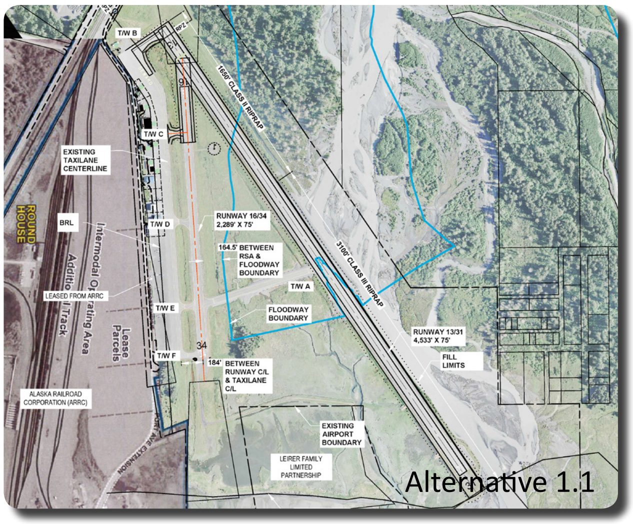
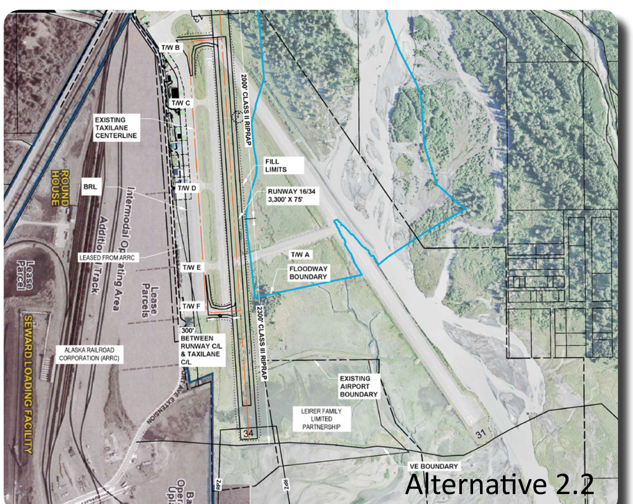
Seward Airport Improvements

Scoping Report

AKSAS No. 54857

June 2017





Prepared for

State of Alaska
Department of Transportation
& Public Facilities
Central Region
4111 Aviation Ave.
Anchorage, AK 99502

Prepared by

PDC Engineers
1028 Aurora Drive
Fairbanks, AK 99709
907.452.1414

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1 INTRODUCTION

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) has retained PDC Engineers (PDC) to lead in the design, environmental, and planning studies for improvements to the Seward Airport. As part of the proposed project, Solstice Alaska Consulting, Inc. is providing public involvement, permitting, and biological assessments. Quantum Spatial, Inc. provided mapping and photogrammetry services. Hydraulic Mapping and Modeling is providing hydrologic and hydraulic modeling, and Shannon & Wilson, Inc. is providing geotechnical investigations.

Seward, Alaska is located on the Kenai Peninsula at the north end of Resurrection Bay, approximately 75 air miles or 125 highway miles southwest of Anchorage. The State owns and operates the Seward Airport which includes a paved main runway (13/31), a paved crosswind runway (16/34), multiple taxiways, and two aprons.

Most of the Seward Airport is located within the floodplain of the Resurrection River Delta. The airport has flooded many times over the years. Both the main runway and Taxiway A have suffered regular damage from these events. Temporary repairs and construction of dikes and installation of culverts have been completed in an effort to keep the airport operational.

1.1 Scope

The scoping phase of the project included:

- Review of historical information
- Coordination with the community
- Field reconnaissance
- Collection and evaluation of data that would potentially impact airport development (land status, wind data, aircraft operations, terrain obstructions, topography, and environmental)
- Detailed initial Geotechnical evaluation
- Detailed hydrologic studies
- Communication with DOT&PF functional groups to evaluate design elements
- Development and evaluation of airport alternatives
- Identification of data gaps

This scoping summary report documents this effort and recommends that two alternatives, Alternatives 1.1 and 2.2, be evaluated further during the environmental process.

1.2 Project History

The Seward Airport Improvement project has been in the planning stages since the 2008 Airport Master Plan was developed. An Environmental Assessment was conducted as part of this plan and a finding of no significant impact (FONSI) was obtained in 2008 for the recommended improvements. Since that assessment, the course of the Resurrection River changed and the main channel is now directed toward the main runway (13/31). As a result, the proposed project selected under the 2008 EA is no longer valid. This project was initiated in 2014.

1.3 Purpose and Need

The Seward Airport Improvements project has two primary purposes. The first is to develop engineering solutions that will protect airport facilities from further damage caused by recurrent flooding from the Resurrection River. The second purpose is to correct deficiencies that exist, based on the airport's function and FAA design standards.

The Seward Airport is located within the floodplain of the Resurrection River; portions of the airport are within the defined floodway. The main runway (RW 13/31) has been overtopped 18 times since 2011, resulting in damage to all the airport facilities. Erosion from the river and regular flood damage require a continued maintenance effort to keep the runway usable. The purpose of the Seward Airport Improvements project is to provide a reliable working airport that satisfies current FAA design standards for an Aircraft Design Group II (ADG II) facility and the state's requirements for a Community Class Airport. These improvements should meet the near term aviation demands as well as plan for future demand. Specifically, the airport needs to:

- Maintain a minimum runway length of 3,300 feet,(consistent with Community Class Airport standards) which will accommodate current and near term aircraft, including medevac operations
- Meet the runway width and taxiway dimensional standards of ADG II
- Construct flood protection to prevent erosion damage from the 100-year flood
- Provide a minimum of 95% wind coverage for the ADG II aircraft
- Include construction of a runway with sufficient bearing capacity to allow for occasional operations by larger aircraft such as Beech 1900, Dash 8, and small charter type business jets
- Provide reliable airport lighting for night operations
- Mitigate approach obstructions and incompatible Runway Protection Zone (RPZ) uses to the extent practicable
- Accommodate the need for aircraft owners to change out from floats to wheels, if practicable
- Ensure the airport has sufficient service roads

1.4 Project Team

Table 1 - Project Team

CONTRACTING AGENCY		
DOT&PF 4111 Aviation Dr. Anchorage, AK 99502		Phone: (907) 269-0617
Barbara Beaton	Project Manager	barbara.beaton@alaska.gov
Joy Vaughn	Consultant Coordinator	joy.vaughn@alaska.gov
Mark Boydston	Environmental Analyst	mark.boydston@alaska.gov
Paul Janke	Hydrologist	paul.janke@alaska.gov

CONSULTANT TEAM		
PDC Inc. Engineers 1028 Aurora Dr. Fairbanks, AK 99709	Prime Consultant Project Management, Engineering, Surveying	Phone: (907) 452-1414 Fax: (907) 456-2707
Royce Conlon	Consultant Project Manager	royceconlon@pdceng.com
Ken Risse	Lead Civil Engineer	kenrisse@pdceng.com
Angela Smith	Civil Engineer	angelasmith@pdceng.com
Erica Betts	Environmental Analyst	ericabetts@pdceng.com
Patrick Cotter	Planner	patrickcotter@pdceng.com
Craig Ranson	Surveyor	craigranson@pdceng.com
Dennis Bogren	Survey Coordinator	dennisbogren@pdceng.com
Solstice Alaska Consulting, Inc. 2607 Fairbanks St., Suite B Anchorage, AK 99503	Public Involvement and Environmental Support	Phone: (907) 929-5960
Robin Reich	Public Involvement / Environmental Coordinator	robin@solsticeak.com
Hydraulic Mapping and Modeling 1091 W. Chena Hills Dr. Fairbanks, AK 99709	Hydrology/Hydraulic Analysis	Phone: (907) 479-5227
Ken Karle	Hydrologist/Hydraulic Engineer	kkarle@mtaonline.net
Shannon & Wilson, Inc. 5430 Fairbanks St., Suite 3 Anchorage, AK 99518	Geotechnical Engineering	Phone: (907) 422-3213 Fax: (907) 561-4483
Kyle Brennan	Geotechnical Engineer	klb@shanwil.com
Quantum Spatial, Inc. 2014 Merrill Field Dr. Anchorage, AK 99501	Aerial Mapping	Phone: (907) 272-4495 Fax: (907) 274-3265

2 EXISTING CONDITIONS

2.1 Airport Facilities

The State of Alaska owns and operates the Seward Airport, which includes a paved main runway (RW 13/31), a paved crosswind runway (RW 16/34), multiple taxiways, and two aprons. Runway 13/31 is 4,249 ft x 100 ft and Runway 16/34 is 2,289 ft x 75 ft. The Seward Airport primarily serves the City of Seward, and residents of the area between Seward and Moose Pass. Local residents use the airport for travel to Anchorage and Prince William Sound. Tour operators use the airport as a base for sightseeing tours of Kenai Fjords National Park via airplane and helicopter. The number of operations at the airport is higher in the summer than in the winter.

Most of the Seward Airport is located within the floodplain of the Resurrection River Delta with about half of Runway 13/31 lying with the floodway. The frequency with which Runway 13/31 has been overtopped by the Resurrection River has substantially increased in recent years. These instances were limited initially to the fall, but they are now occurring in the summer as well (June to November). Recent changes in channel morphology have rendered the existing riprap along the eastern side of the runway inadequate. Without additional protection, erosion and overtopping of the runway will continue; DOT&PF will keep pouring maintenance funds into repairs.

Testing of the main runway embankment has shown an insufficient bearing capacity to support large aircraft. Frequent flooding is thought to have contributed to a weakened embankment under the pavement. As a result, landings by larger aircraft have been restricted.

2.2 Community Characteristics

Much of the information in Sections 2.2 – 2.5 is extracted from the 2008 Airport Master Plan, with updates as known.

Seward is located on Resurrection Bay on the east coast of the Kenai Peninsula. It lies at the foot of Mount Marathon and is the gateway to the Kenai Fjords National Park. Seward is connected by highway to Anchorage, 125 miles to the north. Seward is a major transit site for the Alaska Railroad (ARRC). A 900 foot deep port located at the north end of Resurrection Bay serves cruise ships, cargo barges, and ocean freighters from Seattle and overseas. The ARRC is presently considering expansion of the facilities to serve projected demand.

The Seward city limits cover 14.4 square miles of land and 7.1 square miles of water. Seward experiences a maritime climate and has a year round ice-free port. Seward is primarily a non-Native community, although the Qutekcak Tribe is very active within the community.[1]

[1] "Community Database Online". *State of Alaska, Division of Community and Regional Affairs*. Web. 23 January 2017.

2.3 Land Use and Land Ownership

The Seward Airport is located on 302 acres next to the Resurrection River, at the head of Resurrection Bay. Other land uses in the area include a landfill/transfer station approximately one and a half miles northwest of the west end of the airport, and a municipal sewage lagoon approximately three miles south of the airport. The airport is located east of the Seward Highway, and is about two miles northeast of downtown Seward. The airport is owned and operated by DOT&PF. The original deed for the airport property was obtained from the Alaska Railroad by the State of Alaska in 1907.

The largest landowner adjacent to the airport is the Alaska Railroad Corporation (ARRC) which owns all of the property on the west side of the airport. The Civil Air Patrol (CAP) owns a large parcel of land to the northeast of the airport, but most of this parcel lies within the Resurrection River floodplain making future development unlikely. The other parcels of land adjacent to the airport are relatively small and are owned either by individuals or the City of Seward. A privately owned parcel along the south boundary of the airport is completely surrounded by the airport, with the only land access to this parcel across airport property.

2.4 Airport Vicinity Transportation

2.4.1 Surface Access to the Airport

The Seward Airport is served by a single access road. The road begins at the Seward Highway near the southernmost Resurrection River Bridge and runs southwest alongside the train tracks. The road then turns south and parallels the west side of the apron and the lease lots. The access road is paved, and is approximately 24 feet wide and 4,000 feet long. Because the access road crosses the Alaska Railroad tracks at the Seward Highway, it can be blocked when trains are inbound, outbound or switching. According to the 2008 Master Plan Study, community members report that the current airport entrance is dangerous due to limited visibility when entering the Seward Highway. There is strong support to find a better solution.

There is limited space on the lease lots for parking, so tenants and tourists requiring access to the buildings on the lease lots, generally park on the apron in the vicinity of the buildings or along the shoulder of the airport access road. It is the tenant's responsibility to provide space for parking on their lease lots. Access to these buildings is gained by driving along the apron on the airfield side of the lease lots. The 2008 AMP reported that this causes occasional conflicts between vehicles, aircraft, and pedestrians. This conflict was most evident during the summer when tour helicopters were loading and unloading passengers at the north end of the apron. Updated interviews with airport users did not reveal continued concern, potentially due to reduced air traffic since the 2008 study was done.

2.4.2 Available Utilities

Communications - Interior Telephone (TelAlaska) and AT&T Alascom provide local telephone service; GCI and Interior Telephone provide long distance service. There are three different Internet providers. Seward has six radio stations along with three television stations. GCI Cable provides cable television service. There is one weekly newspaper in Seward, The Seward Phoenix Log.

Electricity - Electricity is provided by the Seward Electric System, which purchases power from Chugach Electric. Seward Electric System also owns high capacity generators to provide backup power to the community. Electricity is available to all lease lots on the airport.

Wastewater - A city-managed public sewage system serves the majority of Seward. It carries wastewater to a treatment lagoon on Lowell Point, approximately three and a half miles south of the Seward Airport. A small portion of Seward households utilize on-site septic tanks. No public wastewater service is available on the airport.

Water - Almost all homes in Seward have indoor plumbing, with only a small percentage lacking complete plumbing. Nearly all homes in Seward utilize the public water system, with a low percent of homes using an individual well. Water is supplied by city wells, where it is chlorinated before being distributed to Seward. No city drinking water is available at the airport, but water is available at the nearby coal facility offices and along the Seward Highway.

Solid Waste Generation and Disposal - Solid waste is collected by the Seward Disposal Service and taken to the Seward Transfer Facility, which is located on Hemlock Street, 1.5 miles northwest of the Seward Airport. From the Seward Transfer Facility, waste is hauled to the Central Peninsula Baling Facility in Soldotna.

Fuel - The primary fuel supplier in Seward is Shoreside Petroleum, which has six fuel tanks with a capacity of 120,000 gallons each. The City of Seward has an additional 40,000 gallons of fuel capacity, and there are 68,000 gallons of capacity available elsewhere in the community. A local fixed-base operator, Seward Air, maintains 5,000 gallons of Jet A and 5,000 gallons of 100LL fuel for purchase at the airport.

