perch opportunities for eagles, raptors, crows, and European starlings. Airfield equipment and structures are in close proximity to runways, which in turn attracts birds closer to aircraft movement areas. Buildings can provide structure for birds (e.g., swallows) to create nests.

Food/Prey Base. Food sources (e.g. small mammals and terrestrial invertebrates) within the airfield provide the strongest attractant for hazardous wildlife. When food is available, many species will persist on the airfield despite management from airport staff.

Off-site Wildlife Attractants

Open Water. Open water resources are present on and near AST including Youngs Bay, the Lewis and Clark River, and several ditches/canals that collect open water. The airport is adjacent to the mouth of the Lewis and Clark River on the east side and Young's Bay on the north side. A portion of Young's Bay is within the northern part of the airport boundary. Numerous canals, standing water areas and ponds also exist on and around AST. AST is drained through five tide gates, which detail water for two six-hour periods daily.

These open water areas are a potential wildlife attractant for Canada geese, waterfowl, gulls, ducks, and shorebirds both resident and migratory. Airport staff commented that the triangle formed by Runways 8 and 14 and Taxiway B3 floods during winter months attracting a large number of ducks and geese. These larger birds and pose risks to aircraft as they arrive or depart from adjacent bay and pass through approach/departure corridors, or fly above or loaf within the AOA.

Livestock Pasture and Fields. The airport maintains several grazing leases within the western portion of the airport boundary (outside the airfield) around the south side, west end, and north side of Runway 8. The leases are year to year and are terminable at will for non-performance. Though some of the leases are within the security fence, there are cattle fences along the pasture boundaries to keep the cattle outside of airport movement areas. Various species of birds (e.g., egrets, Canada geese, and blackbirds) that are hazardous to aircraft are known to loaf and forage within livestock pastures. These birds can leave these pastures and fly across the airfield or enter AST airspace within approach and departure corridors.

In addition to grazing areas, portion of the airports property is used for agricultural production/haying operations. Waterfowl are attracted to these areas, especially after harvesting when they can feed on the remaining stubble.

Conclusions

Several on-site conditions were identified during WHSV that warrant inclusion or discussion in the forthcoming WHMP revision. Specific recommendations associated with on-site conditions and habitats are associated turf/grass management, agricultural practices, and the presence of wildlife in airfield structures, and the need to obtain depredation permits to manage on-site wildlife. These observations and other observations pertaining to on-site wildlife hazard management practices documented in **Attachment A** to this memo will be documented in the forthcoming WHMP update.

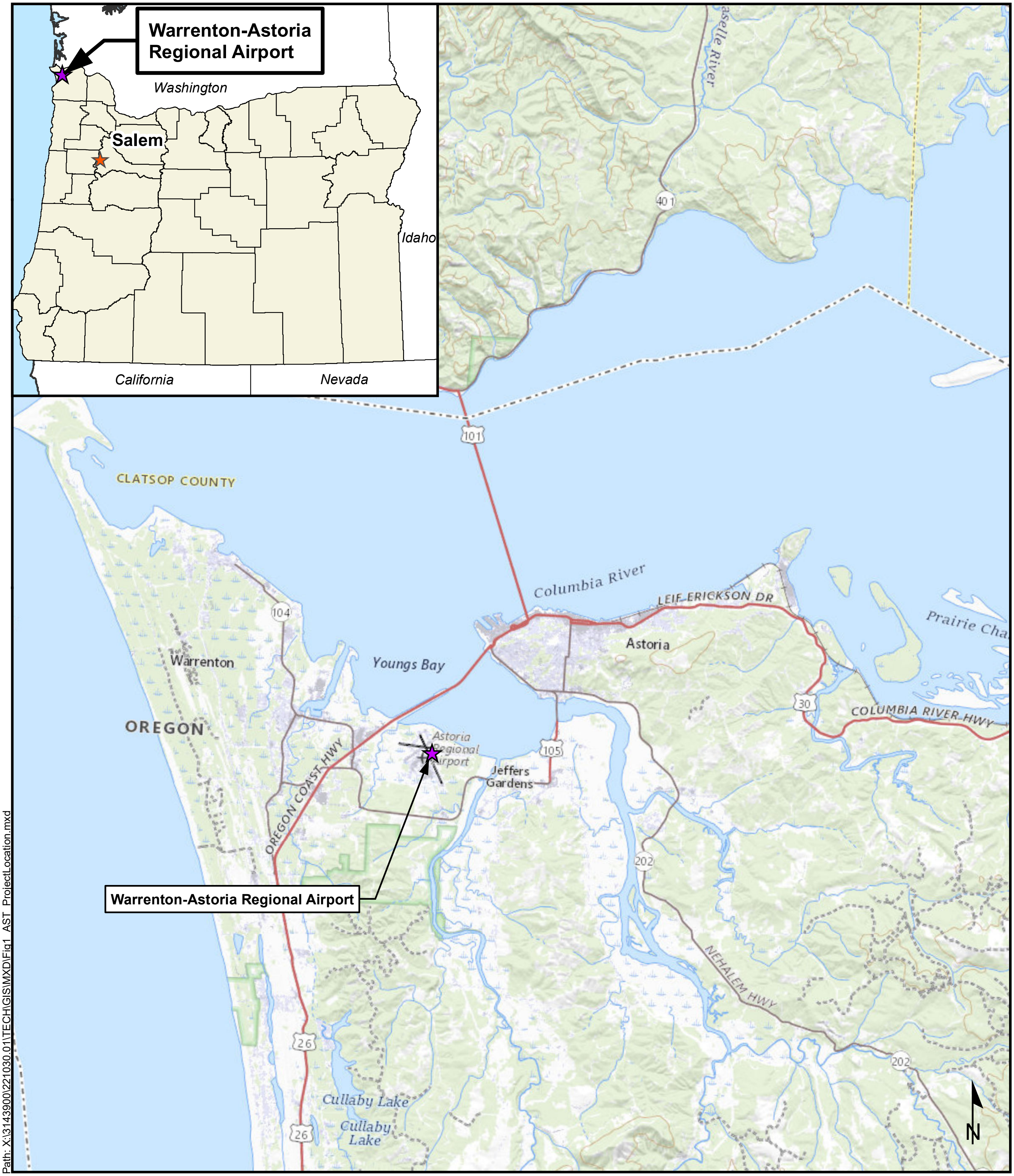

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Figure 1
Site Location
Astoria Regional Airport
Warrenton, Oregon

Source: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed December, 2019.

