ANGOON AIRPORT

Final Environmental Impact Statement and Section 4(f) Evaluation

Appendices A–J

SEPTEMBER 2016

Federal Aviation Administration

APPENDIX A

PUBLIC AND AGENCY SCOPING REPORT

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

ANGOON AIRPORT
Environmental Impact Statement

PUBLIC AND AGENCY SCOPING REPORT

PREPARED FOR:

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MAY 27, 2009

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1.0 INTRODUCTION

1.1 Background Information

The Alaska Department of Transportation and Public Facilities (DOT&PF) has proposed a land-based airport on Admiralty Island to serve the City of Angoon, and the Federal Aviation Administration (FAA) is the lead federal agency for the project. The FAA is preparing an environmental impact statement (EIS) to disclose the potential environmental impacts associated with the airport's construction and operation, and to consider alternatives to the DOT&PF's proposed action. This EIS process will inform the public and agencies about the potential impacts on human and natural resources.

A notice of intent (NOI) to prepare the EIS was published in the *Federal Register* on September 24, 2008 (Appendix A). Publication of the NOI initiated the formal public and agency scoping period during which the FAA solicited comments regarding the project and its potential impacts. The FAA held public and agency scoping meetings for the EIS in Anchorage, Juneau, and Angoon, Alaska, to provide information on project planning activities to date and to give agency personnel and members of the public the opportunity to ask questions of the FAA project manager and resource specialists involved with the project. Meeting attendees were also able to provide comments on the issues and alternatives that will be included in the Draft EIS.

1.2 Purpose

This scoping report is intended as an aid in clarifying preliminary issues, determining the appropriate scope of environmental analysis, and gathering new input on alternatives development from comments received in response to the September 24, 2008, NOI (Appendix A). It summarizes public and agency comments received during the scoping period, describes the analysis of those comments, and provides a preliminary list of issues, concerns, and opportunities for analysis in the EIS. All substantive issues raised by respondents within the scope of the FAA's and the U.S. Forest Service's (USFS) decisions will be included in the Draft EIS, as will other resource categories and issues (e.g., visual resources, cultural resources) that are required by FAA Orders 1050.1E and 5050.4B but that were not mentioned specifically by respondents.

1.3 Document Organization

This document contains summary descriptions of the following:

- Scoping meetings, including advertising leading up to the meetings
- Opportunities for public and agency comment during the scoping period
- Scoping content analysis process, including how individual letters and comments were coded and tabulated
- Comments received during the scoping period (September 24, 2008 to December 31, 2008) in a tabular format (Appendix B)
- Comments organized by resource

As part of the NEPA process all comments are given equal consideration, regardless of the method of their transmittal. Appendix C contains contact information for those who submitted scoping comments.

2.0 Description of Formal Scoping Meetings

Four public scoping meetings and two agency scoping meetings were held for the Angoon Airport EIS (Table 1). Scoping meeting attendees are listed in Appendix D.

Table 1. Formal Scoping Meeting Dates, Times, and Locations

Date	Time	City, State	Address
Public Scoping Meetings			
October 27, 2008	3:30–5:00 PM	Anchorage, Alaska	Loussac Library, 3600 Denali Street
October 29, 2008	5:30–8:00 PM	Juneau, Alaska	Centennial Hall, 101 Egan Drive
October 30, 2008	5:30–8:00 PM	Angoon, Alaska	Angoon Community Center
October 31, 2008	5:30–8:00 PM	Angoon, Alaska	Angoon Community Center
Agency Scoping Meetings			
October 27, 2008	1:00–3:00 PM	Anchorage, Alaska	Loussac Library, 3600 Denali Street
October 29, 2008	1:00–3:00 PM	Juneau, Alaska	Centennial Hall, 101 Egan Drive

2.1 Meeting Set-up

The scoping meetings combined formal presentation and open house formats. At each meeting a welcome message display board was posted just outside the meeting hall. Attendees were greeted at the entrance and asked to sign in (see Appendix D for copies of the sign-in sheets). Each attendee was asked if he or she would like to be added to the mailing list and, if so, to provide contact information. Attendees were informed about the meeting format and given a meeting information folder containing a meeting agenda, copies of the meeting display boards, a project hotsheet, a write-up of frequently asked questions, a list of all documents contained on the project website, and a scoping comment form (Appendix F). Attendees were informed about ways to submit comments to the FAA (including the locations of comment boxes in the meeting room) and were informed about the flow of information on the display boards in the room.

After meeting sign-in and seating, the FAA project manager introduced the project team, and a Microsoft PowerPoint overview of the project was presented. Attendees were encouraged to ask questions during the presentation and to seek out individual resource specialists for answers to their questions during the open house portion of the meeting.

Eleven informational display boards were arranged in stations (see Appendix E) in the following order around the meeting rooms:

1. Welcome message to meeting attendees
2. Explanation of the NEPA process and the general timeline and sequence of events associated with this EIS
3. Description of the general need for an airport in Angoon
4. Description of the initial airport planning steps and the DOT&PF's Airport Master Plan (the Master Plan)
5. Map of the sites investigated by DOT&PF during airport master planning
6. Map of the sites investigated by the FAA during the supplemental airport planning site evaluation
7. Map of initial dimensional criteria

8. Approach segment obstacle clearance surfaces for Alternative 3 (the DOT&PF's Master Plan Preferred Alternative)
9. Map of preliminary alternative airport locations for consideration in the EIS
10. Potential resource issues
11. Explanation of the importance of public comment and a description of comment methods

At each information station, FAA staff and resource specialists from the EIS consultant team were available to answer questions. Refreshments were provided at each meeting.

2.2 Meeting Advertising

Pursuant to NEPA requirements, the scoping meetings were advertised in a variety of formats (Table 2; Appendix G) at least two weeks prior to their scheduled dates. In each format, the advertisements provided logistics, explained the purpose of the scoping meetings, gave the schedule for the public and agency comment period, outlined additional ways to comment, and provided methods of obtaining additional information.

Table 2. Advertising of Formal Public and Agency Meetings

Newspaper Advertisements
Legal advertisements were published in the Juneau Empire and in the Anchorage Daily News on September 26, 2008.
A display advertisement was published in the Anchorage Daily News on October 24, 2008.
Display advertisements were published in the Juneau Empire on October 22, 2008, and October 28, 2008.
Online advertisements were purchased in both the Anchorage Daily News and the Juneau Empire, and were spread over a several day period during the week preceding the meetings until 10,000 viewings were achieved. These advertisements were placed either as a banner at the top of the website or posted prominently to the right of the newspaper content area of the website.
Media Notices and Other Forms of Advertising
Media notice releases and three-second public service announcements were e-mailed and/or faxed on October 20, 2008 to: • the Anchorage Daily News, the Juneau Empire, the Sitka Sentinel, and the Capital City Weekly newspapers; • KCAW, KIFW, KTOO, APRN, KNBA, KSKA, KINY, and KJNO radio stations; and • KTOO, KAKM, and KTNL television stations.
Meeting information was posted on the Centennial Hall marquee beginning approximately October 25, 2008.
Meeting information was posted on the project website, www.angooonairporteis.com on October 14, 2008.
Meeting information was posted on the www.myangoon.org website on October 14 and October 27, 2008.
Postcards and Other Invitations
Postcards announcing the scoping meetings were sent to those on the project mailing list: • Members of the Alaska State legislature • FAA staff identified as having an interest in the project • DOT&PF staff identified as having an interest in the project; the Angoon Community Association (ACA); and the Angoon City Council • Kootznoowoo, Inc. • Non-governmental organizations (NGO) identified during pre-scoping meetings or through development of the public involvement plan as having a possible interest in the project

Table 2. Advertising of Formal Public and Agency Meetings

• Federal and state agencies identified during pre-scoping meetings as having jurisdictional authority in the project • Angoon residents who had attended pre-scoping meetings • Members of the general public who signed up for updates via the project website
Additional postcards were mailed to the City of Angoon, the ACA office, the Angoon Business Center, the Angoon Health Clinic, and the Angoon Trading Company to post or hand out to facility visitors, or both.
A meeting invitation was e-mailed to those on the project mailing list for whom e-mail addresses were provided or were obtainable.

2.3 Methods for Public and Agency Comment

Members of the public and representatives of agencies were afforded several methods for providing comments:

- Comments could be recorded on comment forms at the scoping meetings. Comment forms (see Appendix F) were provided in meeting information packets and were also available throughout the meeting room and at a station where attendees could write and submit comments at that time.
- Comments could be submitted online at www.angoonairporteis.com.
- E-mailed comments could be sent to a dedicated e-mail address: comments@angoonairporteis.com.
- Individual letters and comment forms could be mailed via U.S. Postal Service to Leslie Grey, AAL 614, FAA Project Manager, Angoon Airport EIS, 222 W. 7th Ave., Box #14, Anchorage, AK 99513-7587.

2.4 Additional Agency Engagement

Some agency personnel were not able to attend the Anchorage or Juneau agency scoping meetings, and, as an additional way to engage them, a third agency scoping meeting was conducted on November 26, 2008. Invitees were given the option of attending a meeting facilitated by the FAA project manager at the FAA Alaskan Region office in Anchorage, Alaska, or participating by teleconference. All were sent a .pdf version of the scoping meeting information packet and downloading instructions for the Microsoft PowerPoint presentation. During the meeting, those attending by teleconference could run the presentation from their computer simultaneously with the presentation shown at FAA headquarters. Members of the EIS consultant team were available by telephone to provide commentary during the presentation and answer questions from meeting attendees.

3.0 Scoping Content Analysis

3.1 Comment Processing

Each comment letter or form was numbered sequentially (beginning with 1) and labeled with a comment type code indicating the entity from which it was received (Table 3).

Table 3. Comment Type Codes

Type	Type Code
Individual	I
Government agency	G
NGO (special interest)	O
Business	B
Tribe	T

This combination of number and comment type code results in a unique alphanumeric identifier for each individual letter or form submitted. This system provides ease in referencing and cross-checking the letters and forms received and the comments contained within them.

3.2 Comment Analysis

After all letters and forms were labeled with alphanumeric identifiers, each was reviewed for the specific comments it contained. Each letter or form may contain one or multiple comments, and each comment was categorized and coded by resource issue or topic. Comments were assigned codes corresponding to their respective issue (Table 4). For example, a comment concerning subsistence issues in Favorite Bay would be coded as SUB to identify it as a subsistence resource issue. This form of analysis allows for specific comments to be captured and grouped by general topic or resource issue.

Table 4. Resource Issue Identification

Resource Code	Resource Issue
ALT	Alternatives
CUM	Cumulative effects
FSH	Fisheries and essential fish habitat
LAR	Lands use
MS	Miscellaneous
PN	Purpose and Need
PRO	Process
SOC	Socioeconomics
SUB	Subsistence
WLD	Wilderness
WLF	Wildlife

3.3 Comment Disposition

After specific comments were categorized and coded by resource issue, they were also coded according to their disposition. A comment's disposition refers to the way in which it would be addressed in the EIS. Within this analysis, comments fell into one of six disposition categories (Table 5).

Table 5. Comment Disposition

Disposition Code	Comment Disposition	Explanation
PRO	Process	Identifies certain elements of the NEPA process that must be documented and disclosed in the EIS, but does not require specific resource analysis in the EIS.
PN	Purpose and Need	Requires additional documentation or clarification of the project Purpose and Need.
ALT	Alternatives Development	Requires analysis of existing alternatives or consideration of new alternatives.
IA	Impacts Analysis	Requires EIS analysis of impacts to specific resources of concern.
OOS	Out of Scope	Comments receiving the disposition codes OOS or NS are not addressed in the EIS. These are comments that are not within the scope of the FAA's decision regarding the Angoon Airport, or are otherwise not substantive.
NS	Nonsubstantive	

4.0 Summary of Scoping Comments from Letters and Forms

Substantive scoping comments fell into the following four broad disposition categories described in Table 5: Process, Purpose and Need, Alternatives Development, and Impacts Analysis (including resource-specific concerns and cumulative impacts). Comments are summarized below in narrative form for each resource issue area (e.g., all comments specific to wildlife are included under the Wildlife category; all comments specific to subsistence are included under the Subsistence category). This section represents a summary of the formal comments received during public and agency scoping. A more detailed record of all formal comments is arranged by category and can be found in Appendix B.

The narrative summary is organized in the following order:

- Process
- Purpose and Need
- Alternatives
- Impacts Analysis (listed alphabetically by resource, followed by cumulative impacts)

4.1 Process

It was requested that the Draft EIS include a detailed description of the involved government agencies and their various roles in decision-making for this project. It was pointed out that the ACA, the federally recognized tribal government, "was not listed in the Agency Contacts"[1] and that there is a federal requirement to consult with them on a government-to-government basis.

It was requested that, given the location of the area, a number of other issues and considerations need analysis in order to make an informed decision, one that meets the federal intent and letter of NEPA, the Alaska National Interest Lands Conservation Act (ANILCA), and the revised Tongass Land Use Management Plan (TLUMP). In addition, it was requested that federal and state laws and issues be addressed, including water quality, coastal zone management, disposal of hazardous waste, the Bald Eagle Protection Act, protection of fish and wildlife habitat, the State of Alaska's Forest Practice Act, and cultural and subsistence protection.

It was noted that the proposed project may require authorizations from various state agencies, including the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Natural Resources (DNR), and the Alaska Department of Environmental Conservation (DEC). Specific mention was made of the need for fish habitat permits for any in-stream activities affecting water bodies that may contain anadromous or resident fish.

Appreciation was expressed for information in the scoping materials about the process established under Title XI of ANILCA to consider proposed transportation and utility systems within ANILCA conservation system units, including areas designated as wilderness.

Requests for information were also captured in this category, including requests for the Draft EIS when available and for communications on project activities.

4.2 Purpose and Need

General support was expressed for the airport because of its potential to lower the cost of both transportation and the import and export of goods to and from Angoon. Support was also expressed because of the need for a safe and reliable airport that enables better access for air medevac, sea planes, air medics, forest fire fighters, U.S. Postal Service, U.S. Forest Service, and emergency response.

Support was expressed for expansion of the runway to 5,000 feet.

[1] In some cases, respondents made statements for which the meaning could not be definitively understood or which were factually untrue. These kinds of comments are noted in quotations, and a clarification for them is provided in a footnote. In this case, the respondent is correct that the ACA is defined as a sovereign government for which there must be government-to-government consultations. However, there was no formal list of agency contacts distributed at the scoping meetings, and, further, as a sovereign government the ACA would not be included on any agency list, even if such a list were to be distributed.

4.3 Alternatives Development

One respondent stated a preference for an airport location closer to the community of Angoon because roads in Angoon are icy and hard to maintain in winter and because the cost of gas is high for both private vehicles and maintenance equipment travelling to and from the airport.

Support was offered specifically for the preliminary Alternative 12a site because of the following considerations:

- It would be closer to the existing road system and therefore more accessible.
- There would be less overall road to construct.
- It would provide a tailwind and southeast headwind.
- It would provide access to fresh water.
- It would not affect subsistence-taking.
- It would be much less costly to construct than would the sites on the west-northwest side of Favorite Bay.

Support for preliminary Alternative 3a was also specifically expressed because of the following factors:

- Low wind shear, north wind or southeast wind
- Access to fresh water
- "[T]he short 1-mile distance to the village road"[2]
- A safe approach regarding the rough terrain
- A way to access subsistence foods

However, respondents expressed general opposition to any alternative that would impact Favorite Bay (which would include preliminary Alternatives 3a and 4 and the DOT&PF's proposed alternative, Site 3). Opposition to Alternatives 3 and 3a included the road being too long and therefore gas costs being too high for private citizens and maintenance equipment. Specific concerns are discussed in the Impacts Analysis section, below.

A suggestion was made that instead of building a state-run airport, which would be accessible to any outsider, a private airstrip capable of handling both passenger and cargo planes could be built on lands owned by Kootznoowoo, Inc., the local native corporation. The reasoning behind this suggestion was that residents could then control use of the airstrip (with the exception of emergencies) and thereby protect local resources around Favorite and Kanalku bays. Concern was also expressed that jobs created from construction of a state-run airport would be given to technical workers brought in from outside the communities rather than to local workers.

[2] The preliminary alternatives presented for Alternative 3a included several access road options (two roads around Favorite Bay and one involving a series of bridges across the bay). It appears the respondent was expressing support for the Alternative 3a bridge access road option, as this would reduce the road mileage to about 1 mile, although that was not stated explicitly...

It was recommended that a gravel runway should be constructed instead of a hard-surface type of runway. The reasons for this recommendation include the following:

- Southeast Alaska lacks a high-quality gravel runway that is open to the public, and the lack of a good gravel airstrip places significant limitations on training for tailwheel airplane operations.
- Using a hard-surface runway for training is somewhat hazardous and, to some extent, defeats the purpose of that kind of training because the idea is to learn to land on gravel.
- A gravel surface would be cheaper.
- A hard-surface runway sooner or later must be repaved and would be difficult given the ever-decreasing supply of cement and asphalt.

4.4 Impacts Analysis (including cumulative impacts)

Fisheries and Essential Fish Habitat

It was noted that the proposed project may require authorizations from various state agencies, including the ADF&G, the DNR, and the DEC. It was requested that all water bodies potentially impacted by the proposed project must be sampled for fish presence and that construction activities be planned to avoid sensitive life stages of fish. Specific mention was made of the need for fish habitat permits for any in-stream activities affecting water bodies that may contain anadromous or resident fish.

Lands and Realty

It was pointed out that if Alternative 3 is the preferred alternative, an application for land use from the DNR may be required.

Socioeconomics

It was suggested that the airport would provide jobs and economic benefit to the community. However, concern was expressed that the cost of airfare would not be affordable, causing residents to continue using current transportation methods such as the ferry.

It was also suggested that the current untouched wilderness at Favorite Bay provides more of a benefit to tourism because of its uniqueness.

It was also requested that the Draft EIS address the social and economic costs and benefits anticipated by the proposed project to Angoon and the public.

Subsistence

Concern was expressed for the impact of the airport on continued subsistence use. Specific areas of concern are the inside waterway and bays and inlets (including Kootznahoo Inlet, Favorite Bay, Mitchell Bay, Salt Lake, and Kanalku Bay) as valued food sources that contain most, if not all, of the major foods Angoon residents use to survive. These foods are deer, crab, clams, shrimp, salmon, gumboots, bottom fish, waterfowl, bear, goose tongue, wild asparagus, blueberries, huckleberries, currants, and other traditional foods.

Concern was expressed that a seven-mile road (an option for access to Sites 3 and 3a) constructed along both the south and north shores of Favorite Bay with crossings over Favorite Creek would have an impact on an important salmon-spawning stream.

Concern was expressed that many pilots throughout Southeast Alaska would use the airport to access hunting and fishing opportunities in the Angoon area, creating direct competition with Angoon subsistence users and residents.

It was pointed out that land ownership, land use patterns, and natural resource values are key issues to address and resolve. This applies to a parcel of land that the airport access road would pass through, a parcel that was purchased and returned to the Admiralty Island National Monument and Kootznoowoo Wilderness Area due to a controversial logging project that would have impacted traditional subsistence use.

Wilderness

It was requested that the Draft EIS consider the potential mitigation of project impacts to the Monument–Wilderness Area values, including consideration of a land exchange or alternative project locations. Concern was expressed for the conflicts between this project and the natural and cultural resource values of the area.

Wildlife

Concern was expressed regarding impacts to wildlife in and around Favorite Bay.

Support was offered for the Danger Point location (a location suggested during development of the Master Plan) "because it doesn't involve wildlife."

Cumulative Impacts

It was requested that the cumulative impacts and effects of the project (airport, access road, and air traffic) be addressed in the Draft EIS.

5.0 Summary of Informal Comments from Notes Taken during the Public and Agency Scoping Meetings

In addition to formally submitted comments, informal comments and input were received from agency officials and members of the public during the meetings' question and answer sessions and general discussions. Those comments were noted during the meetings and are summarized in the following order:

- Purpose and Need
- Alternatives
- Impacts Analysis (listed alphabetically by resource, followed by cumulative impacts)

5.1 Purpose and Need

General support was expressed for the airport because of the need for medevac service and mail delivery by regular U.S. Postal Service. It was noted that Angoon did not qualify for a previous project because it did not have an airport, and meeting attendees wondered if the city's ability to compete for business could be part of the Purpose and Need. Attendees also expressed concern that the Draft EIS would inappropriately take into account other desired uses of an access road into USFS lands by the community as part of the project Purpose and Need.

Support was expressed for the expansion of the runway to 5,000 feet in order to accommodate the following:

- Necessary future expansion and the growth potential for the community
- The aircraft that carriers will use in the future to service the community
- Medevac aircraft of a size that can transport patients directly to Anchorage when needed
- The runway's use as a possible training area for the U.S. National Guard

Concern regarding the expansion of the runway beyond the length specified in the Master Plan included the following comment and questions:

- The FAA has the responsibility to respond to community transportation needs, but it is not appropriate to consider speculative needs. Only reasonably foreseeable uses should be considered.
- Because current demographic projections do not show population growth in Angoon, how big a factor is the ability of the airport to expand its runway beyond that proposed in the Master Plan? Might a viable alternative be discarded because that alternative does not accommodate expansion?

5.2 Alternatives

Airport Planning

Meeting attendees asked for clarification about the use of a landing technique called a turning missed approach, which, rather than a straight-out missed approach, would need to be used for all of the preliminary alternatives. Is it a common, normal, and safe procedure? If all of the alternatives are equally safe, is cost the next factor in considering alternatives? When would cost be too high and cause an alternative to be eliminated?

Site Location

Some attendees stated a preference for an airport location closer to the village because of road conditions in Angoon, difficulty of road maintenance, and fuel costs.

Attendees also noted the need to relocate the landfill and wondered how the old and new landfill locations affect alternative locations.

Facilities and Acreage

Meeting attendees requested more details regarding the proposed airport facilities and noted that the Draft EIS will need to disclose the full acreage of the entire impact zone for all facilities related to the project. The disclosure would need to be at a level that meets permitting requirements.

Meeting attendees requested more details about construction, funding, and maintenance of the road.

Meeting attendees requested more details regarding the decision to pave the runway. One respondent noted that a general lack of gravel runways in Southeast Alaska reduces opportunities for pilots to train for other types of landings (e.g., beaches and sand).

Access to Airport

Meeting attendees questioned why the lower access road alternative around Favorite Bay was the DOT&PF's preferred alternative. They also wondered if variations on the Favorite Bay bridge alternative and/or a fast ferry had been considered. Noting that NEPA requires analysis of a reasonable range of alternatives, attendees expressed a desire to see in the Draft EIS the reasons why an alternative was either selected as representing a reasonable range or dismissed from further analysis.

Meeting attendees requested consideration of bridge designs that minimize impacts to estuarine areas along Favorite Creek.

Meeting attendees questioned who would manage the access road to the airport. One attendee commented that the airport should be managed or co-managed by Kootznoowoo, Inc., not solely the USFS, because the airport/access road is on corridor lands, which include "immediate environs," according to this respondent.[3] Attendees wondered if these issues would be addressed in the Draft EIS.

5.3 Impacts Analysis

General

Several public and agency respondents noted that the analysis in the EIS needs to include both direct and indirect impacts and that the Draft EIS will need to consider mitigation for impacts.

Human Health and Safety

Attendees requested details on impacts to human health and safety, including the following:

- The site location possibly resulting in crashes that would affect people in town
- The use of the turning missed approach and its effect on safety
- The impacts of roads, including speed limit and road maintenance, or lack thereof, on safety
- The relationship of the Alternative 12a location and landfill sites in terms of wildlife hazards, air quality, etc.

Noise

Meeting attendees requested details on noise impacts on the town, particularly with Alternative 12a.

Socioeconomics

Meeting attendees requested details regarding impacts of Alternative 12a on land ownership and wondered if there were any issues regarding surface versus subsurface ownership.

Attendees also noted that tourism is a valuable part of the economy. They wondered about the impacts of human activity in wilderness areas to wildlife and tourism.

[3] Kootznoowoo, Inc. retains ownership of lands around the perimeter of Favorite Bay. These lands are referred to as the Kootznoowoo Corridor Lands. The USFS has at least some authority to approve uses of corridor lands because those uses could impact the adjacent Admiralty Island National Monument and Kootznoowoo Wilderness Area. Legislation establishing the corridor lands referenced said lands "and the immediate environs" as lands to which Kootznoowoo, Inc. had some management authority. There is dispute over what "immediate environs" means. To also clarify, the DOT&PF, not the USFS, would manage the airport, as suggested in the respondent's statement.

Subsistence

Meeting attendees requested details on impacts to subsistence. Specific comments regarding analysis included the following:

- Analysis should include whether increased access would result in changes to subsistence patterns in terms of both increased and decreased usage for subsistence.
- Analysis should include interviews with people who are currently conducting subsistence activities, and not just rely on traditional subsistence usage.
- The Favorite Bay and Mitchell Bay areas are prime subsistence areas, especially during freeze-ups. They are important parts of the community and need to remain that way.
- The community needs to know that subsistence areas will be protected, and the Draft EIS must include mitigation measures.
- The bridge alternative over Favorite Bay would have the biggest impacts to subsistence. Water areas are important subsistence resources, so the road alternative would be better.
- A road around Favorite Bay might allow better hunting access and subsistence opportunities.

Vegetation

Meeting attendees requested details regarding tree clearance areas for each of the alternatives.

Water Quality/Hazardous Materials

Meeting attendees requested details on the impacts of fueling operations, as well as more detail regarding chemicals that would be used for runway and aircraft maintenance.

Wetlands

Attendees expressed concern about impacts to estuarine areas. Meeting attendees requested minimization of impacts to estuarine areas through a 1,000-foot beach buffer and bridge span across Favorite Creek.

Wildlife

Attendees expressed concern about the presence of bears in the area and maintenance to the access road possibly leading to bear-human conflicts.

Attendees expressed concern regarding impacts to fish and wildlife habitat, including eagle nests. Meeting attendees noted that the project should be designed so as not to attract birds and bears, and they requested that the U.S. Fish and Wildlife Service's eagle database be researched. One meeting attendee noted that the lake near the Alternative 12a location is excellent bird habitat and that he had seen well over 1,000 mallards there at one time.

Attendees also wondered about the impacts of increased access to wilderness areas on wildlife, and mentioned other areas of Alaska where wildlife became scarcer after access increased.

Cumulative Impacts

Meeting attendees requested information about projects outside of FAA jurisdiction that would be considered in the cumulative impacts analysis and mentioned the Favorite Creek water project as an example, noting that cumulative impacts analysis must include past, present, and reasonably foreseeable projects.

Appendix A: Notice of Intent

55200 Federal Register / Vol. 73, No. 186 / Wednesday, September 24, 2008 / Notices

Dated: September 16, 2008.

Mark Skolnicki,

Executive Secretary, Shipping Coordinating Committee, Department of State.

[FR Doc. E8–22432 Filed 9–23–08; 8:45 am]

BILLING CODE 4710–09–P

DEPARTMENT OF TRANSPORTATION

Office of the Secretary

Notice of Applications for Certificates of Public Convenience and Necessity and Foreign Air Carrier Permits Filed Under Subpart B (Formerly Subpart Q) During the Week Ending September 12, 2008

The following Applications for Certificates of Public Convenience and Necessity and Foreign Air Carrier Permits were filed under Subpart B (formerly Subpart Q) of the Department of Transportation's Procedural Regulations (See 14 CFR 301.201 *et seq.*). The due date for Answers, Conforming Applications, or Motions To Modify Scope are set forth below for each application. Following the Answer period DOT may process the application by expedited procedures. Such procedures may consist of the adoption of a show-cause order, a tentative order, or in appropriate cases a final order without further proceedings.

Docket Number: DOT–OST–2008–0285.

Date Filed: September 12, 2008.

Due Date for Answers, Conforming Applications, or Motion To Modify Scope: October 3, 2008.

Description: Application of Sovereign Air, Inc. requesting authority to operate scheduled passenger service as a commuter air carrier.

Renee V. Wright,

Program Manager, Docket Operations, Federal Register Liaison.

[FR Doc. E8–22363 Filed 9–23–08; 8:45 am]

BILLING CODE 4910–9X–P

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Environmental Impact Statement: Angoon Airport, Angoon, AK

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of intent.

SUMMARY: The FAA announces that they will prepare an Environmental Impact Statement (EIS) to consider alternatives to and disclose the potential impacts of constructing a new land-based commercial airport near the City of Angoon. The FAA will hold public and agency scoping meetings to help identify substantive project concerns to be addressed in the EIS process. Cooperating agencies in this process include the United States Forest Service (USFS), and the United States Army Corps of Engineers (ACOE).

DATES: 1. October 27, 2008 in Anchorage, Alaska for agency scoping meeting.

2. October 27, 2008 in Anchorage, Alaska for public scoping meeting.

3. October 29, 2008 in Juneau, Alaska for agency scoping meeting.

4. October 29, 2008 in Juneau, Alaska for public scoping meeting.

5. October 31, 2008 in Angoon, Alaska for public scoping meeting.

6. November 10, 2008 close of scoping comment period.

Responsible Official: Leslie A. Grey, Environmental Protection Specialist AAL–614, Federal Aviation Administration, Alaskan Region, Airports Division, 222 W. 7th Avenue, #14, Anchorage, AK 99513–7587 Anchorage, AK 99513–7587, Telephone (907) 271–5453.

FOR FURTHER INFORMATION CONTACT: Leslie A. Grey, Environmental Protection Specialist AAL–614, Federal Aviation Administration, Alaskan Region, Airports Division, 222 W. 7th Avenue, #14, Anchorage, AK 99513–7587, Telephone (907) 271–5453, e-mail: *comments@angoonairporteis.com.*

Additional details regarding the project can be found on the project Web site at *http://www.angoonairporteis.com.*

Submit Written Comments, Send to: Leslie A. Grey, Environmental Protection Specialist AAL–614, Federal Aviation Administration, Alaskan Region, Airports Division, 222 W. 7th Avenue, #14, Anchorage, AK 99513–7587, Telephone (907) 271–5453, e-mail: *comments@angoonairporteis.com.*

SUPPLEMENTARY INFORMATION: The FAA will prepare an EIS to assess the proposed construction of a land-based airport in or near the community of Angoon. The Alaska Department of Transportation and Public Facilities' (DOT&PF) Airport Master Plan site submitted to the FAA for consideration would encompass approximately 270 acres and would include a single 3,300 foot runway (with the ability to be expanded to 4,000 feet in the future) and a 3.5 acre apron that would include areas for airport support facilities as needed. This airport would be similar in size and facilities to existing airports at Hoonah, AK and Kake, AK.

Because DOT&PF's proposed site is partially within Admiralty Island National Monument, the USFS has to make a decision on whether to grant and administer a Special Use Permit for airport operation on the Monument, or pursue some type of conveyance of the property to state ownership. To facilitate this process, the FAA has asked the USFS to be a cooperator in the EIS process to ensure that the EIS analysis and range of alternatives will meet the need of the USFS to make an informed decision.

Because jurisdictional waters of the United States occur within the proposed project area, it is possible that a 404(b)(1) permit application will also be required for the project. The FAA has also asked the ACOE to be a cooperator in this process because of the ACOE's jurisdictional authority over this resource.

To ensure that the full range of issues related to the proposed action are addressed and that all significant issues are identified, the FAA will coordinate and consult with the public; tribal governments; Federal, State, local agencies, and tribal corporations that have jurisdiction by law or have special expertise with respect to any environmental impacts associated with the proposed projects.

The agency scoping meetings will be held in Anchorage, Alaska on October 27, 2008 and in Juneau, Alaska on October 29, 2008. Public scoping meetings will be held in Anchorage, Alaska on October 27, 2008, in Juneau, Alaska on October 29, 2008 and in Angoon, Alaska on October 31, 2008. Notification of the public scoping meetings will be published on the project Web site (*http://www.angoonairporteis.com*), in the Juneau Empire, and in the Anchorage Daily News, and will be posted at the Community Center in Angoon.

In addition to providing input at the scoping meetings, the agencies and the public may submit written comments via the e-mail address *comments@angoonairporteis.com* or the address shown above under, "to Submit Written Comments, Send to." Comments must be submitted by November 10, 2008.

Issued in Anchorage, Alaska, on September 17, 2008.

James W. Lomen,

Deputy Division Manager, FAA, Airports Division, AAL–601.

[FR Doc. E8–22475 Filed 9–23–08; 8:45 am]

BILLING CODE 4910–13–P

APPENDIX B: PUBLIC AND AGENCY SCOPING COMMENTS SUMMARY TABLE

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	1	1	PN	I see a need for air medevac.	PN
I	1	2	PN	12a is my choice for future expansion to 5,000 feet, closer to existing road system.	PN
I	1	3	WLF	I object to 3a, 2, 4, anything affecting Favorite Bay – too many effects on wildlife, Angoon subsistence lifestyle, and negative effects.	IA
I	1	4	SUB	I object to 3a, 2, 4, anything affecting Favorite Bay – too many effects on wildlife, Angoon subsistence lifestyle, and negative effects.	IA
I	2	1	PN	Sea planes, air medic, forest fire fighters, U.S. Postal Mail, U.S. Forest Service, other airlines in landing emergencies and for year-round jobs for people for years to come.	PN
I	2	2	PN	Whatever strip you build, please to 5,000 feet and then some, with an emergency fire response crew.	PN
I	2	3	SOC	Excellent for business!	IA
I	3	1	ALT	My personal preference is 3a; it seems the best approach with the least possibility of crashing into a mountainside.	ALT
I	3	2	SUB	My husband, who is a wonderful provider and fills our freezer with subsistence foods, said that a road to 3a could provide a way to access, not just to the airport (The Walter Sobeloff Airport!), but also to harvest our foods.	IA
I	4	1	SUB	Under the 1971 Alaska Native Claims Settlement Act (ANCSA), the Village of Angoon selected the area surrounding Angoon and Kootznahoo Inlet on Admiralty Island (approximately 23,000 acres). However, after considering the possibly negative effects on local subsistence uses by the commercialization of those lands, our elders petitioned their elected representatives to change their cultural lifestyle as true subsistence users since time immemorial. The decision by the elders, the follow-through by their local representatives of Kootznoowoo, and the ultimate approval by the U.S. Congress for the change in Kootznoowoo's land selection to Prince of Wales Island resulted not only in substantially increased revenues to Kootznoowoo and its shareholders (from the increased value of the timber on the lands on Prince of Wales Island over the values of the original Kootznahoo Inlet (Angoon selection). Additionally, Kootznoowoo, in the re-selection of lands on Prince of Wales Island over Kootznoowoo Inlet, was granted an additional 10,000 acres. Acres making the total acreage awarded Kootznoowoo equal to 33,000 acres—more than any other ANCSA village corporation! More importantly, however, was that in changing Kootznoowoo's original land selection off-island for lands on Prince of Wales Island over that in Kootznahoo Inlet, the lands and waters surrounding Angoon and its subsistence values were protected for future generations.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
				Of all the ANCSA land selections by the villages in southern Southeast Alaska, other than Klukwan and Goldbelt, Kootznoowoo (Angoon) alone chose to protect their cultural subsistence values. In most cases, the rest chose to log right up to their city boundaries. It has been said by other villages that Kootznoowoo (Angoon) alone got its cake and ate it, too! That is, we received the increased revenues from commercial logging and kept our subsistence uses surrounding our village intact. Today, we have an issue before us that I believe will adversely affect our ability to continue our most sacred and valued subsistence uses and lifestyles. Our elders, parents, and grandparents worked hard to protect and pass on this knowledge on to future generations. Do we wish to continue that protection that has sustained us for generations and generations as our elders did? Or shall we destroy (for temporary monetary gain) our valued heritage? It does not have to be one or the other, because, as with the change in our land selections under ANCSA, we were able to retain our subsistence values and still increase our wealth. With wise decisions, we can have the best of both worlds! The current issue is a decision to construct a proposed 100–400 acre airport at the mouth of Favorite Bay in Kootznahoo Inlet, with access to the airport by a road to be constructed along the south side of Favorite Bay, bridging across the salmon stream at the head of Favorite Bay, continuing back down the north side of the bay to the proposed airport site across from the Angoon Boat Harbor and extending in a northwesterly direction to Kanalku Bay. The inside waterway, including Kootznahoo Inlet, Favorite Bay, Mitchell Bay, Salt Lake, and Kanalku Bay are one of the most, if not the most, valued food sources we have, containing most, if not all, of the major foods our people utilize to survive. Deer, crab, clams, shrimp, salmon, gumboots, bottom fish, waterfowl, bear, goose tongue, wild asparagus, blueberries, huckleberries, currants, and other traditional foods are readily available in this close proximity to town. When Chatham Strait was stormy and inaccessible for our local hunters, fishermen, and food gatherers, they could find subsistence staples in this location. Our ancestors were truly wise to make Kootznahoo their home. Many, if not most, of us here today live here because of the area's bountiful resources. To put an airport right in the middle of this untamed, resource-bountiful area would help destroy the very reason our ancestors and we here treasure it today. We do not have to be like everybody else, just because Kake and Hoonah, Craig did it; we do not have to. Just as in our decision to change our ANCSA land selection and log elsewhere—and thereby gaining the best of two worlds—we can again have our cake and eat it, too!	

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	4	2	SUB	In definition, an airstrip is a graveled runway 3,500 to 4,000 feet in length and 50 to 60 feet wide. Such a strip can adequately handle both small- and medium-wheeled passenger and cargo planes. Aside from cost, the major problem with putting in a state airport is that the community loses control over who (basically anyone with access to an airplane!) can utilize the airport. Many pilots throughout Southeast Alaska have said that should an Angoon airport be built, they would use the airport to access hunting and fishing opportunities in the Angoon area, which would be in direct competition with Angoon subsistence users and residents.	IA
I	4	3	ALT	Having traveled and worked throughout much of rural northern and western Alaska, I observed that many villages far more landlocked and remote than Angoon made extensive and sole use of simple airstrips to meet all their shipping and transportation needs. These villages constructed airstrips rather than full-fledged airport facilities and kept the cost to a minimum. For several years I have suggested that instead of a huge state airport accessible to any outsider, we build an airstrip capable of handling both passenger and cargo planes on lands owned by Kootznoowoo Incorporated. By doing so we would have not only the availability of both wheeled passenger and cargo planes without the huge handprint of a full-sized airport located in a prime subsistence use area like Favorite and Kanalku bays, available to an unknown amount of outsiders, many of whom have said that they would not utilize commercial facilities in Angoon, preferring to camp out rather than paying for services. The key here is that by placing the airstrip on privately owned Kootznoowoo land, we could control who uses the airstrip, emergencies excepted. Kootznoowoo could authorize certain air services and individuals to utilize the airstrip and have the final say as to who is allowed to use the airstrip. There are several areas on or near our present road system where an airstrip could be placed, which would have little or no effect on our lifestyle and cultural subsistence use. With the construction of an airstrip instead of a state-owned airport, we can have our cake and eat it, too!	ALT

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	4	4	SOC	Supporters of a state airport say that there would be many temporary local jobs created in the construction of the airport and the access road leading to the airport and after the airport is completed. This has not been proved to be the case in the construction of the other state airports in Hoonah and Craig. Most of the technical workers were brought in from outside the communities. Yes, some jobs would be available to local workers during the construction period of a state airport; however, in building a strip instead, as many or more local jobs would be created and accomplish the same results as in the building of a state airport without affecting our subsistence values in Favorite and Kanalku bays.	IA
I	4	5	SOC	More importantly, economically speaking, rather than benefiting the great tourism potential that we have by our surrounding untouched wilderness, an airport at that location (Favorite Bay) will detract from those values making us just like everyone else.	IA
I	4	6	SOC	A final thought is that many of us, when shopping for food supplies, take our vehicles into Juneau on the state ferry every few weeks or months to buy in large quantities. We can fill up our vehicles and return home at a reasonable cost. Whether a huge state airport or an airstrip is built, we will still not be able to afford the roundtrip airfare and excess baggage fees. It will make no difference in our ability to bring in supplies and most will continue to use the ferry. A state airport will forever change the values that we and our ancestors held/hold so dear!	IA
I	4	7	SUB	In personally attending the hearing by the EIS planning team on October 30, 2008, I remain steadfast in my objections to the construction of an airport on the west-northwest side of Favorite Bay fearing, as stated in my written statement, possible serious negative effects of such construction to our subsistence uses not only in construction at an airport there, but just as serious or more so, a nearby seven-mile road being constructed along both the south and north shores of Favorite Bay to access the airport, with one or two crossings over Favorite Bay Creek on important salmon spawning stream.	IA
I	4	8	MS	Within my written statement I suggest that instead of a state-financed airport that Kootznoowoo Inc. instead build an airstrip located on Kootznoowoo lands to have some control on the users of the field, being privately owned so as to control over the use of the local fish and game resources. I now believe that the concept or opportunity has passed us by and that any other discussions on that would only delay or even cause stoppage of the building of an airport in Angoon. Since so much time, effort, and money has been spent on DOT's planning for the Angoon airport.	NS

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	4	9	ALT	I believe that Site 12a of the airport planning site evaluation is the best site for the airport. It is right on the present road system (nearly) and easily accessible, does not affect subsistence taking, and is obviously much less costly to construct than the sites on the west-northwest side of Favorite Bay.	ALT
I	5	1	ALT	I would go for 12a.	ALT
I	5	2	SOC	I would like to see the airport come as soon as possible. A lot of elders that passed away that didn't want it because of our alcohol and drugs coming in. Not worry about it because we need it because of the high cost of living.	IA
I	6	1	ALT	My thoughts would be #3a airport would be an excellent choice, low wind shear north wind or SE wind, access to fresh water, and only one-mile road to village road. I do believe #3a air strip will be an excellent choice. I've lived in Angoon for 35 years and plan on living my life out there.	ALT
I	6	2	ALT	Or 12a with tail wind and SE head wind and access to fresh water also. With less road to build. Either one would be great 25 years ago.	ALT
I	7	1	WLF	Prefer the Danger Point location; doesn't involve wildlife	IA
I	7	2	ALT	Prefer closer location because roads are icy and hard to maintain. Don't get enough sand to maintain roads properly; even the roads close to town —by rock quarry—have a lot of snow, need additional equipment to maintain properly.	ALT
I	7	3	ALT	Site 3/3A has too long a road. Gas prices are very high—for private citizens and for maintenance equipment.	ALT
B	8	1	ALT	It is my position that very serious consideration should be given to building a gravel runway instead of a hard surface type. One reason is that Southeast Alaska lacks a high quality gravel runway that is open to the public. The one at Snetisham is not for public use. This leaves the strip at Atlin, BC, which is beyond the mountains and in another country. The lack of a good gravel strip places significant limits on training for tailwheel airplane operations. There are numerous locations in the southeast where one can land a tailwheel airplane, and people do it all the time. However, one would not want do primary training using any of these strips. Using a hard surface runway for training is somewhat hazardous and to some extent defeats the purpose, since the idea is to learn to land on gravel. Another reason is that a gravel surface would be cheaper and, in the future, when petroleum fuels will become less and less available and more and more expensive, it will be possible to maintain the gravel surface by fairly primitive means. Even now one sees from an article in	ALT

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
				the Juneau Empire: "Expect a bumpier drive. An asphalt shortage is delaying road maintenance projects in communities nationwide, including Alaska. Asphalt is becoming scarce as U.S. refiners overhaul their equipment to maximize output of highly profitable fuels such as diesel and gasoline, using inexpensive—and hard to process—crude oil. To make matters worse, refiners are also cutting back on the production of a petrochemical that many states mix into asphalt to make roads more durable. “In the past, about 40 percent of an oil barrel would be turned into asphalt products and now it's around 10 percent,” McMinimee said. There is also a shortage of cement, so that is not necessarily a cure to the problem. If one builds a hard surface runway, sooner or later one must repave it. We should contemplate how that will be done given the ever-decreasing supply of cement and asphalt.	
I	9	1	SUB	I don't hunt or fish, nor have I ever gone on any trips with anyone to hunt or fish, but I have waited for the ones who do so that when they come home, me and my family may have a chance to buy some subsistence to feed our family and to support the people who hunt and fish with the price it costs them to provide the subsistence.	IA
I	9	2	SOC	I hope my husband can get a job on this project so we can bring our family back home to Angoon, AK.	IA
I	10	1	ALT	I support the 3rd or preferred site of the Angoon Airport. I had a chance to speak on the subsistence of the area, but did not get a chance to say I fully support the "Favorite Bay Site."	ALT
I	11	1	PN	In reviewing the documents and analysis presented on the State of Alaska Department of Transportation Angoon Airport planning web site, we conclude that most, if not all, the analysis deals with technical airport design and construction. We acknowledge the value of providing Angoon with a reliable and safe airport.	PN

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	11	2	PRO	Given that Admiralty Island National Monument and Kootznoowoo Wilderness represents a world class reserve, there are a number of other issues and considerations that need analysis in order to make an informed decision and one that meets the federal intent and letter of NEPA, ANILCA, and the revised Tongass Land Use Management Plan. In addition there are other federal and state laws and issues that must be addressed, among which are water quality, coastal zone management, disposal of hazardous waste, the Bald Eagle Protection Act, protection of fish and wildlife habitat, the State Forest Practice Act, and cultural and subsistence protection.	PRO
I	11	3	PRO	There is also a requirement for the federal government to interact with the Angoon Community Association, the federally recognized tribal government on a “government to government” basis. They were not listed in your “Agency Contacts.”	PRO
I	11	4	SUB	The land ownership, use patterns, and natural resource values are key issues to address and resolve. Your favored airport location (#3) is partially on Kootznoowoo Corporation lands and on Admiralty Island National Monument and Kootznoonoo Wilderness Area lands with anticipated impacts to tidal lands. The proposed project will have significant impacts to the public lands and waters, and diminish those values for which those lands were designated. An example is a native allotment (on the east side at the head of Favorite Bay) that was purchased and returned to the Monument–Wilderness Area status due to a controversial logging project that would have impacted traditional subsistence use. It appears that the airport access road would pass through this same parcel. This land purchase is a demonstrated value of the resource values important to Angoon as well as the American people.	IA
I	11	5	CUM	Favorite Bay, Kanalku Bay, and the adjacent waterways and land contain high-importance wildlife and fish habitat and populations and wilderness, subsistence, cultural, scenic, and recreation values. The primary concerns our organization has focus on the obvious conflicts between this project and the natural and cultural resource values. Given the significant level of national and local values, we ask that the Draft EIS address in detail: 1) The cumulative impacts and effects of this project (airport, access road, and air traffic).	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	11	6	SOC	Favorite Bay, Kanalku Bay, and the adjacent waterways and land contain high-importance wildlife and fish habitat and populations and wilderness, subsistence, cultural, scenic, and recreation values. The primary concerns our organization has focus on the obvious conflicts between this project and the natural and cultural resource values. Given the significant level of national and local values, we ask that the Draft EIS address in detail: 2) The social and economic costs and benefits to Angoon and the public anticipated by this project.	IA
I	11	7	WLD	Favorite Bay, Kanalku Bay, and the adjacent waterways and land contain high-importance wildlife and fish habitat and populations and wilderness, subsistence, cultural, scenic, and recreation values. The primary concerns our organization has focus on the obvious conflicts between this project and the natural and cultural resource values. Given the significant level of national and local values, we ask that the Draft EIS address in detail: 3) Potential mitigation of project impacts to the national Monument/Wilderness values. Please consider a land exchange, alternative project locations, or other strategies.	IA
I	11	8	PRO	Favorite Bay, Kanalku Bay, and the adjacent waterways and land contain high-importance wildlife and fish habitat and populations and wilderness, subsistence, cultural, scenic, and recreation values. The primary concerns our organization has focus on the obvious conflicts between this project and the natural and cultural resource values. Given the significant level of national and local values, we ask that the Draft EIS address in detail: 4) A detailed description of the involved government agencies and their various roles in the decision-making of this project.	PRO

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	12	1	PRO	We support the overarching goal to provide the community of Angoon with a safe and reliable airport. We also recognize certain alternatives under consideration would locate the proposed airport and access road within designated Wilderness due to limited suitable, developable land elsewhere. As such, we appreciate the scoping materials address the process established under Title XI of the Alaska National Interest Lands Conservation Act to consider proposed transportation and utility systems within ANILCA conservation system units, including designated wilderness. We also appreciate the Federal Aviation Administration's continuing efforts to work with appropriate parties to assess these alternatives and address any related issues in the context of ANILCA.	PRO
G	12	2	FISH	The proposed project may require authorizations from various state agencies, including the Alaska departments of Fish and Game, Natural Resources, and Environmental Conservation. For example, fish habitat permits are required for any in-stream activities affecting water bodies that may contain anadromous or resident fish. Favorite Creek (112-67-10800) is currently the only cataloged anadromous stream in the project area. However, because the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* may be incomplete and does not identify waters important to resident fish; all water bodies potentially impacted by the proposed project must be sampled for fish presence. Construction activities also need to be planned to avoid sensitive life stages of fish. In addition, the project area is located within the Alaska coastal zone boundary and, as such, is subject to the requirements of the Alaska Coastal Management Program.	IA
G	13	1	LAR	The Land Section of the Division of Mining, Land and Water has reviewed the above-referenced development project for public scoping comments. The project proposes three alternatives to develop an airport in Angoon, Alaska. If Access Alternative 3 is the preferred alternative, please be advised that an application for land use from the Department of Natural Resources may be required.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	1	PN	The EIS should clearly identify the underlying purpose and need to which the FAA is responding in proposing the alternatives, including the broader public interest and need. The purpose of the proposed action is typically the specific objectives of the activity or project, while the need for the proposed action may be to eliminate a broader underlying problem or take advantage of an opportunity. Thus, the purpose and need should be a clear, objective statement of the rationale for the proposed project, as it provides the framework for identifying project alternatives. In supporting the statement of purpose and need, the EIS should discuss the proposed project in the context of other aviation and transportation services in the region, and clearly describe how the need for the proposed action has been determined.	PN
G	14	10	WR	The EIS should use existing plans to identify aquatic resources that would be potentially impacted by construction and operation of the proposed airport. Since the FAA has previously determined that jurisdictional waters are present in the project area, the FAA should continue to coordinate with the [U.S. Army] Corps [of Engineers] to ensure the development of a preferred alternative that will meet the requirements of Section 404(b)(l) guidelines in the CWA (*Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* [40 CFR 230]), and that the preferred alternative can be determined to be the least environmentally damaging practicable alternative (LEDPA). The EIS should describe all waters of the U.S. that could be affected by the project alternatives, and include maps that clearly identify all waters within the project area. The discussion should include acreages and channel lengths, habitat types, values, and functions of these waters. If, under the proposed project, dredged or fill material would be discharged into waters of the U.S., the EIS should discuss alternatives to avoid those discharges. If a discharge to waters of the U.S. becomes necessary, the EIS should discuss how potential impacts would be minimized and mitigated. This discussion should include (a) acreage and habitat type of waters of the U.S. that would be created or restored; (b) water sources to maintain the mitigation area; (c) re-vegetation plans, including the numbers and age of each species to be planted, as well as special techniques that may be necessary for planting; (d) maintenance and monitoring plans, including performance standards to determine mitigation success; (e) size and location of mitigation zones; (f) parties that would be ultimately responsible for the plan's success; and (g) contingency plans that would be enacted if the original plan fails. Mitigation should be implemented in advance of the impacts to avoid habitat losses due to the lag time between the occurrence of the impact and successful mitigation, and should follow the preferences for mitigation types outlined in the recent *Compensatory Mitigation Rule* (Federal Register. April 10, 2008).	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	11	AQ	The EIS should provide a detailed discussion of ambient air conditions (baseline or existing conditions), National Ambient Air Quality Standards (NAAQS), and criteria pollutant non-attainment areas in the project area and vicinity, if applicable. The EIS should estimate emissions of criteria pollutants for the airport area and discuss the timeframe for release of these emissions from construction through the lifespan of the project. Also, the document should include analysis of the potential impacts to air quality (including cumulative and indirect impacts) from the project, especially during construction. The EIS should specify emission sources and quantify these emissions. Such an evaluation is necessary to assure compliance with state and federal air quality regulations and to disclose the potential impacts from temporary or cumulative degradation of air quality. The EIS should include the following: (a) detailed information about ambient air conditions, NAAQS, and criteria pollutant non-attainment areas in all areas considered for the airport and adjacent areas; (b) data on emissions of criteria pollutants from the proposed project and discuss the timeframe for release of these emissions; (c) specific information about pollutant from mobile sources, stationary sources, and ground disturbance (this source-specific information should be used to identify appropriate mitigation measures and areas in need of the greatest attention); and (d) an Equipment Emissions Mitigation Plan that identifies actions to reduce diesel particulate, carbon monoxide, hydrocarbons, and NOx associated with construction activities.	IA
G	14	12	HMW	The EIS should address potential direct, indirect, and cumulative impacts of use of hazardous and non-hazardous materials in the construction and operation of the project. Because of the project, hazardous materials such as compressed gas, petroleum products, and others may be used and/or stored in the community or at the airport site. Although their proper management is presumed to be safe, concerns remain about the possibility of accidents resulting in the release of hazardous materials to the environment. The EIS should therefore describe measures that will be taken to minimize the chances of such an accident, and emergency response measures that would be taken should an accident occur.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	13	HMW	The EIS should address the applicability of state and federal hazardous materials, pollution prevention, and solid waste requirements, and appropriate mitigation measures to prevent and minimize the generation of solid and hazardous materials. Consistent with the FAA guidelines on Environmental Resource Categories and Associated Statutory and Regulatory References (seehttp://www.faa.gov/airports_airtraffic/airports/regional_guidance /great_lakes/airports_resources/ppms/media/5050.15.pdf) and EPA regulations (40 CFR 112. Final Rule published November 5, 2008), preparation and implementation of Spill Prevention, Control, and Countermeasure (SPCC) plans for the proposed airport may be necessary depending on storage capacities and types. The EPA recommends that information addressing such plans be included in the EIS document, if applicable.	IA
G	14	14	HMW	If any pesticides and herbicides will be used during construction, operation, and maintenance of the project, the EIS should address any potential toxic hazards related to the application of the chemicals, and describe what actions will be taken to assure that impacts by toxic substances released to the environment will be minimized.	IA
G	14	15	VEG	Executive Order 13112, Invasive Species (February 3, 1999) mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. The EIS should include a project design feature that calls for the development of an invasive plant management plan to monitor and control noxious weeds, and to utilize native plants for restoration of disturbed areas after construction. Finally, since the operation of a rural airport usually requires the construction of support and passenger facilities, the EPA recommends that the EIS discuss how wastewater and solid waste generated at the airport will be managed.	IA
G	14	16	TES	Evaluation of the proposed airport project should identify the endangered, threatened, and candidate species under the Endangered Species Act (ESA), and other sensitive species within the project area, if applicable. The EIS should describe the critical habitat for the species and identify any impacts the project will have on the species and its critical habitat and how the proposed project will meet all requirements under ESA, including consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service (NMFS). The EIS may need to include a biological assessment and a description of the outcome of consultation with the services under Section 7 of ESA. The FAA actions should promote the recovery of declining populations of species.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	17	LU	Land use impacts would include, disturbance of existing land uses within construction work areas during construction and creation of permanent rights-of-ways for construction, operations, and maintenance of the airport and associated facilities. The EIS should document all existing land cover and uses in the project area, particularly traditional and subsistence uses; anticipated impacts by the project to the land cover and uses; and mitigation measures that would be implemented to reduce the impacts. The EIS should indicate which land uses would be converted into airport use and acreages, and measures that would be taken to compensate landowners for loss of their resources due to the project.	IA
G	14	18	LU	Since the currently proposed alternatives include ones located in the Monument–Wilderness Area, the EIS should specify the special designation areas, indicate impacts to the areas, and document any easement conditions for use of the areas, including mitigation measures.	IA
G	14	19	CUM	[The Council on Environmental Quality] (CEQ) definition of cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." The cumulative impacts analysis should therefore provide the context for understanding the magnitude of the impacts of the alternatives by analyzing the impacts of other past, present, and reasonably foreseeable projects or actions and then consider those cumulative impacts in their entirety. The EIS should include and analyze present and reasonably foreseeable projects and actions proximate to the airport area and vicinity. Where adverse cumulative impacts may exist, the EIS should disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts.	IA
G	14	2	ALT	The EIS should include a range of reasonable alternatives that meet the stated purpose and need for the project and that are responsive to the issues identified during the scoping process. The Council on Environmental Quality (CEQ) recommends that all reasonable alternatives should be considered, even if some of them could be outside the capability of the applicant or the jurisdiction of the agency. Also, the environmental impacts of the proposal and alternatives should be presented in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker and the public. The potential impacts of each alternative should be quantified to the greatest extent possible. It would also be useful to list each alternative action's impacts and corresponding mitigation measures. The EPA encourages selection of reasonable alternatives that will minimize environmental degradation.	ALT

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	20	CUM	The EIS should clearly identify the resources that may be cumulatively impacted, the time over which impacts are going to occur, and the geographic area that will be impacted by the proposed project. The focus should be on resources of concern - those resources that are at risk and/or are significantly impacted by the proposed project before mitigation. In the introduction to the Cumulative Impacts Section, identify which resources are analyzed, which ones are not, and why. For each resource analyzed, the EIS should (a) identify the current condition of the resource as a measure of past impacts, for example, the percentage of species habitat lest to date; (b) identify the trend in the condition of the resource as a measure of present impacts, for example, the health of the resource is improving, declining, or in stasis; (c) identify the future condition of the resource based on an analysis of the cumulative impacts of reasonably foreseeable projects or actions added, and identify existing conditions and current trends, for example, what will the future condition of the watershed be; (d) assess the cumulative impacts contribution of the proposed alternatives to the long-term health of the resource, and provide a specific measure for the projected impact from the proposed alternatives; (e) disclose the parties that would be responsible for avoiding, minimizing, and mitigating those adverse impacts; and (f) identify opportunities to avoid and minimize impacts, including working with other entities.	IA
G	14	21	CLIM	Currently, there is concern that continued increases in greenhouse gas emissions resulting from human activities contribute to climate change. Effects of climate change may include changes in hydrology, sea level, weather patterns, precipitation rates, and chemical reaction rates. The EIS document should therefore consider how resources affected by climate change could potentially influence the proposed project and vice versa, especially within sensitive areas. Also, the EIS should quantify and disclose greenhouse gas emissions from the project and discuss mitigation measures to reduce emissions.	IA
G	14	22	PRO	The EIS should describe the process and outcome of government-to-government consultation between the FAA and tribal government(s) that would be affected by the project and issues that were raised, if any, and how those issues were addressed. *Executive Order 13175, Consultation and Coordination with Indian Tribal Governments* (November 6, 2000) was issued in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the U.S. government-to-government relationships with Indian tribes.	PRO

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	23	SOC	The EIS should include an evaluation of environmental justice populations within the geographic scope of the project. If such populations exist, the EIS should address the potential for disproportionate adverse impacts to minority and low-income populations and the approaches used to foster public participation by these populations. Assessment of the project's impact on minority and low-income populations should reflect coordination with those affected populations.	IA
G	14	24	SOC	The EIS must demonstrate that communities bearing disproportionately high and adverse effects have had meaningful input into the decisions being made about the project. The EIS needs to include information describing what was done to inform the communities about the project and the potential impacts it will have on their communities (notices, mailings. fact sheets, briefings, presentations, exhibits, tours, news releases, translations, newsletters, report s, community interviews, surveys, canvassing, telephone hotlines, question and answer sessions, stakeholder meetings, and on-scene information); what input was received from the communities; and how that input was utilized in the decisions that were made regarding the project. One tool available to locate environmental justice populations is the Environmental Justice Geographic Assessment tool, which is available online at: http://www.epa.gov/enviro/ej.	IA
G	14	25	SOC	*Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994) directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations, allowing those populations a meaningful opportunity to participate in the decision-making process.	IA
G	14	26	PRO	The proposed project has the potential to impact a variety of resources for an extended period of lime. As a result, EPA recommends that the project be designed to include an environmental inspection and mitigation monitoring program to ensure compliance with all mitigation measures and to assess their effectiveness. The EIS document should describe the monitoring program and how it will be used as an effective feedback mechanism, such as through adaptive management, so that any needed adjustments can be made to the project to meet environmental objectives during the project operation, maintenance, and eventual decommissioning. The EIS should also discuss how the existing transportation facilities would be decommissioned, if applicable.	PRO
G	14	27	ATT	Attachment 1: EPA's Section 309 Review: The Clean Air Act and NEPA.	NS
G	14	28	ATT	Attachment 2: The National Environmental Policy Act and CEQ	NS

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	3	WR	Water quality degradation is one of the EPA’s primary concerns. Section 303(d) of the Clean Water Act requires the State of Alaska to identify water bodies that do not meet water quality standards and to develop water quality restoration plans to meet established water quality criteria and associated beneficial uses. The EIS must disclose which waters may be impacted by the project, the nature of potential impacts, and specific pollutants likely to impact those waters. It should also report those water bodies potentially affected by the project that are listed on the state's most current EPA-approved 303(d) list. The EIS document should describe existing restoration and enhancement efforts for those waters, how the proposed project will coordinate with on-going protection efforts, and any mitigation measures that will be implemented to avoid further degradation of water quality within impaired waters.	IA
G	14	4	WR	Antidegradation provisions of the CWA apply to those water bodies where water quality standards are currently being met. This provision prohibits degrading the water quality unless an analysis shows that important economic and social development necessitates degrading water quality. Project evaluation should determine how the antidegradation provisions would be met.	IA
G	14	5	WR	Public drinking water supplies and/or their source areas often exist in many watersheds. It is possible that source water areas may exist within the watershed(s) in which the new airport and associated facilities will be built. Source water is water from streams, rivers, lakes, springs, and aquifers that is used as a supply of drinking water. Source water areas are delineated and mapped by the state for each federally regulated public water system. The 1996 amendments to the Safe Drinking Water Act (SDWA) require federal agencies to protect sources of drinking water for communities. As a result, state agencies have been delegated responsibility to conduct source water assessments and provide a database of information about the watersheds and aquifers that supply public water systems. If the construction and operation of the project may impact sources of drinking water, EPA recommends that FAA contact the Alaska Department of Environmental Conservation to help identify source water protection areas within the project area. The EIS document should: (a) identify all source water protection areas within the project area, (b) identify all activities that could potentially affect source water areas, (c) identify all potential contaminants that may result from the proposed project, and (d) identify all measures that would be taken to protect the source water protection areas in the Draft EIS.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	6	WR	The EIS should note that, under the CWA, any construction project disturbing a land area of one or more acres requires the National Pollutant Discharge Elimination System (NPDES) permit for discharges to waters of the U.S. The EIS should document the project's consistency with applicable stormwater permitting requirements and should discuss specific mitigation measures that may be necessary or beneficial in reducing adverse impacts to water quality. Construction of the new airport will disturb soils and increase impervious surface area, resulting in potential stormwater impacts that should be analyzed. If project construction or site clearing is initiated prior to the delegation of the construction stormwater program to the State of Alaska (October 31. 2009), a Notice of Intent should be submitted to EPA for coverage under the NPDES Stormwater Construction General Permit. A Stormwater Pollution Prevention Plan (SWPPP) should be developed and implemented on site to minimize potential adverse effects of stormwater runoff to receiving waters. The SWPPP should identify best management practices, effective control measures, structural design features, and post-project monitoring. To the maximum extent practicable, we recommend that natural vegetation be maintained adjacent to the road, pad, and airstrip to support natural filtration of stormwater and trapping of sediments.	IA
G	14	7	WR	Should the discharge of pollutants to waters of the U.S. be necessary during airport operation, the airport will also need coverage under the EPA NPDES Multi-Sector General Permit. This permit was recently reissued in September 2008, and information regarding the changes to the permit can be viewed at http://cfpuh.epa.eov/npdes/stormwater/msgp.cfm. Please note that the Stormwater Program will be delegated to the State of Alaska on October 31, 2009, as well.	IA
G	14	8	FSH	Additionally, ethylene and propylene glycol, common deicing fluids used extensively in Alaska, are known to cause harm to fish by reducing the amount of oxygen in the water when it reaches streams or lakes. In its 2004 Effluent Limit Guidelines Plan, EPA reviewed existing permits and decided to develop effluent guidelines for the airport deicing category. EPA plans to publish a proposed rule in the near future and take final action by December 2009. As such, discharge controls should be considered in the project design and management programs to prevent deicing fluid from reaching the numerous water bodies in the project area and to ensure that wastes from deicing operations are properly collected and treated, if applicable.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	14	9	WLF	Construction of facilities and access roads and runways may also compact the soil, thus changing hydrology, runoff characteristics, and affecting flows and delivery of pollutants to waterbodies and ecological function of the area. The EIS should therefore include a detailed discussion of the cumulative effects from this and other projects on the hydrologic conditions of the proposed airport. The document should clearly depict reasonably foreseeable direct, indirect, and cumulative impacts to groundwater and surface water resources. For groundwater, the potentially affected groundwater basin should be identified and any potential for subsidence and impacts to springs or other open waterbodies and biologic resources should be analyzed.	IA
I	15	1	PN	We need an airport because when the weather is bad no planes come in; other ways are slower and sometimes we have to get in faster, like for emergency. The bad weather (environment) sometimes keeps planes from coming in for up to 3 weeks during the winter months. We can expect our mail from coming in but we need to get out “fast” in emergency. I was medevac’ed out of Angoon with a brain aneurism. I was lucky the weather was okay; some people were not.	PN
I	15	2	SOC	The money we will save will also impact our economy/environment.	IA
I	16	1	ALT	I would like to have an airport here in Angoon. I believe selection #3 would be the best site, and I do not believe it will significantly affect subsistence hunting, fishing, or gathering.	ALT
I	16	2	PN	An airport is important because in the winter, many days planes are unable to land on the water here in Angoon. It will also encourage other carriers to service Angoon because they will not have to be a floats-only operation.	PN
I	17	1	ALT	I am in favor of selection 3 because that area is flat and has no landmark. I used to hunt (that area), and people got lost in that area before. I remember Wally Frank Sr. got lost in that area for 3 days (before). Because of the flat terrain this area would be good location for our airport runway. The water runs in the opposite direction, and since it is flat, it could be easy to get lost so I would go up the mountain. There are other areas to hunt. I am now 67 years old so I had hunted for many years.	ALT
I	18	1	ALT	I speak in favor of site #3 for our airport location.	ALT
I	18	2	PN	Angoon is the only (isolated) town located on Admiralty Island. Angoon is the largest Southeast community without an airport. There is no official helicopter landing for emergency evacuation. We use the ball field, which can be torn up by (grader) snow plowing. While transportation by ferry is an option, it is not practical during an emergency situation. Currently, our elderly are reluctant to climb in/out of floatplanes over the water (unsure footing). Our larger “baby boomer” population is	PN

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
				rapidly coming to age where medical attention will be a huge concern.	
I	18	3	SOC	With rising costs, a runway would bring lower air transportation costs, and provide much relief for (our) already limited financial resources, and most importantly, “a sound environment is impossible without a sound economy” (taken from a bumper sticker).	IA
I	18	4	MS	In October 1998, the Angoon community voted in favor of having an airport. Since then, we have had several community meetings with State DOT regarding potential locations/pros/cons, and we eagerly await its arrival.	NS
I	19	1	ALT	In regard to the Angoon Airport, I feel that area 3 is the best area for the airport. Having an airport in any of the other sites takes away from the shareholder land or the corporation or the city land and is not the answer. Living on Admiralty [Island] National Monument means living with limited public land usage; anything that frees up more land is a plus.	ALT
I	19	2	SUB	Furthermore, there is much talk about encroaching on subsistence land by putting the airport in any of these sites. There are wonderful hunting sites for 100 miles in any direction in this area, and putting the airport on Site 3 will have little more effect on the hunting and fishing than the constant seaplane traffic that currently takes place.	IA
I	19	3	SUB	The people of Angoon are constantly being told that they enjoy a subsistence lifestyle. It would be nice if that was a choice out here and not a necessity pushed on us by people in bigger communities that enjoy the benefits of airports and roads and at the same time can gather subsistence foods just as easily as we can. If you live in Juneau you can live a subsistence lifestyle; I know many that do.	IA
I	19	4	SOC	Finally, there has been much talk of how an airport would affect tourist influx in this area. Currently we have 10 ferry travel opportunities a month here. You can travel to Angoon with a camper and twenty-foot boat for around $250.00 round trip, launch your own boat, and catch your limit without paying any guide service or spending any time or money within the community of Angoon. If you had to fly in you would have to interact with the community to accomplish this, and it would benefit the entire community of Angoon.	IA
I	20	1	SOC	I think having airport will benefit very good to our community such as economic boom. May be able to have fresh seafood business which very abundant in this community. I know fresh seafood is very demanded everywhere.	IA
I	20	2	PN	With this airport we can probably have flights all year even when temperatures are very low.	PN
I	20	3	SOC	This airport will definitely create more jobs for the community, so please let the	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
				airport happen in Angoon.	
I	21	1	SOC	Local hire—for work needed to be done	IA
I	21	10	SOC	Boost economy	IA
I	21	2	PN	Start ASAP	PN
I	21	3	PN	Would help in EMS transports, emergencies, etc	PN
I	21	4	PN	Mail regularly, pay bills on time	PN
I	21	5	SOC	Cheaper cost on import/export—food, supplies, etc	IA
I	21	6	SOC	Town people could come home for holidays	IA
I	21	7	SOC	Help in shipping funeral type events: caskets, bodies	IA
I	21	8	SOC	More business could possibly start	IA
I	21	9	SOC	Bring more people in shorter time	IA
I	22	1	PN	Please get the airport here ASAP!	PN
I	22	2	ALT	I heard that 3 was a good spot.	ALT
I	22	3	SOC	I want to see Angoon grow some or a lot. It would bring Angoon more money and work. I want to see more jobs in Angoon, AK. I want more planes coming and going from here. It would help lower prices on flying then.	IA
I	22	4	PN	Make medevac out of Angoon better. I'd like to see Alaska Airlines come here too. I hear AK Airlines would be able to land here when skies are fogged in and Juneau is snowing. Instead of flying to Seattle or Anchorage they could land here. I want mileage on my AK airlines ha ha ha. But we need an airport bed here in Angoon. So please make it happen ASAP.	PN
I	23	1	SOC	I think that having an airport here would be great. It would mean that it would be a bit easier for some people to have a temporary job and having learning skills.	IA
I	23	2	PN	Having an airport would be a whole lot better once it's built for an emergency plane to get in and get out of Angoon.	PN
I	23	3	SUB	But a question would always be asked when something this huge is going on… "How would it affect the subsistence lifestyle?"	IA
I	24	1	SOC	I think the FAA's Angoon Airport EIS would be good for Angoon. Angoon needs new businesses.	IA
I	24	2	ALT	I like site 3 by Favorite Bay better.	ALT
I	25	1	SOC	We need the airport. More jobs, a place for a chopper to land.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
I	25	2	PN	Our mail gets stranded during cold weather.	PN
I	25	3	PN	Need plane that will fly to Sitka when going to hospital.	PN
I	25	4	ALT	I thought Site 3	ALT
I	26	1	ALT	I feel that Area #3 is the best location for Angoon's Airport. It will have less impact on the environment in the area but still provide an excellent location for the community.	ALT
I	26	2	SOC	This project will develop the much-needed jobs in the community and help boost our much-needed economy.	IA
I	26	3	PN	Angoon has always been a very isolated community and has limited means of transportation. Having an airport lessons the cost of chartered flights year-round especially in the winter when the float planes can't fly because of the freezing factor.	PN
I	27	1	PN	I think that Angoon needs an airport: would be a bit easier for people	PN
I	27	2	SOC	I think Angoon needs an airport: more jobs for the community	IA
I	27	3	PN	I think Angoon needs an airport: it would be nice to just build it now instead of talking about it for years, years	PN
I	28	1	PN	Stop beating around the bush now and start the airport.	PN
G	29	1	PRO	Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires federal agencies to consult with NMFS on all actions that may adversely affect essential fish habitat (EFH).	PRO
G	29	2	FSH	EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA § 3[10]). For any action that may adversely affect EFH, the action agency must provide NMFS with a written assessment of the effects of that action on EFH. The EFH assessment can be contained within the EIS; if so it should be clearly identified as a discrete part of the document. The EFH assessment must contain (1) a description of the Proposed Action, (2) an analysis of the potential adverse effects of the action on EFH and managed species, (3) the federal action agency's conclusions regarding the effects of the action on EFH, and (4) proposed mitigation, if applicable. If appropriate, the assessment should also include (1) the results of an on-site inspection to evaluate the habitat and the site-specific effects of the project, (2) the views of recognized experts on the habitat or species that may be affected, (3) a review of pertinent literature and related information, (4) an analysis of alternatives to the action (such analysis should include alternatives that could avoid or minimize adverse effects on EFH), and (5) other relevant information. Under Section 305(b)(4) of the MSFCMA,	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
				NMFS is required to provide EFH conservation recommendations to federal agencies for actions that would adversely affect EFH. The EFH conservation recommendations will be provided as part of the EFH consultation process, following receipt of the EFH assessment. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects. Section 305(b)(4)(B) requires the federal agency to provide a detailed response in writing to NMFS addressing the measures proposed for avoiding , mitigating, or offsetting the impact of the activity on EFH habitat. Please see our website for more information: http://www.fakr.noaa.gov/habitat/faq.htm#fed. In the meantime, we offer the following comments for your consideration.	
G	29	3	FSH	EFH for salmon is present within the project area. Favorite Bay and the adjoining Mitchell Bay marine, estuarine, and freshwater complex is a rich area that supports rearing and spawning habitat for coho, chum, sockeye, and pink salmon, as well as Dolly varden and cutthroat trout (Johnson & Dqaigneault 2008). Sites 3, 3a, and 4 may be in wetlands and streams that either support anadromous fish or have a nexus to anadromous waters. There are also uncatalogued anadromous streams in the project area. Several Angoon residents report having seen salmon in the inlet to a lake system that lies within Section 34 in T 50 S., R 68 E., and within Sections 2 and 3 in T 51 S., R 68 E (Frank, pers. comm.; Woodbury pers. comm.). Coho salmon are present in Lighter Creek and Mitchell Bay (Frank pers. comm.), which could be impacted from runoff from Sites 3 and 3a. Land contours also suggest the presence of other unmapped anadromous streams. NMFS recommends that all streams in the project area be surveyed for the presence of anadromous and other fishes, and that newly documented anadromous habitat be nominated to the anadromous stream catalogue (Johnson & Dqaigneault 2008).	IA
G	29	4	FSH	Eelgrass beds are an ecologically important nearshore habitat that is susceptible to degradation and loss due to coastal development and natural environmental changes (Johnson et al. 2003). This habitat can be especially important to many animals, including rearing salmon, flatfish, crab, and others (Johnson et al. 2003). Angoon residents report extensive eelgrass beds at the head of Favorite Bay and also at the mouth of the unnamed stream and lake system that lies within Section 34 in T 50 S., R 68 E., and within Sections 2 and 3 in T 51 S., R 68 E. (Woodbury pers. comm.), NMFS recommends surveying for, verifying anecdotal reports of, and mapping the extent of eelgrass beds in Freshwater Bay, Mitchell Bay, and Kanalku Bay that could be impacted by runoff from Site 3, 3a and 4, and from any new road. We also suggest that eelgrass surveys be conducted in Killisnoo Harbor, if that EFH could be affected by runoff from Site 12. Please contact NMFS staff for mapping protocol.	IA

Table B-1. Scoping Comments Summary Table

Respondent Type	Letter Number	Comment Number	Comment Resource Code	Comment	Disposition
G	29	5	FSH	EFH for groundfish is present in the project area. Groundfish species present include, but are not limited to, Pacific cod, Pacific Ocean perch, walleye pollock, dusky rockfish, shortraker and rougheye rockfish, yelloweye rockfish, sablefish, sculpin, skate, flathead sole, and rex sole. Other rockfish expected to be in the project area include black rockfish, quillback rockfish, copper rockfish, and yellowtail rockfish.	IA
G	29	6	FSH	NMFS recommends that the timing of activities that could adversely impact EFH be restricted to protect EFH and managed species during critical lifecycle phases. In general, prohibiting in-water work between March 15 and June 15 could protect spawning herring and migrating juvenile salmon from construction activities. Herring occur in Freshwater Bay and Kanalku Bay, where fecund females have been captured (Frank pers. comm.). Herring spawning activity should be confirmed with Angoon residents and, if possible, by actual documentation	IA
G	29	7	WR	The Clean Water Act 404 (B)(1) guidelines direct agencies to: first, avoid impacting wetlands; second, minimize any impacts to wetlands; and finally, compensate for unavoidable adverse impacts. Compensatory mitigation for unavoidable wetland impacts may be required for this action and should be addressed in the EIS. We recommend that you coordinate mitigation plans with NMFS and other resource agencies.	IA
G	29	8	TES	Section 9 of the Endangered Species Act (ESA) and federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. In addition, the Marine Mammal Protection Act (MMPA) specifically prohibits the take of marine mammals, including harassment, unless the activity is exempted by law or permitted under the act. General information on ESA species and MMPA species under NMFS jurisdiction can be found at: http://www.fakr .noaa.gov/protectedresources. Endangered humpback whales and threatened Steller sea lions occur within the project area, as do MMPA-protected killer whales, porpoises, seals, and sea otters (Frank pers. comm.; Woodbury pers. comm.). Noise from in-water construction activities or from operational procedures can negatively impact marine mammals. This and other potential impacts to marine mammals should be analyzed in the EIS. Precautions may need to be implemented to prevent injury, harm, or harassment of marine mammals. Also, under Section 7(a)(2) of the ESA, the FAA is required to consult with NMFS to ensure that any action authorized, funded , or carried out by the FAA is not likely to jeopardize the continued existence of threatened or endangered species.	IA

APPENDIX C: CONTACT INFORMATION FOR RESPONDENTS

Table C-1. Contact Information for Respondents

Letter Number	Respondent Type	Last Name	First Name	Organization	Address	City	State	ZIP	Date Received
1	Individual	Anonymous							10/30–10/31/08
2	Individual	Walker	Philip J.		PO Box 182	Angoon	AK	99820	10/30–10/31/08
3	Individual	Walker	Lenora		PO Box 182	Angoon	AK	99820	10/30–10/31/08
4	Individual	Sharp	Frank		PO Box 23	Angoon	AK	99820	10/30–10/31/08
5	Individual	Washington	Charlotte		PO Box 114	Angoon	AK	99820	10/30–10/31/08
6	Individual	Walker	Phil		PO Box 182	Angoon	AK	99820	10/30–10/31/08
7	Individual	Ethel	Jack		PO Box 169	Angoon	AK	99820	10/30–10/31/08
8	Business	Long	Wallace		PO Box 35721	Juneau	AK	99803	11/20/08
9	Individual	Jack	Michelle		635 Chinook Way	Angoon	AK	99820	11/27/08
10	Individual	Anonymous							12/31/08
11	Organization	Metcalf	K.J.	Friends of Admiralty Island	PO Box 20791	Juneau	AK	99802	12/30/08
12	Government	Magee	Susan	State of Alaska, ANILCA Implementation Program	550 W. 7th Ave. Ste. 1430	Anchorage	AK	99501	12/31/08
13	Government	Dugaqua	Alexandria	DNR Division of Mining Land and Water SE Regional Office	P.O. Box 111021	Juneau	AK	99811 -1000	11/31/08
14	Government	Curtis	Jennifer	EPA Region 10	Room 537 Federal Building 222 W. 7th Ave #19	Anchorage	AK	99513	12/30/09
15	Individual	Daniels	Francis		PO Box 31	Angoon	AK	99820	12/30/08
16	Individual	Thompson	Joseph	Angoon Oil and Gas	PO Box 111	Angoon	AK	99820	12/30/08
17	Individual	Jack, Jr.	Johnny		PO Box 6	Angoon	AK	99820	12/30/08
18	Individual	Thompson	Maxine	Southeast Conference	PO Box 111	Angoon	AK	99820	12/10/08
19	Individual	Thompson	Shayne	Angoon Trading Company	PO Box 161	Angoon	AK	99820	12/3/08

Table C-1. Contact Information for Respondents

Letter Number	Respondent Type	Last Name	First Name	Organization	Address	City	State	ZIP	Date Received
20	Individual	Bales	Kwan		PO Box 174	Angoon	AK	99820	12/31/08
21	Individual	See	Travis	Angoon Trading Company	PO Box 203	Angoon	AK	99820	12/31/08
22	Individual	McCluskey	John		PO Box 93	Angoon	AK	99820	12/31/08
23	Individual	Askoak	M.		PO Box 86	Angoon	AK	99820	12/31/08
24	Individual	Kookesh	Andrew C.		PO Box 222	Angoon	AK	99820	12/31/08
25	Individual	McCluskey, Sr.	Pete		PO Box 93	Angoon	AK	99820	12/31/08
26	Individual	Bates	Sue		PO Box 161	Angoon	AK	99820	12/31/08
27	Individual	Johnson	Sugar						12/31/08
28	Individual	Awes	Russell		PO Box 68				12/31/08
29	Government	Mecum	Robert D.	U.S. Department of Commerce, National Oceanic and Atmospheric Administration	National Marine Fisheries Service PO Box 21668	Juneau	AK	99802	2/10/2009

APPENDIX D: SCOPING MEETING ATTENDEES

Table D-1. Scoping Meeting Attendees

Last Name	First Name	Organization	Address	City	State	ZIP
Anchorage						
Helms	Eric	FAA AAL-622	222 W. 7th	Anchorage	AK	
Greenwood	Bruce	FAA; AAL-616	222 W. 7th	Anchorage	AK	
Oien	Pat	FAA; AAL-621	222 W. 7th	Anchorage	AK	
Juneau						
Spillman	Erik	USFS	204 Signaha Way	Sitka	AK	99835
Gendron	Jane	DOT & PF	PO Box 112506	Juneau	AK	99801
Neary	John	USFS	8510 Mendenhall Loop Road	Juneau	AK	99801
Carlson	Pete	Aircraft Owners and Pilots Association (AOPA)/Alaska Airmen's Association	PO Box 22620	Juneau	AK	99802
Long	Wallace H.	Alaska Flight Center	PO Box 35721	Juneau	AK	99803
Monahan	Ruth	USFS	PO Box 21628	Juneau	AK	99802
Nelson	Mike	USFS	PO Box 38	Angoon	AK	99820
Nelson Jr.	George	ACA	Mailing address not provided			
Nelson III	George	Self	Mailing address not provided			
Zuboff	Sharon	Self	8407 Decoy Blvd	City not provided		
Walker	Phillip	Angoon T-E	PO Box 182	Angoon	AK	99820
Pursell	Jenny	Friends of Admiralty Island	PO Box 20791	Juneau	AK	99802
Naoroz	Peter	Angoon/ Kootznoowoo	8585 Old Dairy Road, Suite 201	Juneau	AK	99801
Shaw	Linda	NMFS	PO Box 21668	Juneau	AK	99802-1668
Berger	Jennifer	USFS	8510 Mendenhall Loop Rd.	Juneau	AK	99801
Richards	Betsy	USFS	PO Box 21628	Juneau	AK	99802
Enriquez	Richard	U.S. Fish and Wildlife Service	3000 Vintage Blvd. #201	Juneau	AK	99803
Gillian	Myra	USDA-Admiralty National Monument	8510 Mendenhall Loop Rd.	Juneau	AK	99801
Griffin	Pete	USFS	8510 Mendenhall Loop Rd.	Juneau	AK	99801
Howard	Albert	City of Angoon	PO Box 189	Angoon	AK	
Pullman	Lonetta	Self	173 Behrends	Juneau	AK	
Cullum	Melissa	Admiralty Research and Development	PO Box 314	Angoon	AK	99820
Sanford	Merrill	CBJ Assembly		Address not given		
Mitcnell	Duff	Self	PO Box 21938	Juneau	AK	99802

Table D-1. Scoping Meeting Attendees

Last Name	First Name	Organization	Address	City	State	ZIP
Tremblay	Bill	Tongass National Forest	PO Box 309	Petersburg	AK	99833
Meade	Chris	Environmental Protection Agency	PO Box 20370	Juneau	AK	99802-0370
Skagerberg	Judy	N/A				
Walker	Lenora	City of Angoon	PO Box 182	Angoon	AK	99820
Johnson	Leonard R.		206 W. 11th St	Juneau	AK	99801
Cartwright	Meg	Juneau Audubon Society	PO Box 21725	Juneau	AK	99801
Birk	Roger	USFS	P.O. Box 21628	Juneau	AK	99802
Williams	Gordon	Self	555 Hemlock St.	Juneau	AK	99801
Plantz	Ron	Hella Greens Creek Mining	PO Box 32199	Juneau	AK	99803
Trigg	Jan	Self	PO Box 32081	Juneau	AK	99803
Angoon						
Thomas	Starla		PO Box 104	Angoon	AK	99820
Thompson	Maxine	UTAB	PO Box 111	Angoon	AK	99820
Sharp	Joseph	Angoon Oil	PO Box 111	Angoon	AK	99820
Jim	Pauline		PO Box 3	Angoon	AK	99820
Kookesh	Matt	Kootznoowoo Inc.	PO Box 102	Angoon	AK	99820
Jack	Denise	Tribe	PO Box 54	Angoon	AK	99820
Washington	Charlotte	ANS Camp 7 President	PO Box 114	Angoon	AK	99820
Sharp	Frank	Personal	PO Box 23	Angoon	AK	99820
Walker	Lenora	City of Angoon	PO Box 182	Angoon	AK	99820
Jim	Pauline	Angoon Subsistence Tribe	PO Box 182	Angoon	AK	99820
Frank	Wally	Angoon ACA	PO Box 112	Angoon	AK	99820
Naoroz	Peter	Kootznoowoo, Inc	8585 Old Dairy Road, Suite 201	Juneau	AK	99801
Jackson	Frank	City of Angoon	Mailing address not given			
Jackson	Paul	Angoon	Mailing address not given			
Zuboff	Sharon		Mailing address not given			
Frank	Joyce		Mailing address not given			
Frank	Kevin	ACA Tribal Council	PO Box 184	Angoon	AK	99820
James?	Russell		PO Box 68	Angoon	AK	99820
Jim	Floyd G.	ACA Tribal Council	PO Box 185	Angoon	AK	99820
Nelson?	Reggie		PO Box 52	Angoon	AK	99820
Williams	Peggy		Address not given			
Dawcels	Jamie		PO Box 284	Angoon	AK	99820
Getgood	K. (Martha)	Angoon Business Center/Central	PO Box 113	Angoon	AK	99820

Table D-1. Scoping Meeting Attendees

Last Name	First Name	Organization	Address	City	State	ZIP
		Council of the Tlingit and Haida Indian Tribes of Alaska (CCTHITA)				
Silva	Harriet		PO Box 124	Angoon	AK	99820
Martin	Carol	City of Angoon	PO Box 98	Angoon	AK	99820
K?			Address not given			
Walker	Lenora	City of Angoon	PO Box 182	Angoon	AK	99820
Jim	Pauline		PO Box 3	Angoon	AK	99820
Jack	Ethel		PO Box 169	Angoon	AK	99820
Jack	Paul		PO Box 117	Angoon	AK	99820
Washington	Charlotte	Self	PO Box 114	Angoon	AK	99820
Naoroz	Peter	Kootznoowoo, Inc	8585 Old Dairy Road, Suite 201	Juneau	AK	99801
Howard	Albert	City of Angoon	PO Box 189	Angoon	AK	99820

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Anchorage, AK

Meeting Date: 10-27-08

Agency Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Eric Helms	AAL-622	222 W 7th Anchorage	eric.g.helms@faa.gov
Bruce Greenwood	AAL-616	" Anchorage	bruce.greenwood@faa.gov
Pat Oien	AAL621	" "	pat.oien@faa.gov

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Centennial Hall, Juneau

Meeting Date: 10/29/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Pete Carlson	AOPA ALASKA AIRMEN'S ASSOC	P.O.Box 22620 99802	pcarlson@ALASKA.NET
Wallace H. Long	Alaska Flight Center	P.O. Box 35721 99803	Jozksstv@gci.net
Ruth Monahan	USDA Forest Service	P.O Box 21628 99802	rmonahan@fs.fed.us.
Mike Nelson	—	Box 38 99820	
George Nelson JR	ACA		
George Nelson III			
Sharon Zuboff	—	8407 Decoy Blvd	—
Phillip Walker	Angoon T-E	Box 182 Angoon AK 99820	pjwalker01@yah
Jenny Pursell	Friends of Admir. Isl.		
Peter Naoroz	ANGOON/KOOTZNOOWOO	—	—

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Centennial Hall, Juneau

Meeting Date: 10/29/08

Agency Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Erik Spillman	USDA Forest Service	204 Siginaka Way, Sitka AK 99835	espillman@fs.fed.us
Jane Gendron	DOT & PF		
John Neary	USFS	Admiralty	

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Centennial Hall, Juneau

Meeting Date: 10/29/08

Agency Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Linda Shaw	NMFS	P.O. Box 21668 Juneau, AK 99802-1668	linda.shaw@noaa.gov
Jennifer Berger	USFS	8510 Mendenhall Loop Rd Juneau, AK 99801	jberger@fs.fed.us
Betsy Rickards	USFS	POB 21628 JNU, AK 99802	brickards@fs.fed.us
Richard Enriquez	USFWS	3000 Vintage BLVd. #201 Juneau, AK 99803	Richard_Enriquez@fws.gov
Myra Gilliam	USDA - ANM	8510 Mendenhall Loop Rd. Juneau, AK 99801	
Pete Griffin	US Forest Service	" " "	
Albert Howard	city of Angoon	PO Box 189 Angoon AK.	