2.5 Environmental Data

2.5.1 Topography, Geology, and Soil

Seward is located at the northern end of Resurrection Bay on the southeast coast of the Kenai Peninsula. This Bay is an extension of an eroded glacial valley in the Kenai Mountains, and is a deep fjord extending north from the Gulf of Alaska. Rising steeply above the bay, the surrounding Kenai Mountains climb to altitudes of nearly 5,000 feet. The waters and shores of the bay are ice-free year round. The City of Seward is particularly susceptible to earthquakes, tsunamis, and stream flooding, which may be aggravated by heavy rains, melt runoff, heightened tidal action, and severe winds. During winter months, deep snow and avalanches occasionally hamper transportation and emergency response time in the community.

2.5.2 Hydrology

The Seward Airport was constructed in the Resurrection River floodplain, on the delta at the river's mouth. The river is a wide, glacial fed, braided river with low banks. Over time the river channel has moved back and forth across the floodplain, consistent with the behavior of a braided river. Wetland areas have developed where surface drainage is restricted, or in areas subject to tidal inundation. With depths of one to two feet, the groundwater table is very shallow in places. The airport has flooded 18 times since 2011; the frequency and severity of flooding has been accelerating. The result is more frequent and intense flooding events. Both the main runway and Taxiway A have suffered regular damage from these events.

2.5.3 Climate Data

Seward has a maritime subpolar, or a subarctic climate, which is characterized by long, cold winters and short, cool to mild summers. Seward experiences moderate temperatures for Alaska and, due to its location along the Gulf of Alaska, high levels of precipitation. Average winter temperatures range from 17° to 38° F; summer average temperatures range from 49° to 63° F. Annual precipitation averages 66 inches of rain and 80 inches of snowfall.

3 AVIATION ACTIVITY AND FORECAST

3.1 Forecast Elements

Forecasts of future levels of aviation activity are the basis for making decisions in airport planning and future development. A comprehensive forecast includes elements of socioeconomics, demographics, geography, and external factors. Recent interest in Seward by the fishing and marine industries has sparked anticipation of growing industrial development in the community. This forecast update for Seward Airport was finalized in July 2015. Baseline data for the forecast was 2013.

The FAA is providing the majority of the funding for the improvements, as a result, FAA regulations and guidance are used as the basis of this report. The methodology used in this forecast is based on the process recommended in FAA AC 150/5070-6B, Airport Master Plans, and in the supplemental FAA publication, Forecasting Aviation Activity by Airport. These documents provide national guidance for the development of airport master plans, and have been used since enactment of the Airport and Airway Development Act of 1970.

The level and type of aviation activity anticipated at an airport, as well as the nature of the planning to be done, determine the factors to be forecasted. Generally, the most important activities for airfield planning are aircraft operations and the fleet mix. These factors aid in the determination of the design aircraft, which in turn defines the runway and taxiway requirements.

Practical considerations dictate the level of detail and effort that should go into an airport planning forecast. Air traffic activity at Seward comprises single and twin-engine GA aircraft, medevac aircraft, military aircraft, and helicopters. Because this project centers on runway improvements, the forecast for Seward Airport (SWD) will focus on:

- Aircraft operations – an aircraft landing or takeoff; one flight to and from the same location counts as two operations.
- Based aircraft – the total number of active general aviation aircraft that use an airport as a home base.
- Fleet mix – describes the makeup of the different aircraft in use at an airport.

3.2 Previous Airport Forecasts

Relevant forecasts of aviation activity at Seward are summarized below.

3.2.1 Seward Airport Master Plan (2008)

In 2008, the DOT&PF updated the Seward Airport Master Plan. This update forecasted aircraft operations and passenger enplanements as summarized in the following table. An annual growth rate of 1.2% was used to forecast future operations, enplanements, and cargo.

An enplanement is defined as a passenger boarding.

Table 2 - 2008 Seward Airport Master Plan Aviation Forecast, Moderate Growth Scenario

	2003 (Base)	2008	2013	2018	2023
Enplanements	3,746	3,976	4,221	4,480	4,755
Commercial Operations	2,912	3,091	3,281	3,483	3,697
GA Operations	2,475	2,627	2,789	2,960	3,142
Military Operations	75	—	—	—	—
Cargo (lbs)	4,000	4,416	4,876	5,383	5,944

3.2.2 Alaska Aviation System Plan (2008)

The Alaska Aviation System Plan (AASP) is a component of DOT&PF's Statewide Transportation Plan. Most recently updated in 2008, the AASP contains forecasts of enplanements, cargo, operations, and based aircraft for 2015, 2020, and 2030. The AASP has a complex forecasting methodology that combines historical data with population projections, expendable income, and other economic considerations, as well as gradual transformation in the aircraft fleet. The equations for forecasting enplanements, cargo, and operations differ; growth factors are different for each period. The forecast for the 2008 update was completed and published in 2011 using 2008 as the base year. Details of the methodology are documented in the AASP.

Table 3 - Alaska Aviation System Plan Forecast, Seward Airport

Seward	2008 (Base)	2015	2020	2030
Enplanements	22	23	25	29
Cargo	None	None	None	None
Critical Aircraft	Cessna 185			
Aircraft Operations				
Commercial	4,500	4,136	4,318	4,576
GA	6,000	5,932	6,211	7,133
Military	10	10	10	10
Total Operations	**10,510**	**10,178**	**10,539**	**11,719**
Based Aircraft				
Single engine	28	29	29	31
Multi-engine	0	0	0	0
Helicopter	0	0	0	0

3.2.3 FAA Terminal Area Forecast

The FAA Terminal Area Forecast (TAF) is the official FAA forecast for aviation activity for U.S. airports. The TAF for Seward Airport is summarized in Table 4 - FAA Terminal Area Forecast (2013) Seward Airport. The TAF includes passenger enplanements, aircraft operations, and based aircraft. A local operation is performed by a based aircraft, whereas an itinerant operation is performed by an aircraft not based at the airport; another term often used for itinerant operations is transient operations.

Table 4 - FAA Terminal Area Forecast (2013) Seward Airport

Passenger Enplanements			Itinerant Aircraft Operations				Local GA Ops	Total Ops
Air Carrier	Commuter/ Air Taxi	Total	Air Carrier	Commuter/ Air Taxi	GA	Military		
0	9	9	0	4,500	4,000	10	2,000	10,510

The U.S. Department of Transportation (DOT) is the main source of airport statistics. U.S. scheduled and non-scheduled certified air carriers, commuter air carriers, and small certified air carriers submit data to DOT on Form 41 Schedule T-100 (simply referred to as T-100 data). The unusually low number of commuter/air taxi enplanements, compared to the number of operations, is likely due to the lack of scheduled commercial service to SWD. This indicates enplanements are most likely not recorded in the T-100 database, which could account for the low number.

3.2.4 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS presents a five-year forecast of enplaned passengers and based aircraft. The current NPIAS forecast for Seward (for the years 2013-2017, using 2011 as the base year) is presented in Table 5.

Table 5 - NPIAS Forecast Year 2017

Enplanements	8
Based Aircraft	25

3.3 Operations

The FAA requires master plan forecasts to incorporate the number of aircraft operations for various categories of aircraft. Passenger enplanement, cargo, mail, and freight data are also recommended. The governing Advisory Circular (AC) specifies that population, employment rates, and socio-economic factors be included, as any of these can also affect the forecast.

Historical air traffic data for Seward were collected from FAA's Airport Master Record Form 5010, the FAA TAF, the NPIAS, the USDOT Bureau of Transportation Statistics, the AASP, and the 2008 Airport Master Plan. Data also came from interviews with airport users, potential airport users, medevac providers, and Seward-based industry. Air traffic operations at Seward Airport are not recorded on site because there is no air traffic control tower. Because of this, GA activity is likely underreported. Also, local residents have reported that after the recent airport flooding events, aviation activity has slowed. The magnitude of this would be difficult to define given the airport is not towered, and there are no reporting requirements. Aviation activity at Seward is predominantly unscheduled GA and air taxi flights, with consistent medevac and occasional military use.

There are two primary sources of aircraft operations for Seward Airport: the FAA's Form 5010, *Airport Master Record*, and the FAA TAF. These data are presented in the table below. The FAA TAF for SWD dating back to 1980 has not changed (see Appendix A). The list has reported 10,510 operations for each year, broken down as shown in Table 6.

Table 6 - Aircraft Operations

Source	Air Carrier	Air Taxi	GA Local	GA Itinerant	Military
Form 5010	0	4,500	2,000	4,000	10
TAF	0	4,500	2,000	4,000	10

3.3.1 Passengers

Passenger traffic at Seward Airport (SWD) has remained low over the past decade. The T-100 database shows fewer than 30 passengers per year since 2004 (see Table 7 – Historic SWD Commuter Passenger Enplanements, 1990-2013).

It should be noted that scheduled passenger service was discontinued in 2002.

Table 7 – Historic SWD Commuter Passenger Enplanements, 1990-2013

Year	Passengers	Year	Passengers
1990	2218	2002	15
1991	598	2003	0
1992	1073	2004	20
1993	127	2005	1
1994	1073	2006	7
1995	587	2007	26
1996	846	2008	22
1997	1373	2009	18
1998	1331	2010	9
1999	583	2011	22
2000	512	2012	8
2001	338	2013	0

3.3.2 Freight and Mail

The USDOT T-100 data show no history of freight or mail passing through SWD. Mail and cargo are most frequently transported via highway or rail. With the proposed expansion of the shipyard by Vigor Alaska, air cargo may increase in the future. See the Economic Activity discussion below.

3.3.3 Based Aircraft

The FAA Airport Master Record Form 5010 lists 25 single-engine aircraft based at SWD. This number concurs with previous forecasting efforts and interviews with airport users.

3.4 Current Aircraft Fleet Mix

Table 8 - Current (2013) Fleet Mix Using Seward Airport lists the types and Aircraft Design Group (ADG) of aircraft that landed at SWD at least once during the period from 2007 through 2013.

Table 8 - Current (2013) Fleet Mix Using Seward Airport

Operator	Aircraft	ADG	Use
LifeMed	A-Star helicopter King Air 200	N/A II	Medevac
LifeFlight	King Air 200	II	Medevac
Guardian	King Air 200	II	Medevac
Scenic Mountain Air	Cessna 172	I	Flight seeing/air taxi
Seward Air	Super Cub PA-18	I	Personal
Private	Cessna 172 Super Cub PA-18	I I	Personal
Private	Cessna 170	I	Personal
Grant Aviation	B200	II	Air Taxi/Charter
Homer Air	Cessna C206/207/209/210 Stationair	I	Air Taxi/Charter
Smokey Bay Air	Cessna C206/207/209/210 Stationair	I	Air Taxi/Charter
Iliamna Air Taxi	Pilatus PC-12	II	Air Taxi/Charter
Island Air Service	Cherokee 6	I	Air Taxi/Charter
Alaska Central Express	Beech 1900	II	Air Taxi/Charter
Era Aviation	Beech 1900	II	Air Taxi/Charter
Frontier Flying Service	Beech 1900	II	Air Taxi/Charter
Warbelow	Cessna 172	I	Air Taxi/Charter
Wright Air Service	Cessna 208 Caravan	II	Air Taxi/Charter

US DOT T-100 data were acquired and reviewed (see Appendix A). No flights for Seward were listed in the 2013 data. This is potentially due to recurrent runway flooding, and subsequent weight restrictions of 12,500 lbs, that was placed on the main runway.

The Kenai Peninsula Aviation Superintendent provided a list of large aircraft, either meeting or exceeding the weight restrictions, which requested permission to land at Seward in 2013.

- Lear 35 (ADG C-I): 11 requests
- King Air 200 (ADG B-II): 16 requests
- Gulfstream 5 (ADG C-III): 4 requests
- DC-6 (ADG B-III): As needed

The King Air 200 maximum landing and takeoff weight is 12,500 lbs., so this aircraft was unaffected by the weight restrictions.

In addition to the above fleet mix, the U.S. Coast Guard has historically used SWD for search and rescue activities, and also for pilot training for short field landings with the C-130 (an ADG IV aircraft). Helicopters used include the H-60 and H-65.

3.5 Socioeconomic Activity

An analysis of socioeconomic activity is usually helpful in developing a forecast of aviation demand. Projected increases in population or economic activity can lead to increased use of an airport.

The following section highlights major factors anticipated to contribute to socioeconomic growth in Seward. These include:

- Population forecasts
- Possible relocation of Coastal Villages Region Fund (CVRF) Community Development Quota (CDQ) Fleet to Seward
- Use of Seward as the homeport for *R/V Sikuliaq*, a marine research vessel
- Vigor Alaska's purchase and planned expansion of Seward Drydock
- Tourism

3.5.1 Population

The population of Seward has grown steadily over the past 14 years to a current population of 2,754 (see Figure 1). The compound annual growth rate over this time period is 1.23%. This is higher than the Alaska Department of Labor and Workforce Development's projected growth rate of 0.5% for the Kenai Peninsula Borough as a whole (Alaska Department of Labor and Workforce Development, 2014).

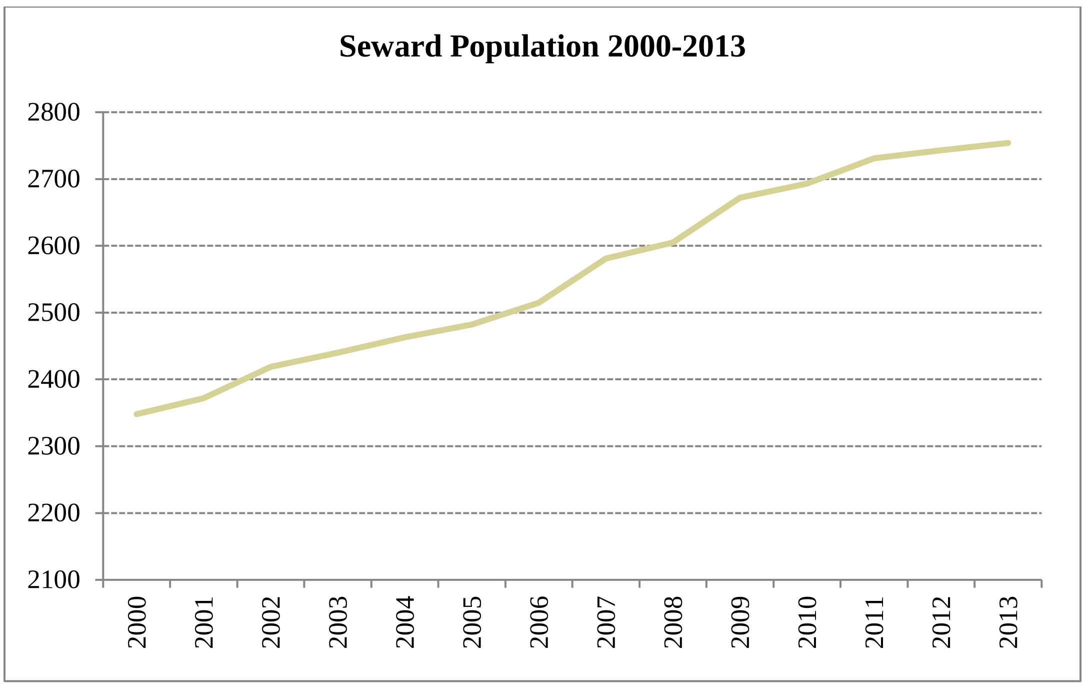


Figure 1 - Historic Seward Population, 2000-2013

3.5.2 Coastal Villages Region Fund CDQ Fleet

The CVRF represents 20 western Alaska communities in the CDQ fishery. The CDQ's purpose is to:

- Provide eligible western Alaska villages with the opportunity to participate and invest in fisheries in the Bering Sea and Aleutian Islands Management Area
- Support economic development in western Alaska
- Alleviate poverty and provide economic and social benefits for residents of western Alaska
- Achieve sustainable and diversified local economies in western Alaska

The City of Seward has been actively trying to homeport the CDQ fleet in Seward rather than in Seattle. The CVRF has partnered with Seward to develop the Seward Marine Industrial Center (SMIC) support facilities. The SMIC will increase the available moorage, warehousing space, and upland areas to accommodate the CDQ fleet.