0 0.5 1 2 Miles

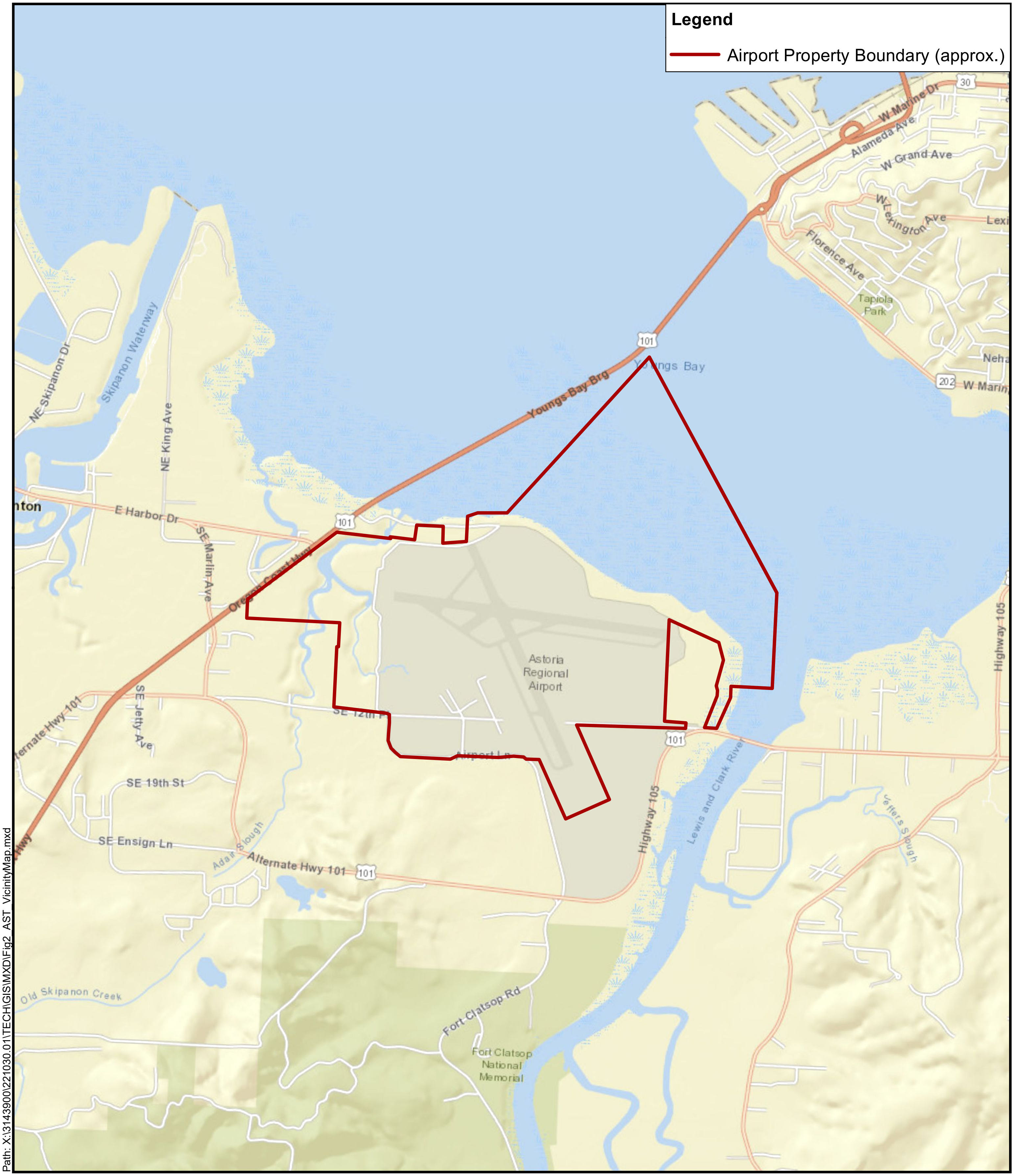

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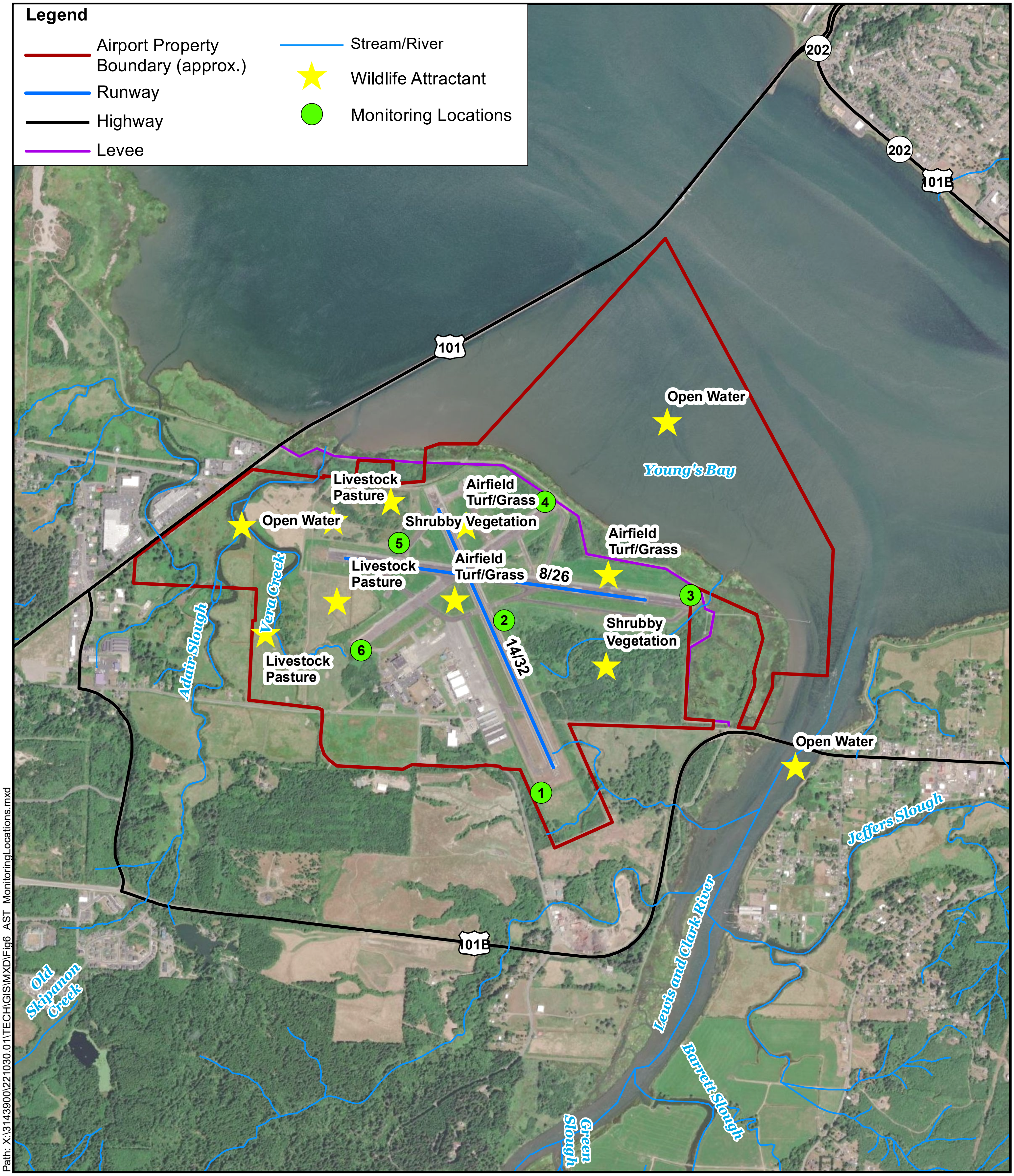
Figure 2
Site Vicinity
Astoria Regional Airport
Warrenton, Oregon

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User

Figure 3
Site Visit Observation Points and Wildlife Attractants
Astoria Regional Airport
Warrenton, Oregon

0 1,000 2,000 4,000 Feet

N

<u>Astoria, OR (AST) Airport Wildlife Hazard Management Plan - Site Visit (July 7-9, 2022):</u>

<u>General Questions:</u>

1. All personnel and departments responsible for airport operations. (Titles and Duties as they relate to wildlife hazard management)

   Gary Kobes (Former Airport Manager / Current Operations Contractor/Consultant) – obtain tags for airfield deer culls; schedule culls and coordinate with local government / law enforcement; (Note: these are duties that Gary performed while working as a full-time Airport Manager and he continues to perform these functions based on his availability. Gary currently only works one day per week on Mondays. If Gary is unavailable, these duties will be performed by Matt McGrath)

   Brent Gilland (Operations Supervisor) – Attend deer culls and facilitate carcass cleaning; locate and remove/schedule removal of wildlife hazards (beavers and dams, cattle on airfield due to broken fencing, geese, etc.)

   Chris Gibbs (Airport Attendant) – Perform Operations Supervisor duties when supervisor not available; assist supervisor when scheduled on same day (currently Wednesdays and Thursdays)

   Matt McGrath (Deputy Director / Interim Airport Manager) – Oversee daily airport operations

2. Number of aircraft operations per year.
   38,690

3. Type of operations (i.e., % private, civil, and military).
   Military 36%
   Civil 64%

4. Recent airport construction or airfield changes.
   2019-2022
   Realignment of TWY A3, addition of TWY A4, and new connector with TWY B3.
   Phase 1 and 2 of Ramp Rehabilitation.

5. Past and present (future if known) land management practices.
   Unsure of what is being asked here that relates to wildlife hazard threats. We have added elk fencing around the airfield perimeter and have conducted numerous deer culls over the last two years that have yielded removal of twenty-six deer.

6. Description of current wildlife hazard threats or concerns that AST knows about.
   Bird strikes primarily from migratory waterfowl. Airport has open water on the north side, a river on the east side, and has numerous bodies of water on site. Site is drained through five tide gates and therefore is subject to retaining outflow for two six-hour periods daily.

   In the last two years we have taken 26 deer on the airport. There are indications that 2-3 remain and periodically we will hunt them. Port to schedule next cull in October 2022.

7. Description of the AST perimeter fence, cattle guards, gates, and condition of fence and its effectiveness for elk, deer, and coyotes.
   There is a 4.3 mile long, 8-foot-high perimeter fence surrounding the airport. There are two cattle guards installed at the public access points. The system was installed in 2007-2008 to keep a herd of elk that lives in the area from entering the airport. It has been effective in keeping the elk out.

   We believe that several deer that we culled were inside the fence when it was installed. Given the amount of wooded area on the airfield, there are a number of places where the deer can hide to avoid detection. We have asked tenants to notify Port personnel if/when they spot any deer within the airport boundaries.

8. Does AST have any current Federal and State depredation/ wildlife control permits that they use and annual permit reports if they have been submitted.
   No

Wildlife Specific Questions:

1. Any existing wildlife hazard management efforts and related maintenance procedures, if applicable – Records of past management efforts may be helpful during this initial consultation.

2. Are there any known wetlands on airport property? If so, do these wetlands create an attractant to birds. If so, when and what birds.

   Yes and yes. Wetlands on the airport property attract a number of species of birds including ducks and Canada geese,

3. After rain events, are there areas that collect temporary standing water. If so, where, and how much water and how long does it stick around.

4. Describe the specifics of the fish mill that is being constructed in the airport industrial park. (Who, What, When, Where, Why) Please describe the lease stipulations that have been put in place by the airport so that the airport can address bird concerns if they arise from the mill.

The fish meal processing plant is being developed by the Scoular Company, Omaha, NE. They are taking the waste material from two local seafood processors and converting the material to protein powder, they will be trucking the raw material to the site in covered tote bins. It is then processed and dried into protein powder. The finished product is bagged and then removed from the site in truckload quantities.

This plant is expected to operate six to eight months throughout the year and will coincide with the commercial fishing seasons.

The facility is located 2,500’ south of RWY 8-26, and 2,200 feet west of RWY 26.

The use is compatible with local zoning and also the existing airport master plan. There is a shortage of suitable commercial sites elsewhere in the area.

We will attach an extraction of lease stipulations as requested.

ARTICLE 4
USE OF THE PREMISES

4.1 Permitted Use. The Premises shall be used for protein processing plant, cold storage, and related ancillary activities, including canning, blast freezing, retail packing and processing (collectively, the “**Permitted Use**”). No other purposes are permitted without the written consent of the Port, which consent shall not be withheld unreasonably. If the Permitted Use is prohibited by law or governmental regulation in the future, this Lease shall terminate on one hundred eighty (180) days’ notice to Lessee, or such shorter period as may be necessary to comply with such applicable laws or regulations. Without modifying the foregoing, Lessee understands that all access to and from airport property from the Premises is subject to all the reasonable rules and regulations related thereto as may be prescribed by, or applicable to, the applicable authorities from time to time. Lessee shall not bring upon the Premises or use the Premises or permit the Premises or any portion thereof to be used for the growing, manufacturing, administration, distribution (including without limitation, any retail sales), possession, use or consumption of any cannabis, marijuana or cannabinoid product or compound, regardless of the legality or illegality of the same.

4.2 Restrictions on Use. In connection with the use of the Premises, Lessee shall:

(a) Comply with all applicable laws and regulations of any public authority, including, but not limited to, the Port, the City of Warrenton, and any other local, state or federal agency having lawful jurisdiction to impose orders or regulatory approvals affecting or applicable to the Premises and the use thereof. Without limiting the foregoing, Lessee agrees to comply with any stormwater permit governing activities on the Premises whether obtained by the Lessor or Lessee.

(b) Refrain from any activity that would make it impossible to insure the Premises against casualty, would increase the insurance rate, or would prevent Port from taking advantage of any ruling of the Oregon Insurance Rating Bureau, or its successor, allowing Port to obtain reduced premium rates for long-term fire insurance policies, unless Lessee pays the additional cost of the insurance.

(c) Refrain from any use that would be reasonably offensive to the Port, other lessees, sub lessees or owners or users of neighboring the Premises to the extent that would tend to create a nuisance or damage the reputation of the Premises.

(d) Refrain from making any marks on or attaching any sign, insignia, antenna, aerial, or other device to the land or the exterior walls, windows, or roof of any building on the Premises without the written consent of Port, which consent will not be unreasonably withheld or delayed.

(e) All operations at the Premises shall be performed in a manner which is in compliance with rules and regulations which may be established by the Port. In the event of any conflict between these rules and regulations and the Lease, the provisions of the Lease shall govern. In addition, Lessee agrees to take all steps available to minimize the attraction and congregation of seagulls (and other birds) in and around the Premises.

14.2 Default in Other Covenants. Failure of Lessee to comply with any term or condition or fulfill any obligation of the Lease (other than the payment of Rent or other charges) within thirty (30) days after written notice by Port specifying the nature of the default with reasonable particularity. If the default is of such a nature that it cannot be completely remedied within the thirty (30) day period, this provision shall be deemed satisfied if Lessee begins correction of the default within the thirty (30) day period and thereafter proceeds with reasonable diligence and in good faith to effect the remedy as soon as practicable.

ARTICLE 15
REMEDIES ON DEFAULT

15.1 Termination. Except as otherwise expressly provided in this Lease, in the event of a default by Lessee may be terminated at the option of Port, by written notice to Lessee. Whether or not the Lease is terminated at the election of Port or otherwise, Port shall be entitled to recover damages from Lessee for the default, and Port may reenter, take possession of the Premises, and remove any persons or property by legal action and without having accepted a surrender.

5. How tall is the perimeter fence and is there a buried skirting? When was the installation of the fence completed?

   8 feet tall.
   No buried skirting
   Installed 2007-2008

6. Grass Management:
   a. Describe what areas the airport mows.
      See below

b. Describe the areas that is mowed by the company that has the lease.

See above

c. When do you start mowing each year and when do you stop?

Spring and fall respectively, sometimes into winter on each.

d. When the grass is mowed, at what height is the grass.

2 to 6"

e. How often do you have to mow RSAs?

Dependent upon the weather. Approximately every two weeks during highest growth rate

f. How often does the lease have to mow?

As needed

g. Are there any priority areas that are mowed first?

Drainage ditches, antenna field, areas around runway and taxiway sig

7. Shrub Management. Does the airport manage the shrub cover that is present along the entire perimeter fence? It appears that no management occurs on the vegetation along the perimeter fence.

   The Port is responsible for the management though it has not done this recently. Port currently contracted with Earthworx Excavation to clear fencelines and manage shrubs along perimeter.

8. Structure Management. Are there any structures, buildings, hangars, etc. that are seen as a bird attractant (e.g. pigeons roosting, blackbirds, swallow nests, owls, etc).

   Not in our experience.

9. What hazing/harassment methods does the airport use to disperse birds off of the airfield (e.g. pyrotechnics, vehicle/human harassment, sirens, etc.)