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Centennial Hall Juneau

Meeting Date: 10/29/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Judy Skagerberg	n/a		
Lenora Walker	City of Angoon	PO Box 182 Angoon 99820	sebeauty4@hotmail.com
Leonard R Johnson	Juneau Alaska 99801	206 W 11th St	—
Meg Cartwright	Juneau Audubon Soc	P.O. Box 21725 Juneau AK 99801	meg-cartwright@gci.net
Roger Birk	Forest Service		
Gordon Williams	Self	555 Hemlock St Juneau 99801	gwilliams@acsalaska.net
Ron Plantz	Hecla Greens Creek Mining	PO Box 32199 JNU AK 99803	RPlantz@Hecla-Mining.com
Jan Trigg		PO Box 32081 Juneau AK 99803	jan.trigg@gmail.com

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Centennial Hall, Juneau

Meeting Date: 10/29/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Loretta Pittman	Self.	173 Behrends Jun Ak	jeanpitte yahoo.com
Melissa Cullum	Admiralty Research & Development	PO Box 314 Angoon, AK 99820	
Merrill Sanford	CBJ Assembly		fish3dick@ aol.com
DUFF MITCHELL	SELF	PO BOX 21938 JUNEAU, AK 99802	duff.mitchell@ yahoo.com
Bill Tremblay	TNF-	Box 309 Petersburg, AK 99833	btremblay@fs.fed.us
Chris Meade	EPA	Po Box 20370 Juneau, AK 99802-0370	meade.chris@epa.gov

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Angoon

Meeting Date: 10/30/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Maxine Thompson	WTAB	PO BOX 111 Angoon 99820	
[illegible]	ANgoon oil	PO Box 111 ANgoon 99820	
[illegible]		Box 3	
MATT KOOKESH	KOOTZ INC	Box 102 Angoon, AK 99820	
Denise Jack	Tribe	Box 54 Angoon AK 99820	
Charlotte Washington	ANS Camp 7 President	Box 114 Angoon AK 99820	
Frank Sharp	Personal	Box 23 ANGOON, AK 99820	
Lenora W	City of Angoon	Box 182 Angoon	
Paul W	Angoon School [illegible]	" "	
Wally Frank	Angoon A.C.A Tribe	BOX 112 ANGOON	

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Angoon

Meeting Date: 10/30/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Starla Thomas		PoBox 104 Angoon	Starlathomas@hot-mail.com

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Angoon

Meeting Date: 10/30/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Peter Naoroz	Kootznoowoo	—	peter@kootznoowoo
Frank Jack ta	City of Angoon	—	—
Paul Jackson	Angoon		
[illegible]			
Joyce Frank			
Kevin Frank	ACA - tribe	Box 184 Ang AK 99820	Kmfsr82@hotmail kmfsr82 hotmail
Russell Ames		P.O. Box 8	
Floyd G. Jim	ACA Council	P.O. Box 185	
Reggie Nelson S.		BOX 52 Angoon AK 99820	
Peggy William			

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Angoon

Meeting Date: 10/31/08

Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Janice Dawley		PO Box 284 Angoon AK 99820	mad_carver73 @yahoo.com
K. Getgood	Ang. Bus. Center CCTHITA	PO Box 113 Angoon AK	mgetgood@ ccthita.org
Harriet Silva		PO Box 124 Angoon AK	
Carol Martin	City / ANS	Box 98 Angoon	Kalola_75@ hotmail.com
[illegible]			
Lenora Walker	City of Angoon		
Pauline Jim			
[illegible] Jack	Angoon	Box 169	

ANGOON AIRPORT
Environmental Impact Statement

Meeting Location: Angoon

Meeting Date: 10/31/08

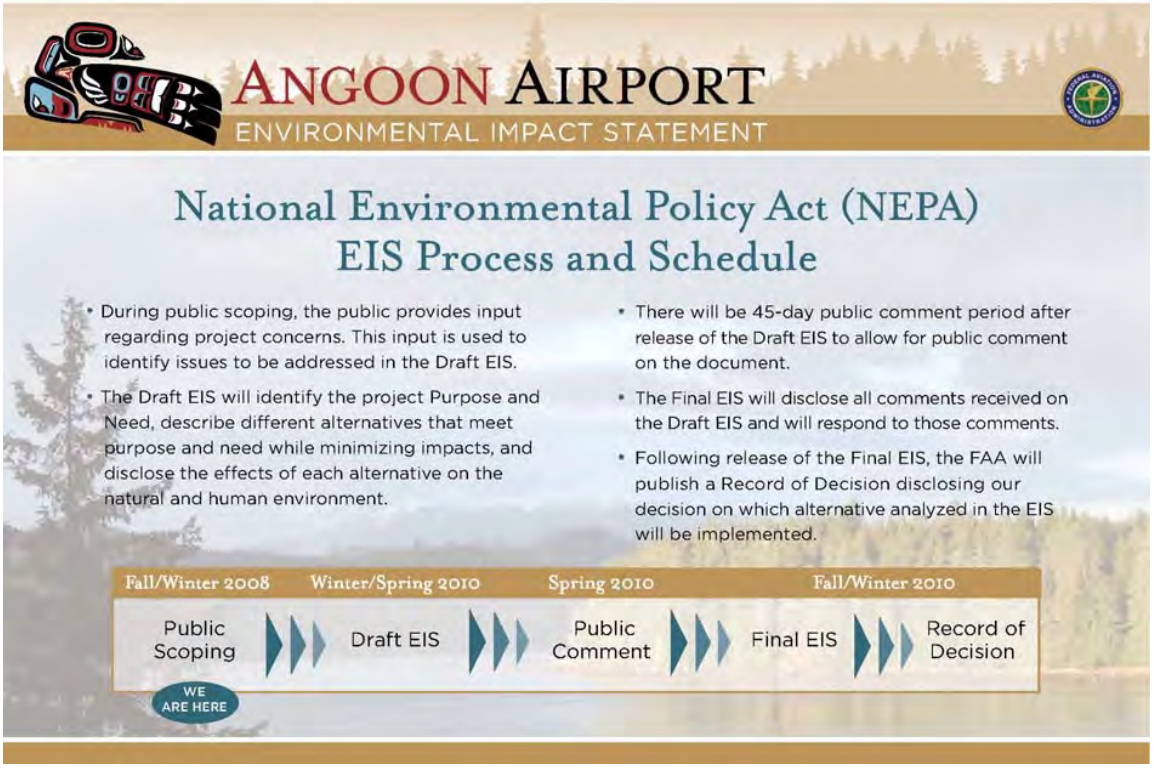
Public Scoping Meeting Sign In Sheet

Please add mailing address and/or email information if you would like to be on the mailing list for this project. Thank you.

Name	Organization	Mailing Address	Email
Paul Jack		PO Box 47	
Charlotte Washington	self ANS Camp #7 President	P.O. Box 114 Angoon AK	907-788-3242
Peter Naoro	Kootznoowoo	—	
Albert Howard Jr	City of Angoon	Box 189	

APPENDIX E: SCOPING MEETING DISPLAY BOARDS


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Welcome!!
Welcome to the Federal Aviation Administration's (FAA) scoping meeting for the Angoon Airport Environmental Impact Statement (EIS). The Alaska Department of Transportation and Public Facilities (DOT&PF) has proposed a land-based airport on Admiralty Island to serve the City of Angoon. The FAA is the lead federal agency for the project and will be preparing an EIS to disclose the potential environmental impacts associated with the construction and operation of the proposed airport and potential alternatives to it.
The FAA is requesting public input on issues to be considered in the Draft EIS and values your input. While you are here, please take time to learn about the proposed project, ask questions, and discuss your concerns with FAA's project manager and the resource specialists involved with this project. Written comments may be submitted tonight or at any point **until December 31, 2008.**
Thank you for joining us.


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
National Environmental Policy Act (NEPA)
EIS Process and Schedule
• During public scoping, the public provides input regarding project concerns. This input is used to identify issues to be addressed in the Draft EIS.
• The Draft EIS will identify the project Purpose and Need, describe different alternatives that meet purpose and need while minimizing impacts, and disclose the effects of each alternative on the natural and human environment.
• There will be 45-day public comment period after release of the Draft EIS to allow for public comment on the document.
• The Final EIS will disclose all comments received on the Draft EIS and will respond to those comments.
• Following release of the Final EIS, the FAA will publish a Record of Decision disclosing our decision on which alternative analyzed in the EIS will be implemented.
Fall/Winter 2008
Winter/Spring 2010
Spring 2010
Fall/Winter 2010
Public Scoping
Draft EIS
Public Comment
Final EIS
Record of Decision
WE ARE HERE


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Why Does Angoon Need an Airport?
FAA Vision: Our vision is to improve the safety and efficiency of aviation, while being responsive to our customers and accountable to the public.
"Fewer flights to our villages results in less access to food, health care, and can impact the safety of our rural communities. Aviation in Alaska is critical to our economy and public welfare."
- DOT&PF Deputy Commissioner Christine Klein
Angoon's only regularly scheduled air transportation (floatplane) is limited because:
• it cannot operate at night or in poor weather;
• it has limited ability to operate in the winter because of
• the small amount of available daylight,
• ice in Favorite Bay, and icing of the required amphibious landing gear when the Juneau Airport floatplane pond is frozen;
• it has limited passenger capacity (3 to 4 passengers);
• it is more expensive to operate than land-based aircraft; and
• it does not have medical evacuation capability.
The proposed project would allow Angoon to be serviced by larger capacity land-based aircraft with the capability to fly passengers or medical evacuations in poor weather and at night.

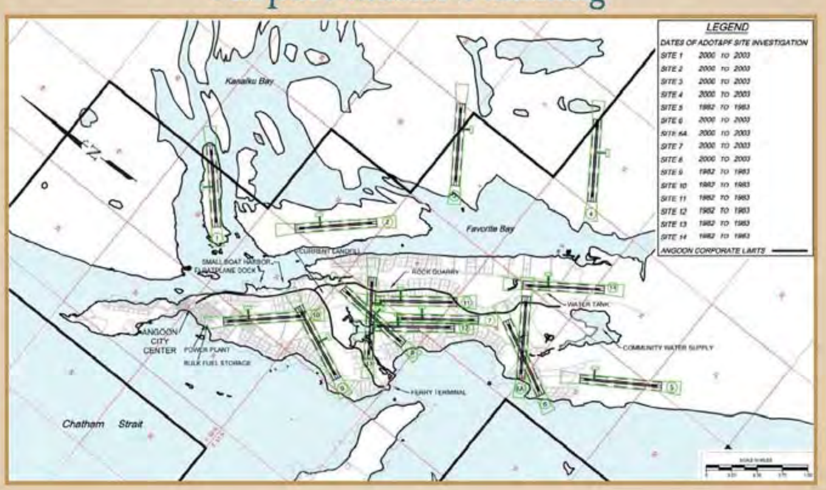
ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT

Initial Airport Planning Steps and the Airport Master Plan

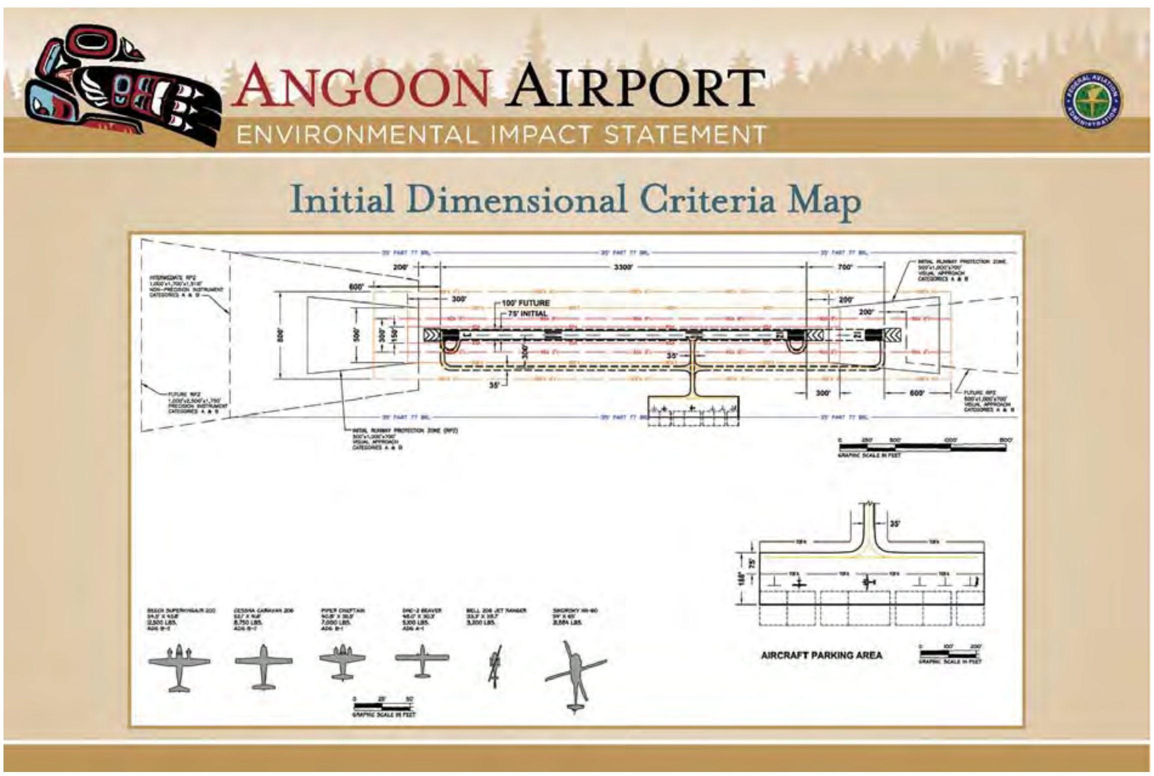
- In 2004, Alaska Department of Transportation and Public Facilities (DOT&PF) completed a site reconnaissance study of fourteen different potential airport locations.
- In 2007, DOT&PF completed the Angoon Airport Master Plan, which identified a preferred airport location across Favorite Bay from Angoon on Admiralty Island National Monument/ Kootznoowoo Wilderness lands.
- The proposed airport design includes a 3,300-foot runway with full length parallel taxiway system, and would allow for future runway expansion to 4,000 feet. Associated facilities would include an airport access road, aircraft parking areas, maintenance/storage facilities, and a terminal building and parking lot.
- DOT&PF presented the 2007 Master Plan to the FAA for consideration. As required by NEPA, the FAA is preparing an EIS to analyze the proposed airport and potential alternatives before we make a decision on whether to approve the project.

ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT

Sites Investigated by DOT & PF During Airport Master Planning




ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Supplemental Airport Planning Site Evaluation
Kanalku Bay
Site 3a
Site 3
(MP Prefered Site)
Site 4
Site 1
Site 2
Favorite Bay
Rock Quarry
Small Boat Harbor
Float Plane Dock
Current Landfill
Angoon City Center
Site 14
Site 11
Water Tank
Site 10
Site 8
Site 7
Site 6a
Community Water Supply
Site 12a
Site 13
Power Plant
Bulk Fuel Storage
Site 9
Site 6
Site 5
Ferry Terminal
Chatham Strait


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Initial Dimensional Criteria Map
3300'
100' FUTURE
75' INITIAL
AIRCRAFT PARKING AREA


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Approach Segment Obstacle Clearance Surfaces for Alternative 3
Final Approach Obstacle Clearance Surface (W)
Final Approach Obstacle Clearance Surface (X)
Final Approach Obstacle Clearance Surface (Y)
Missed Approach Section 1b
Turning Missed Approach Section 2
Final Approach and Straight Missed Approach Segments
Final Approach and Turning Missed Approach Segments


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Preliminary Alternative Airport Locations
3,300 foot runway with option for future expansion to 4,000 feet. • Non-precision GPS instrument approach.


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
Potential Resource Issues
• Public Health & Safety (medical evacuations)
• Subsistence
• Socioeconomics/ Environmental Justice
• Wilderness Values
• Land Ownership
• Wildlife
• Cultural and Historic Resources
• Wetlands and Coastal Resources
• Section 4(f)
• Noise


ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
You Can Submit Scoping Comments in a Number of Ways:
• Submit written comments tonight
• Submit comments online to: www.angoonairporteis.com
• Submit comments by e-mail to: comments@angoonairporteis.com
• Mail hardcopy comments to:
Leslie Grey
AAL 614, FAA Project Manager
Angoon Airport EIS
222 W. 7th Ave., Box #14
Anchorage, AK 99513-7587
All comments must be received by December 31, 2008.
Thank you for your participation in the Angoon Airport EIS process.

APPENDIX F: SCOPING MEETING HANDOUTS

- Scoping meeting agendas (3 pages)
- Project hotsheet update #2: 10/23/08 (2 pages)
- Frequently asked questions (4 pages)
- Website information (1 page)
- Comment form (2 pages)

ANGOON AIRPORT
Environmental Impact Statement

AGENCY AND PUBLIC SCOPING MEETING AGENDA

Loussac Library, PUBLIC CONFERENCE ROOM
3600 Denali St., ANCHORAGE, AK

OCTOBER 27, 2008

1:00-3:00 PM AGENCY SCOPING MEETING

- 1:00-1:15 PM **Sign in:** Receive meeting materials.
- 1:15-3:00 PM **Seated presentation:** Project team introductions, project overview.
- 3:00-3:30 PM **Open house:** Agency question and answer session and open house

3:30-5:00 PM PUBLIC SCOPING MEETING

- 3:30-5:00 PM **Open house:** invited to browse resource stations, speak with the FAA Project Manager and resource specialists directly involved with the project, ask questions, and submit comments.

ANGOON AIRPORT
Environmental Impact Statement

AGENCY AND PUBLIC SCOPING MEETING AGENDA

CENTENNIAL HALL, EGAN ROOM
101 EGAN DRIVE, JUNEAU, AK

OCTOBER 29, 2008

1:00-3:00 PM AGENCY SCOPING MEETING

- **1:00 PM: Sign in.** Obtain meeting materials.
- **1:15-3:00 PM: Presentation.** Project team introductions, project overview, question and answer session

5:30-8:00 PM PUBLIC SCOPING MEETING

- **5:30-5:45 PM Sign in:** Receive meeting materials.
- **5:45-6:30 PM Seated presentation:** Project team introductions, project overview, question and answer session.
- **6:30-8:00 PM Open house:** Public invited to browse resource stations, speak with the FAA Project Manager and resource specialists directly involved with the project, ask questions, and submit comments (refreshments provided).

ANGOON AIRPORT
Environmental Impact Statement

PUBLIC SCOPING MEETING AGENDA

ANGOON COMMUNITY CENTER
ANGOON, AK

OCTOBER 30 AND OCTOBER 31, 2008

- **5:30-5:45 PM Sign in:** Receive meeting materials.

- **5:45-6:30 PM Seated presentation:** Project team introductions, project overview, question and answer session.

- **6:30-8:00 PM Open house:** Public invited to browse resource stations, speak with the FAA Project Manager and resource specialists directly involved with the project, ask questions, and submit comments (refreshments provided).

ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT

ANGOON AIRPORT EIS PROJECT HOTSHEET UPDATE #2: OCTOBER 23, 2008

We are on our way! The last few months since our August 2008 hotsheet was released have been very busy. The Angoon Airport EIS team is finishing up the supplemental airport planning process and the Environmental Impact Statement (EIS) process has officially begun with publication of the Notice of Intent (NOI) to prepare an EIS in the Federal Register. Since release of our last hotsheet update, the EIS Team has:

- Published an NOI in the Federal Register on September 24, 2008, announcing the intent of the FAA to prepare an EIS for the proposed Angoon Airport project. Publication of the NOI initiated the formal public and agency scoping period in which the FAA will be soliciting comments regarding the project and its potential impacts. This comment period will extend until December 31, 2008 to ensure that all interested parties have an opportunity to formally submit their questions, comments, and concerns.

- Continued to collect wind data at three sites near Angoon, including one site on the Angoon side of Favorite Bay and two sites across Favorite Bay. Data from these sites has been, and will continue to be, used to supplement existing wind data in helping determine the optimal runway alignment(s) for consideration in the EIS. Data gathered to date indicates relatively calm conditions in and around Angoon. However, the fall and winter data that is beginning to be collected will be key, since anecdotal evidence suggests that fall and winter are the seasons when strong winds that blow laterally across Favorite Bay from the northeast are most likely to occur.

- Prepared Memorandums of Understanding with the US Forest Service, Kootznoowoo, Inc., and the U.S. Army Corps of Engineers, who have all received final copies of these MOUs for their signatures. Additionally, we continue to work with the Alaska State Office of Permitting etc. to ensure the involvement of appropriate Alaska state agencies as contributors in this EIS process.

- Finalized the *Supplemental Airport Planning Memorandum: Working Paper One* and *Supplemental Airport Planning Memorandum: Working Paper Two*. The first working paper provides additional analysis of potential airport operational constraints associated with airport facility needs. The second working paper analyzes topographical and other constraints further to narrow down the range of potential airport locations to those sites which will best meet the project needs. Look for the final versions of both these documents on the Angoon Airport EIS website (www.angoonairporteis.com).

- Developed a range of preliminary alternatives to meet project purpose and need while addressing resource impacts, including wilderness values, land use, subsistence, and

1

socioeconomics. These alternatives include: 1) a minor realignment of the original 2007 Angoon Airport Master Plan Preferred Alternative; 2) an alternative on Admiralty Island National Monument/Kootznoowoo Wilderness south of the Master Plan Preferred Alternative; and 3) an alternative on the peninsular side of Favorite Bay near the City of Angoon.

- Conducted preliminary data gathering on subsistence uses in Angoon, including subsistence interviews and a review of existing ADF&G data on subsistence uses in the area. This information will help us in evaluating the best airport sites to meet project needs while avoiding subsistence impacts as much as possible.

The EIS Team is planning the following for the months of October and November, 2008.

- Public and agency scoping meetings in Anchorage, Juneau, and Angoon the week of October 27, 2008. These meetings will be used to provide project information to the public, answer questions, and solicit input that will be used to finalize a range of alternatives and environmental consequences to be analyzed in the Draft EIS.
- Continued data research on resources in the project area.
- Development of the work plans for the environmental impacts analysis that will be used in the Draft EIS.

Upcoming EIS project activities throughout the remainder of the calendar year include:

- Formulation of a scoping report documenting and summarizing all comments received during the public scoping period. This scoping report will be published on the project website and will serve as the roadmap for the writing of the Draft EIS.

For more information on the Angoon Airport EIS, visit www.angoonairporteis.com.

If you have questions regarding this agenda or project progress, you may also contact Leslie Grey, FAA Project Manager at (907) 271-5453 or Leslie.Grey@faa.gov

ANGOON AIRPORT
Environmental Impact Statement

FREQUENTLY ASKED QUESTIONS

1. WHAT IS AN ENVIRONMENTAL IMPACT STATEMENT (EIS)?

In 1969, the US Congress passed the National Environmental Policy Act (NEPA) which requires Federal Agencies analyze and disclose the impacts of their actions and consider those impacts before they make decisions to implement those actions. Specifically, NEPA requires that the Federal Aviation Administration (FAA) develop a "detailed statement" (NEPA 102(c)) disclosing the potential impacts of a proposed project on human and natural resources if those impacts are likely to have a significant impact or be controversial. The EIS serves as that "detailed statement", providing a discussion of potential impacts that would occur and informing the FAA and the public of the reasonable alternatives which could avoid or minimize those adverse impacts.

2. WHY DID DOT&PF PROPOSE A NEW AIRPORT AT ANGOON?

The City of Angoon, the only permanent settlement on Admiralty Island, has no road links to any other developed areas and is completely dependent upon either marine or seaplane transportation. It is the largest southeast Alaska community without an airport.

Travel and transport to and from the community is accomplished through day boat ferry service, chartered ferry, or commercial or chartered seaplane. Night landing is prohibited. There are navigational hazards near the seaplane float area, and at certain times of the year, prevailing northeasterly winds make landing difficult. Additionally, in the winter, Favorite Bay periodically ices up, precluding floatplane operations. The Alaska Marine Highway System generally provides ferry service to Angoon once a week during late fall, winter, and early spring, and 2-3 times/week in the summer. The nearest commercial center (Sitka) is over five hours away by ferry.

Because of the combination of isolation and limited transportation options, Angoon has difficulty in accessing emergency health care, markets for its products, and necessary social, recreational, and educational opportunities. The Alaska Department of Transportation and Public Facilities (DOT&PF) conducted several studies (see Section 3 below) and determined that an airport that could accommodate Part 135 air carriers (scheduled commuter and unscheduled, on-demand charter carriers) would provide safe and reliable access to health care, goods, and services available in nearby developed areas.

3. What Has Happened On The Project To Date?

In 2004, DOT&PF completed the Angoon Airport Reconnaissance Study (Reconnaissance Study) to identify a favorable location for an airport in Angoon. That study resulted in the identification of a preferred site location (Site 3) on lands managed by the U.S. Forest Service (USFS) east of Favorite Bay. The DOT&PF completed the Angoon Airport Master Plan (Master Plan) in 2007, selecting Site 3 as the State's preferred alternative and identifying specific facility needs. The DOT&PF Aviation Project Evaluation Board (APEB) then reviewed the Angoon Airport project to determine whether to nominate it to the FAA to receive funding through the Airport Improvement Program (AIP). The APEB nominated the project and DOT&PF submitted a proposal for the project to the FAA.

FAA has reviewed the proposal and has determined that it would involve federal approvals and funds and therefore is subject to NEPA. The NEPA process is an independent, Federal decision-making process requiring public disclosure of critical planning and environmental information regarding a proposed action and its reasonable alternatives. As stated previously, NEPA requires that the FAA develop a "detailed statement" (NEPA 102(c)) disclosing the potential impacts of the proposed project on human and natural resources. FAA solicited several proposals for this work and has chosen a third-party contractor (SWCA, Inc.) to assist in the preparation of an EIS, which serves as this "detailed statement" of those impacts.

Complete copies of DOT&PF's background work for the proposed Angoon Airport, including the Master Plan, and the Reconnaissance Study, are found on the Airport Master Plan Documents page of www.angoonairporteis.com.

4. Why Is FAA Preparing An EIS For This Project?

Based on the proposed airport project and its environmental effects, FAA decides if the Federal action qualifies as a categorical exclusion or requires an environmental assessment (EA) or an environmental impact statement (EIS). Because the proposed new airport could result in significant environmental impacts and/or has the potential for public controversy, preparation of an EIS is required (FAA Order 1050.1E, Section 500c).

Additionally, alternatives being considered by the FAA during the environmental review are located within the Admiralty Island National Monument and/or Kootznoowoo Wilderness (Conservation System Units or CUS), established thorough the Alaska National Interest Lands Conservation Act (ANILCA). ANILCA provides for the placement of transportation and utility systems (which include airports and runways) on CUSs, such as designated wilderness. This unique process is spelled out in Title XI of ANILCA (Transportation and Utility Systems in and across, and access into Conservation System Units). Title XI provides very clear guidance on the steps required to site a transportation and/or utility system on a conservation system unit. The process also requires completion of an EIS as well as public hearings in Washington DC and the local area, and independent evaluation of the location by each affected federal agency and the President of the United States. For more information on ANILCA, see the ANILCA page on www.angoonairporteis.com.

5. What Are The Next Steps In The EIS Process?

The next steps for the process include: 1) FAA publishing a Notice of Intent (NOI) to prepare an EIS, officially marking the start of the EIS process; 2) conducting scoping meetings with federal, state, and local agencies, and interested members of the public; 3) reviewing agency and public input with airport planning data to identify a range of alternative airport locations that will be evaluated in the EIS; 4) analyzing the potential effects of the proposed airport on human and natural resources; 6) publishing the results of that analysis in a draft EIS for public review and comment; 7) responding to agency and public comments on this draft EIS; and 8) publishing a Final EIS and Record of Decision (ROD) disclosing the FAA's decision on which alternative has been chosen for implementation.

6. What Are The Potential Outcomes Of This EIS Process?

As stated previously, the purpose of the EIS process is to inform both the FAA and the public of the impacts of the proposed airport before the decision is made on whether it will be built. An EIS requires the alternatives to the proposed airport site also be analyzed. These alternatives will allow the FAA to look at different options for airport sighting or design to minimize impacts or resource conflicts as much as possible. Additionally, the EIS must analyze a No Action Alternative, which is an alternative which would not construct the airport. The potential outcomes of the EIS process could be the FAA choosing any one of the alternative airport sites analyzed in the EIS, or choosing the No Action Alternative, with the consequence that no airport would be constructed. FAA's choice will depend on which alternative best meets the project needs while minimizing impacts to both human and natural resources.

7. What Is The Project Team Doing Right Now?

The FAA project team is currently conducting additional airport planning to supplement and verify information prepared by DOT&PF. This includes the gathering of additional wind data in and around potential airport sites. Temporary wind data collection and data storage equipment have been installed at three sites. One site is located approximately 4 miles southeast of the City of Angoon near the community water storage tank. The second and third sites are both located across Favorite Bay, approximately 1.5 and 2 miles northeast, respectively, of the first site. The second site is located on Kootznoowoo Corporation corridor lands, and the third site is located on land managed by the U.S. Forest Service within the Admiralty Island National Monument. The wind monitors will collect data in Angoon for one to two years to help airport planners determine the best orientation of the runway in relation to prevailing winds.

Additional airport planning factors being analyzed include airport facility requirements, instrument approach modeling, and aviation activity forecasts. The EIS team is integrating this information with environmental, cultural, and land-use information to develop potential alternative(s) to meet the aviation needs of the community while minimizing impacts on natural, cultural, and human resources.

8. Who Can Be Involved With The Project?

NEPA is an open disclosure process that seeks input from all interested parties. This includes agencies with jurisdictional authority or special expertise over resources that could be impacted by the proposed project, local government, non-governmental organizations (NGOs), adjacent landowners, and the interested public.

9. What Kind Of Airport Is Proposed By DOT&PF?

Any land based airport established in Angoon would provide services similar to those in other rural Alaskan communities and would be served by Federal Aviation Regulations (FAR) Part 135 air carriers using aircraft such as the Cessna Grand Caravan and the Piper Navajo. Many of the float planes currently used for service are amphibious and would continue to serve the community after the runway is constructed.

DOT&PF prepared the Master Plan, which proposes that the airport include a single runway and required facilities, including a terminal building for passengers, airport support and storage structures, and a vehicle parking area. The Master Plan also proposes that the runway would be developed initially to a length of 3,300 feet with visual approaches serving each runway end and that it have the flexibility for a future extension to a length of 4,000 feet with instrument approach capabilities.

10. How Can I Stay Involved?

Formal opportunities for public comment occur during the scoping process and after the publication of the draft and final EIS documents. However, the FAA will accept public input throughout the entire EIS study and encourages your participation. If you would like to receive project updates, please visit our project website at www.angoonairporteis.com and click on the "Subscribe, Input and Contacts" page to add your name to our mailing list.

ANGOON AIRPORT
Environmental Impact Statement

PROJECT WEBSITE INFORMATION

The FAA has created project website for the Angoon Airport Environmental Impact Statement, www.angoonairporteis.com. The website currently contains the project information listed below and will be updated as new information becomes available.

Proposed Angoon Airport Master Plan Improvements

Angoon Airport EIS Process Flow Chart

Airport Master Plan Documents

- Angoon Airport Master Plan, Layout Drawings, and Maps, 2007
- Angoon Airport Master Plan Public Review Draft Background Report, 2006
- Background Report and Maps Angoon Airport Reconnaissance Study, 2004

Angoon Airport Technical Studies

- Supplemental Airport Planning Memorandum, Working Paper One, August 2008
- Appendices to the Supplemental Airport Planning Memorandum, Working Paper One, August 2008
- Supplemental Airport Planning Memorandum, Working Paper Two, October 2008
- Appendices to the Supplemental Airport Planning Memorandum, Working Paper Two, October 2008

Public Outreach Documents

- Public Scoping Meeting Schedule and Agendas
- Angoon Airport EIS Project Hotsheet Update #1, August 18, 2008
- Angoon Airport EIS Project Hotsheet Update #2, October 22, 2008
- Angoon Airport EIS Update Newsletter, May 2008
- Thank You to the City of Angoon, September 2008

Frequently Asked Questions

How to Submit Comments/Subscribe to Mailing List

Project Contact Information

Leslie Grey - AAL 614
FAA Project Manager
Federal Aviation Administration, Airports Division
222 West 7th Avenue, Box #14
Anchorage, Alaska 99513-7587
Phone. 907-271-5453 FAX. 907-271-2851
comments@angoonairporteis.com

ANGOON AIRPORT
Environmental Impact Statement

I have the following comments regarding the
FAA's Angoon Airport EIS

All submissions from organizations or businesses will be made available for public review in their entirety. Individuals may request confidentiality with respect to their name, address and phone number. If you wish to have your name or street address withheld from public review, under the Freedom of Information Act, the first line of the comment should start with the words "CONFIDENTIALITY REQUESTED" in uppercase letters. Such requests will be honored to the extent allowed by law. Comment contents will not be kept confidential.

Additional comments and information can be sent separately to the address provided on the front of this form.

Scoping Comments MUST BE RECEIVED by
DECEMBER 31, 2008

Thank you for sharing your ideas with us!

Your Contact Information:

Your Name ______________________
Organization______________________
Address______________________
City/State/Zip ______________________
E-mail Address ______________________
Phone Number______________________

Please keep me informed of the project through updates:

- ☐ Yes
- ☐ No

Opportunities for Input and Project Contact Information:

By Email: comments@angoonairporteis.com
Website: www.angoonairporteis.com
By Mail:
Leslie Grey, AAL-614
FAA Project Manager
Angoon Airport EIS
222 W. 7th Ave., Box #14
Anchorage, AK 99513-7587

Scoping comments must be postmarked and received by December 31, 2008.

Fold this form in thirds, making sure to display the mailer portion on the outside. Please tape and affix the correct postage.

Leslie Grey, AAL-614
FAA Project Manager, Angoon Airport EIS
222 W. 7th Ave., Box #14
Anchorage, AK 99513-7587

Please Affix First Class Postage

You are invited to provide input on issues to be addressed in the Federal Aviation Administration's

Angoon Airport Draft Environmental Impact Statement (EIS)

APPENDIX G: ADVERTISING POSTCARD, SAMPLE PRESS RELEASE, AND SAMPLE PUBLIC SERVICE ANNOUNCEMENT

Project Point of Contact
Leslie Grey - AAL 614, FAA Project Manager
Angoon Airport EIS
222 West 7th Avenue, Box #14
Anchorage, AK 99513-7587

MEETING DETAILS

Monday, Oct. 27, 2008 • 3:30-5 PM
Loussac Library • 3600 Denali St., Anchorage, AK

Open House: Public invited to browse resource stations, ask questions of project specialists, and submit comments in an open house format.

Wednesday, Oct. 29, 2008 • 5:30-8 PM
Centennial Hall • 101 Egan Dr., Juneau, AK

Friday, Oct. 31, 2008 • 5:30-8 PM
Angoon Community Center • Angoon, AK

Agenda will be as follows:

- **5:30 pm Sign in:** Obtain meeting materials.
- **5:45-6:30 pm Presentation:** Project team introductions, project overview, and question and answer session.
- **6:30-8 pm Open house:** Public invited to browse resource stations, ask questions of project specialists and submit comments (refreshments provided).

Comments may also be submitted hardcopy to the address listed above, by e-mail to comments@angoonairporteis.com, or by filling out a comment form at www.angoonairporteis.com.
The deadline for scoping comments is Dec. 31, 2008.

Thank you for your interest in the Angoon Airport EIS Project. We look forward to seeing you at our October scoping meetings.

Media Information

Federal Aviation Administration, Alaskan Region
222 W. 7th Avenue / Anchorage, AK 99513-7587

Contact: Leslie Grey, (907) 271-5453 FOR IMMEDIATE RELEASE

FAA Schedules Angoon Airport Environmental Impact Statement Public Scoping Meetings

ANGOON, AK – The Federal Aviation Administration (FAA) will be hosting public scoping meetings in Anchorage, Juneau, and Angoon for the proposed Angoon Airport Environmental Impact Statement (EIS). The purpose of the meetings will be to provide information on project planning activities to date and to give members of the public the opportunity to ask questions of the project manager and resource specialists involved with the project. The public will also be able to provide comments on the issues and alternatives that will be included in the Draft EIS.

The Alaska Department of Transportation and Public Facilities (DOT&PF) has proposed a land-based airport on Admiralty Island to serve the City of Angoon. The airport would enhance the safety and reliability of air travel to and from Angoon. The EIS will analyze the potential environmental and socioeconomic impacts of the DOT&PF's proposed airport and alternatives to it. The FAA is the lead agency for the preparation of the EIS, and Leslie Grey is the FAA's Project Manager.

The meetings will be held in Anchorage on October 27, 2008 from 3:30 to 5 PM at the Loussac Library (3600 Denali St,), in Juneau on October 29 from 5:30 to 8 PM at Centennial Hall (101 Egan Drive), and in Angoon on October 30 and October 31 from 5:30 to 8 PM at the Angoon Community Center.

“These meetings help identify important questions and concerns early on in the process,” Grey said. "We want to make sure the best alternatives are presented in this EIS and that means we need to consider lots of different information and points of view in order to understand the broader picture."

The EIS process is expected to take three or more years to complete and will disclose impacts to the human and natural environment that might occur as a result of the proposed project. It will also look at a range of reasonable alternatives that could avoid or minimize potentially adverse impacts while still achieving the overall purpose of a land-based airport in Angoon. “EISs ensure that all important aspects of a project are considered,” Grey said, adding "It provides a 'look-before-you-leap' approach to federal projects. And, if there are significant impacts to the environment, the EIS will also consider measures to counteract those impacts".

Scoping comments will be accepted through December 31, 2008 and can be submitted at the public meetings, emailed to comments@angoonairporteis.com, submitted online at www.angoonairporteis.com, or mailed to: Leslie Grey AAL-614; FAA Project Manager, Angoon Airport EIS; 222 W. 7th Ave, Box 14; Anchorage, AK 99513-7587.

More information on the project as can be found at www.angoonairporteis.com.

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PUBLIC SERVICE ANNOUNCEMENT (30 second)-Juneau/Angoon

The FAA will be hosting 3 meetings for the proposed Angoon Airport Environmental Impact Statement to give the public a chance to learn about the project and provide comments on the issues and alternatives that will be covered in the Draft Environmental Impact Statement .

The meetings will be held from 5:30 to 8 PM at Juneau's Centennial Hall on October 29th and at the Angoon Community Center on October 30th and October 31st. For more information, contact Leslie Grey at 271-5453 or visit the project website at www.angoonairporteis.com.

##########

APPENDIX B

ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT
ANGOON, ALASKA

Prepared for

Federal Aviation Administration
and
Alaska Department of Transportation and Public Facilities

Prepared by

SWCA Enviromental Consultants

April 30, 2014

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1.0 INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) has proposed to construct and operate a land-based airport in Angoon. The Federal Aviation Administration (FAA) has responded by preparing an environmental impact statement (EIS) to both study the potential effects resulting from implementation of the proposed action and to consider alternatives that might lessen environmental effects while still meeting purpose and need for the project. Chapter 3: Alternatives of the EIS describes the process that the FAA used to identify and screen alternatives. This appendix provides more information about potential alternatives to the proposed action that were eliminated from consideration prior to full environmental analysis.

1.1 Identifying alternatives

National Environmental Policy Act (NEPA) regulations require that an EIS consider 1) a range of reasonable alternatives to the proposed action, 2) alternatives "not within the jurisdiction of the lead agency," and 3) the effects of taking no action (meaning, in this case, that no land-based airport or access road would be constructed).

Alternatives to a proposed action need not be identified only by the lead federal agency conducting an EIS, and such is the case for the proposed Angoon airport. Shortly after publishing in the *Federal Register* a Notice of Intent to Prepare an EIS (FAA 2008:55200), the FAA began to identify possible alternatives. The scoping process (see section 2.6 of Chapter 2: Purpose of and Need for a Land-Based Airport at Angoon) generated many comments about the project, including suggested alternatives to the proposed action. Other possible alternatives were included in studies conducted by the DOT&PF, including the *Angoon Airport Reconnaissance Study* (DOT&PF 2004) and *Angoon Airport Master Plan* (DOT&PF 2007), or developed by the FAA while evaluating different airport locations and runway orientations.

Possible alternatives to the proposed action fall into one or more of three broad categories, including those that

- respond to environmental, operational, and economic concerns raised by the public, agencies, businesses, special interest groups, and other stakeholders during project scoping; or
- address potential environmental, engineering, or operational issues discussed in DOT&PF studies or identified during the FAA's operational planning studies; or
- satisfy statutory requirements.

1.2 Screening alternatives

The scoping process and relevant studies identified a full spectrum of alternatives, including other modes of airport access or different transportation systems; improvements to the existing medical facility to better accommodate emergencies and serious illness; improvements to existing air service; 15 alternative airport locations and five access road routes; and even the possible use of existing nearby airports (in Kake, Hoonah, or Petersburg, for example) instead of constructing a new airport in Angoon. After compiling this list of potential alternatives, the FAA screened each to determine whether it met the purpose and need for the project, as defined in section 2.3 of this EIS. If a possible alternative did not meet purpose and need, it was eliminated from further consideration. A possible alternative that did address the purpose and need was further evaluated to determine if it was reasonable from a NEPA perspective, meaning practical or feasible from a technical and economic standpoint.

1.3 Factors used to determine technical and economic feasibility

To be considered “reasonable,” an alternative must meet the purpose and need, and be practical or feasible. For airport location alternatives, this means that the location must support established aviation design and safety standards. Airports are designed in accordance with the airport reference code standards outlined in the FAA Advisory Circular *AC 150/5300-13, Airport Design* (FAA 2012). These standards ensure that an airport is properly designed to accommodate the aviation requirements of the design aircraft. The FAA’s airport design guidelines provide standard planning criteria for runways, taxiways, aprons, safety dimensional standards, and other physical features of airports based on the airport reference code designation of the design aircraft.

The FAA used design criteria for airport reference code category B-II to establish the minimum development footprint of airport alternatives that would meet the purpose and need of the project. Each of the alternatives carried through for detailed analysis in the EIS met the minimum FAA standards for wind coverage, obstacle and obstruction clearance, safe approach and departure routes, and other factors relating to air navigation. Airport alternatives that could not meet minimum standards were eliminated from further consideration.

A detailed analysis of how airport location alternatives did or did not meet FAA aviation standards provided the basis for determining reasonable airport location alternatives that met purpose and need. That analysis, included in the Angoon Airport EIS *Supplemental Airport Planning Memorandum, Working Paper Two* (Barnard Dunkelberg & Company 2008), also disclosed reasons as to why some alternatives were not practical or feasible.

1.4 Alternatives considered but dismissed from detailed analysis

Alternatives that passed the FAA’s multiple levels of screening were carried forward for detailed analysis in the EIS, whereas those that did not satisfy the purpose and need or meet all the screening criteria were dismissed from further consideration. This section describes some of the more typical reasons why alternatives were eliminated from the EIS analysis. Table 1 provides more information on the spectrum of alternatives initially considered, the reasons why each alternative was developed, and rationale for why each was dismissed from full environmental review.

Some alternatives did not meet the project’s purpose and need. This was primarily the case for other modes of transportation, such as the current and future planned state-run ferry service or constructing a new emergency helicopter landing pad in Angoon. Although these modes of transportation have benefits, and each could help address some of the current transportation deficiencies, neither would address the need to improve the availability and reliability of transportation services to and from Angoon, as defined in section 2.3 of the draft EIS. For this draft EIS, the definition of availability and reliability includes

- frequency, or the amount of time that Angoon can be accessed (number of hours or percent of the year), dependent on weather and lighting conditions, and
- the ability to have on-demand or emergency transportation for varying numbers of passengers.

Other alternatives that could potentially meet purpose and need, or at least improve transportation access to Angoon, were not practical or feasible, and dropped from further analysis. A full environmental analysis was not necessary to recognize that construction of a road or railroad from Angoon to Juneau would be economically impractical and possibly technically infeasible. A bridge across Favorite Bay, a possible alternative raised during the scoping process and in previous studies related to a potential airport in Angoon, is another example of an access road option that would be economically impractical.

Fourteen other airport locations in and relatively near to Angoon were initially considered by the DOT&PF during project planning, and later reviewed by the FAA for their ability to meet design and safety standards for the design aircraft and airports. These locations, shown on Figure ALT1, were eliminated from full environmental analysis because they could not meet one or more of the required design or safety standards (such as wind coverage, or safe approach and departure routes). The most common failing of these possible alternatives was a consequence of hills or mountains that would be too close to the airport and create “terrain obstructions.” In some instances, terrain obstructions would prevent the airport from meeting glidepath clearance standards or preclude the ability for final approach and straight missed approach.

In addition to considering alternatives to a land-based airport in Angoon and to the different potential locations of such an airport, the FAA also considered alternatives to provide access to an airport. These alternatives considered everything from different modes of access to different routes for access roads. Table 2, below, summarizes the access alternatives that were considered but dismissed from detailed analysis by the FAA. Road alternatives are shown on Figure 1. Table 2 also provides the rationale for the dismissal of these alternatives from detailed consideration.

Table 1. Summary of alternatives to improve transportation services to and from Angoon considered but dismissed from detailed analysis

Alternative	Alternative description	Issue or concern addressed by alternative	Rationale for dismissing alternative
Improve other modes of non-local travel instead of a new land-based airport in Angoon			
Travel Mode 1	Stage a dedicated emergency helicopter and landing pad on the Angoon peninsula	• Would reduce environmental effect • Would not require use of Admiralty Island National Monument and Kootznoowoo Wilderness Area (referred to in this EIS as Monument–Wilderness Area) lands nor an Alaska National Interest Lands Conservation Act (ANILCA) Title XI application	• Alternative would not meet purpose and need to improve the availability and reliability of transportation services to and from Angoon, as defined in section 2.3 of the draft EIS and as stated above.
Travel Mode 2	Improve existing Alaska Marine Highway System	• Would reduce environmental effect • Would not require use of Monument–Wilderness Area lands nor an ANILCA Title XI application	• Increasing service levels for the ferry or improving the existing system (in other words, providing more frequent service) would not meet purpose for and need to improve the availability and reliability of transportation services to and from Angoon, as defined in section 2.3 of the draft EIS and as stated above. • The DOT&PF is currently updating its *Southeast Alaska Transportation Plan* (last updated in 2004). Preliminary analysis shows that increasing ferry service to Angoon would cost approximately $400 million (Potdevin 2014).
Travel Mode 3	Build a road or railroad from Angoon to Juneau	• Would provide better regional transportation connection than an airport • Would allow for 24-hour medevac operations via road	• Alternative is not economically feasible or prudent. • Alternative is not technically feasible or prudent.
Use other existing regional airports in lieu of a new airport in Angoon			
Other Airport 1 through Other Airport 3	Use of nearby airports: • Existing airports at Kake (44 miles from Angoon), Hoonah (53 miles from Angoon), Petersburg (78 miles from Angoon), and elsewhere	• Would avoid environmental effects from constructing an airport in Angoon	• Alternative does not meet the project purpose and need: There are no existing or reasonably foreseeable road connections between Angoon and any regional community with an existing airport, and visitors to and residents of Angoon would still only be able to access these other airports via aircraft types currently serving Angoon, by ferry, or by other private watercraft.

Table 1. Summary of alternatives to improve transportation services to and from Angoon considered but dismissed from detailed analysis

Alternative	Alternative description	Issue or concern addressed by alternative	Rationale for dismissing alternative
Improve existing air transportation service in lieu of a land-based airport			
Existing Air Service 1	Increase the number of flights per day serving Angoon	• Would increase flight availability to meet travel demand • Would avoid environmental effects of a land-based airport • Would not require new construction	• Alternative would not meet purpose and need: The percentage of time seaplanes can operate into and out of Angoon is determined by weather, lighting conditions, and water conditions in Favorite Bay, not by the number of aircraft. Even if a seaplane is available, the flight would not take place at night or if there is low cloud cover or poor visibility.
Improve existing air transportation service in lieu of a land-based airport (continued)			
Existing Air Service 2	Use larger seaplanes to serve Angoon	• Would increase number of available seats to meet travel demand • Would avoid environmental effects of a land-based airport • Would not require new construction	• Same as Existing Air Service 1.
Existing Air Service 3	Install landing area light and/or develop an instrument approach procedure	• Would not require new construction	• Landing lights or other markings would constitute a navigation hazard for boats. • Large tidal fluctuations would cause the landing area size and location to vary unpredictably. • Debris would cause the system to fail too often for the benefits to be realized. • Alternative does not meet the project purpose and need: Development of an instrument approach procedure at the Angoon Seaplane Base would increase the total available hours for flights in a given year by less than 3% and would still not permit a water landing in Favorite Bay at night.
Improve medical services in Angoon to eliminate the need for medevac			
Medical 1	Equip Angoon's existing medical clinic with emergency facilities and staff	• Would reduce need for land-based airport to serve regional medevac operators	• Alternative would not meet purpose and need to improve the availability and reliability of transportation services to and from Angoon, as defined in section 2.3 of the draft EIS and as stated above.

Other potential airport locations in Angoon			
Airport 1	Airport on Channel Island with ferry or bridge from Angoon	• Would not use Monument–Wilderness Area lands and would not require an ANILCA Title XI application • Would require less land currently used for subsistence gathering than alternatives on the Angoon peninsula or east of Favorite Bay	• Does not meet FAA aviation operation criteria for both runway ends: Terrain obstructions would not allow the airport to meet aircraft glidepath standards for commercial aircraft.
Other potential airport locations in Angoon (continued)			
Airport 2	Airport on Sullivan Island with ferry or bridge from Angoon	• Would require less land currently used for subsistence gathering than alternatives on the Angoon peninsula or east of Favorite Bay • Would use less Monument–Wilderness Area lands than alternatives east of Favorite Bay	• Does not meet FAA aviation operation criteria for both runway ends: Terrain obstructions violate FAA standards for final approach and straight missed approach.
Airport 3	East of Favorite Bay on Monument–Wilderness Area lands	• Would not use private or municipal lands • Terrain is flatter than many other locations, and might require less cut and fill, therefore less environmental effect • Location provides good aviation operation characteristics, such as available arrival and departure approaches and reasonable minimums	• Does not meet FAA aviation operation criteria for one runway end: Terrain obstructions violate FAA standards for final approach and straight missed approach. • This was the DOT&PF Master Plan preferred alternative. It was replaced with Airport 3a, which was carried forward for detailed analysis in the EIS. The DOT&PF adopted Airport 3a, which performs better from an aviation standpoint, as its proposed action for the EIS.
Airport 5	Airport on southwest edge of Angoon peninsula along proposed access road to Hood Bay	• Would be close to the community of Angoon residential areas with a shorter access road and less drive time than alternatives east of Favorite Bay • Would facilitate development of the proposed road to Hood Bay	• Does not meet FAA aviation operation criteria: Terrain obstructions would not allow the airport to meet aircraft glidepath standards for commercial aircraft and would violate FAA standards for final approach and straight missed approach.
Airport 6	Airport on west side of Angoon peninsula, north of Auk'Tah Lake	• Would be close to the community of Angoon residential areas with a shorter access road and less drive time than alternatives east of Favorite Bay • Would not use Monument–Wilderness Area lands, and would not require an ANILCA Title XI application	• Does not meet FAA aviation operation criteria for one runway end: Terrain obstructions would not allow the airport to meet aircraft glidepath standards for commercial aircraft. • Does not meet FAA aviation operation criteria at both runway ends: Terrain obstructions violate FAA standards for runway threshold siting clearance and departure surface clearance.
Airport 6a	Minor variation on Airport 6 with slight reorientation of runway to take advantage of terrain	• Same as Airport 6 but would make better use of terrain for construction and aviation purposes	• Same as Airport 6.

Table 1. Summary of alternatives to improve transportation services to and from Angoon considered but dismissed from detailed analysis

Alternative	Alternative description	Issue or concern addressed by alternative	Rationale for dismissing alternative
Other potential airport locations in Angoon (continued)			
Airport 7	Airport at center of Angoon peninsula	• Same as Airport 6 but would be closer to Angoon's core developed area	• Does not meet FAA aviation operation criteria for both runway ends: Terrain obstructions would not allow the airport to meet aircraft glidepath standards for commercial aircraft. • A similar alternative, Airport 12a, was carried forward for detailed analysis in the EIS; Airport 12a would have similar effects as an airport at the proposed location of Airport 7, but would provide for better aviation operations.
Airport 8	Airport near center of Angoon peninsula, just south of landfill	• Same as Airport 7 but would be closer to Angoon's core developed area	• Does not meet FAA aviation operation criteria for one runway end: Terrain obstructions violate FAA standards for final approach and straight missed approach. • Topographic constraints of the location cannot accommodate present and future airside and landside facilities projected in the aviation demand forecast.
Airport 9	Airport toward north end of Angoon peninsula, between the road to the ferry terminal and Angoon's core developed area	• Same as Airport 7 but would be closer to developed Angoon community core area	• Does not meet FAA aviation operation criteria for both runway ends: Terrain obstructions violate FAA standards for runway threshold siting clearance and departure surface clearance. • Topographic constraints of the location cannot accommodate present and future runway, apron, passenger building facilities projected in the aviation demand forecast.
Airport 10	Airport at north end of Angoon peninsula, immediately south of Angoon's core developed area	• Same as Airport 7 but would be closer to Angoon's core developed area than any other alternative	• Same as Airport 1.
Airport 11	Airport of identical orientation and general location as Airport 7 but farther east, paralleling the existing road to Auk'Tah Lake	• Same as Airport 7	• Same as Airport 1.

Table 1. Summary of alternatives to improve transportation services to and from Angoon considered but dismissed from detailed analysis

Alternative	Alternative description	Issue or concern addressed by alternative	Rationale for dismissing alternative
Other potential airport locations in Angoon (continued)			
Airport 12	Airport of similar orientation and general location as Airport 7 but farther north and west	• Same as Airport 7	• Does not meet FAA aviation operation criteria for both runway ends: Terrain obstructions would not allow the airport to meet aircraft glidepath standards for commercial aircraft. • A variation of this alternative was carried forward for detailed analysis in the EIS as Airport 12a, which features a slight shift in location from Airport Alternative 12 to take advantage of more appropriate terrain.
Airport 13	Airport near center of Angoon peninsula, just south of landfill; roughly same location as Airport 8 but with a different runway orientation	• Same as Airport 7	• Same as Airport 1.
Airport 14	Airport in the southeast portion of the Angoon peninsula, between Auk'Tah Lake and Favorite Bay	• Same as Airport 6	• Same as Airport 1.

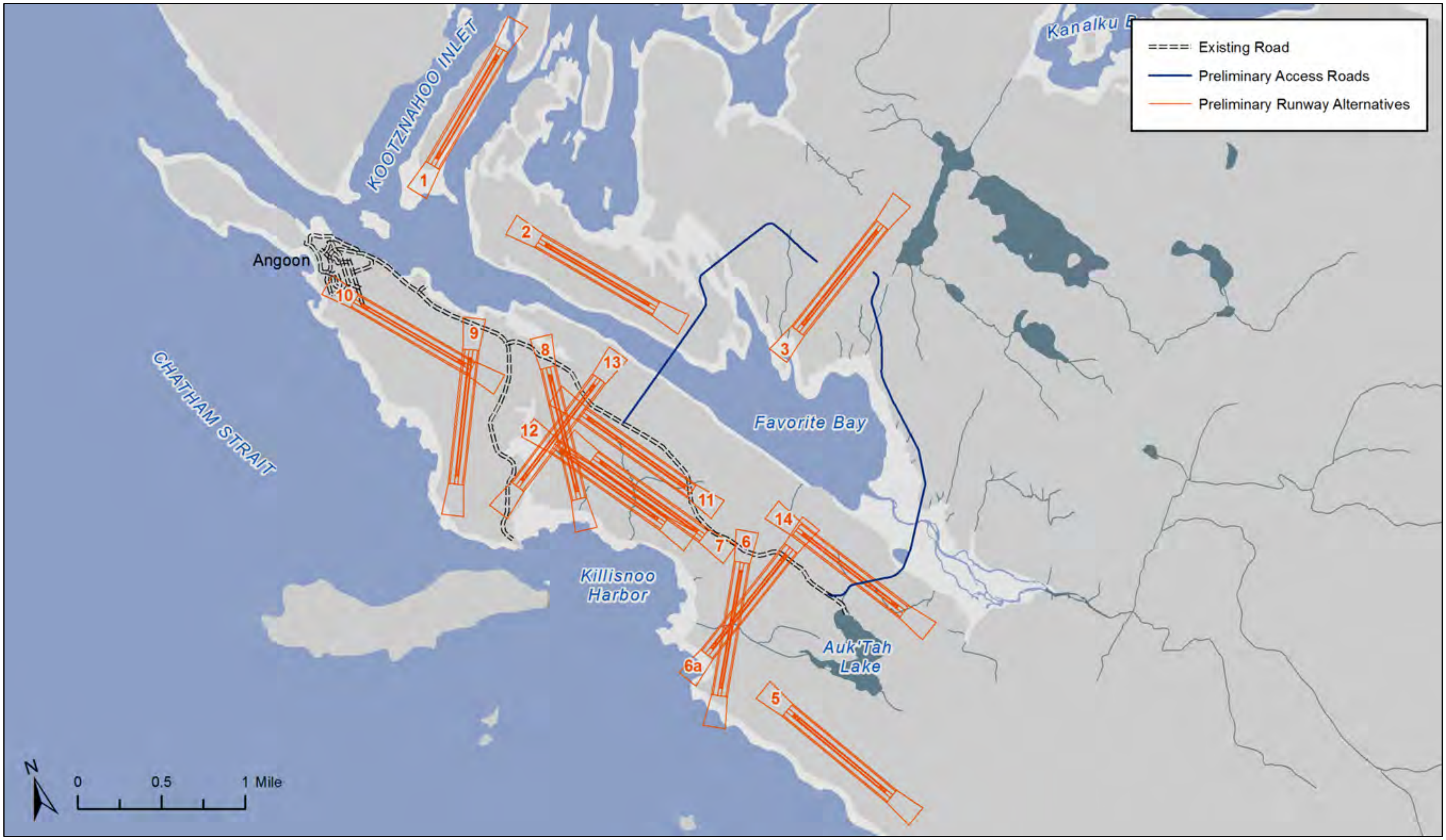

Figure 1. Initial airport location alternatives considered by the FAA.

Table 2. Summary of access alternatives to a proposed land-based airport considered but dismissed from detailed analysis

Access alternative	Access alternative description	Issue or concern addressed by access alternative	Rationale for dismissing access alternative
Other access road routes to proposed airport locations in Angoon			
Access 4	Bridge across the estuary at the head of Favorite Bay	• Would reduce distance from Angoon's core developed area and result in less drive time • Less acreage of land-based subsistence gathering areas would be affected	• Alternative would have significantly greater adverse effects on high-value intertidal areas used for subsistence gathering than other access alternatives. • Alternative would have significantly greater adverse effects on high-value wetlands than land-based alternatives. • Travel time savings would not be substantial enough to outweigh additional environmental effects compared to other alternatives. • Alternative is not economically feasible.
Access 5	Bridge across the narrowest point near the mouth of Favorite Bay	• Same as Access 4	• Alternative would have significantly greater adverse effect on high-value marine and intertidal subsistence gathering areas. • Alternative is not economically feasible.
Other modes of airport access in lieu of an access road			
Access Mode 1	Local ferry across Favorite Bay; similar to the airport ferry at Ketchikan	• Less disturbance to wetlands, terrestrial wildlife habitat and vegetation, cultural resources, and wilderness characteristics than would occur with an access road • Would reduce potential for indirect effects on Monument–Wilderness Area lands, compared to an access road around Favorite Bay, which could be used for purposes other than accessing the airport	• Alternative would result in a substantially greater effect on a primary subsistence gathering area for Angoon residents: Favorite Bay is shallow, with a gradually sloping bottom and very shallow margins. The bay exhibits a large tidal range (17–23 feet) and is one of the most important marine resource gathering areas for subsistence users. High-volume dredging would be needed to accommodate ferry landings on either shoreline. Tidal deposition of sediment would necessitate frequent re-dredging. • Alternative is not economically feasible or technically prudent due to construction costs, long-term maintenance costs, and the extremely high volume of initial and ongoing dredging that would need to occur.

2.0 LITERATURE CITED

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APPENDIX C
CONSTRUCTION METHODS AND ISSUES

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

CONSTRUCTION METHODS AND ISSUES

ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT

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DOWL Project Number 1123.59761.02

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ACRONYMS

AASHTO: American Association of State Highway and Transportation Officials
ADF&G: Alaska Department of Fish and Game
ADT: average daily traffic
ANCSA: Alaska Native Claims Settlement Act
BMP: best management practice
DOT&PF: Alaska Department of Transportation & Public Facilities
EIS: environmental impact statement
ESCP: Erosion and Sediment Control Plan
FAA: Federal Aviation Administration
Mph: miles per hour
N/A: not applicable
ROW: right-of-way
RSA: runway safety area
SWPPP: Storm Water Pollution Prevention Plan
USFS: United States Forest Service

1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) to assess environmental impacts associated with the proposed and alternative locations for an airport to serve Angoon, Alaska.

The purpose of this *Construction Methods and Issues* report is to provide a brief description of the preliminary engineering work performed so far, and to discuss potential construction methods and schedules. This report was prepared to provide planning-level information to the resource specialists assessing the impacts that could result from development of the proposed airport. This report does not contain detailed engineering, but instead provides the details necessary for the EIS analysis. More detailed design engineering would be conducted independent of the EIS if the FAA approves an action for implementation.

This report has been prepared under the direction of the FAA and is being coordinated with the Alaska Department of Transportation & Public Facilities (DOT&PF) among others.

2.0 ALTERNATIVES

The EIS being prepared by the FAA includes an assessment of three airport alternative sites. Two of the three sites are within the U.S. Forest Service (USFS)–managed Admiralty Island National Monument and Kootznoowoo Wilderness Area. The other site is located on the Angoon Peninsula.

Each airport alternative would have the same criteria and be designed for airport reference code B-II. The runway would be 3,300 feet long. The specifications for the airport would be for aircraft weighing less than 12,500 pounds and have an approach visibility minimum of not less than 3/4 statute mile. The EIS being prepared for this project considers the near-term construction of a 3,300-foot-long runway, but will assess the viability of each potential airport to accommodate future expansion to 4,000 feet. The site layouts analyzed would accommodate 4,000 feet; however, impacts are only evaluated for the 3,300-foot alternatives.

Each airport alternative would require construction of an access road. Airport Alternatives 3a and 4 would each have two access road alternatives. Airport Alternative 12a would have one access road alternative. The initial road would be designed as a major access road with average daily traffic (ADT) less than 400 and a design speed of 40 miles per hour (mph). For effects, the EIS assumes that this initial road would include 9-foot lanes with 1-foot shoulders. If needed in the future, the road would be upgraded and designed as a rural, major collector with a design speed of 40 mph and an ADT greater than 400. The current standard for this type of road includes 10-foot lanes with 5-foot shoulders as well as an additional 5-foot clear zone with 4:1 slopes. Beyond the clear zone, slopes may be steepened to minimize the road's footprint.

The minimum ROW width for access roads to the airport would be 150 feet in rolling terrain. The maximum ROW width would be up to 250 feet as necessary to accommodate the roadway and related features such as drainage facilities, cut and fill slopes, rock catchment areas, driver recovery zones, snow storage, utilities, and line of sight for driver safety. The entire ROW will be cleared of all trees and vegetation.

The airport alternatives being assessed in the EIS are described below. A map showing their location is provided as Figure 1.

2.1 Airport Alternative 3a

This alternative would be located about 3 miles east of Angoon within the Admiralty Island National Monument and Kootznoowoo Wilderness Area. The runway for this alternative would be configured in a northeast-southwest direction. Constructing the airport at this location would require the longest road access from Angoon; approximately 4.5 road miles from the end of the Bureau of Indian Affairs (BIA) Road on the existing road network. This alternative is also the DOT&PF's proposed action.

Airport Alternative 3a would have two access alternatives:

1. Access Alternative 2 would be approximately 4.4 miles long, wrap around the southern end of Favorite Bay, and include one bridge over Favorite Creek.

2. Access Alternative 3 would be approximately 4.8 miles long and follow a similar path with a bridge over Favorite Creek. However, it would be located more inland and have a shorter bridge crossing.

2.2 Airport Alternative 4

This alternative would be located roughly 4.3 miles southeast of Angoon in the Admiralty Island National Monument and Kootznoowoo Wilderness Area. The runway for this site would be configured in the northeast-southwest direction. Constructing the airport at this location would require construction of approximately 3.0 new road miles from the end of the BIA Road on the existing road network.

Airport Alternative 4 would have two access alternatives:

1. Access Alternative 2 would be approximately 3.0 miles long, wrap around the southern end of Favorite Bay, and include one bridge over Favorite Creek.
2. Access Alternative 3 would be approximately 3.0 miles long and follow a similar path with a bridge over Favorite Creek. However, it would be located farther inland and have a shorter bridge crossing.

2.3 Airport Alternative 12a – Preferred Alternative

This alternative would be located 2.5 miles south of Angoon on the Angoon Peninsula, on Alaska Native Claims Settlement Act (ANCSA) lands managed by Kootznoowoo Inc. The runway for this alternative would be configured in the northwest-southeast direction. This alternative is the FAA's preferred alternative.

Airport Alternative 12a has one access alternative. Access Alternative 12a would be approximately 0.3 miles long. It would run southwest to the site from the BIA Road, and would be the shortest of the three alternatives.

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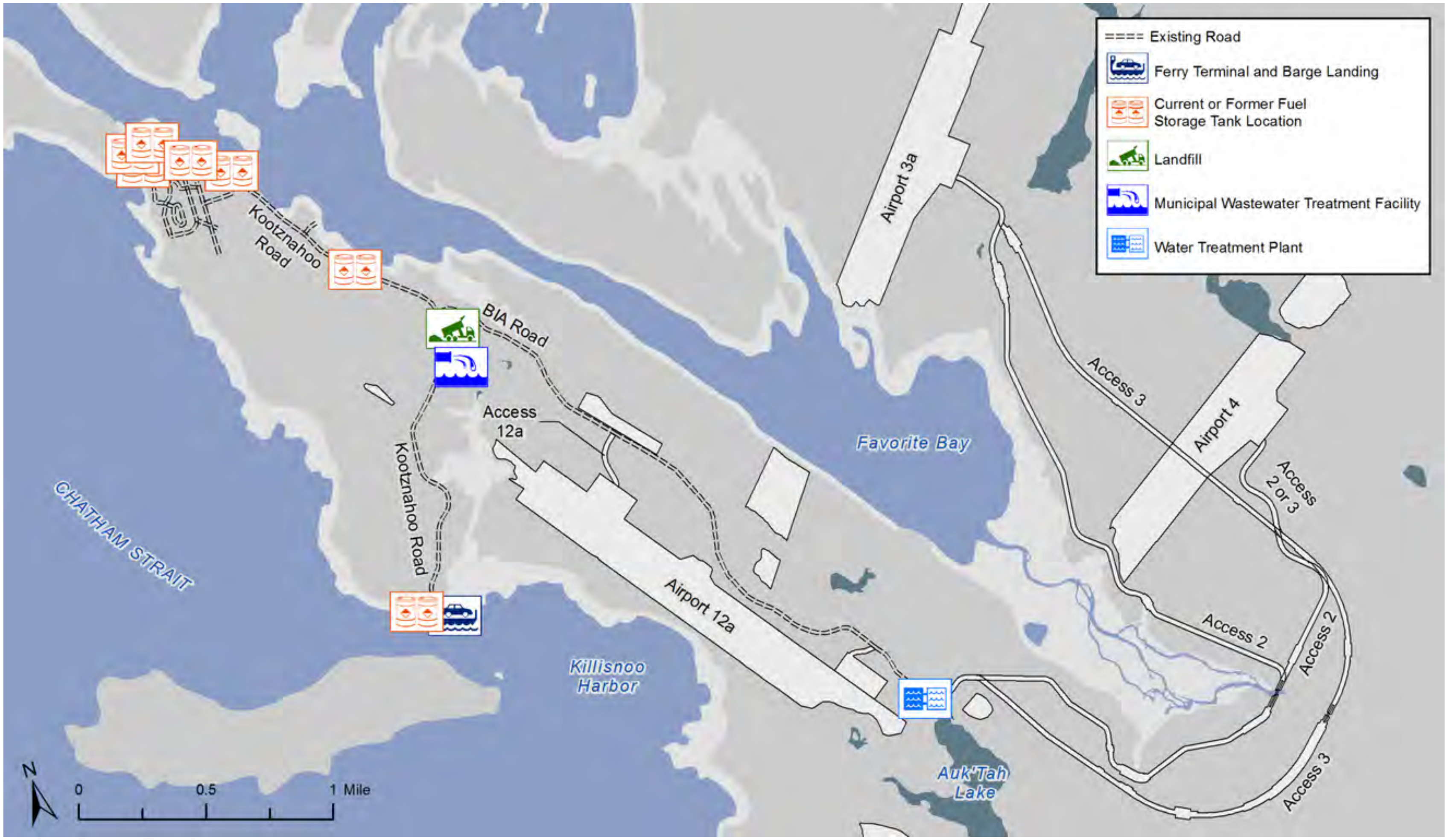

Figure 1: Airport and access road alternatives.

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3.0 CONSTRUCTION MATERIALS AND TYPICAL SECTIONS

Any airport and associated access road would be new construction. This would involve disturbing the terrain; removing or felling trees; excavating and disposing of peat and unusable material from the proposed site; and placing embankment, subbase, crushed aggregate base course, and asphalt pavement. The grading and dimensions of the airport would be in accordance with the standards established in FAA Advisory Circular 150/5300-13, *Airport Design*.

3.1 Construction Materials

Material required for airport and road construction would consist of embankment fill, subbase course, crushed aggregate base course, and an asphalt paving surface course. Embankment fill would likely come from either common excavation or rock excavation.

Material from common excavations would be obtained from suitable silt, sand, or gravel that does not require blasting or ripping. Material from rock excavations would be obtained from blasting or ripping rock or boulders.

Subbase course is classified as material that consists of hard durable particles or fragments of granular aggregates that are mixed with fine sand, stone dust, or similar building material.

Crushed aggregate base course and asphalt paving surface course must be clean, sound, durable particles or crushed stone or gravel. They must be free of organics, silt, or clay coatings. They must also meet specifications for wear and durability.

3.2 Typical Section

The fill section for each alternative would be similar. Material for the runway and road would consist of embankment, followed by a subbase course layer, followed by a crushed aggregate surface course, and finished off with an asphalt paving surface course.

The proposed runway for each alternative would be constructed to standards for airport reference code B-II (Figure 2). The runway would be 75 feet wide with 10-foot shoulders. The Runway Safety Area (RSA) would be 150 feet wide and would extend 300 feet beyond the runway ends.

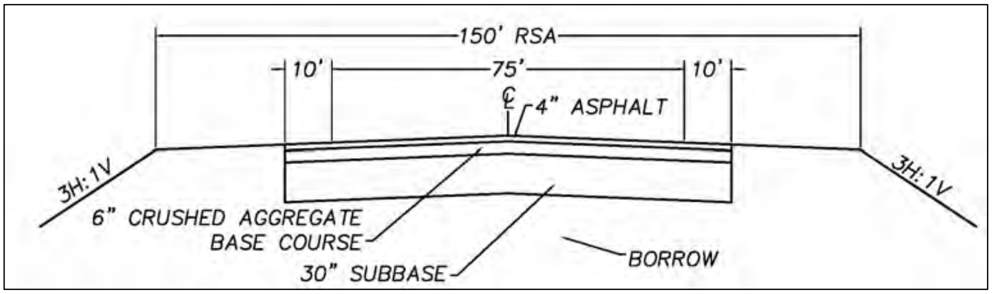

Figure 2: Typical section for runway.

Each access alternative would have the same cross section (Figure 3) with minor variations in the footprint to account for terrain. Each would be designed with two 9-foot-wide lanes and 1-foot shoulders. If warranted, the access alternative could be widened in the future to 10-foot-wide lanes with 5-foot shoulders.

Design criteria for the access road options follow the American Association of State Highway and Transportation Officials (AASHTO) publications *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400); A Policy on the Geometric Design of Highways and Streets (Green Book);* and *The DOT&PF Alaska Highway Preconstruction Manual.*

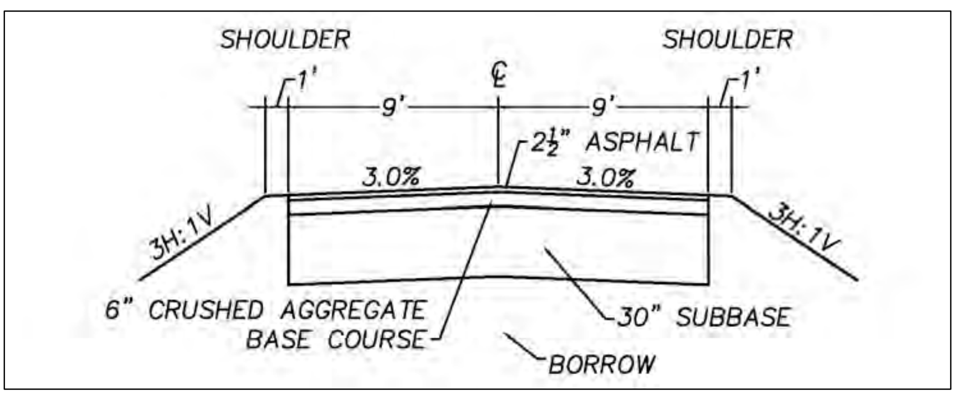

Figure 3: Typical section for access road.

3.3 Right-of-Way

As discussed in Section 2.0, the minimum ROW width for the access alternatives would be 150 feet in rolling terrain. The maximum ROW width would be up to 250 feet, as necessary to accommodate the two 9-foot lanes with 1-foot shoulders, and potential future widening of the roadway. It is assumed that the entire ROW will be cleared of all vegetation to accommodate the initial roadway and related features such as drainage, cut and fill slopes, rock catchment areas, driver recovery zones, snow storage, utilities, and line of sight for driver safety.

It is anticipated that some of the ROW would need to be acquired from Kootznoowoo Inc. to construct a portion of the access road for Alternatives 3a or 4. The other portions of the road ROW for these two alternatives would traverse the Admiralty Island National Monument and Kootznoowoo Wilderness Area.

The land for Airport Alternative 12a would have to be acquired from the City of Angoon, Kootznoowoo Inc., and potentially other land owners. Discussions to acquire this land would be required if this alternative is selected.

Temporary ROW would be required for bridge installation. This ROW is discussed below in section 3.4.

3.4 Bridge

Airport Alternatives 3a and 4 each have a proposed road bridge over Favorite Creek. The bridge would be approximately 650 feet long for both Airport 3a with Access 2 and Airport 4 with Access 2. For Airport 3a with Access 3 and Airport 4 with Access 3, the bridge would be approximately 450 feet long.

The two bridge options built to cross Favorite Creek would be constructed of precast concrete bulb tee girders with 140 foot spans and would rest on steel H piles or steel pipe piles with concrete piers and batter piles (Figure 4 & 5). Alternative Access 2 would have two piers within the stream channel and ordinary high water line, but all other piers would be well outside the ordinary high water line. The Alternative Access 3 bridge structure would not require piers be placed in the active stream channel or within the ordinary high water line. As design progresses, approach segments could be adjusted shorter or longer and intermediate piers could be moved slightly to accommodate bridge design.

A large crane with a pile-driving hammer would be used for pile foundations. The crane would be located adjacent to the foundations and would not be in the creek during construction. Once foundation piles were in place, concrete piers and abutments could be constructed and girders would be set. Decking would be done from the top side once girders are in place.

A temporary bridge would be constructed over Favorite Creek (see section 5.5). This temporary bridge would be used to move equipment back and forth, facilitate construction of the permanent bridge over the creek, and as a haul route. At both Access alternatives the temporary bridge would likely result in temporary impacts within the active stream channel and ordinary high water. No permanent foundations would be required. A temporary access would be constructed to allow equipment to get down to the stream bed so piles could be driven at support locations. The temporary bridge would not be removed until all hauling is complete, near the end of the project. It is anticipated that the ROW would be temporarily increased in the vicinity of the permanent bridge to make room for construction equipment, the temporary access road, and construction of the temporary bridge.

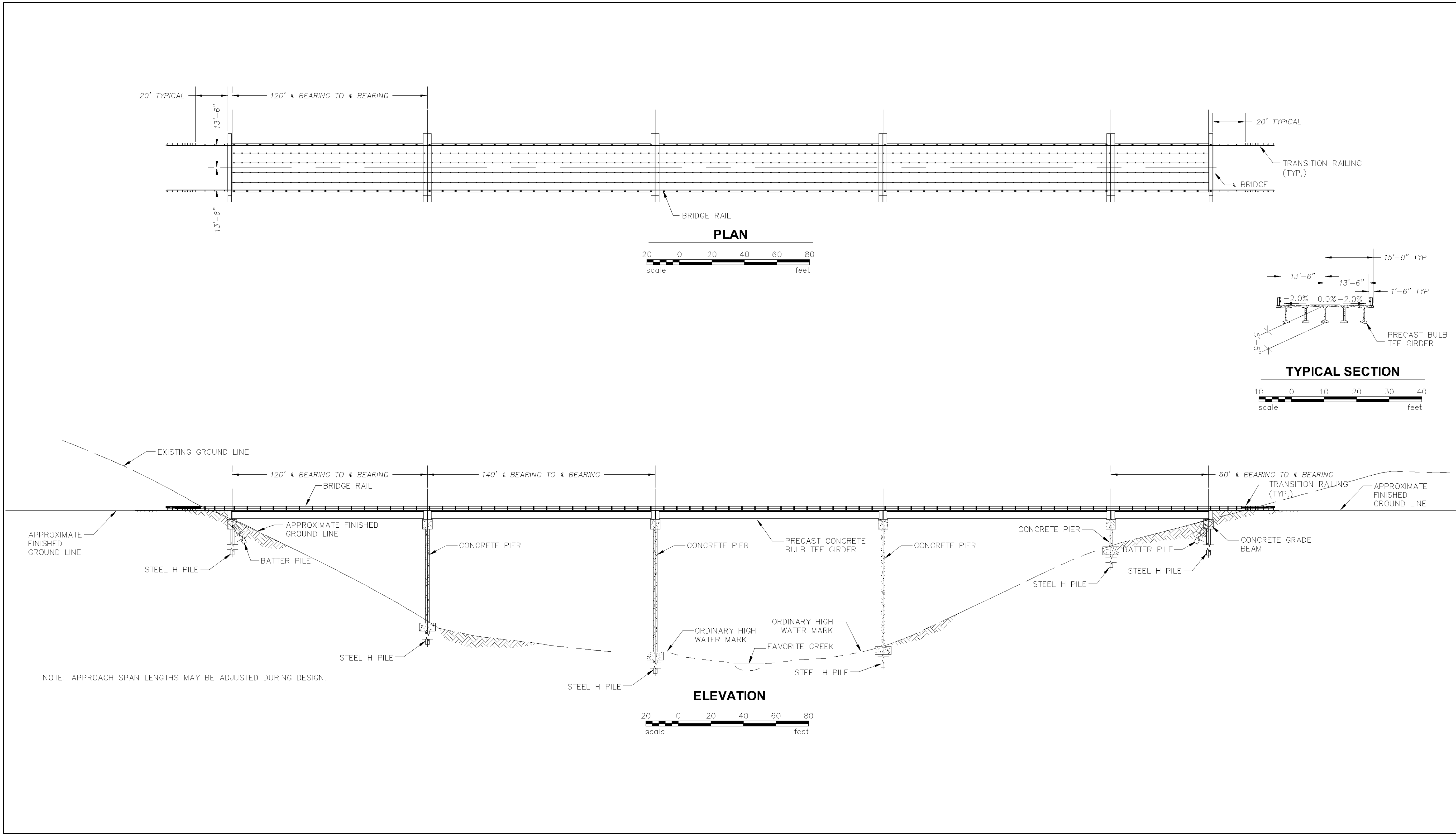

Figure 4: Access 2 road bridge profile.