If the CVRF decides to homeport in Seward, the airport could see increased activity during spring deployment of the CDQ fleet when crews return to Seward. Based on the number of ships in the CDQ fleet, the number of potential crew members, and an assumed percentage of commuters that might fly into/out of Seward, this could result in an increase of approximately 500 enplanements twice a year.

3.5.3 *R/V Sikuliaq*

The City of Seward reported that the SMIC is the homeport for the 260-foot *R/V Sikuliaq*. This Alaska Region Research Vessel, commissioned in March 2014, is one of the most advanced university research vessels in the world. The *Sikuliaq* is owned by the National Science Foundation (NSF) and operated by the University of Alaska Fairbanks (UAF) as a part of the University-National Oceanographic Laboratory System's academic research fleet. The *Sikuliaq* is the first vessel in the U.S. academic research fleet capable of breaking ice up to 2.5 feet thick, making it uniquely equipped for polar and sub-polar research.

According to the City of Seward, an increase in aircraft operations between Anchorage and Seward could occur to equip, supply, and man this vessel for its voyages.

3.5.4 Vigor Alaska

In early 2014, Vigor Alaska announced the purchase of Seward Ship's Drydock. According to the press release, "the purchase will bring the strength of Vigor's physical, financial and human capital to bear on the yard, which will empower the yard to land more projects and larger-scale projects, translating to more work and sustainable employment for Alaska residents. In addition, Vigor will leverage its existing strong public/private partnerships in Alaska to maximize opportunities for the Seward yard." See Appendix A for the full article.

Vigor Alaska has provided a letter of support for airport rehabilitation and improvements, stating that "Shipyards rely on timely and affordable transportation and logistics to be competitive in today's economics." Further, the letter says that Vigor's operations depend on specialized production personnel who travel between their six other shipyards, as well as an array of support contractors, vendor technicians, and inspectors. Time is money. Vigor indicates the five-hour round-trip drive from Anchorage is problematic and poses dangerous winter driving conditions as well as closures due to avalanche. (See Appendix A for copy of the Vigor letter of support, dated January 2015).

It is conceivable that this industry buildup would increase demand for more frequent chartered air service, or even scheduled service between Seward and Anchorage. The aircraft type that may be chartered would depend upon whether the charter was to be cargo or passengers, and the number of passengers.

3.5.5 Tourism

Tourism is a major component of Seward's economy. Cruise ships, the railroad, and personal vehicles all bring tourists to the community. Attractions include Kenai Fjords National Park, the Alaska Sealife Center, the Mount Marathon Race, and Exit Glacier. Tourist activities include flightseeing, sportfishing, hiking, wildlife cruises, and sled dog demonstrations.

Seven main cruise lines served Seward in 2015: Holland America, Norwegian, Silver Sea, Celebrity, Regent, Crystal, and Royal Caribbean. Cruise ships in port can nearly double the population of the community. Many cruisers embark or disembark in Seward, with connections to/from Anchorage, Denali, and Fairbanks via buses or the Alaska Railroad. The number of scheduled dockings is up from 53 in 2014 to 63 in 2015, with an increase in passenger capacity from 67,912 to 91,230. The 34% increase in passengers appears to come not only from the 10 additional dockings, but also through a shift toward larger ships.

Flightseeing activities generally consist of small fixed-wing aircraft tours of the surrounding mountains, glaciers, and ocean. Typical aircraft are Cessna 172 or similar. The increase in passengers could cause an increase in the number of tourism-related flights.

3.5.6 Alaska Railroad (ARRC) Facility Improvements

The ARRC is planning a substantial investment and improvements in the port and rail facilities adjacent to the airport. During project coordination meetings, ARRC staff indicated that if the airport had regularly scheduled flights, ARRC would prefer to have its crews and management teams that occasionally commute to/from Seward fly versus traveling by rail or highway. Travel time and safety were the primary reasons cited. The specific number of enplanements this would add is undetermined.

3.5.7 Gas Line Construction

Seward experienced significant activity during the construction of the Trans-Alaska Pipeline in the 1970s. Most of the pipe was shipped through the port of Seward. During a project co-ordination meeting, ARRC staff predicted that if a new gas pipeline were constructed through Alaska, activity through the combined port/rail terminal would likely increase. This would also likely increase activity at the Seward Airport. This construction impact would be transitory. Short-term effects such as this normally do not drive long-term investment in airport facilities, especially if other (albeit less efficient) modes of transportation can meet the demand.

3.5.8 Other Oil & Gas Related Activity

Seward's ice-free deep sea port and shipyard capabilities, combined with gas and oil exploration and potential development in the Outer Continental Shelf, make Seward a desirable port for use by oil companies such as Shell to maintain and store marine vessels. Like Vigor Alaska and the ARRC, Shell Oil has indicated air travel demand could increase with its presence. "An upgrade to the existing airport would permit Shell to factor charter air transportation of material and personnel more aggressively than in the past to support our current operations while introducing a strong planning factor for future operations." (See Appendix A for Shell Oil letter of support.)

3.5.9 Medevac

The term "medevac" is an abbreviation for "medical evacuation." This and other terms referring to a type of medical emergency response (e.g., "helicopter emergency medical service" and "air ambulance") are used interchangeably in the United States. The value of air access to remote locations, or in the event of an emergency, is not generally recognized until it occurs. It is difficult to place an economic value on such capabilities. Often, the primary means of reaching a community immediately after a major act of nature such as a flood, earthquake, wildfire, or landslide is via air transport.

Both fixed wing aircraft and rotary wing aircraft (helicopters) are used in medical emergency response situations. Patients are flown by fixed wing aircraft for many different reasons ranging from the transfer of stable patients to critical medical operations. The fixed wing environment differs from the rotary wing environment primarily because fixed wing aircraft travel farther, faster, and higher. The fixed wing aircraft is primarily a long-distance facility-to-facility transport and includes a range of multi-engine turboprop and small jet aircraft specially equipped and staffed to respond to patient needs while en route. Rotary wing service is typically engaged for moving a patient from an accident or incident scene to a trauma center, and for air transport of stable patients; helicopters are also suitably staffed and equipped for these missions.

Not all medevac transport is associated with an emergency situation. Many medevacs involve medically appropriate hospital-to-hospital transports on a scheduled basis. Medevac service providers are actively engaged in both emergency response and critical care transport.

Air transportation of patients between Seward and Anchorage is fairly common. Although Seward is connected to Anchorage via the highway system, the local volunteer ambulance service does not have enough staff to transport patients to Anchorage. Therefore, fixed-wing aircraft and helicopters are typically used for medevac transport. If air medevacs cannot operate due to weather conditions, a ground ambulance will be dispatched from Anchorage.

Three medevac operators currently provide service to Seward: LifeFlight, LifeMed, and Guardian. LifeMed and Guardian are the most common medevac operators at SWD, with approximately 300 annual operations combined (see Table 9 – Medevac Operations at SWD).

Table 9 - Medevac Operations at SWD

Medevac Operator	Aircraft	Estimated Annual Operations
LifeMed	King Air 200[1]	60
LifeMed	A-Star Helicopter	140
Guardian	King Air 200	100
LifeFlight	King Air 200	40

[1] The King Air 200 is a fixed-wing aircraft.

LifeMed and Guardian also utilize Lear Jets for medevacs. Since those aircraft require 5,000 feet of runway length, they are not used at SWD. Discussions with medevac operators indicated that Lear Jets based in Anchorage would be utilized for approximately half of the medevacs if the SWD runway were longer and the instrument approach capabilities were better.

3.5.10 Commuter Travel

Seward has not had scheduled air service since 2002. Recent contact with Alaska Airlines and RAVN Alaska, the two air operators most likely to offer commuter service, indicate they have no plans (within the foreseeable future) to offer scheduled service. When asked what would trigger the addition of SWD to their schedule, RAVN replied an increase in demand and a better approach to ensure they could offer reliable service.

RAVN does provide charter service to SWD, generally in support of the cruise ship industry. Also, RAVN provides scheduled service to Homer and Kenai Airports. A brief analysis was conducted to compare and contrast Seward with Homer and Kenai to evaluate potential for future air service to SWD.

Table 10 – Comparison with Homer and Kenai

Community	Airport	Population	Distance/Drive Time	Commercial Flights
Seward (+ Moose Pass)	SWD	5,775	127 miles/2.5 hours	0
Kenai (+ surrounding contributing communities)	ENA	33,489	157 miles/3.25 hours	10 daily
Homer (+ surrounding area)	HOM	8,408	224 miles/4.5 hours	5 daily

Homer and Kenai have better instrument approach capabilities than Seward. Homer has six published approaches, with as low as one mile visibility and minimum descent altitude of 437 feet (389-foot height above touchdown). Kenai has six published approaches, with as low as one-half mile visibility and minimum descent altitude of 298 feet (200-foot height above touchdown). Seward has a single circling approach for aircraft approach categories A and B only, with as low as 1-1/4 mile visibility and minimum descent altitude of 2,660 feet (2,638-foot height above touchdown).

The anticipated economic growth in Seward improves the probability of an air carrier increasing service to Seward. Improved approach procedures with lower minimums would also increase the likelihood of scheduled air service. Conversations with FAA Flight Standards representatives indicate an improved public approach would be difficult, if not impossible, to design in Seward. However, an improved special (private) approach designed for an individual carrier or for specially qualified aircrew and equipment may be possible. Such private approach procedures are expensive to design, so an air carrier or other sponsor would likely only pursue a private approach procedure if they felt reasonably assured that the cost would be outweighed by profit or benefit.

If a private approach was developed and the demand for air transportation increases sufficiently, carriers would most likely use charter aircraft to serve Seward again. (Scheduled air service was discontinued in 2002 due to a lack of demand.) . Demand may increase over the next 20 years to make scheduled service with the larger commuter aircraft that currently fly into Kenai and Homer a feasible option, at least seasonally. Kenai is presently served on a regular basis by the Beech 1900 (B-II) and Dash 8 (C-III) aircraft, and Homer is served by the Beech 1900.

3.5.11 Emergency Preparedness

A larger runway could support emergency preparedness. The airport can provide essential access during emergency or disaster situations when other transportation corridors (rail, harbor, and highway) are unavailable. Reportedly, during the 1964 earthquake, the airport was minimally damaged but remained the only connection with the rest of Alaska for an extended time because the railroad, the Seward Highway, and the port facilities were completely destroyed[2].

The U.S. Coast Guard (USCG) has landed C-130s at Seward in the past and would continue to use this aircraft at Seward if the pavement strength allowed it to land. The C-130 is an ADG IV aircraft used for support of search and rescue and for medical evacuation of mass casualties. The C-130 is not forecast to meet the threshold of regular use (500 annual operations), nor can the FAA fund airport improvements for military aircraft. However, the H-60 helicopters could also be used for mass casualty response. (See Appendix A for e-mail, 8/14/2014, LT Robert Hornick, C-130 Assistant Operations Officer.)

3.6 Design Aircraft and Future Aircraft Usage

The most demanding aircraft (largest wingspan and longest required runway length) currently using the airport regularly is the King Air 200, which is used for medical evacuations. While the annual operations of the medevac aircraft alone do not meet the FAA threshold of 500, the King Air 200 is part of the family of B-II aircraft serving Seward. Other ADG II aircraft operating in Seward are the air taxi and charter aircraft listed in the fleet mix (Table 8).

Air taxi, charter, and medevac operations can be expected to increase as the population increases. The population of Seward has historically grown at 1.23%. The population of the entire Kenai Peninsula Borough is forecast to grow at 0.5% annually. Seward has the potential to grow at a faster rate if the economic factors previously discussed begin to materialize (Vigor Alaska, tourism, Seward Marine Center, CDQ fleet, ARRC, and offshoots of gas and oil activities). Following consultation with the Seward Working Group, a group of local stakeholders advising the project team, it was decided that a 1.23% growth rate would be used, but that a higher growth scenario using 2% is conceivable. Table 11- Forecast Operations at SWD at 1.23% growth/*2.0% growth* shows both growth rates.

3.7 Forecasted Operations

With a 1.23% or 2.0% annual growth rate, SWD will see modest growth in aircraft operations (Table 11 presents forecasts with both growth rates), with general aviation continuing to be the dominant type of operation.

[2] Barber, Skip. *Seward Airport Master Plan, Phase II, Hydrology Report. Seward.* July 25, 2006)

Table 11 - Forecast Operations at SWD at 1.23% growth/*2.0% growth*

Operations	Base Year 2013	+5 Years	+10 Years	+15 Years
Local GA	2,000	2,127 / *2,208*	2,260 / *2,438*	2,402 / *2,693*
Itinerant GA	4,000	4,252 / *4,417*	4,520 / *4,877*	4,805 / *5,387*
Medevac	200	213 / *220*	228 / *2,43*	243 / *268*
Air Taxi/Charter	4,500	4,783 / *4,969*	5,085 / *5,485*	5,406 / *6,056*

The base year data used in this forecast are consistent with the TAF. The TAF shows no change in aircraft operations at SWD throughout the planning period, however, this will likely not be the case. Table 12 summarizes the differences between the 1.23% growth forecast and the TAF.