   Cracker shells and vehicle/human harassment

10. Please describe the effectiveness of the cattle guards in regard to elk and deer gaining access to the airfield.

    The cattle guards are very effective at keeping the elk out of the airport. Since they do so well with the elk it seems reasonable to assume that the do the same for deer; and that the deer population on the airport was the result of a few deer being enclosed by the installation of the fence and breeding up the population.

11. Please describe the process and results of the 2021 and 2022 deer hunts on the airfield?

    2021: Night hunts, spotlighting, at about 3-4 week intervals for about four months. Thirteen deer taken.
    2022: Night hunts, spotlighting, at about 3-4 week intervals for about four months. Thirteen deer taken.

12. Does airport staff perform runway/airfield sweeps? If so when and how often?

    Daily, seven days a week, usually first thing in the morning.

13. Does airport staff record (e.g. in a log book) wildlife observations and if wildlife are removed or hazed?

    No.

14. List the bird species that you believe are the most abundant at AST.

    Canada Geese
    Ducks of various species—Mallards, Pintails, Scaups

15. List the bird species that you believe are the most hazardous at AST.

    Canada Geese
    Ducks of various species—Mallards, Pintails, Scaups

16. When was the last time a deer was observed inside the perimeter fence?

    Two to three months ago on a hunt. We encountered three deer which we were unable to take. Since that time, we have had two more hunts with no sightings. Since we do not think the deer are coming and going through the fence, it is likely they are still on the airport and concealing in wooded areas. We will most likely have a hunt in October.

17. Does the airport report wildlife strikes to the FAA national wildlife strike database? Are there any known strikes that have occurred at AST that are not in the FAA's strike database?

    We expect the crew of the aircraft to report any wildlife strikes. Since they were involved in an incident, they have all of the relevant details they are better equipped to make an accurate report.

There are no known wildlife encounters not reported.

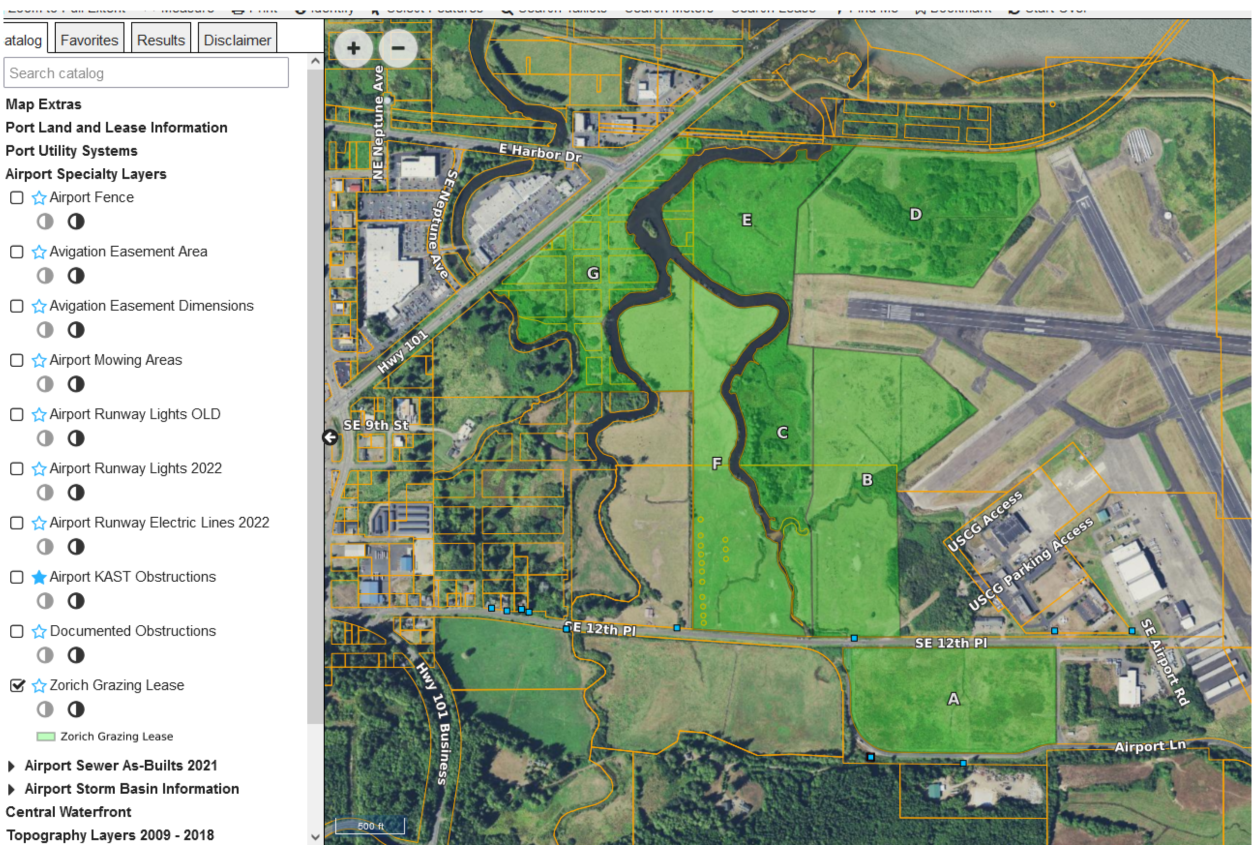
18. Do local pilots, BAR pilots, Life Flight, or Coast Guard pilots report bird strikes to the airport?

    Yes.

19. Describe the areas that are leased out for cattle grazing? What are the lease details of the cattle grazing?
    The leased land is located around the south side, west end, and north side of RWY 8.

    The lease is year to year and is terminable at will for non-performance.

    A plan of the leased parcels below.



20. Has the airport ever observed cattle to be within the AOA?

    One incident where a person entered the airport at night, wrecked his car on the airport, left the runway environment through a cattle gate, left it unlocked and exited the airport. He was arrested several hours later. The following morning about 20 cattle found the gate open and wandered on to the runway. One of the locally based helos on an early flight saw and reported their presence. The staff and cattle tenant herded them back to the pasture and secured them without incident.

Marieke Armstrong

From: Rick Jones
Sent: Sunday, July 24, 2022 1:28 PM
To: Marieke Armstrong
Subject: AST Wildlife Hazard Management Plan #2

Follow Up Flag: Follow up
Flag Status: Flagged

Additional info from AST

RICK JONES, CWB
FAA QUALIFIED AIRPORT WILDLIFE BIOLOGIST, AVIATION
Mead & Hunt
Direct: 303-597-0994 | Transfer Files
meadhunt.com | LinkedIn | Twitter | Facebook | Instagram

From: Matt McGrath <mmcgrath@portofastoria.com>
Sent: Saturday, July 23, 2022 2:43 PM
To: Rick Jones <Rick.Jones@meadhunt.com>
Subject: Fw: AST Wildlife Hazard Management Plan

Rick,

Brent had some additional input to the Wildlife Survey that I forwarded. Please see his info below.

Thanks again,

Matt

From: Airport Staff <flight@portofastoria.com>
Sent: Friday, July 22, 2022 11:50 AM
To: Matt McGrath <mmcgrath@portofastoria.com>
Subject: RE: AST Wildlife Hazard Management Plan

Under Wildlife Specific:
#3 Triangle formed by RW 8, 14 and TW B3. This area floods in a normal winter and attract a large amount of ducks and geese.
#8 Hangars attract nesting Swallows yearly.
#14 & 15 I would add Kill deer and Sandpipers.

Brent Gilland
Airport Supervisor
1110 SE Flight Line Dr • Warrenton, OR
503-298-7531 • flight@portofastoria.com

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

Clatsop County, Oregon

Local office

Oregon Fish And Wildlife Office

📞 (503) 231-6179
📠 (503) 231-6195

2600 Southeast 98th Avenue, Suite 100

Portland, OR 97266-1398

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.

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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. IPaC only shows species that are regulated by USFWS (see FAQ).

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
Pacific Marten, Coastal Distinct Population Segment *Martes caurina* Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/9081	Threatened
Red Tree Vole *Arborimus longicaudus* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8830	Candidate

Birds

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4467	Threatened
Northern Spotted Owl *Strix occidentalis caurina* Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1123	Threatened
Streaked Horned Lark *Eremophila alpestris strigata* Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/7268	Threatened

Western Snowy Plover *Charadrius nivosus nivosus* There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/8035	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

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 https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Sep 30

Black Scoter Melanitta nigra — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Black Swift Cypseloides niger — Breeds Jun 15 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8878

Black-legged Kittiwake Rissa tridactyla — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Brown Pelican Pelecanus occidentalis — Breeds Jan 15 to Sep 30

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/6034

Clark's Grebe Aechmophorus clarkii — Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Loon gavia immer — Breeds Apr 15 to Oct 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/4464

Common Murre Uria aalge — Breeds Apr 15 to Aug 15

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Evening Grosbeak Coccothraustes vespertinus — Breeds May 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Marbled Godwit Limosa fedoa — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Red Phalarope Phalaropus fulicarius — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-breasted Merganser Mergus serrator — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-necked Phalarope Phalaropus lobatus — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-throated Loon Gavia stellata — Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Ring-billed Gull Larus delawarensis | Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Rufous Hummingbird selasphorus rufus | Breeds Apr 15 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Short-billed Dowitcher Limnodromus griseus | Breeds Jun 1 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Surf Scoter Melanitta perspicillata | Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Western Grebe aechmophorus occidentalis | Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/6743

White-winged Scoter Melanitta fusca | Breeds elsewhere

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Willet Tringa semipalmata | Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wrentit Chamaea fasciata | Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

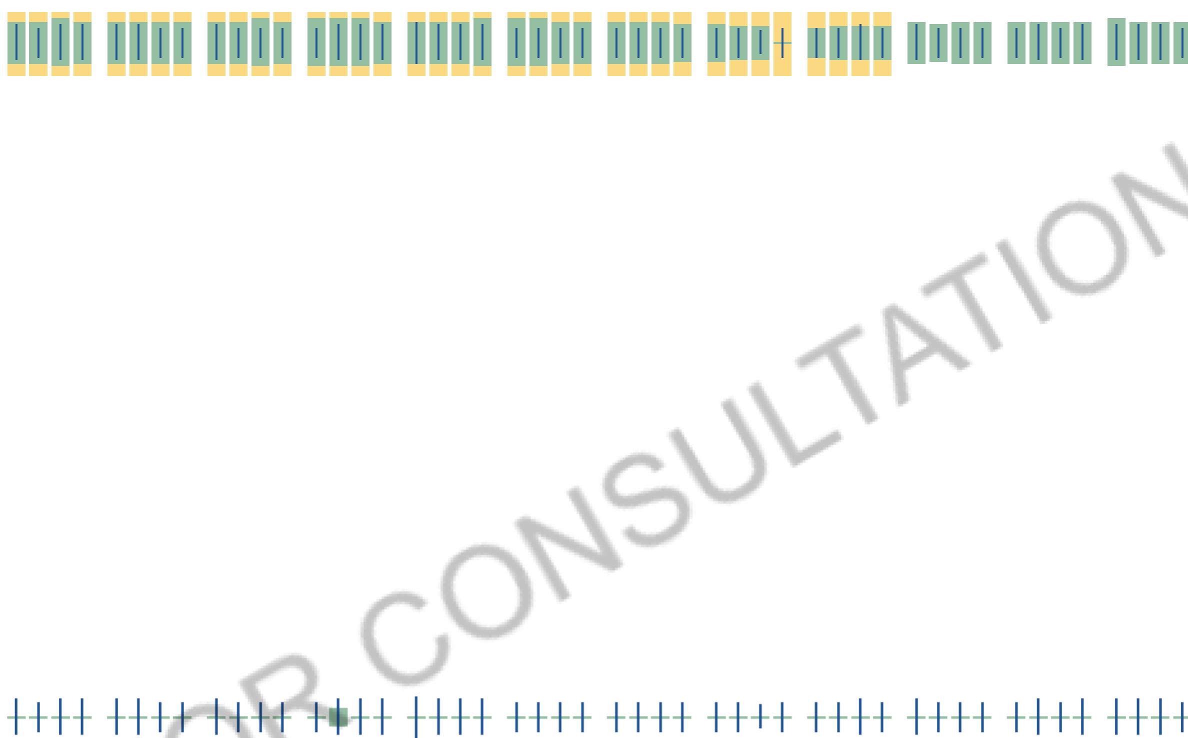
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

probability of presence   breeding season   survey effort   no data

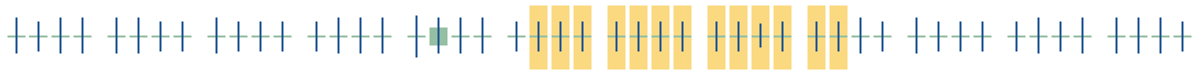
SPECIES   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC