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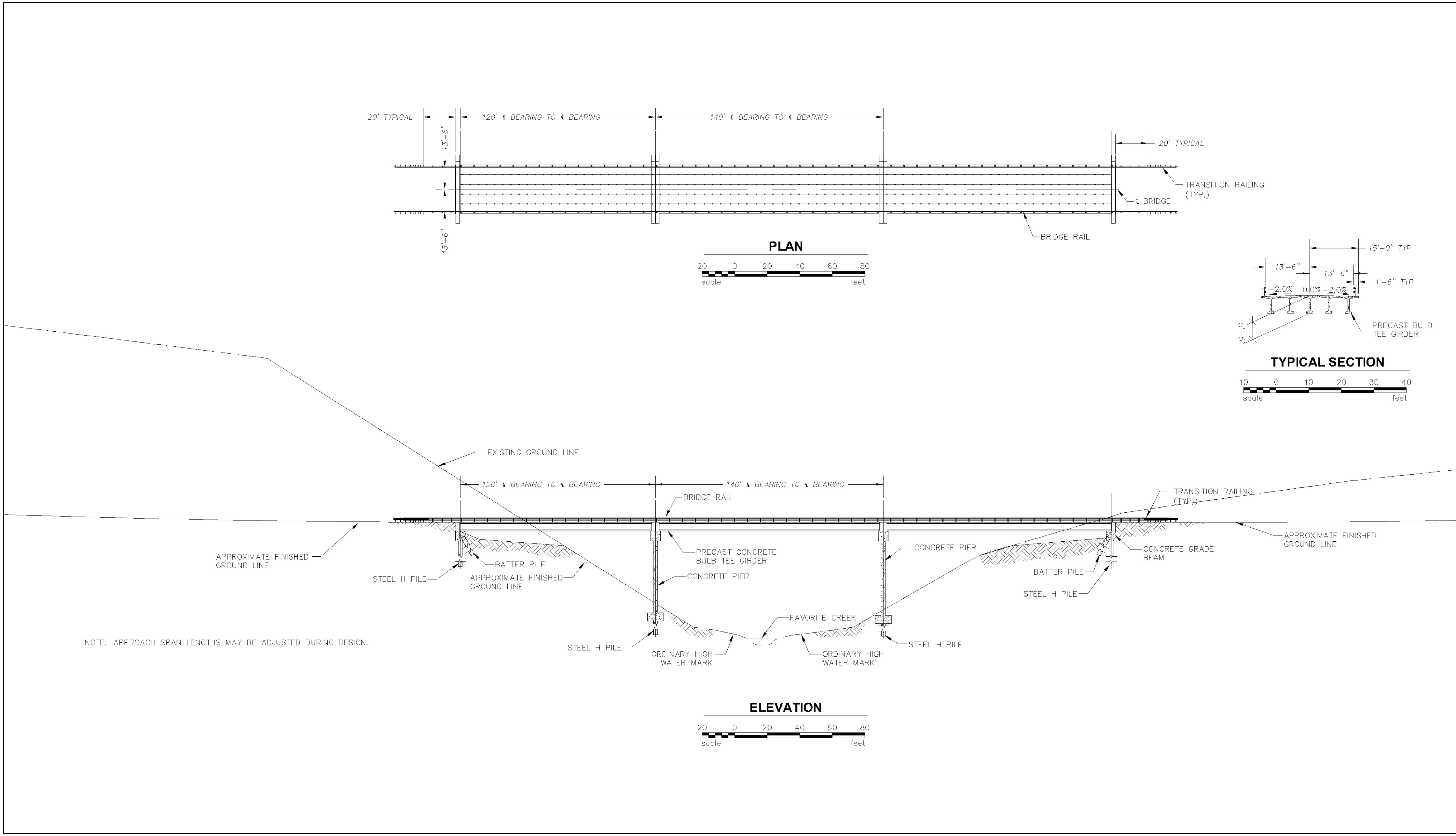

Figure 5: Access 3 road bridge profile.

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3.5 Area Affected by Fill

Disturbance areas vary according to each site and are shown in Table 1.

Table 1: Estimated Disturbed Area

Alternative	Impervious (acres)	Tree Removal (acres)	Terrain Disturbance (acres)	Tree Felling (acres)	Temporary Use Area, at Favorite Creek bridge (acres)
Alternative 3a					
Airport	18.2	54.8	74.6	64.9	
Access 2	10.4	17.1	30.5		7.0
Access 3	11.3	17.8	36.5		4.7
Alternative 4					
Airport	18.4	49.7	73.2	46.7	
Access 2	6.9	11.8	19.6		7.0
Access 3	7.7	12.7	25.7		4.7
Alternative 12a					
Airport	18.5	64.9	76.0	52.9	
Access 12a	0.5	0.7	1.5		

3.6 Quantities

Material quantities for the different sites and access roads are shown in Table 2.

Table 2: Estimated Materials Required for Project

Alternative Material	**Airport Quantities** (cubic yards)	**Road Quantities** (cubic yards)	**Road Quantities** (cubic yards)
Alternative 3a		**Access 2**	**Access 3**
Asphalt Paving	7,000	3,300	3,500
Aggregate Base Course	10,500	7,600	8,300
Subbase Course	52,100	38,000	41,200
Fill	154,900	254,100	224,100
Cut	190,600	280,600	985,900*
Rip Rap		630	148
Alternative 4		**Access 2**	**Access 3**
Asphalt Paving	7,000	2,200	2,400
Aggregate Base Course	10,500	5,000	5,600
Subbase Course	52,100	25,000	28,000
Fill	452,800	100,600	101,800
Cut	380,800	269,900	905,300*
Rip Rap		630	148
Alternative 12a		**Access 12a**	
Asphalt Paving	7,000	200	
Aggregate Base Course	10,500	500	
Subbase Course	52,100	2,200	
Fill	272,300	19,400	
Cut	342,200	100	

*The actual alignment will be adjusted during design and all efforts would be made to minimize the excess cut.

Alternative Access 2 would be closely balanced. However, because not all excavated material (for example, overburden) is usable, there would be some waste material that would have to be disposed of in a waste material site. It is anticipated that there would be surplus material from the airport and access road construction if Access Alternative 3 is chosen. Excess material, whether usable or unusable, would most likely become the property of the contractor. It would then be the contractor's responsibility to use or dispose of the material in accordance with local, state, and federal regulations. Excess earthwork materials in this area would typically be disposed of at the nearest possible location on-site; ideally the contractor, Alaska DOT&PF, or the community of Angoon would identify a need for the material locally. If waste material were placed at a site in Angoon, and assuming a waste site height of 30 feet, 1 acre could hold approximately 50,000 yards of waste material. If Alternative Access 3 were chosen, an additional 15 acres of disturbance would be required.

Trees removed for clearing could be: sold by the contractor if it were a marketable product, donated to locals for their use, or burned on-site. For the four alternatives located on the Admiralty Island National Monument and Kootznoowoo Wilderness Area, the USFS Regional Forester has the discretion to approve which method would be implemented. Clearing and grubbing would consist of clearing the ground surface in designated areas of all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials that are unsuitable for the construction of the access road and airport. Materials removed from designated construction areas to be cleared and grubbed would be disposed of either by burning or by slope flattening.

4.0 MATERIAL SOURCES

The DOT&PF has conducted materials testing on the Angoon peninsula for their Kootznahoo Road improvement project in 1996 (DOT&PF Project # 71526 & 71963). DOT&PF's testing found materials of adequate quality for constructing road surfacing for that project. Because of this, it is reasonable to assume that possible material sources on the Angoon peninsula could be used for the Angoon Airport project.

A brief evaluation of a potential material site was conducted in the summer of 2009. During the evaluation, one existing material site, an existing quarry south of Angoon, was identified for use in building the airport. The site evaluation found that the material at this quarry may have a tendency to break down easily. This type of material is not adequate for constructing the surfacing for an airport or access road. Because full testing of a possible expansion of this site has not been conducted, the EIS analysis assumes that adequate material can be obtained by expanding the current size of the existing quarry.

Also because of its proximity to the existing BIA Road, the site identified as “Proposed Material Source A” in the 2009 Material Site Evaluation (Figure 7 of Appendix 4) is included as a possible material source in the EIS analysis. Full testing would need to be conducted at this site to determine the quality of material’s for use in road and airport construction.

If either of these material sources, or possibly others, are chosen by the construction contractor for further development, then the contractor would have to go through the appropriate permitting processes at that time.

Because the quality of the materials from these sites is either unknown or inadequate for construction, it is not known at this time what portion of materials could be sourced from the island. Therefore, for the purposes of analysis, the EIS analyzes the maximum material volume that would have to be barged in for the project. Known sources for construction materials have already been developed in other locations in Southeast Alaska and British Columbia, Canada. The contractor would be responsible for shipping all required fill or paving material to Angoon.

Table 3: Estimated Barge Trips

Alternative Material	Airport (barge trips)	Road (barge trips)	Road (barge trips)
Alternative 3a		**Access 2**	**Access 3**
Asphalt Paving	3	1	1
Aggregate Base Course	4	3	3
Subbase Course	18	13	14
Rip Rap		1	1
Alternative 4		**Access 2**	**Access 3**
Asphalt Paving	3	1	1
Aggregate Base Course	4	2	2
Subbase Course	17	9	9
Rip Rap		1	1
Alternative 12a		**Access 12a**	
Asphalt Paving	3	1	
Aggregate Base Course	4	1	
Subbase Course	18	1	

*Assumes a barge capacity of 3000 cubic yards.

5.0 MATERIAL PLACEMENT

5.1 Construction Equipment and Fueling

Based on comparable projects of this size, an estimate of roughly 35–50 pieces of equipment would be required for the general contractor. This would include typical construction-related vehicles plus one asphalt paving plant with paving equipment and one small concrete batch plant. To reduce the spread of weeds during construction, the contractor would power-wash heavy equipment at a control site before transporting it to Angoon for use.

Housing would be required for approximately 75 individuals. Each piece of equipment would require an operator, and there would be an additional 10 on-site supervision staff members to oversee the project.

Based on the fleet listed above, the anticipated fuel usage for construction equipment projected for this project would be roughly 300,000 to 500,000 gallons of diesel fuel, and 10,000 to 20,000 gallons of gasoline. During heavy hauling, it is anticipated that fuel use could exceed 10,000 gallons a week for short durations. This would vary by the selected contractor and equipment actually on-site. The local supplier of gasoline and diesel has indicated in discussions that they have adequate resources to provide all the fueling needs for the project. It is the contractor's option as to whether they would choose to use a local supplier or barge their own fuel in.

If the existing supplier is used, all the necessary permits and equipment are already in place. Fuel would be delivered via barge on-demand dependent upon weather and tides. Fuel would be offloaded via hard-piped header system directly from the dock to their tank system, then distributed via truck as needed. The supplier indicated that roughly 55,000 gallons of total storage is available, roughly 36,000 gallons for diesel the remainder for gasoline.

If a contractor supplied the fuel, various rules and regulations would likely necessitate it be done via tanker truck placed on a barge and driven or towed off at the site. Fuel would remain in the truck until used or transferred to a contractor-supplied holding tank. Storage of hazardous materials is discussed further in section 5.8.

5.2 Construction Techniques

Excavating the unusable material and building the new embankment would be carried out through conventional means of earthmoving equipment to load trucks and haul the materials around the construction site. Embankment materials would likely be placed by end dump trucks.

The batch plants required for asphalt paving and concrete production would be shipped to Angoon by barge. This would include a batch plant that would be assembled inside the construction staging area or, if needed, the contractor would be responsible for obtaining additional staging area. Typically, oil and other chemicals used in the production of asphalt and concrete are held in self-contained tanks or drums that are barged in and staged on-site. During paving and placement of concrete, the batched material would be trucked from the batch plant location to the site. Typically, due to the cost of production and payment procedures, no excess asphalt or concrete is produced. Concrete washout areas are required for cleaning the chutes on trucks or pumping rigs.

As indicated by the materials report, bedrock is very shallow. Rock excavation should be anticipated. Rock excavation could be accomplished by two methods: ripping with large bulldozers or blasting. It should be assumed that due to the amount of rock excavation, blasting would be the primary means for rock excavation.

5.3 General Work Sequence

The access road would most likely be constructed in stages. First the road would be cleared, grubbed, and developed as a haul road utilizing excavators, bulldozers, and trucks. Once the initial route was in place, construction of the temporary and permanent bridges would commence. For full access to Airport Alternatives 3a and 4, the bridge would need to be in place or the contractor would need to land a barge and mobilize equipment to the airport sites. The temporary bridge would provide passage for hauling material to and from the airport as well as along the road.

Excavation of unsuitable materials would occur while the initial haul road was being constructed. The contractor would stage the work so that areas of cut could be accessed and used for fill on other parts of the jobs if the material was found to be suitable.

Once clearing and grubbing were completed, the road and airport would be built in layers to accommodate the different material types required for embankment, base, subbase, and paving courses.

Final finishing of the access road and reconstruction of existing roads damaged as a result of construction would happen as the last construction step. Final paving would be required to be completed during the summer season, preferably in the June to September timeframe.

5.4 Hauling Material

It is anticipated that articulated end dump trucks would be used to haul material for most of the access road and airport construction. Articulated trucks can haul roughly 20–30 cubic yards of material per trip, depending on the model. As the project progresses, other trucks such as belly dumps or conventional dump trucks could be incorporated. The following table provides an estimated number of truck trips for the various alternatives, assuming 30 cubic yards per truck.

Table 4: Estimated Truck Trips

Alternative Material	**Airport** (truck trips)	**Road** (truck trips)	**Road** (truck trips)
Alternative 3a		**Access 2**	**Access 3**
Asphalt Paving	233	110	117
Aggregate Base Course	350	254	276
Subbase Course	1,737	1,267	1,374
Fill	5,164	8,470	7,470
Cut	6,354	9,354	32,864
Rip Rap		21	5
Alternative 4		**Access 2**	**Access 3**
Asphalt Paving	233	74	80
Aggregate Base Course	350	167	187
Subbase Course	1,737	834	934
Fill	15,094	3,354	3,394
Cut	12,694	8,997	30,177
Rip Rap		21	5
Alternative 12a		**Access 12a**	
Asphalt Paving	233	7	
Aggregate Base Course	350	17	
Subbase Course	1,737	74	
Fill	9,077	647	
Cut	11,407	3	

The truck trips vary for Airport Alternatives 3a and 4 because there are two access road alternatives for each. The number of trips for Airport 3a varies between 33,293 and 55,939. For Airport 4 the range is 43,534 to 64,880. Site 12a would have an estimated number of 23,552 truck trips. During hauling and compaction efforts, water would be required to control dust and maintain acceptable moisture contents for soil during compaction. For a job of this size, it is anticipated that between 2,000 M-gal and 10,000 M-gal of water would be required. Typically a pump is set up near a lake, stream ditch, or pond that is convenient for the water truck to access. The pump is an on-demand system and is only run when needed.

5.5 Temporary Bridge

A temporary bridge would likely be constructed adjacent to the permanent bridges for Access Alternatives 2 & 3. The structure would be designed by the contractor to support their specific construction technique for road and bridge construction. The bridge would act as a work platform and haul route for vehicles. Typically the temporary bridge would be of similar width to the permanent structure, in this case 30’. Construction materials could consist of steel, concrete, and wood. Support piers would likely be socketed into rock due to the loads expected. The number of supports would be dictated by the type of temporary bridge the contractor uses; however it will likely require multiple supports within the stream channel and ordinary high water line. The number of support piers could range from 3-10 for Access Alternative 2 and 2-5 for Access Alternative 3. The bridge will likely be constructed at one time rather than a staged approach so that hauling and access to the airport sites can be accomplished. The bridge will likely be constructed in the first season and be one of the last items removed prior to completion.

5.6 Drainage

The drainage for the any of the access alternatives would be controlled by culverts. The culverts would range in size from 36 to 72 inches in diameter. It is anticipated that corrugated aluminum or polyethylene pipe would be used for the culverts. Where existing drainages cross the proposed road, culverts would be installed to convey the drainage under the roadway. About 6 additional culverts would be installed per mile along access roads. This would result in approximately 27 culverts for Airport 3a with Access 2; 31 culverts for Airport 3a with Access 3; 18 culverts for Airport 4 with Access 2; 18 culverts for Airport 4 with Access 3; and one culvert for Airport 12a.

The drainage at the airport would be controlled by rerouting existing drainage channels around the runway. It is not anticipated that cross culverts would be installed under the proposed runway.

Rerouting drainage channels would increase channel lengths for Airport Alternatives 3a, 4 and 12a. One channel would need to be rerouted for Airport 3a, increasing the drainage length by about 80 feet. One channel would need to be rerouted for Airport 4, increasing the drainage length by about 1,200 feet. Two channels would need to be rerouted for Airport 12a, increasing drainage lengths by about 2,450 feet.

Rerouting streams has the inherent potential to substantially affect the natural environment. Therefore, coordination with several agencies would be required to mitigate potential risks and ensure that the proposed airport would have minimal effects on the environment during and after construction. Rerouting streams would require coordination between the USFS, the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Environmental Conservation, the U.S. Army Corps of Engineers, and the Alaska Department of Natural Resources to facilitate environmental permitting. Construction would need to be coordinated with USFS and ADF&G biologists to ensure that work was properly phased to minimize effects on resident and anadromous fish as well as other local wildlife.

5.7 Erosion and Sediment Control

During design, an Erosion and Sediment Control Plan (ESCP) would be developed. The ESCP would detail required project-specific best management practices (BMPs) to ensure protection from erosion. In addition, the ESCP would provide direction on how to keep sediment from moving off the construction site. The ESCP would also be used as a guide when the contractor prepared the Storm Water Pollution Prevention Plan (SWPPP) for construction. This SWPPP would identify BMPs to minimize environmental construction effects. BMPs that could be used include straw wattles, compost socks, silt fences, check dams, sediment basins, seeding, etc. It would be the contractor’s responsibility to identify and implement BMPs effective in controlling erosion and sedimentation during construction.

The contractor would also be required to permanently stabilize the construction site prior to terminating the SWPPP. Permanent stabilization means all disturbed areas would be stabilized to prevent erosion and sedimentation after construction. The effort could include seeding, bioswales, and/or rip rap to protect culvert outlet areas.

5.8 Hazardous Materials

Hazardous materials used by the contractor must be stored in a suitable manner to avoid release into the environment. This should include measures such as the use of secondary containment for fueling areas, adequate storage areas, and proper disposal containers. Precautions should also be taken when construction personnel handle hazardous materials.

Hazardous materials that could be used include diesel fuel, gasoline, oils, grease, hydraulic fluids, petroleum-contaminated materials (such as used oil filters, rags, etc.), antifreeze, solvents, cleaners, and lead/acid batteries. The Angoon landfill does not take hazardous materials. These types of materials used for the airport would be barged off and disposed of at an approved facility.

The contractor would be required to develop and implement a hazardous materials control plan. The plan would specify the use, containment, cleanup, and disposal of hazardous material. This would include petroleum products generated by construction activities and equipment. The plan would also specify the contractor's methods for handling accidental spills of hazardous materials that could occur during construction.

The contractor would be required to implement concrete waste management procedures and practices where concrete was used as a construction material, where concrete dust and debris resulted from demolition activities, and where concrete trucks and other concrete-coated equipment were washed on-site. These are common procedures and practices designed to minimize or eliminate the discharge of concrete waste materials to the storm drain systems or watercourses.

The contractor would be required to implement sanitary/septic waste management practices for the use of temporary or portable sanitary/septic waste systems.

6.0 HAUL ROUTE

Figure 1, the Airport and access road alternatives, indicates the potential haul routes. The haul route for the project would be along the BIA Road, south of Angoon. The route would most likely include Kootznahoo Road, which leads to Killisnoo Harbor.

6.1 Barge Unloading Area

Having the ability to offload material directly from the barges would require the least amount of material re-handling and would reduce overall cost. Killisnoo Harbor is about 3 miles south of Angoon on Kootznahoo Road. There is a makeshift barge landing at the harbor.

The City of Angoon is in the planning stages of improving the landing from a makeshift berth to a permanent facility. It is anticipated that the area will be properly designed as a permanent barge loading and unloading location within the next few years.

6.2 Haul Route Maintenance

The general contract provisions contain standard requirements for haul route maintenance. Contract provisions generally state that portions of the haul route may require improvement to support the contractor's operations and that the contractor is responsible for improving the route as required. Improvements would likely be required due to the large number of truck trips needed to construct the airport and access road.

Haul routes would be restored to at least their original condition after airport and access road construction. If the contractor was required to improve the road for construction activities, these improvements would remain. The condition of the haul route would be documented prior to as well as after construction. The documentation would be used to determine whether or not the contractor's activities damaged the road during hauling operations.

7.0 CONSTRUCTION STAGING

Due to limited public lands available, it would be the contractor's responsibility to obtain the use of private lands for construction staging, material stockpiling, fueling area and fuel storage, and equipment storage. It is anticipated that 2 acres would be needed.

8.0 CONSTRUCTION SCHEDULE

DOT&PF would develop a construction schedule and phasing plan with the airport design. Currently, there is no specific completion date for airport and access road construction. It is anticipated that the work would take no less than two construction seasons. For Airport Alternatives 3a and 4, with larger quantity requirements, construction is estimated to take no more than three construction seasons.

The first season would likely involve development of the material sites if sites in the Angoon area were used, construction of the access road and temporary bridge, and preparation of the airport site. The second and third (if required) seasons would be composed of airport, road, bridge construction and final completion.

Because of the mild climate in Angoon, construction could occur year-round. The construction contractor would likely be given the option to cease work during the winter months. The only scheduling impacts for construction would be weather related. Embankment may not be placed if the ground is frozen. Asphalt paving and concrete placement operations are subject to both temperature and precipitation limitations, so those activities would have to occur during the summer season.

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APPENDIX 1: QUANTITIES

Quantity Estimate

P-151 Clearing & Grubbing, Clearing, and Tree Removal (Pavement Option)

PROJECT ELEMENT	(A) CLEARING & GRUBBING * (from C3D) (ACRE)	(B) CLEARING ** (from C3D) (ACRE)	(C) Selected Tree Removal *** (from C3D) (EACH)
RUNWAY, TAXIWAY, AND APRON			
SITE 3A	**92.8**	**54.8**	**5,192**
SITE 4	**91.7**	**49.7**	**3,736**
SITE 12A	**93.9**	**60.3**	**4,648**
ROAD			
SITE 3A - ROAD ALT 2	**41.2**	**17.4**	-
SITE 3A - ROAD ALT 3	**48.0**	**17.8**	-
SITE 4 - ROAD ALT 2	**26.6**	**12.3**	-
SITE 4 - ROAD ALT 3	**33.5**	**12.8**	-
SITE 12A - ROAD	**2.3**	**0.7**	-

*Clearing & grubbing includes the total terrain disturbance plus a 10-foot offset for the road alternatives and the total terrain disturbance plus a 25-foot offset for the airport alternatives (this includes runway, taxiway, apron, and roadway pavement areas)
**Clearing includes a 100' clearing limit minus the total terrain disturbance with a 10-foot offset
***Select tree removal assumed 80 trees per acre required for tree felling

Quantity Estimate

P-152 Excavation & Embankment (Pavement Option)

PROJECT ELEMENT	(A) UNCLASSIFIED EXCAVATION (from C3D) (CY)	(B) EMBANKMENT REQUIRED (from C3D) (CY)	Material Balance*
RUNWAY			
SITE 3A	188,836	128,219	(60,617)
SITE 4	357,622	448,992	91,370
SITE 12A	342,030	227,283	(114,747)
TAXIWAY			
SITE 3A	0	12,818	12,818
SITE 4	848	3,386	2,538
SITE 12A	39	8,837	8,798
APRON			
SITE 3A	1,736	13,789	12,053
SITE 4	22,271	409	(21,862)
SITE 12A	65	36,154	36,089
ROAD			
SITE 3A - ROAD ALT 2	280,558	254,017	(26,541)
SITE 3A - ROAD ALT 3	985,853	224,047	(761,806)
SITE 4 - ROAD ALT 2	269,858	100,580	(169,278)
SITE 4 - ROAD ALT 3	905,270	101,776	(803,494)
SITE 12A - ROAD	18	19,365	19,347

AIRPORT SUMMARY	Cut	Fill Needed	
SITE 3A	**190,600**	**154,900**	(35,700)
SITE 4	**380,800**	**452,800**	72,000
SITE 12A	**342,200**	**272,300**	(69,900)

ROAD SUMMARY	Cut	Fill Needed	
SITE 3A - ROAD ALT 2	**280,600**	**254,100**	(26,500)
SITE 3A - ROAD ALT 3	**985,900**	**224,100**	(761,800)
SITE 4 - ROAD ALT 2	**269,900**	**100,600**	(169,300)
SITE 4 - ROAD ALT 3	**905,300**	**101,800**	(803,500)
SITE 12A - ROAD	**100**	**19,400**	19,300

*Negative value indicates excess excavation

Road ALT 3 for Site 3A and Road ALT 3 for Site 4 require substantial cut in order to reduce the bridge length across Favorite Creek

Quantity Estimate

P-154 Subbase Course (Pavement Option)

PROJECT ELEMENT	Volume (CY)
RUNWAY	
SITE 3A	29,028
SITE 4	29,028
SITE 12A	29,028
TAXIWAY	
SITE 3A	2,661
SITE 4	2,656
SITE 12A	2,547
APRON	
SITE 3A	20,371
SITE 4	20,371
SITE 12A	20,371
ROAD	
SITE 3A - ROAD ALT 2	38,022
SITE 3A - ROAD ALT 3	41,135
SITE 4 - ROAD ALT 2	25,038
SITE 4 - ROAD ALT 3	27,917
SITE 12A - ROAD	2,132

AIRPORT SUMMARY	
SITE 3A	**52,100**
SITE 4	**52,100**
SITE 12A	**52,100**

ROAD SUMMARY	
SITE 3A - ROAD ALT 2	**38,000**
SITE 3A - ROAD ALT 3	**41,200**
SITE 4 - ROAD ALT 2	**25,000**
SITE 4 - ROAD ALT 3	**28,000**
SITE 12A - ROAD	**2,200**

Quantity Estimate

P-180a Riprap, Class II

SITE	Height (ft)	Width (ft)	Length (ft)	Volume/Pier (CY)	Volume (CY)
Site 3A - Road ALT 2 - Long Bridge Span	5	20	170	**315**	**630**
Site 3A - Road ALT 3 - Short Bridge Span	5	20	40	**74**	**148**
Site 4 - Road ALT 2 - Long Bridge Span	5	20	170	**315**	**630**
Site 4 - Road ALT 3 - Short Bridge Span	5	20	40	**74**	**148**
Site 12A - Road	-	-	-	-	-

Quantity Estimate

P-209 Crushed Aggregate Base Course (Pavement Option)

PROJECT ELEMENT	Volume (CY)
RUNWAY	
SITE 3A	5,806
SITE 4	5,806
SITE 12A	5,806
TAXIWAY	
SITE 3A	532
SITE 4	532
SITE 12A	510
APRON	
SITE 3A	4,074
SITE 4	4,074
SITE 12A	4,074
ROAD	
SITE 3A - ROAD ALT 2	7,605
SITE 3A - ROAD ALT 3	8,227
SITE 4 - ROAD ALT 2	5,008
SITE 4 - ROAD ALT 3	5,584
SITE 12A - ROAD	427

AIRPORT SUMMARY	
SITE 3A	**10,500**
SITE 4	**10,500**
SITE 12A	**10,500**

ROAD SUMMARY	
SITE 3A - ROAD ALT 2	**7,600**
SITE 3A - ROAD ALT 3	**8,300**
SITE 4 - ROAD ALT 2	**5,000**
SITE 4 - ROAD ALT 3	**5,600**
SITE 12A - ROAD	**500**

Quantity Estimate

P-401 Hot Mix Asphalt

PROJECT ELEMENT	HMA Volume (CY)	HMA Weight (TONS)	Asphalt Cement, PG 52-28 AC Content (%)	Asphalt Cement, PG 52-28 Weight (TONS)
RUNWAY				
SITE 3A	3,870	7,837	6.0%	470
SITE 4	3,870	7,837	6.0%	470
SITE 12A	3,870	7,837	6.0%	470
TAXIWAY				
SITE 3A	355	719	6.0%	43
SITE 4	354	717	6.0%	43
SITE 12A	340	689	6.0%	41
APRON				
SITE 3A	2,716	5,500	6.0%	330
SITE 4	2,716	5,500	6.0%	330
SITE 12A	2,716	5,500	6.0%	330
ROAD				
SITE 3A - ROAD ALT 2	3,259	6,599	6.0%	396
SITE 3A - ROAD ALT 3	3,490	7,067	6.0%	424
SITE 4 - ROAD ALT 2	2,177	4,408	6.0%	265
SITE 4 - ROAD ALT 3	2,389	4,838	6.0%	290
SITE 12A - ROAD	178	360	6.0%	22

AIRPORT SUMMARY	HMA Volume (CY)	HMA Weight (Tons)	AC Weight (Tons)
SITE 3A	**7,000**	**14,175**	**851**
SITE 4	**7,000**	**14,175**	**851**
SITE 12A	**7,000**	**14,175**	**851**

ROAD SUMMARY	HMA Volume (CY)	HMA Weight (Tons)	AC Weight (Tons)
SITE 3A - ROAD ALT 2	**3,300**	**6,685**	**405**
SITE 3A - ROAD ALT 3	**3,500**	**7,090**	**430**
SITE 4 - ROAD ALT 2	**2,200**	**4,455**	**270**
SITE 4 - ROAD ALT 3	**2,400**	**4,860**	**295**
SITE 12A - ROAD	**200**	**405**	**25**

ACP Unit Weight: 150 lb/ft3

Quantity Estimate

S-145 Bridge, Super and Sub-Structure

SITE	from STA	to STA	Length (ft)	Area (sf)
Site 3A - Road ALT 2	588+00	594+50	650	19500
Site 3A - Road ALT 3	601+50	606+00	450	13500
Site 4 - Road ALT 2	588+00	594+50	650	19500
Site 4 - Road ALT 3	601+50	606+00	450	13500
Site 12A - Road	-	-	-	-

Bridge Width 30 ft

APPENDIX 2: DRAINAGE MEMO

DOWL HKM

PRELIMINARY MEMORANDUM

To: Amanda Childs

From: Brian Hanson, P.E.

Date: July 13, 2012

Subject: Angoon Airport Drainage, Revised

Drainage Criteria and Methodology

The DOT&PF Alaska Preconstruction Manual (APCM) requires a minimum culvert diameter of 24 inches for cross-drainage culverts, unless culvert length exceeds 100 feet, in which case the minimum culvert diameter is 36 inches. A minimum culvert diameter of 36-inches is also recommended for areas with potential for icing or debris fouling. It was assumed for this preliminary drainage plan that all culverts will be a minimum of 36 inches in diameter. Culverts were sized assuming a headwater to depth (HW/D) ratio of 1.0 at the design flood flow in accordance with APCM criteria. All pipe sizing was carried out under the assumption that corrugated steel pipe (CSP) culverts would be installed, as they are generally the most cost effective and readily available type of culvert in rural areas of Alaska. If corrosive soils are present, the use of corrugated aluminum pipe (CAP) or corrugated polyethylene pipe (CPP) should be used for cross culverts, as these materials are corrosion resistant.

The APCM lists a 50-year return period (2% exceedance probability) as the design flood for bridges on all highways and culverts on primary highways and secondary highways of high importance. Culverts and bridges in designated flood hazard areas shall be designed for the 100-year return period (1% exceedance probability); however, there are no mapped Flood Hazard areas in this project area. Due to the remoteness of the project area and the high costs associated with any necessary repairs, it is recommended that the 100-year return period be considered for the design flood frequency on a site-by-site basis during the design period. Any additional costs required to up-size drainage structures to pass the 100-year flows may be warranted by the high costs associated with any necessary repairs and the potential for reduced maintenance demands resulting from debris blockage and ice.

The USGS Regional Regression Equations developed from stream gauge data collected in Southeast Alaska were used to estimate the 100-year peak flows along the road alternatives. Drainage area sizes were estimated from available topographic data. Drainage areas, surface storage, mean annual precipitation data, and the mean January temperature are input into the equations, which use empirically derived equations to predict peak flow for varying recurrence intervals. The DOT&PF Alaska Highway

Drainage Manual (AHDM) indicates that Regression Equations have a higher order of preference than the other approved hydrologic methods listed, even though the majority of the analyzed drainage basins fall outside of the contributing area limitations of the regression equations due to fewer required assumptions related to surface land cover, rainfall data, and time of concentration.

Culvert Frequency and Location

Minor drainage crossings are those streams and drainages that can be conveyed in a 36-inch diameter or smaller culvert and do not typically require a detailed hydrologic and hydraulic analysis. Accurately determining the number of minor drainage crossings would typically require a site investigation along the proposed alignment to identify local drainage features and patterns not necessarily apparent from topographic data or aerial imagery. For the purpose of estimating the number of cross culverts along the proposed corridors, including minor drainage crossings, a recent roadway project on Prince of Wales Island was referenced to establish an "average" number of drainage crossings per mile of roadway. Based upon the frequency of culverts observed at the referenced project, which was 12.2 miles long and including 76 minor drainage culverts, 6 drainage crossings are assumed per mile of roadway for the access road alternatives. The approximate locations of cross culverts were determined where possible from available topographic data and stream mapping. As culvert locations are approximate, reported stations are rounded to the nearest 50-foot interval. It is assumed additional minor drainage crossings will be required at undetermined locations under the assumption of 6 culverts per mile of roadway.

Drainage for Airport Alternative 3A, Road Alternative 2

Road Alternative 2 is approximately 4.4 miles in length, resulting in 27 culverts on the assumption of 6 culverts per mile of roadway. Assuming inlet control at all crossings, culverts up to 72 inches in diameter will be necessary to convey the 100-year peak flow at roadway crossings. In addition to the drainage crossings shown below, it is assumed that 2 additional 36-inch culverts will be necessary at undetermined locations along the roadway to address minor drainage crossings. A 640-foot swale will be necessary to convey runoff around the proposed runway at Airport Alternative 3A. The swale would convey a drainage from the southeast corner of the runway toward the northeast and then into a stream east of the runway.

Road Alternative 2 Culverts			
Station	Diameter (in.)	Station	Diameter (in.)
501+50	36	643+50	36
513+00	36	645+50	36
517+50	48	647+00	36
526+00	60	654+50	36
533+50	36	663+50	36
547+00	48	668+50	36
549+50	36	689+00	36
554+50	72	707+50	48
572+50	36	714+50	36
597+00	36	718+00	36
601+00	48	726+50	36
607+00	36	734+00	36
629+00	72		

Drainage for Airport Alternative 3A, Road Alternative 3

Road Alternative 3 is approximately 4.9 miles in length, resulting in 31 culverts on the assumption of 6 culverts per mile of roadway. Assuming inlet control at all crossings, culverts up to 72 inches in diameter will be necessary to convey the 100-year peak flow at roadway crossings. In addition to the drainage crossings shown below, it is assumed that 5 additional 36-inch culverts will be necessary at undetermined locations along the roadway to address minor drainage crossings. A 640-foot swale will be necessary to convey runoff around the proposed runway to maintain existing drainage patterns. The swale would convey a drainage from the southeast corner of the runway toward the northeast and then into a stream east of the runway.

Road Alternative 3 Culverts			
Station	Diameter (in.)	Station	Diameter (in.)
501+50	36	639+00	36
514+50	36	642+50	36
520+50	48	647+00	36
526+50	60	652+50	36
544+00	36	660+00	36
550+00	36	683+50	36
563+00	60	691+50	36
574+00	36	708+00	36
596+50	36	723+50	36
610+00	36	731+50	36
622+50	36	737+00	36
631+50	36	743+00	36
635+00	36	750+50	36

Drainage for Airport Alternative 4, Road Alternative 2

Road Alternative 2 is approximately 3.0 miles in length, resulting in 18 culverts on the assumption of 6 culverts per mile of roadway. Assuming inlet control at all crossings, culverts up to 72 inches in diameter will be necessary to convey the 100-year peak flow at roadway crossings. In addition to the drainage crossings shown below, it is assumed that 1 additional 36-inch culverts will be necessary at an undetermined location along the roadway to address minor drainage crossings. The proposed runway is located along a relative high point where runoff typically drains away from the runway. Drainage swales are expected to be sufficient to handle local runoff. To convey runoff around the runway, a swale approximately 2300 feet long will need to be constructed around the east end of the runway.

Road Alternative 2 Culverts	
Station	Diameter (in.)
501+50	36
513+00	36
517+50	48
526+00	60
533+50	36
547+00	48
549+50	36
554+50	72
572+50	36
610+50	36
615+50	36
619+00	36
622+50	36
626+50	36
632+00	36
637+00	36
647+00	36

Drainage for Airport Alternative 4, Road Alternative 3

Road Alternative 3 is approximately 3.0 miles in length, resulting in 18 culverts on the assumption of 6 culverts per mile of roadway. Assuming inlet control at all crossings, culverts up to 72 inches in diameter will be necessary to convey the 100-year peak flow at roadway crossings. The proposed runway is located along a relative high point where runoff typically drains away from the runway. Drainage swales are expected to be sufficient to handle local runoff. To convey runoff around the runway, a swale approximately 2300 feet long will need to be constructed around the east end of the runway.

Road Alternative 3 Culverts	
Station	Diameter (in.)
501+50	36
514+50	36
520+50	48
526+50	60
544+00	36
550+00	36
563+00	60
574+00	36
596+50	36
610+00	36
622+50	36
631+50	36
635+00	36
639+00	36
642+50	36
647+00	36
652+50	36
662+00	36

Drainage for Airport Alternative 12A Road

Due to the short length of Airport Alternative 12A Road, which is approximately one-quarter mile in length, only one cross culvert is required. The required culvert is a 36-inch diameter culvert at Sta. 6+50. The use of 36-inch diameter pipe is assumed to be adequate for the crossing assuming inlet control. Two swales will be required to convey drainage around the airport runway. The first swale would have a total length of approximately 2620 feet and would convey runoff around the northwest end of the runway. The second swale would have a total length of approximately 4800 feet and would run convey runoff around the southeast end of the runway.

Airport Drainage

Managing local runoff and its impacts on the existing drainage patterns will be handled in a similar manner for each airport site alternative. The State of Alaska does not have design criteria specific to airport stormwater management, therefore the Aviation Stormwater Design Manual published by the Washington State DOT was consulted for drainage design recommendations pertaining to this project. As climatic factors in coastal Washington are similar to those encountered at the project location, the guidelines listed in the Washington DOT manual are assumed to be applicable.

Where runoff does not naturally drain away from the proposed improvements, such as in cut locations, swales will be constructed alongside the proposed runway and taxiway to convey localized runoff. Per the Washington DOT guidelines, the preferred stormwater treatment options for runoff include media filtration systems, structural systems (vaults), and biofiltration facilities. The first two options are underground facilities requiring periodic maintenance. Due to the remoteness of the project area and the inability of area residents to perform necessary maintenance on these systems, these options are not recommended. However, the Washington DOT guidelines recognize biofiltration swales (bioswales) as an acceptable pretreatment option that may be suitable to this project at the proposed airport. Although the Washington DOT recommends the use of bioswales primarily as a pretreatment measure, bioswales have been used successfully on previous highway and aviation design projects in Alaska to treat runoff for water quality. Runoff will received additional treatment through filtration provided by the natural vegetation downstream of bioswale discharge points.

APPENDIX 3: COST ESTIMATES

Prepared By:
DOWL HKM

Angoon Airport EIS
Cost Estimate

Date Prepared:
6/14/13

Summary

Site	Item	Orig 2007 Estimate
Site 3 (from 2007 Master Plan)	Airport Runway and Apron (Site 3)	$14,606,709
	Access Road (Alternative 1)	$15,452,219
	Right of Way*	$4,390,000
	Total	**$34,449,000**

Site	Item	2010 Gravel Est	Current Pave Est	2009 Pave Est
Site 3A Road Alt 2	Airport Runway and Apron (Site 3A)	$16,531,000	$26,667,000	$18,996,000
	Access Road Alternative 2	$21,066,000	$30,075,000	$58,511,000
	Right of Way**	$357,000	$357,000	$4,390,000
	Total	**$37,954,000**	**$57,099,000**	**$81,897,000**

Site	Item	2010 Gravel Est	Current Pave Est
Site 3A Road Alt 3	Airport Runway and Apron (Site 3A)	$16,531,000	$26,667,000
	Access Road Alternative 3	$45,114,000	$45,588,000
	Right of Way**	$224,000	$224,000
	Total	**$61,869,000**	**$72,479,000**

Site	Item	2010 Gravel Est	Current Pave Est	2009 Pave Est
Site 4 Road Alt 2	Airport Runway and Apron (Site 4)	$20,057,000	$34,876,000	$22,237,000
	Access Road Alternative 2	$17,782,000	$25,292,000	$21,398,000
	Right of Way**	$205,000	$205,000	$4,086,000
	Total	**$38,044,000**	**$60,373,000**	**$47,721,000**

Site	Item	2010 Gravel Est	Current Pave Est
Site 4 Road Alt 3	Airport Runway and Apron (Site 4)	$20,057,000	$34,876,000
	Access Road Alternative 3	$38,997,000	$39,560,000
	Right of Way**	$137,000	$137,000
	Total	**$59,191,000**	**$74,573,000**

Site	Item	2010 Gravel Est	Current Pave Est	2009 Pave Est
Site 12A	Airport Runway and Apron (Site 12A)	$19,131,000	$31,562,000	$20,850,000
	Access Road	$1,809,000	$2,009,000	$3,411,000
	Right of Way **	$1,000,000	$1,000,000	$1,000,000
	Total	**$21,940,000**	**$34,571,000**	**$25,261,000**

**Source: 2004 Angoon Airport Reconnaissance Study*

*** Source: Prorated share based on Angoon Airport Reconnaissance Study*

Prepared By:
DOWL HKM

Angoon Airport EIS
Cost Estimate

Date Prepared:
11/30/12

Site 3A - Runway, Taxiway, and Apron
Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 1,800,000	$ 1,800,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor	1	LS	$ 200,000	$ 200,000
D-701	36" Corrugated Pipe	200	LF	$ 120	$ 24,000
D-701	48" Corrugated Pipe	200	LF	$ 150	$ 30,000
F-162	Fencing	16,000	LF	$ 55	$ 880,000
P-151	Clearing and Grubbing	92.8	AC	$ 5,000	$ 464,000
P-151	Clearing	54.8	AC	$ 3,000	$ 164,400
P-151	Selected Tree Removal	5,192	EA	$ 300	$ 1,557,600
P-152	Unclassified Excavation	190,600	CY	$ 18	$ 3,430,800
P-152	Embankment	154,900	CY	$ 10	$ 1,549,000
P-152	Ditch Linear Grading	640	LF	$ 25	$ 16,000
P-154	Subbase Course	52,100	CY	$ 38	$ 1,979,800
P-156	Temp Erosion and Pollution Control	1	LS	$ 500,000	$ 500,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 125,000	$ 125,000
P-180	Riprap, Class II	500	CY	$ 150	$ 75,000
P-209	Crushed Aggregate Base Course	10,500	CY	$ 50	$ 525,000
P-401	Hot Mix Asphalt	14,175	TON	$ 155	$ 2,197,125
P-401	Asphalt Cement (6%)	860	TON	$ 1,200	$ 1,032,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 161,456.25	$ 161,456
P-603	Bituminous Prime Coat	53	TON	$ 1,000	$ 53,000
P-620	Runway Markings	1	LS	$ 100,000	$ 100,000
P-681	Geotextile Fabric	65,000	SY	$ 5	$ 325,000
L-100	Runway Edge Lighting	18	EA	$ 1,500	$ 27,000
L-101	Beacon	1	EA	$ 80,000	$ 80,000
L-107	Windcone	2	EA	$ 10,000	$ 20,000
L-108	Misc. Cabling	15,000	LF	$ 15	$ 225,000
L-109	Lighting Building	1	EA	$ 100,000	$ 100,000
L-109	Electrical Panel & Main Disconnect, Lights, Wiring	1	EA	$ 50,000	$ 50,000
L-109	Transformers with enclosures, disconnects, etc.	3	EA	$ 5,000	$ 15,000
L-110	Conduit	15,000	LF	$ 15	$ 225,000
L-132	PAPI	2	EA	$ 50,000	$ 100,000
L-132	REILs (pair)	2	EA	$ 15,000	$ 30,000
L-858	Airport Signs	4	EA	$ 4,200	$ 16,800
L-861	Taxiway Edge Lights	30	EA	$ 1,500	$ 45,000
L-862	Runway Edge Lights	40	EA	$ 1,500	$ 60,000
L-862	Runway Threshold Lights	16	EA	$ 1,500	$ 24,000
	Utility Line Extension (4.5 miles)	1	LS	$ 500,000	$ 500,000
	Electrical Service Connection	1	LS	$ 30,000	$ 30,000
T-901	Seeding	1	LS	$ 10,000	$ 10,000
S-142	SRE Building	1	LS	$ 750,000	$ 750,000
	Right of Way	1	LS	$ -	$ -
				Subtotal	$ 19,516,981
				Contingency (15%)	$ 2,927,547
				Design	$ 500,000
				Environmental	$ 500,000
				Construction Engineering (10%)	$ 1,952,000
				ICAP (5.0%)	$ 1,270,000
				Total	**$ 26,667,000**

Angoon Airport EIS
Cost Estimate

Site 3A - Road Alternative 2

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 2,100,000	$ 2,100,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor (3%)	1	LS	$ 600,000	$ 600,000
D-701	36" Corrugated Pipe	1,250	LF	$ 120	$ 150,000
D-701	48" Corrugated Pipe	510	LF	$ 150	$ 76,500
D-701	60" Corrugated Pipe	50	LF	$ 180	$ 9,000
D-701	72" Corrugated Pipe	325	LF	$ 210	$ 68,250
F-162	Fencing	1	LS	$ 5,000	$ 5,000
P-151	Clearing and Grubbing	41.2	AC	$ 5,000	$ 206,000
P-151	Clearing	17.4	AC	$ 3,000	$ 52,200
P-152	Unclassified Excavation	280,600	CY	$ 18	$ 5,050,800
P-152	Embankment	254,100	CY	$ 10	$ 2,541,000
P-154	Subbase Course	38,000	CY	$ 38	$ 1,444,000
P-156	Temp Erosion and Pollution Control	1	LS	$ 425,000	$ 425,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 106,250	$ 106,250
P-180	Riprap, Class II	630	CY	$ 150	$ 94,500
P-209	Crushed Aggregate Base Course	7,600	CY	$ 50	$ 380,000
P-401	Hot Mix Asphalt	6,685	TON	$ 155	$ 1,036,175
P-401	Asphalt Cement (6%)	410	TON	$ 1,200	$ 492,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 70,808.75	$ 70,809
P-603	Bituminous Prime Coat	40	TON	$ 1,000	$ 40,000
P-620	Traffic Markings	1	LS	$ 100,000	$ 100,000
P-681	Geotextile Fabric	500	SY	$ 5	$ 2,500
P-661	Standard Signs	1	LS	$ 5,000	$ 5,000
T-901	Seeding	1	LS	$ 20,000	$ 20,000
S-145	Bridge, Super and Sub-Structure (30ft x 650ft)	19,500	SF	$ 360	$ 7,020,000
	Right of Way	1	LS	$ -	$ -
				Subtotal	$ 22,114,984
				Contingency (15%)	$ 3,317,248
				Design	$ 500,000
				Environmental	$ 500,000
				Construction Engineering (10%)	$ 2,211,000
				ICAP (5.0%)	$ 1,432,000
				Total	**$ 30,075,000**

Site 3A - Road Alternative 3

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 3,100,000	$ 3,100,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor (3%)	1	LS	$ 600,000	$ 600,000
D-701	36" Corrugated Pipe	2,875	LF	$ 120	$ 345,000
D-701	48" Corrugated Pipe	65	LF	$ 150	$ 9,750
D-701	60" Corrugated Pipe	150	LF	$ 180	$ 27,000
F-162	Fencing	1	LS	$ 5,000	$ 5,000
P-151	Clearing and Grubbing	48.0	AC	$ 5,000	$ 240,000
P-151	Clearing	17.8	AC	$ 3,000	$ 53,400
P-152	Unclassified Excavation	985,900	CY	$ 18	$ 17,746,200
P-152	Embankment	224,100	CY	$ 10	$ 2,241,000
P-154	Subbase Course	41,200	CY	$ 38	$ 1,565,600
P-156	Temp Erosion and Pollution Control	1	LS	$ 650,000	$ 650,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 162,500	$ 162,500
P-180	Riprap, Class II	150	CY	$ 150	$ 22,500
P-209	Crushed Aggregate Base Course	8,300	CY	$ 50	$ 415,000
P-401	Hot Mix Asphalt	7,090	TON	$ 155	$ 1,098,950
P-401	Asphalt Cement (6%)	430	TON	$ 1,200	$ 516,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 80,747.50	$ 80,748
P-603	Bituminous Prime Coat	43	TON	$ 1,000	$ 43,000
P-620	Traffic Markings	1	LS	$ 105,000	$ 105,000
P-681	Geotextile Fabric	500	SY	$ 5	$ 2,500
P-661	Standard Signs	1	LS	$ 5,000	$ 5,000
T-901	Seeding	1	LS	$ 20,000	$ 20,000
S-145	Bridge, Super and Sub-Structure (30ft x 450ft)	13,500	SF	$ 360	$ 4,860,000
	Right of Way	1	LS	$ -	$ -

Subtotal	$ 33,934,148
Contingency (15%)	$ 5,090,122
Design	$ 500,000
Environmental	$ 500,000
Construction Engineering (10%)	$ 3,393,000
ICAP (5.0%)	$ 2,171,000
Total	**$ 45,588,000**

Angoon Airport EIS
Cost Estimate

Site 4 - Runway, Taxiway, and Apron

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 2,400,000	$ 2,400,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor	1	LS	$ 200,000	$ 200,000
D-701	36" Corrugated Pipe	200	LF	$ 120	$ 24,000
D-701	48" Corrugated Pipe	200	LF	$ 150	$ 30,000
F-162	Fencing	16,000	LF	$ 55	$ 880,000
P-151	Clearing and Grubbing	91.7	AC	$ 5,000	$ 458,500
P-151	Clearing	49.7	AC	$ 3,000	$ 149,100
P-151	Selected Tree Removal	3,736	EA	$ 300	$ 1,120,800
P-152	Unclassified Excavation	380,800	CY	$ 18	$ 6,854,400
P-152	Embankment	452,800	CY	$ 10	$ 4,528,000
P-152	Ditch Linear Grading	2,300	LF	$ 25	$ 57,500
P-154	Subbase Course	52,100	CY	$ 38	$ 1,979,800
P-156	Temp Erosion and Pollution Control	1	LS	$ 500,000	$ 500,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 125,000	$ 125,000
P-180	Riprap, Class II	500	CY	$ 150	$ 75,000
P-209	Crushed Aggregate Base Course	10,500	CY	$ 50	$ 525,000
P-401	Hot Mix Asphalt	14,175	TON	$ 155	$ 2,197,125
P-401	Asphalt Cement (6%)	860	TON	$ 1,200	$ 1,032,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 30,000	$ 30,000
P-603	Bituminous Prime Coat	53	TON	$ 1,000	$ 53,000
P-620	Runway Markings	1	LS	$ 100,000	$ 100,000
P-681	Geotextile Fabric	65,000	SY	$ 5	$ 325,000
L-100	Runway Edge Lighting	18	EA	$ 1,500	$ 27,000
L-101	Beacon	1	EA	$ 80,000	$ 80,000
L-107	Windcone	2	EA	$ 10,000	$ 20,000
L-108	Misc. Cabling	15,000	LF	$ 15	$ 225,000
L-109	Lighting Building	1	EA	$ 100,000	$ 100,000
L-109	Electrical Panel & Main Disconnect, Lights, Wiring	1	EA	$ 50,000	$ 50,000
L-109	Transformers with enclosures, disconnects, etc.	3	EA	$ 5,000	$ 15,000
L-110	Conduit	15,000	LF	$ 15	$ 225,000
L-132	PAPI	2	EA	$ 50,000	$ 100,000
L-132	REILs (pair)	2	EA	$ 15,000	$ 30,000
L-858	Airport Signs	4	EA	$ 4,200	$ 16,800
L-861	Taxiway Edge Lights	30	EA	$ 1,500	$ 45,000
L-862	Runway Edge Lights	40	EA	$ 1,500	$ 60,000
L-862	Runway Threshold Lights	16	EA	$ 1,500	$ 24,000
	Utility Line Extension (2.9 miles)	1	LS	$ 300,000	$ 300,000
	Electrical Service Connection	1	LS	$ 30,000	$ 30,000
T-901	Seeding	1	LS	$ 10,000	$ 10,000
S-142	SRE Building	1	LS	$ 750,000	$ 750,000
	Right of Way	1	LS	$ -	$ -
				Subtotal	$ 25,772,025
				Contingency (15%)	$ 3,865,804
				Design	$ 500,000
				Environmental	$ 500,000
				Construction Engineering (10%)	$ 2,577,000
				ICAP (5.0%)	$ 1,661,000
				Total	**$ 34,876,000**

Prepared By:
DOWL HKM

Angoon Airport EIS
Cost Estimate

Date Prepared:
11/30/12

Site 4 - Road Alternative 2

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 1,700,000	$ 1,700,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor (3%)	1	LS	$ 600,000	$ 600,000
D-701	36" Corrugated Pipe	875	LF	$ 120	$ 105,000
D-701	48" Corrugated Pipe	165	LF	$ 150	$ 24,750
D-701	60" Corrugated Pipe	50	LF	$ 180	$ 9,000
D-701	72" Corrugated Pipe	170	LF	$ 210	$ 35,700
F-162	Fencing	1	LS	$ 5,000	$ 5,000
P-151	Clearing and Grubbing	26.6	AC	$ 5,000	$ 133,000
P-151	Clearing	12.3	AC	$ 3,000	$ 36,900
P-152	Unclassified Excavation	269,900	CY	$ 18	$ 4,858,200
P-152	Embankment	100,600	CY	$ 10	$ 1,006,000
P-154	Subbase Course	25,000	CY	$ 38	$ 950,000
P-156	Temp Erosion and Pollution Control	1	LS	$ 350,000	$ 350,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 87,500	$ 87,500
P-180	Riprap, Class II	630	CY	$ 150	$ 94,500
P-209	Crushed Aggregate Base Course	5,000	CY	$ 50	$ 250,000
P-401	Hot Mix Asphalt	4,455	TON	$ 155	$ 690,525
P-401	Asphalt Cement (6%)	270	TON	$ 1,200	$ 324,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 50,726	$ 50,726
P-603	Bituminous Prime Coat	27	TON	$ 1,000	$ 27,000
P-620	Traffic Markings	1	LS	$ 65,000	$ 65,000
P-681	Geotextile Fabric	500	SY	$ 5	$ 2,500
P-661	Standard Signs	1	LS	$ 5,000	$ 5,000
T-901	Seeding	1	LS	$ 20,000	$ 20,000
S-145	Bridge, Super and Sub-Structure (30ft x 650ft)	19,500	SF	$ 360	$ 7,020,000
	Right of Way	1	LS	$ -	$ -
				Subtotal	$ 18,470,301
				Contingency (15%)	$ 2,770,545
				Design	$ 500,000
				Environmental	$ 500,000
				Construction Engineering (10%)	$ 1,847,000
				ICAP (5.0%)	$ 1,204,000
				Total	**$ 25,292,000**

Site 4 - Road Alternative 3

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 2,700,000	$ 2,700,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor (3%)	1	LS	$ 600,000	$ 600,000
D-701	36" Corrugated Pipe	1,775	LF	$ 120	$ 213,000
D-701	48" Corrugated Pipe	65	LF	$ 150	$ 9,750
D-701	60" Corrugated Pipe	150	LF	$ 180	$ 27,000
F-162	Fencing	1	LS	$ 5,000	$ 5,000
P-151	Clearing and Grubbing	33.5	AC	$ 5,000	$ 167,500
P-151	Clearing	12.8	AC	$ 3,000	$ 38,400
P-152	Unclassified Excavation	905,300	CY	$ 18	$ 16,295,400
P-152	Embankment	101,800	CY	$ 10	$ 1,018,000
P-154	Subbase Course	28,000	CY	$ 38	$ 1,064,000
P-156	Temp Erosion and Pollution Control	1	LS	$ 575,000	$ 575,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 143,750	$ 143,750
P-180	Riprap, Class II	150	CY	$ 150	$ 22,500
P-209	Crushed Aggregate Base Course	5,600	CY	$ 50	$ 280,000
P-401	Hot Mix Asphalt	4,860	TON	$ 155	$ 753,300
P-401	Asphalt Cement (6%)	300	TON	$ 1,200	$ 360,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 55,665	$ 55,665
P-603	Bituminous Prime Coat	30	TON	$ 1,000	$ 30,000
P-620	Traffic Markings	1	LS	$ 75,000	$ 75,000
P-681	Geotextile Fabric	500	SY	$ 5	$ 2,500
P-661	Standard Signs	1	LS	$ 5,000	$ 5,000
T-901	Seeding	1	LS	$ 20,000	$ 20,000
S-145	Bridge, Super and Sub-Structure (30ft x 450ft)	13,500	SF	$ 360	$ 4,860,000
	Right of Way	1	LS	$ -	$ -

Subtotal	$ 29,340,765
Contingency (15%)	$ 4,401,115
Design	$ 500,000
Environmental	$ 500,000
Construction Engineering (10%)	$ 2,934,000
ICAP (5.0%)	$ 1,884,000
Total	**$ 39,560,000**

Prepared By:
DOWL HKM

Angoon Airport EIS
Cost Estimate

Date Prepared:
11/30/12

Site 12A - Runway, Taxiway, and Apron

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 2,200,000	$ 2,200,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor	1	LS	$ 200,000	$ 200,000
D-701	36" Corrugated Pipe	200	LF	$ 120	$ 24,000
D-701	48" Corrugated Pipe	200	LF	$ 150	$ 30,000
F-162	Fencing	16,000	LF	$ 55	$ 880,000
P-151	Clearing and Grubbing	93.9	AC	$ 5,000	$ 469,500
P-151	Clearing	60.3	AC	$ 3,000	$ 180,900
P-151	Selected Tree Removal	4,648	EA	$ 300	$ 1,394,400
P-152	Unclassified Excavation	342,200	CY	$ 18	$ 6,159,600
P-152	Embankment	272,300	CY	$ 10	$ 2,723,000
P-152	Ditch Linear Grading	7,420	LF	$ 25	$ 185,500
P-154	Subbase Course	52,100	CY	$ 38	$ 1,979,800
P-156	Temp Erosion and Pollution Control	1	LS	$ 500,000	$ 500,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 125,000	$ 125,000
P-180	Riprap, Class II	500	CY	$ 150	$ 75,000
P-209	Crushed Aggregate Base Course	10,500	CY	$ 50	$ 525,000
P-401	Hot Mix Asphalt	14,175	TON	$ 155	$ 2,197,125
P-401	Asphalt Cement (6%)	860	TON	$ 1,200	$ 1,032,000.00
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 30,000	$ 30,000
P-603	Bituminous Prime Coat	53	TON	$ 1,000	$ 53,000
P-620	Runway Markings	1	LS	$ 100,000	$ 100,000
P-681	Geotextile Fabric	65,000	SY	$ 5	$ 325,000
L-100	Runway Edge Lighting	18	EA	$ 1,500	$ 27,000
L-101	Beacon	1	EA	$ 80,000	$ 80,000
L-107	Windcone	2	EA	$ 10,000	$ 20,000
L-108	Misc. Cabling	15,000	LF	$ 15	$ 225,000
L-109	Lighting Building	1	EA	$ 100,000	$ 100,000
L-109	Electrical Panel & Main Disconnect, Lights, Wiring	1	EA	$ 50,000	$ 50,000
L-109	Transformers with enclosures, disconnects, etc.	3	EA	$ 5,000	$ 15,000
L-110	Conduit	15,000	LF	$ 15	$ 225,000
L-132	PAPI	2	EA	$ 50,000	$ 100,000
L-132	REILs (pair)	2	EA	$ 15,000	$ 30,000
L-858	Airport Signs	4	EA	$ 4,200	$ 16,800
L-861	Taxiway Edge Lights	30	EA	$ 1,500	$ 45,000
L-862	Runway Edge Lights	40	EA	$ 1,500	$ 60,000
L-862	Runway Threshold Lights	16	EA	$ 1,500	$ 24,000
	Utility Line Extension (1500 feet)	1	LS	$ 30,000	$ 30,000
	Electrical Service Connection	1	LS	$ 30,000	$ 30,000
T-901	Seeding	1	LS	$ 10,000	$ 10,000
S-142	SRE Building	1	LS	$ 750,000	$ 750,000
	Right of Way	1	LS	$ -	$ -

Subtotal	$ 23,246,625
Contingency (15%)	$ 3,486,994
Design	$ 500,000
Environmental	$ 500,000
Construction Engineering (10%)	$ 2,325,000
ICAP (5.0%)	$ 1,503,000
Total	**$ 31,562,000**

Angoon Airport EIS
Cost Estimate

Site 12A - Road

Pavement Option

Pay Item	Description	Quantity	Unit	Unit Price	Item Cost
G-100	Mob/Demob (10%)	1	LS	$ 100,000	$ 100,000
G-130	Engineers Field Office and Lab	1	LS	$ 20,000	$ 20,000
G-135	Constr. Survey By Contractor (3%)	1	LS	$ 100,000	$ 100,000
D-701	36" Corrugated Pipe	105	LF	$ 120	$ 12,600
F-162	Fencing	1	LS	$ 5,000	$ 5,000
P-151	Clearing and Grubbing	2.3	AC	$ 5,000	$ 11,500
P-151	Clearing	0.7	AC	$ 3,000	$ 2,100
P-152	Unclassified Excavation	100	CY	$ 18	$ 1,800
P-152	Embankment	19,400	CY	$ 10	$ 194,000
P-154	Subbase Course	2,200	CY	$ 38	$ 83,600
P-156	Temp Erosion and Pollution Control	1	LS	$ 30,000	$ 30,000
P-156	Erosion and Pollution Control, Admin	1	LS	$ 7,500	$ 7,500
P-180	Riprap, Class II	100	CY	$ 150	$ 15,000
P-209	Crushed Aggregate Base Course	500	CY	$ 50	$ 25,000
P-401	Hot Mix Asphalt	405	TON	$ 155	$ 62,775
P-401	Asphalt Cement (6%)	30	TON	$ 1,200	$ 36,000
P-401	Asphalt Price Adjustment (5% of HMA+AC)	1	CS	$ 4,939	$ 4,939
P-603	Bituminous Prime Coat	3	TON	$ 1,000	$ 3,000
P-620	Traffic Markings	1	LS	$ 5,500	$ 5,500
P-681	Geotextile Fabric	100	SY	$ 5	$ 500
P-661	Standard Signs	1	LS	$ 5,000	$ 5,000
T-901	Seeding	1	LS	$ 5,000	$ 5,000
S-145	Bridge, Super and Sub-Structure	0	SF	$ 360	$ -
	Right of Way	1	LS	$ -	$ -
				Subtotal	$ 730,814
				Contingency (15%)	$ 109,622
				Design	$ 500,000
				Environmental	$ 500,000
				Construction Engineering (10%)	$ 73,000
				ICAP (5.0%)	$ 96,000
				Total	**$ 2,009,000**

APPENDIX 4: MATERIALS

DOWL HKM

PRELIMINARY SITE EVALUATION

ANGOON AIRPORT PROJECT

ANGOON, ALASKA

ENGINEERING ■ PLANNING ■ SURVEYING

PRELIMINARY SITE EVALUATION
ANGOON AIRPORT PROJECT

ANGOON, ALASKA

Prepared for:

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January 2014

STATE OF ALASKA
49TH
Maria E. Kampsen
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1/3/14
REGISTERED PROFESSIONAL ENGINEER

Prepared by:

Maria E. Kampsen, P.E.
Manager, Geotechnical Engineering

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 SUMMARY

The city of Angoon is located in Southeast Alaska, on the eastern side of Admiralty Island. The Federal Aviation Administration is proposing to construct an airport in or near the city of Angoon and has narrowed down airport locations to four potential sites, referred to as Sites 3, 3A, 4, and 12. Although the locations are in different areas around Angoon and adjacent to Favorite Bay, the four sites have similar characteristics.

The soils and geology in the Angoon area are a result of several geologic processes, some of which continue to shape the area. An understanding of the soils and geology will help with proposed airport planning. Refer to Appendix A, Geology and Soils Technical Report Environmental Impact Statement, for a general overview of the soils and geology in and around the Angoon area.

Office research yielded general information regarding the general soil and bedrock conditions on Admiralty Island, but few specific studies are known to have occurred in the immediate vicinity of Angoon. Local residents and organizations were interviewed about recently constructed buildings, such as the post office. No known soils investigations were completed for those projects.

A site visit was conducted from June 8 to June 11, 2009 to visually determine the existing conditions at each proposed airport location and at potential material sites. Refer to Appendix B, Preliminary Material Site Evaluation, for a description of the proposed airport locations and material site evaluations. The proposed airport sites were evaluated for topography and drainage, access, overburden depth, soils, groundwater, and presence of bedrock. Peat probes were conducted to determine overburden depth along the proposed runways. The type of vegetation was found to be an indicator of overburden depth. In general, areas of deadfall, moss, and a high canopy had relatively shallow overburden depths of one to three feet. Areas of secondary growth and high concentrations of devil's club and alders had overburden depths of two to four feet. Poorly drained and marshy areas had overburden depths of five or more feet.

During the site visit, one existing material site and two proposed material sites were identified and evaluated. These potential material sources were visually evaluated in regards to topography, type and quality of material, estimated quantities, and access. An additional gravel site was researched for the type and quality of material being extracted.

Construction of a new airport would require a significant amount of non-frost susceptible, competent material. The use of local material will reduce construction costs; however, the information obtained to date is insufficient to adequately evaluate the subsurface conditions at the proposed airport locations. In addition, there is insufficient information regarding quality and quantity of local material. Further field exploration and laboratory testing are required to determine if the potential material sources contain quality material for the construction of the proposed airport.

The following general conclusions regarding the airport locations and material sources are based on research and observations during the site visit.

Existing Soils. The three main soil types encountered consisted of peat, silts, and granular material (sands and gravels). The following table provides general soil properties. These soils all are susceptible to erosion; therefore slope protection in the form of topsoil/seeding or riprap should be expected.

Table 1: Existing Soil Conditions

Soil Type	Frost Susceptibility	Typical In Situ Moisture Content	Bearing Capacity	Typical Slopes (H to V)	Reusable During Construction	Drainage/Percolation
Peat	High	>100	Low, highly compressible	3:1 - 4:1	Landscaping only	Wet, poorly drained
Silts	High	20 - 40	Low to moderate	2:1 - 3:1	No	Poor drainage
Sands	Moderate	10 -20	Moderate to high	2:1	Possibly	Moderate drainage and percolation
Gravels	Low	2 - 10	High	1.5:1 - 2:1	Yes	Well drained, good percolation

Bedrock. Bedrock was observed at several of the proposed airport sites. The bedrock observed consisted of schist, conglomerate, sandstone, and shale. The upper few feet of bedrock likely is weathered. Weathered bedrock often is rippable with appropriately sized excavation equipment. Once competent bedrock is encountered, excavations in rock will likely require blasting.

Construction Materials. Material required for the construction of an airport would consist of embankment fill, subbase course, crushed aggregate base course, and paving aggregates. Embankment fill would likely come from either common excavation or rock excavation. Material from common excavations is obtained from suitable material of silt, sand, or gravel that does not require blasting or ripping. Material from rock excavations are obtained from blasting or ripping rock or boulders.

Subbase course is classified as material that consists of hard durable particles or fragments of granular aggregates and mixed with fine sand, stone dust, or a similar binding material. Crushed aggregate base course and paving aggregates must be clean, sound, durable particles, or crushed stone or gravel and free of organics, silt or clay coatings, and meet specifications for wear and durability.

2.0 CONCLUSION

Based on the site visit observations, gravels and sands encountered would likely be suitable for reuse as embankment fill. Bedrock and gravels on site will require testing to determine suitability for use as construction materials as well as maximum allowable steepness of slopes (such as 3V:1H for gravels and 2V:1H for rock). Based on site observations and information regarding the quality of dredged gravels in the Angoon area, it is likely that the previously used material sources sites will not meet specifications for wear and durability for surfacing. Subbase, crushed and paving aggregate will have to be barged to Angoon if these are the only sites available.

APPENDIX A

Geology and Soils Technical Report
Environmental Impact Statement, Angoon Airport

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) for the proposed Angoon Airport in Angoon, Alaska (Figure 1, Vicinity Map). The EIS will evaluate the areas surrounding four potential airport location sites. The locations are identified as Sites 3, 3A, 4, and 12A (Figure 2, Proposed Airport Location Map).

This technical report describes the geologic conditions and soils near the proposed Angoon Airport. It focuses on geologic processes and soil conditions which may affect the proposed airport and includes descriptions of the geologic setting. An understanding of the local and regional geology will assist the project planning.

General Area Information. Angoon is the only permanent settlement on Admiralty Island with approximately 450 year-round residents, many of which are Native Alaskan Tlingit. It is the largest community in Southeast Alaska without an airport, limiting transportation to and from the island to boat or seaplane. The existing seaplane service available to the city is essential for health care, purchase and transport of goods, mail service, education, as well as other community needs. Although the seaplane service is on a regular schedule, weather does influence available flights. The seaplane dock is located roughly two miles southeast of the entrance of Favorite Bay into Chatham Strait.

The Kootznoowoo Native Corporation owns the majority of the Angoon area as part of the Alaska Native Claims Settlement act of 1971. This area includes approximately 1,800 acres of land around Angoon, 1,300 of which are development restricted (State of Alaska Department of Transportation and Public Facilities [DOT&PF] 1982).

The community of Angoon on Admiralty Island is located approximately 55 miles southwest of Juneau and 41 miles northeast of Sitka, Alaska (Figure 1). All proposed airport sites are located east or southeast of the city of Angoon (Figure 2).

The proposed airport is planned to consist of a 3,300-foot runway with future expansion capabilities to a 4,000-foot runway. The airport will also include an access road, parking, maintenance facilities, and a terminal building.

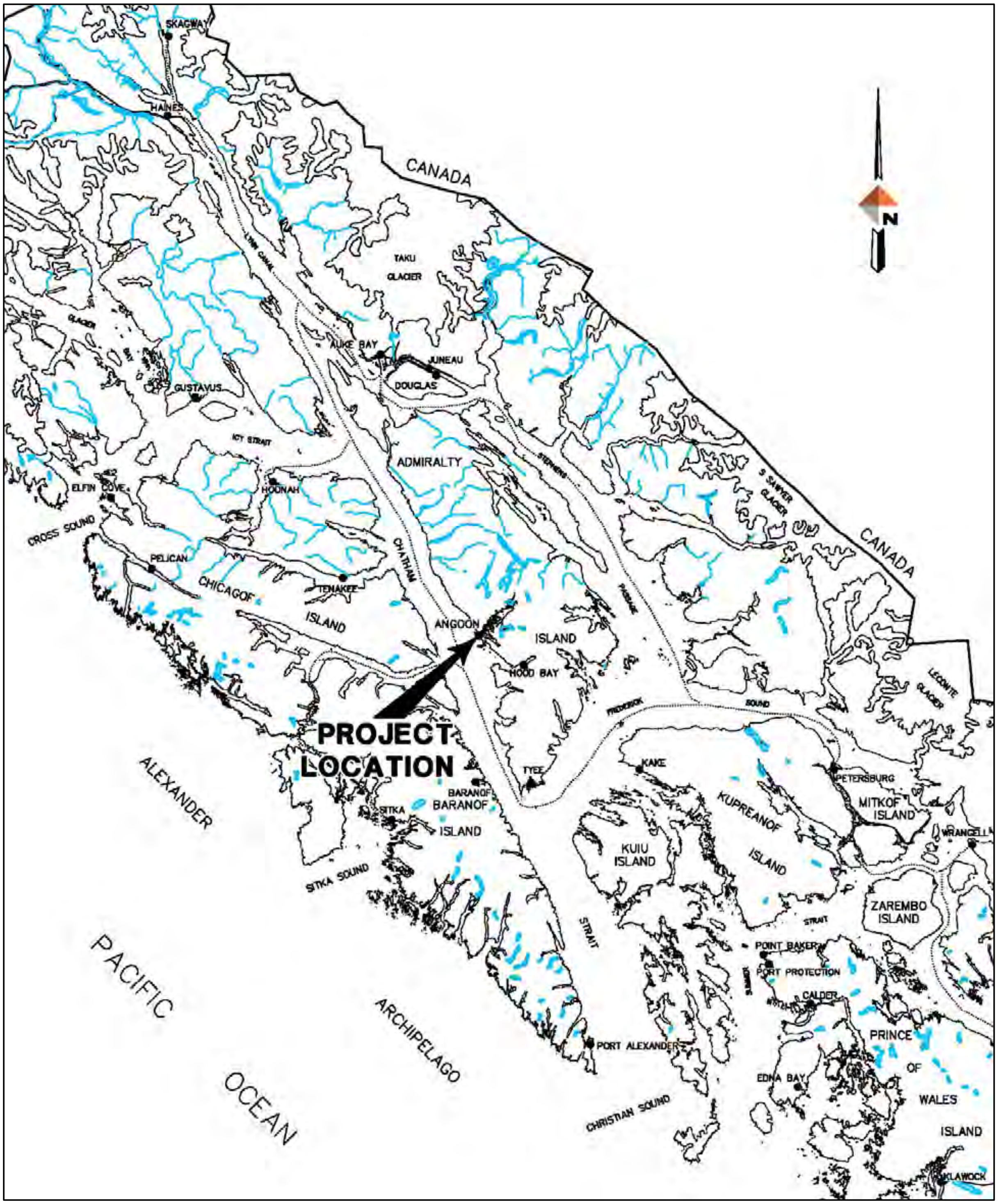

Figure 1: Vicinity Map

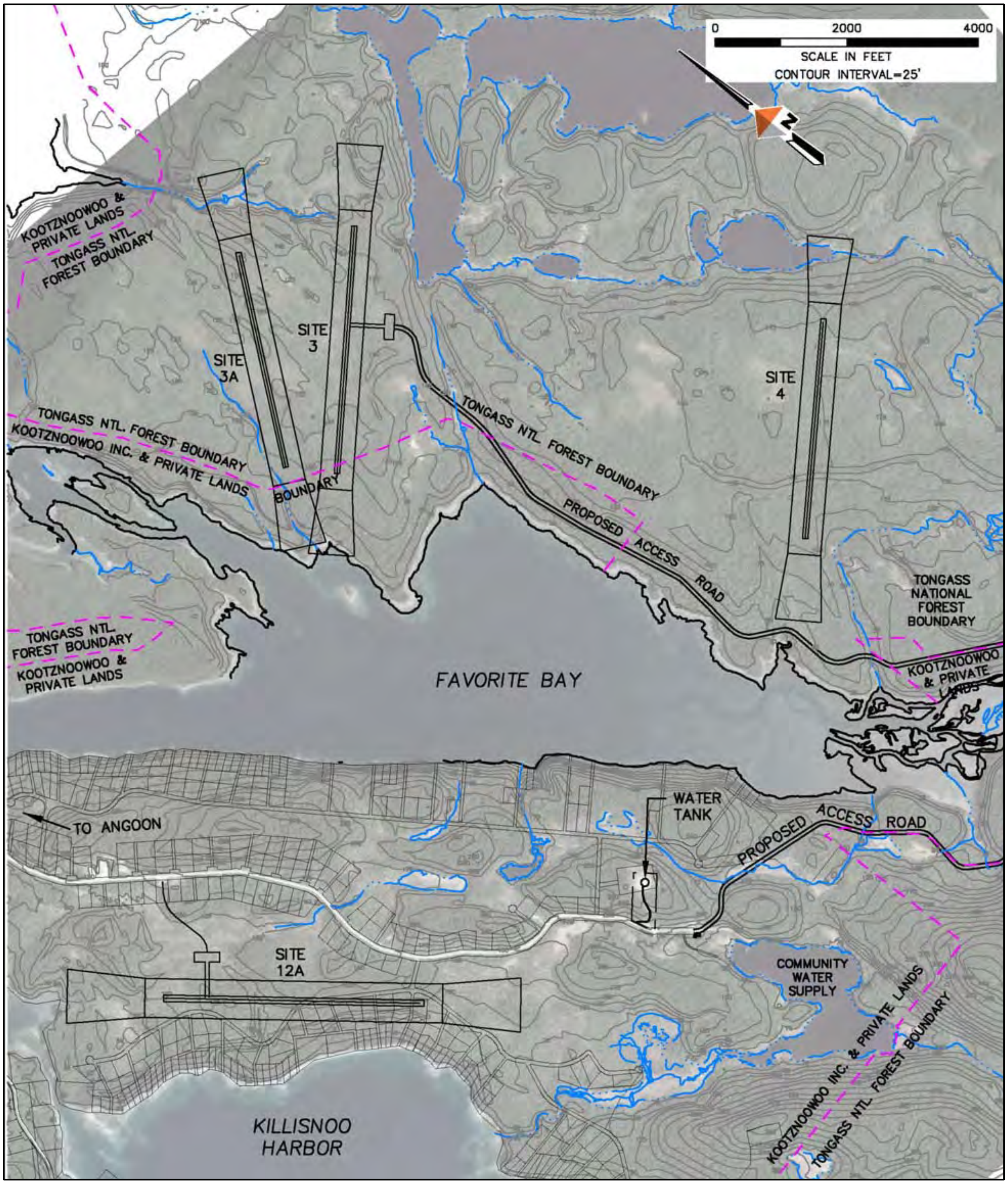

Figure 2: Proposed Airport Location Map

2.0 GEOLOGIC SETTING

Admiralty Island is part of the Coast Range in Southeast Alaska that extends from the Alaska Peninsula to California. Angoon is located on the western shore of Admiralty Island, between Kootznahoo Inlet and Chatham Strait. The geology of the area can be divided into the soils, both organic and inorganic, and the underlying bedrock (DOT&PF, 1982).

2.1 Organic Soils

Organic soils typically form in low-lying poorly drained areas and are underlain by an impermeable material. Deep organics are often indicated by little tree cover, abundance of grasses and small shrubs, and water at or near the ground surface. The depth of organics near the areas of the proposed airport locations varies from less than one foot to greater than five feet.

2.2 Inorganic Soils

Inorganic soils in this area are generally less than four feet thick and are primarily a result of recent glaciations. The inorganic soils consist of alluvium (poorly graded sands and gravels) commonly exposed along creek beds and glacial drift (silty sands and gravels). Shallow inorganic soils are generally present in areas containing first and second growth hemlock and spruce trees, where the organic soils are typically thin. Often, bedrock is observed beneath the inorganic soils. Erosion of soil and bedrock materials is likely in areas where the vegetative cover has been removed, especially on steep slopes (Environmental Services Limited, 1983).

Table 1: Angoon Soil

Soil Type	Depth (feet)	Location Observed	Vegetation	Typical Soil Profile
Organic Soil (Kina and Kogish Peat)	5 to 10	Small isolated areas with inorganic soil groups	Mountain Hemlock, Alaska Cedar	5 to 10 feet of peat over inorganic soil or bedrock
Organic Soil (Staney Peat)	15 or more	Isolated areas	Grass	15 or more feet of peat over inorganic soil or bedrock
Organic Soil (Kina and Maybeso Peat)	2 to 10	Wide distribution	Scrub Cedar, Western Hemlock	2 to 10 feet of peat over inorganic soil or bedrock
Inorganic Soil (Alluvium)	0.5 to 4	Drainages	Western Hemlock, Sitka Spruce	0.5 foot organic mat, followed by 1 to 5 feet silty or sandy gravel, followed by glacial till
Inorganic Soil (Glacial Till)	0.5 to 4	Benches, moderate side slopes, ravines	Western Hemlock, Sitka Spruce	0.5 foot organic mat, followed by 1 to 5 feet of silty sands and gravels over glacial till.

2.3 Bedrock

Angoon is located within the Kupreanof Lowland physiographic sub-province, which is characterized by well-consolidated faulted and folded, locally metamorphosed Paleozoic and Mesozoic sedimentary rocks. Tertiary sedimentary rocks are also present within the region (Wahrhaftig, 1965). Minimal laboratory testing information is available regarding bedrock material sources and their suitability for use in airport construction. Once material sites are identified, quality testing in accordance with DOT&PF specifications should be performed.

Table 2, Angoon Bedrock, provides an overview of the observed formation locations and descriptions of the bedrock. The regional geology (Schmoll, 2009) is shown on Figure 3, Geology Map.

Bedrock along the western side of Favorite Bay is of the Gambier Bay Formation consisting of schist and marble from the Devonian period (Pomeroy, Berg, and Hinckley, 1959). The thickness of the formation is unknown, but is expected to be as thick as 1,000 to 4,000 feet. Rocks within this formation have been folded and recrystallized several times (Lathram, Pomeroy, and Loney, 1965). Proposed Runway 12A is located on this formation.

From the mouth of Favorite Bay Creek, at the southeast end of Favorite Bay, bedrock consists of Paleozoic and Mesozoic undifferentiated metamorphic rocks of an unnamed formation (Pomeroy, Berg, and Hinckley, 1959). Rock types include hornblende-albite-epidote, hornfels, micaceous schist, metamorphosed chert, marble, slate, and phyllite (Nolan, 1965).

Bedrock of the Gambier Bay Formation contains carbonaceous rocks (marble) that may be subject to chemical dissolution and karst topography. The development of karst is dependent upon several factors, including water chemistry, volume of precipitation, overburden type and thickness, and climate (Prussian and Baichtal, 2007). Karst features have not been specifically identified within the project area to date.

Bedrock on the eastern and northeastern side of Favorite Bay is part of the Kootznahoo Formation and is Tertiary in age. Material from the Kootznahoo Formation consists of sandstone, siltstone, shale, conglomerate, and minor amounts of coal (Pomeroy, Berg, and Hinckley, 1959). The majority of Runways 3, 3A, and 4 are located on conglomerate with lesser amounts of sandstone and shale. Large conglomerate boulders can be seen along the northeastern shore of Favorite Bay. Further inland, the bedrock consists of sandstone, siltstone, and shale, with lesser amounts of conglomerate and coal. The thickness of the formation is known to be about 5,000 feet based upon information collected from several fault zones within the areas of the proposed runway locations (Lathram, Pomeroy, and Loney, 1965).