Table 12 - Forecast - TAF Comparison

	2018			2023			2028		
	Forecast	TAF	*Difference*	Forecast	TAF	*Difference*	Forecast	TAF	*Difference*
Local GA	2,127	2,000	***127***	2,260	2,000	***260***	2,402	2,000	***402***
Itinerant GA	4,252	4,000	***252***	4,520	4,000	***520***	4,805	4,000	***805***
Air Taxi/ Charter	4,783	4,500	***283***	5,085	4,500	***585***	5,406	4,500	***906***

4 FACILITY REQUIREMENTS

The facility requirements depend on the critical design aircraft or group of aircraft. With the increasing economic activity and population in Seward, the fleet mix providing the air taxi and charter operations will likely include a greater percentage of the larger B-II aircraft. There is a good probability that over 500 operations of the B-II family of aircraft will result from the increasing activity and changes in the fleet mix. The Seward Airport facilities should meet the B-II facility standards. This would be consistent with the 2008 Airport Master Plan and the approved Airport Layout Plan, which provides for an airport meeting the requirements for a B-II facility. A minimum runway length of 3,300 feet (consistent with a Community Class Airport such as Seward) to serve the existing based aircraft and medevac operations is recommended. Also recommended is the inclusion of a long-term plan to accommodate a runway length of up to 4,000 feet to support commuter aircraft such as the Beech 1900 and/or the Dash 8, should demand increase sufficiently. In the short term, these aircraft will be able to operate on a 3,300-foot runway, with reduced loading.

4.1 Aircraft Use at Seward

The based aircraft at Seward are similar in design characteristics and could be served by an airport designed to the standards for ADG I, Approach Category A, with a runway length of 3,300 feet or less for smaller (under 12,500 lb.) aircraft. In addition, the Alaska Aviation Preconstruction Manual identifies a minimum runway length of 3,300 feet for community class airports such as SWD. This is the minimum runway length under consideration.

According to local medevac operators, Seward routinely experiences about 200 annual fixed wing medevac aircraft operations (Table 9 - Medevac Operations at SWD). By selecting the King Air 200 as the critical design aircraft, the airport design standards increase to ADG II. US DOT T-100 statistics indicated other ADG II aircraft using Seward Airport in the past 5 years include the Beech 1900, Cessna 208 Caravan, and Pilatus PC-12.

Pilots and local officials expressed the desire for a runway that can accommodate small charter jets for tourism, emergency preparedness and search and rescue aircraft such as the Coast Guard C-130, and potential scheduled air service. FAA does not fund public airports to support military or other federal agency operations or aircraft. The Coast Guard needs to provide funding if this activity drives airport improvements.

Anecdotal information indicates that up to 20 small charter jets per year have landed at Seward in the past. A 4,000-foot runway could support this occasional demand, if the aircraft is not fully loaded (see Appendix A for runway length information provided by NetJet). Beyond the current project planning horizon, further lengthening and widening of the facility could be considered.

4.2 Wind Coverage

Wind conditions affect aircraft in varying degrees. Generally, the smaller the aircraft the more it is affected by wind, particularly crosswinds. The FAA provides the following guidance on maximum crosswind components for small to medium-sized aircraft.

Table 13 – Allowable Crosswind Components by Aircraft Design Group

Aircraft Design Group	Allowable Crosswind Component
ADG I (Cessna 170, 185, 206)	10.5 knots
ADG II (King Air200, 1900; Cessna 208, Grand Caravan)	13 knots
ADG-III (DC-6, Dash 8, 737)	16 knots

Wind coverage is the percentage of time crosswind components are below an unacceptable velocity. A runway oriented to provide the greatest wind coverage with the minimum crosswind components is preferred. The desirable wind coverage for an airport is 95%. A second (crosswind) runway is recommended when the primary runway orientation provides less than 95% wind coverage.

Based on the current wind data available for Seward, a single runway oriented between 156 and 204 degrees north azimuth provides 95% or greater wind coverage (for ADG I aircraft).

- Runway 16/34 is oriented at 183 degrees, providing 98.6% wind coverage for ADG I aircraft, and 99.5% coverage for ADG II aircraft.
- Runway 13/31 is oriented at 146 degrees, providing 91.1% coverage for ADG I aircraft and 96.0% coverage for ADG II aircraft.

4.3 Airfield Requirements

4.3.1 Runways

Given the modest number of operations and slight growth anticipated in Seward, a greater growth factor in the forecast of operations would not show an increase great enough to warrant substantial changes in the facility requirements.

A single runway can handle between 62,000 and 131,000 operations annually. This is based on VFR conditions, calculations with taxiway at midpoint, and the airport open for operation 8 to 12 hours per day for 5 to 7 days per week. The Seward Airport experiences 10,700 operations currently, significantly less than 62,000. Projected operations are 14,404 in 15 years with a 2% growth forecast, also significantly less than 62,000. Thus operations can be accommodated by a single runway. Parallel taxiway systems to help improve runway capacity and minimize user delays are typically not warranted until annual operations approach 20,000. In 2015 the forecast indicated 10,178 operations for Seward Airport.

Facility requirements are listed in the table below for three potential groups and compared with the larger of the two existing runways.

Table 14 – Runway Dimensional Standards for Various Scenarios

Feature	Current Based Aircraft Group	Current Demand & Medevac (King Air 200) *Recommended for Near-Term Development*	Growth Scenario & Emergency Preparedness (Beech 1900) *Consider for Long-Term Development*	Existing RW 13-31
Approach Category	A	**B**	B	B
ADG	I	**II**	II	II
Runway Length	3,300' (Note 1)	**3,300' (Note 1)**	4,000'/4,700' (Note 2)	4,249'
Runway Width	60'	**75'**	75'	100'
Visibility Minimums	1 mile	**1 mile**	1 mile	1 mile
Crosswind Component	10.5 knots	**13 knots**	16 knots	13 knots
Runway Safety Area	120' x 3,780'	**150' x 3,900'**	150' x 5,300'	150' x 4,749'
Object Free Area	400' x 3,780'	**500' x 3,900'**	500' x 5,300'	500' x 4,749'
RPZ	1,000' x 500' x 700'	**1,000' x 500' x 700'**	1,700' x 500' x 1,010'	1,000' x 500' x 700'
Part 77 Primary Surface	500' x 3,700'	500' x 3,700'	500' x 5,100'	500' x 4,649'
Part 77 Approach Slope	20:1 (Visual)	20:1 (Visual) (Note 3)	20:1 (Visual) (Note 3)	20:1 (Visual)

Table 14 Notes:

1. Minimum runway length for community airports per Alaska Aviation Preconstruction Manual exceeds FAA AC 150/5325-4B (2,750 feet for 95% of fleet or 3,250 feet for 100% of fleet) and King Air 200 published takeoff and landing distances.
2. The 4,700-foot runway length is based on FAA AC 150/5325-4B for aircraft over 12,500 lbs. but less than 60,000 lbs. (75% of fleet at 60% useful load). The FAA is circulating a Draft AC 150/5325-4C, which

recommends using manufacturer's airport planning manuals for all large airplanes (over 12,500 lbs.). The Beech 1900D specification and performance sheet lists a takeoff length of 3,737 feet. Discussions with the primary air carrier in Alaska using this aircraft indicated a need for a 4,000-foot runway to accommodate it. A 4,000-foot runway option is being considered, which would accommodate the Beech 1900 and other large aircraft such as the Dash 8 and Sherpa.

3. By definition, a non-precision instrument (NPI) approach runway means a straight-in approach is planned or has been approved (Part 77.2). SWD's approach is currently a circling approach (RNAV [GPS]-A). Review of the FAA flight standards and local topography indicates a straight-in approach is not viable at Seward due to the mountainous terrain on all sides.

4.3.2 Taxiways / Taxilanes

Taxiways should be upgraded to meet the current standards. Major changes to taxiway standards have been made in the revisions to AC 150/5300-13 and AC 150/5300-13A since the design of the current airport. The critical aircraft (the wheelbase and distance between the cockpit and main gear of the design aircraft) as well as the airplane design group, determine the taxiway geometry. Current guidance indicates the taxiway intersections with runways should avoid the middle one third of the runway length. ¶401.b(5)(d) defines as a "high energy" intersection that should be avoided. "By limiting runway crossings to the outer thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear." Taxiways A and D currently conflict with this guidance and will be resolved during design.

Further, taxiways providing direct access from the aircraft parking areas to a runway should be avoided (¶401.b(5)(g) and ¶503.). Taxiways C, D, E, and F currently conflict with this guidance. Future layouts should consider correcting this deficiency.

The key dimensional standards that need to be considered in developing the layout of facility improvements are listed in the table below.

Table 15 – Taxiway and Taxilane Design Dimensions Based on Aircraft Design Group (per AC 150/5300-13A; Table 4-1)

Feature	Near Term & Ultimate – B-II (King Air 200 & Beech 1900)	Existing
Runway to Taxilane Separation	240'	184' (Note 1)
Taxiway Safety Area	79'	79'
Taxiway OFA	131'	131'
Taxilane OFA	115'	131'
Taxilane Centerline to Fixed or Movable Object	57.5'	
Taxilane Wing Tip Clearance	18'	

Table 15 Note 1. Separation distance shown on 2008 ALP between Runway 16/34 CL and GA apron taxilane (A-I small requires 150 feet).

To meet the dimensional standards above and preserve the existing BRL and GA apron size, a runway parallel to the apron (Runway 16/35) would need to have a runway-to-BRL separation of 394.5 feet; the existing Runway 16/35 is separated from the BRL by only 300 feet. Additional separation may be needed to provide acceptable taxiway grades if the runway is raised and to correct the layout deficiency of taxiways that provide direct access from the runway to aircraft parking areas.

4.4 Navigational Aids and Airfield Lighting

One set of VASI lights is installed on Runway 31. The previous master plan indicated the VASI should be replaced with PAPIs on both ends of all runways. This is not feasible at Seward, because of the terrain on the north end of the airport. Only the south end of each runway (Runway 31 and Runway 34) can achieve the PAPI Obstacle Clearance Surface, which extends 4 miles out from the end of the runway.

The airfield lighting system is old and should be upgraded and expanded to include taxiways and all runways.

During any paving project, the runway and taxiway markings should be replaced with markings that meet current guidance. Seward Airport runways will continue to be marked as visual runways. SWD currently has a published GPS approach for Category A and B aircraft, but it is rarely used because of the high minimum descent altitude (2,660 feet). This published approach is not a straight-in approach, so the runway is not considered an NPI runway. There are no instrument approaches for Category C and D aircraft.

Lower minimums would make the airport more reliable and would weigh into the consideration for a commuter air taxi service to start scheduled service into Seward. Discussions with the FAA about lowering the minimums, however, did not result in optimism that this would occur. The surrounding terrain is an onerous constraint to improving the approaches in/out of Seward. (See phone log, Appendix A, conversation dated 2/6/2015 with Kyle Christianson of FAA.)

4.5 Other Facility Requirements

A new sand storage building is needed; the existing building is in poor condition.

The airport access road, Seward Highway, and the Alaska Railroad are all within the RPZ of Runway 13. A small portion of the RPZ of Runway 16 overlaps the access road. Although prior to FAA's Interim Guidance on Land Uses within a Runway Protection Zone (9/27/2012) these transportation uses were acceptable, they are not encouraged. Additionally, due to their proximity to the end of Runway 13, these transportation features create an obstruction to that approach. Correction of these non-standard conditions should be considered to the extent practicable.

5 ALTERNATIVES

5.1 Initial Alternative Development

Development of design alternatives requires an understanding of existing conditions and considerations that could impact the reasonableness of any alternatives. Information gained from site visits, data collection, public involvement, and coordination with airport stakeholders, combined with the facility requirements listed above, influenced the identification and development of alternatives for the Seward airport.

5.1.1 Considerations and Constraints in Developing Alternatives

- Surrounding topography that limited the practicality of airport relocation (see map, right)

- The need to consider different runway lengths to provide various potential levels of service to the community
- The Federal Emergency Management Agency (FEMA) defined floodway, floodplain, and coastal flood zone (VE) designations, which affect layout and build elevations for the facilities
- Adjacent built features (such as the railroad, roads, etc., at the northern end of the airport) that could cause substantial cost or be impractical to relocate
- Adjacent privately owned property
- Wind coverage (determining whether a single runway could provide 95% coverage)
- Proximity of the port facilities of the Alaska Railroad Corporation (ARRC) and ARRC's future plans
- DOT&PF's decision not to dredge or reroute the channel due to the maintenance cost of continued dredging, the unpredictability of the long-term changes this could cause, and the potential for unforeseen impacts to owners of adjacent property (such as properties across the channel)

Other considerations such as cost, function, and environmental impacts of the various alternatives were used as evaluation criteria for comparing the alternatives against each other and the no-build alternative.

5.1.2 Initial Alternatives

Development of the alternatives began with five concepts initially developed for preliminary discussion at the 2015 November SWG meeting. These alternatives evolved as additional information was discovered, analysis was completed, or direction provided. The process of refining the original five concepts resulted in the eight alternatives presented in Table 16 below.

Table 16 - Initial Alternatives

Alt	Main Runway Disposition	Crosswind (CW) Runway Disposition	Hydraulic Analysis
1.1	Raise the existing main runway (maintain existing length) - protect from overtopping and protect from erosion	Raise north end to match into raised main runway	Use Q100 with 2-foot freeboard on main runway. This option is within the Regulatory Floodway; consider impacts to properties due to potential for large WSEL increase.
1.2	Allow overtopping of main runway, but protect from erosion and allow reuse shortly after flood event ends	Depending upon the hydraulic analysis, improvements may be needed	Use Q100 with 2-foot freeboard on CW runway. Depending upon the design storm, CW runway may need a grade raise and/or erosion protection.
2.1	Allow breach	Offset CW runway from apron to allow Design Group II; **shift threshold south to avoid road and rail**; widen to 75' (150' Runway Safety Area (RSA) and lengthen to **3,300' (3,900' RSA)**	Use Q100 with 2-foot freeboard on CW runway. Raise CW runway elevation; provide erosion protection; provide protection for the portion in the VE zone.