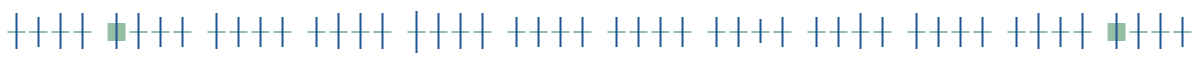
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Black Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Black Swift
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

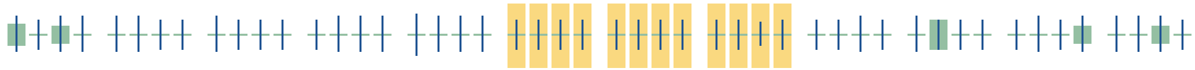


Black-legged Kittiwake
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

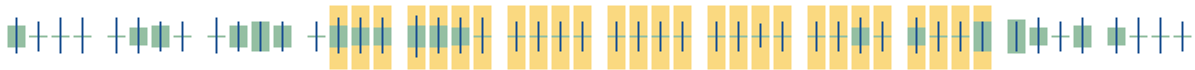


Brown Pelican
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

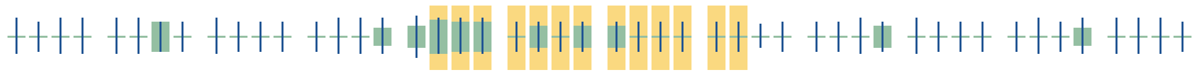


Common Loon
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

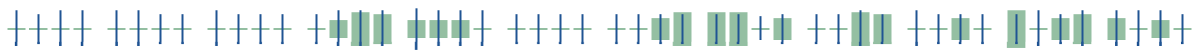


Common Murre
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Evening Grosbeak
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

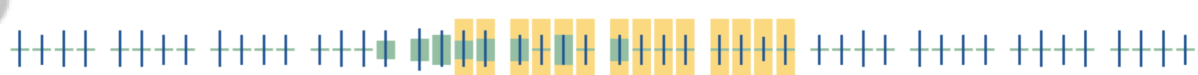


Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



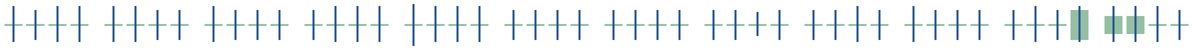
Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Olive-sided Flycatcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



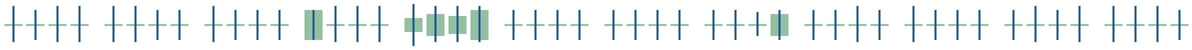
SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Red Phalarope
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Red-breasted Merganser
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

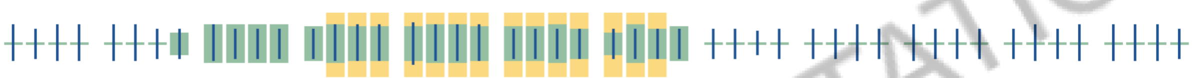
Red-necked Phalarope
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Red-throated Loon
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

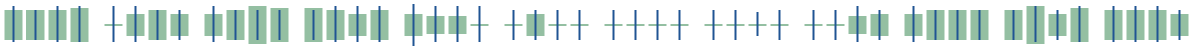
Ring-billed Gull
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

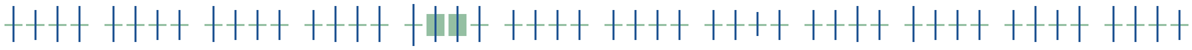
Surf Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



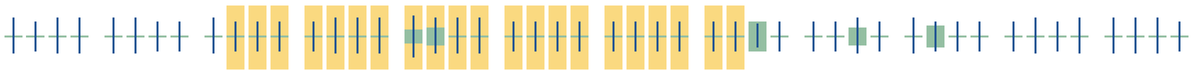
Western Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

White-winged Scoter
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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 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 list of migratory birds that potentially occur 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 Rapid Avian Information Locator (RAIL) 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 or migrating in my 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 query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. 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.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

THERE ARE NO KNOWN COASTAL BARRIERS AT THIS LOCATION.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

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.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

Estuarine

FRESHWATER POND

Palustrine

LAKE

Lacustrine

RIVERINE

Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

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.

Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon

Common Name	Scientific Name	State Status*	Federal Status
FISH			
Bull Trout (range-wide)	*Salvelinus confluentus*		T
Columbia River Chum Salmon	*Oncorhynchus keta*		T
Green Sturgeon (Southern DPS)	*Acipenser medirostris*		T
Hutton Spring Tui Chub	*Siphateles bicolor* ssp	T	T
Lahontan Cutthroat Trout	*Oncorhynchus clarkii henshawi*	T	T
Lost River Sucker	*Deltistes luxatus*	E	E
Lower Columbia River Chinook Salmon	*Oncorhynchus tshawytscha*		T
Lower Columbia River Coho Salmon	*Oncorhynchus kisutch*	E	T
Lower Columbia River Steelhead	*Oncorhynchus mykiss*		T
Middle Columbia River Steelhead	*Oncorhynchus mykiss*		T
Oregon Coast Coho Salmon	*Oncorhynchus kisutch*		T
Pacific Eulachon/Smelt (Southern DPS)	*Thaleichthys pacificus*		T
Shortnose Sucker	*Chasmistes brevirostris*	E	E
Snake River Chinook Salmon (Fall)	*Oncorhynchus tshawytscha*	T	T
Snake River Chinook Salmon (Spring/Summer)	*Oncorhynchus tshawytscha*	T	T
Snake River Sockeye Salmon	*Oncorhynchus nerka*		E
Snake River Steelhead	*Oncorhynchus mykiss*		T
Southern Oregon/Northern California Coast Coho Salmon	*Oncorhynchus kisutch*		T
Upper Columbia River Spring Chinook Salmon	*Oncorhynchus tshawytscha*		E
Upper Columbia River Steelhead	*Oncorhynchus mykiss*		T
Upper Willamette River Chinook Salmon	*Oncorhynchus tshawytscha*		T
Upper Willamette River Steelhead	*Oncorhynchus mykiss*		T
Warner Sucker	*Catostomus warnerensis*	T	T
AMPHIBIANS AND REPTILES			

Green Sea Turtle	*Chelonia mydas*	E	T
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
Loggerhead Sea Turtle	*Caretta caretta*	T	E
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	T	T
Oregon Spotted Frog	*Rana pretiosa*		T
BIRDS			
California Brown Pelican	*Pelecanus occidentalis californicus*	E	
California Least Tern	*Sternula antillarum browni*	E	E
Marbled Murrelet	*Brachyramphus marmoratus*	E	T
Northern Spotted Owl	*Strix occidentalis caurina*	T	T
Short-tailed Albatross	*Phoebastria albatrus*	E	E
Streaked Horned Lark	*Eremophila alpestris strigata*		T
Western Snowy Plover	*Charadrius nivosus nivosus*	T	T (Pacific Coast Population DPS)
Yellow-billed Cuckoo (Western DPS)	*Coccyzus americanus*		T
MAMMALS			
Blue Whale	*Balaenoptera musculus*	E	E
Canada Lynx	*Lynx canadensis*		T
Columbian White-tailed Deer (Columbia River DPS)	*Odocoileus virginianus leucurus*		T
Fin Whale	*Balaenoptera physalus*	E	E
Gray Whale	*Eschrichtius robustus*	E	
Humpback Whale	*Megaptera novaeangliae*	E	E
Killer Whale (Southern Resident DPS)	*Orcinus orca*		E
Kit Fox	*Vulpes macrotis*	T	
North Pacific Right Whale	*Eubalaena japonica*	E	E
Pacific Marten	*Martes caurina*		T (Coastal DPS)
Red Tree Vole (North Oregon Coast DPS)	*Arborimus longicaudus*		C
Sea Otter	*Enhydra lutris*	T	T
Sei Whale	*Balaenoptera borealis*	E	E
Sperm Whale	*Physeter macrocephalus*	E	E
Washington Ground Squirrel	*Urocitellus washingtoni*	E	
Wolverine	*Gulo gulo*	T	

* Listed under the Oregon Endangered Species Act (ORS 496.171 through 496.192) *Revised October 2021*

Appendix B: Applicable Guidance Documents

Appendix B. Applicable Guidance Documents

FAA Advisory Circulars (ACs)

FAA ACs are available at the following website**:**
http://www.faa.gov/regulations_policies/advisory_circulars/
Links to individual ACs identified in this document are identified in the table below.

FAA CertAlerts

A list of FAA Certalerts is available at the following website:
http://www.faa.gov/airports/airport_safety/certalerts/
Links to individual Certalerts pertinent to this document are identified in the table below.

ACRP Documents

ACRP documents are available at the following website:
http://onlinepubs.trb.org/onlinepubs/acrp/
Links to individual Synthesis Papers and Reports pertinent to this document are identified in the table below.