Table 2: Angoon Bedrock

Bedrock	Location Observed	Description	Map Symbol
Schist (Gambier Bay Formation)	2 miles south of Angoon	Chlorite-albite schist, quartz-muscovite schist	TrOsv
Marble (Gambier Bay Formation)	Predominate rock type	Thin to thick bedded, medium gray, fine to medium grained marble. Exposures along the west and southwest shore of Favorite Bay appear to be sheared. Marble strikes to the northwest and dips to the northeast.	TrOc
Migmatite, gneiss, and schist (Unknown Formation)	Southern end of Favorite Bay	Migmatite, gneiss, and feldspathic schist	TrOsv
Sandstone, siltstone, shale (Kootznahoo Formation)	East of Favorite Bay, from the bay up to 3/4 miles inland	Sandstone, siltstone, and shale with minor amounts of conglomerate and coal	Ts
Conglomerate (Kootznahoo Formation)	East of Favorite Bay	Conglomerate with minor amounts of sandstone and shale	Ts

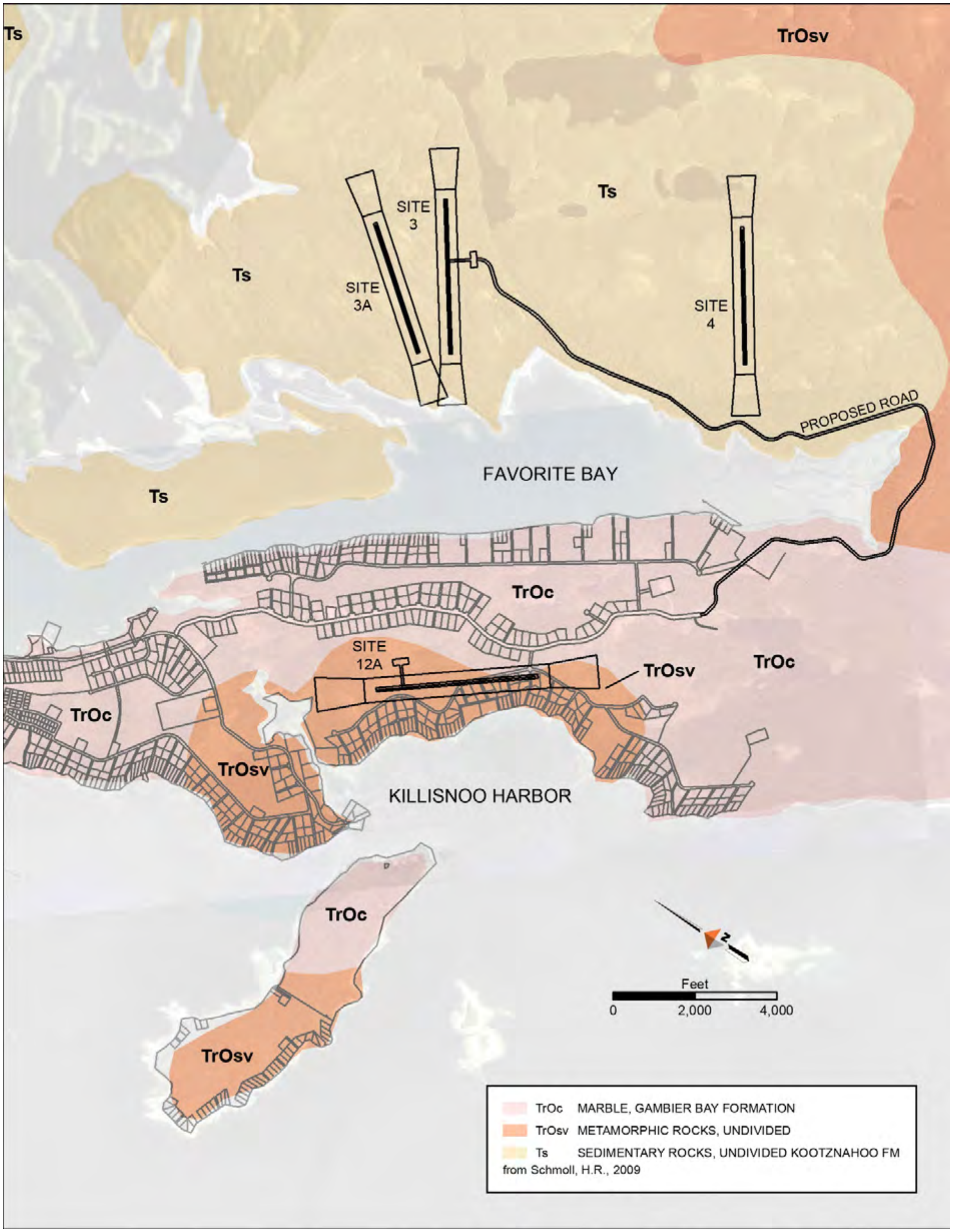

Figure 3: Geology Map

3.0 GEOLOGIC PROCESSES

Admiralty Island is subject to a number of geologic processes, some of which continue to affect the island and should be considered during the design and construction of future airport projects.

3.1 Glacial Processes and History

Glacial processes have defined much of Admiralty Island's topography as well as most of Southeast Alaska. Ice covered most of Southeast Alaska 10,000 years ago, including all but the highest peaks. Peaks that rose above the ice are rough and jagged; those below the ice tend to be round and smooth. Today there are no true glaciers on Admiralty Island, yet a permanent snowfield covers approximately one square mile of land and is located about four and a half miles southeast of Favorite Bay Creek at an elevation of approximately 2,800 feet. (SUPERSCRIPT Consultants, 1989).

The lowlands around Angoon have been shaped by glaciers that have left behind surficial deposits of sand and gravel. The melting of the glaciers also created many depressions which filled with water creating ponds and large poorly drained areas. Large boulders lie along the shore of Favorite Bay as a result of glacial activity. The glaciers carried boulders to the water and then left them behind as the glaciers melted and receded.

3.2 Alluvial Processes

As the glaciers receded, alluvial processes began to modify the topography. Runoff produced by melting glaciers carried the glacial outwash to the sea and reworked the lowlands by depositing coarse sand and gravel between the moraines and on the valley floors. Unlike glacial till, which is poorly graded, angular to subangular material, glaciofluvial deposits typically consist of well graded, subrounded to rounded deposits.

Admiralty Island's rivers and streams actively transport sediments, although the sediment load is typically far less than during deglaciation periods. Sediments of all sizes are transported from high interior ridges. As the gradient of a river lessens, the energy of the current decreases and coarser material is deposited in the river channels. Finer sediments remain suspended in the current, carried downstream, and deposited as deltas at the mouths of the rivers.

The effects of the alluvial processes can be seen along Favorite Bay Creek. Melting snowfall and rain create higher velocity flows in the creek, which picks up sediment and deposits the sediment in areas of lower velocity flow. Sediment carried downstream also erodes and carves channels in the creek bed. Subrounded to rounded sands, gravels, cobbles, and boulders create an alluvial fan at the mouth of the creek as the water carrying the sediment loses momentum. A fairly steep canyon was formed as a result of alluvial processes near the mouth of Favorite Bay Creek before it enters Favorite Bay.

3.3 Wave Processes

Angoon is largely protected from wave action. Coastal features isolate the area from the Gulf of Alaska and create a beachfront only rarely subjected to heavy wave activity. Erosion is typically a result of wave activity and is considered to be minimal in Angoon.

Like all of Southeast Alaska, Admiralty Island has two unequal high tides and two unequal low tides in a 24-hour period. Tides can fluctuate from a high of 18 feet above Mean Sea Level to a low of minus 4 feet, with the greatest range along Chatham Strait. Lesser tides are present in Favorite Bay and Mitchell Bay. The rise and fall of the tides creates currents and when combined with exposed bedrock, creates hazards for boaters traveling in and out of Favorite Bay and Mitchell Bay.

3.4 Chemical Processes

The bedrock that comprises Admiralty Island and the project area may be subject to several chemical processes, including chemical dissolution of carbonates (karst) and acid rock drainage.

3.4.1 Karst Topography

Karst is a geomorphologic term describing topography resulting from the dissolution of carbonate bedrock. Karst is characterized by depressions, caves, and underground drainage. Karst is generally present where sufficient rainfall, temperate climate, and acidic soils are present. Variables, such as overburden type and depth (alluvium versus glacial till) may influence the development and presence of karst. As carbonates (marble) are present in the vicinity of the project area, the presence of karst is possible, however, it has not been reported in published data within the project area.

3.4.2 Acid Rock Drainage

Acid rock drainage (ARD) is the acidic runoff from exposed iron bearing rock or ore that contains high concentrations of metals, usually iron. It is generally identified by orange and reddish colored stream beds or stained surfaces as the iron hydroxide precipitates out of solution. Iron-rich rock, volcanogenic massive sulfides (VMS), and minerals (pyrite) exposed to air and water are sources of naturally occurring ARD. The effects of ARD vary depending on the metal being leached and its concentration. ARD can cause pH imbalances in water systems, adversely affect fish (reduces gill function and reproduction), create a highly corrosive environment for metal culverts, and introduce toxic metals into the water system.

As VMS deposits are not known to be present in the project area, the potential for ARD is believed to be low. However, a panel of acid/base accounting tests can be performed to determine a material source's potential for ARD. If a source is determined to have ARD potential, methods can be implemented to prevent ARD, including covering exposed surfaces, preventing exposure of iron-rich sources, and preventing water run-off across iron-rich materials (stream diversion).

3.5 Tectonic Processes

The state of Alaska is characterized by high seismicity due to the active subduction of the Pacific Plate beneath the North American Plate in the vicinity of the Gulf of Alaska. This subduction zone, known as the "Ring of Fire," is characterized by high seismicity and volcanic activity. Angoon is located on the boundary between Seismic Zone 3 (zone of second highest hazard) and Zone 4 (zone of highest hazard), with the majority of the community in Zone 4. The Chatham Fault is located a little over a mile west of Angoon. However, the largest threat caused by earthquakes along the fault is the potential for slope failure of steep banks/cliffs along the water front and the subsequent formation of large waves.

Although the rocks in Chaik Bay are volcanic, there are no active volcanoes in close proximity to Angoon. The closest volcano is Mount Edgecumbe on Kruzof Island that has not erupted in the last 3,000 years and is reported as inactive. Therefore, the volcanic threat on Admiralty Island and Angoon is low (SUPERSCRIPT Consultants, 1989).

3.5.1 Seismic Hazards

Over 174 earthquakes have been observed in Southeast Alaska from 1850 to 1989. The frequency of earthquakes could result in a number of potential hazards. Refer to Table 3 below for a detailed description of the seismic hazards near Angoon (SUPERSCRIPT Consultants, 1989).

Table 3: Angoon Seismic Hazards

Hazard	Effects
Surface displacement along faults	The majority of faults in the Angoon area are considered inactive. However, structures, roads, and utility lines should avoid fault traces.
Tectonic changes in elevation	Impossible to predict.
Ground shaking	May cause damage to man-made structures, but can be minimized by building on bedrock.
Compaction of sediments	Can result in sediments settling in low lying areas which can lead to flooding and differential settlement.
Liquefaction of cohesionless materials	May cause damage to man-made structures, but can be minimized by not building on cohesionless soils affected by water.
Reaction to sensitive and quick clays	May cause damage to man-made structures, but can be minimized by not building on sensitive or quick clays.
Water sediment ejection and associated subsidence and ground fracturing	May result in ground fracturing, but can be minimized by building on bedrock.
Earthquake-induced sub aerial slides and slumps	Avoid building structures on or at the base of potentially unstable slopes.
Earthquake-induced subaqueous slides	Avoid building structures on steep slopes near water. Angoon has several areas of water located on the surface, both in drainages and ponding. Groundwater is expected to be shallow.
Tsunamis, seiches, and other abnormal water waves	Poses the greatest threat and is impossible to predict.

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APPENDIX B

Preliminary Material Site Evaluation, Angoon Airport

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) for the proposed Angoon Airport in Angoon, Alaska (Figure 1, Vicinity Map). The EIS will evaluate the areas surrounding four potential airport location sites. The locations are identified as Sites 3, 3A, 4, and 12A (Figure 2, Proposed Airport Location Map).

This technical report describes the soil conditions observed at each proposed airport location, and the observed conditions at proposed material sites. Photographs taken during the site visit are shown in Appendix B.1, Photograph Log.

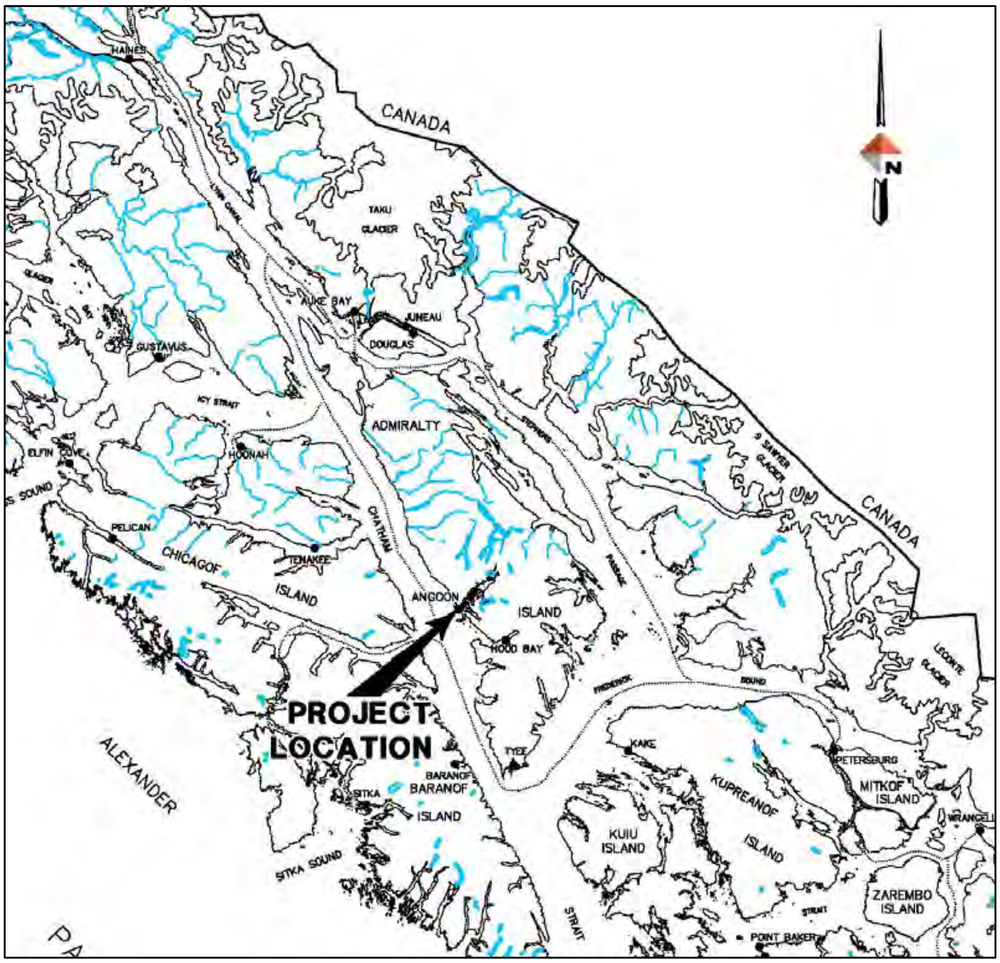

Figure 1: Vicinity Map

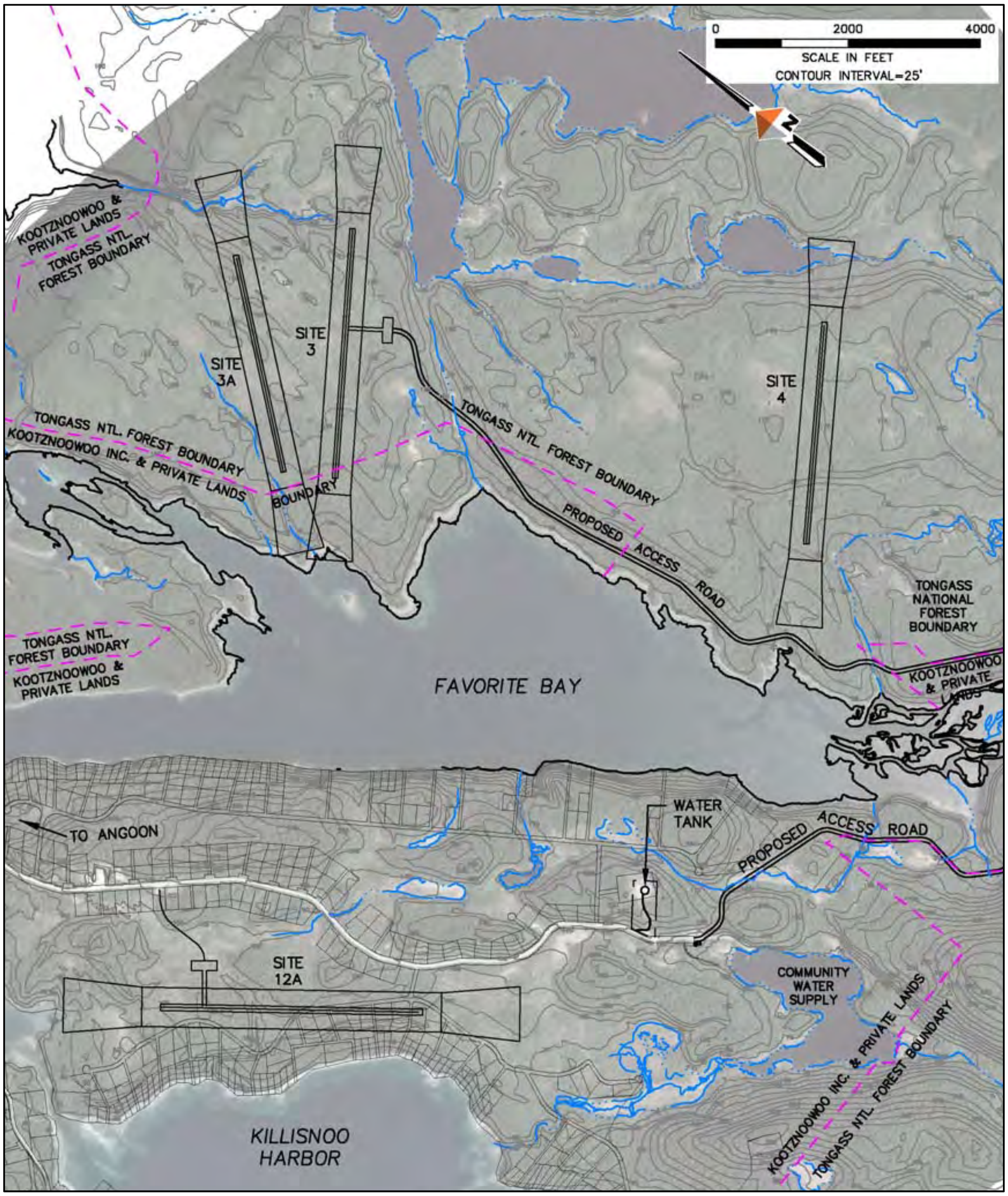

Figure 2: Proposed Airport Location Map

2.0 PROPOSED AIRPORT LOCATIONS

From 1982 to 2003, a total of 15 sites have been under investigation as potential airport locations at Angoon. Of the 15 sites, 2 were selected, and 2 additional airport locations were added by the State of Alaska Department of Transportation and Public Facilities (DOT&PF) for further investigation, resulting in a total of 4 sites to be evaluated during this preliminary investigation.

A site visit was conducted from June 8 to June 11, 2009 to evaluate the proposed airport locations and potential material sites. Samples were not collected and laboratory testing was not conducted on the subsurface material observed at the four airport sites. One surface sample was collected in the vicinity of the access road and tested for particle size distribution. Refer to Section 2.4, subsection Laboratory Testing, for further details. Airport sites were evaluated in regards to their location, topography and drainage, access, general overburden depths, bedrock and soils, and groundwater conditions.

2.1 Sites 3 and 3A

Location. Sites 3 and 3A are located east of Favorite Bay about three miles southeast of the community of Angoon. The area is currently undeveloped. The southwestern end of the proposed runways are owned by Kootznoowoo Incorporated, and the remaining section is within the Admiralty Island National Monument and owned by the Tongass National Forest (DOT&PF, 2007).

Topography/Drainage. Site 3 has an upward slope to the northeast from an elevation of 90 feet to 150 feet. Site 3A has an upward slope to the north from an elevation of 75 feet to 150 feet. The highest point along both runways is at an elevation of around 150 feet. The topography is uneven with areas of higher and lower elevations resulting from a variety of geologic processes. Drainages typically flow to the south or southwest and cut into the topography creating steep slopes, generally 10 feet or less. Some standing water was observed in poorly drained areas.

Access. Access to the sites is limited by boat to the northeastern side of Favorite Bay. Once in the area, access is via game trails and on foot through undeveloped forest. A survey cut line was present along the southwest side of the proposed runway.

Overburden Depth. The general depth of overburden at the sites range from less than one foot to three and a half feet. Areas of shallow overburden were often located in areas of deadfall, thick moss, a high canopy, and spruce trees. Areas where overburden was greater than two feet were typically observed to be peat bogs, marshy areas, or poorly drained areas. The vegetation in poorly drained areas consists of peat, shrubs, moss, and short spruce trees.

Table 1 below identifies the peat probes conducted in the vicinity of Site 3 and 3A, the associated vegetation, and underlying soils information. Refer to Figure 3 for approximate peat probe locations.

Table 1: Sites 3 and 3A Overburden Depths

Site	Peat Probe Number	Depth of Overburden (feet)	Vegetation	Soil
3	PP-17	1	deadfall, moss, high canopy	boulders (sandstone), sands and gravels
3	PP-23	1.25	deadfall, moss, medium to high canopy, open	granular soil
3A	PP-18	1	deadfall, moss, high canopy	granular soil
3A	PP-19	1	deadfall, moss, high canopy	granular soil
3A	PP-20	3.5	peat, moss, short spruce trees	boulder/cobble at 3.5 feet
3A	PP-21	1 to 1.5	deadfall, moss, spruce trees	gravel/cobble/boulder or bedrock at 1 to 1.5 feet
3A	PP-22	0.5	deadfall, moss, high canopy, open	silty sand with gravel (about 35% silt, 5% gravel, gravel subangular to 1", medium sand)

Bedrock/Soils. There was no exposed bedrock observed at Site 3 or 3A; however, bedrock was exposed along the lakeshore located about 700 feet southeast of the northern end of Site 3. Bedrock appeared to be weathered sandstone overlain by overburden and soil. Along the proposed runway, sands and gravels were observed beneath the organic mat. Boulders were present at drainages and under the root clumps of fallen trees. Shallow root systems may indicate shallow bedrock or dense sands and gravels.

Near Site 3A, several boulders were exposed near fallen trees and primarily consisted of conglomerate, sandstone, and lesser amounts of shale. Exposed soils include silty sands and gravels in areas of shallow overburden and peat and organic silts in poorly drained areas.

Groundwater. Several drainages are present near the proposed airport location. Standing water was present in poorly drained areas. No test pits or test borings were drilled/excavated to determine groundwater depth. However, given the shallow bedrock depth, only surface water and not subsurface flow is likely to be a factor during construction.

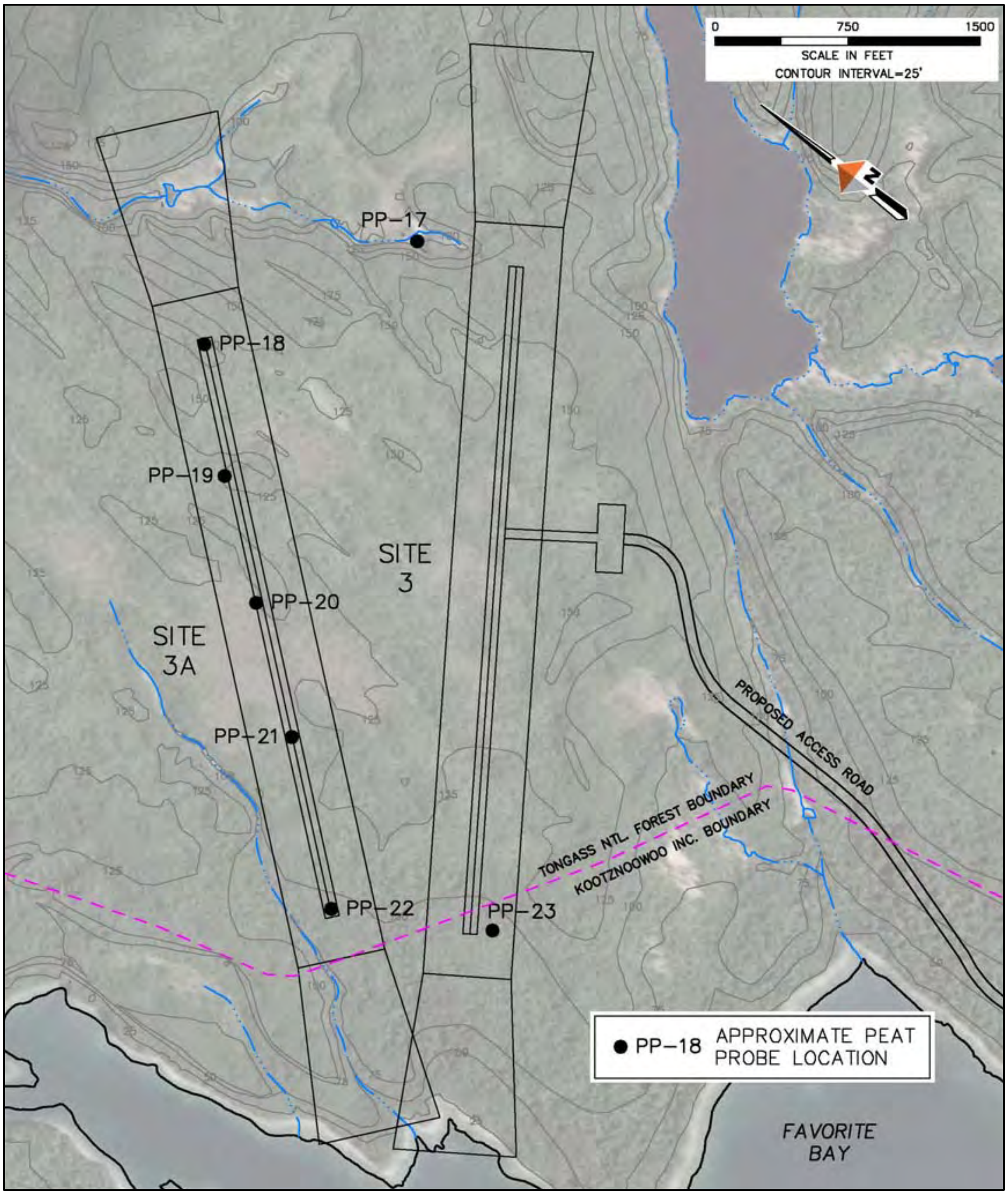

Figure 3: Peat Probe Location Map, Sites 3 and 3A

2.2 Site 4

Location. Site 4 is located east of Favorite Bay, approximately 4.25 miles southeast of the community of Angoon. This site is also undeveloped, owned by the Tongass National Forest, and is within Admiralty Island National Monument, Tongass National Forest.

Topography/ Drainage. Site 4 has an upward slope to the northeast from an elevation of 100 feet to 175 feet. The highest point along the runway is approximately 175 feet. There are a few benches created by previous glacial activity and other geologic processes. Near Peat Probe 15 (Figure 4), a creek has carved out a gully, creating slopes of 5 to 20 feet on either side. The creek drains into a small lake located to the north of the proposed runway, and ponded water was observed along the creek. Drainages located to the southwest of Peat Probe 14 typically drain to the southwest towards Favorite Bay. Creeks and drainages located to the northeast of Peat Probe 14 typically drain to the northeast towards the small lake north of the proposed runway.

Access. Access to the site is by boat to the northeastern side of Favorite Bay. Once in the area, access is limited to game trails and by foot through undeveloped forest.

Overburden Depth. The depth of overburden along Site 4 ranges from less than a foot to greater than five feet. Areas of shallow overburden were often associated with areas of deadfall, a high canopy, and thick moss. Overburden was observed to be deeper in poorly drained areas, particularly those areas containing skunk cabbage. Figure 4 shows peat probe locations taken along the runway. Table 2 below lists the peat probes conducted in the vicinity of the proposed airport, the associated vegetation, and underlying soils information, if determined.

Table 2: Site 4 Overburden Depths

Peat Probe Number	Depth of Overburden (feet)	Vegetation	Soil
PP-11	3.75	deadfall, thick moss	granular soil
PP-12	5+	deadfall, thick moss, skunk cabbage, poorly drained area	fine grained soil
PP-13	0.5 to 1	deadfall, moss	silty sands with gravel (about 35% silt, 5% gravel)
PP-14	1.5	deadfall, secondary growth trees	granular soil
PP-15	5+	skunk cabbage, poorly drained area	soil/ rock not encountered
PP-16	1	deadfall, moss, huckleberries	granular soil

Bedrock/Soils. There were no areas of exposed bedrock observed along Site 4. Large boulders were encountered and consisted primarily of conglomerate, sandstone, and shale. Soils exposed under the organic mat indicated silty sands with gravel in well drained areas, and silty sands, sandy silts, and organic silts in poorly drained areas.

Groundwater. Several drainages were present in the area surrounding Site 4. No test borings or test pits were drilled/excavated to determine groundwater depth. However, given the shallow bedrock depth, only surface water and not subsurface flow is likely to be a factor during construction.

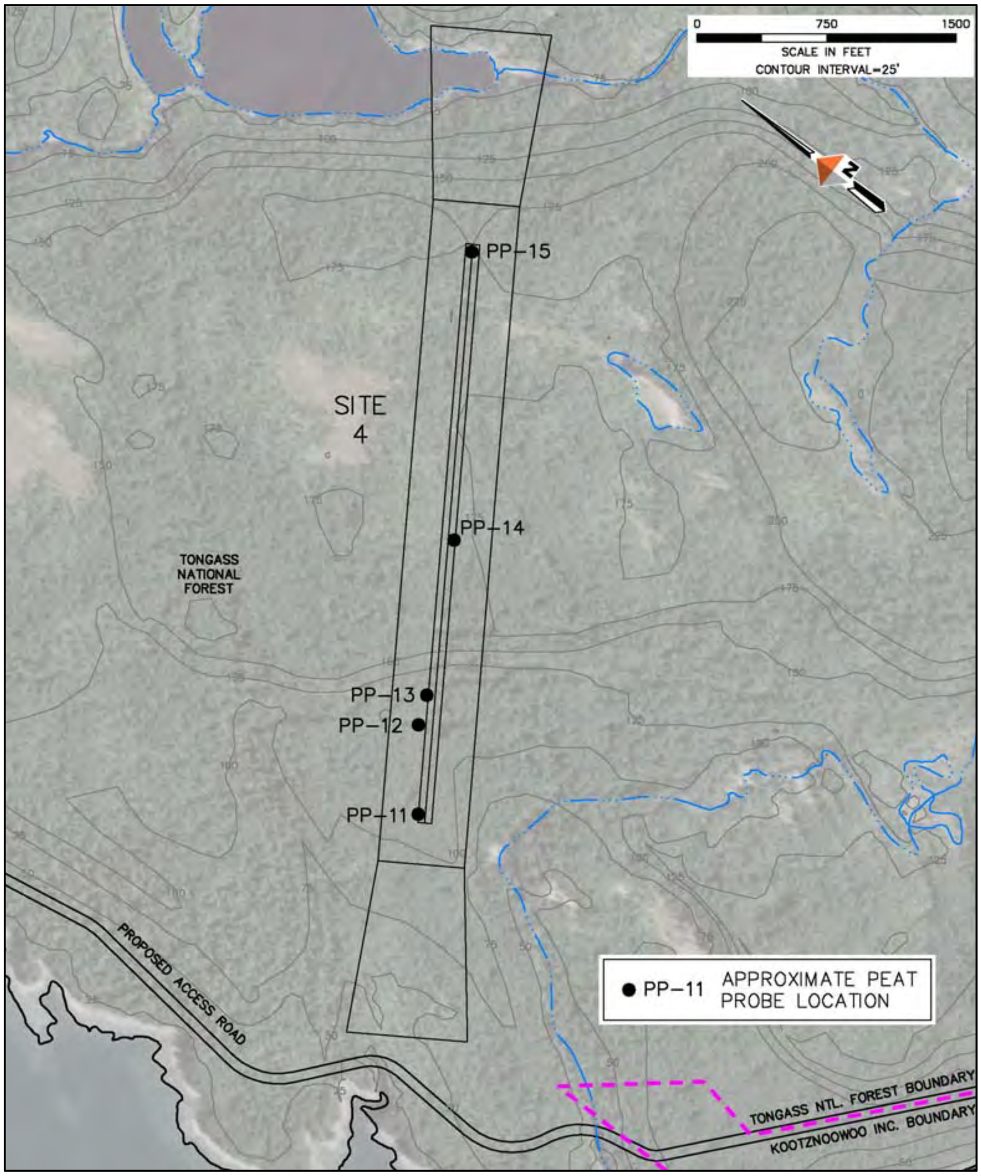

Figure 4: Peat Probe Location Map, Site 4

2.3 Site 12A

Location. Site 12A is located approximately 2.5 miles south of the community of Angoon. The site is undeveloped, and owned by Kootznoowoo Incorporated and private landowners.

Topography/Drainage. In general the topography in the vicinity of the runway alignment undulates. A series of benches, terraces, and low areas span across the runway from end-to-end. The elevation change across the runway is from 75 feet to 100 feet, with a high point of 125 feet, and a low point of 50 feet. The runway slopes to the west towards Killisnoo Harbor. Several drainages are present within the area of the proposed runway, and typically flow west towards Killisnoo Harbor. Standing water is present in low-lying and poorly drained areas.

Access. The site is accessible utilizing the road which leads to the community water tower and reservoir. A 4-wheeler trail extends from the water tower road at the far southern end of the proposed runway and leads to Killisnoo Harbor. The 4-wheeler trail is maintained with logs placed across the trail to help reduce erosion through the marshy areas. Beyond the 4-wheeler trail, Site 12A is accessible by game trails and on foot through undeveloped forest.

Overburden Depth. The depth of overburden along Site 12A varies from less than one-foot to greater than five feet. Typically, areas of shallow overburden are associated with deadfall, and areas of deeper overburden are in marshy or large open areas with short brushy vegetation. Figure 5 shows peat probe locations taken in the vicinity of Site 12A. Table 3 below lists the peat probes conducted in the vicinity of the proposed airport, the associated vegetation, and underlying soils information, if determined.

Table 3: Site 12A Overburden Depths

Peat Probe Number	Depth of Overburden (feet)	Vegetation	Soil
PP-3	5+	short shrubs, alders, open area	soil/ rock not encountered
PP-4	2	deadfall, alders	cobble/ boulder at 2 feet
PP-5	2	deadfall, alders	NA
PP-6	2	deadfall, moss	sands at 2 feet
PP-7	1	deadfall, alders	cobble/boulder at 1-foot
PP-8	1	deadfall, alders, moss	sands and gravels
PP-9	3	swamp	NA
PP-10	2	deadfall, moss	sands
Creek 1	1 to 1.5 feet	deadfall, moss	gravels and sands

Bedrock/Soils. One small area of exposed bedrock was observed near Peat Probe 9. The rock consisted of highly weathered and fractured schist. Moss and other organics covered the majority of the bedrock outcrop. Soils beneath the shallow overburden encountered along the airport alignment consisted of sands and gravels, and in some areas cobbles, boulders, or possibly bedrock. Soils in poorly drained areas consist of silty sands and sandy silts.

Groundwater. Several drainages and areas of standing water were present near Site 12A. Drainages exposed sand, gravel, and cobbles. No test borings or test pits were drilled/excavated to determine groundwater depth. However, given the shallow bedrock depth, only surface water and not subsurface flow is likely to be a factor during construction.

Figure 5: Peat Probe Location Map, Site 12A

2.4 Access Road Northwest of the Community Water Supply

Location. The proposed access road, which would extend from Angoon to Site 3, 3A, or 4 is located northwest of the community water supply and extends around Favorite Bay Creek. During the site visit, the portion of the road extending from the community water supply to the west side of Favorite Bay Creek was probed. Time restraints prohibited further probing.

Topography/Drainage. In general this area is very uneven. A series of benches, terraces, and low areas span the access road. A small hill with an elevation gain of 50 feet is present within the first 1,000 feet of the access road. Steep slopes with an elevation gain of 125 feet in 250 feet are present along the northern side of the existing road to the community water supply and along the northeastern edge of the community water supply reservoir. Along the southern edge of Favorite Bay, steep slopes with a decrease in elevation of 100 feet are present. Areas with little to no change in elevation are often on top of ridges. Drainages are present in the area of the access road. Standing water was observed in low-lying and poorly drained areas.

Access. The site is accessible utilizing the road which leads to the community water tower and reservoir. Beyond the water reservoir there are no access roads and the remainder of the proposed access road is accessible utilizing game trails and on foot through undeveloped forest.

Overburden Depth. Overburden depths in this area range from less than a foot to more than five feet. Areas of deeper overburden were often in poorly drained fields, whereas shallow overburden was observed in forested areas between clearings and in areas of deadfall and thick moss. Figure 6 shows peat probe locations taken near the access road and Table 4 lists the peat probes conducted in the vicinity of the proposed access road, the associated vegetation, and underlying soils information, if determined.

Table 4: Access Road Overburden Depths

Peat Probe Number	Depth of Overburden (feet)	Vegetation	Soil
PP-1	5+	grasses, short bushes, field	soil/rock not encountered
PP-2	3	thick alders, huckleberries, hemlock, spruce	sand
PP-24	5+	grass field	soil/rock not encountered
PP-25	3 to 3.5	moss, alders, hemlock, various shrubs and bushes	sands
PP-26	1	deadfall, moss, hemlock, spruce trees	sands and gravels

Bedrock/Soils. Bedrock outcrops were observed at the end of the existing community road before the City of Angoon Public Water Supply building. The bedrock consisted of moderately to highly weathered fractured shale with quartz veins. Additional outcrops were observed along the steep banks of the community water supply reservoir. The outcrops along the banks were fractured, and in many cases, covered in moss and other vegetation. Soils in the area include silts and organics in the poorly drained areas and sands and gravels with some cobbles in the areas with shallow overburden. A soil sample was collected of the sands and gravels in the side hill near the community water supply.

Groundwater. Several drainages and areas of standing water were observed along the proposed access road. No test borings or test pits were drilled/excavated to determine groundwater depth. However, given the shallow bedrock depth, only surface water and not subsurface flow is likely to be a factor during construction.

Laboratory Testing. One sample was collected along the access road to the community water supply reservoir. Laboratory testing consisted of a particle size distribution test in accordance with ASTM D422. The test consisted of mechanical sieving; the results of which is presented graphically in Appendix B.2, Laboratory Testing.

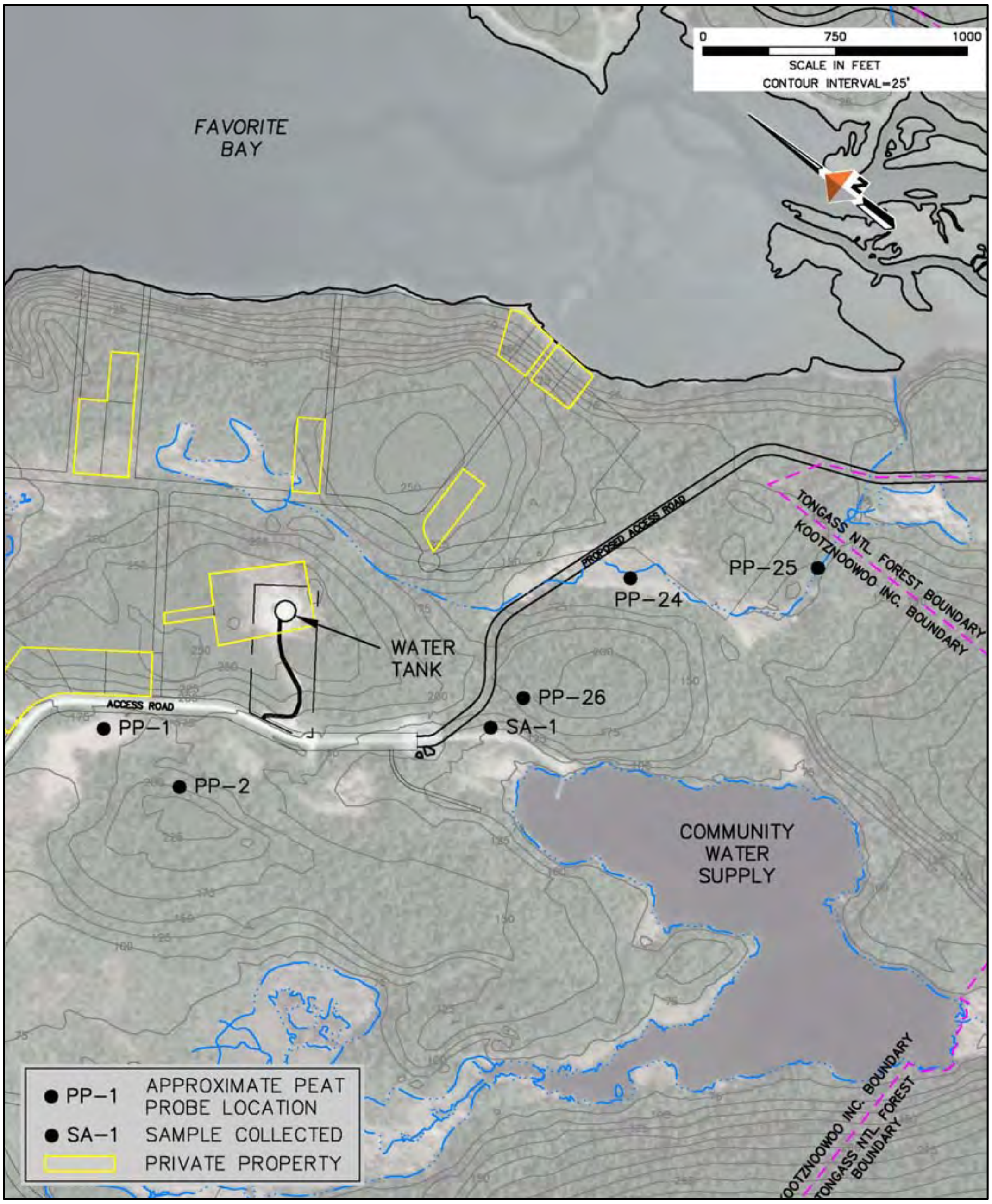

Figure 6: Access Road Peat Probe Location Map

3.0 MATERIAL SITE EVALUATION

A total of four material sites were evaluated during the site visit. Three material sites were evaluated for general site conditions, estimated quantity and quality of material, land ownership, and access. The material sites included two proposed material sources (Proposed Material Source A and B) and one existing material source (Existing Material Source). Preliminary quantities of material were calculated based on estimated site boundaries and estimated overburden depths. No laboratory testing was conducted on material obtained from the existing material site or from the proposed material sites. A fourth site consisted of an existing gravel extraction site which was researched to determine the type and quality of material being extracted. The locations of the material sites can be seen in Figure 7, Material Site Location Map.

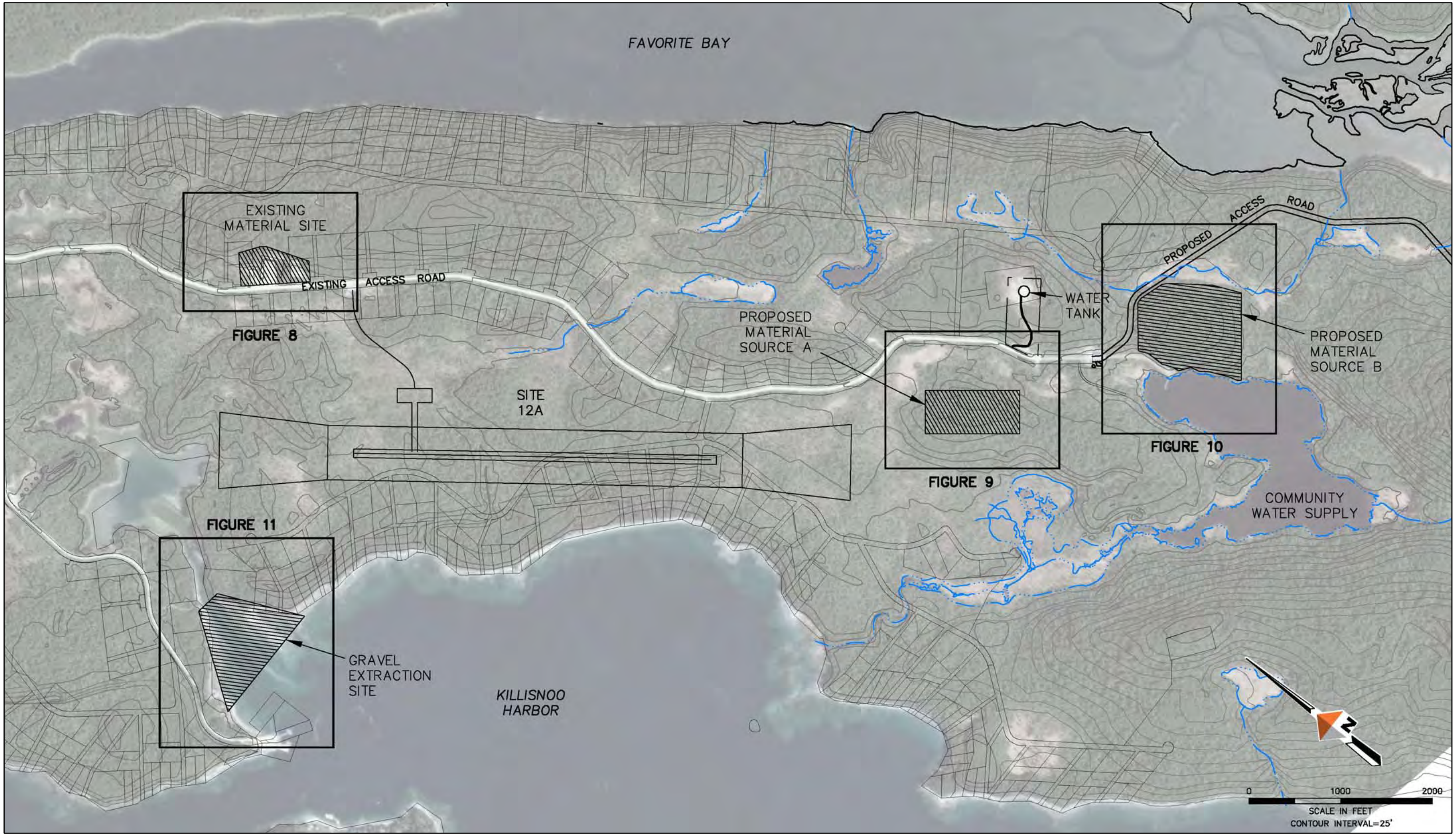

Figure 7: Material Site Location Map

3.1 Existing Material Site

Site Conditions. This site is currently used as a material site and could be the source of material for the road maintenance projects within the city of Angoon. A large portion of the site has been excavated and processed. Equipment was onsite to move extracted material around during the time of the site visit. Drill holes are present within the bedrock at the front of the material site. The holes are filled with water and covered with cones. Vegetation around the material site consists of hemlock, spruce, grasses, shrubs, and moss.

Quantity of Material. The estimated quantity of material could not be determined. Information regarding site boundaries and amount of material used must be obtained before quantities can be determined.

Refer to Figure 8 for an outline of the estimated material site boundaries.

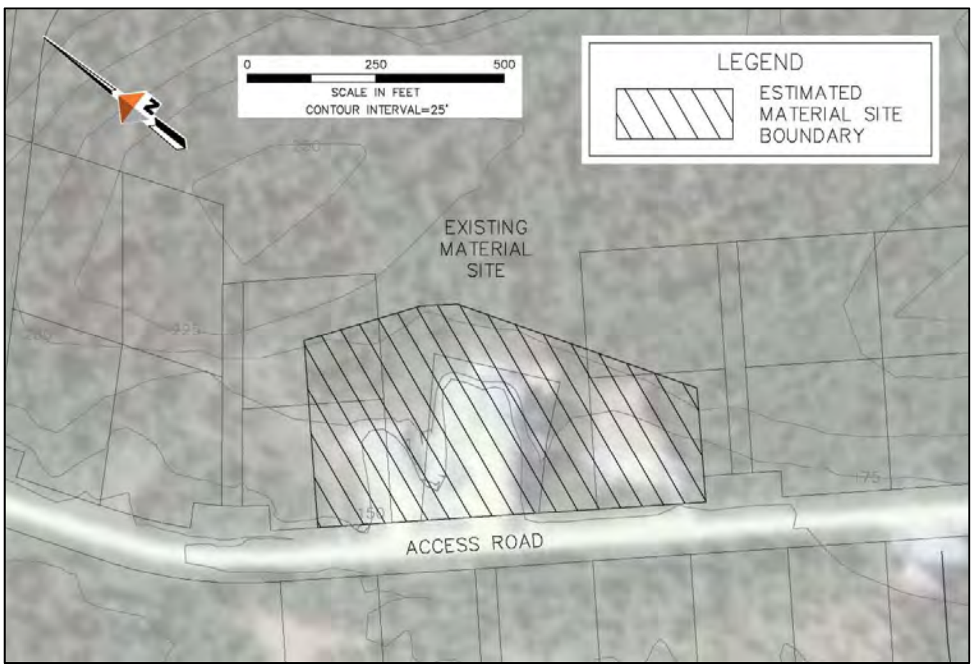

Figure 8: Existing Material Site

Quality of Material. A stockpile near the center of the existing material site contains sands, gravel, cobbles, and boulder-sized material. Dust and fine-grained material around the base of the pile and bedrock face indicates the material may have a tendency to break down easily. Laboratory tests will be necessary to determine the actual quality and strength of the material.

Land Ownership. The land of the existing material site is situated on both private land and land owned by Kootznoowoo Incorporated (DOT&PF, 2007). The exact boundaries and owners of the private parcels are currently unknown.

Access. The site is accessible by utilizing the road leading to the water tower and community water supply. There are currently no locks or gates blocking access to the material site.

3.2 Potential Material Source A

Site Selection. This site was chosen as a proposed material source based on a previous report done by SUPERSCRIPT Consultants in 1989 as part of the Alaska Coastal Management Program. This material source is close to the proposed access road and to Site 12A.

Site Conditions. The site is currently undeveloped and is a hill mostly surrounded by poorly-drained areas. Thick vegetation consisting of hemlock, spruce, alders, grasses, and shrubs cover the hill. There was no exposed bedrock observed at the time of the site visit.

Quantity of Material. The estimated quantity of material is based on the approximate site boundary shown in Figure 9, Potential Material Source A. The site is estimated to cover approximately 16 acres and has the potential to produce an estimated 700,000 to 900,000 cubic yards of material. The quantity mentioned above is dependent on property boundaries, an average of 3 feet of overburden, and an average estimated depth of 40 feet.

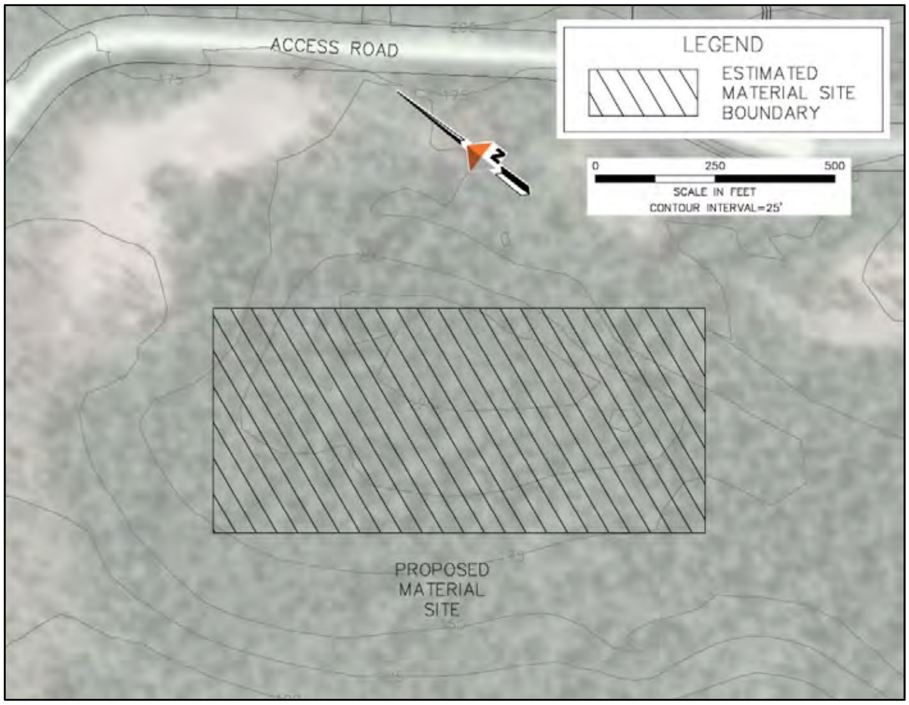

Figure 9: Potential Material Source A

Quality of Material. As no bedrock or soils were exposed at the time of the site visit, the quality of the material at this site is undetermined. Field exploration and laboratory tests are necessary to determine the quality and strength of the material. Based in the site visit and lack of information, it is unclear if this material source should remain under consideration of potential material sites.

Land Ownership. The land of the existing material site is owned by Kootznoowoo Incorporated (DOT&PF, 2007).

Access. There are no existing roads leading to this material source. A wet marshy area separates Potential Material Source A from the road leading to the community water supply. Peat probes taken in the marshy area indicate overburden depths greater than five feet.

3.3 Potential Material Source B

Site Selection. This proposed material site was chosen based on close proximity to the proposed access road and Site 12A, and relatively easy access to the site. However, the close proximity to the community water supply may pose a threat with development of this site.

Site Conditions. The site is mostly undeveloped and is a hill located northeast of the community water supply. A gravel access road to connect the City of Angoon Public Water Supply Building to the community water supply is located in the southwest corner of the estimated material source. Vegetation consisting of hemlock, spruce, moss, alders, and shrubs with ample amounts of deadfall was present in the area of the potential material source. Small sections of bedrock were observed along the northeastern border of the community water supply. There was not enough exposed bedrock to determine the general characteristics of the bedrock.

Quantity of Material. The estimated quantity of material is based on the approximate site boundary shown in Figure 10, Potential Material Source B. The site is estimated to cover approximately 73 acres and has the potential to produce an estimated 4 to 5 million cubic yards of material. The quantity mentioned above is dependent on property boundaries, an average of 3 feet of overburden, and an average depth of 50 feet.

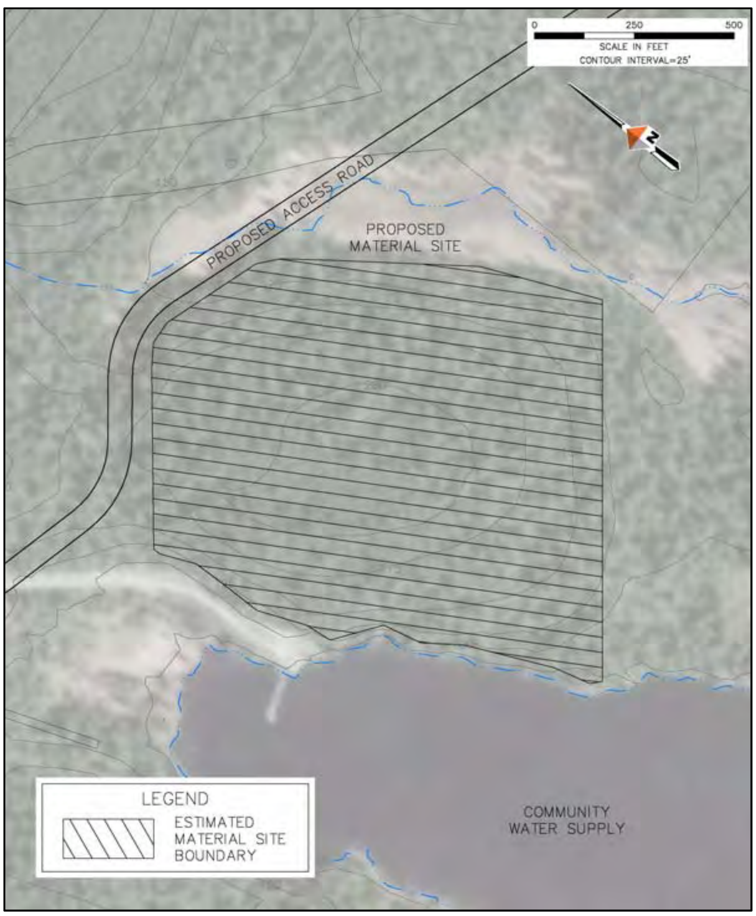

Figure 10: Potential Material Source B

Quality of Material. As minimal bedrock was exposed at the time of the site visit, the quality of the material at this site is undetermined. Field exploration and laboratory tests are necessary to determine the actual quality and strength of the material.

Land Ownership. The land of the existing material site is owned by Kootznoowoo Incorporated and the Tongass National Forest (DOT&PF, 2007).

Access. There are no existing roads leading to this material source. There is an access road leading to the community water supply located southwest of the potential material source. Peat probes taken in the marshy area indicate an overburden depth of approximately one foot.

3.4 Gravel Extraction Site

Site Conditions. It is uncertain if this site is still an active material source. Material was dredged from the mouth of the river and in a 1989 study completed by the State of Alaska as part of the coastal management program. The material was used for road improvements.

The road contains a significant amount of fines. It is unclear whether the extracted material contains the fines or if the material easily degrades.

The gravel extraction site is near the community clamming beds. Concerns have been noted that continued extraction of the material will affect the nearby clamming and cockle beds.

Quantity of Material. The estimated quantity of material is unknown. Figure 11, Gravel Extraction Site, shows a map of the material site.

Figure 11: Gravel Extraction Site

Quality of Material. The quality of the material is currently unknown; sources indicate the material is fair to poor due to high fines content.

Land Ownership. The land for the gravel extraction site is owned by Kootznoowoo Incorporated.

Access. The site is accessible using the road that leads to the ferry dock.

4.0 CONCLUSION

The depth of overburden for all four proposed airport sites ranges from less than one foot to greater than five feet. Where encountered, underlying material also varies. Further exploration is necessary to determine the types of soil, density of the soil, and depth to bedrock.

The material sources were identified through topography and surrounding conditions. A more detailed field exploration and subsequent laboratory testing program is required to determined quality and more accurate quantities.

5.0 REFERENCES

Environmental Services Limited, 1983, *Angoon,* Department of Community and Regional Affairs, Division of Community Planning, February 1983.

Lathram, E.H., J.S. Pomeroy, and R.A. Loney, 1965, *Reconnaissance Geology of Admiralty Island Alaska,* United States Department of the Interior, Geological Survey Bulletin 1181-R, 1965.

Pomeroy, J.S., H.C. Berg, and D.W. Hinckley, 1959, Map of the Geology of the Kootzanhoo Inlet Area, Alaska: United States Geological Survey Bulletin 1181-R, scale 1:63,360, 1959.

State of Alaska Department of Transportation and Public Facilities (DOT&PF), Southeast Section, 1982, *Angoon Airport Reconnaissance Study,* August 1982.

State of Alaska Department of Transportation and Public Facilities (DOT&PF), Southeast Region, 1986, Foundation Report, Angoon Seaplane Facility, October 1986.

SUPERSCRIPT Consultants, 1989, *Angoon Coastal Program,* June 1989.

APPENDIX B.1

PHOTOGRAPH LOG

DOWL HKM
4041 B Street • Anchorage, Alaska 99503
(907) 562-2000 (voice) / (907) 563-3953 (fax)

Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 1 of 6


City of Angoon


City of Angoon from Favorite Bay


Angoon Small Boat Harbor


Road to Ferry Terminal and Landfill


Float Plane


Danger Point

DOWL HKM
4041 B Street • Anchorage, Alaska 99503
(907) 562-2000 (voice) / (907) 563-3953 (fax)

Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 2 of 6


Shore of Favorite Bay near Sites 3 and 3A


Mouth of Favorite Bay Creek


Vegetation near Site 3 and 3A


Open Area near Peat Probe 20, Site 3A


Boulder near Site 3A


Vegetation near Site 3

DOWL HKM
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(907) 562-2000 (voice) / (907) 563-3953 (fax)

Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 3 of 6

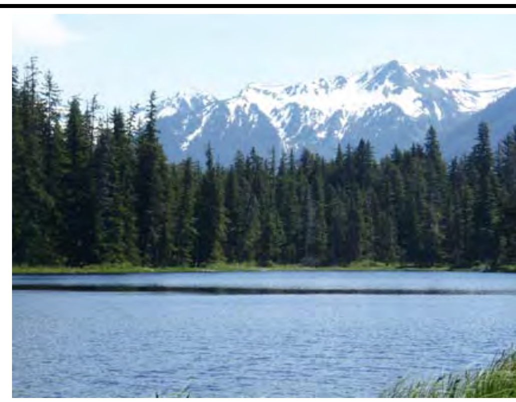
Small Creek at Southwest End of Site 4

Bear Print near Southwest End of Site 4

Vegetation near Site 4

Open Vegetation at Site 4

Pond at Northeast End of Site 4



Large Pond Northeast of Site 4

DOWL HKM
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Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 4 of 6

Open Vegetation near Site 12A

Game Trail at Site 12A

Peat Probe 3 at Site 12A

Trail at South End of Site 12A

Vegetation at Site 12A

Thick Vegetation at Site 12A

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Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 5 of 6

Existing Gravel Pit

Existing Gravel Pit

Drilled Holes Covered with a Cone at the Existing Gravel Pit

Dust on Road to Community Water Tower and Reservoir

Road Cut on Road Leading to Community Water Supply

Community Water Tower

DOWL HKM
4041 B Street • Anchorage, Alaska 99503
(907) 562-2000 (voice) / (907) 563-3953 (fax)

Photo Log

Project Name: Angoon Material Site Evaluation		
Work Order Number: D59761	Report No: 5069	Date: December 2, 2009
Contractor: SWCA Environmental Consultants		
Inspector: Callie Keller		Page 6 of 6

Cut on Road to Community Water Supply

Cut on Road to Community Water Supply

Cut on Road to Community Water Supply

Cut on near Water Tower

Gravel Extraction Site

Cut on Road to Community Water Supply

APPENDIX B.2

LABORATORY TEST RESULTS

Client: SWCA Environmental Consultants
Project: Angoon EIS
Work Order: D59761

Particle Size Distribution

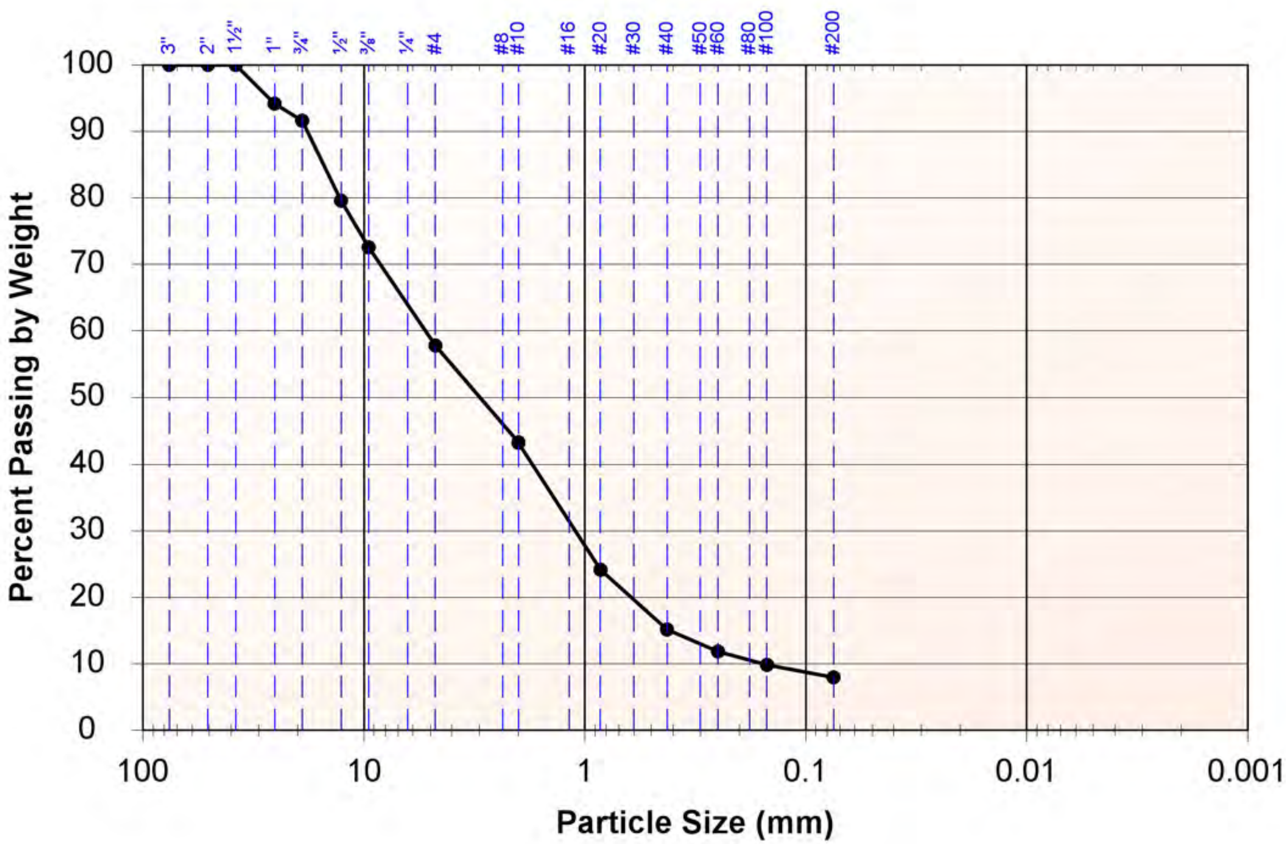
ASTM D422

Lab Number	2009-1506
Received	11/19/2009
Reported	11/23/2009

Location: Side of Hill

Engineering Classification: **Well Graded Sand with Silt and Gravel, SW-SM**

Frost Classification: **Not Measured**



Size	Passing	Specification
3"	100%	
2"	100%	
1½"	100%	
1"	94%	
¾"	92%	
½"	80%	
⅜"	73%	
#4	58%	
Total Weight of Coarse Fraction: 5650.6g		
#10	43%	
#20	24%	
#40	15%	
#60	12%	
#100	10%	
#200	8%	
Total Weight of Fine Fraction: 369.76g		

David L. Andersen, P.E • 4041 B Street • Anchorage • Alaska • 99503 • 907/562-2000 • Fax 907/563-3953

APPENDIX 5: DOT&PF MATERIAL LAB REPORTS

25-229
R-6/91

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

LAB REPORT

THE RESULTS OF THIS TESTING ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

PRECONSTRUCTION ☐ CONSTRUCTION ☒
ACCEPTANCE ☐ QUALITY ☒
ASSURANCE ☐ INFORMATION ☐
FINAL RECORD ☐

TEST OF Quarry Rock   ITEM NO. All Items
PROJECT NO. BIA-020(1)   PROJECT NAME ANG Angoon City Streets Paving
LABORATORY NO. 96C-199
SAMPLED FROM Source   SUBMITTED BY S. Mielke   FIELD NO. N/A
SOURCE Sealaska Corp. Quarry (Sta. 111 Kootznahoo Rd.)   QUANTITY REPRESENTED Source   DATE 6-13-96
LOCATION (RDWY.) Angoon, Alaska   DEPTH N/A   DATE SAMPLED 6-7-96
EXAMINED FOR L.A. Abrasion, Degradation, SP G, Nordic Abrasion   SPECIFICATION ADOT/PF   DATE RECEIVED 6-7-96

% PASSING SIEVE	AS RECEIVED		SPEC
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#8			
#10			
#16			
#20			
#30			
#40			
#50			
#80			
#100			
#200			
02MM			
005MM			
DUST RATIO			

		SPEC
OPTIMUM MOISTURE		
MAX. DRY DENSITY		
MAX DENSITY NUMBER		
CORR. MAX. DRY DENSITY		
FIELD DENSITY		
FIELD MOISTURE		
% COMPACTION		
% + 3/4"		
% + NO. 4		
AASHO T 180 D ☐ ALASKA T-12 ☐		
% FRACTURE		
DEGRADATION VALUE	28	20 Min

		SPEC
% + 10"		
% + 3"		
% GRAVEL		
% SAND		
% SILT		
% CLAY		
FSV		
LL		
PL		
PI		
SOIL CLASS		

NATURAL DENSITY
NATURAL MOISTURE
WEIGHT LOOSE
WEIGHT RODDED

MISCELLANEOUS
Nordic Abrasion Value:
(Ball Mill) = 30.3

STATIC IMMERSION
BRAND ___ 0% ___ 1/2% ___
1% ___ 1-1/2% ___ 2% ___

DELETERIOUS MATERIALS:		COURSE	SPEC.	FINE	SPEC
MINUS #200 MESH					
SOFT FRAGMENTS					
COAL & LIG. OR LT. WT. PART					
CLAY LUMPS					
STICKS & ROOTS					
FRIABLE PARTICLES					
SPECIFIC GRAVITY	Apparent	2.732			
ABSORPTION		0.6%			
FINENESS MODULUS					
SULFATE SOUNDNESS					
FREEZE-THAW RATIO					

L.A. ABRASION LOSS 29   GRADE B   50 Max
THIN-ELONGATED
ORGANIC COLOR ________ THAN 500 PPM

MORTAR COMPRESSION STRENGTH:

	STANDARD	SAMPLE	RATIO	SPEC
___ DAY, PSI				
___ DAY, PSI				

DRY DENSITY - POUNDS / CUBIC FOOT
MOISTURE - PERCENT

FOR ROAD MATERIALS LABORATORY USE ONLY
WHEN PROCESSED TO CONFORM TO GRADING REQUIREMENTS, THIS MATERIAL IS SATISFACTORY FOR

DESCRIPTION OF MATERIALS:
REMARKS: Sent to Anchorage for Sodium Sulfate Soundness as Information Only.

CONFORM TO SPECIFICATIONS:
YES ☐ NO ☐ N.A. ☐

CHECKED BY: Pat Haynan FOR
NAME & TITLE: David M. Sterley/Regional Materials Coord.

SIGNATURE: Barry Bergdoll
NAME & TITLE: Barry L. Bergdoll, P.E./Construction Chief

25-229K
1-95

STATE OF ALASKA
Department of Transportation & Public Facilities
Central Region Materials

5750 EAST TUDOR RD. ANCHORAGE AK 99507
Phone (907)-269-6200 FAX (907) 269-6201

FILE ✓ SEC

Laboratory Report

QUALITY

PROJECT NAME: Angoon City St. Paving   PROJECT NO. BIA-020(1)

LABORATORY NO. 96A-1233
FIELD NO.: 96C-199

SAMPLE OF: Quarry Rock   ITEM/SPECIFICATION NO.:
SAMPLED FROM: Source, Sta. 111
SOURCE/SUPPLIER: Sealaska Corp. Pit   QUANTITY REPRESENTED: Source
LOCATION/ADDRESS: Kootznahoo Rd.   SUBMITTED BY: Brent
EXAMINED FOR: Sulfate Soundness

DATE SAMPLED: 06/07/96
DATE RECEIVED: 06/14/96
DATE COMPLETED: 06/27/96
DATE REPORTED: 06/28/96

Sieve Analysis

SIEVE	Lab	Specs.
4"		
3"		
2"		
1 1/2"		
1"		
3/4"		
1/2"		
3/8"		
1/4"		
#4		
#8		
#10		
#16		
#30		
#40		
#50		
#80		
#100		
#200		
.02mm		
.002mm		

Fineness Modulus

% Fracture
Single Face
Double Face

	Lab	Specs
LL		
PL		
PI		
Dry Unt. Wt.,pcf		

	Coarse	Specs	Fine	Specs
Specific Gravity,Bulk				
Specific Gravity,SSD				
Specific Gravity,App.				
% Absorption				
Lightweight Part., %				
Friable Particles, %				
AASHTO T 104 Sulfate Sound, % Loss	1			
L.A. Abrasion, % Loss				
% Loss @ 100 revs				
Degradation				
Sticks & Roots, %				
Thin Elongated, %				
Sand Equivalent				

MORTAR MAKING PROPERTIES OF SAND
Organic Impurities [ ]Less [ ]More than 500 PPM
Compressive Strength, psi (if More than....)

	Control	Sample	Ratio	Spec.
7 Day				
28 Day				

Remarks:

When Processed to conform to grading requirements, this material is satisfactory for:

The Material as Submitted Conforms to Specifications
Yes[ ] No[ ] NA[X]

THE TEST RESULTS ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED.

Signature
Robert F. Lewis, P.E.
CONSTRUCTION MATERIALS ENGINEER

25-229
R-6/91

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

LAB REPORT

THE RESULTS OF THIS TESTING ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

PRECONSTRUCTION ☐ CONSTRUCTION ☒
ACCEPTANCE ☐ QUALITY ☒
ASSURANCE ☐ INFORMATION ☐
FINAL RECORD ☐

TEST OF: Quarry Rock ITEM NO.: All Items
PROJECT NO: BIA-020(1) PROJECT NAME: ANG Angoon City Streets Paving
LABORATORY NO.: 96C-360
SAMPLED FROM: Source SUBMITTED BY: S. Mielke FIELD NO: N/A
SOURCE: Kootznahoo Quarry @ .75 Mile BIA Road QUANTITY REPRESENTED: Source DATE: 9-25-96
LOCATION (RDWY): Angoon, Alaska DEPTH: N/A DATE SAMPLED: 9-22-96
EXAMINED FOR: L.A. Abrasion, Degradation, SP G, Nordic Abrasion SPECIFICATION: ADOT/PF DATE RECEIVED: 9-23-96

% PASSING SIEVE	AS RECEIVED		SPEC
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#8			
#10			
#16			
#20			
#30			
#40			
#50			
#80			
#100			
#200			
.02MM			
.005MM			
DUST RATIO			

		SPEC
OPTIMUM MOISTURE		
MAX. DRY DENSITY		
MAX DENSITY NUMBER		
CORR. MAX. DRY DENSITY		
FIELD DENSITY		
FIELD MOISTURE		
% COMPACTION		
% + 3/4"		
% + NO. 4		
AASHO T 180 D ☐ ALASKA T-12 ☐		
% FRACTURE		
DEGRADATION VALUE	31	20 Min
NATURAL DENSITY		
NATURAL MOISTURE		
WEIGHT LOOSE		
WEIGHT RODDED		

		SPEC.
% + 10"		
% + 3"		
% GRAVEL		
% SAND		
% SILT		
% CLAY		
FSV		
LL		
PL		
PI		
SOIL CLASS		

MISCELLANEOUS
Nordic Abrasion Value:
(Ball Mill) = 22.8

STATIC IMMERSION
BRAND ___ 0% ___ 1/2% ___
1% ___ 1-1/2% ___ 2% ___

DELETERIOUS MATERIALS:

		COURSE	SPEC.	FINE	SPEC.
MINUS #200 MESH					
SOFT FRAGMENTS					
COAL & LIG. OR LT. WT. PART					
CLAY LUMPS					
STICKS & ROOTS					
FRIABLE PARTICLES					
SPECIFIC GRAVITY	Apparent	2.740			
ABSORPTION		0.6%			
FINENESS MODULUS					
SULFATE SOUNDNESS					
FREEZE-THAW RATIO					

L.A. ABRASION LOSS: 20 % GRADE: B 50 Max
THIN-ELONGATED
ORGANIC COLOR ___ THAN 500 PPM

MORTAR COMPRESSION STRENGTH:

	STANDARD	SAMPLE	RATIO	SPEC.
___ DAY, PSI				
___ DAY, PSI				

DRY DENSITY - POUNDS / CUBIC FOOT
MOISTURE - PERCENT

FOR ROAD MATERIALS LABORATORY USE ONLY
WHEN PROCESSED TO CONFORM TO GRADING REQUIREMENTS, THIS MATERIAL IS SATISFACTORY FOR

DESCRIPTION OF MATERIALS.
REMARKS.

CONFORM TO SPECIFICATIONS: YES ☒ NO ☐ N.A. ☐

CHECKED BY: David M. Sterley
NAME & TITLE: David M. Sterley/Regional Materials Coord.