Alt	Main Runway Disposition	Crosswind (CW) Runway Disposition	Hydraulic Analysis
2.1a	Protect from breach but do not raise the embankment height	Same as above; maybe less erosion protection	Use Q100 with 2-foot freeboard on CW runway. More erosion protection required to protect both embankments.
2.2	Allow breach	Offset CW runway from apron to allow Design Group II; **shift threshold north to avoid VE zone impacts;** widen to 75' (150' RSA) and lengthen to **3300' (3900' RSA);**	Use Q100 with 2-foot freeboard on CW runway. Raise CW runway elevation; provide erosion protection.
2.2a	Armor to protect from breach but do not raise the embankment height	Same as above; maybe less erosion protection	Use Q100 with 2-foot freeboard on CW runway. More erosion protection required to protect both embankments.
3.0	Allow breach	Offset CW runway from apron to allow Design Group II; shift alignment to avoid ARRC on south end, shift north to reduce impact in VE zone; widen to 75' (150' RSA) and lengthen to **4,000' (4,600' RSA)**	Use Q100 with 2-foot freeboard on CW runway. Raise CW runway elevation; provide erosion protection; provide protection for the portion in the VE zone.
4.0	Allow breach	Same alignment and north threshold point as Alt 3.0; lengthen to **4,700' (5,300' RSA)**	Use Q100 with 2-foot freeboard on CW runway. Raise CW runway elevation; provide erosion protection; provide protection for the portion in the VE zone.

5.1.3 Initial Alternatives Analysis

Once the layouts were defined, the next step was to determine the appropriate hydrological parameters, such as flood frequency and freeboard (a measure of the relative height of the flood line), to use to set the surface elevations of the runways. To establish these parameters, hydrologists from Hydraulic Mapping and Modeling (HMM), and DOT&PF drafted a series of technical memoranda and other coordination documents (see Appendix B) that were then discussed among the consultant team and DOT&PF. These actions culminated in the decision to use the 100-year (Q100) flood frequency, and a freeboard of 2 feet. This decision agrees with Federal guidance.

Another consideration identified during discussion of the hydrological parameters was the closure of Runway 13/31. If Runway 13/31 were closed, the embankment could be either (a) armored to serve as a dike to help prevent lateral migration of the main channel, and therefore protect an improved and expanded Runway 16/34, or (b) it could be left as is, allowing future flood waters to breach it. In either case, Runway 16/34 would need to be armored, because the closed runway would not be raised to prevent flooding.

5.1.4 Dropping of Alternative 1.2 from Further Evaluation

Alternative 1.2 would reconstruct Runway 13/31 without raising the runway elevation. As compared to Alternative 1.1, this solution would reduce potential impacts to the mapped floodway, but at the cost of allowing the runway to be flooded on a frequent basis. This option was not carried forward for more detailed review because it was considered impractical:

- The runway would be unreliable due to the frequent flooding.
- Construction costs would be as much as 50% higher than for Alternative 1.1 due to the thicker embankment, the use of crushed rock wrapped in geotextile, and the installation of floodwater erosion protection on the west side of the runway.
- Maintenance and operation (M&O) costs would be substantially higher to cover frequent clearing of the debris after each overtopping event plus likely additional costs to repair pavement and airport lighting.

An initial analysis indicates overtopping would occur for at least 12 to 21 days each year. However, this likely underestimates the overtopping duration because of the shortness and age of the discharge record period (1964–1968) and the fact that the years in that record were low-average years.

5.1.5 Dropping of Alternatives 2.1, 2.1a, and 2.2a from Further Evaluation

Initial concepts for the alternatives that expanded Runway 16/34 kept the railroad and the roadway on the north end outside of the RPZ. Subsequently, when consultation between DOT&PF and FAA determined this was a preference but not necessarily a constraint, alternatives 2.1 and 2.1a were dropped from consideration in favor of alternatives that shifted the runway embankment north, out of the coastal flood zone (VE). Alternatives 2.1a and 2.2a also called for armoring the closed runway. These options were ultimately dropped because of the higher cost to armor both runways with no additional benefit to the airport facilities when compared with options that armored Runway 16/34 only. The alternatives that allow the river to breach the old RW 13/31 embankment allow a wider space for the river to traverse, lowering the potential flood elevation.

5.1.6 Dropping of Alternatives 3.0 and 4.0 from Further Evaluation

Alternatives 3.0 and 4.0 would close Runway 13/31 and reconstruct Runway 16/34 to 4,000 feet long. As compared to Alternative 2.2, these solutions would lengthen Runway 16/34 to 4,000 feet and 4,700 feet, respectively. Based on the forecasted use of the airport in the near-term (0-5 years) and even mid-term (6-10 years), and in conversations with FAA, demand will not justify use of FAA Funds to lengthen the runway beyond 3,300 feet. Alternatives 3.0 and 4.0 would meet potential future demand for operations with the Beech 1900 or for emergency preparedness, but exceed the needs of the current forseeable demand. Future planning will accommodate the 4,000 foot length but due to insufficient funding, it was dropped from evaluation for the EA.

5.2 Alternative Refinement and Consultant Team Evaluation Process

As a result of the considerations discussed above, and in coordination with DOT&PF, it was determined that only the two highlighted alternatives (Alternatives 1.1 and 2.2) were viable alternatives to be carried forward with the no-build alternative for more detailed analysis. The more detailed development of these two alternatives was an iterative process.

- HMM provided preliminary design flood (Q100) elevations.

- PDC modeled the alternatives; based on the Q100 elevation and 2-foot freeboard, the alignment of Runway 16/34 shifted (Alternative 2.2) so that Taxiway grades would meet FAA standards.
- HMM modeled the alternatives with HEC-RAS (a computer program that predicts the hydraulics of water flow), determined initial impacts to the flood elevations (including coastal flooding effects from the 1%-annual-chance tide event, which govern up to Cross-Section E), and identified potential scour velocities and depths. This resulted in further refinement of the alternatives.
- The scour depths and velocities resulted in preliminary recommendations for riprap size, thickness, and volumes (to accommodate scour).
- PDC estimated earthwork quantities, including the excavations necessary to install the riprap.

The key elements of the finalized concept alternatives are presented below. All alternatives meet the dimensional and grading standards for Design Group II. Figures depicting each of the alternatives, including the extents of erosion protection and the riprap size and thickness, are attached for reference.

5.2.1 Alternative 1.1

Alternative 1.1 (Figure 2) would reconstruct and raise Runway 13/31 above the 100-year flood level (Q100) with 2 feet of freeboard, and install armor to protect it. The runway would remain 4,249 feet long, but be narrowed from 100' to the B-II standard of 75'. Runway 16/34 would be raised on the north end to match into the new profile for Runway 13/31. Taxiways B and C would be reconstructed to match into the new Runway 13/31 profile, and entrance Taxiways A, D, and E would be eliminated in accordance with new FAA guidance that disallows taxiways entering the runway in the middle one-third of the runway.

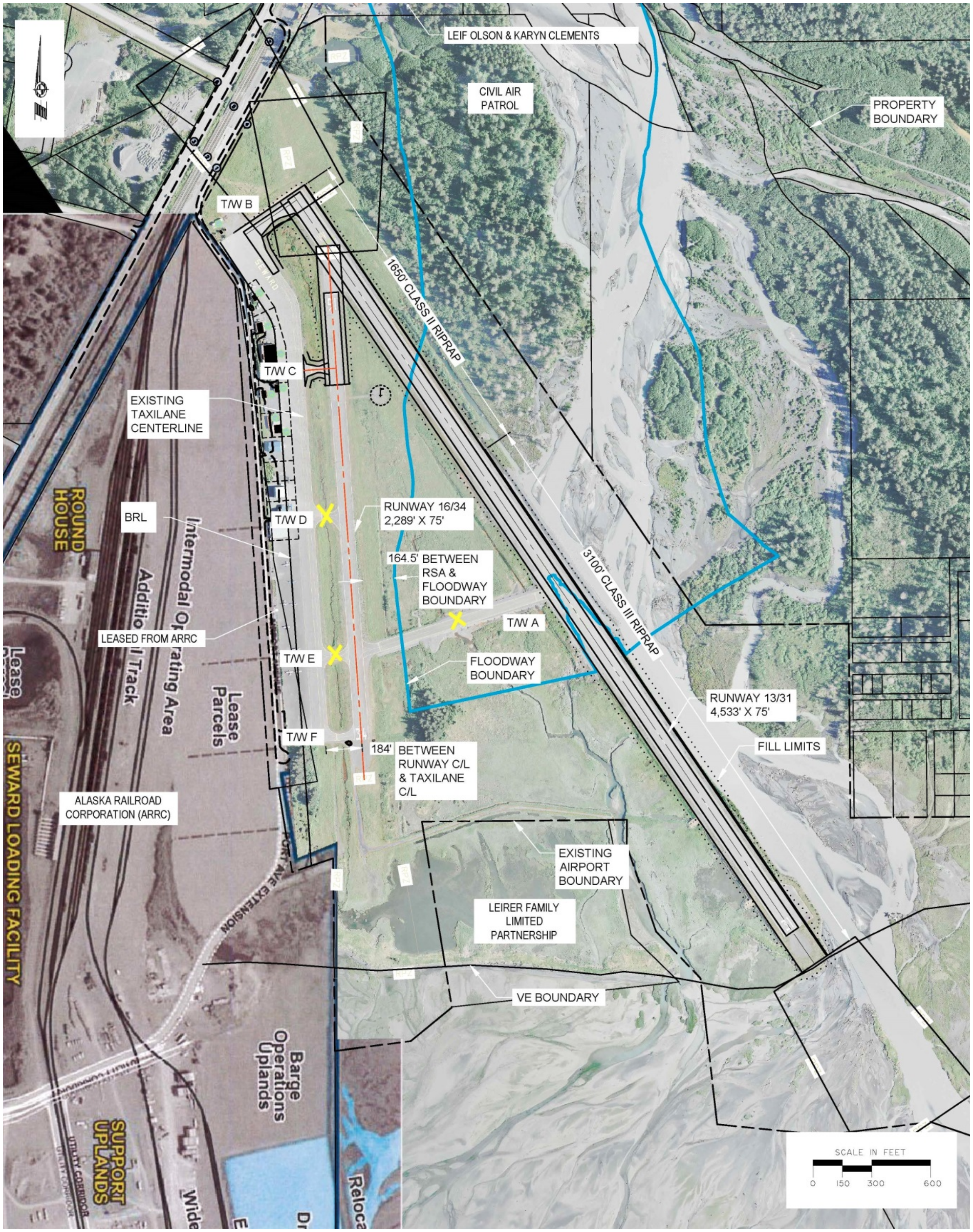


Figure 2 - Alternative 1.1

5.2.2 Alternative 2.2

Alternative 2.2 (Figure 3) would close Runway 13/31 and reconstruct Runway 16/34. Alternative would shift Runway 16/34 to the east and raise it above 100-year flood level with 2 feet of freeboard (shifting the runway minimizes changes to the apron and adjoining lease area/buildings). Armor would be installed to protect Runway 16/34; since Runway

13/31 will likely be overtopped and could subsequently be breached, flood water will likely reach this embankment. Taxiways B would be relocated and Taxiway F would be reconstructed to match into Runway 16/34 location and grade changes. Taxiways A, D, and E would be eliminated in accordance with new FAA guidance.

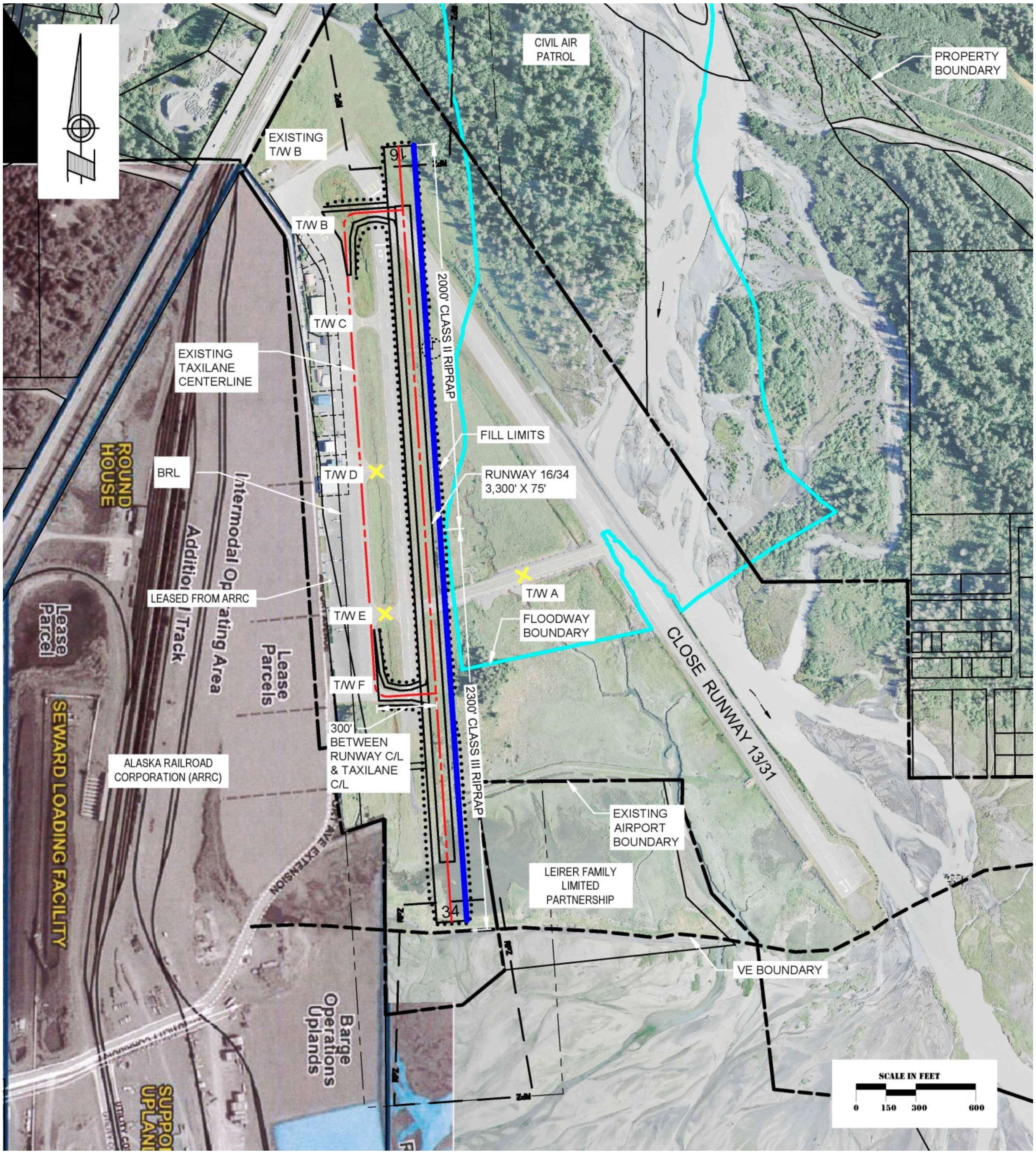


Figure 3 - Alternative 2.2

5.2.3 Evaluation

Evaluation criteria were developed by the consultant team in conjunction with DOT&PF. The criteria were selected to aid in evaluating the important differences between each of the alternatives. The criteria can be broadly grouped into four primary categories:

- Cost
- Ability to serve the community's needs
- Engineering and user considerations or function
- Environmental considerations

A matrix of evaluation criteria, included in Appendix B, was prepared to help with the selection process.