United States Department of Agriculture

The USDA Airport Wildlife Hazards Program is available at the following website:
https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/sa_airport/ct_airport_hazards

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Applicable Individual Guidance Documents		
Resource Number	**Title**	**Website Link**
Federal Aviation Administration (FAA) Advisory Circulars (ACs)		
AC 150/5200-28G	Notices to Air Missions (NOTAMs) for Airport Operators	https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-28G-NOTAMs-2022.pdf
AC 150/5200-32B	Reporting Wildlife Aircraft Strikes	https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5200-32B.pdf
AC 150/5200-33C	Hazardous Wildlife Attractants On or Near Airports	https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-33C.pdf
AC 150/5200-36B	Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports	https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-36B.pdf
AC 150/5200-38	Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans	https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5200-38.pdf
Federal Aviation Administration (FAA) Certalerts		
No. 98-05	Grasses Attractive to Hazardous Wildlife	https://www.faa.gov/sites/faa.gov/files/airports/airport_safety/wildlife/resources/cert9805.pdf
No. 06-07	Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports	https://www.faa.gov/sites/faa.gov/files/airports/airport_safety/wildlife/resources/cert0607.pdf
No. 13-01	Federal and State Depredation Permit Assistance	https://www.faa.gov/sites/faa.gov/files/airports/airport_safety/wildlife/resources/cert1301.pdf
No. 16-03	Recommended Wildlife Exclusion Fencing	https://www.faa.gov/sites/faa.gov/files/airports/airport_safety/wildlife/resources/part-139-cert-alert-16-03.pdf
Airport Cooperative Research Project (ACRP)		
Synthesis 23	*Bird Harassment, Repellent, and Deterrent Techniques for Use on and Near Airports*	https://www.trb.org/Publications/Blurbs/165829.aspx#:~:text=TRB%E2%80%99s%20Airport%20Cooperative%20Research%20Program%20%28ACRP%29%20Synthesis%2023%3A,produced%20a%20webinar%20related%20to%20ACRP%20Synthesis%2023

Appendix B. Applicable Guidance Documents

Synthesis 39	*Airport Wildlife Population Management*	https://www.trb.org/Publications/Blurbs/168836.aspx
Synthesis 52	*Habitat Management to Deter Wildlife at Airports*	https://www.trb.org/Main/Blurbs/170766.aspx
Report 32	*Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports*	https://www.trb.org/ACRP/Blurbs/163690.aspx
Report 125	*Balancing Airport Stormwater and Bird Hazard Management*	*https://www.greshamsmith.com/project/acrp-report-125-balancing-airport-stormwater-and-bird-hazard-management/*
Report 198	*Wetland Mitigation, Volume 2, A Guidebook for Airports*	https://www.trb.org/Publications/Blurbs/179214.aspx

Appendix C: Wildlife Observation Monitoring Log

Date: ________________ **Time**: ______________ **Observer Name**: ________________________

Animal Type *and* Number:

Blackbirds	______	Doves	______	Larks	______	Sparrows	______
Eagles	______	Ducks	______	Pigeons	______	Starlings	______
Corvids	______	Gulls	______	Deer	______	Swallows	______
Coyote	______	Hawks	______	Geese	______	Other	______
Dog	______	Shorebirds	______				

Location:__________________________________ **Species Name (if able):** ________________________

Main Behavior:

❑ Loafing ❑ Feeding ❑ Flyby ❑ Fly – Local

❑ Perch/Stand ❑ Hunt/Search ❑ Running ❑ Other: ___________________________

Action(s) (*for pyrotechnics indicate number used*):

❑ Could only observe ❑ Horn ❑ Vehicle

❑ Banger: ___________ ❑ Screamer: ____________ ❑ Other: ____________________________

Results: __________________________________ **Comments:** __________________________________

__________________________________ __________________________________

__________________________________ __________________________________

Date: ________________ **Time**: ______________ **Observer Name**: ________________________

Animal Type *and* Number:

Blackbirds	______	Doves	______	Larks	______	Sparrows	______
Eagles	______	Ducks	______	Pigeons	______	Starlings	______
Corvids	______	Gulls	______	Deer	______	Swallows	______
Coyote	______	Hawks	______	Geese	______	Other	______
Dog	______	Shorebirds	______				

Location:__________________________________ **Common Name (if able):** ________________________

Main Behavior:

❑ Loafing ❑ Feeding ❑ Flyby ❑ Fly – Local

❑ Perch/Stand ❑ Hunt/Search ❑ Running ❑ Other: ___________________________

Action(s) (*for pyrotechnics indicate number used*):

❑ Could only observe ❑ Horn ❑ Vehicle

❑ Banger: ___________ ❑ Screamer: ____________ ❑ Other: ____________________________

Results: __________________________________ **Comments:** __________________________________

__________________________________ __________________________________

__________________________________ __________________________________

Appendix D: FAA Guidance for WHMP Evaluation

(Excerpted from Advisory Circular 150/5200-38)

The following pages are excerpts from Appendix F of FAA AC150/5200-38

APPENDIX F. AIRPORT WILDLIFE HAZARD MANAGEMENT PLAN REVIEW

Once a Wildlife Hazard Management Plan is in place, it must be evaluated every 12 consecutive months or following a triggering event as per 14 CFR part 139.337(f)(6). Those triggering events are:

- An air carrier aircraft experiences multiple wildlife strikes
- An air carrier aircraft experiences substantial damage from striking wildlife
- An air carrier aircraft experiences an engine ingestion of wildlife

The foundation for these evaluations is not only the documentation of wildlife strikes but the maintenance of consistent records of wildlife surveys and wildlife control activities. Based on the annual evaluation the WHMP should be updated as needed to ensure the information adequately addresses known wildlife hazards. As these changes are adopted, approved, and implemented at the airport, it is of the utmost importance that all documentation is well prepared and available during FAA inspections.

To assist airport operators in documenting this review, the following sample review forms are provided. One form is for the "annual" review (every 12 consecutive months), and one for a review following a triggering event. These forms represent examples and may be used as provided or modified to suit specific needs to review a Wildlife Hazard Management Plan.

Subject: Wildlife Hazard Management Plan Annual Review Date: _______________

Airport: ____ Airport ID: ___________

On ______________________________ we conducted the annual review of the Wildlife Hazard Management Plan, as per the requirements of 139.337(f) (6). General Information/ Significant findings:

- **Name of review coordinator-** (Person facilitating discussions and writing plan updates; usually the Wildlife Coordinator, Wildlife Biologist, or Airport Manager) & **participating airport personnel and representatives of other organizations** (As listed in 139.337(f)(1); may include members of airport management, the wildlife coordinator, airport operations/ wildlife staff, wildlife Biologist who conducted Wildlife Hazard Assessment, members of the wildlife hazard working group*). Attach a sign-in sheet.

- **Summary of results of annual data analysis-** Example: ranking of highest priority species based on the analysis. (Per standardized continual monitoring procedures of 139.337(f)(6); data for analysis may include logs of wildlife strikes, wildlife observations and control measures, standardized wildlife monitoring surveys, and wildlife data from off-airport sites of concern.)

- **Summary of progress and challenges in management of the most significant wildlife attractants and/or habitats on or near the airport -** (Review of habitat management priorities listed in 139.337(f)(2))

- **Summary of progress and challenges in direct wildlife hazard management (i.e., dispersals, strike response) on the airfield -** (Review of procedures to be followed during air carrier operations as listed in 139.337(f)(5))

- **Changes to management strategies identified**

- **Changes to documentation identified**

- **Changes to Wildlife Hazard Working Group membership or objectives identified**

- **Changes to airport training program identified**

- **Changes/ updates to Wildlife Hazard Management Plan identified**
(Submit any changes to the WHMP to the assigned FAA Airport Certification Safety Inspector)

____

Airport Manager/Director

*The wildlife hazard working group is made up of representatives that own and/or manage properties, attractants, and habitats for wildlife (both on- and off-airport property) that impact airport safety. The function of the wildlife hazard working group, or the airport's relationships with such representatives, is to cooperatively address the airport's specific wildlife hazard issues. During the annual review of the Plan, the effectiveness in addressing the issues should be evaluated, with any needed changes documented.

Subject: Wildlife Hazard Management Plan Review Following a Triggering Event

Date: _____________ Airport: ___________________________________ Airport ID: ____________

On ______________________________ we conducted a review of the Wildlife Hazard Management Plan, as per the requirements of 139.337(f) (6).

Description of Triggering Event:

- **Date/Time -** Provide details of the event which triggered the review. Attach strike report, if available and any pertinent information; runway used, airline, take-off, landing, species, damage, etc.

General Information/ Significant findings:

- **Name of review coordinator-** (Person facilitating discussions and writing plan updates; usually the Wildlife Coordinator, Wildlife Biologist, or Airport Manager) & **participating airport personnel and representatives of other organizations** (As listed in 139.337(f)(1); may include members of airport management, the wildlife coordinator, airport operations/ wildlife staff, wildlife Biologist who conducted Wildlife Hazard Assessment, members of the wildlife hazard working group*). Attach a sign-in sheet.

- **The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity-** Example: Review the current wildlife control log and evaluate recent strike reports or events. Make a determination as to whether the current program is working and what can be improved.

- **Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated –** Review assessment to determine if everything is being addressed that was previously identified as a hazard or if other species are now present. Note: If other/additional new species are now present on or in the vicinity of the airport, another Wildlife Hazard Assessment may be needed.

- **Summary of progress and challenges in direct wildlife hazard management (i.e., dispersals, strike response) on the airfield -** (Review of procedures to be followed during air carrier operations as listed in 139.337(f)(5))

- **Changes to management strategies identified**

- **Changes to airport training program identified**

- **Changes/ updates to Wildlife Hazard Management Plan identified**
  (Submit any changes to the WHMP to the assigned FAA Airport Certification Safety Inspector)

____

Airport Manager/Director

The wildlife hazard working group is made up of representatives that own and/or manage properties, attractants, and habitats for wildlife (both on-and off- airport property) that impact airport safety. The function of the wildlife hazard working group, or of the airport's relationships with such representatives, is to cooperatively address the airport's specific wildlife hazard issues. During the annual review of the Plan, the effectiveness in addressing the issues should be evaluated, with any needed changes documented.

Appendix E: Staff Training Log

Wildlife Hazard Management Training Log

The following table summarizes training events held for Port of Astoria staff members involved in airport wildlife hazard management activities. The Wildlife Hazard Management Training Log will be updated to document training events, and copies of training certificates received by staff members will be placed in the WHMP following the Wildlife Hazard Management Training Log.

Wildlife Hazard Management Training Log			
Course Title	**Date(s)**	**Instructor**	**Staff Members/Participants**

APPENDIX F

GLOSSASRY

APPENDIX # - GLOSSARY

This glossary includes definitions of terms and acronyms used in the Plan. It is intended to serve as a reference for other Plan elements. Terms are defined and described in the chapters in which they appear.

A

AAB — Airport Advisory Board

AAC — Aircraft Approach Category: An FAA classification based on how fast an aircraft approaches the runway on landing. Used to determine airfield design characteristics.

- 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.

AC — Advisory Circular: FAA standards and guidelines on a variety of airport characteristics.

Also Asphalt Concrete (in Pavement Condition Index): A composite material commonly used to surface roads, parking lots, and airports. It consists of mineral aggregate bound together with asphalt, laid in layers, and compacted.

ACIP — 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.

ACRP — Airport Cooperative Research Program: An industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is managed by the Transportation Research Board (TRB) of the National Academies and sponsored by the Federal Aviation Administration (FAA). The research is conducted by contractors who are selected on the basis of competitive proposals. (Transportation Research Board, 2014)

ADA — Americans with Disabilities Act: Prohibits discrimination against people with disabilities in several areas including employment, transportation, public accommodations, communications and access to state and local government programs and services.

ADG — Aircraft Design Group: An FAA classification based on the wingspan and tail height of aircraft. Used to determine airfield design characteristics. 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.

ADPM Average Day Peak Month: Number of Operations on an Average Day during Peak Month

ADO Airports District Office: The local ADO is in Seattle. Staff in the ADO oversee airport planning, permitting, and design projects, manage capital improvement programs, and allocate federal funding.

AFFF Aqueous Film Forming Foam: is a highly efficient type of fire suppressant agent, used to attack flammable liquid pool fires.

AGL Above Ground Level: Elevation of a point or surface above ground level.

AIP Airport Improvement Program: The AIP provides grants to public agencies — and, in some cases, to private owners and entities -- for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). Airports receive regular funding each year called "entitlement" and may compete against other airports nationwide for additional "discretionary" funding. (Federal Aviation Administration, 2014)

Aircraft The terms aircraft and airplane are synonymous, referring to all types of fixed-wing airplanes, including gliders. A fixed-wing aircraft is heavier than air, and is supported in flight by the dynamic reaction of the air against its wings

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

Aircraft Operation A count of a takeoff, landing, or touch-and-go. Each time an aircraft touches the runway to take off or land, it counts as an operation.

Airside Airside is a collective term for those areas of the Airport that are accessible to aircraft including runways, taxiways, aprons, and hangar areas. Also referred to as the Airport Operations Area (AOA)

Airport Hazard Airport hazard is any structure or tree or use of land which obstructs the airspace required for the flight of aircraft in landing or taking-off at an airport or is otherwise hazardous to such landing or taking-off of aircraft.