SIGNATURE: Barry Bergdoll
NAME & TITLE: Barry L. Bergdoll, P.E./Construction Chief

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

MODIFIED PROCTOR DENSITY

LAB OR FIELD NO. SB-P-1
Pre Construction ___ Construction X
Acceptance X
Assurance ___
Information ___

ITEM NO. 304(1) Subbase "C"

PROJECT NO. 71526 & 71963 PROJECT NAME ANGOON PAVING DATE 06/25/96

STATION 125+34, Kootznahoo Rd. REF. TO C/L 5' Rt. TYPE OF MATERIAL SUBBASE GRADING "C"

ELEVATION (LIFT) Pipe Trench (Bedding Material) SOURCE Sealaska Pit, Sta: 111+00 Kootznahoo Rd. Angoon

TEST BY STEVE MIELKE - MLT. MOLD VOLUME = 1:13.33 = .075 F^3 PROCTOR NO. 1

COMPACTION TEST NO.	1	2	3	4	5	
WEIGHT WET SAMPLE + MOLD	25.18	25.36	25.82	25.74	25.22	
WEIGHT OF MOLD	14.42	14.42	14.42	14.42	14.42	
WEIGHT OF WET SAMPLE	10.76	10.94	11.40	11.32	10.80	
MOISTURE	2%	4%	6%	5%	3%	
WEIGHT OF WET SAMPLE	1030.8	1240.1	1111.6	1240.8	1214.2	
WEIGHT OF DRY SAMPLE	1009.5	1192.5	1050.8	1181.9	1175.7	
WEIGHT OF MOISTURE	21.3	47.6	60.8	58.9	38.5	
% OF MOISTURE	2.1	4.0	*5.8	* *5.0	3.3	
WET UNIT WEIGHT # F^3	143.4	145.8	152.0	150.9	144.0	
DRY UNIT WEIGHT # F^3	140.5	140.2	143.7	143.7	139.4	

*HEAVY BLEED, **Slight Bleed

SIEVE ANALYSIS OF -3/4 PORTION	
SIEVE	% PASSING
3/4"	100
3/8"	71
#4	48
#10	32
#40	19
#200	10.9

$\% \text{ Of Moisture} = \frac{\text{WEIGHT OF MOISTURE}}{\text{WEIGHT OF DRY SAMPLE}} \times 100$

WET WEIGHT = WEIGHT OF WET SAMPLE X 13.33 or ÷ .075

$\text{DRY UNIT WEIGHT} = \frac{\text{WET UNIT WEIGHT}}{1 + \frac{\% \text{ MOISTURE}}{100}}$

TEST METHOD T-180-D

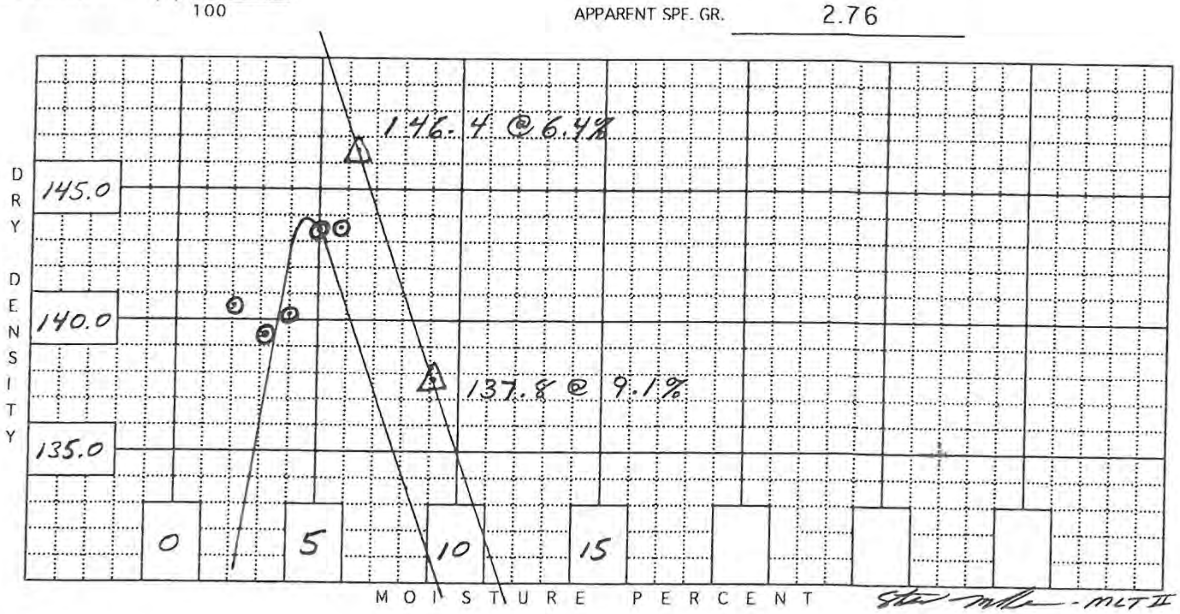
MAXIMUM DENSITY 144.0

OPTIMUM MOISTURE 4.5%

APPARENT SPE. GR. 2.76

1 GRAM = .0022 LB.

1 LB. = 453.6 GRAMS



Steve Mielke - MLT II

$\text{Density @ Zero Air Void Curve} = \frac{(62)\ (\text{Sp. Gr.})}{1 + \frac{(\%\ \text{Moist})\ (\text{Sp. Gr.})}{100}}$

Signature: ___

Name & Title: Larry Geise, Project Engineer

PHH 8-8-97

FILE ✓ PE ___ INSP ___ SE. ___

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

MODIFIED PROCTOR DENSITY

LAB OR FIELD NO. SB-P-2

Pre Construction ___ Construction X

Acceptance X

Assurance ___

Information ___

ITEM NO. 304(1) Subbase "C"

PROJECT NO. 71526 & 71963 PROJECT NAME ANGOON PAVING DATE 07/19/96

STATION 50+50, Kootznahoo Rd. REF. TO C/L 4' Lt. TYPE OF MATERIAL SUBBASE GRADING "C"

ELEVATION (LIFT) 0" to -4" subgrade SOURCE Sealaska Pit, Sta: 111+00 Kootznahoo Rd. Angoon

TEST BY STEVE MIELKE - MLT. MOLD VOLUME = 1:13.33 = .075 F^3 PROCTOR NO. 2

COMPACTION TEST NO.	1	2	3	4		
WEIGHT WET SAMPLE + MOLD	25.18	25.70	25.90	24.98		
WEIGHT OF MOLD	14.42	14.42	14.42	14.42		
WEIGHT OF WET SAMPLE	10.76	11.28	11.48	10.56		
MOISTURE	3%	5%	5.5%	2%		
WEIGHT OF WET SAMPLE	1499.8	1673.1	1500.0	1526.1		
WEIGHT OF DRY SAMPLE	1457.5	1599.8	1428.1	1494.7		
WEIGHT OF MOISTURE	42.3	73.3	71.9	31.4		
% OF MOISTURE	2.9	4.6	*5.0	2.1		
WET UNIT WEIGHT # F^3	143.4	150.4	153.0	140.8		
DRY UNIT WEIGHT # F^3	139.4	143.8	145.7	137.9		

*HEAVY BLEED

SIEVE ANALYSIS OF -3/4 PORTION

SIEVE	% PASSING
3/4"	100
3/8"	69
#4	45
#10	28
#40	15
#200	7.9

% Of Moisture = $\frac{\text{WEIGHT OF MOISTURE}}{\text{WEIGHT OF DRY SAMPLE}}$ X 100

WET WEIGHT = WEIGHT OF WET SAMPLE X 13.33 or ÷ .075

DRY UNIT WEIGHT = $\frac{\text{WET UNIT WEIGHT}}{1 + \frac{\text{\% MOISTURE}}{100}}$

TEST METHOD T-180-D

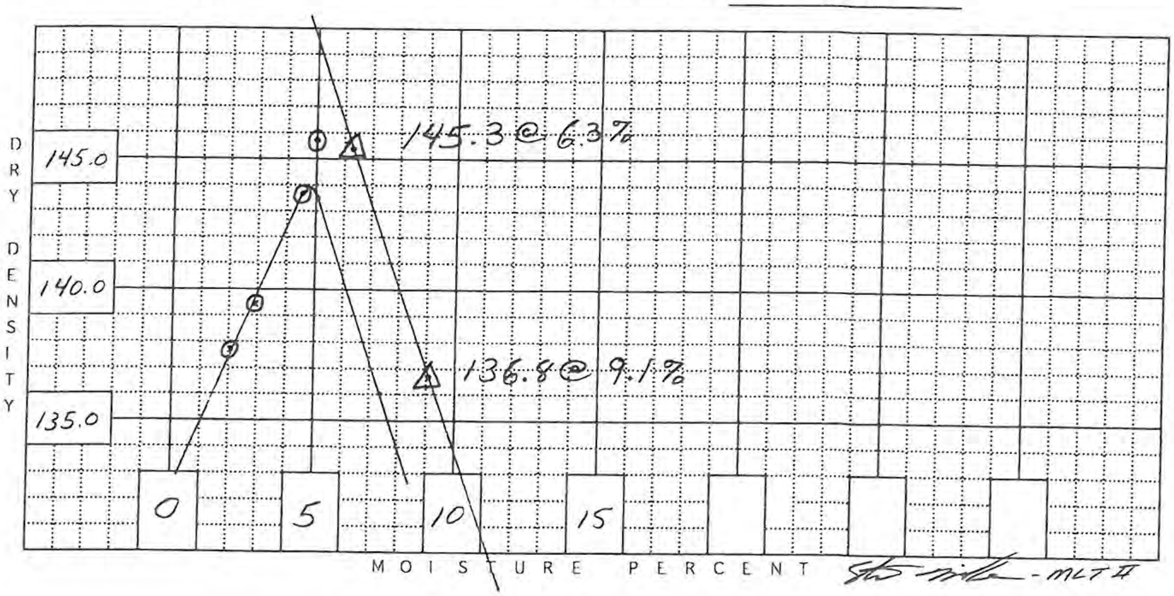
MAXIMUM DENSITY 144.0

OPTIMUM MOISTURE 4.8%

APPARENT SPE. GR. 2.74

1 GRAM = .0022 LB.

1 LB. = 453.6 GRAMS



Steve Mielke - MLT II

Density @ Zero Air Void Curve = $\frac{(62)\ (\text{Sp. Gr.})}{1 + \frac{(\text{\% Moist})\ (\text{Sp. Gr.})}{100}}$

Signature: ___

Name & Title: Larry Geise, Project Engineer

PHH 8-8-97

/ 9/

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 07/21/96 TO 07/27/96

INFORMATION ___ FIELD CONTROL ___ PROGRESS RECORD ___
CONSTRUCTION X CHECK ___ FINAL RECORD ___ ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - DENSITIES						
SAMPLE NO.	SB-D-1						
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Sta: 139+85 6' Lt C/L						
QUANTITY REPRESENTED	1/5,000 ton						
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit						
DATE SAMPLED							
DATE TESTED	07-24-96						
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"	Assurance						
% PASSING 2"	Test Also						
% PASSING 1-1/2"	Done Here						
% PASSING 1"							
% PASSING 3/4"							
% PASSING 1/2"							
% PASSING 3/8"							
% PASSING #4							
% PASSING #8							
% PASSING #10							
% PASSING #16							
% PASSING #20							
% PASSING #30							
% PASSING #40							
% PASSING #50							
% PASSING #80							
% PASSING #100							
% PASSING #200							
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY	144.0						
IDENTIFICATION NO. STD.	SB-P-2						
OPTIMUM MOISTURE	4.8%						
FIELD DENSITY (DRY)	137.1						
MOISTURE (FIELD)	2.4%						
% OF +3/4"	< 5%						
SPECIFIC GRAVITY OF +3/4"	2.74						
CORRECTED LAB. DENSITY	N/A						
% COMPACTION	95%						95% min.
% FRACTURE							
F.M.							
DELETERIOUS							

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise
MATERIALS INSPECTOR Steve Mielke SM

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PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 09/08/96 TO 009/14/96

INFORMATION ____ CONSTRUCTION X
FIELD CONTROL ____ CHECK ____
PROGRESS RECORD ____ FINAL RECORD ____
ACCEPTANCE X

ITEM NO & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C" - DENSITIES						
SAMPLE NO.	SB-D-2	SB-D-3	SB-D-4	SB-D-5	SB-D-6	SB-D-7	
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Sta: 139+85 6' Lt C/L	Sta: 116+00 On C/L	Sta: 92+50 6' Rt. C/L	Sta: 68+00 5' Lt. C/L	Sta: 41+00 On C/L	A-Line Sta: 4+00 On C/L	
QUANTITY REPRESENTED	1/5,000 ton	1/5,000 ton	1/5,000 ton	1/5,000 ton	1/5,000 ton	1/5,000 ton	
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit	
DATE SAMPLED							
DATE TESTED	09/12/96	09/12/96	09/12/96	09/12/96	09/12/96	09/12/96	
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"							
% PASSING 3/4"							
% PASSING 1/2"							
% PASSING 3/8"							
% PASSING #4							
% PASSING #8							
% PASSING #10							
% PASSING #16							
% PASSING #20							
% PASSING #30							
% PASSING #40							
% PASSING #50							
% PASSING #80							
% PASSING #100							
% PASSING #200							
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY	144.0	144.0	144.0	144.0	144.0	144.0	
IDENTIFICATION NO. STD.	SB-P-2	SB-P-2	SB-P-2	SB-P-2	SB-P-2	SB-P-2	
OPTIMUM MOISTURE	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	
FIELD DENSITY (DRY)	141.2	141.1	140.0	141.4	139.6	140.8	
MOISTURE (FIELD)	3.4%	3.2%	3.2%	3.5%	4.0%	4.4%	
% OF +3/4"	< 5%	< 5%	< 5%	< 5%	< 5%	< 5%	
SPECIFIC GRAVITY OF +3/4"	2.74	2.74	2.74	2.74	2.74	2.74	
CORRECTED LAB. DENSITY	N/A						
% COMPACTION	98%	98%	97%	98%	97%	98%	95% min.
% FRACTURE							
F.M.							
DELETERIOUS							

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise
MATERIALS INSPECTOR Steve Mielke SM

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PHH 6-2-98

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 07/21/96 TO 07/27/96

INFORMATION ____ CONSTRUCTION X
FIELD CONTROL ____ CHECK ____
PROGRESS RECORD ____ FINAL RECORD ____
ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - DENSITIES						
SAMPLE NO.	SB-D-8	SB-D-9	SB-D-10	SB-D-11	SB-D-12		
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	K-Line Sta: 7+00 6, Rt. C/L	C-Line Sta:11+00 2, Lt. C/L	D-Line Sta:7+50 On C/L	F-Line Sta:4.25 4, Rt. C/L	I-Line Sta:4+50 3, Lt. C/L		
QUANTITY REPRESENTED	1/5,000 ton	1/5,000 ton	1/5,000 ton	1/5,000 ton	1/5,000 ton		
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit		
DATE SAMPLED							
DATE TESTED	09/17/96	09/17/96	09/17/96	09/17/96	09/17/96		
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"							
% PASSING 3/4"							
% PASSING 1/2"							
% PASSING 3/8"							
% PASSING #4							
% PASSING #8							
% PASSING #10							
% PASSING #16							
% PASSING #20							
% PASSING #30							
% PASSING #40							
% PASSING #50							
% PASSING #80							
% PASSING #100							
% PASSING #200							
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY	144.0	144.0	144.0	144.0	144.0		
IDENTIFICATION NO. STD.	SB-P-2	SB-P-2	SB-P-2	SB-P-2	SB-P-2		
OPTIMUM MOISTURE	4.8%	4.8%	4.8%	4.8%	4.8%		
FIELD DENSITY (DRY)	138.2	142.9	141.7	139.4	142.2		
MOISTURE (FIELD)	4.8%	5.1%	4.0%	3.6%	4.2%		
% OF +3/4"	< 5%	< 5%	< 5%	< 5%	< 5%		
SPECIFIC GRAVITY OF +3/4"	2.74	2.74	2.74	2.74	2.74		
CORRECTED LAB. DENSITY	N/A						
% COMPACTION	96%	99%	98%	97%	99%		95% min.
% FRACTURE							
F M							
DELETERIOUS							

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise
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MATERIALS INSPECTOR Steve Mielke SM

PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 06/23/96 TO 06/29/96

INFORMATION		CONSTRUCTION	X
FIELD CONTROL		CHECK	
PROGRESS RECORD		FINAL RECORD	
		ACCEPTANCE	X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C" - GRADATIONS						
SAMPLE NO.	SB-G-1	SB-G-1A	SB-G-1B	SB-G-1C	SB-G-2		
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Sta: 96+00 ON C/L	Sta: 86+00 6' Lt.	Sta: 96+00 ON C/L	STA: 135+75 ON C/L	STA: 144+00 5' Rt.		
QUANTITY REPRESENTED	rep. first days haul - 1,256 tons placed			5,000 ton	5,000 ton		
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit		
DATE SAMPLED	06-28-95	06-28-96	06-28-96	06-29-96	06-29-96		
DATE TESTED	06-28-96	06-28-96	06-28-96	06-29-96	06-29-96		
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100	100	100	100	100		
% PASSING 3/4"	98	98	99	100	100		100
% PASSING 1/2"	72	72	85	81	80		
% PASSING 3/8"	57	58	74	69	67		
% PASSING #4	34	33	50	44	42		35-65
% PASSING #8	23	22	35	28	28		
% PASSING #10	21	20	32	26	25		
% PASSING #16							
% PASSING #20	14	14	22	17	17		
% PASSING #30							
% PASSING #40	12	11	17	14	13		
% PASSING #50	10	10	15	12	12		
% PASSING #80							
% PASSING #100	8	8	12	10	9		
% PASSING #200	6.6	6.6	9.5	7.9	7.1		2-8
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	1.2%	1.3%	---	1.5%	1.5%		
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100	100	100	100	100		
F.M.							
DELETERIOUS	FREE	FREE	FREE	FREE	FREE		FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

Final adjustments were made to crusher after first day of subbase haul.

PROJECT ENGINEER Larry Geise   MATERIALS INSPECTOR Steve Mielke SM

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PHH 6-2-97

/ N

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 07/14/96 TO 07/20/96

INFORMATION ____ CONSTRUCTION X
FIELD CONTROL ____ CHECK ____
PROGRESS RECORD ____ FINAL RECORD ____
ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C" - GRADATIONS						
SAMPLE NO.	SB-G-3	SB-G-4	SB-G-5	SB-G-6			
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Sta: 108+00 ON C/L	Sta: 117+25 6' Rt.	Sta: 50+50 4' Lt & Rt C/L	STA: 39+00 2' Lt. C/L			
QUANTITY REPRESENTED	5,000 ton	5,000 ton	5,000 ton	5,000 ton			
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit	Sealaska Pit	Sealaska Pit	Sealaska Pit			
DATE SAMPLED	07-15-96	07-16-96	07-18-96	07-19-96			
DATE TESTED	07-15-96	07-16-96	07-19-96	07-19-96			
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100	100	100	100			100
% PASSING 3/4"	98	96	98	99			
% PASSING 1/2"	81	77	81	81			
% PASSING 3/8"	68	65	68	69			
% PASSING #4	43	42	43	45			35-65
% PASSING #8	29	29	29	31			
% PASSING #10	27	27	27	28			
% PASSING #16							
% PASSING #20	18	19	18	19			
% PASSING #30							
% PASSING #40	14	15	14	15			
% PASSING #50	13	14	13	14			
% PASSING #80							
% PASSING #100	11	11	10	11			
% PASSING #200	7.9	8.4	7.5	8.2			2-8
LIQUID LIMIT	21						25 max.
PLASTICITY INDEX	NP						6 max.
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	2.1%	1.5%	----	1.9%			
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100	100	100	100			
F M							
DELETERIOUS	FREE	FREE	FREE	FREE			FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise MATERIALS INSPECTOR Steve Mielke SM

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PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 07/21/96 TO 07/27/96

INFORMATION ____ FIELD CONTROL ____ PROGRESS RECORD ____
CONSTRUCTION X CHECK ____ FINAL RECORD ____ ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - GRADATIONS						
SAMPLE NO.	SB-G-7						
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	J-Line Sta: 1+50 4' Lt. C/L						
QUANTITY REPRESENTED	5,000 ton						
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit						
DATE SAMPLED	07-24-96						
DATE TESTED	07-24-96						
SIEVE ANALYSIS							SPECS
% PASSING 4"	Assurance Test Also Done Here.						
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100						100
% PASSING 3/4"	98						
% PASSING 1/2"	73						
% PASSING 3/8"	59						
% PASSING #4	36						35-65
% PASSING #8	25						
% PASSING #10	22						
% PASSING #16							
% PASSING #20	15						
% PASSING #30							
% PASSING #40	12						
% PASSING #50	11						
% PASSING #80							
% PASSING #100	9						
% PASSING #200	6.6						2-8
LIQUID LIMIT	20						25 max.
PLASTICITY INDEX	NP						6 max.
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	1.2%						
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100						
F.M.							
DELETERIOUS	FREE						FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise MATERIALS INSPECTOR Steve Mielke SM

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PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 07/28/96 TO 08/03/96

INFORMATION ____ CONSTRUCTION X
FIELD CONTROL ____ CHECK ____
PROGRESS RECORD ____ FINAL RECORD ____
ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - GRADATIONS						
SAMPLE NO.	SB-G-8						
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	K-Line Sta: 8+00 4' Rt. C/L						
QUANTITY REPRESENTED	5,000 ton						
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit						
DATE SAMPLED	07/31/96						
DATE TESTED	08/01/96						
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100						100
% PASSING 3/4"	99						
% PASSING 1/2"	82						
% PASSING 3/8"	73						
% PASSING #4	49						35-65
% PASSING #8	34						
% PASSING #10	31						
% PASSING #16							
% PASSING #20	21						
% PASSING #30							
% PASSING #40	17						
% PASSING #50	15						
% PASSING #80							
% PASSING #100	12						
% PASSING #200	8.4						2-8
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	1.0%						
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100						
F.M.							
DELETERIOUS	FREE						FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise
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MATERIALS INSPECTOR Steve Mielke SM

PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 09/22/96 TO 09/28/96

INFORMATION ___ FIELD CONTROL ___ PROGRESS RECORD ___
CONSTRUCTION X CHECK ___ FINAL RECORD ___ ACCEPTANCE X

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - GRADATIONS						
SAMPLE NO.	SB-G-9						
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Sta: 111+00 4' Rt. C/L						
QUANTITY REPRESENTED	5,000 ton						
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Kootznoowoo Inc Pit						
DATE SAMPLED	09/23/96						
DATE TESTED	09/24/96						
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100						100
% PASSING 3/4"	99						
% PASSING 1/2"	81						
% PASSING 3/8"	68						
% PASSING #4	44						35-65
% PASSING #8	31						
% PASSING #10							
% PASSING #16							
% PASSING #20	18						
% PASSING #30							
% PASSING #40	14						
% PASSING #50							
% PASSING #80							
% PASSING #100	10						
% PASSING #200	7.8						2-8
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	1.5%						
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100						
F.M.							
DELETERIOUS	FREE						FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

PROJECT ENGINEER Larry Geise
MATERIALS INSPECTOR Steve Mielke SM

©™ heidi 93

PHH 6-2-97

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

FILE ✓ PE ___ INSP ___

WEEKLY LABORATORY REPORT

PROJECT NO. 71526 & 71963
PROJECT NAME Angoon - Kootznahoo & Seaplane Float Roads and Angoon City Streets Paving
DATE 06/23/96 TO 06/29/96

INFORMATION X | CONSTRUCTION Pre
FIELD CONTROL ___ | CHECK ___
PROGRESS RECORD ___ | FINAL RECORD ___
ACCEPTANCE ___

ITEM NO. & DESCRIPTION	ITEM 304(1) SUBBASE, GRADING "C' - GRADATIONS						
SAMPLE NO.	I-SB-G-1	I-SB-G-2	I-SB-G-3				
SAMPLED FROM (POINT AT WHICH SAMPLE IS TAKEN)	Crusher Belt	Crusher Belt	Crusher Belt				
QUANTITY REPRESENTED	Production	Production	Production				
LOCATION OF SUPPLY (ORIGINAL SOURCE)	Sealaska Pit	Sealaska Pit	Sealaska Pit				
DATE SAMPLED	06-26-96	06-26-96	06-29-96				
DATE TESTED	06-26-96	06-27-96	06-29-96				
SIEVE ANALYSIS							SPECS
% PASSING 4"							
% PASSING 3"							
% PASSING 2-1/2"							
% PASSING 2"							
% PASSING 1-1/2"							
% PASSING 1"	100	100	100				100
% PASSING 3/4"	95	95	99				
% PASSING 1/2"	69	68	80				
% PASSING 3/8"	54	55	65				
% PASSING #4	33	33	40				35-65
% PASSING #8	22	22	26				
% PASSING #10	20	20	24				
% PASSING #16							
% PASSING #20	14	14	16				
% PASSING #30							
% PASSING #40	11	11	12				
% PASSING #50	10	10	11				
% PASSING #80							
% PASSING #100	8	8	9				
% PASSING #200	6.2	5.7	6.9				2-8
LIQUID LIMIT							
PLASTICITY INDEX							
STANDARD MAXIMUM DENSITY							
IDENTIFICATION NO. STD.							
OPTIMUM MOISTURE							
FIELD DENSITY (DRY)							
MOISTURE (FIELD)	0.7%	1.1%	---				
% OF +3/4"							
SPECIFIC GRAVITY OF +3/4"							
CORRECTED LAB. DENSITY							
% COMPACTION							
% FRACTURE	100	100	100				
F.M.							
DELETERIOUS	FREE	FREE	FREE				FREE

IF TEST RESULTS ARE OUTSIDE SPECIFICATION LIMITS, REPORT BELOW WHAT ACTION WAS TAKEN

Information samples were split with contractor to compare test results, and were found to be equal.
NOTE: Contractor personnel continually sampled production and made required adjustments to crusher to bring material into spec.
Product was crushed at 7/8 inch minus. One stockpile will be used for 603 poly pipe bedding, 304 subbase and 306 D-1 for A.T.B..

PROJECT ENGINEER Larry Geise

MATERIALS INSPECTOR Steve Mielke SM

PHH 8-8-97

25-229
R-6/91

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

LAB REPORT

THE RESULTS OF THIS TESTING ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

PRECONSTRUCTION ☐ CONSTRUCTION ☒
ACCEPTANCE ☐ QUALITY ☐
ASSURANCE ☒ INFORMATION ☐
FINAL RECORD ☐

TEST OF Subbase Grading C ITEM NO. 304(1)
PROJECT NO. STP-0003(29) PROJECT NAME AGN Angoon City Streets Paving
SAMPLED FROM Station 125+34, RT
SOURCE Sealaska Corp. Quarry @ Sta. 111+00
LOCATION (RDWY.) Angoon, Alaska
EXAMINED FOR Proctor Density Standard

SUBMITTED BY S. Mielke
QUANTITY REPRESENTED Source
DEPTH N/A
SPECIFICATION ADOT/PF

LABORATORY NO. 96C-227
FIELD NO. SB-P-1
DATE 7-2-96
DATE SAMPLED 6-21-96
DATE RECEIVED 6-24-96

% PASSING SIEVE	AS RECEIVED ASS	ACC	SPEC.
4"			
3"			
2"			
1-1/2"			
1"	100	100	100
3/4"	98	97	
1/2"	91	80	
3/8"	69	69	
#4	47	47	40-75
#8	34	34	
#10	31	31	
#16			
#20	22	23	
#30			
#40	18	18	
#50	16	17	
#80			
#100	13	14	
#200	10.2	10.6	2-8
.02MM			
.005MM			
DUST RATIO:			

	ASS	ACC	SPEC.
OPTIMUM MOISTURE	5.0%	4.5%	
MAX. DRY DENSITY	142.0	144.0	PCF
MAX.DENSITY NUMBER	96C-227	SB-P-1	
CORR. MAX. DRY DENSITY			
FIELD DENSITY			
FIELD MOISTURE			
% COMPACTION			
% + 3/4"	0	0	
% + NO. 4			
AASHO T 180 D ☒		ALASKA T-12 ☐	
% FRACTURE	100	100	50 Max
DEGRADATION VALUE			

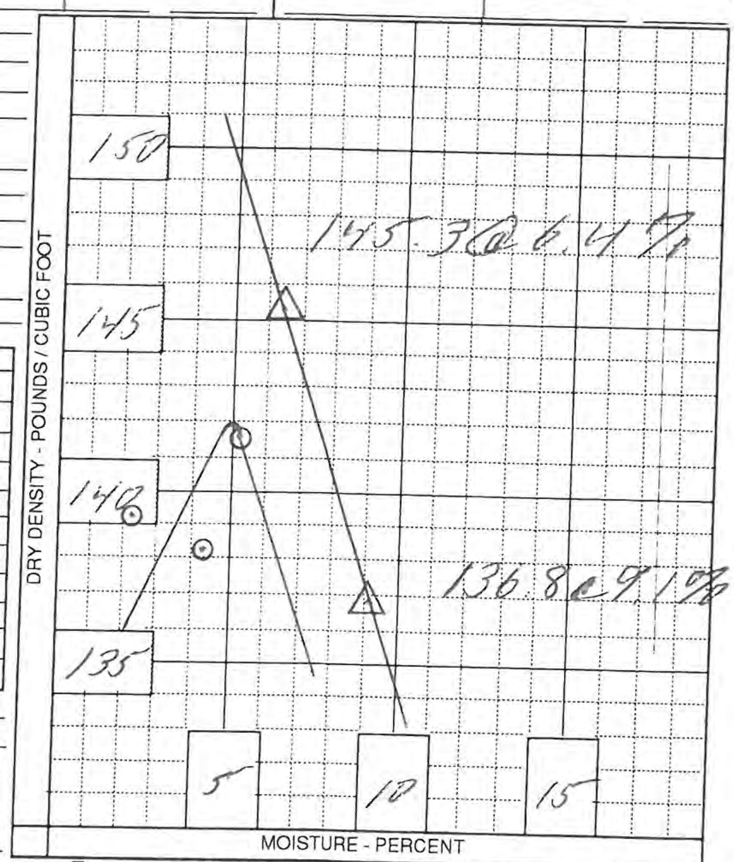
	ASS	ACC	SPEC.
% + 10"			
% + 3"			
% GRAVEL			
% SAND			
% SILT			
% CLAY			
FSV			
LL	NV	NV	25 Max
PL			
PI	NP	NP	6 Max
SOIL CLASS			

NATURAL DENSITY
NATURAL MOISTURE
WEIGHT LOOSE
WEIGHT RODDED

MISCELLANEOUS
DELETERIOUS:

ASS	ACC
FREE	FREE

STATIC IMMERSION
BRAND ___ 0% ___ 1/2% ___
1% ___ 1-1/2% ___ 2% ___



DELETERIOUS MATERIALS:

	COURSE	SPEC.	FINE	SPEC.
MINUS #200 MESH				
SOFT FRAGMENTS				
COAL & LIG OR LT. WT. PART.				
CLAY LUMPS				
STICKS & ROOTS				
FRIABLE PARTICLES				
SPECIFIC GRAVITY	2.73		2.75	
ABSORPTION				
FINENESS MODULUS				
SULFATE SOUNDNESS				
FREEZE-THAW RATIO				

L.A. ABRASION LOSS ___ GRADE ___
THIN-ELONGATED ___
ORGANIC COLOR ___ THAN 500 PPM

MORTAR COMPRESSION STRENGTH:

	STANDARD	SAMPLE	RATIO	SPEC.
___ DAY, PSI				
___ DAY, PSI				

FOR ROAD MATERIALS LABORATORY USE ONLY

WHEN PROCESSED TO CONFORM TO GRADING REQUIREMENTS, THIS MATERIAL IS SATISFACTORY FOR:

DESCRIPTION OF MATERIALS:
REMARKS: Sample Out Of Spec. Field Will Re-sample.
Mean Spg = 2.74

CHECKED BY: David M. Sterley
NAME & TITLE: David M. Sterley/Regional Materials Coord.

CONFORM TO SPECIFICATIONS:
YES ☐ NO ☐ N.A. ☒

SIGNATURE: Chuck Correa
NAME & TITLE: Barry L. Bergdoll, P.E./Construction Chief

FILE / PE ___ INSP ___ SEC 4

25-229
R-6/91

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

LAB REPORT

THE RESULTS OF THIS TESTING ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

PRECONSTRUCTION ☐ CONSTRUCTION ☒
ACCEPTANCE ☐ QUALITY ☐
ASSURANCE ☒ INFORMATION ☐
FINAL RECORD ☐

TEST OF Subbase Grading C ITEM NO. 304(1)

PROJECT NO STP-0003(29) PROJECT NAME AGN Angoon City Streets Paving

SAMPLED FROM Station 139+85, 6' LT. SUBMITTED BY P. Harmon

SOURCE Sealaska Corp. Quarry @ Sta. 111+00 QUANTITY REPRESENTED Project

LOCATION (RDWY.) Angoon, Alaska DEPTH -4" ASS / -2" ACC

EXAMINED FOR Field Density SPECIFICATION ADOT/PF

LABORATORY NO. 96C-279
FIELD NO. SB-D-1
DATE 7-30-96
DATE SAMPLED 7-24-96
DATE RECEIVED 7-26-96

% PASSING SIEVE	AS RECEIVED		SPEC
4"			
3"			
2"			
1-1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4			
#8			
#10			
#16			
#20			
#30			
#40			
#50			
#80			
#100			
#200			
02MM			
005MM			
DUST RATIO			

	ASS	ACC	SPEC
OPTIMUM MOISTURE	4.8%	4.8%	
MAX. DRY DENSITY	144.0	144.0	PCF
MAX DENSITY NUMBER	SB-P-1	SB-P-1	
CORR. MAX. DRY DENSITY	144.0	144.0	PCF
FIELD DENSITY	138.7	137.1	PCF
FIELD MOISTURE	2.4%	2.4%	
% COMPACTION	96	95 ←	95 Min
% + 3/4"	0	0	
% + NO. 4			
AASHO	T 180 D ☒	ALASKA T-12 ☐	
% FRACTURE			
DEGRADATION VALUE			

		SPEC
% + 10"		
% + 3"		
% GRAVEL		
% SAND		
% SILT		
% CLAY		
FSV		
LL		
PL		
PI		
SOIL CLASS		

NATURAL DENSITY
NATURAL MOISTURE
WEIGHT LOOSE
WEIGHT RODDED
MISCELLANEOUS

STATIC IMMERSION
BRAND ___ 0% ___ 1/2% ___
1% ___ 1-1/2% ___ 2% ___

DRY DENSITY - POUNDS / CUBIC FOOT

MOISTURE - PERCENT

DELETERIOUS MATERIALS:

		COURSE	SPEC	FINE	SPEC.
MINUS #200 MESH					
SOFT FRAGMENTS					
COAL & LIG. OR LT. WT. PART					
CLAY LUMPS					
STICKS & ROOTS					
FRIABLE PARTICLES					
SPECIFIC GRAVITY	Apparent	2.74			
ABSORPTION					
FINENESS MODULUS					
SULFATE SOUNDNESS					
FREEZE-THAW RATIO					

L.A. ABRASION LOSS ___ GRADE ___
THIN-ELONGATED ___
ORGANIC COLOR ___ THAN 500 PPM

MORTAR COMPRESSION STRENGTH:

	STANDARD	SAMPLE	RATIO	SPEC
___ DAY, PSI				
___ DAY, PSI				

FOR ROAD MATERIALS LABORATORY USE ONLY

WHEN PROCESSED TO CONFORM TO GRADING REQUIREMENTS, THIS MATERIAL IS SATISFACTORY FOR

ESCRIPTION OF MATERIALS:
REMARKS:

CHECKED BY: David M. Sterley
NAME & TITLE: David M. Sterley/Regional Materials Coord.

CONFORM TO SPECIFICATIONS:
YES ☐ NO ☐ N.A. ☒

SIGNATURE Barry Bergdoll
NAME & TITLE Barry L. Bergdoll, P.E./Construction Chief

FILE ✓ PE ___ INSP ___ SEC C4R

25-229
R-6/91

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

LAB REPORT

THE RESULTS OF THIS TESTING ARE ONLY REPRESENTATIVE OF THE MATERIAL AS SUBMITTED

PRECONSTRUCTION ☐ CONSTRUCTION ☒
ACCEPTANCE ☐ QUALITY ☐
ASSURANCE ☒ INFORMATION ☐
FINAL RECORD ☐

TEST OF: Subbase Grading C   ITEM NO. 304(1)
PROJECT NO: STP-0003(29)   PROJECT NAME: AGN Angoon City Streets Paving
SAMPLED FROM: Station "J" 1+50, 4' LT.   SUBMITTED BY: P. Harmon
SOURCE: Sealaska Corp. Quarry @ Station 111+00   QUANTITY REPRESENTED: Project
LOCATION (RDWY.): Angoon, Alaska   DEPTH: N/A
EXAMINED FOR: Gradation, Limits, Fracture, Deleterious   SPECIFICATION: ADOT/PF

LABORATORY NO: 96C-278
FIELD NO: SB-G-7
DATE: 8-2-96
DATE SAMPLED: 7-24-96
DATE RECEIVED: 7-26-96

% PASSING SIEVE	AS RECEIVED ASS	ACC	SPEC
4"			
3"			
2"			
1-1/2"			
1"	100	100	100
3/4"	99	98	
1/2"	78	73	
3/8"	62	59	
#4	38	36	35-65
#8	26	25	
#10	24	22	
#16		15	
#20	16		
#30			
#40	13	12	
#50	11	11	
#80			
#100	9	9	
#200	6.7	6.6	2-8
02MM			
005MM			
DUST RATIO			

	ASS	ACC	SPEC
OPTIMUM MOISTURE			
MAX. DRY DENSITY			
MAX DENSITY NUMBER			
CORR. MAX. DRY DENSITY			
FIELD DENSITY			
FIELD MOISTURE			
% COMPACTION			
% + 3/4"			
% + NO. 4			
AASHO T 180 D ☐ / ALASKA T-12 ☐			
% FRACTURE	100	100	50 Min
DEGRADATION VALUE			
NATURAL DENSITY			
NATURAL MOISTURE			
WEIGHT LOOSE			
WEIGHT RODDED			

MISCELLANEOUS

DELETERIOUS:

ASS	ACC
FREE	FREE

STATIC IMMERSION

BRAND ___ 0% ___ 1/2% ___
1% ___ 1-1/2% ___ 2% ___

	ASS	ACC	SPEC
% + 10"			
% + 3"			
% GRAVEL			
% SAND			
% SILT			
% CLAY			
FSV			
LL	NV	20	
PL			
PI	NP	NP	6 Max
SOIL CLASS			

DELETERIOUS MATERIALS:

	COURSE	SPEC.	FINE	SPEC
MINUS #200 MESH				
SOFT FRAGMENTS				
COAL & LIG. OR LT. WT. PART.				
CLAY LUMPS				
STICKS & ROOTS				
FRIABLE PARTICLES				
SPECIFIC GRAVITY				
ABSORPTION				
FINENESS MODULUS				
SULFATE SOUNDNESS				
FREEZE-THAW RATIO				

L.A. ABRASION LOSS ______ GRADE ______
THIN-ELONGATED ______
ORGANIC COLOR ______ THAN 500 PPM

MORTAR COMPRESSION STRENGTH:

	STANDARD	SAMPLE	RATIO	SPEC
___ DAY, PSI				
___ DAY, PSI				

DRY DENSITY - POUNDS / CUBIC FOOT

MOISTURE - PERCENT

FOR ROAD MATERIALS LABORATORY USE ONLY

WHEN PROCESSED TO CONFORM TO GRADING REQUIREMENTS, THIS MATERIAL IS SATISFACTORY FOR

ESCRIPTION OF MATERIALS:
REMARKS:

CHECKED BY: David M. Sterley
NAME & TITLE: David M. Sterley/Regional Materials Coord.

CONFORM TO SPECIFICATIONS: YES ☐ NO ☐ N.A. ☒

SIGNATURE: Barry Bergdoll
NAME & TITLE: Barry L. Bergdoll, P.E./Construction Chief

APPENDIX D

U.S. DEPARTMENT OF TRANSPORTATION SECTION 4(F) EVALUATION

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

ANGOON AIRPORT
Environmental Impact Statement

U.S. DEPARTMENT OF TRANSPORTATION ACT SECTION 4(F) EVALUATION FOR THE ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration and
Alaska Department of Transportation and Public Facilities

Prepared by

Certus Environmental Solutions

and

SWCA Environmental Consultants

December 2015

Contents

Figures

1.0 INTRODUCTION

This document identifies U.S. Department of Transportation Act Section 4(f) resources that could be used by the proposed Angoon Airport and airport access road and any of the alternatives to that proposed action. This document also

- evaluates the anticipated use of each identified Section 4(f) property,
- discusses feasible and prudent alternatives to avoid the use of Section 4(f) properties, and
- outlines measures to minimize harm to Section 4(f) resources that cannot be avoided.

This evaluation is meant to supplement the *Angoon Airport Environmental Impact Statement* (the EIS) being prepared by the Federal Aviation Administration (FAA). The results of this evaluation are summarized in that EIS.

2.0 REGULATORY SETTING

Section 4(f) of the U.S. Department of Transportation Act of 1966 is codified at 49 USC 303, and declares that "it is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside ***and public park and recreation lands, wildlife and refuges, and historic sites***" [emphasis added].

The act was amended in 2005, and the Section 4(f) regulation was moved to 23 Code of Federal Regulations (CFR) 774 in 2008 with the issuance of the Final Rule of Section 4(f) by the Federal Highway Administration (FHWA). The FAA uses the FHWA Final Rule as guidance in applying Section 4(f) to projects under its jurisdiction. As stated in 23 CFR 774.3:

> The Administration may not approve the use, as defined in § 774.17, of Section 4(f) property unless a determination is made under paragraph (a) or (b) of this section.
>
> (a) The Administration determines that:
>
> 1. There is no feasible and prudent avoidance alternative, as defined in § 774.17, to the use of land from the property; and
> 2. The action includes all possible planning, as defined in § 774.17, to minimize harm to the property resulting from such use; or
>
> (b) The Administration determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a *de minimis* impact, as defined in § 774.17, on the property.

Subsequent to the 2005 amendment and 2008 issuance of the Final Rule, the FHWA issued a policy paper providing additional detail on the implementation of Section 4(f). The paper was updated in 2012. The FAA uses the FHWA policy paper for the purpose of general guidance in the implementation of Section 4(f) (FAA Order 1050.1E:A-19).

3.0 PROPOSED ACTION AND ALTERNATIVES

The proposed transportation project is a new land-based airport and airport access road for the community of Angoon in Southeast Alaska (Figure 1). The Alaska Department of Transportation and Public Facilities (DOT&PF) is the project sponsor (the party proposing the project). The DOT&PF would maintain and operate the airport if one is built. The FAA is the lead federal agency responsible for the preparation of the EIS, which will disclose the project's anticipated social and environmental effects. The DOT&PF is requesting both funding and approval for the proposed airport from the FAA.

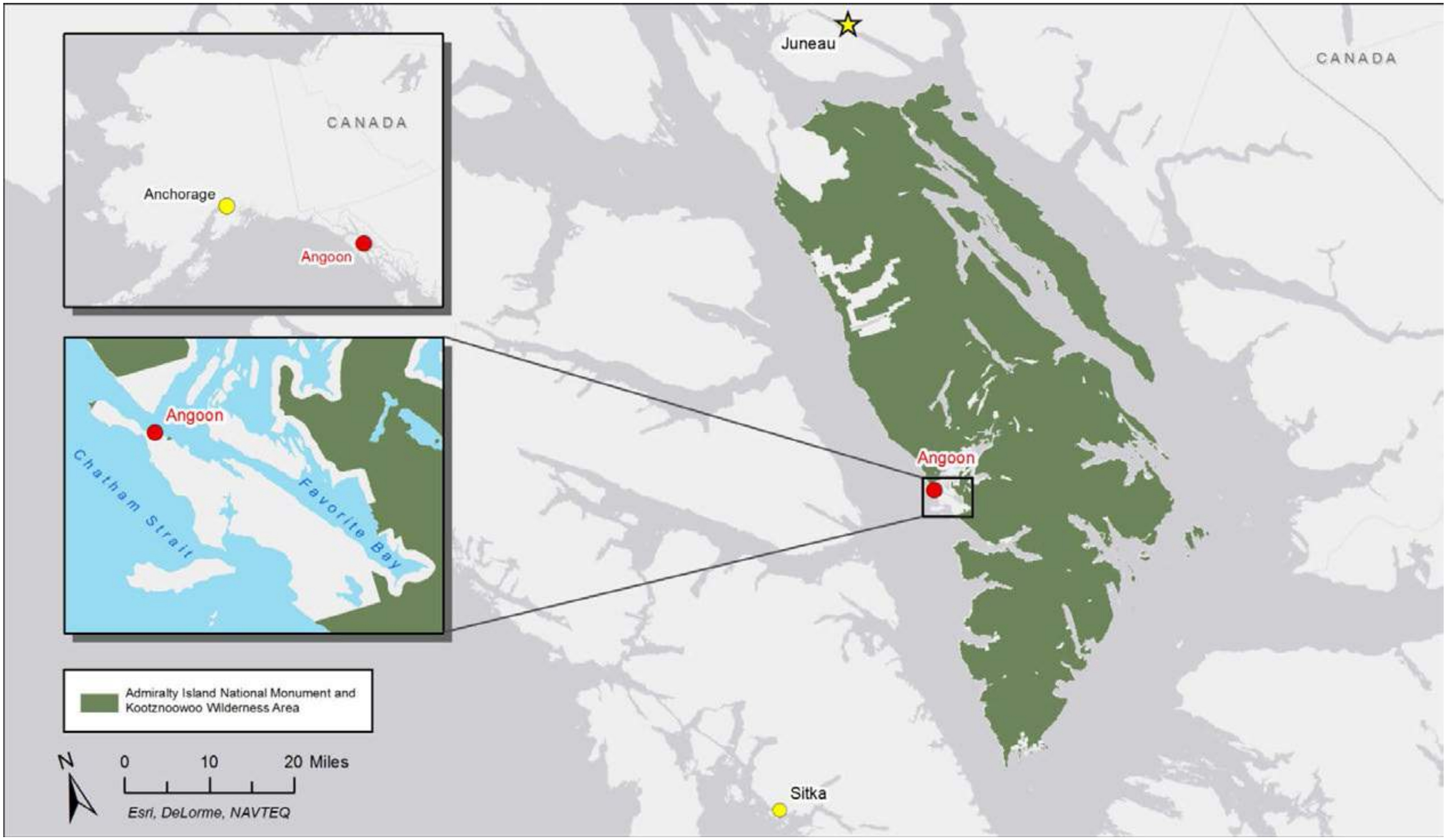


Figure 1. Location of Angoon and the Admiralty Island National Monument and Kootznoowoo Wilderness Area in Southeast Alaska.

3.1 Summary of Purpose and Need

The FAA and DOT&PF have each defined the purpose and need for a land-based airport serving Angoon. The DOT&PF has also identified several objectives for such an airport. The FAA's stated purpose and need are defined below.

> *Current transportation service to and from Angoon is solely by seaplane and ferry. These options do not provide sufficient availability and reliability in transportation to and from Angoon. A land-based airport would improve the availability and reliability of transportation services to and from Angoon.*

A land-based airport would meet Angoon's unmet transportation needs by improving aviation availability and reliability. A land-based airport would have, or would allow for, the following:

- Runway lighting, allowing a pilot to safely land at night or in low light situations.
- The development of instrument approach procedures using a fixed threshold that would allow pilots to navigate to and land at the Angoon Airport during instrument flight rules weather conditions.
- Aircraft operations that are not affected by low temperatures.

A land-based airport with runway lights, instrument approach procedures, and a fixed threshold would improve the availability of aviation service to and from Angoon, allowing flights to occur approximately 89–94% of the total hours in a given year. This more than doubles the 44% of hours per year that seaplane service is currently available.

Other potential benefits of a land-based airport could include

- a wider variety of aircraft,
- use of dedicated medical evacuation aircraft when needed,
- more seats and cargo capacity (see Chapter 3: Alternatives for a comparison of current and potential future aircraft features), and
- the potential for additional direct flights to Sitka (the location of the regional Native hospital) and other Southeast Alaska communities.

In its *2007 Angoon Airport Master Plan* (DOT&PF 2007), the DOT&PF provided similar statements of purpose and need to those defined by the FAA, and identified the following additional objectives:

- Reducing the community's isolation
- Providing improved access to Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area) for recreation, management, and scientific study
- Supporting economic development

3.2 Proposed Action

The DOT&PF has proposed to construct and operate a land-based airport near Angoon. The airport would accommodate small wheeled aircraft and include a single runway with an apron comparable to other rural airports in Southeast Alaska. A new access road for the airport would need to be constructed. The components of the proposed action are summarized below and shown below.

The proposed action is a land-based airport consisting of the following components:

- Runway: Paved; 3,300 feet long and 75 feet wide, with future expansion to 4,000 feet long*
- Runway safety areas: 150 feet wide, centered on runway centerline, extending 300 feet beyond each runway end
- Object free area: 500 feet wide, centered on runway centerline, extending 300 feet beyond each runway end
- Runway protection zone: Standard visual approach dimensions of 500 × 1,000 × 700 feet
- Single, perpendicular taxiway: Paved
- Aircraft apron: Paved
- Navigational aid: Rotating beacon
- Visual approach aid: Precision approach path indicator
- Runway lights: Pilot-controlled, medium-intensity lights
- Terminal space: Sufficient area for a future terminal or passenger shelter
- Lease lots: Five 12,500-square-foot spaces
- Electrical control building and generator: Near future terminal site
- Perimeter fence: For security and wildlife control
- Passenger parking lot: Paved, near future terminal site
- Support facilities: Future weather station, communication, wind cones, etc.
- Access road: Two, paved, 9-foot-wide lanes and 1-foot shoulders with right-of-way sized for future expansion to two 10-foot lanes and 5-foot shoulders*
- Overhead utility lines: Power and telephone lines located within the access road corridor**

*Future expansion would be subject to additional environmental review when proposed for construction.
**Utility lines would only be installed if it is determined to be cost effective.

3.3 Alternatives

Five action alternatives and the no action alternative are being analyzed in the EIS. The action alternatives are shown on Figure 3 below, and comprise the following:

- Airport 3a with Access 2 (the DOT&PF's proposed action)
- Airport 3a with Access 3
- Airport 4 with Access 2
- Airport 4 with Access 3
- Airport 12a with Access 12a (the FAA's preferred alternative)

These alternatives were identified through a multistage screening process that included public and agency scoping, detailed aviation analysis, and constructability analysis. Fourteen other airport locations in and relatively near the community of Angoon were initially considered by the DOT&PF during project planning, and later reviewed by the FAA for their ability to meet design and safety standards for the design aircraft and airports. These locations, shown on Figure 2, were eliminated from full environmental analysis because they could not meet one or more of the required design or safety standards (such as wind coverage, or safe approach and departure routes). The most common failing of these possible alternatives was a consequence of hills or mountains that would be too close to the airport and create "terrain obstructions." In some instances, terrain obstructions would prevent the airport from meeting glidepath clearance standards or preclude the ability for final approach and straight missed approach.

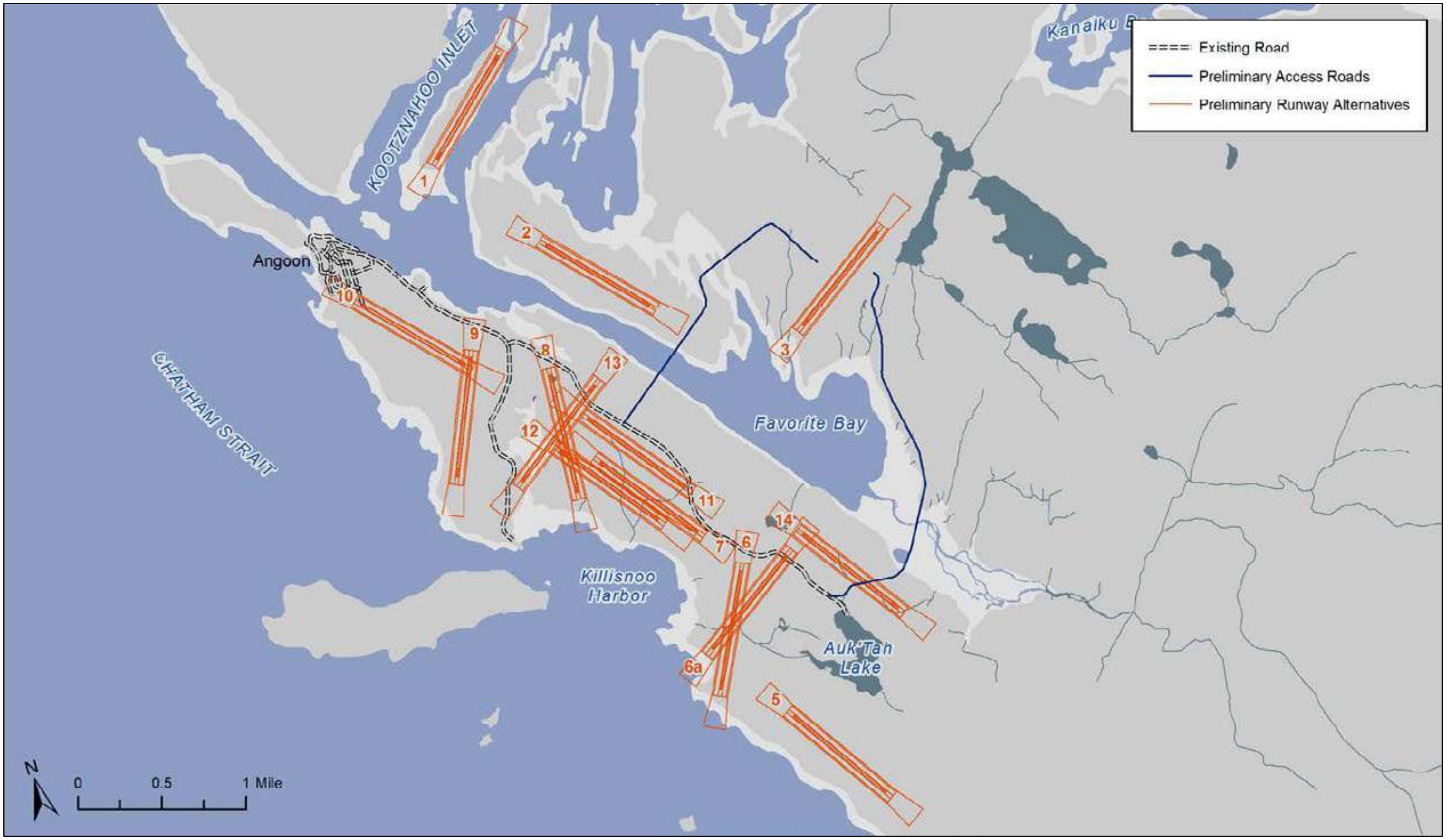


Figure 2. Initial airport and access location alternatives considered and eliminated by the FAA.

In addition to considering alternatives to a land-based airport in Angoon and to the different potential locations of such an airport, the FAA also considered alternatives to provide access to an airport. These alternatives considered everything from different modes of access to different routes for access roads. These road alternatives are shown on Figure 2. The airport alternatives carried forward for analysis in the EIS are described in the sections that follow.

3.3.1 Airport 3a with Access 2 (the DOT&PF's Proposed Action)

Airport 3a with Access 2 is the proposed action. This alternative would be located on lands owned or managed by the U.S. Forest Service; Kootznoowoo, Inc. (the local village Alaska Native corporation); and the City of Angoon. The airport would be located on the north side of Favorite Bay within the boundaries of the Monument–Wilderness Area. Access 2 would begin at the existing Bureau of Indian Affairs (BIA) Road, and travel around the southeastern end of Favorite Bay within 1,000 feet of the shoreline. This access road would be 20 feet wide, consisting of two 9-foot lanes with 1-foot shoulders. It would require the construction of a bridge across Favorite Creek (see Figure 3).

3.3.2 Airport 3a with Access 3

The location of the access road would be the only difference between this alternative and Airport 3a with Access 2 (the proposed action). The location and details for the airport would be the same as for Airport 3a with Access 2 (the proposed action) described above. As with Access 2, Access 3 would begin at the existing BIA Road, but would stay farther inland from the Favorite Bay shoreline. The bridge crossing at Favorite Creek would be located farther upstream than the bridge crossing for Access 2 (see Figure 3).

3.3.3 Airport 4 with Access 2

Airport 4 with Access 2 would be located on the east side of Favorite Bay on lands owned or managed by the U.S. Forest Service, Kootznoowoo, Inc., and the City of Angoon. The airport and parts of the access road would be located within the Monument–Wilderness area. Access 2 would begin at the existing BIA Road and travel around the eastern end of Favorite Bay within 1,000 feet of the shoreline. A bridge crossing at Favorite Creek—the same bridge location as for Airport 3a with Access 2—would be required (see Figure 3).

3.3.4 Airport 4 with Access 3

The location of the access road would be the only difference between this alternative and Airport 4 with Access 2. The location and details for the airport location would be the same as under Airport 4 with Access 2. As with Access 2, Access 3 would also begin at the existing BIA Road, but it would stay farther inland from the Favorite Bay shoreline. The bridge crossing at Favorite Creek would be located farther upstream than the bridge crossing for Access 2, and the road would then go northwest to the proposed Airport 4 location (see Figure 3).

3.3.5 Airport 12a with Access 12a (the FAA's Preferred Alternative)

Airport 12a with Access 12a would be located on lands owned or managed by private landowners, Kootznoowoo, Inc., and the City of Angoon. Both the airport and access road would be on the Angoon peninsula southeast of the community of Angoon. Access 12a would begin at the existing BIA Road and travel directly to the proposed airport location (see Figure 3). Unlike the access roads to Airport 3a or Airport 4, this road would be built as two 10-foot lanes with 5-foot shoulders.

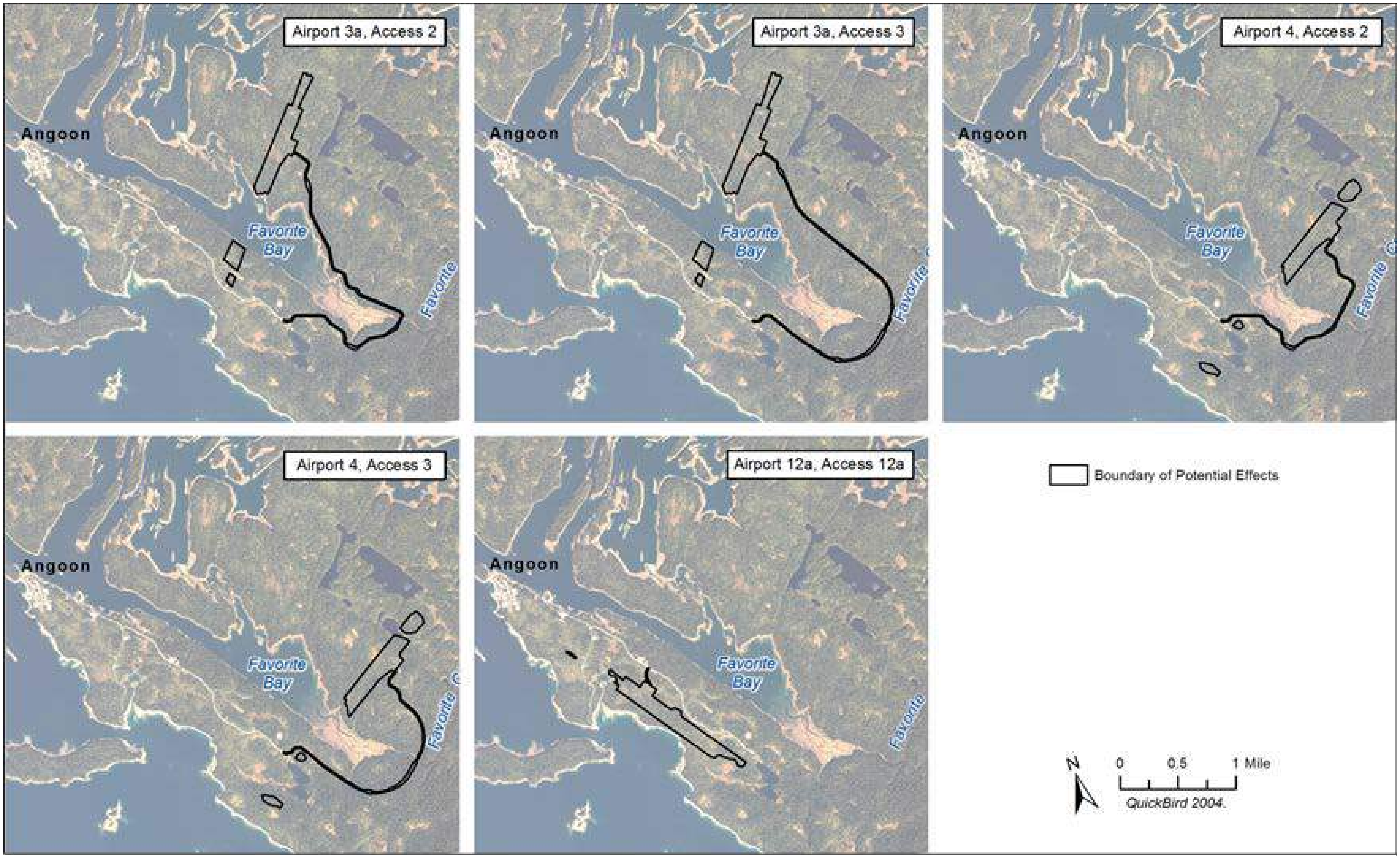


Figure 3. Locations of action alternatives analyzed in the Angoon Airport EIS.

4.0 SECTION 4(F) PROPERTIES

Section 4(f) properties are defined as

- publicly owned land of a park or recreation area of national, state, or local significance;
- publicly owned land of a wildlife refuge of national, state, or local significance; or
- land from a historic site of national, state, or local significance—defined as properties that are eligible for or listed on the National Register of Historic Places (NRHP) (per 36 CFR 800), unless the FAA determines that an exception applies (FAA Order 1050.1E:A-21).

Section 4(f) does not apply if the official(s) with jurisdiction over a public park, recreation area, or wildlife refuge determine(s) that the property, considered in its entirety, is not significant, and the FAA has reviewed and approved that determination (FAA Order 1050.1E:A-19). In the absence of a determination of significance by the officials with jurisdiction, the FAA presumes the resource is significant but conducts an independent evaluation before making a final determination of significance.

As noted above, the FAA has the discretion to determine exceptions to the applicability of Section 4(f) to historic sites. Section 4(f) does not apply to archaeological resources where the responsible FAA official, after consultation with the [State Historic Preservation Officer/Tribal Historic Preservation Officer], determines that the archaeological resource is important chiefly for data recovery, and is not important for preservation in place (FAA Order 2006a:A-21). Section 4(f) allows for the consideration of planned publicly owned wildlife refuges and recreational areas. That is, a refuge or recreational property that is not currently developed can qualify for Section 4(f) protection; however, the officials with jurisdiction over the resource must determine that the property is significant for public recreational purposes, and the FAA must review and approve that determination (FAA 2006a:A-19). There must also be sufficient information regarding the intended purposes of the property for the FAA to determine the applicability of Section 4(f).

Identification of qualifying Section 4(f) properties was carried out through consultation and coordination with officials having jurisdiction over public lands and public resources in the area of the Proposed Action and airport action alternatives. These officials represented the U.S. Forest Service, the City of Angoon, and the Alaska State Historic Preservation Office. Existing and planned landownership and uses were also examined through plats for the community of Angoon; the City of Angoon had no written Master Plan or similar city plan in force at the time this evaluation was prepared. Through this process, it was determined that no publicly owned wildlife refuges exist in the area. One historic site and one publicly owned recreational property were identified.

4.1 Historic sites

The term “historic sites” refers to resources of both the prehistoric and historic periods, including archaeological sites, buildings, structures, etc. As noted in section 4.0, the term specifically refers to resources that are eligible for or listed on the National Register, unless the FAA determines that an exception applies (FAA Order 1050.1E:A-21).

Nine sites in the areas of potential effects for the five action alternatives fit the criteria for National Register eligibility. None of the sites are located in areas that would be physically disturbed during construction or operation of the airport or access road; all of the sites are located in areas that could be affected indirectly by visual intrusion, vibration during construction, or intentional or inadvertent damage due to increased human access.

The nine sites are SIT-00014 (Killisnoo Island Village); SIT-00033 (the Favorite Bay Fish Weir); SIT-00034 (a prehistoric midden and historic garden site); SIT-00056 (St. Andrews Church); SIT-00169 (Killisnoo Harbor Village); SIT-00302 (the Favorite Bay Garden Site); SIT-00502 (a historic garden site); SIT-00749 (the Killisnoo Cemetery site); and SIT-00781 (Beaver Tail Rock). Of these, site SIT-00302 has been formally determined eligible for the National Register under Criterion D. The FAA has made determinations of eligibility for four additional sites: SIT-00014 (Killisnoo Island Village); SIT-00056 (St. Andrews Church); SIT-00169 (Killisnoo Harbor Village); and SIT-00749 (Killisnoo Cemetery). The FAA has determined that all four of the sites are eligible for the National Register under one or more criteria, and received the SHPO's concurrence on these findings.

The Favorite Bay Garden Site (SIT-00302) could be affected by one of the airport alternatives (Airport 4) and two of the access road options. SIT-00302 is a multicomponent site representing the prehistoric and historic periods, and is located on lands administered by the U.S. Forest Service. In consultation with the U.S. Forest Service and the Alaska SHPO, the FAA concluded that the site was eligible for the NRHP under Criterion D for its scientific data potential. Based on the exception criteria noted in section 4.0, the FAA determined that Section 4(f) does not apply to this site; however, the considerations of the National Historic Preservation Act and its implementing regulations at 36 CFR 800 still apply. The officials with jurisdiction over the site—the U.S. Forest Service and the Alaska SHPO—both concurred with this determination.

The FAA has determined that site SIT-00014 (Killisnoo Island Village) is eligible for the National Register under Criteria A and D for its association with important historical events and its scientific data potential. The FAA has also determined that site SIT-00749 (Killisnoo Cemetery) is eligible for the National Register under Criterion A for its association with important historical events. Based on these findings, both sites warrant preservation in place and do not qualify for the archaeological site exception provided for by Section 4(f) (see section 4.0 above for more explanation of the exception). As such, both sites are considered Section 4(f) resources.

The FAA has determined that sites SIT-00056 (St. Andrews Church) and SIT-00169 (Killisnoo Harbor Village) are eligible for the National Register under Criterion D only. As such, these sites do not warrant preservation in place, and the archaeological site exception (FAA Order 2006a:A-21) provided for in Section 4(f) applies. These sites are, therefore, are not considered Section 4(f) resources.

The FAA has made determinations of eligibility for the remaining four sites (SIT-00033, SIT-00034, SIT-00502, and SIT-00781). After evaluation of the sites, the FAA has determined that site SIT-00033 (the Favorite Bay Fish Weir) is eligible for the National Register under Criteria C and D and warrants preservation in place. The FAA has determined that site SIT-00781 (Beaver Tail Rock) is eligible for the National Register under Criterion A and also warrants preservation in place. Finally, the FAA has determined that sites SIT-00034 and SIT-00502 (a historic garden site) are eligible for the National Register under Criterion D. With these findings, the FAA has determined that Section 4(f) applies to sites SIT-00033 and SIT-00781 and that the archaeological site exception discussed above applies to sites SIT-00034 and SIT-00502.

In summary, the FAA has determined that four historic sites qualifying for Section 4(f) protection are present in the areas of potential effects for the airport alternatives being considered in the EIS. These are sites SIT-00014 (Killisnoo Island Village), SIT-00033 (Favorite Bay Fish Weir), SIT-00749 (Killisnoo Cemetery), and SIT-00781 (Beaver Tail Rock). Sites SIT-00014 and SIT-00749 are both located in the area of potential visual effects for the Airport 12a alternative. Sites SIT-00033 and SIT-00781 are located in the areas of potential indirect effects from improved access for both access road options associated with Airports 3a and 4.

4.2 Publicly owned recreational properties

Section 4(f) applies to publicly owned properties whose designated purpose or primary purpose is public recreation. As discussed previously, such properties include existing recreational properties and planned publicly owned recreational properties, as long as the official(s) with jurisdiction over the property have "formally designated and determined it to be significant for park [or] recreation area…purposes" (FHWA 2012). Proof of formal designation (such as the inclusion of the property and its intended public recreation purposes in a city master plan or similar plan) is required.

Three publicly owned properties potentially qualifying for Section 4(f) protection as recreational properties are present in areas that could be used by the airport alternatives and access road options. These properties are the Kootznoowoo Wilderness Area and two platted park properties owned by the City of Angoon (see Figure 4). The FAA evaluated each property to determine whether it meets the criteria for Section 4(f) protection.

4.2.1 Monument–Wilderness Area

National monuments and federally designated wilderness areas are not, in and of themselves, Section 4(f) resources. The applicability of Section 4(f) to such properties is determined based on the major purpose(s) of the area and its designation, and a determination by the official(s) with jurisdiction that the property is significant for such purposes. In accordance with FAA Order 1050.1E, *Policies and Procedures for Considering Environmental Impacts* (FAA 2006a), Appendix A, Section 6.2b, the FAA considers a national wilderness area providing purposes similar to a park, refuge, or historic site to be subject to Section 4(f), unless the agency with jurisdiction specifically determines the area is not being used for Section 4(f) purposes.

The Admiralty Island National Monument was established in 1978 and contains nearly 1 million acres—almost the entirety of Admiralty Island. The Kootznoowoo Wilderness Area was established in 1980 with the passage of the Alaska National Interest Lands Conservation Act (ANILCA). The national monument and the wilderness area—referred to hereafter as the Monument–Wilderness Area— are co-located (meaning that they overlap on the same lands) except for an area of approximately 18,000 acres where the monument designation applies and the wilderness area designation does not. The land within the Monument–Wilderness Area is part of the publicly owned Tongass National Forest. The U.S. Forest Service administers the Monument–Wilderness Area for "unrivaled opportunities for solitude and primitive recreation" (USFS 2012).

As part of determining the applicability of Section 4(f) to the Monument–Wilderness Area, the FAA consulted with the officials who have jurisdiction over the property—the U.S. Forest Service. In March 2014, the U.S. Forest Service provided written confirmation to the FAA that the Monument–Wilderness Area is a significant recreational property (USFS 2014). The Monument–Wilderness Area is therefore considered a Department of Transportation Section 4(f) Resource. The key functions and values of the Monument–Wilderness Area are defined by the Wilderness Act of 1964 and the legislation enacting the special designations. Specifically, the key functions and values are defined by four wilderness qualities (natural quality, undeveloped quality, untrammeled quality, and opportunities for solitude and primitive recreation) and by six public uses or values (recreational, scenic, scientific, educational, conservation, and historical).

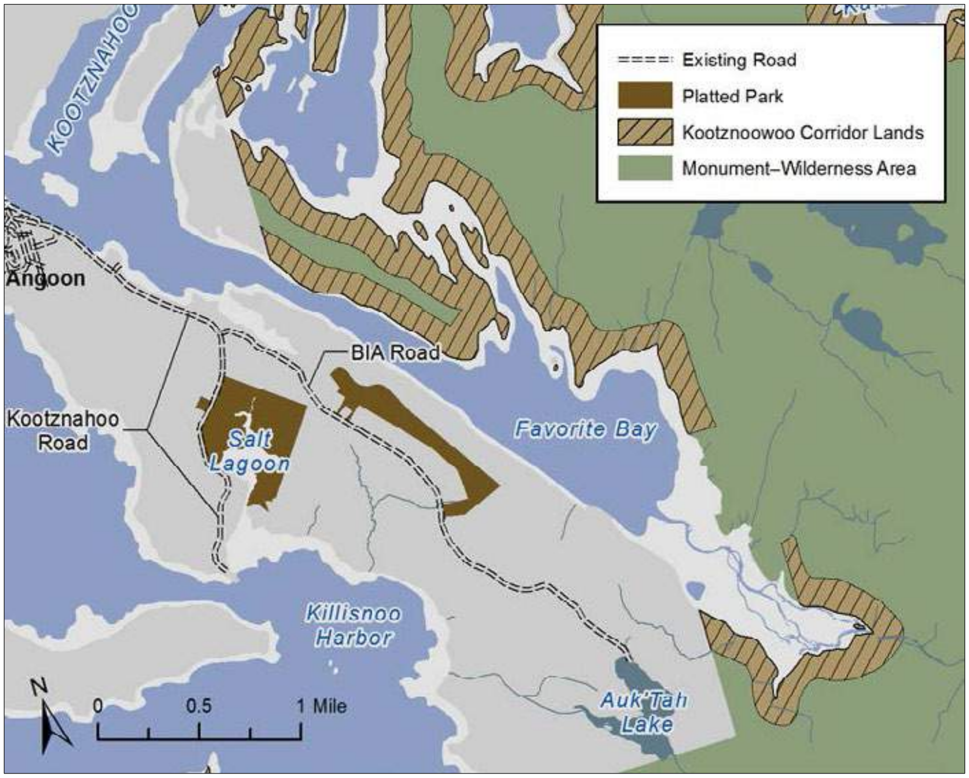


Figure 4. Location of potential Section 4(f) properties. Historic sites not shown for confidentiality reasons.

ANILCA granted ownership of certain lands on Admiralty Island to Kootznoowoo, Inc. Specifically, Section 506 of ANILCA granted to Kootznoowoo, Inc. the surface estate within a 660-foot-wide corridor along most of the shorelands of Favorite, Kanalku, and Mitchell bays. These lands are typically referred to as the Kootznoowoo Corridor Lands and are located directly adjacent to the Monument–Wilderness Area along the shores of Favorite, Kanalku, and Mitchell bays, but they are not inside the Monument–Wilderness Area (see Figure 4). The timber, subsurface, and development rights to these corridor lands reside with the federal government, and are managed by the U.S. Forest Service (USFS 2002). ANILCA 506(a)(3)(C)(iv) states that development rights within the Kootznoowoo Corridor Lands are reserved to the United States “except that the Secretary of Agriculture is authorized to permit construction, maintenance, and use of structures and facilities on said land which he determines to be consistent with the management of the Admiralty Island National Monument, provided that all structures and facilities so permitted shall be constructed of materials which blend and are compatible with the immediate and surrounding landscape” (DOT&PF 2006:44). Further, ANILCA 506(3)(E) states that “the Secretary of Agriculture shall consult and cooperate with Kootznoowoo, Incorporated, in the management of Mitchell, Kanalku, and Favorite bays, and their immediate environs, and the Secretary is authorized to enter into such cooperative arrangements as may further the purposes of this Act and other provisions of law, concerning, but not limited to: permits for any structures and facilities, and the allocations of revenues therefrom; regulations of public uses; and management of the recreational and natural values of the area.” The Kootznoowoo Corridor Lands do not qualify for protection under Section 4(f) because they are not 1) formally designated as part of the Monument–Wilderness Area, 2) publicly owned, or 3) managed for the primary purpose of recreation.

4.2.2 Angoon City Platted Parks

Prior to the release of the draft EIS in January 2015, the FAA was given information that Kootznoowoo, Inc. deeded 111.36 acres of land around the Salt Lagoon on the Angoon peninsula to the City of Angoon as part of a reconveyance of land under Section 14(c)(3) of the Alaska Native Claims Settlement (ANCSA). Further, the FAA was informed that the land was deeded for a public park, referred to as the “City Park” (Naoroz 2009), and that at the same time, Kootznoowoo, Inc. deeded 107.4 acres along the north side of the Bureau of Indian Affairs road (Auk’Tah Road) to the City of Angoon and platted this parcel as “Central Park” (Naoroz 2009).

The City Park parcel is identified in a draft reconveyance plan from the late 1990s (Sheinberg 1997) that outlined the process of identifying lands to be reconveyed from Kootznoowoo, Inc. to shareholders and the City of Angoon under ANCSA 14(c)(3). In the plan, the area now referred to as the City Park was identified as the “Berry Picking Area and Salt Lagoon Uplands” (Sheinberg 1997:4). The 14(c)(3) Reconveyance Selection data sheet for the parcel described the purposes of the parcel as follows:

> This selection will provide land for community recreation and open space. Desired uses include (but are not limited to): berry picking, a sheltered rifle range and archery range (relocated to the “other” side of the Salt Lagoon), a developed picnic/barbeque area for residents, a community recreation facility, boardwalk path around the lagoon, and public restroom. A teen center or community recreation center, swimming pool or tennis courts could also be located here.

The area within the platted park parcel was historically used for berry picking, but such activity has occurred very rarely, if at all, over the last several years due to potential contamination caused by runoff from the community’s landfill and sludge lagoon (Thompson and Thompson 2009). Berry picking can be considered both a recreational activity and a subsistence activity, the recreational berry picking often occurring as incidental to other types of recreation, such as hiking or picnicking. ANILCA Section 803, among other provisions of ANILCA and policies of state and federal land management agencies in Alaska, clearly distinguishes between subsistence activity for the primary purpose of acquiring food or personal use items, and the recreational taking of natural resources (for example, recreational hunting and fishing); that is, existing law and policy treat subsistence use as a non-recreational activity. There are no developed park or recreational facilities currently on the City Park property.

The Central Park parcel is identified in the draft reconveyance plan. In this draft plan, Central Park is identified with the purpose of “Open Space and recreation, utility boxes” (Sheinberg 1997:4). The 14(c)(3) Reconveyance Selection data sheet for the parcel described the purposes of the parcel as follows:

> This selection provides land for public open space, parks and recreation, and miscellaneous utility needs, etc. In the future, this area will have a walking path/greenbelt, picnic area, shelters and playgrounds. In the winter there could be cross-country skiing. Identifying this area for public recreation and open space will also ensure that there is no intensive development between these two large future residential areas.

There are no developed park or recreational facilities currently on the Central Park property. The property sees incidental use as part of the broader landscape within which subsistence activities take place; there are no known recreational activities occurring specifically on this property.

To determine the applicability of Section 4(f) to these properties, the FAA applied the screening criteria discussed in section 4.0, above. The first screening criterion is whether the property is publicly owned. Following the release of the draft EIS, the FAA met with the mayor of Angoon to further discuss the platted parks. During this meeting, the mayor indicated that the deeds for conveying the land to the City were never finalized. As such, the platted parks are not currently publicly owned; rather, they remain in the ownership of

Kootznoowoo, Inc. Kootznoowoo, Inc. is a non-public entity. However, the mayor indicated that the City is in the process of revising the 14(c)(3) conveyances with Kootznoowoo, Inc. Once that is complete, the final paperwork will be filed to complete the land transfer. The mayor did not have a timeframe for the completion of this paperwork at the time of the meeting with the FAA.

The second screening criterion is whether sufficient information exists to identify that the existing or intended primary purposes of the property are for public recreation. Assuming that these criteria are met, the final screening criterion is that the officials with jurisdiction over the properties have identified the resources as significant within their public recreational system, and the FAA has concurred with this determination.

As of April 2014, the City of Angoon did not have a current master plan or other land management plan in place. Previous plans, which were developed prior to the reconveyance of the platted park properties, have expired and are no longer in force. The only written documentation of the intended purposes for the parcels is in the draft reconvenyance plan. This plan documents Kootznoowoo's desired uses of the lands platted as parks but does not necessarily constitute planning on behalf of the City of Angoon, the public property owner, to manage the parcels expressly for these purposes, designate permissible activities, or develop these parcels (as appropriate) to support designated recreational activities. The information provided in the draft reconveyance plan and the related selection data sheets for the two parcels provides a broad range of desired and potential uses and identifies the primary purposes of these lands as both preservation of open space and recreation. To qualify a property for Section 4(f) protection, planning related to that parcel should be sufficiently specific as to allow for the lead agency to determine the key functions and values of the property as it relates to uses that are protected under Section 4(f). The current level of planning regarding these parcels does not appear to provide that level of specificity. Additionally, to qualify for Section 4(f) protection as a publicly owned recreational resource, the land must be managed for the primary purpose of recreation; all other purposes must be secondary or incidental (FHWA 2012: Question 1). As described in the draft reconveyance plan, the two park parcels under scrutiny here both were assigned dual primary purposes. To clarify the City of Angoon's intent for the management of the lands, the FAA consulted with the mayor's office. In January 2014, Mayor Matt Kookesh, Jr., indicated to the FAA that the City of Angoon's intent for management of the two platted park parcels is to retain them as open space for the primary purpose of subsistence use (Kookesh 2014). The mayor further noted that there are no plans at present to develop these parcels as parks. In August 2015, the mayor stated his desire and intent to develop the lands around the Salt Lagoon as a memorial park. He did not address any intent regarding Central Park. The FAA does not consider the mayor's statements regarding his preferences for the Salt Lagoon as a management plan because there is no record to indicate that the city council (i.e., the City of Angoon as a whole) intends to develop the lands for the purposes indicated by the mayor.

After thorough consideration of the information summarized above, the FAA has found that neither of the two platted park parcels qualifies for consideration as a Section 4(f) resource. This is based on the following fundamental findings: 1) Although platted, the parcels are not currently publicly owned; 2) there is no formal or informal management plan for the platted park parcels—the mayor's statements of personal preference for development of the Salt Lagoon as a memorial park do not constitute a record of the City of Angoon's intent; and 3) the primary use of the lands in question is for subsistence (for example, hunting and gathering) rather than recreation—recreational activities such as picnicking are secondary uses.

5.0 Use of Section 4(f) properties

Impacts to Section 4(f) properties are evaluated in terms of "use" of those properties. "Use" is defined by two primary categories as follows:

> *Use*. "Use" occurs when there is an actual physical taking of lands [from a publicly owned recreational property or wildlife refuge or from a historic site] in conjunction with a project (FAA Order 1050.1E:A-20).
>
> ***de minimis* use**. FAA guidance is silent on findings of *de minimis* use, which is set forth in Section 4(f) legislation. As such, the FAA follows the legislation itself at 23 CFR 774.17, as appropriate. For historic sites, *de minimis* impact (or use) means that the FAA has determined, in accordance with 36 CFR 800, that no historic property is affected by the project or that the project will have "no adverse effect" on the historic property in question.
>
> For parks, recreation areas, and wildlife refuges, a *de minimis* impact (or use) is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Certain other types of effects on Section 4(f) properties can occur that do not meet the definitions for use and *de minimis* use stated above. This situation is known as "constructive use." The definition for this term is provided below.

> *Constructive Use.* FAA Order 1050.1E (Appendix A, Section 6) defines *constructive use* as occurring when "there is no physical taking [of land from a Section 4(f) resource" but indirect effects on the resource would be so adverse as to "substantially impair" that resource. The Order further defines *substantial impairment* as occurring "only when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished." The most common source of indirect effects from aviation projects on adjacent land uses is aircraft noise. The FAA relies upon guidance in 14 CFR Part 150 (Airport Noise Compatibility Planning) to assess noise compatibility with sensitive land uses, including Section 4(f) uses, but also weighs other factors to determine appropriate noise thresholds for properties where quiet setting is a generally recognized feature or attribute of the property's significance (FAA 2006a:A-20 to A-21).

5.1 Processes for making use and *de minimis* use findings

Prior to making a finding of use for Section 4(f) properties (for example, approving use of a Section 4[f] property), the FAA must carry out the following coordination, as stated in 23 CFR 774.5(a):

> The Section 4(f) evaluation shall be provided for coordination and comment to the official(s) with jurisdiction over the Section 4(f) resource and to the Department of the Interior, and as appropriate to the Department of Agriculture and the Department of Housing and Urban Development.
>
> The [FAA] shall provide a minimum of 45 days for receipt of comments. If comments are not received within 15 days of the comment deadline, the [FAA] may assume a lack of objection and proceed with the action.

Prior to making a *de minimis* use finding, the FAA must carry out the following coordination, as stated in 23 CFR 774.5(b):

(1) For historic properties:

(i) The consulting parties identified in accordance with 36 CFR § 800 must be consulted; and

(ii) The [FAA] must receive written concurrence from the pertinent State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO), and from the Advisory Council on Historic Preservation (ACHP) if participating in the consultation process, in a finding of "no adverse effect" or "no historic properties affected" in accordance with 36 CFR § 800. The [FAA] shall inform these officials of its intent to make a *de minimis* impact determination based on their concurrence in the finding of "no adverse effect" or "no historic properties affected."

(iii) Public notice and comment, beyond that required by 36 CFR § 800, is not required.

(2) For parks, recreation areas, and wildlife refuges:

(i) Public notice and an opportunity for public review and comment concerning the effects on the protected activities, features, or attributes of the property must be provided. This requirement can be satisfied in conjunction with other public involvement procedures, such as a comment period provided on a [National Environmental Policy Act] NEPA document.

(ii) The [FAA] shall inform the official(s) with jurisdiction of its intent to make a *de minimis* impact finding. Following an opportunity for public review and comment [described above in (b)(2)(i)], the official(s) with jurisdiction over the Section 4(f) resources must concur in writing that the project will not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection. This concurrence may be combined with other comments on the project provided by the official(s).

5.2 Determinations of use

Five properties in the area of the alternatives have been determined by the FAA to qualify for Section 4(f) protection. These are historic sites SIT-00014, SIT-00033, SIT-00749, SIT-00781, and the Monument–Wilderness Area. The sections that follow evaluate the anticipated use, or lack thereof, of these resources by the proposed action and other alternatives.

None of the alternatives would use land from publicly owned wildlife refuges.

5.2.1 Airport 3a with Access 2 (the DOT&PF's proposed action)

Historic Sites

Sites SIT-00033 and SIT-00781 are located in the area of potential indirect effects from improved access associated with Access 2. Neither site would be directly affected by this alternative; that is, no land from the sites would be permanently or temporarily incorporated into the airport, its access road, or its material source. The occurrence or severity of any effects caused in the future by individuals who may travel off the access road and intentionally or inadvertently damage these sites cannot be predicted with any certainty; it is equally likely that the sites will be unaffected. As such, the FAA has determined that a finding of no adverse effects under the National Historic Preservation Act and its implementing regulations at 36 CFR 800 is appropriate at this time. Should adverse effects from increased access be identified in the future, the finding of effect may be amended and mitigation measures may be needed to resolve the effect. Based on the finding of no adverse effects and the provisions outlined in section 5.1, the FAA has determined that Airport 3a with Access 2 would result in a *de minimis* use of historic sites SIT-00033 and SIT-00781.

Monument–Wilderness Area

Airport 3a with Access 2 (the Proposed Action) would use publicly owned recreational property that qualifies for Section 4(f) protection (see Figure 5). Specifically, the alternative would use 238 acres of the Monument–Wilderness Area through one of several potential approaches, or a combination of these approaches:

- Special use permit from the U.S. Forest Service
- A congressionally mandated conveyance
- A land exchange or the voluntary trading of land by between the U.S. Forest Service and the State of Alaska

The exact mechanism by which lands from the Monument–Wilderness Area would be permanently incorporated into the transportation facility (i.e., the airport) has not yet been determined, and will likely not be determined until after the FAA issues a record of decision. However, a special use permit, which would grant long-term use and control of the property to the DOT&PF, is the most likely mechanism. Regardless of which of the specific approaches listed above would be used to invest the DOT&PF with property interest to develop, operate, and maintain the airport and its related access road, all of the above-listed approaches constitutes use of the Section 4(f) resource.

The FAA evaluated the anticipated use of the Monument–Wilderness Area against the criteria for *de minimis* impact findings (see Section 5.0, above). The FAA found that the permanent incorporation of land from the Monument–Wilderness Area into the transportation facility would adversely affect the key functions and values that qualify the property for Section 4(f) protection. In particular, this alternative would adversely affect the natural, undeveloped, and untrammeled qualities of the area as well as opportunities for solitude and primitive recreation on land in the Monument–Wilderness Area through the permanent presence and operation of constructed facilities or the alteration of vegetation cover on those lands. The alternative would similarly adversely affect the wilderness public values on the occupied lands, including scenic, scientific, conservation, recreational, and educational values. As such, the FAA finds that the anticipated effects on the Monument–Wilderness Area under this alternative do not meet the criteria of *de minimis* impacts and Airport 3a with Access 2 would use this Section 4(f) resource. The U.S. Forest Service—the officials with jurisdiction over the Monument–Wilderness Area—concurred with the FAA's determination, stating that the "permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road…would not constitute a *de minimis* use…of the wilderness area" (USFS 2014).

The analysis of noise effects (BridgeNet 2013) for the EIS found that there would be some change in noise conditions in the Monument–Wilderness Area due to this alternative. These changes would include periodic episodes when noise would be louder than current noise conditions near the location of this alternative. The changes would also include a minor increase in the amount of time noise conditions exceed existing background sound conditions in the area. This increase in time is not expected to exceed 57 minutes over a 24-hour period. None of these effects would substantially impair the functions and values that qualify the Monument–Wilderness Area for Section 4(f) protection; specifically, these effects would not substantially impair opportunities for primitive recreation. The anticipated noise effects from this alternative would degrade but not substantially impair opportunities for solitude in the Monument–Wilderness Area. These effects would not impair, substantially or otherwise, the other key qualities of the Monument–Wilderness Area or its related public values.

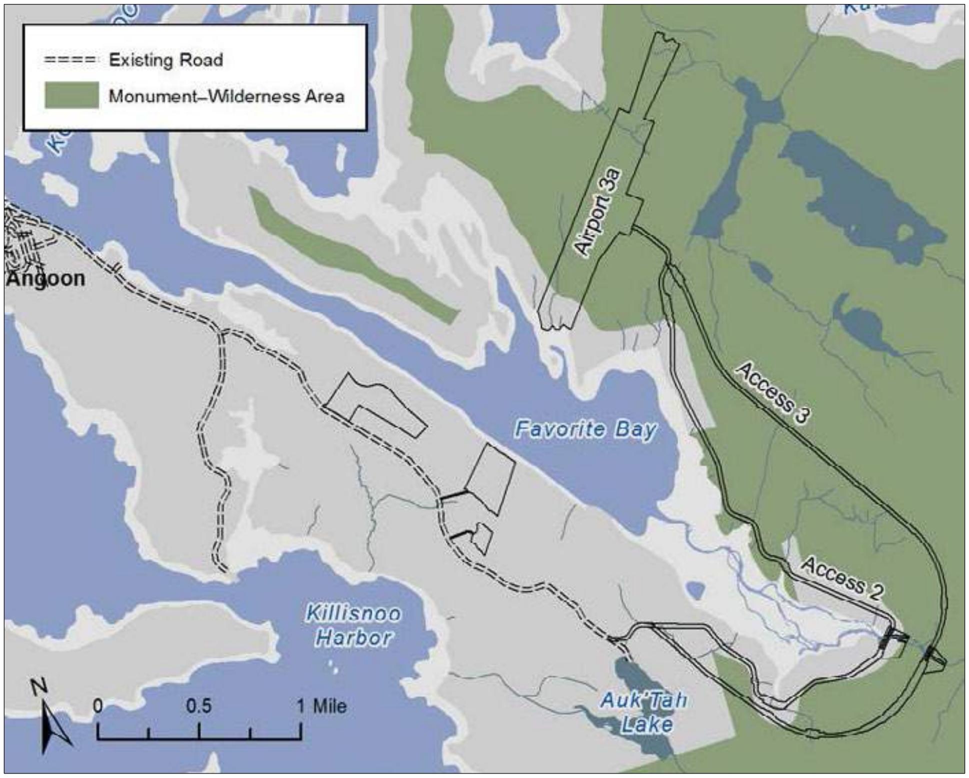


Figure 5. Location of Section 4(f) properties relative to the Airport 3a alternatives. Historic sites not shown for confidentiality reasons.