The construction cost comparison only considers the key differences between the alternatives under evaluation and does not include all costs that could be associated with construction. For instance, mobilization and demobilization would be similar for each of the projects and thus were not considered a differentiating item, whereas embankment items such as borrow, riprap, and pavement are substantially different between the alternatives.

Right of Way costs are approximate planning-level estimates based on the additional area of flooding and the assessed value of the flooded property.

No jurisdictional agency scoping had been completed at this point. Anticipated environmental impacts were based largely upon evaluations presented in the 2008 Environmental Assessment and the experience of the consultant team.

The consultant team and the DOT&PF held two work sessions to compare the alternatives, reviewing each criterion and comparing each alternative against the no-build and against each other to ascertain the relative magnitude of difference.

5.3 Alternatives To Be Carried Forward for NEPA Environmental Scoping

To this point alternative development and evaluations have included coordination with the Seward Working Group and the public as well as detailed engineering evaluations and an environmental overview. The environmental overview was based on information presented in the 2008 EA, and with updates of more recent information that was readily available, see Environmental Section 6.0 below. Both Alternatives 1.1 and Alternative 2.2 appear viable, although both alternatives have a number of potential impacts that rank more than negligible. The appropriate next step is to conduct formal Scoping (NEPA Scoping). This step will allow the jurisdictional agencies to comment on the severity of potential impacts and help in the determination if either alternative could be eliminated before advancing to the full Environmental Assessment.

6 ENVIRONMENTAL REVIEW

As of January 2017, the initial environmental analysis included review of available environmental documents, office and online research, a field visit, and coordination with agencies and the public. Table 6.1 summarizes the results of this work and indicates anticipated impacts from the two build alternatives and the No-Build Alternative.

Table 17 – Environmental Checklist

Environmental Impact Category *(based on FAA 5050.4B)*	**Potential Environmental Impacts**			
	Non-Issue	Negligible	Minimal or Moderate	Substantial
Air Quality	✓ No-Build	✓ 1.1, 2.2		
Biological Resources (including fish, wildlife, and plants)	✓ No-Build		✓ 1.1, 2.2	
Climate		✓ 1.1, 2.2	✓ No-Build	
Coastal Resources	✓ No-Build	✓ 1.1, 2.2		
Section 4(f)	✓ No-Build, 1.1, 2.2			
Farmlands	✓ No-Build, 1.1, 2.2			
Hazardous Materials, Solid Waste, and Pollution Prevention	✓ No-Build	✓ 1.1, 2.2		
Historical, Architectural, Archaeological, and Cultural	✓ No-Build	✓ 1.1	2.2	
Land Use	✓ No-Build	✓ 1.1	✓ 2.2	
Natural Resources and Energy Supply		✓ No-Build, 1.1, 2.2		
Noise and Noise-Compatible Land Use	✓ No-Build, 1.1, 2.2			
Socioeconomics		✓ 1.1, 2.2	✓ No-Build	
Environmental Justice		✓ No-Build, 1.1, 2.2		
Children's Health and Safety Risks		✓ 1.1, 2.2	✓ No-Build	
Visual Effects	✓ No-Build	✓ 1.1, 2.2		

Environmental Impact Category *(based on FAA 5050.4B)*	Potential Environmental Impacts			
	Non-Issue	Negligible	Minimal or moderate	Substantial
Wetlands		✓ No-Build	✓ 1.1, 2.2	
Floodplains		✓ No-Build	✓ 2.2	✓ 1.1
Surface Waters	✓ No-Build	✓ 2.2	✓ 1.1	
Ground Water	✓ No-Build 1.1, 2.2			
Wild and Scenic Rivers	✓ No-Build, 1.1, 2.2			

The following sections detail the rationale for the checklist designations in Table 6.1. These impact categories are based on FAA guidance documents FAA Order 1050.1F as well as the 1050.1F Desk Reference. The level of supporting detail reflects preliminary scoping efforts. Further analysis and documentation of impacts will occur as part of the Environmental Assessment effort highlighted in Section 6.4.

6.1 Air Quality

The study area does not fall within an air quality nonattainment or maintenance area. The proposed project is not likely to result in any permanent air quality impacts, as all disturbed areas will be permanently stabilized after project completion. Air quality degradation during construction may result from equipment exhaust and disturbed soil particles that become airborne. These impacts would be mitigated through the use of Best Management Practices (BMP) such as watering to minimize dust, and routine equipment maintenance.

6.2 Biological Resources (including fish, wildlife, and plants)

The proposed alternative 1.1 could place fill below ordinary high water (OHW) of Resurrection River and other streams to improve runways and taxiways. Temporary adverse impacts from construction would occur, such as increased turbidity and sedimentation. In alternative 2.2, DOT&PF will coordinate with and obtain appropriate authorization from the U.S. Army Corps of Engineers (USACE), NMFS, and ADF&G prior to work that may involve anadromous or resident fish streams. Alternative 2.2 will impact an existing wildlife viewing area. Public comment was received over the loss of an area adjacent to the airport property that is utilized by migratory birds, and for bird watching.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) website, reviewed on December 14, 2016, indicated that the following species of migratory birds could potentially be affected by activities in this location:

- Bald Eagle *Haliaeetus leucocephalus* (season: year-round);
- Black Oystercatcher *Haematopus bachmani* (season: year-round);
- Fox Sparrow *Passerella iliaca* (season: breeding);
- Kittlitz's Murrelet *Brachyramphus brevirostris* (season: breeding);

- Lesser Yellowlegs *Tringa flavipes* (season: breeding);
- Marbled Godwit *Limosa fedoa* (season: breeding);
- Marbled Murrelet *Brachyramphus marmoratus* (season: year-round);
- Olive-sided Flycatcher *Contopus cooperi* (season: breeding);
- Pelagic Cormorant *Phalacrocorax pelagicus pelagicus* (season: year-round);
- Rock Sandpiper *Calidris ptilocnemis ptilocnemis* (season: migrating);
- Rufous Hummingbird *selasphorus rufus* (season: breeding);
- Short-billed Dowitcher *Limnodromus griseus* (season: breeding); and
- Short-eared Owl *Asio flammeus* (season: breeding)

According to the USFWS, in Southcentral Alaska the recommended time period for avoiding vegetation clearing on shrub or open habitat (shrub cover or marsh, pond, tundra, gravel, or other treeless/shrubless ground) is May 1 through July 15. Clearing and grubbing would not occur within the migratory bird window, except as permitted by federal, state, and local laws.

Although migratory birds may temporarily avoid the project area during construction activity, the proposed project is not likely to result in permanent adverse effects to wildlife, due to pre-existing levels of development and disturbance at the airport.

A search of the University of Alaska Southeast and USFWS *Wetland Ecosystems Protocol* website on July 21, 2016, indicated that there are four bald eagle nests within 1,000 feet of the proposed project area:

- Nest No. 5/Object ID 1865 is located within the project area and about 365 feet northeast of Runway 13/31 at 60.1333, -149.4167.
- Nest No. 14/Object ID 1873 is located approximately 290 feet east of the airport and about 789 feet northeast of Runway 13/31 at 60.1349, -149.416.
- Nest No. 6/Object ID 1657 is located approximately 733 feet northeast of the airport and about 1,125 feet northeast of Runway 13/31 at 60.1321, -149.41.
- Nest No. 11/Object ID 1661 is located approximately 911 feet north of the airport and about 1,677 feet north of Runway 13/31 at 60.1396, -149.4235.

It is not anticipated that this project would directly disrupt nests; however, DOT&PF would coordinate with the USFWS to determine an appropriate course of action since some bald eagle nests are active and fall within the primary (330 feet) or secondary (660 feet) protection zones.

The Short-tailed Albatross (*Phoebastria albatrus*), humpback whale (*Megaptera novaeangliae*), North Pacific right whale (*Eubalaena japonica*), and the sperm whale (*Physeter microcephalus*) are known to occur in Resurrection Bay, and for the Albatross also in nearby areas. DOT&PF does not anticipate the proposed project would impact or adversely affect these species as no direct impacts to Resurrection Bay are anticipated as part of the proposed project.

6.3 Climate

None of the Alternatives is associated with a significant increase in Airport operations. Greenhouse gas emissions associated with increased air traffic is not expected. Alternative 1.1 would restore airport operations to previous levels, which would result in higher greenhouse gas emissions over the No-Build Alternative. Alternative 2.2 would result in a limited increase in airport operations because the 3,300-foot runway will limit operations by larger aircraft (Lear jets and C-130s).

The impacts of climate change would most affect the No-Build Alternative. The frequency of large storm events is increasing. A rise in sea-levels will increase the severity of storms at the Resurrection River delta. The hydrology and hydraulic report for this project took into account these future changes when recommending design elevations for both Alternatives 1.1 and 2.2.

6.4 Coastal Resources

It is not anticipated that Resurrection Bay would be directly impacted by the proposed project. Alternative 2.2 would result in development in close proximity to the bay. Breaching of the main runway will likely result in deposition of existing material into the delta. Alternative 1.1 would cause placement of fill into the river, resulting in a rise in the Base Flood Elevation (BFE). This would impact upstream areas along the Resurrection River, but would likely be negligible in the Bay. See Section 6.14.2 for more information on floodplain impacts.

6.5 Department of Transportation 4(f)

The proposed project area does not include any public park, recreation area, wildlife, and waterfowl refuge of national, State, or local significance. It does not include land from a historic site of national, State, or local significance.

6.6 Farmlands

The proposed project area does not include any farmland.

6.7 Hazardous Materials, Solid Waste, and Pollution Prevention

The nearest *Active* contaminated site is located 1,700 feet west of Airport Road and off of airport property. There are 3 ADEC contaminated sites listed as Cleanup Complete, and one as Cleanup Complete-Institutional Controls. Although the known risk of encountering hazardous materials is low with both Alternatives 1.1 and 2.2, there is a slight risk above that for the no-build, which would require no excavation or other earth disturbing activities.

Table 18– Contaminated Sites In and Adjacent to Project Area

Site Name	File Number	Contamination Type	Approximate Location	Activity Status
Seward Military Resort	2102.26.069	Contaminated soil and groundwater at the site from a broken underground storage tank supply line	1,700 feet west of Airport Road	Active
ARRC Seward Rail Yard	2332.38.002	Diesel range organic contamination from leaky heating oil underground storage tank	880 feet west from the airport and 1,166 feet west of RW 16/34	Cleanup Complete - Institutional Controls
ARRC Henderlong Building Seward	2332.38.033	Benzene and toluene were found in soil	600 feet southwest of the airport and 1,265 feet from RW 16/34	Cleanup Complete
Harbor Air Service	2332.38.005	Soil contamination from abandoned 55-gallon drums	270 feet west of RW 16/34	Cleanup Complete
City of Seward - Sewer Lift Station #4	2332.26.014	Diesel range organic contamination from leaky underground storage tank	2,000 feet northwest of Airport Road	Cleanup Complete

6.8 Historical, Architectural, Archaeological, and Cultural Resources

Based on a Cultural Resources Survey conducted in 2004 by Northern Land Use Research for the Seward Airport Master Plan effort, and presented in the 2008 Finding of No Significant Impact, the following sites are in the vicinity of the airport property.

- Site No. SEW-148, associated with the Seward Moose Pass Trail (previously Iditarod National Historic Trail), runs discontinuously adjacent to the railroad; portions of this trail fell into disuse after the completion of the Alaska Railroad in 1923.
- Site No. SEW-007 is associated with the Russian Trail dating back from the Russian Period; the exact location of this site has not been identified. Remnants of an old road at the southern end of the project area could relate to Site No. SEW 007.
- Site No. SEW-835, the Naval Radio Station, is located on the eastern bank of Resurrection River, east of the project area.

The State Historic Preservation Officer (SHPO) determined these resources to be ineligible for the National Register of Historic Places (NRHP). Alternative 1.1 will have less impact to previously undisturbed land and therefore less likely to affect undiscovered cultural resources. Alternative 2.2 will develop several acres of previously undisturbed land but previous investigations have not provided evidence to indicate a high likelihood of encountering undiscovered cultural resources.

In accordance with the Alaska Historic Preservation Act, DOT&PF will coordinate with the appropriate agencies and entities to determine potential impacts to historic, archaeological, and cultural resources.

6.9 Land Use

The Seward Moose Pass Trail (previously Iditarod National Historic Trail) runs discontinuously adjacent to the railroad; portions of this trail fell into disuse after completion of the Alaska Railroad in 1923.

The largest landowner adjacent to the airport is the ARRC, which owns all of the property on the west side of the airport. There is some concern from ARRC that development of Alternative 2.2 would result in airspace restrictions that could impact proposed marine freight development.

The Civil Air Patrol (CAP) owns a large parcel of land to the northeast of the airport, but most of this parcel lies within the Resurrection River floodplain making future development unlikely. The other parcels of land adjacent to the airport are relatively small and are owned either by individuals or the City of Seward. There is a private property bounded by the airport that is used by migratory birds and for bird viewing. The only land access to this parcel is across Airport property. This land use is generally incompatible to safe airport operations.

There are no designated refuges, critical habitat areas or sanctuaries within or adjacent to the proposed project area. The Chugach National Forest is about 1 mile from the proposed project area. Kenai Fjords National Park is approximately 4 miles from the proposed project area, and Caines Head State Recreation Area is about 7 miles from the proposed project area. DOT&PF does not anticipate the proposed project would result in any adverse impacts to these parks, forests, or recreational areas.

6.10 Natural Resources and Energy Supply

Both Alternative 1.1 and 2.2 would require asphalt and base material for construction. The No-Build Alternative has high maintenance and operation needs in order to repair storm damage to Runway 13/31. These efforts have included placement of riprap along the embankment of Runway 13/31, as well as repairs to the Runway surface. Future efforts would likely include resurfacing the runway.

6.11 Noise and Noise-Compatible Land Use

The projected operations for the Seward Airport do not approach the operational thresholds requiring a noise analysis. Land use of property adjacent to the airport includes a rail yard, harbor, river delta, and residential areas. The low level of activity at the airport, and an absence of noise complaints by residents, indicate that noise has not been a substantive issue in the area.