ALP Airport Layout Plan: is a scaled graphic representation of existing and proposed airport facilities, indicating their location on the airport and pertinent clearance and dimensional information required to show conformance with applicable standards.

ALS Approach Lighting System: A series of lights before the runway end that guide aircraft landing in the dark and during periods of low visibility.

AMSL Above Mean Sea Level: Elevation or Altitude above Sea Level

APM Airport Planning Manuals: Aircraft manufacturer's performance charts and tables to determine runway length requirements.

AOA Aircraft Operations Area: A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

ASDA Accelerate-Stop Distance Available: the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff. Also see Declared Distances

ARC Airport Reference Code: A combination of the AAC and ADG. These two elements combined set the design standards, setbacks, and dimensions of safety critical airport facilities, such as pavement to pavement separation, pavement width, safety areas, object free areas, and runway protection zones.

ARTCC Air Route Traffic Control Center: In air traffic control an air route control center, also known as a center, is a facility responsible for controlling aircraft en-route in a particular volume of airspace at high altitudes between airport approaches and departures.

ARFF Aircraft Rescue Firefighting: is a special category of firefighting that involves the response, hazard mitigation, evacuation and possible rescue of passengers and crew of an aircraft involved in (typically) an airport ground emergency.

ASOS Automated Surface Observation System: provides weather observations that include air and dew point temperature, wind, air pressure, visibility, sky conditions, and precipitation.

ASR 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.

ATCT Airport Traffic Control Tower: A manned observation tower in charge of managing ground traffic and air traffic in an airport's airspace. The ATCT staff help maintain safe separation between aircraft in the air, and aircraft and vehicles on the ground.

ATIS Automated Terminal Information Service: The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

ATO Airline Ticketing Offices

ATOW Allowable Takeoff Weight

AV Automated Vehicles

Aviation Use Aviation Use includes aviation and aviation-related land uses on an Airport such as the terminal area, fixed-based operator (FBO) facilities, general aviation hangars, airport maintenance facilities, Airport Traffic Control Tower (ATCT), areas for NAVAIDs, and other aviation facilities.

AVGAS Aviation Gasoline (also referred to at 100LL): Leaded gasoline used in piston powered aircraft.

AWOS Automated Weather Observation System: The AWOS provides general reports which include: temperature, dew point, sky condition, visibility, cloud heights, current weather, precipitation accumulations, icing conditions and sea level pressure.

B

Based Aircraft Based Aircraft are aircraft that hangar or tie-down at an airport. These aircraft indicate that they are based at an airport on their registration form, and the owners typically live or work in the area

Blast Pad A surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash. A blast pad is not a stopway.

BRL Building Restriction Line: identifies areas on an airport where structures can be located to be compatible with airfield operations. Buildings should not conflict with the recommended airport design standards defined for a particular runway-taxiway system or the protected airspace associated with the runway. The location of the BRL is measured from the runway centerline outward in a perpendicular direction.

BTS Bureau of Transportation Statistics: The statistical arm of the U.S. Department of Transportation. The BTS mission is to create, manage, and share transportation statistical knowledge with public and private transportation communities and the Nation. (U.S. Department of Transportation, 2014)

C

CAA Clean Air Act of 1970: Federal law that regulates air emissions from stationary and mobile sources

CAC Community Advisory Committee: The CAC is made up of community stakeholders, including airport tenants, land use planning bodies, and economic development agencies. CAC members are tasked with reviewing Master Plan materials and providing comment from the perspective of the organizations of which they are a member of.

CAGR Compound Annual Growth Rates: The average, annual rate of growth (or loss) over a period of multiple years.

Catchment Catchment Area is the geographic boundary from which an airport draws its users, and airport activity is primarily influenced by the movement of people and products to and from the catchment area. Catchment areas are defined by the types of services offered at an airport, proximity of competitor airports, and the tendency of the local population to use the airport

Category-1 (CAT-I). An instrument approach or approach and landing with a Height Above Threshold (HATh) or minimum descent altitude not lower than 200 ft (60 m) and with either a visibility not less than ½ statute mile (800m), or a runway visual range not less than 1800 ft (550m).

Category-2 (CAT-II). An instrument approach or approach and landing with a Height Above Threshold (HATh) lower than 200 ft (60 m) but not lower than 100 ft (30 m) and a runway visual range not less than 1200 ft (350m).

Category-3 (CAT-III). An instrument approach or approach and landing with a Height Above Threshold (HATh) lower than 100 ft (30m), or no HATh, or a runway visual range less than 1200 ft (350m).

CEQ Council on Environmental Quality: Coordinates federal environmental activities and assists in the development of environmental policy across the executive branch.

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act: Also known as Superfund, provides a Federal “Superfund” to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.

CFR Code of Federal Regulations: The CFR annual edition is the codification of the general and permanent rules published in the Federal Register by the departments and agencies of the Federal Government. (U.S. Government Printing Office, 2014)

CIP Capital Improvement Plan: An airport’s list of planned capital expenditures over the next five years, on file with the state and the FAA. The CIP is used by federal and state agencies to plan and allocate funding and use by airport sponsors to plan the local share of capital expenditures.

Circling A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable.

Clearway A defined rectangular area beyond the end of a runway cleared or suitable for use in lieu of runway to satisfy takeoff distance requirements (see also Takeoff Distance Available [TODA]).

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.
- 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.

Critical Aircraft A critical aircraft is the most demanding aircraft, or family of aircraft, to use an airport. Facility design standards and dimensions are set to accommodate the critical aircraft. For projects requiring FAA-funding, the critical aircraft must have scheduled operations of any number per year, or over 500 non-scheduled operations per year.

Crosswind	A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.
CTAF	Common Traffic Advisory Frequency: CTAF is a radio frequency used by pilots to communicate with each other at non-towered airports, or when the tower is closed at night. The CTAF may also be used to coordinate arrivals and departures and control airfield lighting systems.
CWA	Clean Water Act: establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.

D

DA	Decision Altitude: A specified altitude on a vertically-guided approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established. DA is referenced to mean sea level (MSL).
dB	Decibel: A decibel is a measure of the amplitude or strength of a sound wave. The strength, or loudness, of a sound wave is measured using decibels on a logarithmic scale. The range of audibility of a human ear is 0 dB (threshold of hearing) to 125 dB (pain begins). The use of a logarithmic scale often confuses people because it does not directly correspond to the perception of relative loudness. A common misconception is that if two noise events occur at the same time, the result will be twice as loud. In reality, the event will double the sound energy, but only result in a 3 dB increase in magnitude. For a sound event to be twice as loud as another, it must be 10 dB higher.
dBA	Weighted Decibel: Scientific studies have shown that people do not interpret sound the same way a microphone does. For example, humans are bias and sensitive to tones within a certain frequency range. The A-weighted decibel scale was developed to correlate sound tones with the sensitivity of the human ear. The A-weighted decibel is a “frequency dependent” rating scale which emphasizes the sound components within the frequency range where most speech occurs.
DME	Distance Measuring Equipment: is a transponder-based radio navigation technology that measures slant range distance by timing the propagation delay of Very-High Frequencies (VHF) or Ultra-High Frequencies (UHF) radio signals.
DNL	Day/Night Average Sound Level: The standard metric used to measure noise from aircraft is the Day-Night Noise Level, which measures the cumulative noise levels of all aircraft

operations. DNL includes penalties for night operations (10pm-7am), when ambient noise levels tend to be lower and aircraft noise may be viewed as more disruptive.

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.

DTWL Dual-Tandem Wheel Landing Gear

DWL Dual-Wheel Landing Gear

E

EA Environmental Assessment: An EA is a concise document that takes a hard look at expected environmental effects of a proposed action. EA's are required for projects that receive federal funding, pursuant to the National Environmental Policy Act and other applicable regulations. Should significant environmental impact be expected as part of a purposed action, then an environmental impact statement may be warranted. (Federal Aviation Administration, 2006)

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.

ECOS Environmental Conservation Online System: Serves a variety of reports related to the FWS Threatened and Endangered Species.

EIS Environmental Impact Statement: If the EA indicates the proposed action's impacts would meet or exceed a significance threshold(s) for the affected resource(s), or that mitigation would not reduce the significant impact(s) below the applicable threshold(s), FAA must prepare an EIS. An EIS provides additional, detailed evaluations of the proposed action and its alternatives, including the No Action alternative. (Federal Aviation Administration, 2006).

Entrance Taxiway A taxiway designed to be used by an aircraft entering a runway. Entrance taxiways may also be used to exit a runway.

Enplanement The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

EPA Environmental Protection Agency: The purpose of the EPA is to ensure that Americans are protected from significant risks to health and the environment; that national efforts to reduce environmental risk are based on the best available scientific information; and that federal laws protecting health and the environment are enforced; that environmental protection is an integral consideration in U.S. policies concerning natural resources, human health, economic growth, energy, transportation, agriculture, industry, and international trade, and these factors are similarly considered in establishing environmental policy. (U.S. Environmental Protection Agency, 2014)

ESA — Endangered Species Act: The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service.

Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments. (U.S. Fish and Wildlife Service, 2013)

ETMSC — Enhanced Traffic Management System Counts: Provides information on traffic counts by airport or by city pair for various data groupings such as aircraft type or by hour of the day. Data are created when pilots file flight plans and/or when flights are detected by the National Airspace System

ETOPS — Extended-range Twin-engine Operating Performance: Aircraft certified to fly on one engine for more than 3-hours to allow twin-engine aircraft to fly 90 minutes from the nearest airport over water.

Exit Taxiway — A taxiway designed to be used by an aircraft only to exit a runway: Acute-Angled Exit Taxiway – A taxiway forming an angle less than 90 degrees from the runway centerline. 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.

F

FAA — Federal Aviation Administration: The FAA's continuing mission is to provide the safest, most efficient aerospace system in the world. (Federal Aviation Administration, 2010) They are the regulatory authority on airports, airspace, aircraft, and pilots in the U.S. FAA policy is created in Washington D.C. and administered by local regional and district offices.

FAR Federal Aviation Regulation: Found in Title 14 of the United States Code of Federal Regulations (14 CFR); 14 CFR provides regulatory mandates that govern various elements of the civil aviation system.

FAR Part 77 Federal Aviation Regulation Part 77: Establishes standards and notification requirements for objects affecting navigable airspace.

FBO Fixed Base Operator: FBOs are airport businesses that provide a variety of general aviation services including aircraft parking, fuel, maintenance, charter and aircraft rental, pilot lounge, flight instruction and sales.

FEMA Federal Emergency Management Agency: FEMA coordinates the federal government's role in preparing for, preventing, mitigating the effects of, responding to, and recovering from all domestic disasters, whether natural or man-made, including acts of terror. (Federal Emergency Management Agency, 2014)

FONSI Finding of No Significant Impact: A federal agencies record of decision on an environmental assessment declaring that the proposed action poses no significant impact on natural and human resources included in the National Environmental Policy Act.

FPO FAA Flight Procedures Office: The FPO is responsible for establishing instrument procedure (departure, en route, arrival, approach) design and obstacle clearance standards, criteria, and policy for the existing National Airspace System flight procedure structure and to accommodate emerging technologies and flight operation capabilities. The FPO develops and establishes criteria for terminal instrument procedures for issuance in the current edition of United States Standard for Terminal Instrument Procedures and related 8260-series orders. (Federal Aviation Administration, 2014)

FPPA Farmland Protection Policy Act: Intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Frangible 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.