5.2.2 Airport 3a with Access 3

Historic Sites

Sites SIT-00033 and SIT-00781 are located in the area of potential indirect effects from improved access associated with Access 3. Neither site would be directly affected by this alternative; that is, no land from the sites would be permanently or temporarily incorporated into the airport, its access road, or its material source. For the same reasons described in section 5.2.1 for Airport 3a with Access 2, the FAA has determined that Airport 3a with Access 3 would result in a *de minimis* use of historic sites SIT-00033 and SIT-00781.

Monument–Wilderness Area

Airport 3a with Access 3 would use publicly owned recreational property that qualifies for Section 4(f) protection (Figure 5). This alternative would use 285 acres of the Monument–Wilderness Area through one of the three approaches previously described for Airport 3a with Access 2. As such, land from the Monument–Wilderness Area would be permanently incorporated into the transportation facility, and this would qualify as use of the Section 4(f) resource.

The FAA evaluated the anticipated use of the Monument–Wilderness Area against the criteria for *de minimis* impact findings (see Section 5.0). For the same reasons as previously described for Airport 3a with Access 2, the FAA found that the permanent incorporation of Monument–Wilderness Area land into the transportation facility under Airport 3a with Access 3 would adversely affect the key functions and values that qualify the property for Section 4(f) protection. The FAA therefore found that anticipated effects on the Monument–Wilderness Area under this alternative do not meet the criteria of *de minimis* impacts, and Airport 3a with Access 3 would use this Section 4(f) resource. The U.S. Forest Service—the officials with jurisdiction over the

Monument–Wilderness Area—concurred with the FAA's determination, stating that the "permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road…would not constitute a *de minimis* use…of the wilderness area" (USFS 2014).

5.2.3 AIRPORT 4 WITH ACCESS 2

Historic Sites

Sites SIT-00033 and SIT-00781 are located in the area of potential indirect effects from improved access associated with Access 2. Neither site would be directly affected by this alternative; that is, no land from the sites would be permanently or temporarily incorporated into the airport, its access road, or its material source. For the same reasons described in section 5.2.1 for Airport 3a with Access 2, the FAA has determined that Airport 4 with Access 2 would result in a *de minimis* use of historic sites SIT-00033 and SIT-00781.

Monument–Wilderness Area

Airport 4 with Access 2 would use publicly owned recreational property that qualifies for Section 4(f) protection (Figure 6). This alternative would use 263 acres of the Monument–Wilderness Area through one of the three approaches described above for Airport 3a with Access 2. As such, land from the Monument–Wilderness Area would be permanently incorporated into the transportation facility, and this would qualify as use of the Section 4(f) resource.

The FAA evaluated the anticipated use of the Monument–Wilderness Area against the criteria for *de minimis* impact findings (see Section 5.0). For the same reasons as previously described for Airport 3a with Access 2, the FAA found that the permanent incorporation of Monument–Wilderness Area land into the transportation facility under Airport 4 with Access 2 would adversely affect the key functions and values that qualify the property for Section 4(f) protection. The FAA therefore found that the anticipated effects on the Monument–Wilderness Area under this alternative do not meet the criteria of *de minimis* impacts, and Airport 4 with Access 2 would use this Section 4(f) resource. The U.S. Forest Service—the officials with jurisdiction over the Monument–Wilderness Area—concurred with the FAA's determination, stating that the "permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road…would not constitute a *de minimis* use…of the wilderness area" (USFS 2014).

5.2.4 AIRPORT 4 WITH ACCESS 3

Historic Sites

Sites SIT-00033 and SIT-00781 are located in the area of potential indirect effects from improved access associated with Access 3. Neither site would be directly affected by this alternative; that is, no land from the sites would be permanently or temporarily incorporated into the airport, its access road, or its material source. For the same reasons described in section 5.2.1 for Airport 3a with Access 2, the FAA has determined that Airport 4 with Access 3 would result in a *de minimis* use of historic sites SIT-00033 and SIT-00781.

Monument–Wilderness Area

Airport 4 with Access 3 would use publicly owned recreational property that qualifies for Section 4(f) protection. This alternative would use 289 acres of the Monument–Wilderness Area through one of the four instruments described above for Airport 3a with Access 2. As such, land from the Monument–Wilderness Area would be permanently incorporated into the transportation facility, and this would qualify as use of the Section 4(f) resource.

The FAA evaluated the anticipated use of the Monument–Wilderness Area against the criteria for *de minimis* impact findings (see Section 5.0). For the same reasons as described above for Airport 3a with Access 2, the

FAA found that the permanent incorporation of land from the Monument–Wilderness Area into the transportation facility under Airport 4with Access 3 would adversely affect the key functions and values that qualify the property for Section 4(f) protection. The FAA therefore found that the anticipated effects on the Monument–Wilderness Area under this alternative do not meet the criteria of *de minimis* impacts, and Airport 4 with Access 3 would use this Section 4(f) resource. The U.S. Forest Service—the officials with jurisdiction over the Monument–Wilderness Area—concurred with the FAA's determination, stating that the "permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road…would not constitute a *de minimis* use…of the wilderness area" (USFS 2014).

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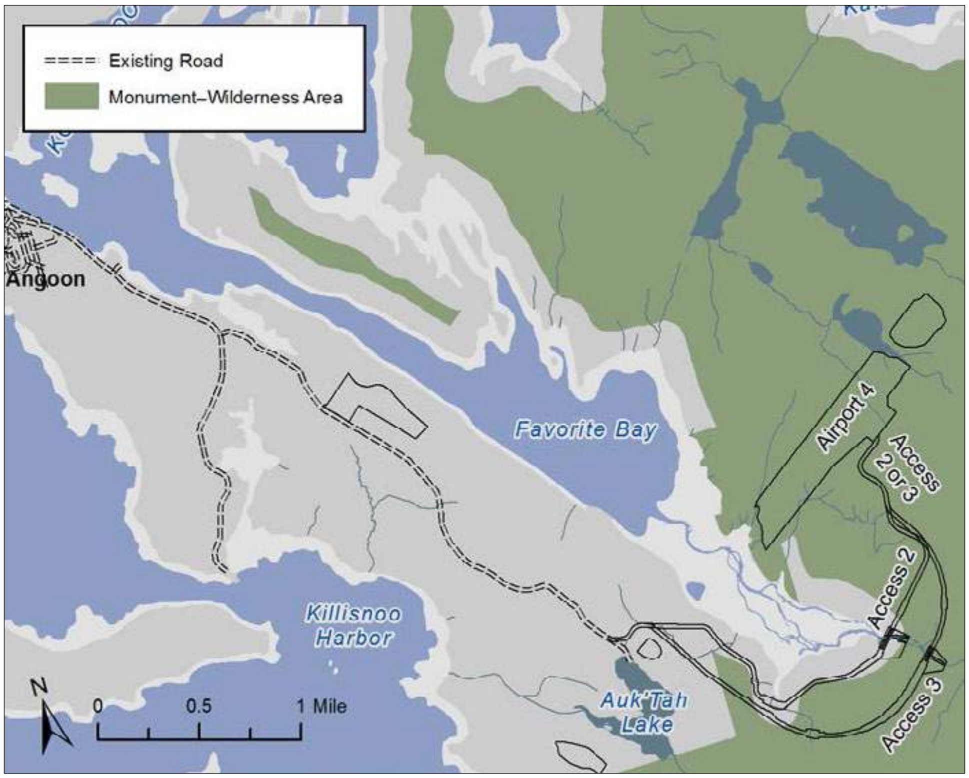

Figure 6. Location of Section 4(f) properties relative to the Airport 4 alternatives. Historic sites not shown for confidentiality reasons.

5.2.5 Airport 12a with Access 12a (the FAA's Preferred Alternative)

Historic Sites

Sites SIT-00014 and SIT-00749 are both located in area of potential visual effects for the Airport 12a alternative. Neither site would be directly affected by this alternative; that is, no land from the sites would be permanently or temporarily incorporated into the airport, its access road, or its material source. Through the National Historic Preservation Act and its implementing regulations at 36 CFR § 800, the FAA has made a finding of no adverse effects for these two sites in association with Airport 12a with Access 12a, and has received concurrence from the Alaska SHPO on these findings. Based on this finding and pursuant to the criteria outlined in section 5.1, the FAA has determined that Airport 12a with Access 12a would result in a *de minimis* use of sites SIT-00014 and SIT-00749

Monument–Wilderness Area

Airport 12a with Access 12a would not use any land from the Monument–Wilderness Area (see Figure 7); the entire alternative is located outside the Monument–Wilderness Area.

For Airport 12a with Access 12a, long-term effects to wilderness qualities—specifically opportunities for solitude—would be limited to the visibility of aircraft, visibility of skyglow during operation, and aircraft noise in portions of the Kootznoowoo Wilderness Area. This increase in noise time above ambient (TAA) would be up to 10 additional minutes per 24-hour period (BridgeNet 2013) in areas where opportunities for solitude are already degraded by aircraft overflights and seaplane traffic from the Angoon Seaplane Base. The FAA has determined that the noise effects on opportunities for solitude in the wilderness area from Airport 12a with Access 12a would be infrequent and of short duration, and opportunities for solitude would be readily available very close by. For these reasons, the effects would be compatible with the desired conditions set forth in the Wilderness Act and the land management plan. Chapter 2320 of *U.S. Forest Service Manual 2300* (U.S. Forest Service 2007) requires the U.S. Forest Service to consider and disclose effects to wilderness qualities from both inside and outside the boundary of a wilderness area in an EIS. However, these policies also restrict the agency's ability to manage non–U.S. Forest Service lands to preserve wilderness character. Therefore, because these effects are outside of U.S. Forest Service jurisdiction, they are considered compatible with the wilderness area.

Therefore, Airport 12a with Access 12a would have no constructive use of this Section 4(f) resource.

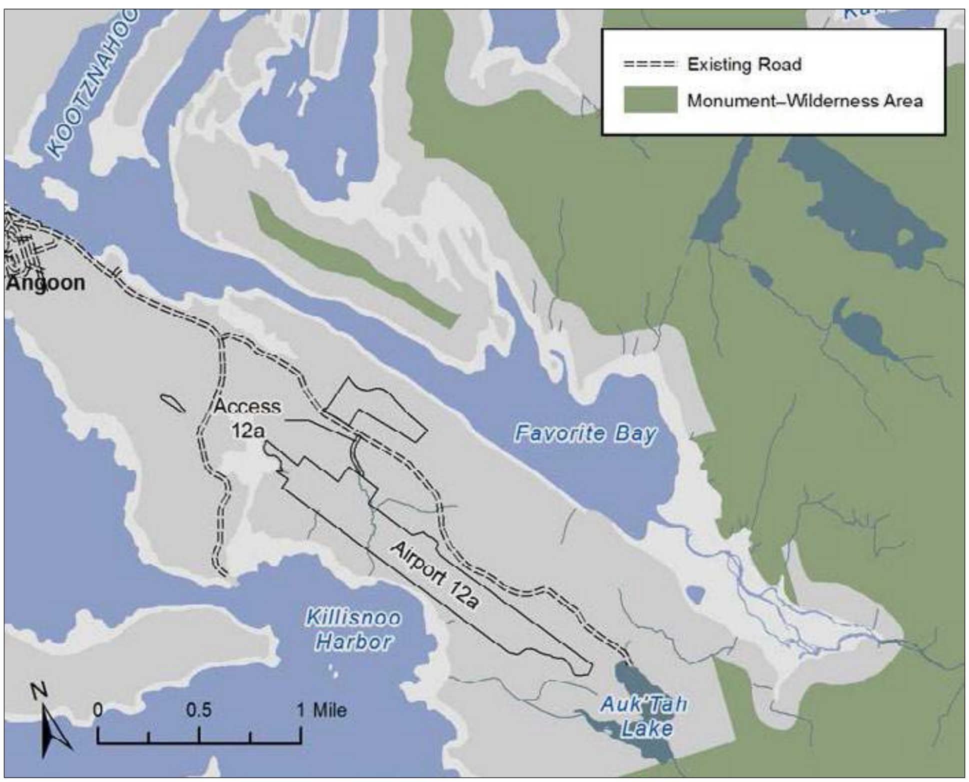

Figure 7. Location of Section 4(f) properties relative to the Airport 12a alternative. Historic sites not shown for confidentiality reasons.

6.0 AVOIDANCE ALTERNATIVES

To comply with 23 CFR 774.3, the FAA must examine feasible and prudent measures to avoid the use of Section 4(f) resources.

Feasibility and prudence are defined in 23 CFR 774.17 as follows:

(1) A feasible and prudent avoidance alternative avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property.

(2) An alternative is not feasible if it cannot be built as a matter of sound engineering judgment.

(3) An alternative is not prudent if:

(i) It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;

(ii) It results in unacceptable safety or operational problems;

(iii) After reasonable mitigation, it still causes:

(A) Severe social, economic, or environmental impacts;

(B) Severe disruption to established communities;

(C) Severe disproportionate impacts to minority or low income populations; or

(D) Severe impacts to environmental resources protected under other Federal statutes;

(iv) It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;

(v) It causes other unique problems or unusual factors; or

(vi) It involves multiple factors in paragraphs (3)(i) through (3)(v) of this definition, that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

Because design alternatives would not avoid use of Section 4(f) resources under Airport 3a (the Proposed Action) or Airport 4, the FAA examined location alternatives. The FAA also considered a no action (No-Build) alternative. As described in section 3.3, above, and shown in Figure 2, the FAA considered a large number of potential airport location alternatives that were dismissed during the NEPA alternatives development process for being infeasible, imprudent, or not meeting the purpose and need of the project (see *Alternatives Eliminated from Detailed Analysis* [SWCA 2014a], included as Appendix B of the Angoon Airport EIS). None of the five alternatives that were carried forward in the NEPA process would entirely avoid use of Section 4(f) resources. Only the no action alternative would avoid use of Section 4(f) resources.

The FAA determined that the no action alternative is not prudent in that it would compromise the project to such a degree that the project's purpose and need would no longer be met.

7.0 MEASURES TO MINIMIZE HARM

As noted in Section 5.0, the FAA considered measures to avoid and minimize harm to Section 4(f) resources. To address potential indirect harm to historic sites and direct harm to the Monument–Wilderness Area, design modifications were incorporated into all alternatives to reduce impacts on Section 4(f) properties. Primary among these were the following:

- Limiting facilities to only those needed to meet the purpose and need of the project
- Using variable road right-of-way width to minimize the amount of land incorporated into the transportation facility
- Routing access roads and siting airport facilities to make best use of topography, thereby minimizing cut and fill requirements
- Limiting vegetation clearing to areas needed for safe aircraft operations and vehicles lines of site and using thinning instead of removal in all other areas
- Re-using material excavated from one part of the project for fill in another part
- Designing culverts, water retention areas, and bridge footings to allow for fish passage, maintenance of floodplain capacity, and flow of large woody debris important for habitat quality
- Increasing side-slope angles to minimize fill footprints (FAA, ADOT&PF, and USFS slope standards would be met)
- Maintaining natural vegetation wherever possible
- Using precast components for the bridge over Favorite Creek to reduce the need for water and the potential for spills from on-site concrete mixing

These minimization measures were incorporated into all of the action alternatives. However, because the Proposed Action (Airport 3a with Access 2) and Airport 3a with Access 3, Airport 4 with Access 2, and Airport 4 with Access 3 are located wholly or almost wholly within the Monument–Wilderness Area, design modifications cannot eliminate the substantive use of this Section 4(f) resource.

8.0 COORDINATION

The FAA coordinated with the U.S. Forest Service and the Alaska SHPO, the agencies with jurisdiction over the Section 4(f) resources that would be affected by the Proposed Action, the FAA's preferred alternative, and all other action alternatives considered in the EIS. This coordination included receiving a statement from the U.S. Forest Service that the Monument–Wilderness Area is a significant recreational resource in the wilderness area system as managed by their agency. It also included concurrence from the U.S. Forest Service of the Section 4(f) use findings made by the FAA as they relate to the Monument–Wilderness Area. Additionally, the FAA coordinated with the U.S. Forest Service regarding the applicability of Section 4(f) to the Favorite Bay Garden Site (SIT-00302). The FAA received concurrence from the U.S. Forest Service that, because the site is chiefly important for its information potential, Section 4(f) does not apply to the site.

The FAA consulted with the Alaska SHPO regarding historic sites that could be affected by the proposed project, specifically, the National Register eligibility of sites in the proposed areas of the airport and access road alternatives, and the applicability of Section 4(f) to those sites determined eligible for the National Register. The FAA received concurrence from the Alaska SHPO that sites SIT-00014 and SIT-00749 are chiefly important for reasons beyond their data potential. Therefore, Section 4(f) applies to these two sites. The Alaska SHPO also concurred with the FAA's determination that sites SIT-00056, SIT-00169, and SIT-00302 are chiefly important for their data potential, and, accordingly, Section 4(f) does not apply to these sites). The FAA continues to coordinate with the Alaska SHPO regarding the potential Section 4(f) uses of sites SIT-00014 and SIT-00749. Additionally, the FAA is coordinating with the Alaska SHPO regarding the applicability of Section 4(f) to four additional sites: SIT-00033, SIT-00034, SIT-00502, and SIT-00781. The FAA received SHPO concurrence on the Finding of Effects for Airport 12a with Access 12a (the preferred alternative) on November 13, 2015.

Coordination also included consultation between the FAA and federally recognized Alaska Native tribes and Alaska Native Corporations that may have cultural or historical interests in the study area. None of these tribal parties have indicated any specific concerns with the project as they relate to resources qualifying for Section 4(f) protection. Those tribal parties contacted by the FAA are as follows:

- The Angoon Community Association
- The Central Council of Tlingit and Haida Indian Tribes of Alaska
- Kootznoowoo, Inc.
- Sealaska Corporation

Finally, the FAA coordinated with the City of Angoon regarding the platted city parks near Airport 12a with Access 12a. This coordination included efforts to identify evidence of formal or informal designation and planning on behalf of the City of Angoon to use the platted park parcels for purposes protected under Section 4(f).

Copies of written coordination regarding Section 4(f) resources are provided in Appendix A.

9.0 LITERATURE CITED

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COORDINATION DOCUMENTATION

U.S. Department
of Transportation
Federal Aviation
Administration

Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

May 29, 2008

Ms. Judith Bittner
Alaska State Historic
Preservation Officer
550 W. 7th Ave., Suite 1310
Anchorage, Alaska 99501-3565

RE: Initiation of Section 106 Consultation for the Angoon Airport Environmental Impact Statement, Angoon, Alaska

Dear Ms. Bittner:

The Federal Aviation Administration (FAA), Alaskan Region, is beginning preparation of an Environmental Impact Statement (EIS) for proposed development of a land-based airport in or near the City of Angoon, Alaska. This letter is intended to serve as a formal initiation of Section 106 consultation between the FAA, its consultants, and the Alaska State Historic Preservation Office (ASHPO) as required under 36 CFR 800.

SWCA Environmental Consultants (SWCA) is the prime third-party consulting firm for this project and will be assisting the FAA in working through the Section 106 process and in complying with the requirements of the National Environmental Policy Act (NEPA) relative to cultural resource issues. Specifically, Sheri Murray Ellis of SWCA has been appointed as the coordinator of cultural resource studies, including archaeological investigations and Native American consultation for the EIS.

As per the requirements of 36 CFR 800.4(a)(1), we are asking for your input on defining the area of potential effects (APE) for cultural resources for the purpose of future evaluation in the EIS. The Alaska Department of Transportation and Public Facilities (ADOT&PF) is the project Sponsor. They prepared a site selection study and developed a Master Plan, identifying an ADOT&PF proposed airport location (see Figure 1, attached). The FAA will likely be considering this location or a variation thereof as one of the alternatives in the EIS. The FAA proposes to define the APE for this location as shown on Figure 1, ADOT&PF Proposed Location. We believe this APE is sufficient to encompass all areas and resources that could be directly affected by physical disturbance or indirectly affected by potential noise intrusions.

In addition to the ADOT&PF's proposed airport location, the FAA will be considering at least one, and possibly several alternative locations for the airport. We are still in the process of gathering data to determine where those alternative locations will be, and will not identify specific locations until early 2009. We will collect existing data for the broader Angoon area peninsula and surrounding islands and lands until such time as specific alternative locations are identified. At that time, we will consult with your office regarding definition of an appropriate APE for more detailed investigations.

Should you have any concerns with how we have defined the APEs for the ADOT&PF proposed airport location and potential alternative locations, please, do not hesitate to contact me. We welcome your expertise and knowledge of the area in making sure we define the APEs to encompass those cultural resources that could be affected.

Pursuant to 36 CFR 800.4(a)(2)-(3), SWCA staff will be examining the records held by your office for previous cultural resource studies and known cultural resource sites within the agreed upon APE to be addressed in the EIS. This work will take place later this spring. Should it be determined that field surveys are necessary to determine the presence/absence of archaeological sites within the APE, SWCA will conduct such studies. All lands potentially involved in the project are under the jurisdiction of either Kootznoowoo, Inc., the village Native Corporation, or the U.S. Forest Service (USFS), as part of Admiralty Island National Monument. SWCA will coordinate with the USFS and seek a permit from them for any work on USFS lands. Any archaeological fieldwork associated with the EIS would likely not take place until at least the spring of 2009. Preparation of the EIS and completion of the NEPA process is expected to take at least three years, with a draft EIS potentially distributed for comment in the spring of 2010.

Development of the runway, hangar, and apron space would include ground-disturbing activities that could have the potential to impact cultural resources that may be present in the selected airport location. As such, and as part of our consultation with your office under 36 CFR 800, we invite you to let the FAA know at this time of any concerns you may have about potential impacts to cultural resources that could result from development of the airport at the location proposed by the ADOT&PF in their Master Plan (shown on Figure 1) or in any other areas within or immediately surrounding Angoon and the peninsula on which the community is located. Information about specific known sites in these areas, other parties with whom we should consult regarding cultural resource concerns, or general cultural resources issues of which we should be aware, would be greatly appreciated.

We look forward to working with you on this project and welcome your active participation. Please, do not hesitate to contact either myself or Ms. Ellis at any time should you have questions or comments. I can be reached at Leslie.Grey@faa.gov or (907) 271-5453, and Ms. Ellis can be reached at either sellis@swca.com or (801) 322-4307.

Sincerely,

Leslie A. Grey

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS

cc: Sheri Murray Ellis, SWCA

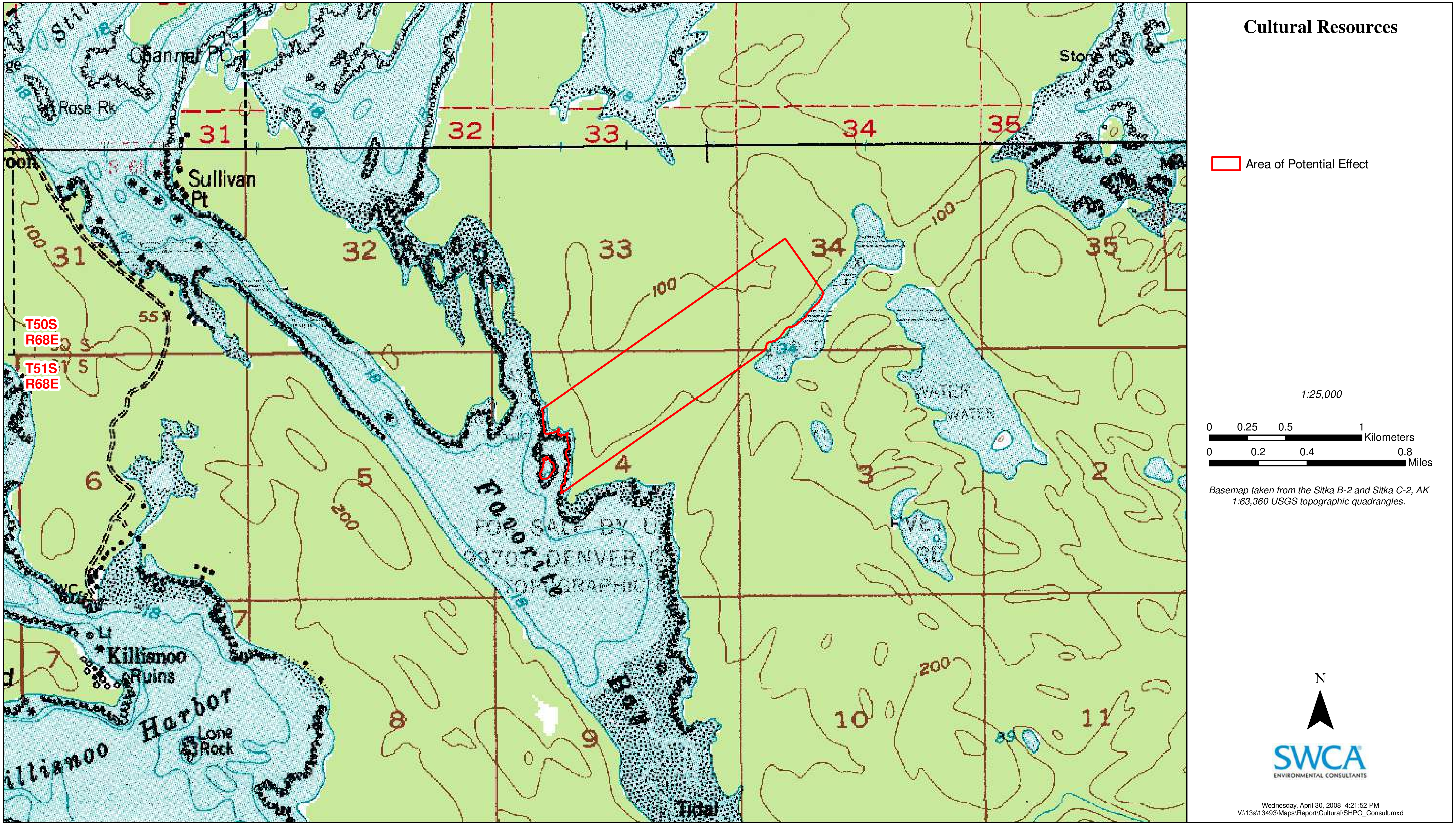


Figure 1. Location of APE for the ADOT&PF's Master Plan preferred airport location.

U.S. Department
of Transportation
**Federal Aviation
Administration**

AAL-614
Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

In Reply Refer To:
AIP-3-02-0018-0705

April 12, 2012

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 West 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Aviation Administration (FAA), is proposing to construct a new airport for the community of Angoon on Admiralty Island in Southeast Alaska. The FAA is preparing an environmental impact statement (EIS) to evaluate and disclose the potential impacts of the DOT&PF's proposed airport location (Airport Alternative 3a) and is considering two other airport location alternatives (Airport Alternatives 4 and 12a), three airport access road alternatives (Access Alternatives 2, 3, and 12a), and an alternative to take no action regarding the proposed airport. The DOT&PF has proposed the airport for lands located in Sections 33 and 34, Township 50 South, Range 68 East, and Section 4, Township 51 South, Range 68 East, Copper River Meridian (U.S. Geological Survey quadrangles Sitka B-1 and Sitka B-2). The two airport alternatives and the three access road alternatives are located near Sections 2–6, 8–10, 15, and 16, Township 51 South, Range 68 East. The DOT&PF's proposed airport location and the alternatives to it are depicted on Figure 1, enclosed. A portion of these lands is managed by the U.S. Forest Service (USFS) as the Admiralty Island National Monument and Kootznoowoo Wilderness Area. The remainder is privately owned; owned by Kootznoowoo, Inc. (the local native corporation); or owned by the City of Angoon. The USFS is a cooperating agency in the preparation of the EIS and a cooperator in the Section 106 process associated with the EIS.

Pursuant to 36 Code of Federal Regulations (CFR) § 800.4(c)(1)–(2), implementing regulations of Section 106 of the National Historic Preservation Act, the FAA and USFS have determined that a historic property is present in the area of potential effects (APE) for the proposed undertaking (hereafter referred to as the Project). The FAA and USFS also notify you of their intention to conduct phased identification of historic properties, as provided for in 36 CFR § 800.4(b)(2), and to consult with you regarding their findings of effect under separate cover.

The Project

The three airport alternatives being considered in the EIS are Airport Alternatives 3a, 4, and 12a. These alternatives were identified through detailed aviation planning, which indicated that extreme terrain in the area in and around Angoon limits the potential locations for airports that would meet FAA requirements for safe aircraft operations, particularly approaches and departures. Therefore, only a very small number of potential airport locations is considered viable, and the alignments of the runways at these locations are limited to within a few degrees of variation. Three access alternatives are also under consideration in the

EIS: Access Alternatives 2, 3, and 12a. At the time the field studies reported herein were conducted, a fourth access road alternative, Access Alternative 5, was also under consideration; however, the FAA has since eliminated this alternative from consideration.

The Project consists of a new airport and an associated access road. The Project—whether constructed at the DOT&PF's proposed location or at one of the alternative locations also being considered in the EIS—would require ground disturbance from both temporary construction activities and long-term or permanent structures and terrain alteration. The design of the Project is still in development. In general terms, the Project would consist of the following activities and components with the potential to affect historic properties:

- Vegetation clearing, excavation, and fill placement for the following:
  - A 3,300-foot-long, 75-foot-wide paved runway
  - A 150-foot-wide runway safety area centered on the runway centerline but extending 300 feet beyond each runway end
  - A 75-foot-wide, roughly 150-foot-long paved taxiway
  - A roughly 70,000-square-foot paved apron area with future hangar, lease lots, and passenger shelter space and vehicle parking space
  - A paved airport access road comprising two 9-foot-wide travel lanes with minimal shoulders
- Excavation of post holes and installation of an airport perimeter fence
- Vegetation clearing inside the airport perimeter fence in areas immediately surrounding the runway and taxiway
- Vegetation clearing in select locations outside the airport perimeter fence along the approach and departure paths
- Vegetation clearing in portions of the access road right-of-way to provide for line-of-sight
- Installation of an overhead power and telephone line along the access road right-of-way
- Construction of bridges and culverts (number and extent vary by airport and access road alternative)
- Possible excavation of material sources from one or more existing or newly developed material source locations
- Possible transfer of lands from federal ownership to state ownership (depending on selected airport alternative, a lease or special use permit under the Alaska National Interest Lands Conservation Act [ANILCA] Title XI may apply instead)

Area of Potential Effects

Because of the nature of EIS preparation and the timing during which identification of potentially significant resource conflicts needs to occur, field studies for cultural resources (and other resources) generally need to take place before the design of a proposed action and before any alternatives to the proposed action are sufficiently advanced to identify a distinct project footprint and all project design features to a degree that a firm direct and indirect effects APE can be established. For this reason, and because of the high cost of conducting cultural resource field studies in Angoon, the FAA opted to proceed with a process of phased definition of the APE and phased identification of historic properties to limit the survey of areas not directly or indirectly affected by the final alternatives. Therefore, the APE is defined as follows:

- **Phase 1 APE** (Figure 2, enclosed): The FAA identified a 1,000-foot-wide by 8,000-foot-long area (the Phase 1 APE) around each potential runway location within which most direct effects from construction of the runway, taxiway, apron, and safety areas are likely to occur; this APE does not capture areas within which indirect effects might occur. The same approach was applied to potential access road locations, where a 50-foot-wide corridor along each road alignment was established as the Phase 1 APE. In total, these airport and access road APEs encompass 615 acres. Field studies have been conducted in these areas (see Historic Properties Identification Efforts below).

The APE was defined as such to obtain sufficient information to compare alternatives in the EIS relative to known or potential direct risk to historic properties. Relative potential direct effects on historic properties will also be estimated using the USFS cultural resources sensitivity model (see pages 16 and 17 section 5.2.1 of the enclosed report).

The FAA and USFS are using information obtained for the Phase 1 APE in partial fulfillment of the Section 106 process but recognize that it is insufficient to complete the Section 106 process.

- **Phase 2 APE:** When the airport and access road locations and designs have progressed sufficiently to allow for more concrete definition of the APE, the FAA, in consultation with the USFS, the State Historic Preservation Officer (SHPO), and other consulting parties, will re-define the APE to include all areas of anticipated direct and indirect effects. At this time, the FAA will see to it that additional field studies are conducted, as necessary, to fulfill the Section 106 process. This phase of APE definition is expected to occur between the draft EIS and final EIS, when the FAA has considered public and agency comments on the airport and access road locations and modifies the Project designs accordingly or, possibly, eliminates alternatives from further consideration. The FAA fully anticipates that this Phase 2 APE will be larger than the Phase 1 APE. A separate report of survey methods and findings for the Phase 2 APE will be prepared at a later date, and the FAA, in cooperation with the USFS, will consult with the SHPO regarding additional or amended determinations of eligibility and findings of effect.

Historic Properties Identification Efforts

Efforts to date to identify historic properties comprise the following: 1) a search of available site and project records from the Office of History and Archaeology and the Tongass National Forest, Admiralty Island National Monument office for areas within 1 mile of the Phase 1 APE; 2) oral interviews with elders and others from the community of Angoon; 3) consultation with the Angoon Community Association, the Central Council of the Tlingit and Haida Indian Tribes of Alaska, Sealaska Corporation, and Kootznoowoo, Inc.; and 4) archaeological field surveys in the Phase 1 APE. The cultural resource studies conducted to date constitute the first phase of a two-phase approach in identifying historic properties and in determining Project effects. This first phase considers the Phase 1 APE. The second phase will focus on a refined APE (the Phase 2 APE) that will be defined when the Project design details and FAA's preferred alternative are identified. The results of the first phase of study are contained in the enclosed report, Cultural Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement, Angoon, Alaska, prepared by SWCA Environmental Consultants (SWCA).

As a result of the identification efforts completed thus far, a single heritage resource site was identified in the Phase 1 APE. This site was previously documented by the USFS as SIT-00302 (the Favorite Bay Garden Site). See Figure 2 for the location of SIT-00302. At the time of their documentation, the USFS did not make a determination of the site's eligibility for the National Register of Historic Places (NRHP). SIT-00302 is located on the eastern shore of Favorite Bay. The site includes numerous discernable garden furrows and other landscape features likely attributable to the ethnographic and historic periods of occupation in the area. Shovel probing conducted by SWCA uncovered an obsidian microblade within the site boundary, but no other prehistoric artifacts were identified.

Determination of Eligibility

The FAA and USFS believe that SIT-00302 is ***eligible for the NRHP under Criterion D***, as set forth in 36 CFR § 60.4 (see report pages 31–38). In compliance with the implementing regulations (36 CFR Part 800) of the NHPA, the FAA and USFS are affording the Alaska State Historic Preservation Officer an opportunity to comment on this evaluation.

The determination that the site is eligible for the NRHP is based on the following findings:

- Shovel probing identified a prehistoric artifact in a subsurface context, which indicates the potential for additional data regarding land-use patterns, palimpsests, and important research questions to be recovered.
- The presence of an obsidian microblade, the first found in the Angoon area, indicates the site has the potential to significantly refine present interpretations of the area's cultural chronology, tool stone acquisition practices, and, potentially, trade relationships.
- The site retains good archaeological integrity, which would allow for confidence in the vertical and horizontal relationships of artifacts, features, and cultural strata.

The FAA believes that the Favorite Bay Garden Site (SIT-00302) has minimal value for preservation in place and is important chiefly for what can be learned through data recovery, and, as per 23 CFR § 771.135(g), your concurrence would result in the FAA determining that Section 4(f) of the U.S. Department of Transportation Act would not apply.

Finding of Effect

As noted previously, the Project design is not sufficiently developed to fully evaluate its expected impacts on historic properties. As such, the FAA and USFS will make a finding of effect for SIT-00302 at a later date. We will consult with your office and with other consulting parties regarding this finding at that time.

Results of Consultation

The FAA has consulted with other parties, including the Project sponsor (DOT&PF), the USFS, the Angoon Community Association, the Central Council of the Tlingit and Haida Indian Tribes of Alaska, Sealaska Corporation, Kootznoowoo, Inc., and several members of the Angoon community as part of our efforts to identify historic properties. All consulting parties will receive a copy of this DOE. Beyond the USFS, only local community members and Kootznoowoo, Inc. have provided information regarding the potential locations of historic properties and their relative importance to the community. Other than SIT-00302, these parties have identified two other previously documented sites in the Favorite Bay area as being of cultural importance. These are a wood stake fish weir (SIT-00033) located in the tidally influenced channel of Favorite Creek and the Tlingit legend site of Beaver Tail Rock located along the eastern shoreline of Favorite Bay. Both of these sites are outside the Phase 1 APE.

At this time, we request your concurrence with our determination that SIT-00302, the Favorite Bay Garden Site, is eligible for the NRHP. We also request any information you may have regarding other considerations related to historic properties we should take into account. Please direct your concurrence or comments to me at the address above, by telephone at (907) 271-5453, or by e-mail at Leslie.Grey@faa.gov.

Sincerely,

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS

Chad M. VanOmer
Monument Ranger
Admiralty Island National Monument
Tongass National Forest

Enclosures:

Figures 1 and 2
Office of History and Archaeology Coversheet
SWCA Environmental Consultants. 2012. *Cultural Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement. Prepared for Federal Aviation Administration and Alaska Department of Transportation and Public Facilities.* Salt Lake City, Utah: SWCA.

cc w/o enclosures:

Verne Skagerberg, DOT&PF Southeast Region, Project Manager
Jane Gendron, DOT&PF Southeast Region, Regional Environmental Manager
Laurie Mulcahy, DOT&PF, Cultural Resources Manager

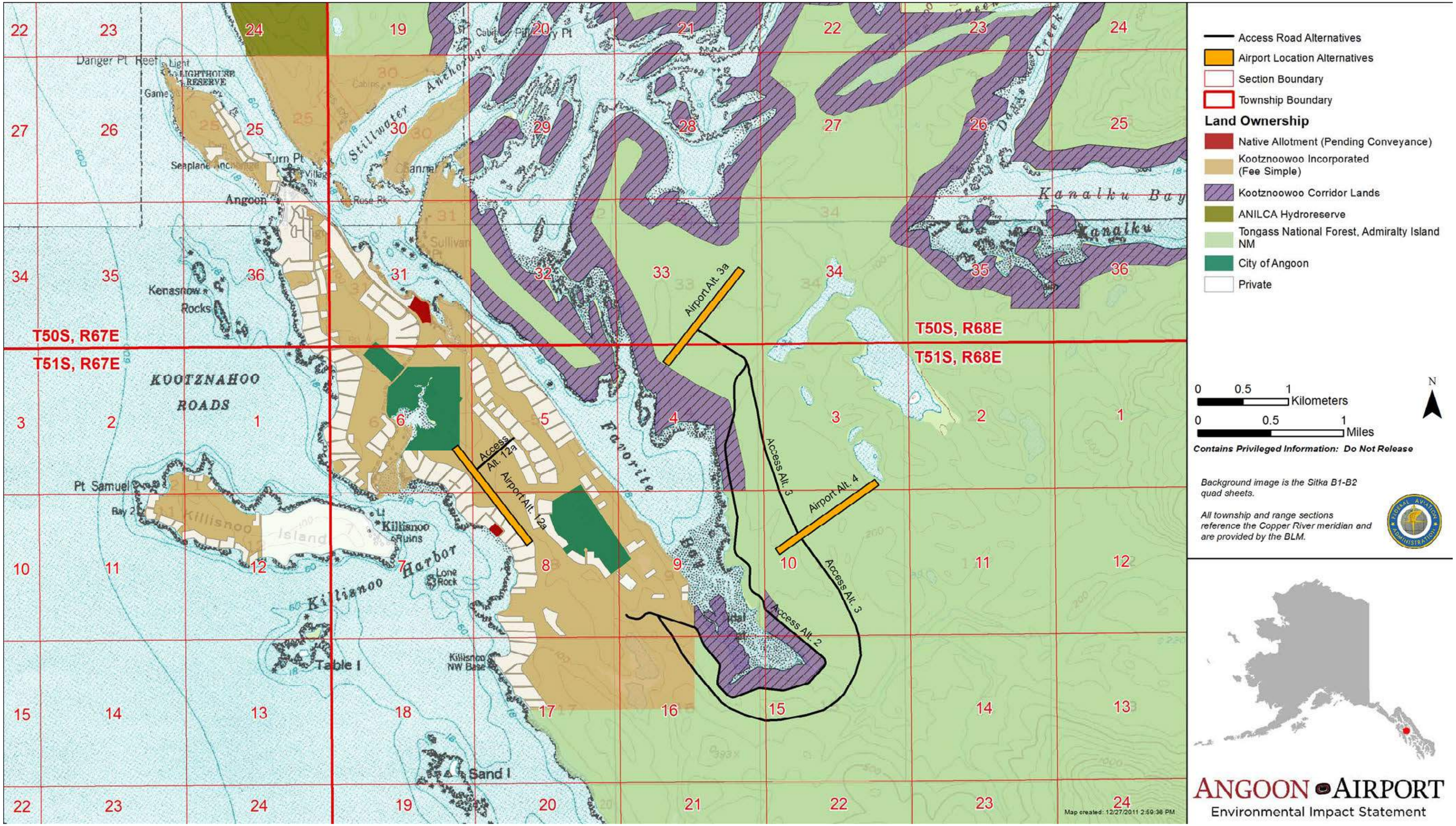


Figure 1. Airport location and access road location alternatives and land ownership.

RECEIVED

APR 3 0 2012

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

550 WEST 7TH AVENUE, SUITE 1310
ANCHORAGE, ALASKA 99501-3565

PHONE: (907) 269-8721
FAX: (907) 269-8908

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS & OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

April 26, 2012

File No.: 3130-1R FAA
3330-6 SIT-00302

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS
AAL-614
Alaskan Region Airports Division
222 West 7th Avenue, #14
Anchorage, AK 99513

Subject: Determination of Eligibility for the Favorite Bay Garden Site (SIT-00302), Angoon Airport Project

Dear Ms. Grey:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated April 12, 2012) on April 16, 2012.

Following our review of the documentation provided, we concur with your determination that site SIT-00302 is **eligible** for the National Register of Historic Places (NRHP).

Thank you for the opportunity to comment. We look forward to continued consultation on the subject undertaking. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

U.S. Department
of Transportation
**Federal Aviation
Administration**

AAL-614
Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

July 1, 2013

Chad Van Ormer, Monument Ranger
Juneau Ranger District – Admiralty National Monument
U.S. Forest Service
8510 Mendenhall Loop Road
Juneau, AK 99801

RE: Angoon Airport Environmental Impact Statement
Section 4(f)

Dear Mr. Van Ormer:

In conjunction with the environmental impact statement (EIS) for the proposed Angoon Airport, the Federal Aviation Administration (FAA) is preparing an evaluation pursuant to Section 4(f) of the Department of Transportation Act of 1966 (Public Law 89-670) and its implementing regulations at 23 CFR 774. Section 4(f) requires that the proposed Angoon Airport avoid the use of land from publicly owned wildlife and waterfowl refuges and recreational properties, as well as certain types of historic sites, if feasible and prudent alternatives exist. The process of identifying such resources and evaluating the potential use of land from them requires consultation with the officials with jurisdiction over said resources. The FAA has identified the Kootznoowoo Wilderness Area as a publicly owned recreational property, over which the U.S. Forest Service has jurisdiction.

Section 4(f) requires that the FAA obtain your concurrence with four specific findings:

- The Kootznoowoo Wilderness Area is a publicly owned property whose primary purpose is recreation—in this case, primitive recreation.
- The Kootznoowoo Wilderness Area is a significant public recreational resource in the U.S. Forest Service system.
- The permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road—through easement, special use permit, long-term lease, or other instrument not involving a land exchange—would not constitute a *de minimis* use of the wilderness area.
- Section 4(f) does not apply to the archaeological site known as the Favorite Bay Garden Site (SIT-00302).

The FAA has determined that the Kootznoowoo Wilderness Area consists of federal public lands administered by the U.S. Forest Service and that primitive recreation by members of the general public is a primary purpose and goal of management of the wilderness area. Additionally, the FAA believes that the formal establishment of the wilderness area by Congress and a comparison of the recreational functions and values of the area versus the functions and values of other lands administered by the U.S. Forest Service support a finding that the wilderness area is a significant recreational property in the U.S. Forest Service system. That is, the Kootznoowoo Wilderness Area plays an important role in meeting the U.S. Forest Service's objective of providing public recreational opportunities. The FAA also finds that, in accordance with the criteria set forth in 23 CFR 774.11(d), Section 4(f) consideration applies to all lands within the boundary of the wilderness area.

Section 4(f), at 23 CFR 774.17, establishes that *use* of a Section 4(f) property occurs when:

1. land is permanently incorporated into a transportation facility;
2. there is a temporary occupancy of land that is adverse in terms of the Section 4(f) statute's preservationist purposes; or
3. there is a constructive use of a Section 4(f) property.

Based on the evaluation conducted in conjunction with the EIS, the FAA finds that alternatives Airport 3a and 4 and their access road options would use land from the Kootznoowoo Wilderness Area through permanent incorporation of wilderness area lands into the airport and access road (see Figure 1, attached). This permanent incorporation would occur through measures that would provide the Alaska Department of Transportation & Public Facilities with sufficient property interests to implement, operate, and maintain the transportation facilities over the long term. The FAA also finds that there would be no temporary occupancy or constructive use of wilderness area lands under either of these alternatives and that the permanent incorporation of wilderness area lands into the airport and access road under either Airport 3a or 4 would adversely affect the activities, features, or attributes of the wilderness area that qualify it for Section 4(f) protection.

The FAA further finds that alternative Airport 12a and its associated access road, which are located outside of the wilderness, would not use lands of the Kootznoowoo Wilderness Area. Airport 12a would not permanently incorporate lands of the wilderness area into either the airport or access road, nor would it require temporary occupancy of wilderness area lands or result in constructive use of said lands.

With regards to the archaeological site known as the Favorite Bay Garden Site, Section 4(f) states that historic sites that are chiefly important for what can be learned through data recovery (i.e., have minimal value for preservation in place) are excepted from Section 4(f) protection (23 CFR 774.13(b)(1)). The Favorite Bay Garden Site has been determined eligible for listing on the National Register of Historic Places under Criterion D (information potential). The FAA made this determination in consultation with the U.S. Forest Service and the Alaska State Historic Preservation Officer; there was no evidence to conclude that the site warrants preservation in place. Based on this determination of eligibility, the FAA finds that the site meets the exception criteria found in the statute, and Section 4(f) does not apply to the Favorite Bay Garden Site.

In accordance with Section 4(f), we respectfully request your written concurrence with our findings as outlined above. Alternatively, if you do not agree with our findings, please provide the details of your objection in writing.

Should you require additional information, I would be happy to arrange a conference call to discuss the matter. You can reach me via phone at (907) 271-5453, via e-mail at Leslie.Grey@faa.gov, or at the address above. You may also contact Sheri Ellis, who has been assisting the FAA in preparing the Section 4(f) evaluation for the Angoon Airport project. She may be reached via phone at (801) 230-7260 or via e-mail at Sheri@certussolutionsllc.com. I look forward to hearing from you soon.

Sincerely,

Leslie A. Grey

Leslie Grey
FAA Alaskan Region Airports Division
Angoon Airport EIS Project Manager

Attachment

cc: A. Childs (SWCA)

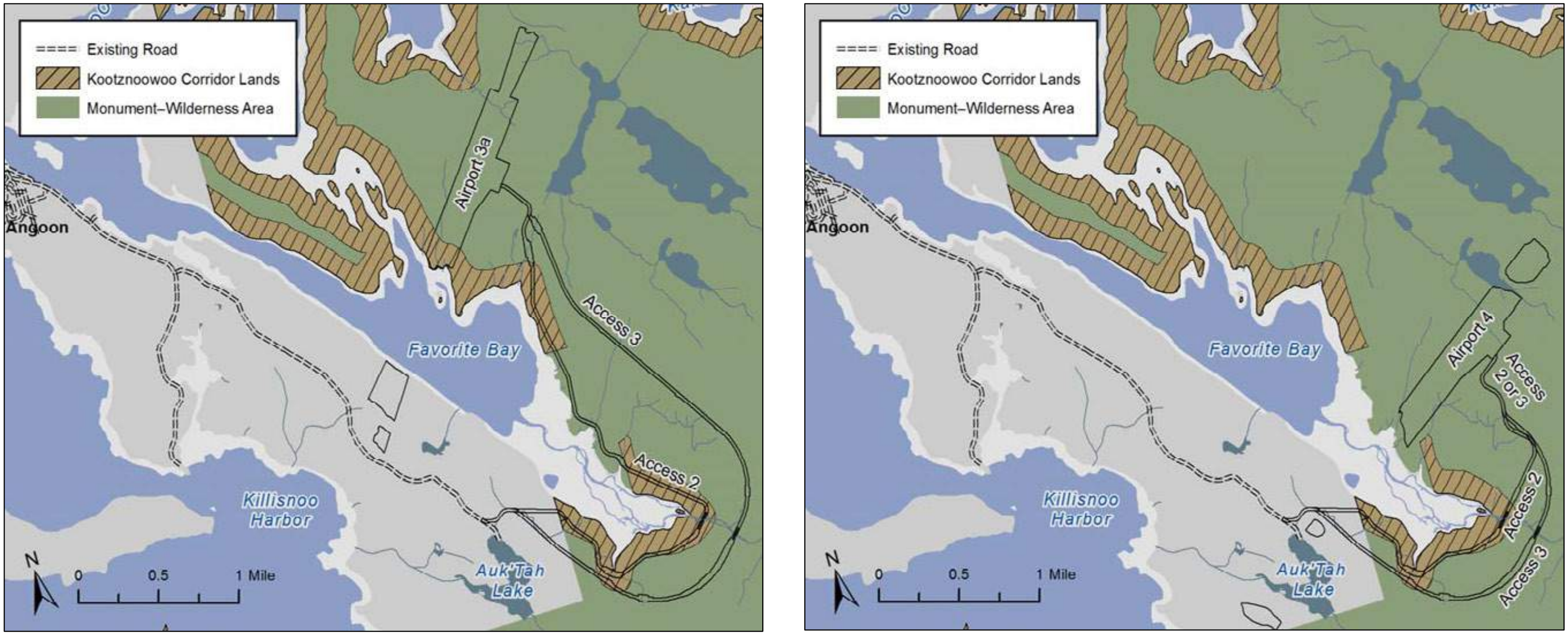


Figure 1. Locations of Airport 3a and Airport 4 with Access 2 or Access 3 showing proposed use of Section 4(f) properties. Airport 12a with Access 12a is not shown on this figure, but is located on the Angoon peninsula outside of the wilderness area.

U.S. Department
of Transportation
**Federal Aviation
Administration**

AAL-614
Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

July 15, 2013

Judith Bittner
State Historic Preservation Officer
Office of History and Archaeology
550 West 7th Ave., Ste. 1310
Anchorage, AK 99501-3565

RE: File No. 3131-1R FAA
Angoon Airport Environmental Impact Statement

Dear Ms. Bittner:

In April 2012, the Federal Aviation Administration (FAA) submitted our determinations of eligibility (DOE) for the above-referenced undertaking in Angoon, Alaska. We received your concurrence with our determinations on late April 2012. In our DOE letter, we notified you that the FAA is implementing a phased approach to historic properties identification. We noted that at such time as the FAA had identified a preferred alternative as part of the environmental impact statement (EIS) process and had sufficient information to identify the full area of potential effects (APE), we intended to conduct additional field investigations for that alternative. The FAA recently identified our preferred alternative—Airport 12a with Access 12a—and are prepared to proceed with the additional archaeological investigations.

As you may recall from our initial consultation with your office, the FAA is considering three action alternatives and one no action alternative for a land based airport in Angoon. Two of the action alternatives (Airport 3a and Airport 4) are located primarily on lands administered by the U.S. Forest Service. The third action alternative, Airport 12a, is located on lands owned by private individuals, the City of Angoon, and the village corporation (Kootznoowoo, Inc.). In addition to consultation with you, we are engaged in consultation with these parties, as well as the Angoon Community Association—the federally recognized tribal government—regarding the preferred alternative, its potential effects on historic properties and traditional cultural properties, and the additional field studies to be conducted.

The FAA has identified the APE for the preferred alternative to include all lands that would be subject to ground disturbance, vegetation clearing, or vegetation alteration (such as thinning or topping) for construction and operation of the airport and its access road. This APE, which is depicted on the attached figure, also includes anticipated disturbance areas for materials sites. Indirect effects from visual intrusion will not extend beyond the footprint of the areas cleared for airport and access road use due to the dense nature of the spruce-hemlock forest surrounding in the area and the nature of the terrain; the airport would be only minimally visible for a short distance beyond the edge of any cleared areas. Anticipated noise effects will extend beyond the airport footprint. The FAA will assess the effects of said noise on any noise-sensitive historic properties identified to date in the area surrounding the Airport 12a site; any currently undocumented noise-sensitive historic properties identified through consultation with tribal parties and community members will be evaluated similarly.

The FAA has contracted with SWCA Environmental Consultants (SWCA) to conduct the additional archaeological survey for the preferred alternative. SWCA also completed the previous survey associated with the EIS. SWCA will conduct an intensive-level pedestrian inventory of the APE as depicted on the attached figure. Using the U.S. Forest Service Admiralty Island model for identifying areas of high probability for archaeological resources and professional judgment, SWCA will also excavate shovel probes to help identify subsurface cultural resources and confirm the boundaries of known resources in the vicinity of the APE. To the extent allowable by terrain and vegetation cover, SWCA will place shovel probes in a systematic fashion on regular intervals. Upon completion of fieldwork, SWCA will prepare a technical report summarizing the results, and the FAA will consult with you and other consulting parties regarding any new determinations of eligibility and our findings of effect.

Pursuant to our DOE letter and the criteria in 36 CFR 800.3(c)(3) and 800.4(a), we request that you review the information contained in this letter, including the attached figure, and provide us with any comments you may have regarding 1) the APE as described herein, and 2) the methods proposed to identify historic properties. Please, also notify us of any concerns you may have about the undertaking in general or any specific historic properties of which you believe the FAA should be aware.

Should you require additional information, I would be happy to arrange a conference call to discuss the matter. You can reach me via phone at (907) 271-5453, via e-mail at Leslie.Grey@faa.gov, or at the address above. I look forward to hearing from you soon.

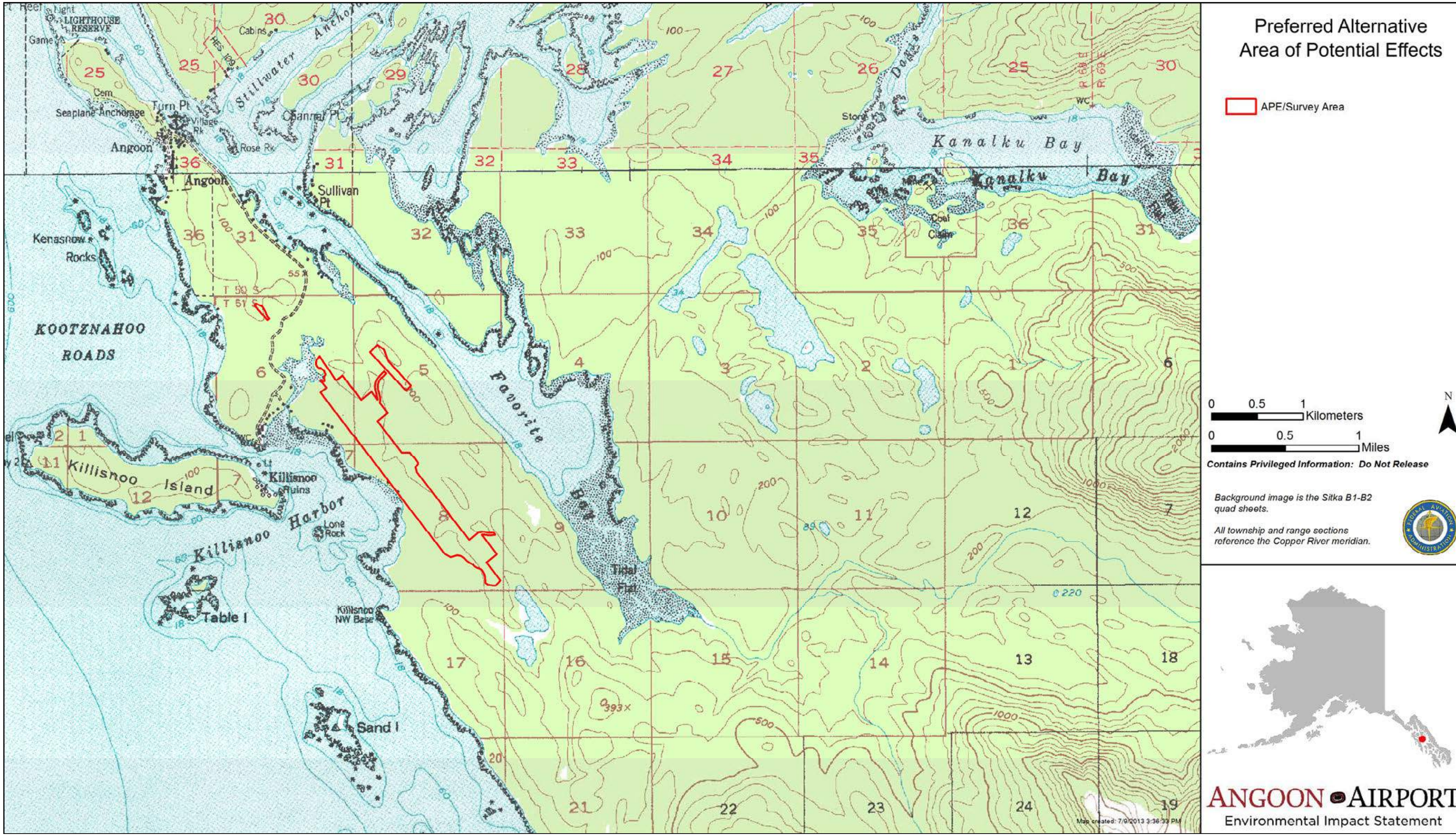
Sincerely,

Leslie A. Grey

Leslie Grey
FAA Alaskan Region Airports Division
Angoon Airport EIS Project Manager

Attachment

cc: A. Childs (SWCA)
V. Skageberg (ADOT&PF)
J. Gendron (ADOT&PF)



Area of potential effects / survey area for FAA's preferred alternative—Airport 12 with Access 12a—and associated materials sites and disturbance areas.

THE STATE
of ALASKA
GOVERNOR SEAN PARNELL

Department of Natural Resources

DIVISION OF PARKS AND OUTDOOR RECREATION
Office of History and Archaeology

550 West 7th Avenue, Suite 1310
Anchorage, Alaska 99501-3565
Web: http://dnr.alaska.gov/parks/oha
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AUG 29 2013

August 26, 2013

File No.: 3130-1R FAA

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS
AAL-614
Alaskan Region Airports Division
222 West 7th Avenue, #14
Anchorage, AK 99513

Subject: Angoon Airport Environmental Impact Statement

Dear Ms. Grey:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated July 15, 2013) on July 22, 2013.

Following our review of the documentation provided, we have no objections to the proposed area of potential effects (APE) as it is presently defined, with the understanding that as the project develops or changes, the APE may be amended accordingly. Additionally, we agree that the proposed methodology for further identification of historic properties is appropriate. We look forward to receiving the results of the inventory as they are available and to further consultation on the subject undertaking.

Thank you for the opportunity to comment. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer

JEB:sad

RECORD OF CONVERSATION	Time: 12:15PM	Date: 1/30/14

TYPE ☐ In-person Conversation ☐ Meeting/Conference ☒ Telephone ☒ Incoming ☐ Outgoing ☐ E-mail Chain (summarized here due to length and to focus on relevant information; copy should accompany this ROC)

Location of In-person Conversation, Meeting, or Conference: NA

Name of Persons Contacted or in Contact with You	Organization	Telephone No.
Matt Kookesh, Jr.; Mayor	City of Angoon	907.788.3653

Subject: call discussing Jamie's email "RE: formal plans for 2 platted parks?"

Summary of Conversation

Mayor Kookesh returned Jamie's call/email regarding:

- obtaining further information on the City's use and management of the two platted park areas, and
- confirming that the City understands that the FAA determined that these platted parks are not Section 4(f) resources in the Angoon Airport EIS.

Mayor Kookesh answered that:

- other than to protect them for subsistence uses, there are no plans for these platted parks, and likely won't be for some time.
- He has reviewed pages 166-167 of the preliminary draft EIS, and the City understands that the FAA made this determination, but these lands still have meaning to the community because they were selected via the 14(c)3 process. The community did not receive all of the acreage that they requested in that process. Those lands cannot be replaced via any other process, and they represent some of the only areas within which the City can expand. The City does not want Airport 12a because it would coincide with some of their only available land base.

Jamie explained that only the avigation easements for Airports 3a and 12a (shown on pages 169 and 171) would overlap with the platted City parks. These areas would have trees removed for aviation safety, but would otherwise still be accessible to Angoon community members.

Mayor Kookesh stated that the City does not support the Airport 12a location and that the entire City Council should be included in discussions regarding the airport locations. He said that he had a teleconference with the Alaska DOT Commissioner because the City feels that the FAA is ignoring the City in regards to the airport project. The City feels that the tribe (Angoon Community Association, ACA) has been consulted more than the City. Jamie explained that the informal community visits held at the ACA building were open to all members of the public and were not tribal consultation meetings. FAA has involved the City in the same manner as the ACA and Kootznoowoo, Inc., having most recently met with all 3 entities in late June 2013 to discuss the FAA's identification of a preferred alternative, and then included the City in the internal agency review of the preliminary draft EIS.

Mayor Kookesh brought up voting for airport locations and Jamie clarified that the FAA did not request that any voting take place. Jamie said that the FAA has received and reviewed resolutions of support from both the City and the ACA regarding the proposed airport locations.

Action Required: None

Name of Person Documenting Conversation: Jamie Young, SWCA Environmental Consultants

U.S. Department
of Transportation
**Federal Aviation
Administration**

AAL-614
Alaskan Region Airports
Division
222 West 7th Ave #14
Anchorage, AK 99513

**In Reply Refer To:
AIP-3-02-0018-0705**

February 14, 2014

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W. 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

**RE: File No. 3131-1R FAA
Angoon Airport Environmental Impact Statement**

Dear Ms. Bittner:

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Aviation Administration (FAA), is proposing to construct a new land-based airport for the community of Angoon on Admiralty Island in Southeast Alaska. As you may recall from our initial consultation with your office in May 2008 and follow-on correspondence in April 2012 and July 2013, the FAA is considering three action alternatives and one no action alternative for this land-based airport. Two of the action alternatives (Airport 3a and Airport 4) are located primarily on lands administered by the U.S. Forest Service (USFS). The third action alternative, Airport 12a, is located on lands owned by private individuals, the City of Angoon, and the village corporation (Kootznoowoo, Inc.). The FAA has identified Airport 12a with its associated access road as the preferred alternative. Airport 12a with Access 12a is located in Sections 5, 6, and 8, Township 51 South, Range 68 East, Copper River Meridian (U.S. Geological Survey quadrangles Sitka B-2). Pursuant to 36 Code of Federal Regulations (CFR) 800.4(d)(1), the implementing regulations of Section 106 of the National Historic Preservation Act, the FAA finds that no historic properties would be affected by the proposed project at the FAA's preferred location (Airport 12a with Access 12a).

The Project

The Project consists of a new airport and an associated access road. The Project would require ground disturbance from both temporary construction activities and long-term or permanent structures and terrain alteration. In general terms, the Project would consist of the following activities and components with the potential to affect historic properties:

- A 3,300-foot-long, 75-foot-wide paved runway

- A 150-foot-wide runway safety area centered on the runway centerline but extending 300 feet beyond each runway end
- A 75-foot-wide, roughly 150-foot-long paved taxiway
- A roughly 70,000-square-foot paved apron area with future hangar, lease lots, and passenger shelter space and vehicle parking space
- A paved airport access road comprising two 10-foot-wide travel lanes with 5-foot shoulders
- Excavation of post holes and installation of an airport perimeter fence
- Vegetation removal related to the airport and road (clearing for construction or for visibility)
- Terrain disturbance related to the airport and road (includes cutting and filling of soil, and ripping and blasting of shallow bedrock to level the ground)
- Terrain disturbance from potential extraction of construction materials such as gravel, soil, and rock from on-island materials sources
- Pavement related to the airport and road (creating smooth surfaces for airplanes and vehicles)
- Tree felling (cleared trees would be left where they fall) related to certain avigation easements (creating visually open areas for flight approach and takeoff)
- Rerouting or culverting of streams (to continue water flow that otherwise would be impeded by newly filled areas)

Area of Potential Effects

As discussed in the April 2012 and July 2013 correspondence with your office, the FAA implemented a phased approach to identifying cultural resources that could be affected by construction and operation of the airport. These phases consist of Phase 1 (preliminary studies of all three airports and their associated access road locations) and Phase 2 (intensive studies of only the FAA's preferred alternative). Following the identification of the preferred alternative, the FAA implemented Phase 2 for Airport 12a with Access 12a. The FAA has identified the direct area of potential effects (APE) for the preferred alternative to include all lands that would be subject to the above activities. Your office provided a letter of no objection to this APE in August 2013. Following our consultation with your office on the APE, the FAA identified additional areas wherein historic properties could be affected indirectly through visual intrusion, noise, and vibration. These APEs are shown on Figure 1 and Figure 2.

Historic Properties Identification Efforts

As part of the literature review conducted during the Phase 1 studies, the FAA's cultural resource consultant team reviewed the Office of History and Archaeology (OHA) citation database, Alaska Heritage Resources Survey (AHRS) records and location editor (geographic information system [GIS] site locator maps), Alaska Resources Library and Information Services data archives, and the Tongass National Forest Heritage Resources Survey data. Additionally, the FAA's cultural resource consultant reviewed the works of de Laguna (1960), Erlandson and Moss (1983), and Moss and Erlandson (1985), all of whom have conducted extensive work in the Angoon area, as well as the broader regional works of Goldschmidt and Haas (1946) and others. The specific data resources of the OHA and AHRS records were reviewed to identify relevant documentation and information for past archaeological and ethnographic studies and previously documented archaeological sites within 1 mile of the Phase 1 Direct APE. Because the Phase 1 and 2 APEs are slightly different, the cultural resource consultant team updated the literature review search area to a 1-mile radius around the Phase 2 Direct APE. In addition, this updated search included sources not available at the time of the Phase 1 studies. The updated literature review occurred in July 2013. The results of the Phase 2 cultural resources studies conducted for Airport 12a with Access 12a are included in the enclosed report, *Cultural Resources Technical Report for the Area of Potential Effects for Airport 12a with Access 12a (Preferred Alternative),* prepared by SWCA Environmental Consultants (SWCA). The results of the Phase 1 study were submitted to the State Historic Preservation Office (SHPO) in April 2012 and are also included as an appendix to the enclosed report.

Considerations of National Register of Historic Places Eligibility

Through the cultural resource studies, the FAA identified four cultural resource sites within the APEs for the Project. Three of these sites (SIT-00014, SIT-00056, and SIT-00749) are located wholly or partially in the Visual APE on Killisnoo Island, and one (SIT-00169) is located partially within the Vibration APE on the Angoon peninsula. Although these sites were previously documented during separate undertakings not part of the FAA's efforts, no determinations of eligibility have been made for any of the sites. For the purposes of this undertaking, the FAA has opted to forego a formal determination of eligibility and assume three sites (SIT-00014, SIT-00749, and SIT-00169) are historic properties. To allow for findings of effects relative to the potential visual intrusions and vibration effects from the Project, the FAA considered the historical significance of all sites relative to the criteria of the National Register of Historic Places (NRHP) and the sensitivity of that significance to visual or vibration effects. The review of significance is provided below, and the findings of effect follow.

Site SIT-00056 (St. Andrews Church) was also previously documented in the Visual APE; however, no evidence of the site, other than the land on which it was located, was identified by the FAA's archaeological consultant. As no physical remains of the church site were located, the FAA did not evaluate the site for impacts from the proposed undertaking.

Site SIT-00014, Killisnoo Island Village

SIT-00014 is the Killisnoo Island Village site—a historic Tlingit and Euro-American village and commercial/industrial site. The village was destroyed by a fire in 1928. This site appears to be eligible for the NRHP under Criteria A and D for the following reasons:

- The whaling operations from the village are also associated with one of the most infamous events in the history of Angoon, namely the shelling of Angoon by the U.S. Navy in 1882.
- Killisnoo Island Village is directly associated with the relocation of Aleuts from Atka during World War II.
- There is potential for both surface and subsurface archaeological deposits that could expand the understanding of the history of Killisnoo Island Village.

- The artifact assemblage has the potential to yield information dating as far back as the prehistoric period and all of the different use periods since then. In particular, the assemblage could provide information about the interactions of the different ethnic, religious, and culture groups that occupied the village both over time and at the same time.

Due to the destruction and/or demolition of all of the buildings, and the near-complete lack of building ruins, SIT-00014 does not appear to retain sufficient integrity to be eligible under Criteria B and C—that is, the site lacks sufficient integrity to convey its historical associations with any specific historical person or to reflect specific architectural or engineering types, styles, or manners of construction.

Site SIT-00169, Killisnoo Harbor Village
Site SIT-00169 is the Killisnoo Harbor Village site. It is located on the eastern shoreline of Killisnoo Harbor, south of the current Angoon ferry terminal. The first archaeological investigations of the site appear to have been conducted by de Laguna, who learned from residents of Angoon that the village had been abandoned after an epidemic, perhaps in the 1830s (de Laguna 1960). She observed garden furrows and found traces of midden in subsurface tests. In the 1970s the site was investigated and formally recorded by Sealaska Corporation, at which time the remains of two cabins, historical debris, and extensive gardens were noted (Sealaska and Wilsey & Ham 1975). Shortly thereafter, Fields and Davidson (1979) conducted a cursory examination of the area and recorded four decaying cabins, historical debris, depressions, garden plots, and crushed shell possibly indicative of midden deposits.

Based on observations of the site, it appears likely the site would qualify for the NRHP under at least Criterion D, as it has the potential to yield information important in expanding the understanding of historical land uses in the Angoon area. Because the structural remains at the site are collapsed and in ruins and do not retain integrity of design and workmanship, it is unlikely the site would qualify for listing in the NRHP under Criterion C. The FAA did not research the associations of the site relative to important historical persons or events and, therefore, is not offering an opinion on the eligibility of the site relative to Criteria A and B of the NRHP.

Site SIT-00749, Killisnoo Cemetery
SIT-00749 is a historical Aleut and Russian Orthodox cemetery (Killisnoo Cemetery) located on Killisnoo Island. The cemetery contains several dozen graves of primarily Russian Orthodox Alaska Natives. Several Aleut persons who died during their forced relocation from Atka—in the Aleutian Chain—to Killisnoo during World War II are also buried in the cemetery, as are at least a few persons of Japanese or Japanese-American descent. Grave markers and remnants of burial houses are still present, though heavily weathered. There is no evidence that the cemetery constitutes a designed landscape.

Although cemeteries are typically excluded from inclusion in the NRHP, the SIT-00749 cemetery appears likely to meet the standards for Criteria Consideration D, which addresses exceptions to the rule. Specifically, the Killisnoo Cemetery appears to be eligible for the NRHP under Criterion A. The cemetery does not appear to meet the criteria consideration for associations with persons of “transcendent importance” or retain sufficient integrity of structural features to merit eligibility under Criteria B or C.

Under Criterion A, the cemetery is a significant site for its associations with the history of Killisnoo Island and Killisnoo Island Village. The cemetery still reflects strong associations with the various cultural and religious affiliations of Killisnoo Island’s residents over time. Russian Orthodox, Aleut, Tlingit, Japanese, and Euro-American grave markers are all present and represent the small island’s varied occupants. The cemetery also reflects the different periods of occupation of nearby Killisnoo Island Village, from the late 1800s to the mid-1900s. For these reasons, the cemetery site appears to be eligible for the NRHP under Criterion A and meets the criteria considerations set forth by the National Park Service (NPS) for cemetery sites.

Findings of Effect

Site SIT-00014, Killisnoo Island Village

SIT-00014, Killisnoo Island Village, is located within the Visual APE for the current undertaking. The characteristics for which SIT-00014 appears to be eligible for the NRHP are not sensitive to visual intrusion. The historical village site was not located on the eastern shore of Killisnoo Island because of its particular viewshed. Rather, all indications are that the village was located as such because of the calm waters afforded by Killisnoo Harbor. During its period of industrial and residential development, the situating of buildings does not appear to have been specifically influenced by the viewshed and was defined by available land, the island’s topography, and the development of different zones (e.g., industrial and residential) to separate, at least to a certain degree, living quarters and social activities from the industrial facilities. The historical associations of the village site under Criterion A are not affected by the viewshed from the site.

The apparent eligibility of the Killisnoo Island Village site under Criterion D for its information potential is not vulnerable to changes in the viewshed of the site; the extent, nature, or quality of the data that could be recovered would be in no way affected by alteration of the landscape on lands across the harbor from the site.

Based on the reasons presented above, the anticipated landscape changes from Airport 12a would have no effect on the Killisnoo Island Village site (SIT-00014). As such, the FAA has made a finding of ***No Historic Properties Affected*** relative to site SIT-00014.

Site SIT-00169, Killisnoo Harbor Village

Site SIT-00169, Killisnoo Harbor Village, is partially located in the Vibration APE for the current undertaking. Since the soil composition in the vicinity of the site is stable and not defined by loose deposits that could allow for movement of subsurface artifacts due solely to vibration, the archaeological component of this site does not appear vulnerable to vibration effects. The structural component of site SIT-00169 consists of collapsed cabin remains. Because these structures have already collapsed and become overgrown and heavily weathered, they no longer appear susceptible to damage or impairment from potential vibration associated with construction of the airport on adjacent lands.

Based on the reasons presented above, vibration associated with construction of the airport on adjacent lands would have no effect on the Killisnoo Harbor Village. As such, the FAA has made a finding of ***No Historic Properties Affected*** relative to site SIT-00169.

SIT-00749 Killisnoo Cemetery

Site SIT-00749, the Killisnoo Cemetery, is located in the Visual APE for the current undertaking. This site is located in a moderately dense, second-growth spruce-hemlock forest. Visibility from the cemetery grounds to the surrounding landscape is somewhat limited by the forest landscape.

Although cemeteries are often intentionally situated on the landscape to take advantage of viewsheds afforded by certain topographic features, this does not appear to be the case with the Killisnoo Cemetery. Rather, the cemetery's location appears from historical maps of the island to be as much, if not more, a matter of available land near the Killisnoo Village as a specific selection based on viewshed. Additionally, the reasons for which the Killisnoo Cemetery would be eligible for the NRHP are not specifically because of its role as a cemetery site but rather its associations with and ability to reflect the historical activities and cultures of Killisnoo Village and Killisnoo Island over time. These facets of the site's importance are not sensitive to visual intrusion from the landscape across Killisnoo Harbor. As such, the visual changes to the landscape anticipated from Airport 12a are expected to have no effect on the significance of site SIT-00749, the Killisnoo Cemetery and thus, the FAA has made a finding of ***No Historic Properties Affected*** relative to site SIT-00749.

Overall Finding of Effect

No historic properties are present in the Direct APE or the Noise APE. Historic properties are present within the Visual APE and the Vibration APE but the Project does not have any effect on the characteristics that qualify these properties for inclusion in the NRHP. Therefore, the FAA's issuance of approvals or funding for the construction and operation of an airport at the Airport 12a with Access 12a location or use of the potential materials source would result in a finding of ***No Historic Properties Affected***.

Based on our determinations of effect through this Section 106 consultation process, the FAA also intends to make a finding of No Use of Historic Properties for all of the sites under Section 4(f) of the Department of Transportation Act (as amended).

Previous Consultation Efforts

The FAA has consulted with other parties, including the Project sponsor (DOT&PF), the USFS, the Angoon Community Association, the Central Council of the Tlingit and Haida Indian Tribes of Alaska, Sealaska Corporation, Kootznoowoo, Inc., and several members of the Angoon community, as part of our efforts to identify historic properties. All consulting parties will receive a copy of this finding of effect. Beyond the USFS, only local community members and Kootznoowoo, Inc. have provided information regarding the potential locations of historic properties and their relative importance to the community.

The FAA respectfully requests your concurrence with our findings of No Historic Properties Affected for this project. Please feel free to contact me if you have any questions or comments regarding the enclosed materials or require additional information. I can be reached at the address above or at 907-271-5453.

Sincerely,

Leslie A. Grey

Leslie A. Grey
FAA Project Manager
Angoon Airport Environmental Impact Statement

Enclosures:

Figures 1 and 2
Office of History and Archaeology Cover Sheet
SWCA Environmental Consultants. 2014. *Cultural Resources Technical Report for the Area of Potential Effects for Airport 12a with Access 12a (Preferred Alternative).* Anchorage, Alaska: SWCA

cc w/ enclosures:

Laurie Mulcahy, DOT&PF, Cultural Resources Manager

cc w/o enclosures:

Verne Skagerberg, DOT&PF Southeast Region, Project Manager
Jane Gendron, DOT&PF Southeast Region, Regional Environmental Manager
John Barnett, DOT&PF, Acting Regional Environmental Manager
Michael Kell, DOT&PF, Historic Archaeologist

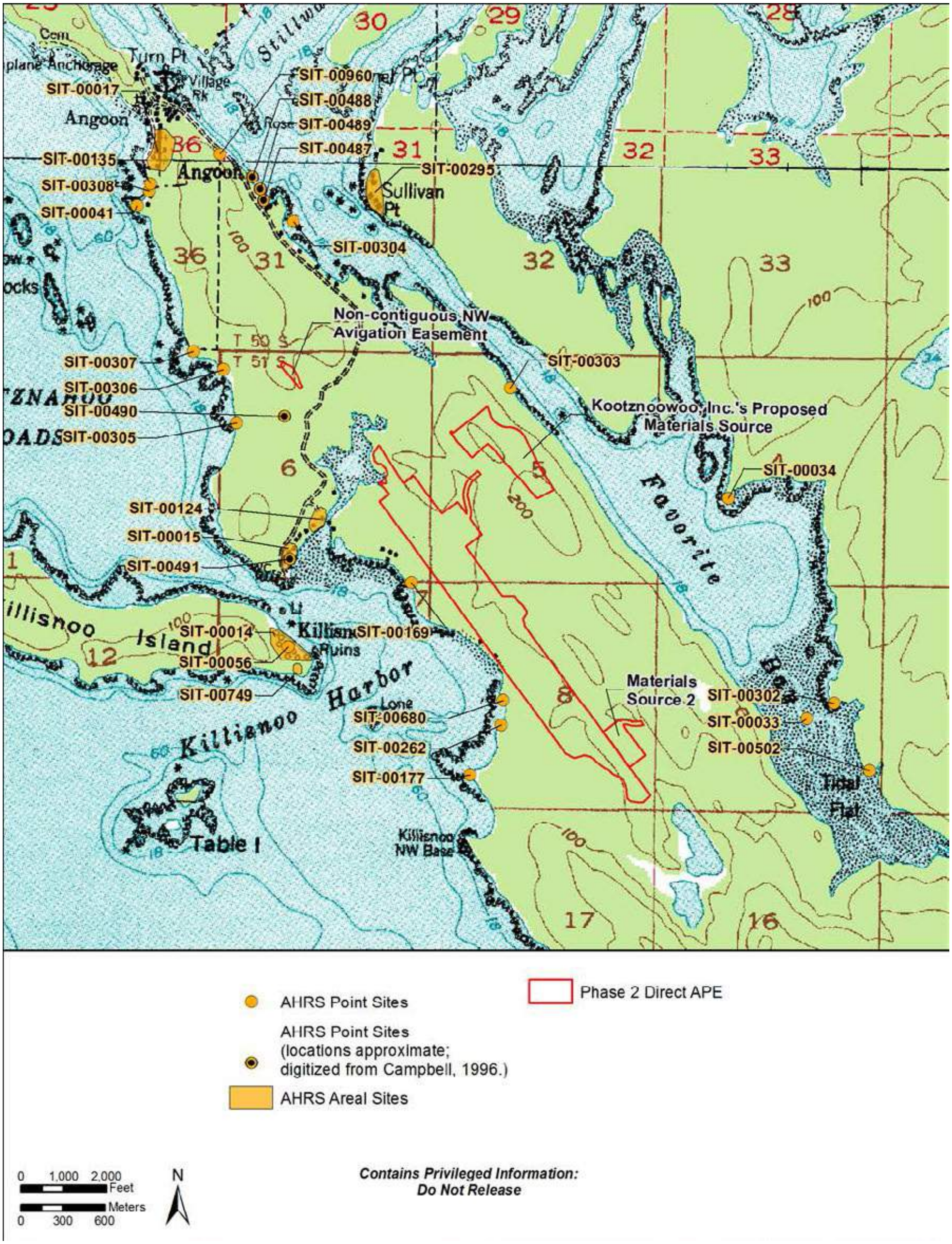

Figure 1. Phase 2 Direct APE and AHRS point sites within 1 mile of this APE.

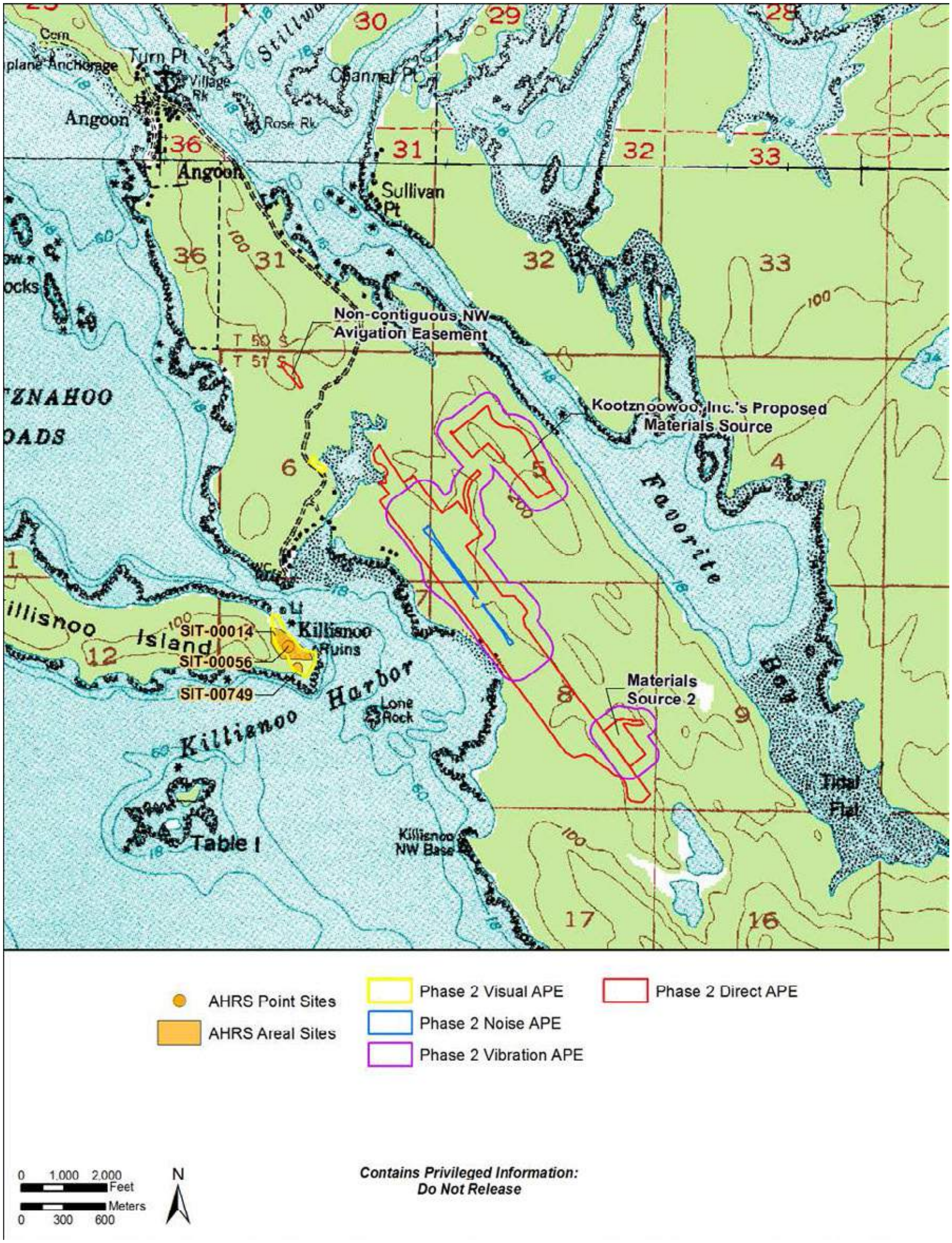

Figure 2. Phase 2 indirect APEs and AHRS recorded sites within these APEs.