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

The proposed project is not anticipated to adversely affect neighborhoods, community cohesion, or disadvantaged social groups. Alternative 1.1 would result in an increase to the BFE, and would likely require property acquisitions to mitigate for the increased flood impact potential. Should this alternative be carried forward for further consideration, DOT&PF will evaluate whether any disadvantaged social groups are disproportionately affected by the increased flood elevations.

The No-Build alternative would result in either continued high cost maintenance, or the eventual decision by the DOT to discontinue or reduce maintenance, which could then result in the closure of portions of the airport. As the runway deteriorates, the facility would no longer be able to effectively meet the needs of the Community. This has the potential to affect the health and safety of residents where such services are needed.

Alternatives 1.1 and 2.2 provide a working runway, which will allow the airport to resume regular operations. Alternative 1.1 supports use by Lear Jets, as well as large cargo and passenger planes which used the runway infrequently prior to the weight restrictions. Alternative 2.2 allows for occasional use by passenger planes, if not fully loaded and it does not preclude the future expansion of Runway 16/34 should demand increase.

6.13 Visual Effects

There are no visually-protected coastal areas, Wild and Scenic Rivers, sensitive wildlife species, Section 106 or Section 4(f) resources within or near the project area which could be affected by light emissions or changes to visual resources and visual character. None of the proposed upgrades to the airport lighting are anticipated to disturb nearby residences or create off-airport glare.

6.14 Water Resources

6.14.1 Wetlands

DOT&PF conducted a Wetland Delineation and Aquatic Site Assessment in 2004, to determine the presence and extent of wetlands for use in the 2008 Seward Airport Master Plan Environmental Assessment and Finding of No Significant Impacts. DOT&PF field checked the 2004 delineation in September 2016, and updated wetland boundaries. Identified wetland types include: Estuarine and Marine Deepwater (E1UBL); Estuarine and Marine Wetland (E2USN, E2USM, E2EM1P); Freshwater Pond (PUBH); Riverine (R3USC, R3UBH); and Freshwater Forested/Shrub Wetland (PFO1/SS1A, PSS1A, PSS1/EM1R, PSS1/EM1C).

Placement of fill in wetland areas is anticipated for the improvements at the airport. DOT&PF will design the project such that wetland impacts are avoided or minimized to the maximum extent practicable. DOT&PF will comply with mitigation guidelines for any impacts that cannot otherwise be avoided. For the purpose of the initial comparison, preliminary estimates of wetland impacts are 5 acres for Alternative 1.1 (see Figure 4) and 13.5 acres for Alternative 2.2 (see Figure 5). Temporary work areas or vegetated buffers may be located in wetlands if other upland areas are not available. Any such impacts would be included as part of the USACE's Section 404 wetland permitting process.

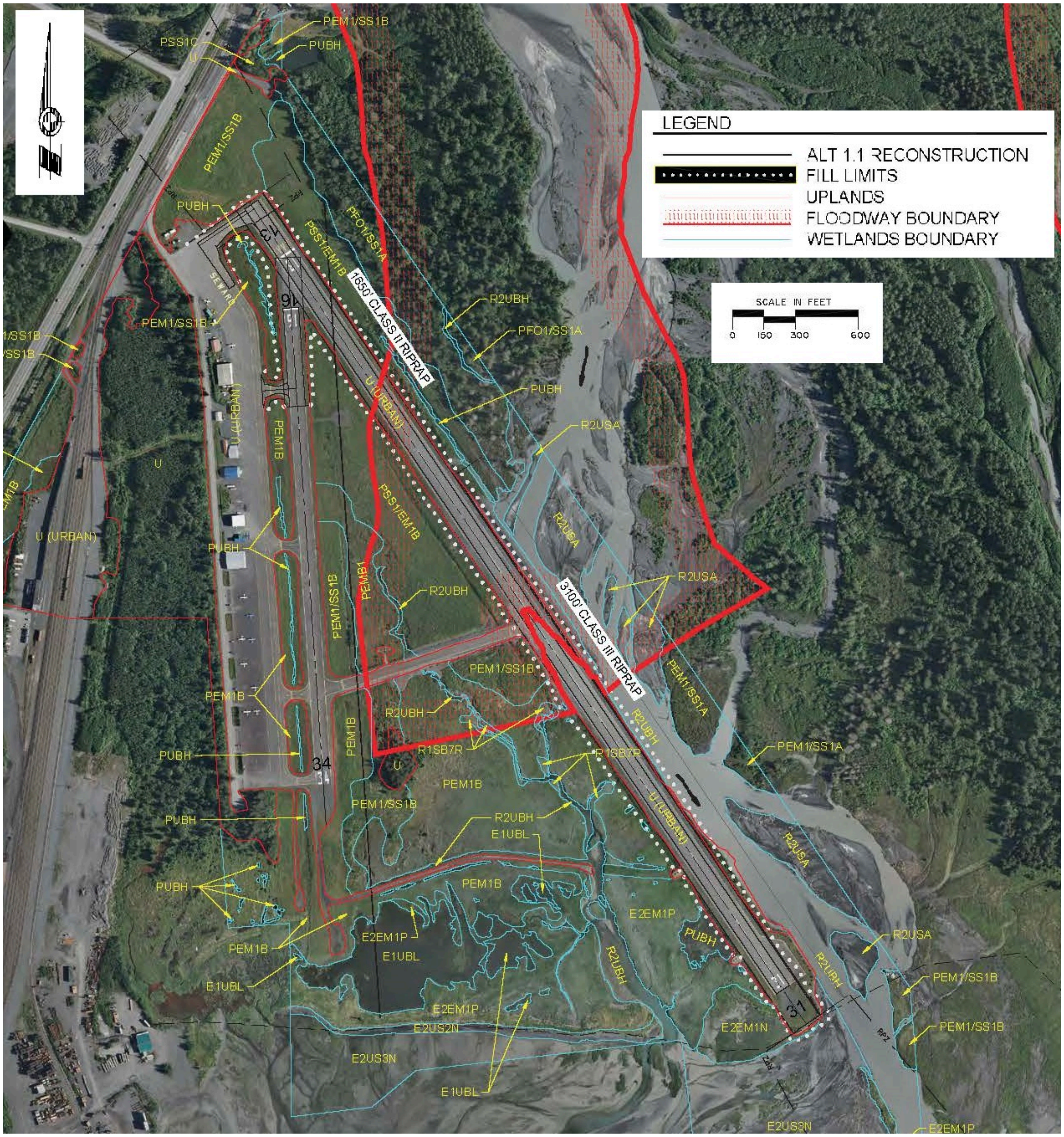


Figure 4 - Alternative 1.1

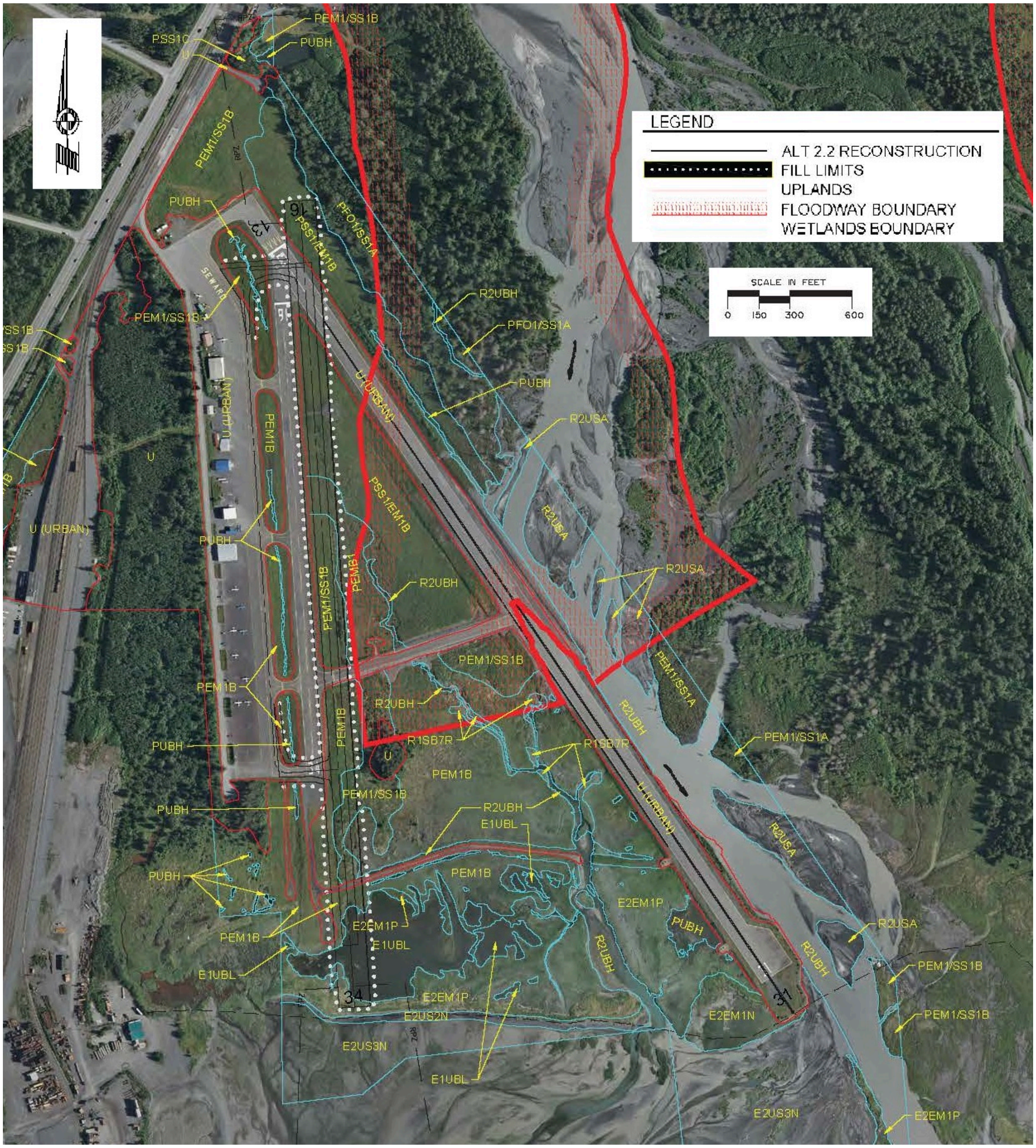


Figure 5 - Alternative 2.2

6.14.2 Floodplains

DOT&PF completed a flood study for the proposed project, which is available for agency review. Alternative 1.1 would require placement of fill within the regulatory floodway, as well as the floodplain, due to construction of the raised runway. Increases to the base flood elevation (BFE) by as much as 4 feet would occur in some areas. This encroachment and subsequent rise in the base flood elevation would result in a backing up of floodwaters onto private properties along the Resurrection River. An additional estimated 159 acres of land would be subject to flooding during a 100-year storm event while approximately 50 acres of land (west of the runway, mostly airport property) would be placed out of the existing floodplain. See Figures 6 and 7. The selection of Alternative 1.1 would likely require modifications to the effective FIRM and Floodway map. This would require a Letter of Map Revision (LOMR).

Fill for Alternative 2.2 would fall within the floodplain, but outside the regulatory floodway. Alternative 2.2 would result in a BFE increase of less than 1 foot. The FIRM and Floodway map would not need to be modified for this alternative. Alternative 2.2 would result in minor flood increases to an additional 22 acres of land while reducing flood impacts to 44 acres of land currently within the 100-year floodplain. See Figure 8.