FSDO FAA Flight Standards District Office: The FSDO is the regulatory agency in charge of low-flying aircraft, accident reporting, air carrier certification and operations, aircraft maintenance, aircraft operational issues, aircraft permits, airmen certification (licensing) for pilots, mechanics, repairmen, dispatchers, and parachute riggers, certification and modification issues, enforcement of airmen & aircraft regulations. (Federal Aviation Administration, 2013)

G

GA General Aviation: General aviation refers to aircraft activity that is not scheduled for commercial purposes (e.g. airlines and cargo carriers) or conducted by the military. GA operations include charter and on-demand air transport, flight instruction, recreational flying, pipeline inspection, business, and charter users not operating as airlines under Federal Aviation Regulation (FAR) Part 121, Part 135, or military regulations and emergency response.

GHGs Greenhouse Gases: Gases that trap heat in the atmosphere.

GIS Geographic Information System: A computer system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.

GPA Glide Path Angle: is the angle of the final approach descent path relative to the approach surface baseline.

GPS Global Positioning System: A system of 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GRP Gross Regional Product: is the value of goods and services produces in the County and serves as a health index for the overall economy.

GS Glideslope: is the vertical component of the instrument landing system (ILS) for the glide path guidance when combined with the lateral guidance of the localizer. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or
2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GSF Gross Square Footage

H

HAA Height Above Airport: The height of the circling approach descent altitude (MDA) above the airport elevation.

HAZMAT Hazardous Materials: materials that pose a risk to human health and safety, and the environment. Transport, storage, and disposal of these materials are regulated by state and federal environmental and transportation agencies.

Helicopter Helicopters are characterized by having a rotor mounted above the cabin for lift and propulsion. Helicopters are commonly used for flight training, by law enforcement and emergency response, and by aerial businesses such as pipeline inspection, forestry, and aerial agriculture. Helicopters can be piston or turbine powered, and depending on the complexity of the model, can be operated by one pilot or two.

HIRL High Intensity Runway Lights: HIRLs are used to outline the edges of runways during periods of darkness or reduced visibility.

Horizontal Surfaces 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.

HVAC Heating, Ventilation, Air Conditioning: Environmental control systems for a building

I

IAF Instrument Approach Fix: The designated point at which the initial approach segment begins for an instrument approach to a runway.

IAP Instrument Approach Procedure: consist of a series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight rules (IFR) conditions from the beginning of the initial approach to a landing, or to a point from which the landing can be made visually. IAPs are classified as precision instrument, with both horizontal and vertical guidance; non-precision instrument, with only horizontal guidance; and visual, without positional guidance

ICAO International Civil Aviation Organization: ICAO is a United Nations specialized agency that works with Member States and global aviation organizations to develop international Standards and Recommended Practices (SARPs) which States reference when developing their legally-enforceable national civil aviation regulations. (International Civil Aviation Organization, 2014)

IFR Instrument Flight Rules: IFR governs flight procedures when there is cloud ceiling less than 1,000 feet and/or visibility less than 3 miles. These rules require pilots to be specially licensed to navigate using instruments and air traffic control instruction, without visual reference.

ILS Instrument Landing System: An instrument landing system operates as a ground-based instrument approach system that provides precision lateral and vertical guidance to an aircraft approaching and landing on a runway, using a combination of radio signals and, in many cases, high-intensity lighting arrays to enable a safe landing during instrument meteorological conditions (IMC), such as low ceilings or reduced visibility due to fog, rain, or blowing snow.

IMC Instrument Meteorological Conditions: is an aviation flight category that describes weather conditions that require pilots to fly primarily by reference to instruments, and therefore under instrument flight rules (IFR), rather than by outside visual references under visual flight rules (VFR).

IPaC Information for Planning and Consultation: A project planning tool which streamlines the USFWS environmental review process.

Instrument Procedures A series of predetermine maneuvers consisting of navigational waypoints, headings, and minimum altitudes, intended to guide aircraft between the terminal (airport area) phase of flight and the enroute phase of flight.

ISA International Standard Atmosphere: ISA is a mathematical model that describes how the earth's atmosphere, or air pressure and density, changes relative to altitude. The atmosphere is less dense at higher elevations. ISA is frequently used in aircraft performance calculations because conditions that deviate from ISA will affect aircraft performance.

Itinerant Aircraft An aircraft that is proceeding to or arriving from another location; or leaves the aerodrome traffic circuit but will be returning to land.

Itinerant Operations An operation that originates and terminates at different airports. An example is an aircraft flying from MFR to another airport.

J

Jet Jet aircraft are characterized for having a turbine engine instead of a piston engine. Jet aircraft range in size from small four-passenger business jets to the largest airliners. They can generally fly faster and at higher altitudes than SEP and MEP, making them better suited for business travel and emergency response. It is less common, but not unheard of, to see a jet used for recreational flying and flight instruction. Some smaller civilian jets can operate with a single pilot; however, most civilian jet aircraft require two.

Jet A Jet A is gasoline used in turbine engine powered aircraft. These include jets and propeller aircraft with turbine engines. Jet A is kerosene, refined to meet aviation specifications.

K

L

Large Aircraft	An aircraft with a maximum certificated takeoff weight of more than 12,500 lbs.
LDA	Landing Distance Available: The runway length declared available and suitable for landing an aircraft.
LIRL	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.
LOC	Localizer: is the lateral guidance component of the instrument landing system (ILS) for the runway center line when combined with the vertical guidance of the glide slope.
Local Traffic	Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.
Local Operation	An operation that originates and terminates at the same airport. An example is an aircraft taking off from MFR, remaining near the airport to practice flight maneuvers, and then landing at MFR.
LPV	Localizer Performance with Vertical Guidance: GPS based approach system that provides vertical guidance with precision similar to a ground-based ILS system

M

Magnetic Bearing	This determines the numbering scheme of runways. Runways are measured based on their orientation to the magnetic north pole (not the true North Pole, located at 90 degrees north latitude).
MALS	Medium-Intensity Approach Light System with Indicator Lights
MALSR	Medium-Intensity Approach Light System with Runway Alignment Indicator Lights: medium-intensity approach light system 1,400 feet in length with runway alignment indicator lights.
MDA	Minimum Decent Altitude: The lowest authorized altitude on an approach that does not have vertical guidance. MDA is referenced to mean sea level (MSL).
MEP	Multi-Engine Piston: MEP have two or more engines and are typically larger than Single Engine Piston (SEP) aircraft. Multiple engines make the aircraft more capable and require

additional flight instruction beyond what is needed to operate an SEP. MEP are primarily used for flight training and business aviation. MEP may require two pilots, but many variants can be operated with one.

MGW — Main Gear Width

MIRL — Medium Intensity Runway Lights: MIRLs are located along the edge of the runway and are used by pilots at night and in low visibility to land and take-off from the runway.

MITL — Medium Intensity Taxiway Lights: MITLs are located along the edge of the taxiway and are used by pilots at night and in low visibility to navigate on taxiways.

Modification to Standards — Any approved nonconformance to FAA standards, other than dimensional standards for Runway Safety Areas (RSAs), applicable to an airport design, construction, or equipment procurement project that is necessary to accommodate an unusual local condition for a specific project on a case-by-case basis while maintaining an acceptable level of safety.

Movement Area — The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft including helicopters and tilt-rotors, exclusive of loading aprons and aircraft parking areas

MSL — Mean Sea Level: is an average level of the surface of one or more of Earth's oceans from which heights such as elevations may be measured. MSL is a type of vertical datum – a standardized geodetic reference point – that is used, for example, as a chart datum in cartography and marine navigation, or, in aviation, as the standard sea level at which atmospheric pressure is measured to calibrate altitude and, consequently, aircraft flight levels.

N

NAAQS — National Ambient Air Quality Standards: The Clean Air Act requires the Environmental Protection Agency to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. (U.S. Environmental Protection Agency, 2011)

NAS National Airspace System: is the airspace, navigation facilities and airports of the United States along with their associated information, services, rules, regulations, policies, procedures, personnel and equipment.

NAVAID Navigational Aid: an electronic or visual guidance system that allows pilots to maintain situational and locational awareness during periods of low visibility. NAVAIDs include airfield lights and radio beacons that convey positional information to pilots.

NHPA National Historic Preservation Act: Legislation intended to preserve historical and archaeological sites.

NRCS U.S. Department of Agriculture Natural Resources Conservation Service: Provides technical assistance to farmers and other private landowners and managers.

NDB Non-Directional Beacon: is a radio transmitter at a known location, used as an aviation or marine navigational aid.

NEPA National Environmental Policy Act: The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet NEPA requirements federal agencies prepare a detailed statement known as an Environmental Assessments and Environmental Impact Statements (EIS). EPA reviews and comments on EISs prepared by other federal agencies, maintains a national filing system for all EISs, and assures that its own actions comply with NEPA. (U.S Environmental Protection Agency, 2014)

NM Nautical Mile: 6076.1

NMFS National Marine Fisheries Service: Responsible for the stewardship of the nation's ocean resources and their habitat.

NOAA National Oceanic and Atmospheric Administration: is an American scientific agency within the United States Department of Commerce that focuses on the conditions of the oceans, major waterways, and the atmosphere.

Non-Aviation Non-Aviation land use on an airport allows for the development of compatible non-aviation uses such as highway, commercial, light industrial, business park, and hotel uses. This designation also includes agricultural and open space land uses.

Non-Movement Area The areas of an airport that are used for taxiing or hover taxiing, or air taxiing aircraft including helicopters and tiltrotors but are not part of the movement area (i.e., the loading aprons and aircraft parking areas).

NPA Non-Precision Approach: a straight-in instrument approach procedure that provides course guidance, with or without vertical path guidance, with visibility minimums not lower than 3/4 mile (4000 RVR).

Non-Precision Instrument

NAVAIDs and instrument procedures enabling only lateral guidance of aircraft, compared to precision instrument which provides lateral and vertical guidance. During periods of visibility below 3 a statute mile and when the cloud ceiling is below 1,000 feet above ground level, aircraft, airports, and pilots must be equipped and trained to fly non-precision instrument procedures, otherwise the airport must close until visibility improves.

NOTAM — Notice to Airmen: Federally issued notice pertaining to deviations from standard operating procedures in the national airspace system. NOTAMs typically pertain to airspace and runway closures, and special events such as air shows. Pilots are responsible for reviewing applicable NOTAMs in the airspace and airports within which they operate.

NPIAS — National Plan of Integrated Airport Systems: The NPIAS identifies nearly 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. The FAA is required to provide Congress with a 5-year estimate of AIP eligible development every two years. The NPIAS contains all commercial service airports, all reliever airports, and selected general aviation airports. (Federal Aviation Administration, 2014)

NRHP — National Register of Historic Places: Official list of the Nation's historic places worthy of preservation. Authorized by National Historic Preservation Act.

NRI — Natural Resource Inventory: A statistical survey of land use and natural resource conditions and trends on U.S. non-Federal lands, maintained by the US Department of Agriculture.

NWI — National Wetlands Inventory: A publicly available resource that provides detailed information on US wetlands.

O

Obstacle — An existing object at a fixed geographical location or which may be expected at a fixed location within a prescribed area with reference to which vertical clearance is or must be provided during flight operation.

OCS — Obstacle Clearance Surface: An evaluation surface that defines the minimum required obstruction clearance for approach or departure procedures.

OE/AAA — FAA Obstacle Evaluation / Airport Airspace Analysis: OE/AAA evaluates cases related to airspace in the U.S. Structures built within 20,000 feet of public airports or exceeding 200 feet above ground level must go through OE/AAA review. OE/AAA issues a determination on whether the proposed construction is or is not a hazard to air navigation.