United States Department of Agriculture | Forest Service | Alaska Region Tongass National Forest | 648 Mission Street Ketchikan, AK 99901 Phone: (907) 225-3101 Fax: (907) 228-6215

File Code: 1900
Date: March 4, 2014

Leslie Grey
Angoon Airport EIS Project Manager
FAA - Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

Dear Ms. Grey:

Regarding the environmental impact statement (EIS) for the proposed Angoon Airport, I've reviewed your evaluation pursuant to Section 4(f) of the Department of Transportation Act of 1966 (Public Law 89-670).

With this letter, I concur with FAA's four specific findings:

- The Kootznoowoo Wilderness Area is a publicly owned property, for which a primary purpose is recreation.
- The Kootznoowoo Wilderness Area is a significant public recreational resource in the National Forest System.
- The permanent incorporation of land from the Kootznoowoo Wilderness Area into an airport and access road – through easement, special use permit, long-term lease, or other instrument not involving a land exchange – would not constitute a *de minimis* use (in the context of Section 4(f)) of the wilderness area.
- Section 4(f) does not apply to the archaeological site known as the Favorite Bay Garden Site (SIT-00302).

The Kootznoowoo Wilderness Area exemplifies a complex character which includes outstanding opportunities for solitude or primitive and unconfined types of recreation; untrammeled areas and natural conditions where wildlife and waterfowl may thrive, and unrestricted opportunities for subsistence.

I agree with FAA's finding that alternatives Airport 3a and 4 and their access road options would constitute "use" of land from the Kootznoowoo Wilderness Area, as defined in Section 4(f), at 23 CFR 774.17. Permanent incorporation of wilderness area lands into the airport and access road under either Airport 3a or 4 would adversely affect the activities, features, or attributes of the wilderness area that qualify it for Section 4(f) protection.

Additionally, I concur with FAA's finding that alternative Airport 12a and its associated access road, would not use lands within the Kootznoowoo Wilderness Area. Airport 12a would not permanently incorporate lands designated as wilderness into either the airport or access road, nor would it require temporary occupancy of wilderness or result in constructive use of said lands.

Should you require additional information or consultation, please feel free to contact Jennifer Berger of the Admiralty Island National Monument staff. She can be reached at (907) 789-6278 or via email at jberger@fs.fed.us . Thank you for your efforts on this project to date.

Sincerely,

FORREST COLE
Forest Supervisor

cc:
Chad VanOrmer
Jennifer Berger

THE STATE of ALASKA

GOVERNOR SEAN PARNELL

Department of Natural Resources

DIVISION OF PARKS AND OUTDOOR RECREATION
Office of History and Archaeology

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April 4, 2014

File No.: 3130-1R FAA
3330-6 SIT-00014, 3330-6 SIT-00169, 3330-6 SIT-00749

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS
AAL-614
Alaskan Region Airports Division
222 West 7th Avenue, #14
Anchorage, AK 99513

Subject: Angoon Airport Environmental Impact Statement and Cultural Resources Technical Report for the Area of Potential Effects for Airport 12A with Access 12A (Preferred Alternative)

Dear Ms. Grey:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated February 14, 2014) on February 18, 2014. Following a request for additional information from this office, you provided a summary of consulting party comments on March 20, 2014. In addition, we received a summary of comments / concerns from DOT&PF Southeast Region on April 2-3, 2014.

Following our review of the documentation provided, we offer the following comments:

- Although FAA specified in the cover letter provided that they would forego formal determinations of eligibility and assume three sites eligible for the National Register of Historic Places (NRHP), we believe that the cultural resource report and summary information provided in FAA's cover letter provide sufficient support that SIT-00014, SIT-00169, and SIT-00749 are **eligible** for the NRHP. Therefore, rather than assume eligibility, we believe that SIT-00014 is eligible under criteria A and D, SIT-00169 is eligible, at a minimum, under criterion D and additional research may reveal that it is eligible under other criteria, and that SIT-00749 is eligible under criteria consideration D and criterion A.
- We recommend that the FAA provide a formal determination of eligibility for SIT-00056. If it is no longer present and no archaeological material remains, a formal determination of 'not eligible' may be appropriate. It appears that there is sufficient documentation available to make this eligibility call.
- We understand that local community members (e.g., elders and others) and Kootznoowoo, Inc. provided feedback regarding the locations of Beaver Tail Rock (SIT-00781). However, the nature or location of site is not discussed in the report nor does our office have any additional information for SIT-00781. Will it be affected by the undertaking?
- With respect to the known sites located within the indirect visual APE (SIT-00014 and SIT-00749), we believe the proposed project presents the potential for effects to these sites. We recommend that FAA apply the Criteria of Adverse Effect (36 CFR 800.5[a]) in order to assess whether the effect is adverse or not.

- A review of comments provided by other consulting parties – primarily DOT&PF – we believe that some key concerns remain unaddressed:
    - While we did not object to the APE as defined in FAA's July 2013 correspondence, it appears that other key consulting parties believe the APE has been inadequately defined. We recommend that the FAA respond to the comments provided by DOT&PF regarding the definition of the APE and provide a basis for its definition. Does the indirect APE adequately encompass the geographic area where effects may occur to historic properties?
    - The archaeological survey was conducted in mid-summer 2013 when ground-covering vegetation is at its height and surface visibility must have been somewhat limited. Does FAA believe that additional pedestrian inventory is warranted during a season of improved surface visibility?
    - A concern has been raised that the boundary of SIT-00169 has not been sufficiently defined and that it may be more extensive than the present survey reports. Does the FAA have a high level of confidence in the boundary of SIT-00169 as presently defined? Is there a potential for the site to be affected by the proposed undertaking?
    - Given the presence of cemetery sites in the vicinity, has the potential for encountering buried human remains been adequately addressed?
    - For similar reasons, would it be advisable to require archaeological monitoring during construction?
    - Has the FAA adequately considered the potential long-term indirect effects that could result from increased access in the vicinity of the project area?

Thank you for the opportunity to comment. We look forward to continued consultation on the subject undertaking. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer
JEB:sad

U.S. Department
of Transportation
**Federal Aviation
Administration**

AAL-614
Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

In Reply Refer To: AIP-3-02-0018-0705

April 30, 2014

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

**RE: File No. 3131-1R FAA
Angoon Airport Environmental Impact Statement and Cultural Resources Technical Report for the Area of Potential Effects for Airport 12a with Access 12a (Preferred Alternative) Determinations of Eligibility**

Dear Ms. Bittner:

In your letter dated April 4, 2014, which was submitted in response to our consultation with your office regarding the above-referenced undertaking, you requested that the Federal Aviation Administration (FAA) make formal determinations of eligibility for the National Register of Historic Places (NRHP) for several cultural resource sites located within the area of potential effects (APE) of the project rather than merely assume eligibility for the purposes of assessing project effects. The sites in question are SIT-00014, SIT-00169, SIT-00749, and SIT-00056. This letter provides our formal determinations for these sites and requests your concurrence with them.

In our consultation letter to you dated February 14, 2014, we provided a review of NRHP eligibility considerations for sites SIT-00014, SIT-00169, and SIT-00749. We reiterate those here, with additional evaluation, along with our formal determinations regarding site eligibility. Also, as requested, we have included a more detailed evaluation of site SIT-00056 and a formal determination of eligibility for said site.

Site SIT-00014, Killisnoo Island Village

SIT-00014 is the Killisnoo Island Village site—a historic Tlingit and Euro-American village and commercial/industrial site. The village was almost entirely destroyed by a fire in 1928 and has been affected by the Whaler's Cove Lodge complex built on approximately two-thirds of the site area, but artifacts, historical objects, and a few landscape features do remain in portions of the site more inland from the lodge facility. The FAA has determined this site is eligible for the NRHP under Criteria A and D for the following reasons:

- The whaling operations from the village are associated with one of the most infamous events in the history of Angoon, namely the shelling of Angoon by the U.S. Navy in 1882.
- Killisnoo Island Village is directly associated with the relocation of Aleuts from Atka during World War II; the relocations of Alaska Natives and Japanese-Americans has been designated a significant historical theme/context by the National Park Service (NPS).

- The potential exists in portions of the site for both surface and subsurface archaeological deposits that could expand the understanding of the history of Killisnoo Island Village.
- The artifact assemblage has the potential to yield information dating as far back as the prehistoric period and all of the different use periods since then. In particular, the assemblage could provide information about the interactions of the different ethnic, religious, and culture groups that occupied the village both over time and at the same time.

Although many individuals and collections of individuals are associated with the site, the remnants of the village that do exist lack the integrity needed to convey their association with such individuals for the purposes for which said persons are historically important. As such, the FAA finds the site ineligible for the NRHP under Criterion B. Further, due to the destruction and/or demolition of all of the buildings, SIT-00014 does not appear to retain sufficient integrity to be eligible under Criterion C—that is, the site lacks sufficient integrity to convey its historical associations with any specific historical person or to reflect specific architectural or engineering types, styles, or manners of construction.

Site SIT-00056, St. Andrews Church

Site SIT-00056 is the St. Andrews Church site. The site was documented in Alaska Heritage Resources Survey (AHRS) records in 1974 through an archival exercise associated with Russian Orthodox Church buildings and sites in Alaska. No fieldwork was conducted at that time to verify the existence of the church or any archaeological remains. The documented site location is on the eastern side of Killisnoo Island, within the boundary of site SIT-00014 (the Killisnoo Island Village site). The church building was constructed during the early 1890s and used until the 1928 fire that burned the church, and the rest of the buildings in Killisnoo Island Village, to the ground.

As noted in the discussion of site SIT-00014, approximately two-thirds of the Killisnoo Island Village site, within which the St. Andrews Church was located, is now occupied by the Whaler’s Cove Lodge complex. A reconnaissance of the documented location of the St. Andrews Church site during the Phase 1 field studies for the Angoon Airport project in 2009 concluded that the property on which the St. Andrews Church was located remains undeveloped as an inholding within the Whaler’s Cove Lodge property; however, there are no physical remains of the church building present on that property. No artifacts were observed at the site location during the 2009 reconnaissance, but vegetation overgrowth obscured the ground surface. It should also be noted that given the long and extensive history of artifact collecting and salvage that has occurred in the Killisnoo Island Village site since the abandonment of the village after the fire, the provenience of any surface artifacts at the St. Andrews Church site should be met with skepticism. Lacking permission to conduct any subsurface probing at the site, the 2009 crew did not excavate any shovel probes to assess the potential for intact subsurface deposits.

Although St. Andrews Church played a prominent role in the lives of the Russian Orthodox in Killisnoo Island Village and was an important outpost in the battle between the Russian Orthodox Church and other religious institutions to gain converts among Alaska Natives, the site lacks the integrity needed to reflect this association or its association with important individuals. Because it does not have structural remains and standing features, the site also lacks the integrity to represent a particular architectural type or style, method of construction, or artistic design. As such, the FAA has determined that the site, independent of the Killisnoo Island Village site (SIT-00014), is not eligible for the NRHP under Criteria A, B, and C. The FAA does find, however, that the potential exists for subsurface cultural deposits, although such deposits are likely to be both sparse and shallow due to the relatively short period of time over which the church existed. Therefore, the FAA has determined that site SIT-00056, the St. Andrews Church site, is <u>eligible for the NRHP under Criterion D</u>, at least until proven otherwise by subsurface investigations.

Site SIT-00169, Killisnoo Harbor Village

Site SIT-00169 is the Killisnoo Harbor Village site. It is located on the eastern shoreline of Killisnoo Harbor, south of the current Angoon ferry terminal. The site includes garden furrows, the ruins of two cabins, historical artifacts, earthen depressions, and evidence of a subsurface shell midden. The structural remains at the site are collapsed and in ruins and do not retain integrity of design and workmanship.

According to the 1960 work *The Story of a Tlingit Community* by Frederica de Laguna, the village site was reportedly occupied for a relatively short period of time and appears to have been abandoned during or shortly after the 1836–1839 smallpox epidemic; the village was said to comprise only a handful of "huts" (houses) but fairly extensive gardens. The oral history collected by de Laguna about the site suggests it was not a major or historically important establishment but rather a convenient, wide spot on the shoreline of Killisnoo Harbor where individuals who chose not to live in one of the other village settlements established homes and garden plots. There is no evidence from de Laguna's work or the multiple investigations of the site over the years since then, including the assessment conducted for the current undertaking, to suggest the site is associated with important historical events or persons.

Based on the information outlined above, the FAA has determined that site SIT-00169 is eligible for the NRHP under Criterion D, as it has the potential to yield information important in expanding the understanding of historical land uses in the Angoon area, albeit over an apparently short period of time. Additionally, an analysis of the artifact assemblage could yield information that may shed additional light on the occupants of the area and any cultural, ethnic, or other reasons why they chose to live outside the larger village sites in the area. The FAA has determined that the site is not eligible for the NRHP under Criteria A, B, or C.

Site SIT-00749, Killisnoo Cemetery

SIT-00749 is a historical Aleut and Russian Orthodox cemetery (Killisnoo Cemetery) located on Killisnoo Island. The cemetery contains several dozen graves of primarily Russian Orthodox Alaska Natives. Several Aleut persons who died during their forced relocation from Atka—in the Aleutian Chain—to Killisnoo during World War II are also buried in the cemetery, as are at least a few persons of Japanese or Japanese-American descent. Grave markers and remnants of burial houses are still present, though heavily weathered. There is no evidence that the cemetery constitutes a designed landscape.

Although cemeteries are typically excluded from inclusion in the NRHP, the SIT-00749 cemetery appears likely to meeting the standards for Criteria Consideration D. Specifically, the Killisnoo Cemetery appears to be eligible for the NRHP under Criterion A. The cemetery does not appear to meet the criteria consideration for associations with persons of "transcendent importance" or retain sufficient integrity of structural features to merit eligibility under Criteria B or C.

Under Criterion A, the cemetery is a significant site for its associations with the history of Killisnoo Island and Killisnoo Island Village. The cemetery still reflects strong associations with the various cultural and religious affiliations of Killisnoo Island's residents over time. Russian Orthodox, Aleut, Tlingit, Japanese, and Euro-American grave markers are all present and represent the small island's varied occupants. The cemetery also reflects the different periods of occupation of nearby Killisnoo Island Village, from the late 1800s to the mid 1900s. For these reasons, the FAA has determined that the cemetery site is eligible for the NRHP under Criterion A and meets the criteria considerations set forth by the NPS for cemetery sites.

The FAA respectfully requests your concurrence with our determinations of eligibility for the four sites discussed herein. Please feel free to contact me if you have any questions or comments regarding the information we have provided in support of our determinations. I can be reached at the address above or at 907-271-5453. We will be submitting under separate cover our amended findings of effect and responses to the other comments you provided in your April 4, 2014, correspondence. We look forward to continuing our consultation with your office regarding the Angoon Airport.

Sincerely,

Leslie A. Grey
FAA Project Manager
Angoon Airport Environmental Impact Statement

cc:

Laurie Mulcahy, DOT&PF, Cultural Resources Manager
Verne Skagerberg, DOT&PF Southeast Region, Project Manager
Jane Gendron, DOT&PF Southeast Region, Regional Environmental Manager
John Barnett, DOT&PF, Acting Regional Environmental Manager
Michael Kell, DOT&PF, Historic Archaeologist

References

de Laguna, Frederica. 1960. *The Story of a Tlingit Community*. Washington D.C.: United States Government Printing Office.

THE STATE of ALASKA

GOVERNOR SEAN PARNELL

Department of Natural Resources

DIVISION OF PARKS AND OUTDOOR RECREATION
Office of History and Archaeology

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RECEIVED

JUN 10 2014

June 9, 2014

File No.: 3130-1R FAA
3330-6 SIT-00014, 3330-6 SIT-00169, 3330-6 SIT-00749, 3360-6 SIT-00056

Leslie A. Grey
FAA Project Manager
Angoon Airport EIS
AAL-614
Alaskan Region Airports Division
222 West 7th Avenue, #14
Anchorage, AK 99513

Subject: Angoon Airport Environmental Impact Statement and Cultural Resources Technical Report for the Area of Potential Effects for Airport 12A with Access 12A (Preferred Alternative) Determinations of Eligibility

Dear Ms. Grey:

The Alaska State Historic Preservation Office (AK SHPO) received your correspondence (dated April 30, 2014) on May 12, 2014.

Following our review of the documentation provided, we offer the following comments:

- As noted in a letter from our office dated April 4, 2014, we concur that SIT-00014, SIT-00169, and SIT-00749 are **eligible** for the National Register of Historic Places (NRHP). Specifically, that SIT-00014 is eligible under criteria A and D, SIT-00169 is eligible under criterion D, and that SIT-00749 is eligible under criteria consideration D and criterion A.
- We further concur that SIT-00056 is **eligible** for the NRHP under criterion D and that additional investigations may tell us more about the extent and significance of archaeological deposits present at the site.

Thank you for the opportunity to comment. We look forward to continued consultation on the subject undertaking. Please contact Shina duVall at 269-8720 or shina.duvall@alaska.gov if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner

Judith E. Bittner
State Historic Preservation Officer
JEB:sad

Memorandum

To: Leslie Grey (FAA)

CC: Amanda Childs (SWCA)

From: Sheri Murray Ellis (Certus)

Date: 8/24/2015

Re: Angoon Airport EIS – Review of Information from Angoon Mayor Regarding Section 4(f) Applicability to Platted Parks

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Introduction

This memo summarizes pertinent information gathered during our recent meeting with Mayor Matthew Kookesh of Angoon regarding platted park lands in Angoon and the applicability of Section 4(f) to those lands. This meeting was held in response to the mayor's official comments submitted to the FAA regarding the draft EIS. In said comments, the mayor asked what Section 4(f) is and how it applies to the airport project. He also specifically requested additional discussion of the platted park lands. The FAA's purposes in meeting with the mayor were to 1) provide an overview of the law; 2) discuss, in detail, the criteria the FAA must consider in determining whether a resource/property qualifies for Section 4(f) protection as a public park or recreation area; and 3) to request any additional information that the mayor has that is applicable to the Section 4(f) evaluation of the platted park parcels.

As you are aware, thus far in the evaluation conducted for the Angoon Airport EIS, the FAA has determined that Section 4(f) does not apply to lands shown on the available city plat for lands in the area of the Airport 12a alternative as "parks." This plat map comes from the draft ANCSA 14(c) conveyance plan prepared on behalf of Kootznoowoo, Inc., the village native corporation for the Angoon area. The FAA determined Section 4(f) does not apply to these lands for several reasons, including the lack of evidence of the City of Angoon's intentions to manage or develop the lands for public park or recreation purposes and the mayor's previous statements that the land in question is currently primarily used for subsistence activities (e.g., hunting and berry picking). With regards to the intentions to manage or develop the land for public park or recreation purposes, the City of Angoon had been unable to provide any documentation of such intention beyond the draft conveyance plan, which outlines development and uses of the platted park lands for park purposes. The FAA determined that this plan was issued on behalf of Kootznoowoo, Inc. and, lacking documentation of the City's adoption of the plan in whole, does not necessarily reflect the intentions of the City of Angoon.

During our meeting with Mayor Kookesh, he provided information both verbally and in hard copy that is relevant to the Section 4(f) evaluation for the Angoon Airport EIS. Amanda Childs of SWCA electronically recorded the conversation for the project record. The discussion below summarizes the key findings of our meeting with the mayor.

Section 4(f) Considerations

As part of our discussion with Mayor Kookesh, I reviewed the four criteria a property must meet to be considered a Section 4(f) resource as a publicly owned recreation area. These criteria are as follows:

- **Criterion 1:** It must be publicly owned
- **Criterion 2:** It must be open to the public
- **Criterion 3:** Its major purpose must be for park or recreation activities
- **Criterion 4:** It must be significant as a park or recreation area

In reviewing these criteria with the mayor relative to the lands in question near the Airport 12a alternative, several key bits of information were obtained:

Criterion 1—It must be publicly owned

- In contrast to information shared previously by Kootznoowoo, Inc.—the entity responsible for deeding land to the City of Angoon as an ANCSA 14(c)(3) conveyance—the deeds for conveying the land to the City were never finalized. As such, the **land shown on plat maps as city parks is not currently publicly owned** as the FAA previously understood. Rather, it remains in the ownership of Kootznoowoo, Inc., a non-public entity.

  - Mayor Kookesh indicated that the City of Angoon is in the process of revising the 14(c)(3) conveyances with Kootznoowoo, Inc. Once that is completed, the final paperwork will be filed to complete the land transfer. The mayor did not have a time frame for when this would be completed; however, he did indicate he intends to resume work on the effort this winter.

  - Mayor Kookesh indicated that the transfer of lands to the City of Angoon as part of the 14(c)(3) agreement was never finalized due to the failure of the previous mayoral administration to file the necessary paperwork. This statement is supported by land ownership information available through the Alaska Department of Natural Resources for the Angoon Area; the Alaska DNR retains recorder's plat information for the Angoon area—there is no county recorder. I reviewed land ownership transactions available through the DNR website, and although there are several quit-claim deeds from Kootznoowoo, Inc. to the City of Angoon from the last 15 years, none include the parcels in questions as platted parks.

  - It is worth noting that Kootznoowoo, Inc. must transfer land to the City of Angoon for city and public uses. Under ANCSA, this is an obligation of the corporation. The only flexibility in this action is *which* lands are transferred.

Criterion 2—It must be open to the public

- For all intents and purposes, the land appears to managed by default as open to the public. Neither Kootznoowoo, Inc. (the current title holder) nor the City of Angoon (the future title holder) limit access to any of the land platted as park land.

Criterion 3—Its major purpose must be for park or recreation activities

- At present, the lands are used for a mixture of subsistence and recreational activity. The mayor, as well as a city council member who joined the meeting, cited instances of individuals using land around the Salt Lagoon (one of the platted park areas) for picnicking purposes and noted that the lack of current picnic facilities is largely what limits use of the area for such purposes.

- The mayor stated that the City of Angoon worked with Kootznoowoo, Inc. to identify the intended parcels and land uses presented in the draft conveyance plan. This statement is supported by written documentation provided by the mayor at the meeting. Copies of these materials are attached.

- In May 2003, the City of Angoon drafted a non-code ordinance (#03-02) authorizing the City of Angoon to acquire lands from Kootznoowoo, Inc. under Section 14(c)(3) of ANCSA. The land in question comprised 832.18 acres and was reflected in the Map of Boundaries developed by the City and the corporation. As near as we can tell, this map is the same as the map previously provided to the FAA. The ordinance acknowledges the draft conveyance plan and the cooperative process in developing it but does not specifically state the City's intent to implement it as written.

    - The FAA could consider the issuance of the ordinance by the City as proof of the City's intent to follow the plan and manage the land in question as public park/recreation land as outlined in the draft conveyance plan.

- On September 24, 2003, the City of Angoon signed a 14(c)(3) Settlement Agreement with Kootznoowoo, Inc. referencing and adopting the parcels to be conveyed and the terms of the conveyances. The copy of the agreement provided by the mayor was not fully executed, as Kootznoowoo, Inc. had not signed it. The mayor was unable to provide a copy of a fully executed agreement.

- Mayor Kookesh stated his desire and intent to develop the land around the Salt Lagoon as a memorial park to Japanese members of the community, both past and present. He did not specifically discuss the development plans but alluded to creating more picnicking facilities. He did not address his intent regarding other lands platted as parks.

Criterion 4—It must be significant as a park or recreational resource

- The mayor indicated both verbally during the meeting and in his written comments on the draft EIS that the platted park land—specifically around the Salt Lagoon—is significant to the community of Angoon. He noted that the community currently has no developed parks or picnicking facilities and that the Salt Lagoon area is one of the few areas accessible for such uses.

11/13/15 3130-1R FAA

U.S. Department
of Transportation
Federal Aviation Administration

RECEIVED
NOV 3 2015
OHA

AAL-614
Alaskan Region Airports Division
222 West 7th Ave #14
Anchorage, AK 99513

In Reply Refer To: AIP-3-02-0018-0705

October 26 2015

No Historic Properties Adversely Affected
Alaska State Historic Preservation Officer MWr
Date: 11/13/15 File No.: 3130-1R FAA
Please review 36 CFR 800.13 / A.S. 41.35.070(d)

Ms. Judith Bittner
State Historic Preservation Officer
Alaska Office of History and Archaeology
550 W 7th Avenue, Suite 1310
Anchorage, AK 99501-3565

RE: File No. 3131-1R FAA
Angoon Airport Environmental Impact Statement and Cultural Resources Technical Report for the Area of Potential Effects for Airport 12a with Access 12a (Preferred Alternative) Response to SHPO Comments and Finding of Effect

Dear Ms. Bittner:

In your letter dated April 4, 2014, which was submitted in response to our consultation with your office regarding the above-referenced undertaking, your office requested that the Federal Aviation Administration (FAA) address several key concerns relating to the technical report. The FAA responded with formal determinations of eligibility for four cultural resource sites within the area of potential effects (APE) of the project, and your office concurred with those determinations on June 9, 2014. This letter and the enclosed revised report, *Cultural Resources Technical Report for the Area of Potential Effects for Airport 12a with Access 12a (Preferred Alternative),* prepared by SWCA Environmental Consultants (SWCA), seek to respond to the remaining concerns in your April 4 letter.

In regards to your question about the location and nature of Beaver Tail Rock (SIT-00781), the site is not located within either the Direct or Indirect APEs for Phase 2 of this undertaking. The site is located approximately 1.5 miles northeast of the southeastern corner of the Phase 2 Direct APE, and as such, was not included in the file search conducted for Phase 2 of these investigations which was restricted to within one mile of the Direct APE. However, Beaver Tail Rock was included in the file search area for the Phase 1 technical report for this undertaking (SWCA 2012).

In response your concerns about the definition of the APE, the FAA has determined the APE has been adequately defined and encompasses the geographic area where effects may occur to historic properties and has included a Direct APE, Noise APE, Visual APE, and has considered the area in which construction-related vibrations may affect historic properties. Other comments provided in your April 4 letter are addressed in the enclosed revised technical report.

Findings of Effect

No historic properties are present in the Direct APE or Noise APE; however, three historic properties are present in the Visual APE (SIT-00014, SIT-00056, SIT-00749) and one historic property (SIT-00169) is located in close proximity to the Direct APE where vibration effects may occur. The FAA applied the

2015-01727

ANGOON AIRPORT
Environmental Impact Statement

CULTURAL RESOURCES TECHNICAL REPORT FOR THE AREA OF POTENTIAL EFFECTS FOR AIRPORT 12A WITH ACCESS 12A (PREFERRED ALTERNATIVE)

ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration
Alaska Department of Transportation and Public Facilities

Prepared by

Certus Environmental Solutions

and

SWCA Environmental Consultants

SWCA Cultural Resources Report No. 13-494

SWCA Project No. 24650

October 2015

PUBLIC VERSION – INFORMATION PROTECTED BY FEDERAL LAW HAS BEEN REDACTED

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Appendices

1.0 Introduction

This report outlines studies conducted in support of a proposal to construct a land-based public airport to serve the community of Angoon in Southeast Alaska (Figure 1). The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF) for funding and other approvals for the new airport. The FAA is the lead federal agency, and the FAA's approvals and funding would constitute the agency's undertaking as defined in the implementing regulations of the National Historic Preservation Act (NHPA). SWCA Environmental Consultants (SWCA) carried out the cultural resource studies under the direction of the FAA. Dr. Robert Kopperl served as the principal investigator, and Molly Odell served as the field lead.

The FAA is considering three potential airport locations (i.e., alternatives) and multiple access road alternatives associated with those airport locations. Two of the three potential airport locations and portions of their associated access roads are located on lands administered by the U.S. Forest Service (USFS) within the Admiralty Island National Monument and Kootznoowoo Wilderness Area. The third alternative occurs on privately owned lands and lands owned by the City of Angoon and Kootznoowoo, Inc. The FAA has identified this latter alternative, known as Airport 12a with Access 12a, as its preferred alternative for the draft EIS.

The FAA, in consultation with the Alaska State Historic Preservation Officer and the USFS, implemented a phased approach to identifying cultural resources that could be affected by construction and operation of the airport. These phases consist of Phase 1 (preliminary studies of all three airports and their associated access road locations) and Phase 2 (expanded studies of only the FAA's preferred alternative). The Phase 1 studies are described in *Cultural Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement*, which is attached as Appendix A to this report (SWCA 2012). The FAA recognized that the preliminary nature of the field studies conducted during Phase 1 would not provide sufficient information to fulfill the Section 106 requirements of the NHPA for any alternative but would be sufficient for the EIS to compare the relative risk to cultural resources from each alternative.

Once a preferred alternative was identified by the FAA, the agency carried only that preferred alternative through the remainder of the Section 106 process; that is, the FAA moved forward with Section 106 consultation for the preferred alternative only. As such, the FAA focused Phase 2, intensive-level field studies, on Airport 12a with Access 12a. Two potential materials (e.g., gravel, rock, etc.) source locations that were identified *after* the Phase 1 reconnaissance studies were also included in the FAA's Phase 2 study efforts.

This technical document reports the findings of the Phase 2 studies for the preferred alternative and the potential materials sources (described in section 3.0 below). It also provides updates to archival research and descriptions of field methods. Information contained in the Phase 1 report is incorporated by reference, and relevant information from that report has also been included in this Phase 2 technical report.

For the purposes of this report, cultural resources are defined as archaeological, historic, prehistoric, and traditional cultural (heritage) properties. The term "historic properties" is also used in this report. This term refers to cultural resources that have gone through a formal evaluation of their eligibility for listing on the National Register of Historic Places (NRHP), regardless of their resource type, age, or particular cultural affiliation. This report includes information on cultural resources that occur or have the potential to occur in the vicinity of the airport and access road alternative. Raw data collected during the field studies are available for review to the extent allowable by federal law and policy (i.e., within the parameters of protecting confidential information as allowed by federal law). This report also provides the cultural resource consultant's recommendations of NRHP eligibility for cultural resources identified in the Phase 2 area of potential effects (APE).

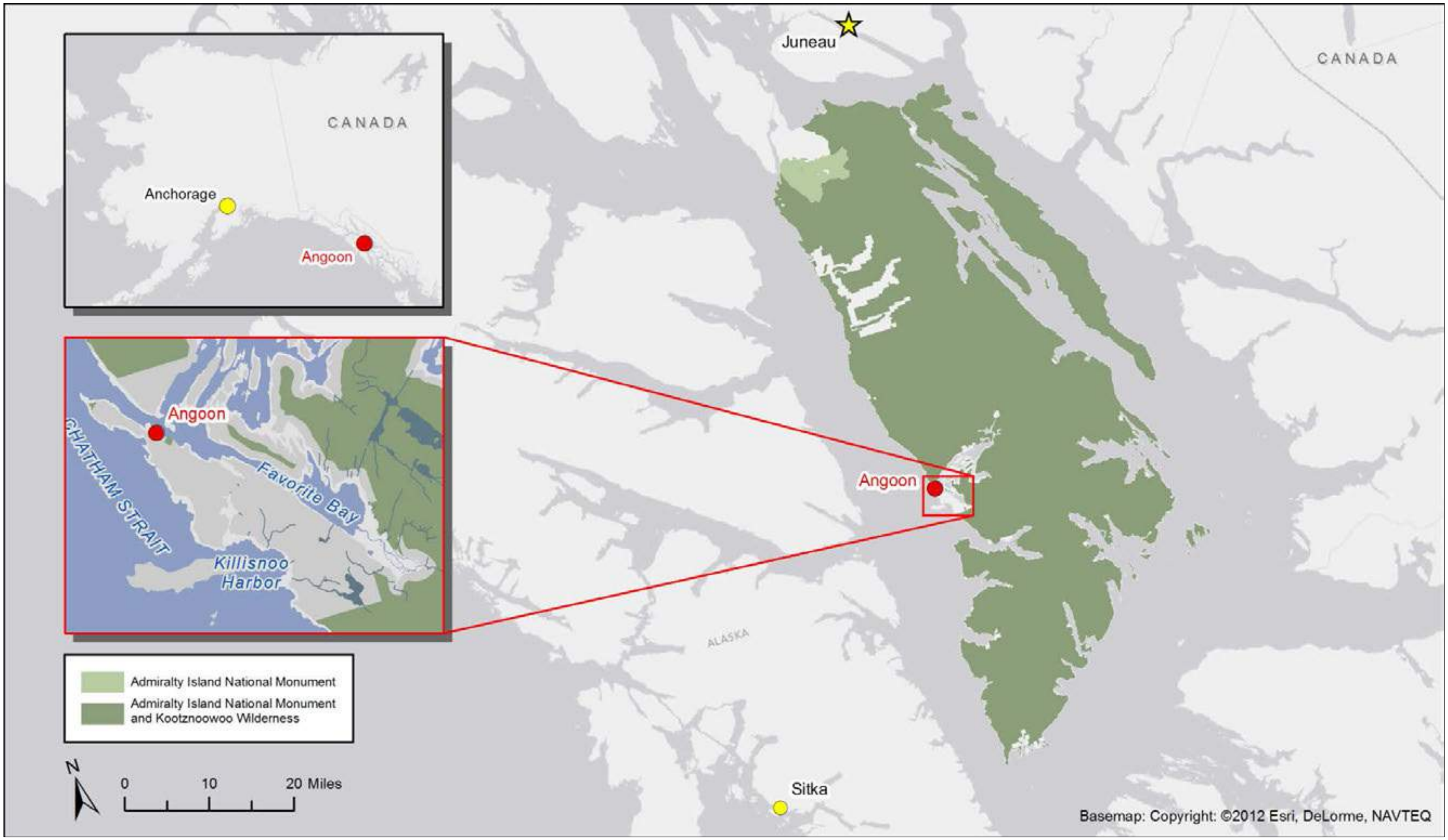

Figure 1. General location of Angoon Airport project.

2.0 PROPOSED UNDERTAKING

As noted above, the proposed undertaking by the FAA would be the issuance of their approvals and funding for the airport as proposed by the DOT&PF. The proposed airport project consists of construction and operation of a land-based airport and airport access road for the community of Angoon, which currently has no land-based airport. The DOT&PF would own and operate the airport. The land-based airport would accommodate small, wheeled aircraft and would include a single runway with an apron. A new access road for the airport would need to be constructed. The components of the airport are summarized below.

Components of the airport project:

- Runway: Paved; 3,300 feet long and 75 feet wide, with future expansion to 4,000 feet long*
- Runway safety areas: 150 feet wide, centered on runway centerline, extending 300 feet beyond each runway end
- Object free area: 500 feet wide, centered on runway centerline, extending 300 feet beyond each runway end
- Runway protection zone: Standard visual approach dimensions of 500 × 1,000 × 700 feet
- Single, perpendicular taxiway: Paved
- Aircraft apron: Paved
- Navigational aid: Rotating beacon
- Visual approach aid: Precision approach path indicator
- Runway lights: Pilot-controlled, medium-intensity lights
- Terminal space: Sufficient area for a future terminal or passenger shelter
- Lease lots: Approximately 65,000 square feet available for leasing
- Electrical control building: Near future terminal site
- Perimeter fence: For security and wildlife control
- Passenger parking lot: Paved, near future terminal site
- Support facilities: Weather station, communication, etc.
- Access road: Two, paved, 10-foot lanes and 5-foot shoulders
- Overhead utility lines: Power and telephone lines located within the access road corridor**

*Future expansion would be subject to additional environmental review when proposed for construction.
**Utility lines would only be installed if it is determined to be cost-effective.

Construction of the airport would include the following activities:

- Vegetation removal related to the airport, road, and certain avigation easements (clearing of all vegetation for construction, line of sight, and open areas for flight approach and takeoff)
- Tree felling in certain avigation easements (cutting down the trees but not other vegetation). For the effects analysis where tree felling is identified in certain avigation easements, it is assumed that all trees in these easements would be felled (cut down).
- Terrain disturbance related to the airport, airport access road, and access roads to avigation easements (cutting and filling of soil or blasting of bedrock to level the ground)
- Terrain disturbance from potential extraction of construction materials such as gravel, soil, and rock from an on-island materials source
- Laying of pavement related to the airport and road (creating impervious surfaces)
- Culverting, re-routing, or filling of streams
- Movement of construction equipment and vehicles along roads
- Construction activity and equipment in work areas
- Illumination of construction areas and of some equipment for low-light daytime and nighttime construction
- Barging of construction materials to the island and unloading of barged materials at the ferry terminal
- Construction of airport perimeter fence

3.0 Area of Potential Effects

Implementation of the proposed undertaking (i.e., construction and operation of an airport at location Airport 12a with Access 12a) has the potential to affect historic properties in a variety of ways. Construction-related ground disturbance and manipulation of vegetation has the potential to directly affect such properties through physical alteration or damage. Construction- and operation-related noise and visual changes in the existing landscape caused by construction of the airport have the potential to indirectly affect historic properties. To assess the effects from direct disturbance, visual intrusion, and noise, the FAA identified APEs for each of these anticipated types of effect. In some cases, the different APEs overlap or coincide with each other, such as the Noise APE, which is fully encompassed by the Direct APE. In other cases, such as for the Visual APE, the area of anticipated effect is distinct from other APEs. The sections below discuss and describe the different APEs defined by the FAA.

The locational information for the APEs as described below are as follows:

- Direct APE - Sections 5, 6, 7, and 8, Township 51 South, Range 68 East, Copper River Meridian, Sitka B-2
- Visual APE - Section 6 and 7, Township 51 South, Range 68 East, Copper River Meridian, Sitka B-2
- Noise APE - Sections 5, 6, and 8, Township 51 South, Range 68 East, Copper River Meridian, Sitka B-2

In addition to defining specific APEs, the FAA assessed the overall potential for vibration effects to historic properties. This was accomplished by considering resource types vulnerable to adverse effects from vibration during construction. The evaluation of potential vibration effects is discussed further in section 5.5, below.

3.1 Direct APE

The Phase 2 studies focus on the FAA's preferred alternative—Airport 12a with Access 12a—and two potential materials source locations, the Kootznoowoo, Inc. Proposed Materials Source and Materials Source 2, identified after the Phase 1 studies were completed. All of the lands within the Phase 2 Direct APE are privately owned or owned by the City of Angoon.

The Phase 2 Direct APE, shown below in Figure 2, encompasses an area of 267.91 acres on the greater Angoon peninsula and includes all areas that would be subject to vegetation removal, terrain disturbance, and tree felling. The Phase 2 Direct APE is limited to areas that would experience direct effects from landscape disturbance. The FAA received concurrence on the Direct APE from the Alaska State Historic Preservation Office (SHPO) in August 2013 (Bittner 2013). Subsequent to receiving the SHPO's concurrence, the FAA expanded the Phase 2 Direct APE to include the potential materials source locations where ground disturbance may also occur, based on information from the City of Angoon (2008).

As shown on Figure 2, the Phase 2 Direct APE overlaps with a portion of the Phase 1 APE and has been, in some locations, reduced in size from the Phase 1 APE. Additional Phase 2 studies were completed in portions of the Phase 2 Direct APE that were previously unsurveyed during Phase 1 and in some overlapping portions that were considered most sensitive for cultural resources to provide additional data for identification and evaluation of potentially significant historic properties. All portions of the Phase 2 Direct APE were surveyed during either the Phase 1 or Phase 2 field investigations. The results of relevant Phase 1 studies that examined portions of the Phase 2 Direct APE are incorporated into the Phase 2 findings and reported below (see section 7.0).

The information in this figure is protected by federal law. It is not for public release

Figure 2. Phase 2 Direct APE and Alaska Heritage Resources Survey (AHRS) point sites within 1 mile of this APE.

3.2 Visual APE

Based on an analysis of anticipated changes to the visual nature of the landscape as a result of the airport project, the FAA defined an APE for visual effects to historic properties (Figure 3). Dense tree cover in the area of Airport 12a, as for all other alternatives, obscures the potential landscape changes associated with the airport and access road from most viewpoints around Angoon; that is, the locations from which landscape changes would be visible are discrete and localized. There are two viewpoints from which the landscape changes associated with Airport 12a would be visible:

1. On the eastern shore of Killisnoo Island. Previous surveys have identified cultural resources that may be sensitive to visual intrusion.
2. Along the exiting ferry road next to the Salt Lagoon. There are no known sites within this part of the Visual APE.

The FAA included these areas and the known sites in the Visual APE.

3.3 Noise APE

Areas of potential noise effects were identified through a noise model analysis and using FAA guidelines on significant noise effects (Figure 3).

The FAA relies on the day-night average sound level (DNL), which describes the average noise level experienced during an entire 24-hour day, as their primary metric for assessing noise. Using a database of aircraft performance and engine noise characteristics, the FAA used Integrated Noise Model (INM) Version 7.0b to generate and plot DNL noise contours based on airport operational information, such as the number of flights and weather conditions.

For the purposes of this analysis, the Noise APE consists of all lands that would fall within the DNL 65 dBA contour as a result of Airport 12a operation. This APE is based on FAA Order 1050.1E, which states that an action alternative is considered to have a significant effect if it would cause the noise levels at noise-sensitive areas currently exposed to DNL 65 dBA or higher to increase by at least DNL 1.5 dBA.

The information in this figure is protected by federal law. It is not for public release

Figure 3. Phase 2 indirect APEs and AHRS recorded sites within these APEs.

4.0 CULTURAL AND ENVIRONMENTAL SETTING

The area around the community of Angoon is rich in history, heritage, and cultural resources. It has been home to Alaska Natives for thousands of years, and Alaska Natives make up the majority of the population in the community today. The inlets and bays around Angoon offer abundant natural and subsistence resources, as evidenced by large populations of salmon, halibut, other freshwater and saltwater fishes, seals, deer, bears, and a wide variety of marine and upland plants. The area supports a subsistence lifestyle and the maintenance of a unique cultural heritage tied closely to the natural environment. Full discussion of the cultural and environmental setting of the project is presented in the 2012 (Phase 1) technical report (Appendix A; SWCA 2012), which includes pre-contact and ethnographic Native American cultural contexts, historic contexts of Euro-American settlement and industry in the area, and the physical and biological environmental setting in the vicinity of the Phase I APE. This background information was used to develop expectations of sensitivity for cultural resources in the Phase 2 Direct APE and the methods designed to identify resources during the Phase 2 fieldwork. As the 2012 report is provided (Appendix A), only updated information and conditions specific to the Phase 2 APE are presented here.

4.1 Update to Prehistoric Context

Limited archaeological evidence exists for the Early Period (10,000–5,000 B.P.) (see USFS 2009:3–74) in Southeast Alaska, and prior to 2009, there was no evidence from the immediate Angoon area. During the Phase 1 field investigations, however, an obsidian microblade fragment was found in a shovel probe excavated at the Favorite Bay Garden Site (SIT-00302) in another airport alternative (SWCA 2012:37–38). Microblades are diagnostic of Early Holocene cultural traditions in Northern and Central Alaska. While their temporal range is not well-established in Southeast Alaska, the presence of a microblade suggests that humans may have been present in the Angoon area during the Early Period.

4.2 Update to Ethnographic Context

Recent ethnographic research (not available at the time of Phase 1 investigations) has synthesized traditional Tlingit place-names throughout Southeast Alaska—names in which cultural information about the importance, history, resources, and dangers that characterize particular places on the landscape is embedded (Thornton 2012). For lands or features in the vicinity of, but outside, the Phase 2 APEs, 10 traditional place-names have been documented by collaboration between Tlingit elders and modern ethnographers (Thornton 2012:113–118). *S'igedí Deiyí* ("Beaver Trail") was the primary travel corridor that ran from Killisnoo Harbor to the present-day village of Angoon, and *Wooch Géide Tliséet* refers to the channel north of Killisnoo Island. *Kadus.áak'w* ("Little Lake On It") refers to the saltwater lagoon northwest of the proposed airport runway. *Tlaaguwu Noow* ("Ancient Fort") was a defensive site on the shore of Killisnoo Harbor west of the proposed airport. A cluster of traditionally named places are located along the shore of the same harbor southwest of the proposed airport, and include *Keitanji Aan* ("Village Where It Continually Lifts Up"), *Dákde Yakatan Aas* ("Tree Leaning Out"), *Daasakwt'aagaanoow* ("Fort of the Village Alongside Daasákw"), and *Tsax̱'adaadzaayí Aan* ("Seal's Mustache Land"). *Féeshwaan Aaní* ("Fisherman's Town") was a settlement on Favorite Bay east of one of the potential materials sources examined during the Phase 2 survey. On Killisnoo Island is *Kanasnoow* ("Windbreak"), which refers to the Killisnoo Settlement, presumably the same settlement recorded as SIT-00014. Some of these names are likely associated with archaeological remains of settlements de Laguna (1960) investigated during her anthropological field investigations in this area. Though none refer to places specifically within the boundaries of the Phase 2 APEs, the names attest to the rich history of the *Xutsnoowú Kwáan,* whose territory is centered on the community of Angoon (Thornton 2012:107).

4.3 Environmental Setting

The majority of the Phase 2 APEs are covered in a dense spruce-hemlock forest. In places the understory is mossy and relatively free of brush, but with abundant deadfall (Figure 4). In other places, there is a thick understory of alder (*Alnus viridis* [*crispa*]), Devil's club (*Oplopanax horridum*), and blueberry (*Vaccinium* spp.) (Figure 5). In addition, there are areas of hydric soils and standing water blanketed by grasses, sedges, skunk cabbage (*Lysichiton americanus*), and a sparse pine-spruce forest (Figures 6-8).

Figure 4. Overview in southeastern portion of the Phase 2 Direct APE, view to the northwest.

Figure 5. Overview of non-contiguous northwest avigation easement, view to the southeast.

Figure 6. Overview of the northeastern edge of the Phase Direct 2 APE in the northeastern portion of the APE, view to the northwest.

Figure 7. Saturated sediments within a forested area of the Phase 2 Direct APE, view to the east.

Figure 8. Saturated sediments in an open bog within the Phase 2 Direct APE.

5.0 METHODS

As part of Phase 1 investigations, the FAA cultural resource consultant team conducted background research and preliminary fieldwork to identify cultural resources that may be impacted by the development of an airport and access road and assessed the eligibility of those resources for the NRHP. As noted previously, this research and initial fieldwork addressed all three airport location alternatives considered in the EIS.

The background research included a literature review of records at the Alaska Office of History and Archaeology (OHA) in Anchorage as well as published and archival sources at public and university libraries, and tribal consultation and interviews with elders, culture bearers, and residents of Angoon.

For Phase 2, the FAA cultural resource consultant team updated the background research to account for the expanded areas of the Phase 2 APE and to include ethnographic data and pertinent cultural resource reports made available since the Phase 1 studies were completed. In addition, the consultants conducted field investigations of the new Phase 2 Direct APE (as shown on Figure 2 and discussed in section 3.0 above). The consultant team also revisited areas investigated during the Phase 1 fieldwork that the team, for various reasons, considered to have a high probability of containing cultural resources.

5.1 Literature Review

As part of the literature review conducted during the Phase 1 studies, the FAA's cultural resource consultant team reviewed the OHA citation database, Alaska Heritage Resources Survey (AHRS) records and location editor (geographic information system [GIS] site locator maps), Alaska Resources Library and Information Services data archives, and the Tongass National Forest Heritage Resources Survey data. Additionally, the consultant reviewed the works of de Laguna (1960), Erlandson and Moss (1983), and Moss and Erlandson (1985), all of whom have conducted extensive work in the Angoon area, as well as the broader regional works of Goldschmidt and Haas (1946) and others. The specific data resources of the OHA and AHRS records were reviewed to identify relevant documentation and information for past archaeological and ethnographic studies and previously documented archaeological sites within 1 mile of the Phase 1 APE. Because the Phase 1 and 2 APEs are slightly different, the cultural resource consultant team updated the literature review search area to a 1-mile radius around the Phase 2 Direct APE. In addition, the search included sources not available at the time of the Phase 1 studies. Updated literature reviews occurred in July 2013 and August 2015.

5.2 Field Inventory

As discussed above in section 3.0 and shown on Figure 2, much of the Phase 2 Direct APE was surveyed during the Phase 1 investigations (SWCA 2012). Phase 1 involved pedestrian survey using transects spaced 20 meters (66 feet) apart as permitted by vegetation, terrain, and hydrography. Shovel probes were excavated in high-probability locations as allowed by soil conditions. The probes were 30 to 40 centimeters (cm) in diameter to depths allowable by hand tools, which varied between 50 and 100 cm below surface (cmbs). All excavated sediment was screened through ¼-inch mesh. These methods and the resulting coverage across the Phase 1 APE were considered adequate in most areas and were not revisited during Phase 2. The goals of the Phase 2 survey were to 1) complete pedestrian survey transect coverage in areas of the Phase 2 Direct APE not surveyed during the Phase 1 investigations, including the potential materials source locations; 2) excavate shovel probes in places within the previously unsurveyed portions of the Phase 2 Direct APE considered to be sensitive for buried archaeological resources, and 3) revisit high-probability portions of the APE previously surveyed during Phase 1 studies and excavate additional shovel probes.

The locations of all shovel probes and notable cultural features were recorded using a handheld Trimble GeoXT 6000 global positioning system (GPS) unit with an external antenna. Digital photographs were taken in all Phase 2 survey areas. These photographs include overviews, profiles of typical shovel probes, and cultural resources. Non-digital field data were recorded on standardized field forms, and included daily work records, photograph logs, resource inventory forms, shovel probe forms, and hand-drawn maps.

5.2.1 Sensitivity Analysis Methods

Sensitivity for cultural resources in the Phase 2 Direct APE was assessed using a combination of the USFS's (2002) sensitivity zone model, described in detail in the Phase 1 technical report (SWCA 2012); review by the project principal investigator of various GIS layers to prioritize fieldwork; and professional judgment of the field crew regarding topography, proximity to tidewater and known prehistoric and historic sites, information obtained from local residents (i.e., traditional knowledge), hydrography, and the presence of certain ecotone habitats. While no portion of the Phase 2 APEs falls in USFS lands, the FAA cultural resource consultants, in consultation with FAA and SHPO, agreed to use the USFS sensitivity zone model for all portions of the EIS field investigations for reasons of consistency. The desktop review of GIS layers and descriptions of the various terrains of Airport 12a from the Phase 1 fieldwork identified high-potential areas to be revisited. They also indicated which areas had greater sensitivity for, and potential preservation of, both aboveground resources and buried archaeological deposits. Factors considered included topographic characteristics (relatively level terraces, saddles, and topographic high-points, as opposed to moderate or steep slopes), vegetation zones (ecotones and forested land, as opposed to the centers of bogs and wetlands), and proximities (known cultural resources and tidewater).

While most of the areas in the Phase 2 Direct APE that were not part of the Phase 1 APE lie in regions predicted to have low sensitivity for cultural resources, shovel probes were excavated in places where topography and well-drained soils combined to create a depositional environment likely to preserve buried archaeological materials if present, as well as in ecotone habitats (Figure 9). In addition, the overall sensitivity of the Kootznoowoo, Inc. Proposed Materials Source was given greater consideration when the bear guards accompanying the field crew noted that ancient battles, prior to contact with Euro-Americans, occurred along the hillsides overlooking Favorite Bay (personal communication, A. Johnson 2013; personal communication, D. Johnson 2013). No specific locations or resources were noted by the bear guards, although the Kootznoowoo, Inc. Proposed Materials Source is situated on this aspect. Both pedestrian survey transects and shovel probes on level surfaces and saddles between smaller knolls were used to identify cultural resources that may be present in this area.

Additional shovel probes were excavated in two areas of the Phase 2 Direct APE that were also investigated during the Phase 1 fieldwork. The northwestern portion of the Phase 2 APE near the Salt Lagoon was considered sensitive for cultural resources due to its proximity to tidewater. In addition, the southwestern boundary of the Phase 2 Direct APE near Killisnoo Harbor was subject to additional shovel probing due to its proximity to the known site SIT-00169, the previously documented boundary of which is somewhat ill-defined.

Field investigations were not conducted in most portions of the Indirect APE (e.g., visual and noise) that extend outside the Phase 2 Direct APE. The Noise APE is located entirely within the Phase 2 Direct APE and was adequately investigated during the Phase 1 field survey. The Visual APE, while in a high-sensitivity zone according to the USFS model, has been investigated previously and is unlikely to contain additional cultural resources. One site (SIT-00169) containing structural remains was known to be present in the immediate area of the construction footprint near Killisnoo Harbor. This specific site was visited and assessed for potential vibration effects.

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Figure 9. Shovel probe locations in relationship to high probability areas in the Phase 2 Direct APE.

5.2.2 *Pedestrian Survey*

The Phase 2 field survey was conducted between July 25 and August 2, 2013, in weather that was adequate for surface visibility and note taking. The 2013 field survey personnel included three archaeological technicians (Mary Ahonen, Jeanette Hayman, and Allison Neterer) and a geoarchaeological technician (Cyrena Undem), supervised by Molly Odell, M.A. Principal Investigator Robert Kopperl, Ph.D., was present for the first three days of the survey. Two bear guards, local residents Alvin and Donald Johnson, accompanied the team during all fieldwork. Michael Kell, Alaska DOT&PF archaeologist, visited the crew during their fieldwork on July 26 and 27, 2013.

Surveys for Phase 2 were completed using pedestrian survey transects spaced at 10 to 20 meter (33 to 66 foot) intervals to the extent permitted by vegetation, landform, and hydrography. Dense, impenetrable vegetation in some areas made a complete survey with straight transects impractical. In those instances, the field crew made every practical attempt to investigate the area. Pedestrian survey involved examination of all surfaces exposed along the transects, taking every opportunity to observe erosion profiles and mineral soil matrices adhering to the root mass of tree-tips, given the overall thickness of forest duff, preponderance of deadfalls, and density of shrubwood that compromise surface and near-ground visibility year-round. These exposures were examined for artifacts, features, and other evidence of human occupation or cultural modification such as shell midden deposits and anthropogenic charcoal lenses. The pedestrian survey also included examination of potential aboveground features such as culturally modified trees (CMTs), historic structures, and modified landscapes.

The pedestrian survey was conducted in summer when vegetation is at its maximum. In southeast Alaska, thick vegetation is present year-round and the ground surface is typically obscured under a very thick mat of living and decaying vegetation and tree deadfalls regardless of the season. It is likely the field crew would have encountered areas of impenetrable vegetation regardless of the time of year. In addition, surface features and artifacts were clearly visible in SIT-00169 despite the vegetation, suggesting that the field crew would have been able to locate cultural materials on the surface had they been present in other surveyed areas.

5.2.3 *Shovel Probes*

Shovel probes were excavated by hand with shovels and trowels. Each probe was 35 to 40 cm in diameter and was dug until impenetrable rocks, roots, or the water table was encountered, or until hand excavation was no longer possible. Excavated soils were sifted through ¼-inch screen, and stratigraphic characteristics of excavation profiles were documented prior to backfilling the probes. A total of 105 shovel probes were excavated during the Phase 2 field investigations.

5.3 Visual Analysis

For lands in the Visual APE, the FAA did not conduct additional field studies. The area within the APE has been surveyed before, and cultural sites have been documented. The sites were, however, revisited during the course of field studies for the airport project—either during the Airport 12a survey reported herein or during informal visits associated with previous surveys for the airport alternatives (SWCA 2012). This approach is consistent with the industry standard for identifying visual effects from such undertakings as cell towers, wind farms, solar arrays, and similar structures.

Cultural resources that are sensitive to visual intrusions created in the viewshed of the resource are generally those where the viewshed is or was important to the historical use of the site or the intended design and setting of the site. More specifically, sensitive resources are those whose viewshed is important to the resource's eligibility for listing on the NRHP. Generally speaking, resources that are eligible for the NRHP under Criterion B for associations with important persons or Criterion D for their information potential are not considered sensitive to visual intrusion. In contrast, resources that are eligible for the NRHP under Criterion A for their particular use in a historically important event or pattern of events and those that are eligible under Criterion C for their structural elements are typically considered to be more sensitive to visual intrusion. However, in both cases, the viewshed must be important to the reasons the resource is eligible under one of the two criteria. For example, a building that is eligible for the NRHP and that is intentionally situated on the landscape and designed to integrate the viewshed into the use of the building—such as a residence with large picture windows looking out on a particular viewshed—would be considered sensitive to visual intrusion within that viewshed.

Potential effects on these sites from anticipated visual changes to the landscape associated with the construction and operation of Airport 12a are evaluated in the Results section of this report (section 7.3).

5.4 Noise Analysis

Because the Noise APE is completely encompassed by the Direct APE, field surveys within the Direct APE covered all lands wherein noise effects would have the potential to damage or otherwise impair the use of historic properties. As such, no additional efforts to identify historic properties were needed specific to the Noise APE.

5.5 Vibration Analysis

As noted in section 3.4, potentially damaging vibration could occur during construction if blasting is necessary. Given the geology of the immediate area in and around Airport 12a, damaging vibration is expected to attenuate very quickly (i.e., over a short distance). Because the exact locations where blasting might occur are not known at this time, and will not likely be known until more detailed engineering of a selected alternative is carried out, the FAA considered potential vibration effects on a broad scale by assessing the presence/absence of resources of the types known to be vulnerable to adverse effects from vibration. Those types of resources are generally limited to standing structures, and exclude sites of a purely archaeological nature. One such resource is present in the vicinity of the construction footprint (SIT-00169), and the potential effects to it from vibration are discussed below.

6.0 Previous Research and Known and Potential Cultural Resources

Several previous assessments for historical, architectural, archaeological, and cultural resources have occurred in the vicinity of the Phase 2 APEs and the general Angoon area. Cultural research and archaeological investigations have been formally documented since the 1940s, spurred by academic interest and more recently by undertakings requiring compliance with Section 106 (36 Code of Federal Regulations [CFR] 800) or Section 110, or both, of the NHPA. Many of these studies have been conducted by the USFS or in conjunction with proposed development. Tables 1 and 2 summarize past cultural resource investigations and known sites within a 1-mile buffer around the Phase 2 Direct APE; this 1-mile buffer encompasses all of the indirect effects APEs. Of the investigations listed below, only two, by Yarborough (2005) and SWCA (2012), took place inside the boundary of the Phase 2 Direct APE. Neither identified any cultural resources in the Phase 2 Direct APE.

Table 1. Previous Investigations within 1 Mile of the Phase 2 Direct APE

Report Title	Author (Year)	Resources Identified within the File Search Study Area
Possessory Rights of the Natives of Southeastern Alaska	Goldschmidt and Haas (1946)	SIT-00302
The Story of a Tlingit Community: A Problem in the Relationship Between Archaeological, Ethnological, and Historical Methods	de Laguna (1960)	SIT-00295, SIT-00303, SIT-00305, SIT-00306, SIT-00169, SIT-00177, SIT-00014, SIT-00015
Archaeological Reconnaissance of the Angoon-Killisnoo Harbor Road	Clark (1976)	SIT-00015
Cultural Resource Investigation at Killisonoo [sic] Harbor	Fields and Davidson (1979)	SIT-00015, SIT-00169, SIT-00177, SIT-00680, SIT-00014
Archaeological Reconnaissance of Favorite Bay, Admiralty Island	McAfee et al. (1982)	SIT-00302
Results of Archaeological Reconnaissance on Admiralty Island National Monument, Southeast Alaska	Erlandson and Moss (1983)	SIT-00169, SIT-00262, SIT-00295
Preliminary Results of Archaeological Investigations on Admiralty Island, Southeast Alaska: 1985 Field Season	Moss and Erlandson (1985)	SIT-00124
1989 Archaeological and Historical Site Monitoring Program for the Chatham Area, Tongass National Forest	Lively and Davis (1989)	SIT-00015
Archaeology and Cultural Ecology of the Prehistoric Angoon Tlingit	Moss (1989)	SIT-00124, SIT-00033
The Antiquity of Tlingit Settlement on Admiralty Island, Southeast Alaska	Moss et al. (1989)	SIT-00124, SIT-00033
An Archaeological Survey of the Angoon-Kootznahoo and Seaplane Base Roads Paving Project, Admiralty Island, Alaska	Campbell (1996)	SIT-00487, SIT-00488, SIT-00489, SIT-00490, SIT-00491
Haa Aani Our Land: Tlingit and Haida Land Rights and Use	Goldschmidt and Haas (1998)	SIT-00302
Cultural Resources Inventory of the Angoon Proposed Airport	Yarborough (2005)	SIT-00169, SIT-00680, SIT-00262, SIT-00033, SIT-00302, SIT-00502, SIT-00034
Cultural Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement Angoon, Alaska	SWCA (2012)	SIT-00302
Angoon Administrative Site, 49SIT-00960, Determination of Eligibility R2013100534010	Gilliam (2013)	SIT-00960

Note: Data obtained through USFS Tongass National Forest Heritage Resources Archives and OHA, Anchorage.

Table 2. Alaska Heritage Resources Sites within 1 Mile of the Phase 2 Direct APE

AHRS Number	Site Type	Site Name	Eligibility
SIT-00014	Historic Tlingit village/Euro-American commercialism [graves, village site, cannery remains]	Killisnoo (Killisnoo Ruins/Kenasnow/ KanasNu/Killishoo/ Killisnoo Island Village)	Eligible
SIT-00015	Prehistoric/historic Tlingit fort/cemetery	Killisnoo Harbor Fort and Cemetery	Undetermined
SIT-00017	Location of late-nineteenth-century Angoon village	Angoon	Undetermined
SIT-00033	Prehistoric/historic stake fish weir	Favorite Bay Fish Weir	Undetermined
SIT-00034	Prehistoric/historic Tlingit site	Favorite Bay Midden/Garden	Undetermined
SIT-00041	Pictographs	Magpie Point Pictographs	Undetermined
SIT-00056	Historic religious building site (Russian Orthodox)	St. Andrews Church	Eligible
SIT-00124	Prehistoric Tlingit site	Killisnoo Picnic Ground Midden	Undetermined
SIT-00135	Possible location of a fort, buried cultural material	Ganaxca Nuwu (Ganax Women's Fort)	Undetermined
SIT-00169	Historic Tlingit occupation site	Ketintci-'an (Killisnoo Harbor Village)	Eligible
SIT-00177	Historic Tlingit site/possible fort/cemetery remains	South Killisnoo Village (Dadakatak Nuwu/Dasuqtag-an/Potato Point)	Undetermined
SIT-00262	Prehistoric midden	Dukdeiyukutun As Midden	Undetermined
SIT-00295	Prehistoric/historic Tlingit occupation site [cabins/lithics/middens/cache pits]	Ta Uk Aan Nee Shoo (Takwanicu/End of Winter Village)	Undetermined
SIT-00302	Prehistoric deposits, historic gardens	Favorite Bay Garden Site	Determined eligible by SHPO and agency
SIT-00303	Historic Tlingit site	Xicwan-'ani (Fisherman's Town)	Undetermined
SIT-00304	Prehistoric/historic midden site	Xanaxaye (Garnes Point Shell Midden)	Determined not eligible by SHPO and agency
SIT-00305	Historic Tlingit garden site	Kootznahoo Roads Garden	Undetermined
SIT-00306	Historic Tlingit cabins and midden site	Scott's Ranch and Midden	Undetermined
SIT-00307	Historic Tlingit structure, garden, and midden site	Kenasnow Camp and Midden	Undetermined
SIT-00308	Midden with possible prehistoric and historic components	South Angoon	Undetermined
SIT-00487	Paleontological shell midden	N/A	Undetermined
SIT-00488	Rectangular depressions	N/A	Undetermined
SIT-00489	Collapsed grave house	N/A	Undetermined
SIT-00490	Three-sided shelter used as drying rack	N/A	Undetermined

Table 2. Alaska Heritage Resources Sites within 1 Mile of the Phase 2 Direct APE

AHRS Number	Site Type	Site Name	Eligibility
SIT-00491	Cluster of buildings	"Japantown"	Undetermined
SIT-00502	Historic Tlingit garden	Garden Site	Undetermined
SIT-00680	Historic Euro-American water flue	N/A	Undetermined
SIT-00749	Historic Aleut and Russian Orthodox cemetery	Killisnoo Cemetery	Eligible
SIT-00960	Mid-twentieth-century wood frame building	Angoon Administrative Site	Not Eligible

Detailed discussion of the previous cultural resource investigations listed in Table 1, above, can be found in the Phase 1 report (Appendix A; SWCA 2012), except for three specific studies, the information for which became available after the Phase 1 report was complete. One of these studies was for the first known federally mandated investigation in the search area and was a survey for the Angoon-Killisnoo Harbor Road. This study included documentation of SIT-00015 by USFS archaeologists (Clark 1976). The second study was a 1996 cultural resource survey conducted as part of the Angoon-Kootznahoo and Sea Plane Base Roads Paving Project for Alaska DOT&PF, resulting in the identification of SIT-00490 and SIT-00491 (Campbell 1996). The third study, conducted by the USFS in 2013, assessed the NRHP eligibility of the Angoon Administrative Site (SIT-00960) (Gilliam 2013).

6.1 Burials and Human Remains

Individual burials and historic cemeteries are present in a variety of locations around Angoon and the broader landscape surrounding the village. Table 2 identifies two formally documented sites containing human remains that are within the file search area, SIT-00015 and SIT-00749. Neither of these sites are located in areas that would directly affected by development of Airport 12a with Access 12a. However, given the intense history of long-term occupation of the Angoon area, it is possible that additional, yet-to-be-identified burials are present in the general area.

7.0 Results

The Phase 2 assessment resulted in the identification of four cultural resource sites and 10 CMTs. All four cultural resource sites had been previously documented as a result of undertakings not related to the airport project. Three of these sites (SIT-00014, SIT-00056, and SIT-00749) are located wholly or partially in the Visual APE on Killisnoo Island, and one (SIT-00169) adjacent to the Direct APE was identified as having structural remains that could be susceptible to vibration impacts from construction activities in the Direct APE. No cultural resource sites were located in the Direct APE, Noise APE, or the portion of the Visual APE next to the Salt Lagoon.

In addition to the 10 newly identified CMTs, all of which are located in the Direct APE, two CMTs identified during the Phase 1 surveys are also located in the Phase 2 Direct APE (Figures 10-12). Thus, a total of 12 CMTs are present in the Phase 2 Direct APE.

The findings of the field survey and the analyses of visual, vibration, and noise effects are discussed below. General information about the findings of shovel probes is also provided.

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Figure 10. Shovel probe and CMT locations in the northwestern portion of the Phase 2 Direct APE.

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Figure 11. Shovel probe and CMT locations in the northeastern portion of the Phase 2 Direct APE.

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Figure 12. Shovel probe and CMT locations in the southern portion of the Phase 2 Direct APE.

7.1 Findings of Shovel Probes

At total of 113 shovel probes were excavated in the Phase 2 Direct APE (refer to Figures 10-12). Of these, 8 were excavated during the Phase 1 field studies (SWCA 2012) and 105 were excavated during the Phase 2 studies. The shovel probes encountered no cultural material but provided valuable stratigraphic data that confirmed the relative geologic age and depositional contexts of the particular landforms that were tested. A shovel probe summary table is given in Appendix B for probes excavated during Phase 2 field investigations. Previously excavated shovel probes are described in the Phase 1 report (Appendix A) (SWCA 2012).

Among the shovel probes excavated in the Direct Effects APE, those shovel probes located in well-drained areas uncovered layers of silt, sand, and angular pebbles and gravels and were terminated at thick roots, regolith, or bedrock. In low-lying areas with hydric soils, probes uncovered organic-rich silt and were terminated at the water table. Several of the shovel probes along the border of the Phase 2 Direct APE near Killisnoo Harbor uncovered evidence of paleo-beach deposits between 80 and 120 cmbs. While identifying paleo-shorelines in subsurface excavations can sometimes lead to the discovery of archaeological material of relatively great antiquity, no cultural materials were found during the testing conducted along the edge of the Direct APE near Killisnoo Harbor.

7.2 Culturally Modified Trees

As noted above, 12 CMTs were identified in the Phase 2 Direct APE (Table 3). Several different types of CMTs were identified during the Phase 2 fieldwork, including trees with blazes, springboard notches, axe marks, burning, stripped bark, and cut and stacked logs.

Table 3. CMTs Identified in the Phase 2 Direct APE

Field No.	Condition of Tree	Type of Modification	UTM Northing	UTM Easting
CU72109_1	Standing dead	Three springboard notches	[redacted]	[redacted]
CU72109_2	Living tree	Blaze	[redacted]	[redacted]
AGN-1	Stumps and cut logs	Cut and stacked logs	[redacted]	[redacted]
AGN-2	Living tree	Blaze	[redacted]	[redacted]
AGN-4	Stump	Possible springboard notch	[redacted]	[redacted]
AGN-5	Living tree	Axe and burn marks	[redacted]	[redacted]
AGN-5B	Living split trunk tree	Blaze, one on each trunk	[redacted]	[redacted]
AGN-5C	Stump	Axe marks near base	[redacted]	[redacted]
AGN-6	Living tree	Stripped bark	[redacted]	[redacted]
AGN-7	Living tree	Axe mark	[redacted]	[redacted]
AGN-8	Living tree	Stripped bark	[redacted]	[redacted]
AGN-9	Stump	Springboard notch	[redacted]	[redacted]

Note: Universal Transverse Mercator (UTMs) collected in North American Datum (NAD) 83 UTM Zone 8N.

Three blaze trees, identified as having a scar cut through the bark, were identified (Figures C-1, C-2, and C-3 in Appendix C). The blaze trees in the Phase 2 Direct APE are distributed widely and do not occur in clusters. The FAA cultural resource consultant field crew could not discern clear functions for any of the blaze trees; however, the blazes could mark property boundaries, old timber units, old trails, or hunting locales. While exact ages could not be determined, the blazes appear to be at least somewhat recent and may have been created in the last 50 years.

Three CMTs with springboard notches or possible springboard notches were also recorded in the Phase 2 Direct APE and Kootznoowoo, Inc. Proposed Materials Source (Figures C-4, C-5, and C-6). Associated with historic logging, the notches were created for the insertion of a plank on which a logger stood while swinging an axe or wielding a cross-cut saw to cut the tree at an acceptable height above its base. Such notched trees are common throughout Southeast Alaska and the Pacific Northwest.

Two of the CMTs recorded in the Phase 2 APE exhibit axe marks (Figures C-7 and C-8). Another exhibits both axe and burn marks (Figure C-9), and two others exhibit areas of stripped bark (Figures C-10 and C-11).

Another type of CMT includes three cut stumps and a stack of cut log rounds (Figure C-12). No roads or trails were visible in the vicinity of the cut trees, and moss growth indicated they had been stacked for quite some time, possibly several decades. No cultural materials were found in shovel probes in the vicinity of the stacked logs. Anecdotal evidence suggests these trees may have been cut for shake (personal communication, A. Johnson 2013).

Six of the identified CMTs are located near Killisnoo Harbor in close proximity to SIT-00169. The FAA cultural resource consultant has determined that these CMTs are not associated with SIT-00169. All six CMTs are located inland from SIT-00169 and are geographically separated from the site by a swale that runs roughly parallel to and just outside the northwest-southeast-trending boundary of the Direct APE. The CMTs appear to be associated with more than one activity or episode, and in some cases their function cannot be determined; one is a possible springboard notch, one is a blaze tree, two are trees with axe marks, one exhibits both axe and burn marks, and one tree has stripped bark. Similarly, the CMTs appear to be from a variety of time periods. The blazes appear quite recent, possibly made in the last 10 to 15 years, while the springboard notches on another tree may be more than several decades old. Time frames for many of the CMTs cannot be determined. No cultural materials were found on the surface or in subsurface probes in the area that might tie activities near the CMTs to SIT-00169, which is discussed in more detail in Section 7.3.3.

7.2.1 NRHP Eligibility of Culturally Modified Trees

While CMTs can be eligible for the NRHP—typically under Criterion A for association with historical events or Criterion D for information potential—the trees must meet certain eligibility criteria. In general, CMTs associated with the early historic period or prehistoric period or those associated with significant events or themes regardless of their time period are more likely to be determined eligible for the NRHP. Recent CMTs or those associated with non-significant land uses or themes are unlikely to be considered eligible. Those found in association with archaeological sites may be considered to be a contributing feature of the site rather than eligible in their own right.

None of the CMTs in the Phase 2 Direct APE are known to be associated with any specific historical events or people or hold potential to yield information important to history or prehistory. While the springboard notched CMTs in the Phase 2 survey area are presumably associated with historical logging, logging was never a significant industry in Angoon. Rather, it was short-lived and of limited scale. Most historical logging in the Phase 2 Direct APE was undertaken by local residents or commercial operators to obtain wood for construction of buildings and similar structures. Occasional trees would have also been felled for the construction of canoes or similar watercraft. However, such associations cannot be identified for a specific CMT based on the evidence at hand. Therefore, the CMTs in the Phase 2 Direct APE do not appear to meet the criteria to be considered significant resources. As such, all 12 CMTs are recommended ineligible for the NRHP under all criteria.

7.3 Cultural Resource Sites

As noted above, four cultural resource sites—all of which were documented prior to the current undertaking—are located within the indirect effects APEs for the airport project. [redacted]

The sections below provide descriptions of the sites, discussion of their NRHP eligibility, and an assessment of anticipated effects from the airport undertaking.

7.3.1 Site SIT-00014, Killisnoo Island Village

SIT-00014 is the Killisnoo Island Village site—a historic Tlingit and Euro-American village and commercial/industrial site (Figure 13). It is located within the Visual APE for the current undertaking. The village was destroyed by a fire in 1928. The site was first documented by the USFS in the early 1970s (Fields and Davidson 1979). Additional documentation was reportedly completed by the USFS for an NRHP nomination form that was never submitted to the NPS, and Saleeby and Mobley investigated the site in 2008 (see Mobley 2012).

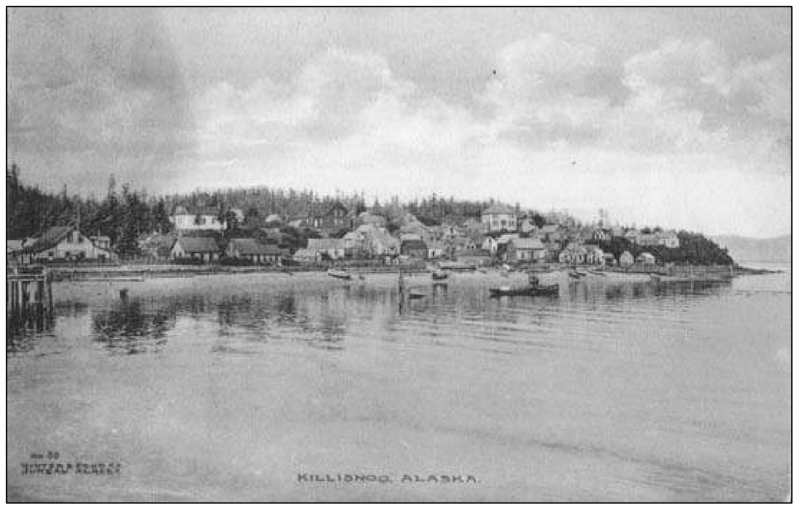

Figure 13. Killisnoo Island Village, ca. 1908.

The site is located [redacted]. No buildings or building ruins from old Killisnoo Island Village remain; landscape features and artifacts are present on land—primarily in the forested inland area west of the fishing lodge complex—and in the intertidal zone (Mobley 2012:107). Artifacts are scattered across the landscape, though their provenience is questionable in some instances due to the high frequency of recreational exploration on the island, intentional land clearing, and other disturbances. Subsurface archaeological deposits are also likely present in the site area. Artifacts and features represent both the pre-1928 fire period of whaling operations and trading post as well as the World War II and immediate post-war industrial periods of Killisnoo Island.

NRHP Eligibility Review

The FAA has determined this site is eligible for the NRHP under Criteria A and D. The assessment of the site's historical significance and eligibility for the NRHP is outlined below.

Although much of the former Killisnoo Island Village site has been altered through modern ground disturbance and land development, the bulk of the site retains integrity of at least location. The integrity of setting, feeling, association, workmanship, design, and materials has been compromised somewhat by the modern land uses.

The herring plant at Killisnoo in the late 1800s was one of the first industrial enterprises in Alaska after the territory was purchased by the U.S. government (Mobley 2012:95). The whaling operations from the village are also associated with one of the most infamous events in the history of Angoon, namely the shelling of Angoon by the U.S. Navy in 1882. The shelling, which resulted in the deaths of many Alaska Natives from either injury or slow starvation from the destruction of food stores, was a turning point in settlement in the area; following the shelling, many surviving villagers from Angoon relocated to Killisnoo Island, at least seasonally. Further bolstering its association with important historical events, Killisnoo Island Village is directly associated with the relocation of Aleuts from Atka during World War II. For all of these reasons, the FAA has determined that the village site is eligible for inclusion in the NRHP under Criterion A.

The FAA has also determined that the village site is eligible for the NRHP under Criterion D. The investigations conducted extensively by Mobley (2012) and less extensively by the FAA's consultants in 2009 clearly indicate the potential for both surface and subsurface archaeological deposits that could expand the understanding of the history of Killisnoo Island Village. The artifact assemblage has the potential to yield information dating as far back as the prehistoric period and all of the different use periods since then. In particular, the assemblage could provide information about the interactions of the different ethnic, religious, and culture groups that occupied the village both over time and at the same time. Such topics as differential access to goods, cultural adaptation, and industrial technology from the late 1800s to mid-1900s may be addressed by the artifact assemblage.

Due to the destruction and/or demolition of all of the buildings and the near-complete lack of building ruins, the site does not appear to retain sufficient integrity to be eligible under Criteria B and C—that is, the site lacks sufficient integrity to convey its historical associations with any specific historical person or to reflect specific architectural or engineering types, styles, or manners of construction.

Effects Analysis

Site SIT-00014 is located in the Visual APE for the current undertaking. The characteristics for which the site appears to be eligible for the NRHP are not sensitive to visual intrusion. The historical village site was not located on the eastern shore of Killisnoo Island because of its particular viewshed. Rather, all indications are that the village was located as such because of the calm waters afforded by Killisnoo Harbor. During its period of industrial and residential development, the situating of buildings does not appear to have been specifically influenced by the viewshed and was defined by available land, the island's topography, and the development of different zones (e.g., industrial and residential) to separate, at least to a certain degree, living quarters and social activities from the industrial facilities. The historical associations of the village site under Criterion A are not affected by the viewshed of the site.

The eligibility of the Killisnoo Island Village site under Criterion D for its information potential is not vulnerable to changes in the viewshed of the site; the extent, nature, or quality of the data that could be recovered would be in no way affected by alteration of the landscape across the harbor from the site.

Based on the reasons presented above, the anticipated landscape changes from the Airport 12a alternative would have ***no adverse effect*** on the Killisnoo Island Village site (SIT-00014).

7.3.2 Site SIT-00056, St. Andrews Church

The St. Andrews Church site was documented in AHRS records in 1974 through an archival exercise associated with Russian Orthodox Church buildings and sites in Alaska. No fieldwork was conducted at that time to verify the existence of the church or any archaeological remains. The documented site location is on the [redacted] This area is located within the Visual APE for the current undertaking.

As noted in the discussion of site SIT-00014, approximately two-thirds of the site is now occupied by the Whaler's Cove Lodge complex. A reconnaissance of the documented location of the St. Andrews Church site during the Phase 1 field studies for the Angoon Airport project in 2009 concluded that the property on which the St. Andrews Church was located remains undeveloped [redacted]; however, there are no physical remains of the church present on that property.

NRHP Eligibility Review

Although St. Andrews Church played a prominent role in the lives of the Russian Orthodox in Killisnoo Village and was an important outpost in the battle between the Russian Orthodox Church and other religious institutions to gain converts among Alaska Natives, the site lacks the integrity to reflect this association or its association with important individuals. Lacking structural remains and standing features, the site also lacks the integrity to represent a particular architectural type or style, method of construction, or artistic design. As such, the FAA has determined that the site, independent of the Killisnoo Island Village site (SIT-00014), is not eligible for the NRHP under Criteria A, B, and C. The FAA does find, however, that the potential for subsurface cultural deposits does exist, although such deposits are likely to be both sparse and shallow due to the relatively short period of time over which the church existed. Therefore, the FAA has determined that site SIT-00056, the St. Andrews Church site, is <u>eligible for the NRHP under Criterion D</u>, at least until proven otherwise by subsurface investigations.

Effects Analysis

Site SIT-00056 is located in the Visual APE for the current undertaking. The apparent eligibility of the St. Andrews Church site under Criterion D for its information potential is not vulnerable to changes in the viewshed of the site; the extent, nature, or quality of the data that could be recovered would be in no way affected by alteration of the landscape across the harbor from the site.

Based on the reasons presented above, the anticipated landscape changes from the Airport 12a alternative would have ***no adverse effect*** on the St. Andrews Church (SIT-00056).

7.3.3 Site SIT-00169, Killisnoo Harbor Village

Site SIT-00169 is the Killisnoo Harbor Village site. [redacted] The first archaeological investigations of the site appear to have been by de Laguna who learned from residents of Angoon that the village had been abandoned after an epidemic, perhaps in the 1830's (de Laguna 1960). She observed garden furrows and found traces of midden in subsurface tests. In the 1970's the site was investigated and formally recorded by Sealaska at which time the remains of two cabins, historical debris, and extensive gardens were noted (Sealaska and Wilsey & Ham 1975). Shortly thereafter, Fields and Davidson (1979) conducted a cursory examination of the area and recorded four decaying cabins, historical debris, depressions, garden plots, and crushed shell possibly indicative of midden deposits.

During Phase 2 field investigations, the FAA's cultural resource consultants conducted investigations to determine if any surface or subsurface components of SIT-00169 extended into the Phase 2 Direct APE. A 600-meter-long (1,969-foot-long) section of the northwest-southeast-trending boundary of the Phase 2 Direct APE in this area was surveyed with 10-meter (33-foot) transects extending 10 meters (33 feet) outside the APE on the seaward side and 30 meters (98 feet) inside the APE on the inland side. In addition, the field crew located surface features and artifacts [redacted]

Inland from the surface features and artifacts visible at [redacted] The boundary of the Phase 2 Direct APE is inland of the swale along a small rise roughly two meters high.

Subsurface testing was also conducted just inside the Phase 2 Direct APE [redacted] Twenty-four shovel probes were placed in this area during Phase 2 field investigations on private parcels where right-of-entry had been obtained from the landowners. Shovel probes were placed in relatively flat areas most likely to have been used for occupation or activity areas. No cultural materials were found in any of the shovel probes. Given that no surface features or artifacts were found within the Direct APE, that no cultural materials were found in shovel probes, that no evidence was found to associate any of the CMTs with the activities at SIT-00169, and that the swale appears to have been a natural barrier to the inland extent of Sit-00169, the FAA believes there is sufficient evidence to suggest that SIT-00169 does not extend into the Phase 2 Direct APE. However, portions of SIT-00169 are located in areas where construction-related vibration could occur outside of the Direct APE.

NRHP Eligibility Review

No formal determination of eligibility has been made for site SIT-00169 as a result of its prior documentation. For the purpose of the current undertaking, the FAA assessed existing information about the site, as well as information gathered during the field investigations discussed herein, and determined that the Killisnoo Harbor Village site (SIT-00169) is eligible for the NRHP under Criterion D, as it has the potential to yield information important in expanding the understanding of historical land uses in the Angoon area, albeit over an apparently short period of time. Additionally, an analysis of the artifact assemblage could yield information that may shed light on the occupants of the area and any cultural, ethnic, or other reasons why they chose to live outside the larger village sites in the area. The FAA has determined that the site is not eligible for the NRHP under Criteria A, B, or C.