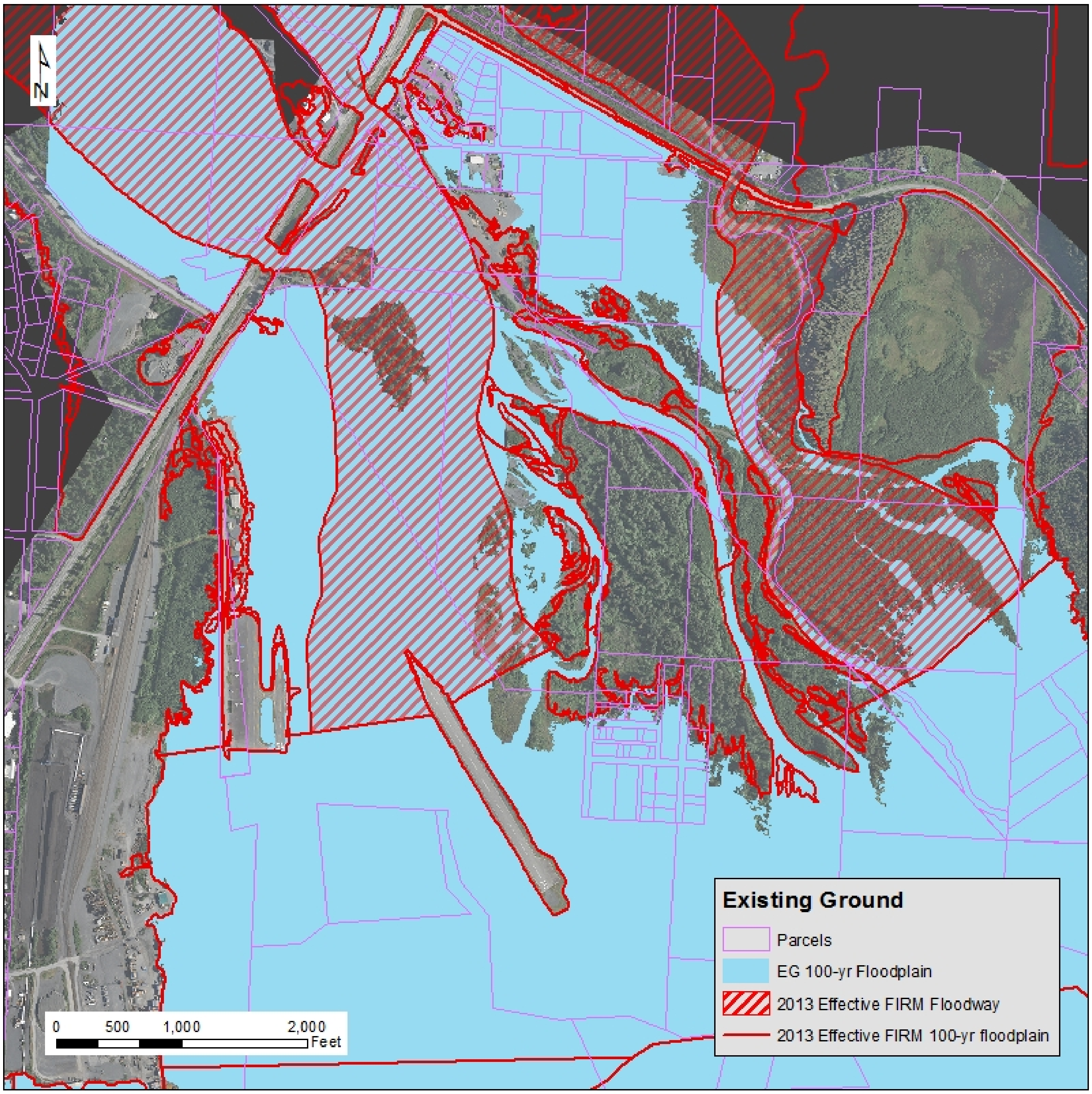


Figure 6 – 100-year flood map for Existing Conditions

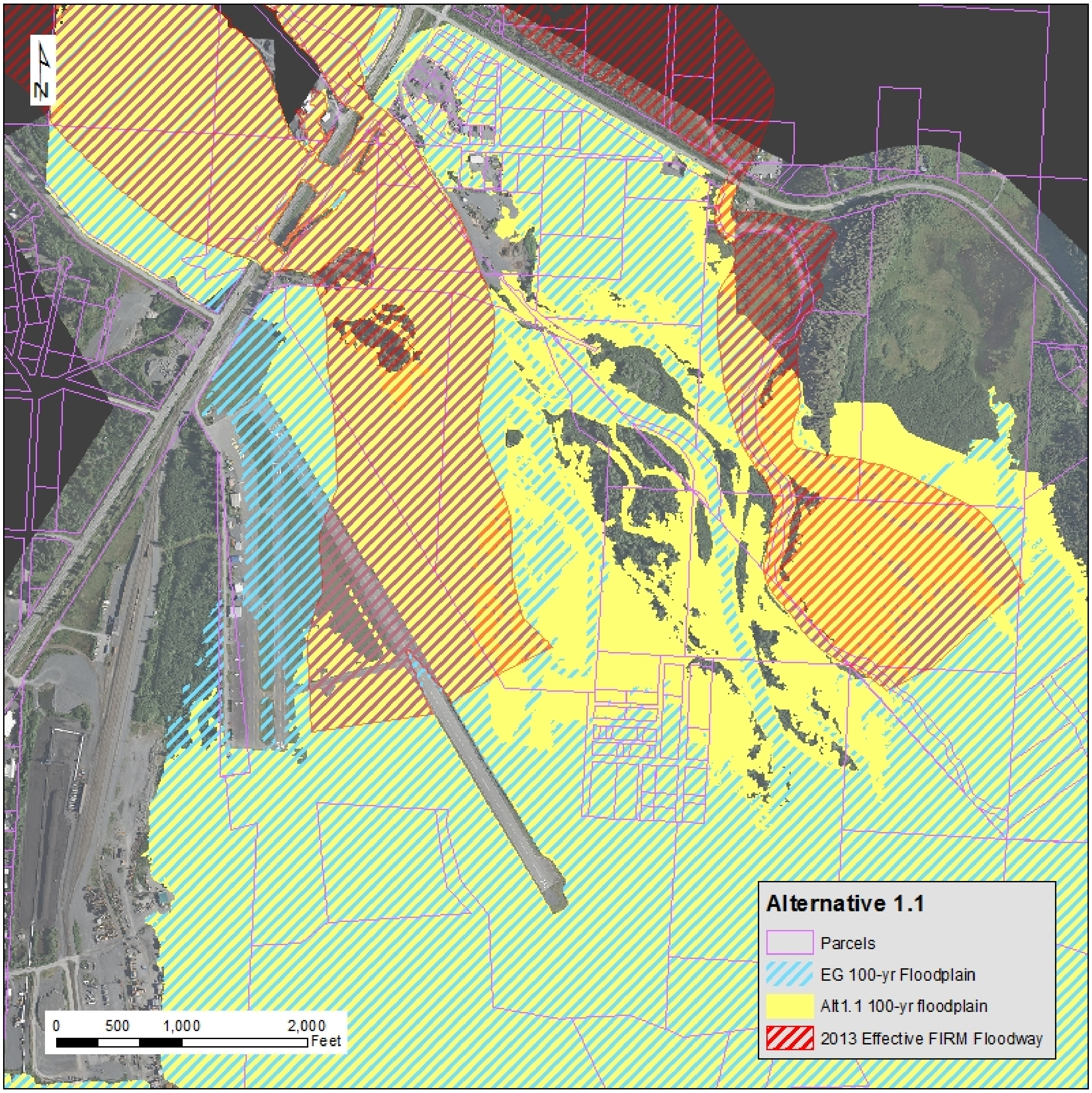


Figure 7 – 100-year flood map for Alternative 1.1

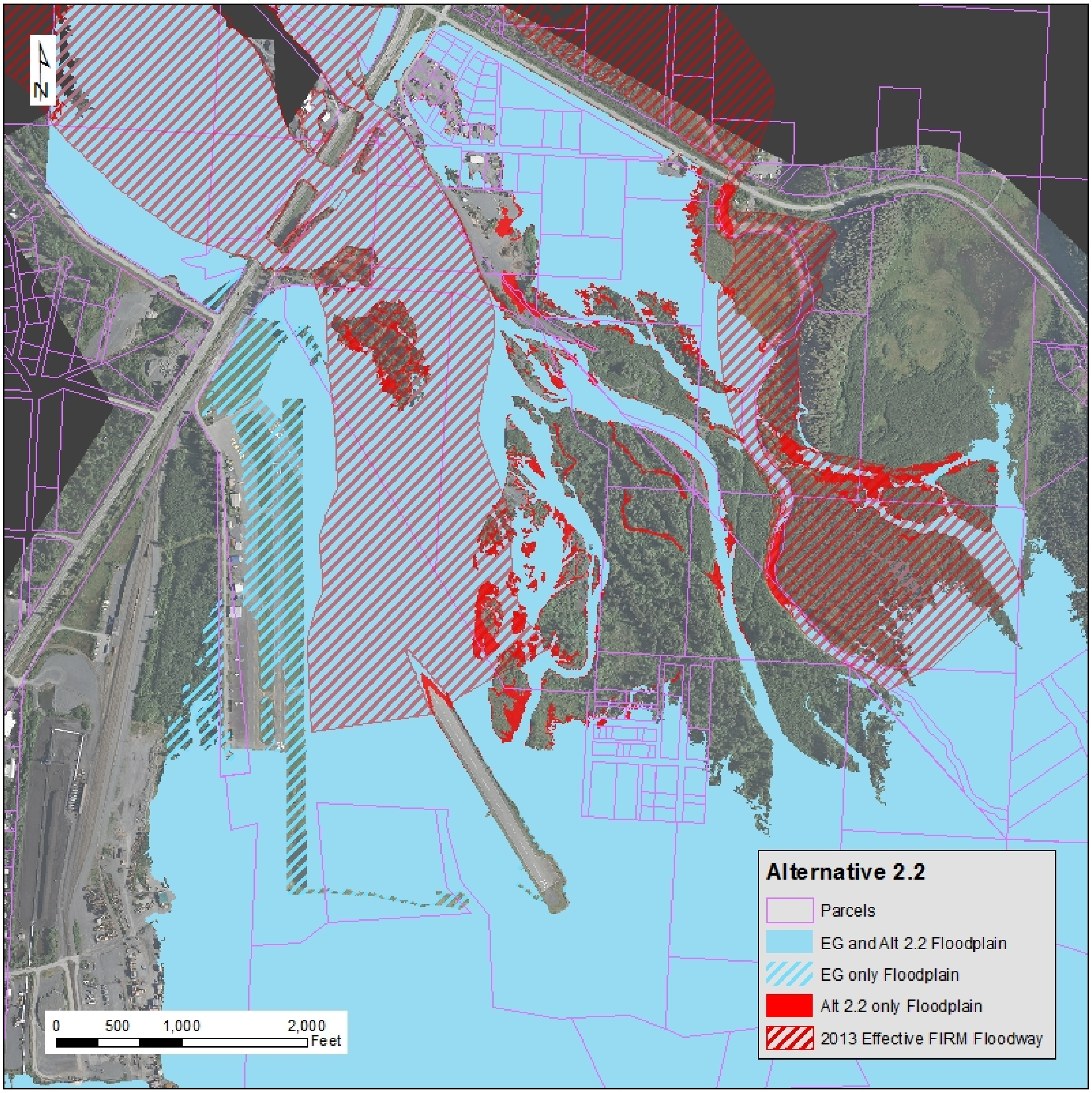


Figure 8 – 100-year flood map for Alternative 2.2

6.14.3 Surface Waters

Water quality degradation during construction may result from sedimentation of storm water runoff. Alternative 1.1 would require in-water work to provide increased armoring of the riverbank, and to provide appropriate embankment for the increased runway height. This may result in a temporary increase in turbidity. These impacts are anticipated to be mitigated by the use of BMPs, and implementation of a Storm Water Pollution Prevention Plan in accordance with the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (CGP). There is no other pollutant input anticipated during construction.

There are five potential receiving water bodies within the study area, which are shown in Table 19 below. None of these receiving waters has been labeled as impaired. Alternative 1.1

is anticipated to affect the Resurrection River and potentially Airport Creek depending on the extent of Airport embankment needed to raise Runway 13/31. Alternative 2.2 could impact Unnamed stream 231-30-10075 with the relocation of Runway 16/34. Resurrection Bay is not anticipated to be directly affected by either Alternative but Section 6.4 identifies possible impacts to coastal resources associated with Alternative 2.2.

Table 19 – Anadromous Fish Streams in Project Area

Stream Name	AWC Code	Location	Anadromous Species and Use
Airport Creek	231-30-10080-2003	East side of the airport and adjacent to Runway 13/31	Spawning habitat for pink salmon
Unnamed anadromous fish stream	231-30-10075	Southern end of the airport between Runway 16/34 and Runway 13/31	Spawning habitat for pink salmon
Unnamed anadromous fish stream	231-30-10080-2017	East of the airport and Runway 13/31	Rearing habitat for coho salmon Spawning and rearing habitat for sockeye salmon
Resurrection River	231-30-10080	East of the airport	Spawning habitat for chum salmon Spawning and rearing habitat for Coho salmon Spawning habitat for pink salmon Spawning habitat for eulachon Chinook and sockeye salmon present
Resurrection Bay	N/A	South of the airport	Flathead sole present Pacific cod present Walleye pollock present All 5 species of Pacific salmon present

6.14.4 Ground Water

A review of the ADEC Drinking Water Protection Mapper on December 15, 2016 revealed many groundwater sources, and associated drinking water protection areas, established along the project corridor. The proposed project is not anticipated to impact local aquifers or established drinking water sources.

6.14.5 Wild and Scenic Rivers

No Wild and Scenic Rivers are located within or near the proposed project area.

6.15 Agency Coordination

An agency scoping letter was sent to State and Federal agencies on January 24, 2017. An agency scoping meeting was held on March 2, 2017 to initiate the NEPA process.

6.16 Public Coordination

The following sections highlight public coordination efforts undertaken for this project. Copies of meeting summaries, newsletters, mailing list, and phone logs are available in Appendix C.

6.16.1 Public Open Houses

Two open house style public meetings were held during the project scoping effort. More than thirty-three people attended the first open house on September 11, 2014 from 4:00 pm to 7:00 pm at the K.M Rae Marine Education Building in Seward. The goal of the public meeting was to provide information about the project and solicit initial thoughts, ideas, and comments. Meeting materials presented included project overview, details, current findings, schedule, and request for public comments. Seven comment sheets were completed during the meeting, and additional verbal and written comments were received after the meeting. An article summarizing the meeting was published in The Seward Phoenix Log on September 18, 2014.

More than twenty-two people attended the second public open house on April 20, 2016 from 5:00 pm to 7:30 pm at the K.M Rae Marine Education Building in Seward. During the open house, information about the process to date; aviation demands, hydrology, and funding challenges; alternative evaluation processes; and viable alternatives was provided. Alternative 2.2 was presented as the engineering preferred alternative. One comment sheet was received immediately following the meeting, one was submitted before the meeting, and several were submitted following the meeting. A Seward City News article summarizing the meeting was published on May 05, 2016. Copies of meeting materials for both public meetings including notes and comment sheets can be found in Appendix C1.

6.16.2 Stakeholder Working Group Meetings

A stakeholder working group (SWG) was formed and three meetings were held.

The first meeting was held on November 19, 2014 from 11:30 am to 2:00 pm at the Seward Community Library. The meeting included representatives from ARRC, the City of Seward, Civil Air Patrol, Kenai Peninsula Borough (KPB) Seward/Bear Creek Flood Service Area, leaseholders, Federal Aviation Administration (FAA), DOT&PF Central Region Aviation Design, DOT&PF Maintenance and Operations, and the consulting team. The goal of the meeting was to introduce the project process, establish the SWG's role, and reach an agreement on the draft of the "Aviation Activity & Facility Requirements" Technical Memorandum.

The second SWG meeting was held on July 21, 2015 from 11:00 am to 12:00 pm by teleconference. This meeting included representatives from ARRC, the City of Seward, Civil Air Patrol, KPB Seward/Bear Creek Flood Service Area, General Aviation (lease holder), FAA, DOT&PF Central Region Aviation Design, DOT&PF Maintenance and Operations, and the consulting team. The goal of the meeting was to discuss the project's status, address any questions, and reach a consensus on the final "Forecast of Aviation Activity & Facility Requirements" Technical Memorandum.

The third SWG meeting was held on April 20, 2016 from 1:30 pm to 3:45 pm at the K.M. Rae Marine Education Building in Seward. This meeting included representatives from ARRC, the City of Seward, KPB Seward/Bear Creek Flood Service Area, FAA, DOT&PF Central Region Aviation Design, and the consulting team. Representatives from Civil Air Patrol, General Aviation (lease holder), and DOT&PF Maintenance and Operations were not in attendance. The goal of the meeting was to review the status of the project; present the results of the Hydrology Report; present alternatives developed to address identified issues and needs; present the advantages and disadvantages associated with each alternative;

gather input on alternatives and their advantages and disadvantages; and gather input from SWG members on how to evaluate alternatives. Alternative 2.2 was presented as the engineered preferred alternative. Copies of SWG meeting materials including notes and comment sheets can be found in Appendix C2.

6.17 Environmental Assessment

Based on the preliminary scoping completed for this project, an Environmental Assessment will be required to comply with NEPA. The following is a list of work planned to complete the environmental document.

- Agency scoping meeting
- Prepare new EA document
- Permit preparation
- Further field studies as needed

6.17.1 Anticipated Permits and Authorizations

This project may require the following permits:

- APDES CGP for storm water discharge
- ADF&G Fish Habitat Permit
- ADNR Land Use Permit
- USACE Section 404 Permit
- KPB Multi-agency Permit
- KPB Floodplain Development Permit