OFA — Object Free Area: The OFA is centered about the runway or taxiway centerline. The OFA clearing standard requires clearing the OFA of above-ground objects protruding above the nearest point of the safety area, except those fixed by function. Buildings and parked aircraft are not permitted in the OFA (Federal Aviation Administration, 2012).

OFZ — Obstacle Free Zone: The OFZ clearing standard precludes aircraft and other object penetrations, except for frangible NAVAIDs that need to be located in the OFZ because of their function. Its shape is dependent on the approach minimums for the runway end and the aircraft on approach, and thus, the OFZ for a particular operation may not be the same shape as that used for design purposes. (Federal Aviation Administration, 2012)

Operation — An operation is data showing how many times aircraft have taken off, landed, or performed a touch-and-go at an airport. One visit to an airport counts as two operations (landing and takeoff).

Other Aircraft — This category includes experimental, sport, glider, and ultralight aircraft. These aircraft are used for recreational flying.

- Experimental aircraft refer to kit airplanes that are built by users or third-parties besides the original manufacturer. Experimental aircraft share many characteristics with SEP – the key differentiator is how and where the aircraft is assembled.
- Sport aircraft are airplanes that have a specific weight and maximum speed in level flight. Sport aircraft require less training and a less strict medical certificate to pilot the aircraft.
- Gliders are unpowered aircraft that are towed into flight and use thermal uplift to sustain altitude.
- Ultralight aircraft weigh less than 155lbs and do not require the pilot operating the aircraft to have a private pilot's license or medical certificate.

P

PAPI — Precision Approach Path Indicator: A series of lights that indicate to a pilot whether they are on, above, or below the prescribed glide path to a runway end. These devices have either two or four lights that alternate between white and red to indicate the pilot's position.

PBB — Passenger Boarding Bridge: An enclosed, elevated passageway which extends from an airport terminal gate to an airplane.

PCI — Pavement Condition Index: A numerical index used in transportation civil engineering between 0 and 100 which is used to indicate the general condition of a pavement.

PFC	Passenger Facility Charge: Publicly owned commercial service airports can assess a PFC on domestic, territorial, or international revenue passengers enplaned at the airport.
PHS	Priority Habitats and Species: PHS is the principal means by which WDFW provides important fish, wildlife, and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning purposes.
Precision Instrument	NAVAIDs and instrument procedures enabling both lateral and vertical guidance of aircraft. During periods of visibility below 1/2 a statute mile and when the cloud ceiling is below 200 feet above ground level, aircraft, airports, and pilots must be equipped and trained to fly precision instrument procedures, otherwise the airport must close until visibility improves.
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.
POFA	Precision Object Free Area: 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 POFA is a clearing standard, which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than ¾ mile visibility.
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 statute mile.

Q

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.
RCRA	Resource Conservation and Recovery Act: RCRA gives EPA the authority to control hazardous waste. This includes generation, transportation, treatment, storage, and disposal of hazardous waste.
RDC	Runway Design Code: A combination of the AAC and ADG. These two elements combined set the design standards, setbacks, and dimensions, pavement width, safety areas, object

free areas, and runway protection zones for a single runway. (Federal Aviation Administration, 2012)

Regression Analysis — Using projected change of one variable to forecast the change of another. Regression analysis typically identifies correlation between two variables historically, indicating whether these variables change in a similar fashion to each other, or inversely. Correlation and regression do not determine causation.

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.

REIL — Runway End Identifier Lights: provide rapid and positive identification of the approach end of a runway. The system consists of a pair of synchronized flashing lights located laterally on each side of the runway threshold.

RNAV — Area Navigation: RNAV is a method of instrument flight rules (IFR) navigation that allows an aircraft to choose any course within a network of navigation beacons, rather than navigate directly to and from the beacons. Typically GPS system navigation.

ROFA — Runway Object Free Area: This is an object free area centered on the runway. See the definition of OFA.

RPZ — Runway Protection Zone: The RPZ is a trapezoidal feature, and its function is to enhance the protection of people and property on the ground by keeping the area clear of incompatible land uses. These land uses generally include noise sensitive land uses, land uses that are characterized by high concentrations of people; and fuel and hazardous material storage.

RSA — Runway Safety Area: The RSA is a safety area that is centered longitudinally on the runway. It must be clear of all objects, graded, drained, and capable of supporting snow removal equipment, firefighting equipment, and the passage of aircraft without damage to the aircraft. (Federal Aviation Administration, 2012)

Runway — A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of aircraft.

Runway Incursion — 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.

RVR — Runway Visibility Range: An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

RVZ Runway Visibility Zone: An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

S

SASO Specialized Aviation Service Operator: A single-service provider or special Fixed Based Operator performing less than full services.

SASP State Aviation System Plan.

SEL Sound Exposure Level.

SEP Single Engine Piston: SEP have one piston-powered engine. These aircraft are generally smaller and are often used for flight training and recreational flying.

SHPO State Historic Preservation Offices: Responsible for operation and management of Office of Historic Preservation and preservation planning.

SID Standard Instrument Departure: A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

SIP State Implementation Plan: United States state plan for complying with the federal CAA, administered by the EPA.

Shoulder An area adjacent to the defined edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft and emergency vehicles deviating from the full-strength pavement; enhanced drainage; and blast protection.

Small Aircraft An aircraft with a maximum certificated takeoff weight of 12,500 lbs (5670 kg) or less.

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.

SRE — Snow Removal Equipment: Typical Airport SRE includes plow trucks, sweeper broom trucks, front loaders, dump trucks, and vehicles for de-icing chemical dispersal.

Stopway — An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff. A blast pad is not a stopway.

STAR — Standard Terminal Arrival Route: 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.

SWL — Single Wheel Landing Gear: Runway Weight Bearing Capacity for Aircraft with Single-Wheel Tandem Type Landing Gear.

T

TACAN — Tactical Air Navigation: An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAF — Terminal Area Forecast: The TAF is the annual FAA forecast of passengers, aircraft operations, and based aircraft for the National airspace system. This is a top down forecast, starting from the FAA national aerospace forecast and being distributed to the different airports. It is used as a basis for comparison for Master Plan generated forecasts.

Taxilane — A taxiway designed for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area, providing access from taxiways (usually an apron taxiway) 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.

TDG Taxiway Design Group: Relates to the undercarriage dimensions of the aircraft. Taxiway/taxilane width and fillet standards, and in some cases, runway to taxiway and taxiway/taxilane separation standards are determined by TDG

TESM Taxiway Edge Safety Margin: The distance between the outer edge of the landing gear of an airplane with its nose gear on the taxiway centerline and the edge of the taxiway pavement.

TFMSC Traffic Flow Management System Traffic Counts data: The TFMSC includes data collected from flight plans. These operations are categorized by aircraft type and used to identify trends in the MFR fleet mix.

THC Threshold Crossing Height: the TCH is the theoretical height above the runway threshold at which the aircraft's glideslope (GS) antenna would be if the aircraft maintains the trajectory established by the Instrument Landing System (ILS) GS, or the height of the pilot's eye above the runway threshold based on a visual guidance system.

Threshold The beginning of that portion of the runway available for landing. In some instances, the threshold may be displaced. "Threshold" always refers to landing, not the start of takeoff.

Tiedown Tiedowns are located on aircraft parking aprons and used to secure parked aircraft so that they do not move in high winds.

TODA Takeoff Distance Available: The Takeoff Run Available (TORA) plus the length of any remaining runway or clearway beyond the far end of the TORA – Also see Declared Distances

TOFA Taxiway Object Free Area: This is an object free area centered on the taxiway. See the definition of OFA.

TORA Takeoff Run Available: The runway length declared available and suitable for the ground run of an aircraft taking off.

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.

TRACON Terminal Radar Approach Control.

TSA Taxiway Safety Area: The TSA is a safety area that is centered longitudinally on the taxiway. It must be clear of all objects, graded, drained, and capable of supporting snow removal equipment, firefighting equipment, and the passage of aircraft without damage to the aircraft. (Federal Aviation Administration, 2012)

TSC Technical Steering Committee: The TSC is made up of Airport staff, members of the Airport Advisory Board, and others with an in-depth understanding of aviation. TSC members are tasked with becoming familiar with how the Airport operates and what facilities pilots and aviation-related businesses require.

Turboprop — Turboprop aircraft use gas turbine engines to drive a propeller. These aircraft tend to be slower than jets. Turboprops are used as small commuter aircraft due to lower fuel and maintenance costs.

U

UAS — Unmanned Aircraft System: The UAS is the combination of a pilotless vehicle and pilot that flies the vehicle remotely. This acronym is often used interchangeably with unmanned aerial vehicle; however, UAS refers to the vehicle and the pilot.

UAV — Unmanned Aerial Vehicle: A UAV is a pilotless vehicle. This acronym is often used interchangeably with unmanned aerial system; however, UAV refers to the vehicle itself, and not the pilot.

Uncontrolled Airport — An airport without an air traffic control tower at which the control of Visual Flight Rules (VFR) traffic is not exercised.

Uncontrolled Airspace — Airspace within which aircraft are not subject to air traffic control

UGB — Urban Growth Boundary: A regional boundary, set by the local jurisdiction by mandating that the area inside the boundary be used for higher density urban development and the area outside be used for lower density development, with the hope of controlling urban sprawl.

USACE — U.S. Army Corps of Engineers: The USACE has regulatory over navigable waterways in the U.S. They manage river hydrology, flood prevention, and emergency response.

USC — United States Code: The United States Code is a consolidation and codification by subject matter of the general and permanent laws of the United States. It is prepared by the Office of the Law Revision Counsel of the United States House of Representatives. (United States House of Representatives, 2014)

USFS — United States Forest Service: An agency of the U.S. Department of Agriculture that administers the nation's national forests and national grasslands.

USFWS — U.S. Fish and Wildlife Service: USFWS is tasked with enforcing federal wildlife laws, protecting endangered birds and species, managing bird migrations and fisheries, restoring wetlands, and collecting excise taxes on fishing and hunting. (U.S. Fish and Wildlife Service, 2014)

V

VASI	Visual Approach Slope Indicator: An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.
VFR	Visual Flight Rules: Under visual flight rules, pilots must be able to maintain separation from aircraft and objects visually, without the use of navigational aids (NAVAIDS). When weather reduces visibility below three statue miles then pilots may not operate under Visual Flight Rules (VFR) and must instead use Instrument Flight Rules (IFR). (FAR Part 91).
VGSI	Visual Glide Slope Indicators: Lighting systems located adjacent to runway son the airfield to assist aircraft with visually based vertical alignment on approach to landing.
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.
VOR	Very High Frequency (VHF) omnidirectional range: VOR NAVAIDS convey position and course (relative to the VOR) information to aircraft in flight. These NAVAIDs are used to establish airways across the U.S.
VORTAC	Very High Frequency Omni-Directional Range | Tactile Air Navigation: A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

W

WAAS	Wide Area Augmentation System: WAAS is a ground-based global positioning system (GPS) signal augmentation service. WAAS antennas boost strength and reliability of satellite GPS signals, enabling aircraft to use GPS to fly instrument approach procedures.
Weight Bearing Capacity	The amount of weight a piece of pavement is capable of bearing under normal circumstances, without resulting in excessive wear. Aircraft that weigh more than a pavements weight bearing capacity may still use the pavement; however, frequent use by such aircraft will cause premature wear of the pavement, requiring earlier replacement.
Wingspan	The maximum horizontal distance from one wingtip to the other wingtip, including the horizontal component of any extensions such as winglets or raked wingtips.
WHMP	Wildlife Hazard Management Plan

X

Y

Z

PORT OF ASTORIA