Effects Analysis

Site SIT-00169, Killisnoo Harbor Village, is located outside but near the Direct APE, where construction-related vibration may occur. As discussed in section 5.5, above, cultural resources known to be susceptible to damage or impairment from vibration are, with a few exceptions, structural in nature. Since the soil composition in the vicinity of the site is stable and not defined by loose deposits that could allow for movement of subsurface artifacts due solely to vibration, the archaeological component of this site does not appear vulnerable to vibration effects.

The structural component of site SIT-00169 consists of collapsed cabin remains. Because these structures have already collapsed and become overgrown and heavily weathered, they no longer appear susceptible to damage or impairment from potential vibration associated with construction of the airport on adjacent lands.

Long-term effects to historic properties can occur due to new or improved access to areas that may lead to inadvertent or intentional trampling or damage to cultural resources from increased human activity in the area, or looting of artifacts. For Airport 12a with Access 12a, the FAA has determined that this undertaking would not improve access into currently inaccessible areas. The airport operational area would be surrounded by a fence and would not be available for use as new or improved access to the Killisnoo Harbor shoreline near SIT-00169, or any other areas adjacent to the airport. As such, the FAA anticipates ***no adverse effect*** to this site from the proposed undertaking.

7.3.4 *Site SIT-00749, Killisnoo Cemetery*

SIT-00749 is a historical Aleut and Russian Orthodox cemetery (Killisnoo Cemetery) located [redacted] (Figure 14). It is unclear when the site was first documented and by whom, but the most recent documentation was carried out by Saleeby and Mobley, who investigated and evaluated the site in 2008 (see Mobley 2012).

Figure 14. Killisnoo Cemetery, ca. 1908.

The cemetery contains several dozen graves of primarily Russian Orthodox Alaska Natives. Several Aleut persons, who died during their forced relocation from Atka—in the Aleutian Chain—to Killisnoo during World War II, are also buried in the cemetery, as are at least a few persons of Japanese or Japanese-American descent. Grave markers and remnants of burial houses are still present, though heavily weathered. There is no evidence that the cemetery constitutes a designed landscape.

NRHP Eligibility Review

As a general rule, the NPS, the keeper of the NRHP, does not consider cemeteries and graves eligible for inclusion in the NRHP (Potter and Boland 1992:1). However, the NPS has created exceptions to this rule. These exceptions are known as Criteria Considerations. Criteria Consideration D applies specifically to cemeteries. Under Criteria Consideration D, a cemetery may be eligible for inclusion in the NRHP if it can be nominated individually under Criteria A, B, or C; a cemetery is not eligible for the NRHP if it is chiefly eligible because of its information potential (i.e., under NRHP Criterion D). A cemetery may be eligible under Criteria A, B, or C if it "derives its primary significance from graves or persons of transcendent importance, from age, from distinctive design features, or from association with historic events" (Potter and Boland 1992:16).

The FAA has determined that the Killisnoo Cemetery is eligible for the NRHP under Criterion A. The cemetery does not appear to meet the criteria consideration for associations with persons of "transcendent importance" or retain sufficient integrity of structural features to merit eligibility under Criteria B or C.

Under Criterion A, the cemetery is a significant site for its associations with the history of Killisnoo Island and Killisnoo Island Village. The Killisnoo Cemetery still reflects strong associations with the various cultural and religious affiliations of Killisnoo Island's residents over time. Russian Orthodox, Aleut, Tlingit, Japanese, and Euro-American grave markers are all present and represent the small island's varied occupants. The cemetery also reflects the different periods of occupation of nearby Killisnoo Island Village, from the late 1800s to the mid-1900s. For these reasons, the cemetery site is eligible for the NRHP under Criterion A and meets the criteria considerations set forth by the NPS for cemetery sites.

Effects Analysis

Site SIT-00749, the Killisnoo Cemetery, is located in the Visual APE for the current undertaking. The site is located in a moderately dense, second-growth spruce-hemlock forest. Visibility from the cemetery grounds to the surrounding landscape offshore of Killisnoo Island is somewhat limited by the forest landscape.

Although cemeteries are often intentionally situated on the landscape to take advantage of viewsheds afforded by certain topographic features, that does not appear to be the case with the Killisnoo Cemetery. Rather, the cemetery's location appears from historical maps of the island to be as much, if not more, a matter of available land near the Killisnoo Village as a specific selection based on viewshed. Additionally, the reasons for which the Killisnoo Cemetery is eligible for the NRHP are not specifically because of its role as a cemetery site but rather due to its associations with and ability to reflect the historical activities and cultures of Killisnoo Village and Killisnoo Island over time. These facets of the site's importance are not sensitive to visual intrusion from the landscape across Killisnoo Harbor. As such, the visual changes to the landscape anticipated from Airport 12a are expected to have ***no adverse effect*** on the significance of site SIT-00749, the Killisnoo Cemetery.

7.4 Potential for Inadvertent Discoveries during Construction

No historic properties were identified within the Direct APE for Airport 12a with Access 12a. As is the case for most projects, however, there exists potential for buried cultural resources and human burials within the APE that were not identified during either the Phase 1 or 2 field investigations. As a result, the FAA will require a Monitoring and Inadvertent Discovery Plan be developed by DOT&PF prior to the start of construction.

8.0 SUMMARY

Two phases of investigation, including archival research, local interviews, field investigations with pedestrian survey and shovel probe excavation, and visual, noise, and vibration effects analysis have been undertaken in the APEs for the FAA's preferred airport and access road location (Airport 12a with Access 12a) for the community of Angoon. Two potential materials source sites that could be used during airport construction have also been investigated in a similar manner.

The investigations resulted in the identification of 12 CMTs in the Direct APE. None of the CMTs are recommended eligible for the NRHP. No archaeological sites or prehistoric or historic structures were identified in the Direct APE or the Noise APE during any of the investigations. Three sites (SIT-00014, SIT-00056, and SIT-00749) are located in the Visual APE and one (SIT-00169) is adjacent to but outside the Direct APE, where construction-related vibration might extend outside of the construction footprint. The FAA has determined sites SIT-00014, SIT-00169, and SIT-00749 are eligible for the NRHP. FAA evaluated each of these three sites relative to the criteria of the NRHP under which they are eligible for the listing and assessed the sensitivity of these sites to visual, vibration, or long-term effects in relation to the applicable criteria. Based on this analysis the FAA concludes that the proposed undertaking would have no adverse effect on any of the three historic properties. Therefore, the FAA has made a determination that the undertaking would result in a finding of No Adverse Effect to Historic Properties.

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10.0 ACRONYMS

AHRS	Alaska Heritage Resources Survey
APE	area of potential effects
CASA	Civil Aviation Safety Authority
CFR	Code of Federal Regulations
cmbs	centimeters below surface
CMT	culturally modified trees
DOT&PF	Department of Transportation and Public Facilities
EIS	environmental impact statement
FAA	Federal Aviation Administration
GIS	geographic information system
GPS	global positioning system
NAD	North American datum
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
OHA	Office of History and Archaeology
SHPO	State Historic Preservation Officer
SWCA	SWCA Environmental Consultants
USFS	U.S. Forest Service
UTM	Universal Transverse Mercator

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APPENDIX A. PHASE 1 CULTURAL RESOURCES EXISTING CONDITIONS TECHNICAL REPORT FOR THE ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT

ANGOON AIRPORT
Environmental Impact Statement

CULTURAL RESOURCES EXISTING CONDITIONS TECHNICAL REPORT FOR THE ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration

and

Alaska Department of Transportation and Public Facilities

Prepared by

SWCA Environmental Consultants

Under authority of U.S. Forest Service ARPA Permit No. JUN709

SWCA Cultural Resources Report No. 2010-20

SWCA Project No. 15489

April 2012

PUBLIC VERSION – INFORMATION PROTECTED BY FEDERAL LAW HAS BEEN REDACTED

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF), the Sponsor, for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska (Figure 1). At present, there is no land-based airport runway in or near Angoon. The DOT&PF prepared the Angoon Airport Master Plan (DOT&PF 2007) for their proposed airport location. In addition to the DOT&PF's proposed airport location, the EIS considers two alternative airport locations and multiple access road alternatives associated with those airport locations (Figure 2). (*Note*: Access Alternative 5 was studied and is shown on maps throughout this report, but it was subsequently dropped from consideration in the EIS.) Two of the three potential airport locations and portions of their associated access roads are located on lands administered by the U.S. Forest Service (USFS) within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area).

In consultation with the USFS, DOT&PF, the Angoon Community Association (ACA), Sealaska Corporation (Sealaska), and the Central Council of Tlingit and Haida Indian Tribes of Alaska (CCTHITA), the FAA directed its cultural resource consultant team (SWCA Environmental Consultants) to conduct field studies to identify cultural resources that could be directly or indirectly affected by the proposed undertaking. This technical report was prepared to document the area of investigation, the methods employed, and the results of these studies. The information contained herein will assist the FAA and USFS in assessing the potential impact of the proposed airport project on cultural resources and in engaging other agencies and consulting parties through processes associated with Section 106 of the National Historic Preservation Act (NHPA) and the National Environmental Policy Act (NEPA).

This report provides a detailed description of the first phase of studies to identify cultural resources potentially affected by implementation of the proposed airport project. For the purposes of this report, *cultural resources* are defined as archaeological, historic, prehistoric, and traditional cultural (heritage) properties. The term *historic properties* is also used in this report. This term refers to those cultural resources that have gone through a formal evaluation relative to their eligibility for listing on the National Register of Historic Places (NRHP). This report includes information on cultural resources that occur or have the potential to occur in the vicinity of the airport and access road alternatives. Raw data collected during the field studies are available for review to the extent allowable by federal law and policy (i.e., within the parameters of protecting confidential information as allowed by federal law). This report also provides the consultant team's recommendations of NRHP eligibility for those cultural resources identified in the survey area. Those sites recommended "eligible" for the NRHP would be considered *historic properties* upon a final determination of eligibility by the FAA in consultation with the appropriate consulting parties. No findings of effect have yet been made, as the alternatives being considered in the EIS are still being designed. The FAA and USFS will issue joint determinations of eligibility and findings of effect under separate cover when design plans are sufficiently defined to allow for an evaluation of anticipated impacts.

All field investigations took place on privately owned lands, lands owned by the City of Angoon and Kootznoowoo, Inc., and lands administered by the USFS. Investigations carried out on lands administered by the USFS were conducted under authority of USFS Archaeological Resources Protection Act (ARPA) Permit No. JNU709. Field investigations were carried out from July 11 to July 25, 2009, and again on August 29, 2009.

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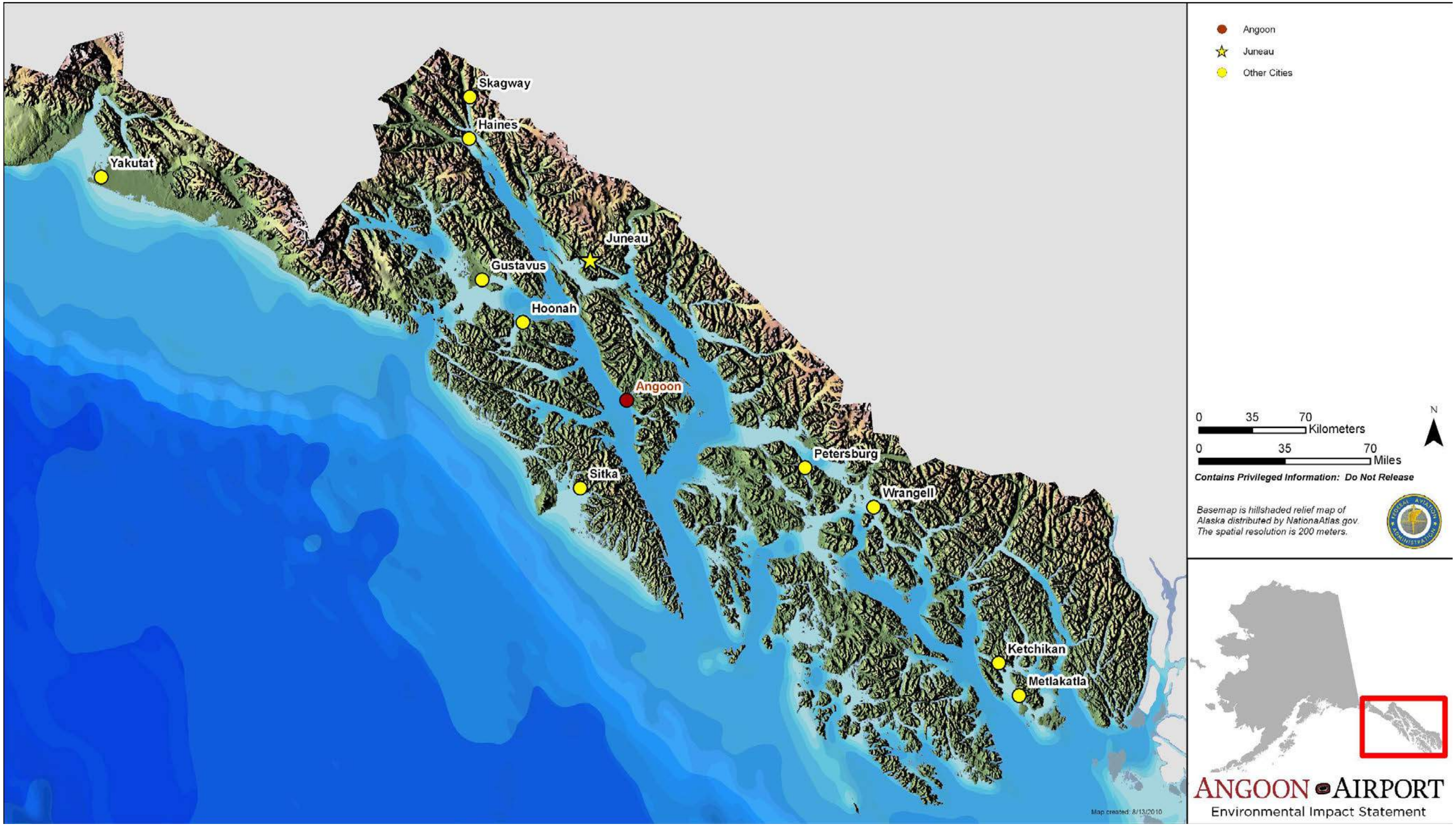

Figure 1. Southeast Alaska regional overview map showing the location of Angoon.

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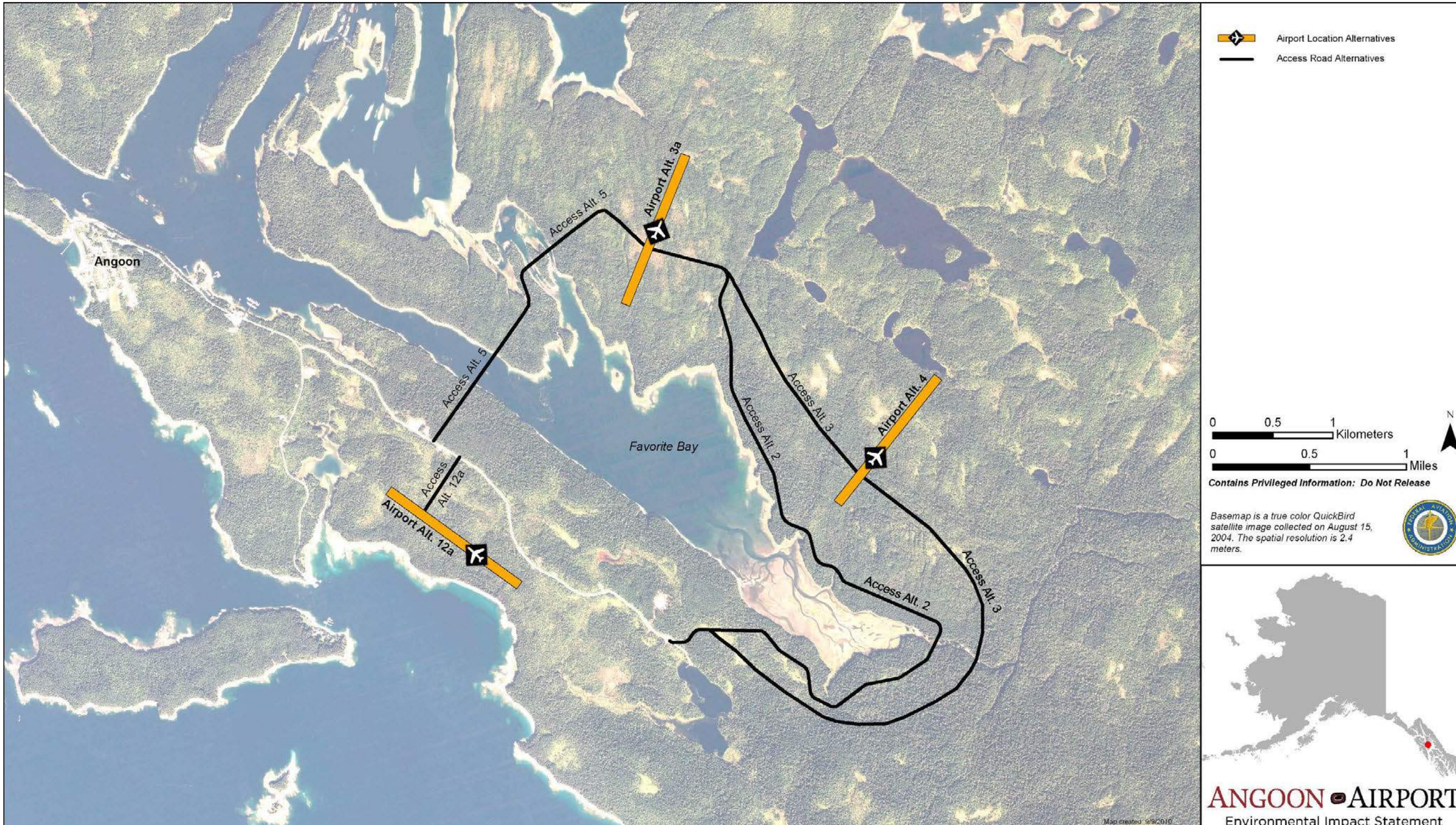

Figure 2. Locations of airport alternatives and access road alternatives. *Note*: Airport alternatives illustrated on this figure represent locations only and do not depict final areas of disturbance.

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2.0 PROPOSED UNDERTAKING

The proposed airport project consists of construction and operation of a land-based airport and airport access road for the community of Angoon, which currently has no land-based airport. The DOT&PF would own and operate the airport, and they have prepared a master plan for the proposed airport (DOT&PF 2007), identifying a preferred location (see Airport Alternative 3a on Figure 2). They submitted a proposed airport layout plan to the FAA, who has conditionally approved it. The DOT&PF intends to apply to the FAA for construction funding. Before granting final approval of the airport layout plan and funding, the FAA must evaluate and disclose the anticipated impacts of the airport project, consider alternatives to the DOT&PF's proposed action, and identify impact minimization and mitigation measures. To this end, the FAA is preparing the aforementioned EIS, which considers three potential land-based airport locations and associated access alternatives (see Figure 2), as well as the no action alternative. The FAA has not yet identified a preferred alternative.

The land-based airport would be a small, commercial airport typical of other rural airports in the region. The initial construction would include a 3,300-foot-long paved runway; runway length could be extended to 4,000 feet in the future if air traffic warrants it. The runway would be 75 feet wide. Runway safety areas would be 150 feet wide and centered on the runway centerline, and would extend 300 feet beyond each runway end. The airport would have a short, perpendicular taxiway leading from the runway to a roughly 70,000-square-foot apron area, which may eventually contain a small passenger shelter building similar to the facility currently present at the airport in the village of Kake. The airport layout is being designed to accommodate a future full-parallel taxiway, but this taxiway would not be constructed initially and would only be built if air traffic demands are sufficient to warrant this additional safety and efficiency feature. The runway, taxiway, and apron would all be paved with asphalt, while the runway safety areas would remain unpaved. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. Additional areas of vegetation clearing and/or terrain alteration outside the airport boundary may also be needed for some of the airport locations under consideration in the EIS. At the time the cultural resources field studies were conducted, the exact layouts, boundaries, and additional cleared areas were not known. See section 3.0 below for additional information on the phased approach to identifying cultural resources.

Regardless of the airport location under consideration, an access road would need to be constructed to connect the new airport to the existing Angoon road system. The access road would have a gravel surface and would be two lanes wide (one lane in each direction) with 9-foot-wide lanes and minimal shoulders. The road right-of-way width will vary depending on terrain and cut and fill. Overhead power and utility lines may be placed inside the right-of-way. For two of the access road alternatives considered in the EIS, bridges would need to be constructed over Favorite Creek.

3.0 AREA OF POTENTIAL EFFECTS (APE)

The three airport build alternatives being considered in the EIS are Airport Alternatives 3a, 4, and 12a (see Figure 2). These locations were identified through detailed aviation planning, which indicated that extreme terrain in the area in and around Angoon limits the potential locations for airports that would meet FAA requirements for safe aircraft operations, particularly for approaches and departures. Therefore, only a very small number of potential airport locations is considered viable, and the alignments of the runways at these locations are limited to within a few degrees of variation. Three airport access road alternatives are also under consideration in the EIS: Access Alternatives 2, 3, and 12a (see Figure 2). At the time the field studies reported herein were conducted, a fourth access road alternative, Access Alternative 5, was also under consideration, but the FAA has since eliminated this alternative from consideration.

The extent of the area of potential effects (APE) for any airport and access road built in Angoon depends largely on factors such as terrain and potential uses of the road for purposes other than accessing the airport. For example, for airport locations where the terrain is irregular more cut and fill would be required than would be necessary in a location where the terrain is flatter and more even. Additionally, access road alternatives extending around Favorite Bay are more likely to be used for non-airport purposes, such as accessing subsistence areas, than is a road to an airport on the Angoon peninsula. The non-airport use of access roads would pose a potential risk of indirect impacts to cultural resources near the access roads. However, because the vegetation through which the roads around Favorite Bay would pass consists of thick spruce-hemlock forest with an extremely dense understory, the magnitude of potential cross-country travel from an airport access road is expected to be very different depending on the distance of the road from the shoreline of Favorite Bay. A road closer to the shoreline is expected to see much greater non-airport use than a road farther from the shoreline due to the substantial use of the bay for subsistence gathering by Angoon residents. Access Alternative 2 is located near the shoreline of the bay, and Access Alternative 3 is located approximately 0.20–0.75 miles inland from the shoreline, in an upland area.

Because of the nature of EIS preparation and the timing during which potentially significant resource conflicts must be identified, field studies for cultural resources (and other resources) generally must take place before the design of a proposed action and any alternatives to it are sufficiently advanced. A distinct project footprint and all project design features must be identified to a degree that a firm APE for direct and indirect effects can be established. For this reason, and because of the high cost of conducting cultural resource field studies in Angoon, the FAA opted to proceed with a process of phased definition of the APE and phased identification of historic properties so that survey of areas not directly or indirectly affected by the final alternatives and their designs are limited. The FAA offered the Alaska State Historic Preservation Officer (SHPO), USFS, DOT&PF, and other consulting parties the opportunity to comment on the APE and provide information on cultural resources in and near the APE that should be taken into consideration for the project.

FAA's objectives for defining the APE in phases are as follows:

- **Phase 1: Establish an APE sufficient for comparison of alternatives in the Draft EIS.** The FAA identified an area—referred to herein as the Phase 1 APE—around the potential runway locations within which the majority of direct effects from construction of the runway, taxiway, apron, and safety areas is likely to occur. The Phase 1 APE also includes a 50-foot-wide corridor along each road alignment for the access road alternatives. This Phase 1 APE, which encompasses 615 acres, does *not* capture areas within which *indirect effects* might occur. Field studies were conducted within the Phase 1 APE, and therefore it is also referred to in this report as the "survey area." The purpose of these studies was to obtain sufficient information to compare alternatives in the EIS relative to known or potential direct risk to historic properties. Relative potential direct effects on historic properties are also estimated using the USFS cultural resources sensitivity model (see section 5.2.1). Information obtained for the Phase 1 APE is also used in partial fulfillment of the Section 106 process but is insufficient to complete the Section 106 process. The survey of this Phase 1 APE is reported here. The Phase 1 APE is illustrated in Figure 3.

  Phase 2: Refine the APE sufficiently to complete the Section 106 process. When the airport and access road locations and designs have progressed sufficiently to allow for more concrete definition of the APE, the APE would be redefined to include all areas of anticipated direct *and* indirect effects. At this time, additional field studies would be conducted as necessary to fulfill the Section 106 process. This phase of APE definition is expected to occur between the Draft EIS and Final EIS, when the FAA has considered public and agency comments on the airport and access road locations and modifies the project designs accordingly or, possibly, eliminates alternatives from further consideration. The FAA fully anticipates that this Phase 2 APE will be larger than the Phase 1 APE. A separate report of survey methods and findings for the Phase 2 APE will be prepared at a later date.

In summary, the identification efforts for historic properties discussed herein apply only to the Phase 1 APE. Additional identification efforts will be necessary to fully capture the extent of direct and indirect effects on historic properties that may result from an airport and access road in Angoon. The FAA will consult with the USFS, SHPO, DOT&PF, and other consulting parties to define the boundaries of the Phase 2 APE and the appropriate level of effort to identify historic properties within those areas. Any cultural resources identified during the subsequent investigations will be addressed per the requirements of Title 36 of the Code of Federal Regulations (CFR), Part 800 with regard to determinations of eligibility, findings of effect, and resolution of adverse effects, should any be identified.

4.0 CULTURAL AND ENVIRONMENTAL SETTING

The area around the community of Angoon is rich in history, heritage, and cultural resources. It has been home to Alaska Natives for thousands of years, and Alaska Natives make up the majority of the population in the community today. The inlets and bays around Angoon offer abundant natural and subsistence resources, as evidenced by large populations of salmon, halibut, other freshwater and salt water fishes, seals, deer, bear, and a wide variety of marine and upland plants. The area supports a subsistence lifestyle and the maintenance of a unique cultural heritage tied closely to the natural environment.

4.1 Cultural Context

The following sections provide a brief discussion of the important cultural contexts and periods of significance for the Angoon area. The discussion addresses both chronological sequencing and temporal themes relevant to understanding the cultural resources in the Angoon peninsula and Favorite Bay area.

4.1.1 PREHISTORIC PERIOD

Archaeological evidence dates prehistoric occupation of Southeast Alaska to at least 7,000 years before present (B.P.). However, archaeological investigations on Admiralty Island, and specifically around Angoon and Favorite Bay, have been limited. For these reasons, the scientific and anthropological understanding of the area’s cultural history is still being developed. The lack of documented archaeological evidence of prehistoric occupation in and around Angoon is most likely due to the relative scarcity of detailed archaeological studies in the area and not to an actual lack of sites. It is important to note that regardless of the current state of archaeological data, Angoon Tlingit oral histories document a long-term occupation extending back millennia.

The prehistoric chronology of Admiralty Island has been categorized in different ways by different researchers. The USFS, in preparing its environmental analysis for the Thayer Lake Hydroelectric Project near Angoon, assigned the prehistory of the Admiralty Island area to the general chronology of the Northwest Coast cultural sequence (USFS 2009:3–74). That coarse sequence comprises three temporal periods as follows: Early Period (10,000–5,000 B.P.); Middle Period (5,000–1,500 B.P.), and Late Period (1,500 B.P.–A.D. 1741).

The Early Period in Southeast Alaska is known only from a few archaeological sites. No sites from this period have been documented in the immediate Angoon area. The archaeological hallmark of these sites is the presence of microblade tools. Research on the microblade tool tradition is most well developed for northern and central Alaska and less understood for Southeast Alaska, and it is presently unclear if microblade tools from archaeological contexts in Southeast Alaska represent the same temporal range as they do for areas farther north, or if their use persisted into more recent periods as cultural traditions made their way south along the Alexander Archipelago.

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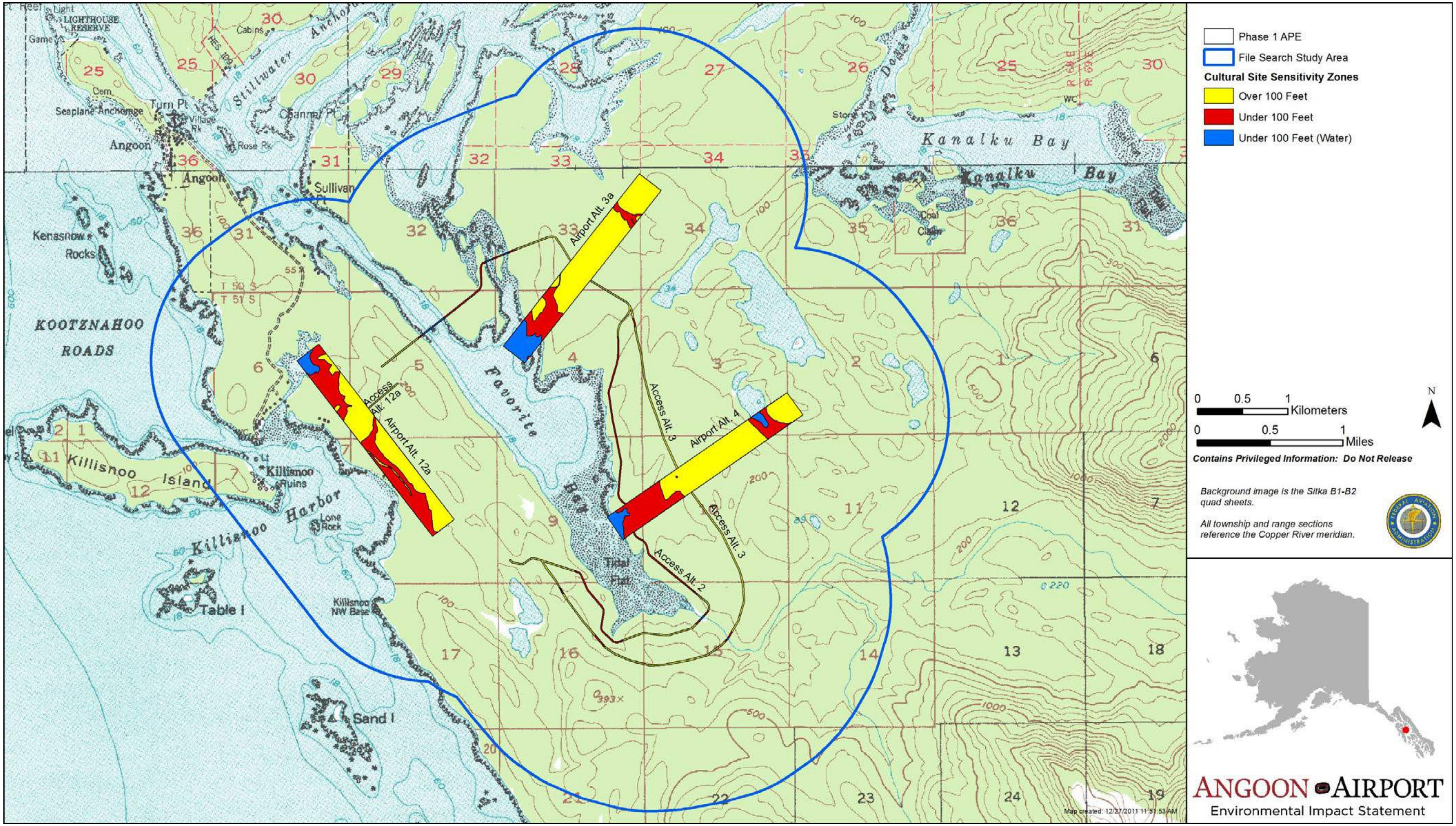

Figure 3. Location of the Phase 1 APE, also referred to as the survey area, including high-sensitivity zones distinguished by elevation.

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As a general rule, known sites from the Early Period are rare, but as with essentially all periods in the history of Southeast Alaska, the material evidence of those few sites depicts a clear reliance of the prehistoric occupants on maritime resources. However, the maritime cultural tradition was not yet fully developed.

By the Middle Period, adaptation to a true maritime culture was in full swing. This is reflected in the archaeological record by an apparent intensified occupation of coastal zones, an expansion of the diversity and volume of stone and bone tools designed for use in acquiring and processing marine resources, and more extensive use of wood stake fish weirs and fish traps for catching large quantities of fish, suggesting there was a need to feed a larger number of people in a localized area. Archaeological evidence of larger and more permanent camp sites (often referred to as fort sites) has also been found. In the Angoon area, the Favorite Bay Fish Weir site (SIT-00033) and the Killisnoo Picnic Ground Midden site (SIT-00124) have been dated to this period. The oldest archaeological evidence for human occupation of the Angoon and Favorite Bay areas comes from the Favorite Bay Fish Weir site. Radiocarbon dating of this weir yielded an oldest date of just over 3,200 years B.P. and a youngest date of just over 2,170 years B.P., suggesting prolonged use of the site.

The Late Period on Admiralty Island and in the Angoon area appears to be marked more by intensification of coastal occupation and increasing population than a change in cultural tradition or material culture. Fort sites datable to the period are more common and tend to be larger than those of the Middle Period. Many such fort sites are known throughout the general Angoon area, particularly in the vicinity of Kootznahoo Inlet and Mitchell Bay. No such fort sites have yet been identified in the immediate Favorite Bay area. Garden plots appear in association with many terminal Late Period archaeological sites, but archaeological research is sufficiently limited that it is unclear whether this is a result of Late Period horticultural activity or ethnographic period re-occupation of Late Period sites.

4.1.2 Ethnographic Period

During the ethnographic period (the period immediately after initial European contact in the mid-1700s), several Tlingit villages were located around the shores of Favorite Bay, on the Angoon Peninsula, and on various islands in the surrounding area (see de Laguna 1960; Moss 1989; Moss and Erlandson 1985; Moss et al. 1989). It is unclear whether villages were occupied at the same time or sequentially. Ethnographic data indicate that occupants of these early Angoon villages periodically relocated to new places in the area for a variety of reasons, the most recent of which was the bombing of the last known historical village by the U.S. Navy in the late 1800s. During this period, and extending well into the historic period, the Tlingit food economy was based on a combination of horticulture and seasonal round subsistence gathering. Along the shores of Favorite Bay and other bays and islands in the Angoon area, villagers established garden plots where root vegetables, particularly potatoes and turnips, were grown. The gardens are a clear reflection of cultural trade and intermingling, with the initial root stock for the crops coming not through native plant species but through cultural exchange. Archaeological evidence of these gardens remains intact at numerous sites along the eastern shoreline of Favorite Bay.

The ethnographic Tlingit of the area are described by Yarborough (2005) interpreting information provided by de Laguna (1960) as having "an economy based upon fish (particularly anadromous fish); settled villages; a highly sophisticated woodworking industry; a highly developed and distinctive art form; a social organization structured around lineages, clans, and phratries; and a ritual life focused upon totemism, shamanism, and the attainment of status through potlatching." Yarborough further describes a pattern of movement across the landscape and resource use consistent with a seasonal round lifeway wherein centralized villages are occupied during the winter but largely abandoned at other times of the year when individuals and families relocated to fishing and hunting camps. The lifeway of the ethnographic Tlingit peoples left its mark on the landscape surrounding Favorite Bay in the form of structural remains, occasional isolated artifacts, and distinctive marks left on trees in the dense spruce-hemlock forest. In particular, various types of cuts visible on tree trunks today reflect past

Tlingit activities such as gathering pitch for waterproofing canoes and other items, marking trails or routes to subsistence gathering areas, or obtaining materials for the extensive woodworking for which the Tlingit peoples are still well known today.

Ethnographically, the Angoon Tlingit traditional territory was first occupied by the Gaanaxteidi' (Raven) clan of the Raven moiety. Later, the Deisheetaan (Beaver) clan of the Raven moiety arrived, having followed Beaver across the isthmus, according to oral tradition. The Gaanaxteidi' eventually left the area, giving all rights to the village to the Deisheetaan. Other clans of the Raven moiety, as well as clans of the Eagle/Wolf moiety migrated into the Angoon area over time. In addition to the Deisheetaan, the Raven moiety included the Aanxaakhittaan clan (Dog Salmon House). The Eagle/Wolf moiety included the Wooshkeetaan clan (Shark House), Teikweidi clan (Bear house), and Daklaweidi clan (Killer Whale House).

4.1.3 HISTORIC PERIOD

The historic period—the period of written history—began in Southeast Alaska with the 1741 arrival of Russian explorer Vitus Bering's ships off the west coast of Prince of Wales Island, about 150 miles south of Angoon (Betts and Bowers 1994:18). More than 50 years later, in 1794, the ships of British Royal Navy Captain George Vancouver made their way to Admiralty Island, visiting a native village in the vicinity of Killisnoo Island, which is located just off the coast of the peninsula on which modern-day Angoon is located. This village may have been an earlier location of Angoon (de Laguna 1960:172).

Killisnoo and the Whaling Industry

The Russian empire laid claim to Alaska and established its capital at Sitka (then called New Archangel) in 1799. Euro-American explorers and traders forayed into the Angoon area for the next several decades, but none appears to have established permanent settlements around Angoon. It was not until 1878, 11 years after the United States purchased Alaska from the Russians, that large-scale permanent non-native settlement took place around Angoon in the form of a Northwest Trading Company trading post on Killisnoo Island. A few years later, the Northwest Trading Company opened a whaling station on the island. The whaling operation provided employment to many of the Tlingit villagers from Angoon, and a large number of Angoon families left the native village and moved to Killisnoo Island, where facilities including a school and church were available. Despite certain mutual benefits to the Northwest Trading Company and the Tlingit villagers from their coexistence, it was an uneasy arrangement at best. Interracial tensions fomented by cultural misunderstanding led to many confrontations, including one of the darkest chapters in Angoon's history. In the late fall of 1882, the accidental death of a Tlingit shaman working on a whaling vessel thrust the cultural ignorance and intolerance to the fore, ultimately culminating in the shelling of the native village of Angoon and a nearby summer subsistence camp by the U.S. Navy. The destruction of the village food stores just before winter left many of the surviving villagers to starve to death.

The attack on the village of Angoon understandably dampened the whaling operation on Killisnoo Island for many years. But there was money to be had, and the Northwest Trading Company began processing herring oil and fish guano at Killisnoo in 1887 under the name of the Alaska Oil and Guano Company. The new operations brought new employment opportunities for Tlingit villagers, and the settlement at Killisnoo once again grew. The processing facilities operated for more than two decades before suspending operations in 1915 and then operating off and on until their final closure in 1931 (de Laguna 1960:197). The loss of monetary employment caused many native villagers to return to the former village at Angoon. The town of Angoon was organized in its present location in 1917, and was organized as a city in 1963.

Substantial archaeological evidence of this period remains in the Angoon area. Though most structural evidence directly associated with the whaling and trading company operations are found on Killisnoo Island (for example site SIT-00014/Killisnoo Ruins on Figure 3), artifacts from the period can be found in archaeological contexts on the Angoon peninsula and surrounding areas. Several unexploded artillery rounds from the Navy's shelling of Angoon have reportedly been found on land surrounding Favorite Bay.

Admiralty Island's Timber and Mining Heritage

Unlike many other areas of Southeast Alaska, that portion of Admiralty Island around Angoon has seen little in the way of mining and logging over the area's history, although logging most certainly occurred around Angoon, including the Favorite Bay area, during the late 1800s and early 1900s in support of construction and barrel stave manufacture associated with the commercial operations on Killisnoo Island. Shortly after President Theodore Roosevelt created the present-day Tongass National Forest by proclamation in 1907, the USFS began promoting the timber industry on Admiralty Island, but it gained little traction near Favorite Bay. The most recent commercial logging of note near Angoon occurred to the south and east of Favorite Bay in the 1950s and 1960s, prior to the establishment of the Monument–Wilderness Area. Evidence of these activities is relatively abundant in the area and in the form of cut tree stumps, springboard notches in tree stumps, logging cables, and other small artifacts of the logging industry.

As with logging, large-scale and commercial mining activity has also been very limited around Angoon and has focused on coal mining. The most substantial mining activity on Admiralty Island has occurred at the extreme north end of the island, at Funter Bay, where gold mining began in the 1920s. In the mid to late 1800s, steamer ships recovered coal from the Sepphagen Coal Mine in Kootznahoo Inlet. However, the quality of the coal was too poor for use in steamer ship boilers, and development of the coal vein never progressed in a meaningful way. Around 1895, the Admiralty Island Coal and Fuel Company was formed and began extracting coal from the southern end of Admiralty Island at Murder Cove. More than 30 years later, in 1928, the company opened the Hardrader Mine in Kanalku Bay, just east of Angoon. The mine operated for less than a year because of legal troubles and produced less than 1,000 tons of coal (Mobley 1994:31; USFS 2011). Kootznoowoo, Inc., the village native corporation for Angoon, owns a coal lease in the vicinity of the former Hardrader Mine, but it is not currently under development.

The Monument–Wilderness Area

Admiralty Island National Monument, which encompasses the vast majority of Admiralty Island and on which the DOT&PF's proposed airport and one airport location alternative would be located, was set aside for monument purposes in 1978 by a presidential proclamation (43 F.R. 57009) from President Jimmy Carter. The proclamation stated

> protection of the entire island [Admiralty Island], exclusive of the Mansfield Peninsula, is necessary to preserve intact the unique scientific and historic objects and sites located there. Designation of a smaller area would not serve the scientific purpose of preserving intact this unique coastal island ecosystem.

The monument was formally established in 1980 as a provision of the Alaska National Interest Lands Conservation Act (ANILCA) (§ 503 (b)). ANILCA § 503(c) defined the purpose for the monument as follows:

> Subject to valid existing rights and except as provided in this…section, the [Monument] shall be managed by the Secretary of Agriculture as units of the National Forest System to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest.

The Kootznoowoo Wilderness Area was also established by ANILCA in 1980 and was known as the Admiralty Island Wilderness Area at that time (ANILCA § 703(a)(1)). It was established in accordance with the Wilderness Act of 1964, which holds as its core purpose maintaining "an enduring resource of wilderness" (Public Law 88-577 § 2(a)). The Wilderness Act further clarifies the purpose of a wilderness area as a means of administering lands for the "use and enjoyment of the American people in such manner as would leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (Public Law 88-577 § 2(a)).

The monument and wilderness area overlap significantly, with the wilderness area boundary being only slightly smaller than the monument boundary because of certain lands that were excluded from wilderness designation because their development and use does not meet the criteria for wilderness. The USFS has managed the lands of the monument and wilderness area for its intended purposes since they were established. This management has meant severely limiting permanent development and use of motorized vehicles and equipment.

Direct archaeological and historic evidence of monument and wilderness area establishment and management is extremely limited, primarily consisting of the occasional boundary marker. Historic USFS cabins on the island generally pre-date the monument and wilderness area period. None of these cabins are located in the immediate vicinity of any of the airport or access road alternatives; the closest cabin is located at Jims Lake, approximately 12 miles east-northeast of Angoon by air. The most significant archaeological legacy of the monument and wilderness area is the de facto preservation of both Tlingit cultural resource sites and historic logging and cabin sites on Admiralty Island. This is certainly apparent along the east side of Favorite Bay near Angoon, where sites associated with early Tlingit settlement and ethnographic use remain largely intact.

4.2 Environmental Setting

Southeast Alaska has some of the most rugged terrain found in North America. The rainforests of the Monument–Wilderness Area are no exception. The Phase 1 APE is situated 2–5 miles (3–8 kilometers [km]) southeast of Angoon. Dense spruce-hemlock forests with large areas of dense alder (*Alnus viridis* [*crispa*]), devil's club (*Oplopanax horridum*), and blueberry (*Vaccinium* spp.) dominate this area. Field crews found vegetation to be less dense on the east side of Favorite Bay than on the west side, closer to Angoon.

The surrounding area is broken up by a maze of bays, inlets, tidal channels, and smaller islands that are situated in a southwest-northeast orientation. Numerous similarly oriented bedrock ridges were encountered under the forest canopy, suggesting massive glacial scouring with glacial activity likely originating in the nearby Hasselborg Lake area. Soils within the project area are variable, ranging from meters of organic overburden to exposed bedrock to only centimeters of mineral soils overlying bedrock. Within the project area, the topographic landscape is relatively flat when compared to the steep snow-covered peaks of interior Admiralty Island; however, incised drainages are present throughout the area.

The environmental conditions in and around Airport Alternative 3a, the northernmost of the two airport alternatives on the east side of Favorite Bay, were similar to those in and around Airport Alternative 4, though vegetation cover was slightly less dense. Vegetation was most dense toward the head of Favorite Bay and became less dense to the north. The overstory consisted of typical spruce-hemlock forest with trees reaching heights of 100 feet or more. The understory was a mixture of blueberry and alder, with small amounts of devil's club and skunk cabbage (*Lysichiton americanum*) in wetter areas. Numerous areas opened up into sphagnum (*Sphagnum* sp.) meadows with standing or running water in most, creating large areas of hydric soils. Numerous areas of exposed bedrock were observed in the northern half of the Airport Alternative 3a survey area. The survey areas nearest the water were wet and muddy, conditions that provide good habitat for numerous species of clams and sea asparagus (*Ensis macha*).

The survey area encompassing Airport Alternative 4 exhibited similar environmental conditions to Airport Alternative 3a but had a more mature overstory of spruce and hemlock. Large areas of blowdown were observed near the survey area's southwest end and northeast end. Blueberry is the dominant understory vegetation and was extremely dense within many of the blowdown areas. As with Airport Alternative 3a, the survey area for Airport Alternative 4 had numerous occurrences of sphagnum meadows with standing and running water. The survey area intersects an unnamed lake near its northeastern extent. Numerous bedrock outcrops forming north-south ridges measuring up to 10 meters (m) (33 feet) tall were observed south of the lake. Toward the southwest end of the Airport Alternative 4 survey area, Favorite Creek forms a channel providing fresh water and salmon runs. Chum salmon (*Oncorhynchus keta*) and pink salmon (*O. gorbuscha*) were observed in large numbers heading up Favorite Creek at the time of the field studies.

Airport Alternative 12a had the deepest soils, wettest conditions, and densest understory of all three airport alternatives investigated. The southeastern half of the survey area for this airport alternative had the wettest conditions and thickest vegetation. The northwestern half of the survey area was drier and contained more timber because of its higher elevation. The hydric soils allow for dense wetland vegetation such as devil's club, skunk cabbage, and alder.

5.0 METHODS

A three-pronged approach was used to identify cultural resources that may be impacted by the development of any of the airport and access road alternatives. Initially, two of FAA's consultants, archaeologists Sheri Ellis and Amy Schlenker, conducted preliminary records and files searches at the Tongass National Forest Admiralty Island National Monument office in Juneau, Alaska, on August 19, 2008, and the Alaska Office of History and Archaeology (OHA) in Anchorage on June 22, 2009. Additional sources of information were consulted, including community and university libraries, journals, and books addressing the history, prehistory, and archaeology of the Angoon area. The second component of the research consisted of investigative pedestrian field surveys to look for the presence or absence of previously recorded and previously unidentified cultural resources within the survey area. The third component consisted of tribal consultation and interviews with elders, culture bearers, and residents of Angoon with special knowledge of the location and cultural significance of cultural resources in the Favorite Bay area. The sections below describe each of these lines of inquiry in greater detail.

5.1 Literature Review

As part of the literature review regarding previous environmental, historical, archaeological, and heritage resource investigations and known resource sites within the survey area, the FAA's cultural resource consultant reviewed the OHA citation database, Alaska Heritage Resources Survey (AHRS) records and location editor (GIS site locator maps), Alaska Resources Library and Information Services data archives, and the Tongass National Forest Heritage Resources Survey data. Additionally, the FAA's cultural resource consultant reviewed the works of de Laguna (1960), Erlandson and Moss (1983), Moss and Erlandson (1985), all of whom have conducted extensive work in the Angoon area, as well as the broader regional works of Goldschmidt and Haas (1998) and others. The specific data resources of the OHA and AHRS records were reviewed to identify all relevant documentation and information for past archaeological and ethnographic studies and previously documented archaeological sites within 1-mile of the Phase 1 APE. This literature review area is referred to in this report as the "project area".

The archival review indicated that portions of the survey area have been inventoried for cultural resources as part of previous investigations; however, most of these investigations were associated with academic research rather than project development. The FAA's cultural resource consultant re-inventoried all areas within the current survey area that were inspected during these previous efforts. The data acquired from the literature review are discussed at length in section 6.0.

5.2 Field Inventory

As noted previously, field investigations were conducted in July and August 2009. Crews encountered mixed weather, which ranged from clear skies and 70° temperatures to dark, wet, rain-soaked 40° days. Overall, the weather was favorable for conducting cultural resource surveys. Access to the survey areas was gained by foot, boat, or automobile, depending on the area being investigated. Walking conditions varied from moderately easy to very difficult. A dense understory of mosses and blueberry limited ground visibility. In many areas, plant cover was so dense that all but the most obvious signs of human use, such as aboveground resources, would have been covered and reclaimed by the dense vegetation. Because of this limitation, field investigations included subsurface shovel tests and soil probes.

Most of the previously documented and undocumented but known cultural resource sites in the area are located along the shoreline of Favorite Bay. As such, field crews focused particular effort along shoreline areas within the survey area. Numerous bedrock outcrops forming north-south ridges measuring up to 10 m (33 feet) tall were observed within the survey area for Airport Alternative 4. This area, as well as the shorelines, was given particular scrutiny during field studies due to the known association of such outcrops with cultural resource sites elsewhere in the region. All previously documented cultural resource sites in or immediately adjacent to the survey area were also revisited as part of the studies.

5.2.1 Sensitivity Analysis Methods

Because a portion of the survey area is located on lands administered by the USFS, the FAA's cultural resource consultant incorporated the USFS's sensitivity zone model into the approach to field investigations by tailoring the nature of field investigations to include more intensive methods in areas considered high sensitivity zones under the USFS model. The model was established in the *Second Amended Programmatic Agreement (PA) Among the USDA Forest Service Alaska Region, the Advisory Council on Historic Preservation, and the Alaska State Historic Preservation Officer Regarding Heritage Resource Management on National Forests in Alaska* (USFS 2002). Appendix E of the PA defines sensitivity zones that guide field crews while performing field inventories. High sensitivity zones are defined as follows:

- Land between mean lower low water and 100 feet in elevation above mean high water, with no consideration of slope
- Areas of former lode and placer mining
- River valleys, lake and river systems providing passes or portages across larger land masses
- Lake and stream systems containing or known to have contained anadromous fish runs, including a focus of barrier falls locations in such systems
- Elevated or fossil marine, river, and lake terrace systems
- Caves and rockshelters, areas of karst landforms, and rock formations known for caves and rockshelters
- Areas associated with myths and legends (e.g., traditional cultural properties or cultural landscapes)
- Known sources of potential raw materials (e.g., obsidian sources, exceptional concentrations of cedar trees)
- Alpine areas, if ethnographic or historic evidence or previous surveys conducted nearby indicate cultural use
- Other areas identified through oral history research or other sources

Lands within the survey area that met any one of the above criteria were afforded additional attention beyond simple surface inspection. Field supervisors, using their professional judgment, also defined areas of high probability on the basis of microenvironments encountered during survey even if these areas did not meet any of the above criteria. Based on the criteria of the USFS model, approximately 33% of the survey area was categorized as high sensitivity for cultural resources. All such areas were subjected to subsurface sampling through shovel probes and soil probes.

5.2.2 SURFACE INVENTORY METHODS

The FAA consultant field personnel consisted of two bear guards (Ryan French and George Weekley), four archaeologists (Brian Durkin, Cyrena Undem, Mary Pearce, and Michael Farrell), and one field archaeology supervisor (Omar Ramirez). This team performed an archaeological inventory of the survey area between July 11 and 25, 2009, and again on August 29, 2009. Sheri Ellis (principal investigator), Myra Gilliam (archaeologist for the Admiralty Island National Monument), and Rachel Myron (seasonal archaeologist for the Admiralty Island National Monument) provided additional assistance at various times throughout the field sessions.

Field crews walked each of the airport alternative and access road alternative survey areas while maintaining regular 20-m (66-foot) transect intervals to the extent permitted by vegetation and landforms. In some situations dense, impenetrable vegetation was encountered, making a complete survey impracticable. The crews made every effort to investigate lands covered in dense vegetation. The presence of such dense vegetation may necessitate implementation of an on-site monitoring program during construction, should an action alternative be selected through the EIS process. During the field inventory archaeologists examined the survey area for artifacts, features, and other evidence of cultural occupation, such as shell middens; charcoal-stained sediments; peeled and blazed trees; historic structures, such as dugout foundations and linear sites (e.g., trails, roads, and canals); and historic camps.

All site features, such as site boundaries, tree lines, and distinctive environmental features, as well as point data, such as the site datum, cultural features, shovel probes, and select individual artifacts (e.g., temporally diagnostic tools) were mapped with a Trimble geographical positioning system (GPS) unit when satellite alignment and tree canopy allowed. When GPS signals were unavailable, field crews drew detailed maps to record information obtained by compass and metric tape. These data were later digitized into ArcMap. Field GPS data for sites was post-processed using Trimble Pathfinder software and projected into Universal Transverse Mercator (UTM), Zone 8 North, North American Datum (NAD) 1983. All GPS data were exported into ArcMap 9.3.1 shapefiles and plotted onto the associated georeferenced U.S. Geological Survey (USGS) quadrangle (Sitka B-2) to ensure accuracy; subsequently the data were used to produce location maps of the resources. In addition to the site mapping, project personnel took overview photographs of each resource recorded, with a minimum of two compass bearings. Associated features and diagnostic artifacts were described, measured, recorded with GPS units, and photographed (where photography was illustrative), as appropriate. All non-digital field data including photograph logs, feature forms, site/isolated occurrence forms, shovel probe forms, and hand-drawn maps were recorded on field forms or in field notebooks.

5.2.3 SUBSURFACE INVENTORY METHODS

As noted previously, dense vegetation and groundcover in the survey area may obscure evidence of cultural resources, and the FAA's cultural resource consultant included subsurface sampling in field inspections to help address this issue. A 1-inch soil core was used to investigate soils for the potential to yield cultural resources. This core was also used to probe subsurface soils, mostly by sound and feel, for unidentified shell middens and other unnatural occurrences of materials. When good soils were encountered on lands identified by the model as high sensitivity for cultural resources, shovel probing was conducted.

Under certain conditions, like those found along the shoreline of Favorite Bay, it is reasonable to anticipate the existence of buried cultural deposits based on the known intensity of past land uses in this area. In areas of high probability/sensitivity for site occurrence and low ground visibility, judgmental shovel probing was conducted with probes ranging between 30 and 40 centimeters (cm) (12–16 inches) in diameter and averaging 50 cm (20 inches) deep. Probes excavated deeper than 50 cm (20 inches) were continued to depths allowable by hand tools (i.e., less than 1 m). Excavated soils were sifted through ¼-inch (0.6-cm) screen to identify cultural material. Shovel probes containing cultural material were terminated after two sterile levels (arbitrary 10-cm [4-inch] levels) had been encountered. Where bedrock, hydric soils, or impenetrable tree roots were encountered during subsurface testing, or where the probe was too deep to continue hand excavation, the shovel probe was terminated. Any artifacts uncovered during subsurface probing were documented, bagged, and returned to the hole from which they came. The locations of all subsurface probes were recorded using handheld GPS units with sub-meter accuracy.

5.2.4 Airport Alternative-specific Field Methods

The surface and subsurface inventory methods described above outline the overall approach to field identification of cultural resources. Because the microenvironment of each airport and access road alternative differs from the others, field crews tailored the application of the overall approach to specific portions of the survey areas. The following sections discuss the specific approach to each airport alternative.

Airport Alternative 12a

Airport Alternative 12a is situated on a northwest–southeast alignment paralleling the greater Angoon Peninsula (see Figure 3). The road to the village water treatment facility parallels the Airport Alternative 12a to the northeast, and Killisnoo Harbor is located to the southwest. An all-terrain vehicle trail provided clear pedestrian access to the south end of the survey area.

Field crews found the soils along the southwest margin of the airport survey area to be largely hydric and difficult or impossible to screen. The field approach was to look for higher ground above the hydric soils and out of the swampy areas. After walking the entire survey area for this airport alternative, the field archaeologists focused their shovel probing efforts in the northern portion of the survey area, which, based on professional opinion, appeared to have the highest potential for cultural resources.

The extremely wet conditions in the survey area support densely growing vegetation, including thick patches of devil's club, skunk cabbage, and alder. On occasion the field crew was forced to deviate from their parallel transects to avoid dense vegetation or standing water.

Airport Alternative 3a

Airport Alternative 3a is situated in a northeast–southwest orientation with the southwest end of the airport survey area beginning just off the shoreline of Favorite Bay (see Figure 3). Vegetation was densest in the southwestern part of the survey area (i.e., from Favorite Bay upland for 500 m) but thinned out toward the middle of the survey area. Subsurface sampling was carried out in the southwestern portion of the survey area, because this area was categorized as a high sensitivity zone for cultural resources based on the aforementioned criteria. Shovel probing was conducted in locations that field supervisors deemed as having the highest likelihood of buried or obscured cultural resources. Soils in the survey area were mixed evenly between wet hydric soils and drier organic soils overlying bedrock.

Numerous sphagnum meadows with standing and running water were identified in the northeastern portion of the survey area. Soils around the meadows were hydric and were only investigated visually.

Airport Alternative 4

Airport Alternative 4 is situated in a northeast–southwest orientation beginning near the shoreline at the head of Favorite Bay, north of Favorite Creek and south of an unnamed lake (see Figure 3). Vegetation in this survey area is made up of spruce-hemlock overstory and blueberry understory. The blueberry was especially thick in the southwestern half of this survey area. The southwestern third of the survey area was categorized as having high sensitivity for cultural resources based on elevation, proximity to Favorite Creek, and other factors. The area surrounding the unnamed lake near the northeastern extent of the survey area was also categorized as a high sensitivity area. As noted previously, numerous areas of bedrock outcrops were investigated near the lake. All of the high sensitivity areas were subjected to intensive inspection, including subsurface sampling.

5.3 Consultation and Interviews

Consultation was undertaken in advance of this report to identify and evaluate cultural resources within the survey areas for the airport and access road alternatives. This consultation includes federally recognized tribes and Alaska Native organizations, Native corporations, local individuals, and other interested parties. While this technical report marks a milestone in the consultation process, it does not constitute an end to that consultation. The FAA will continue to consult with the agencies, Tribe, and other consulting parties throughout the preparation of the EIS and until the Section 106 process of the NHPA has been completed. Future consultation will specifically address findings of effect from the proposed project; however, FAA will also continue consultation related to identifying historic properties that could be affected by the undertaking.

Among the agencies consulted to date regarding cultural resources and the project APE are the Alaska SHPO and the USFS. This consultation has occurred through a combination of written correspondence, meetings, and informal conversations.

Consultation is also being undertaken by the FAA with the tribal council of the Angoon Community Association (the federally recognized tribal government in Angoon) and the Central Council of the Tlingit and Haida Indian Tribes of Alaska. Consultation is occurring at a government-to-government level to the extent desired by the tribes themselves. The FAA Angoon Airport Project Manager is leading these consultation efforts. Consultation to date has consisted of meetings and written correspondence. Government-to-government consultation will occur throughout the life of the project.

In addition to the government-to-government consultation with federally recognized tribes, the FAA is soliciting the input of the appropriate Native corporations. Sealaska Corporation is the regional corporation for the area, and Kootznoowoo, Inc. is the village corporation. The FAA has contacted these corporations through written correspondence, telephone conversations, and in-person meetings. Throughout the EIS process to date, the FAA has invited, and will continue to invite, representatives of the corporations to participate in project-related group meetings with regulatory agencies and other parties.

The final category of parties engaged by the FAA in discussions about cultural resources in the survey area is individual elders and culture bearers in the Angoon community and the non-governmental organizations Friends of Admiralty Island (FOA) and Southeast Alaska Conservation Council (SEACC). The FAA's cultural resource consultant conducted numerous interviews with individual elders and culture bearers in Angoon. Using maps, aerial photographs, and field visits, consultant staff members requested information on known cultural resources; general land uses in the past; traditional, myth, or legend sites; and current cultural uses of lands and sites that could be affected by any of the airport or access alternatives. Many individuals interviewed expressed concern about divulging such information, citing past instances in which agencies or others have removed artifacts from the area and taken them to curation facilities or museums outside of Angoon and Southeast Alaska. Given this sensitivity, the FAA and its consultant have ensured confidentiality of specific site information to the extent allowable by law but will use the information to thoroughly assess potential project impacts and refine alternatives as appropriate to avoid or minimize impacts. Interviews and discussions with elders and community members will continue throughout the life of the project.

While not specifically focused on cultural resources, members of FOA and SEACC have a wealth of knowledge about cultural resources in the vicinity of Favorite Bay and general cultural tradition in the area. FOA and SEACC have been engaged by the FAA in general project discussions as part of the public involvement program for the EIS, and several of the discussions have addressed cultural resource issues. The inclusion of these parties in discussion of cultural resources in the Angoon area was focused on identifying known resources rather than evaluating the cultural significance of these resources and was geared at taking advantage of the collective knowledge of NGO members who have spent considerable time in and around of the area of Angoon. Evaluation of the cultural significance of cultural resources identified in the survey area was carried out by FAA in consultation with the USFS, ACA, SHPO, DOT&PF, and other consulting parties having either a designated role in the Section 106 process or ascribing patrimonial affiliation to the resources in question.

6.0 Previous Research and Known and Potential Cultural Resources in and around the Phase 1 APE

The locations of the airport and access alternatives and the surrounding lands have been subject to several previous assessments for historical, architectural, archaeological, and cultural resources potential. Cultural research and archaeological investigations have been formally documented since the 1940s, spurred by academic interest, and more recently, by undertakings requiring compliance with Section 106 or Section 110, or both, of the NHPA (36 CFR 800). Many of these studies have been conducted by the USFS or in conjunction with proposed development. Table 1 summarizes past cultural resource investigations within a 1-mile buffer around the Phase 1 APE, referred to as the file search study area. Following the table are more detailed discussions of these investigations and known and potential cultural resource sites in the Phase 1 APE.

6.1 Academic Research

Academic documentation of traditional lifeways and activities of Alaska Natives (primarily Tlingit) of Admiralty Island began in the mid 1940s with the research of Goldschmidt and Haas (1946; republished 1998). The duo conducted extensive ethnographic work through greater Southeast Alaska, focusing on the Tlingit and Haida peoples. Their early work, published in 1946, documented the geographic locations of distinct clans and moieties, traditional use areas, and subsistence hunting and fishing areas. Goldschmidt and Haas continued to chronicle the historical and contemporary lifeways of the Tlingit peoples for nearly 50 years through the transcription of stories and ethnographic interviews they conducted with Tlingit and Haida tribal members (Goldschmidt and Haas 1998).

De Laguna began her intensive academic studies on Admiralty Island in the mid 1950s (de Laguna 1960). De Laguna's work recorded the traditional use areas of the Tlingit peoples of Angoon. During this research she identified and gathered preliminary documentation on a variety of heritage sites ranging from structures such as forts and fish weirs to archaeological sites such as garden rows and shell middens. Many of the sites identified by de Laguna are located around Favorite Bay. De Laguna documented the oral histories associated with many of the sites and sought to understand their significance to the people of Angoon. Subsequent research at sites identified by de Laguna in the general Angoon area has included limited testing and excavation and has provided invaluable data for understanding the past uses of the area. Sites in the file search study area that de Laguna visited are SIT-00295, SIT-00303, SIT-00305, SIT-00306, SIT-00169, SIT-00177, SIT-00014, and SIT-00015.

Using de Laguna's work as a guide, Moss and Erlandson began their research on Admiralty Island in the early 1980s. Moss, a USFS employee at the time, and Erlandson, an instructor at the University of California, Santa Barbara, used baseline USFS data as a stepping stone to academic research, culminating in Moss's 1989 dissertation, *Archaeology and Cultural Ecology of the Prehistoric Angoon Tlingit.* Moss and Erlandson's work has helped to establish the cultural chronology of Angoon by focusing on archaeological sites and testing carboniferous materials located within features of the sites. Their work has also documented the traditional uses of many of the natural resources located within and around Admiralty Island through analysis of faunal remains at three primary site types: villages, forts, and fishing sites (Moss 1989). Moss and Erlandson conducted archaeological excavations at many site locations around Angoon, and the resulting data complements de Laguna's archaeological research and contributes to a much broader view of traditional lifeways in Angoon (Moss 2004). Moss's work continues today through the University of Oregon. Traditional or heritage sites documented by Moss and Erlandson within the file search study area are SIT-00169, SIT-00262, SIT-00295, SIT-00124, and SIT-00033.

While not entirely academically based, Sealaska Corporation's publication *Native Cemetery and Historic Sites of Southeast Alaska* (Sealaska Corporation 1975) also provides valuable information about cultural resources in the general area of Angoon. Published in 1975, Sealaska's study identifies sites that could be eligible for conveyance as historic or cemetery sites under section 14(h)1 of the Alaska Native Claims Settlement Act.

Table 1. Previous Investigations within the File Search Study Area

Report Title	Author (Year)	Resources Identified within the File Search Study Area
Possessory Rights of the Natives of Southeastern Alaska	Goldschmidt and Haas (1946)	SIT-00302[1]
The Story of a Tlingit Community: A Problem in the Relationship Between Archaeological, Ethnological, and Historical Methods	de Laguna (1960)	SIT-00295, SIT-00303, SIT-00305, SIT-00306, SIT-00169, SIT-00177, SIT-00014, SIT-00015
Cultural Resource Investigation at Killisonoo [sic] Harbor	Fields and Davidson (1979)	SIT-00015, SIT-00169, SIT-00177, SIT-00680, SIT-00014
Archaeological Reconnaissance of Favorite Bay, Admiralty Island	McAfee et al. (1982)	SIT-00302[1]
Results of Archaeological Reconnaissance on Admiralty Island National Monument, Southeast Alaska	Erlandson and Moss (1983)	SIT-00169, SIT-00262, SIT-00295
Preliminary Results of Archaeological Investigations on Admiralty Island, Southeast Alaska: 1985 Field Season	Moss and Erlandson (1985)	SIT-00124
1989 Archaeological and Historical Site Monitoring Program for the Chatham Area, Tongass National Forest	Lively and Davis (1989)	SIT-00015
Archaeology and Cultural Ecology of the Prehistoric Angoon Tlingit	Moss (1989)	49SIT124, 49SIT33
The Antiquity of Tlingit Settlement on Admiralty Island, Southeast Alaska.	Moss et al. (1989)	SIT-00124, SIT-00033
A Cultural Resource Management Plan for Admiralty Island National Monument - DRAFT	Mobley (1994)	–

Table 1. Previous Investigations within the File Search Study Area

Report Title	Author (Year)	Resources Identified within the File Search Study Area
Haa Aani Our Land: Tlingit and Haida Land Rights and Use	Goldschmidt and Haas (1998)	SIT-00302[1]
Cultural Resources Inventory of the Angoon Proposed Airport	Yarborough (2005)	SIT-00169, SIT-00680, SIT-00262, SIT-00033, SIT-00302, SIT-00502, SIT-00034
Archaeological Investigation of Cape Addington Rockshelter: Human Occupation of the Rugged Seacoast on the Outer Prince of Wales Archipelago, Alaska	Moss (2004)	–

Note: Data obtained through USFS Tongass National Forest Heritage Resources Archives, and OHA, Anchorage.
[1] Site is in the current survey area.

While the sites documented by De Laguna and Moss and Erlandson are located in the general airport and access road file search study area, they are located outside of the Phase 1 APE. However, the information obtained by the work of these researchers is valuable in identifying the types of archaeological, historic, and heritage resources that occur in the area. Since the majority of these studies focused on the immediate shorelines of Favorite Bay, Mitchell Bay, and other bays and inlets in and around Angoon, they are most useful in predicting coastal site locations and types; they provide less information about upland site types and locations. The results of these studies clearly indicate intensive prehistoric and historic use of shorelines in the area and suggest that any airport or access road alternative extending into the immediate shoreline area would have a high probability of encountering archaeological, historic, and traditional resources.

6.2 Federally Mandated Investigations

Proposed development, improvements to existing infrastructure, and resource management needs have triggered nine research investigations in the vicinity of the file search study area under Sections 106 and 110 of the NHPA. The following section describes these efforts.

Most of the land on Admiralty Island is managed by the USFS, and a number of research efforts have been completed by the agency over the last 30 years. The proposed construction of the Killisnoo Harbor Pipeline triggered a cultural resources review of the proposed pipeline route under Section 106. This project and its related investigations were located along the western edge of Admiralty Island (Fields and Davidson 1979). The investigation was conducted by USFS archaeologists and consisted of a pedestrian survey along the shorelines and higher-probability areas. The survey was supplemented with limited excavation of test units. Four sites were identified and addressed during this effort: SIT-00177, SIT-00680, SIT-00169, and SIT-00015. [redacted]

Efforts to establish hydroelectric facilities on Admiralty Island for the benefit of the community of Angoon began in the 1980s, after provisions for such facilities were included in the Alaska National Interest Lands Conservation Act. In the early 1980s, a hydroelectric facility, along with a fish hatchery and electric powerhouse, were proposed and feasibility studies were begun. The USFS conducted a cultural resource reconnaissance to assess potential impacts to resources resulting from the geotechnical drilling associated with the study (McAfee et al. 1982). The investigation documented sites SIT-00302 and SIT-00034. [redacted] The FAA's cultural resource consultant team revisited this site during the studies for the current undertaking and conducted additional investigations to establish the NRHP eligibility of the site. Section 7.0 of this document provides more information about this site. SIT-00034 is located outside the anticipated disturbance zones of the airport and access road alternatives under consideration in the EIS.

During the 1990s, the USFS began a series of site monitoring projects, which consisted of revisiting known sites to document their current condition and identifying and documenting newly discovered sites. These monitoring activities focused on the Chatham Straight area (Lively and Davis 1989). In 1994 the USFS contracted to Charles Mobley and Associates to prepare a cultural resource management plan for Admiralty Island National Monument (Mobley 1994). The plan, which was never finalized, established a cultural chronology for the island, using a combination of ethnographic interviews and data collected over the years by academic scholars and USFS archaeologists, and set forth the management direction at the time. A key component of the plan was a complete re-inventory of all known cultural resource sites and traditional land use areas located on Admiralty Island National Monument lands, which numbered more than 50. Of the sites identified in the plan by Mobley, none are located within the file search study area. Since the completion of the plan, the USFS has conducted additional monitoring of known archaeological sites, including those around Favorite Bay. Specifically, SIT-00302 has been subject to such monitoring.

In 2003 fieldwork was conducted in and around the community of Angoon by Cultural Resource Consultants (Yarborough 2005) for the proposed Angoon Airport project (which has undergone many phases and investigations during the efforts to move the project forward and reach NEPA compliance). The resulting report from the 2003 investigations indicates that the goal of the fieldwork, which was referred to as a “field reconnaissance”, was to identify some, but not all, cultural resources that may be affected by the locations of the proposed project’s airport and access alternatives in an effort to identify the archaeological sensitivity of the general area of the airport and access alternatives (Yarborough 2005). Coastal, estuary, and wetland areas were not investigated, and the resulting findings consisted of a handful of cut stumps and culturally modified trees. Previously identified sites SIT-00169, SIT-00680, SIT-00262, SIT-00033, SIT-00302, SIT-00502, and SIT-00034, located in the file search study area, are discussed and further documented in the report.

The most recent known study associated with cultural resources in the vicinity of the file search study area was the documentation by the USFS of a Tlingit legend site, [redacted]

As with the aforementioned academic research, most of the studies carried out under federal mandate have occurred within the shoreline areas of bays and other waterways around Angoon. These studies further confirm the intensity of prehistoric and historic uses of this landform.

6.3 Known and Potential Sites and Resources in the General Area around the Angoon Peninsula and Favorite Bay

As noted, the various investigations described above resulted in the identification of numerous cultural resource sites in the immediate vicinity of the general area around the Angoon peninsula and Favorite Bay. Additionally, these studies yielded information that suggests other resources may be present although they have not yet been identified or documented. This section further summarizes the known and potential cultural resources in the file search study area. While most of the known resources are located outside of the Phase 1 APE and in portions of the file search study area that are not expected to experience any effects from the proposed undertaking, they provide valuable insight into the array of site types—from maritime subsistence sites to garden sites to legend sites—that are found in the general area.

6.3.1 *ALASKA HERITAGE RESOURCES SURVEY SITES AND U.S. FOREST SERVICE HERITAGE RESOURCE SITES*

The OHA maintains a database of archaeological and historical resources identified and documented within the state. This information is referred to as the Alaska Heritage Resources Survey. The vast majority of resource information in the database is derived from inventories conducted in advance of federal undertakings or other projects subject to state and federal preservation laws. Other resources have been added to the database as a result of academic studies and other scientific investigations. Similarly, the USFS maintains an internal archive of documented, and undocumented but known, resources. Much of this resource information is a result of USFS archaeologists inventorying the agency's lands in conjunction with planning, management, and maintenance activities. As noted above, the records of the OHA database and the USFS were examined as part of the resource identification efforts associated with this technical report. The OHA and USFS records included information on 19 documented archaeological and heritage sites within the file search study area. These resources are listed in Table 2 and discussed below. Only one of these, SIT-00302, is located wholly or partly within the current cultural resources survey area.

The 19 previously documented sites represent a variety of prehistoric and historic activities and include such resources as buildings and structures, forts, cemeteries, middens, garden rows, fish weirs, village or other occupation sites, and a legend site. Most are affiliated with past Tlingit occupation of the area, although some are associated with the activities of Euro-Americans or others. No NRHP eligibility determinations are on file for any of these previously documented sites. Figure 4 shows the locations of these sites.

As noted, the only previously documented heritage resource located within an area that may be directly affected by any of the airport or access alternatives currently under consideration in the airport EIS is SIT-00302. This site is known as the Favorite Bay Garden Site. It was first documented by Goldschmidt and Haas in 1946, and the USFS also reported on the site (McAfee et al. 1982). The site was formally entered into the OHA site archives as a result of its documentation by Moss and Erlandson in 1985. Since that time, the USFS has periodically monitored the condition of the site, which contains historic Tlingit garden rows, cultivated crabapple trees, and blazed trees. The site may be related to the adjacent fish weir site, SIT-00033, located to the west of site SIT-00302.

[redacted]

Table 2. Documented Cultural Resources Located within the File Search Study Area

Alaska Heritage Resources Survey Number	Site Type	Site Name	Eligibility
SIT-00302*	Historic Tlingit garden	Favorite Bay Garden Site	Undetermined
SIT-00169	Historic Tlingit occupation site	Ketintci-'an (Killisnoo Harbor Village)	Undetermined
SIT-00033	Prehistoric/historic stake fish weir	Favorite Bay Fish Weir	Undetermined
SIT-00502	Historic Tlingit garden	Garden Site	Undetermined
SIT-00177	Historic Tlingit site/possible fort/cemetery remains	South Killisnoo Village (Dadakatak Nuwu/Dasuqtag-an/Potato Point)	Undetermined
SIT-00262	Prehistoric midden	Dukdeiyukutun As Midden	Undetermined

Table 2. Documented Cultural Resources Located within the File Search Study Area

Alaska Heritage Resources Survey Number	Site Type	Site Name	Eligibility
SIT-00680	Historic Euro-American water system	Water Flume	Undetermined
SIT-00749	Historic Aleut and Russian Orthodox cemetery	Killisnoo Cemetery	Undetermined
SIT-00014	Historic Tlingit village/Euro-American commercialism [graves, village site, cannery remains]	Killisnoo (Killisnoo Ruins/Kenasnow/ KanasNu/Killishoo/ Killisnoo Island Village)	Undetermined
SIT-00056	Historic religious buildings site	St. Andrew Church (Russian Orthodox)	Undetermined
SIT-00015	Prehistoric/historic Tlingit fort/cemetery	Killisnoo Harbor Fort and Cemetery	Undetermined
SIT-00124	Prehistoric Tlingit site	Killisnoo Picnicground Midden	Undetermined
SIT-00305	Historic Tlingit garden site	Kootznahoo Roads Garden	Undetermined
SIT-00306	Historic Tlingit cabins and midden site	Scott’s Ranch and Midden	Undetermined
SIT-00307	Historic Tlingit structure, garden, and midden site	Kenasnow Camp and Midden	Undetermined
SIT-00295	Prehistoric/historic Tlingit occupation site [cabins/lithics/middens/cache pits]	Ta Uk Aan Nee Shoo (Takwanicu/End of Winter Village)	Undetermined
SIT-00303	Historic Tlingit site	Xicwan-'ani (Fisherman's Town)	Undetermined
SIT-00034	Prehistoric/historic Tlingit site	Favorite Bay Midden/Garden	Undetermined
SIT-781 [USFS]	Prehistoric/historic legend site	Beaver Tail Rock	Undetermined

***** Resource located within current survey area.

6.3.2 SEALASKA CORPORATION AND ANGOON COASTAL MANAGEMENT PLAN SITES

Two other sources of information about known and potential cultural resource sites in the general project area are the aforementioned Sealaska Corporation’s 1975 publication *Native Cemetery and Historic Sites of Southeast Alaska* (Sealaska Corporation 1975), and the now void Angoon Coastal Management Plan (City of Angoon 1992). Several of the sites reported by these two sources are also documented in the Alaska Heritage Resources Survey program (see Table 2); these consist of Killisnoo Harbor Fort, Killisnoo Harbor Village, Killisnoo Island Village, South Killisnoo Village, and Sullivan Point Favorite Bay Village. Several others of the sites are located well outside the file search study area and will not be considered further as part of the EIS and related studies. These sites consist of Turn Point Village, Channel Point Village, Danger Point Village, Stillwater Anchorage Fort, and Kootznahoo Roads Petroglyph.

Three other potential sites were identified through the Sealaska and Angoon Coastal Management Plan sources; however, their exact locations are not known. These sites consist of the Angoon Favorite Bay Seasonal Village, Favorite Bay Village Site, and South of Angoon Burial Site. The FAA consultant’s cultural resource field crews attempted to identify the locations of these sites through interviews with local elders, but the names of the sites as published were not recognized, and the elders were unsure as to what locations they represented.

6.3.3 BURIALS AND HUMAN REMAINS

Individual burials and historic cemeteries are present in a variety of locations around Angoon and the broader landscape surrounding the village. Table 2 identifies those formally documented sites containing human remains that are within the file search study area. None of these sites are located in areas that would be directly or indirectly affected by development of an airport and associated access road at any of the locations under study in the EIS. However, given the intense history of long-term occupation of the Angoon and Favorite Bay area, it is likely that additional, yet-to-be-identified burials are present in the general area.

Goldschmidt and Haas (1998:14) refer to a burial on an island in Favorite Bay, as does de Laguna (1960:46). De Laguna notes that "a Decitan man is buried on the little island off the north shore of Favorite Bay, near the upper entrance to the lagoon behind Sullivan Point Island." The exact location of the island described by de Laguna is unknown, and no elders interviewed about known and potential cultural resources in the file search study area could or would confirm the location of any burials in the Favorite Bay area. The cultural resource survey area for Airport Alternative 3a encompasses an island in Favorite Bay, and the FAA's cultural resource consultant team thoroughly examined this island and found no evidence of any burials.

7.0 SURVEY RESULTS

No new archaeological, historical, or traditional/heritage sites were identified during the field inventory. The FAA's consultant team documented one new isolated occurrence and revisited and conducted additional investigations at one previously recorded site. In the State of Alaska an isolated find, or isolated occurrence, is defined as consisting of a single artifact, whereas sites are defined as occurrences of two or more artifacts. Field crews revisited one previously documented site to confirm its location relative to the survey area but did not update the site record. Additionally, field crews identified in the survey area numerous culturally modified trees (CMT), which are ubiquitous across Southeast Alaska. Information about all of these resources is provided below. The locations of the CMTs, the newly documented isolated occurrence, and the updated archaeological site are depicted on Figure 5.

The information in this figure is protected by Federal law. It is not for public release.

Figure 4. Locations of previously documented sites.

The information in this figure is protected by Federal law. It is not for public release.

Figure 5. Locations of CMTs, newly documented isolated occurrence, and updated archaeological site.

7.1 Newly Documented Isolated Occurrence

One new isolated occurrence was identified during field survey, and consists of a historic boring or jackhammer bit.

Field Isolate Number: OR71209-1

Site Type: Historic boring bit or jackhammer bit

Temporal Component(s): Historic mining or logging

Physiographic Province: Admiralty Island/Southeast Alaska

UTMs (NAD83): [redacted]

Legal Description: [redacted]

USGS Topographic Quad and Sheet: [redacted]

City/Village, State: Angoon, Alaska

Landowner: Kootznoowoo, Inc.

NRHP Eligibility Recommendation: Not Eligible

Description: [redacted]

The steel bit measures 25 inches long and 0.75 inch thick. It has a slight counterclockwise twist to it (Figure 6). It is octagonal in cross section and pointed on one end where it has four sides that appear to have been hand-forged, as they are rather roughly shaped. The pointed portion of the bit measures approximately 4 inches long (Figure 7). The entire bit is badly rusted, suggesting it has been exposed to the elements for a prolonged period. Artifacts relating to historic mining and logging are common throughout the greater Angoon area. No other artifacts, features, or other cultural materials were found in association with this item.

Figure 6. Isolate OR71209-1, historic boring or jackhammer bit.

Figure 7. Close-up of pointed end of bit.

7.2 Updated Site

[redacted] No determination of the site's eligibility for the NRHP had been made as a result of its earlier documentation. Field crews revisited the site to evaluate its current condition and gather additional data necessary to make a recommendation of NRHP eligibility to the FAA and USFS. The relevant information about the site and the consultant team's NRHP evaluation follow.

Field Site Number: SIT-00302

Site Type: Historic garden and pre-contact lithic scatter

Temporal Component(s): Historic garden; unknown prehistoric/historic

Physiographic Province: Admiralty Island/Southeast Alaska

UTMs (NAD83): [redacted]

Legal Description: [redacted]

USGS Topographic Quad and Sheet: [redacted]

City/Village, State: Angoon, Alaska

Landowner: USFS, Tongass National Forest, Admiralty Island National Monument

NRHP Eligibility Recommendation: Eligible under NRHP Criterion D

Period(s) of Significance: Prehistoric (Middle and Late Periods: 5,000 B.P. to A.D. 1741) and Ethnographic Period

Description: [redacted] In 1982 a USFS crew conducting an archaeological reconnaissance of Favorite Bay recorded and mapped SIT-00302. The site was reported as a historic garden site in 1985 by Moss and Erlandson, and was noted in 1946 by Goldschmidt and Haas.

Upon revisiting the site for the airport project, the FAA's cultural resource consultant team found the site still retained much of what was described in the original site description. However, the collapsed shelters and "shelf," which were identified during previous documentations, could not be found.

The Favorite Bay Garden Site consists of extensive garden plots stretching for 70 –75 m (230 –246 feet) in an L-shaped pattern of elevated rows (Figures 10 and 11), which are oriented perpendicular to the shoreline of Favorite Bay. The garden rows, measuring approximately 5–15 m long (16.4–49.2 feet), are just inside the forest fringe and have spruce trees, some of which are up to 75 cm (29.5 inches) in diameter, growing on top of them. There are 13 furrowed garden rows oriented east–west in the northwest portion of the site and 31 furrowed garden rows oriented north–south in the southern portion of the site. Farther inland from the garden rows is an open 20 × 30–m (65.6 × 98.4–foot) area consisting of a flat natural terrace with crabapple trees on its south end. A major tidal channel of Favorite Creek with a stake fish weir (SIT-00033) is located to the west of the site and may be associated with subsistence activities at SIT-00302 (see Figure 4 for location of SIT-00033). In addition to the garden rows, two other distinct features were identified. Feature 1 is located in the southwest portion of the site, and Feature 2 is located in the northernmost portion of the site

Figure 8. Overview of SIT-00302, view facing south from the northern edge of the site.

Figure 9. Overview of SIT-00302, view facing west and overlooking the datum.

The information in this figure is protected by Federal law. It is not for public release.

Figure 10. Site map of SIT-00302 with locations of shovel probes.

Figure 11. Raised furrowed garden rows (running from left to right) at SIT-00302, view facing northeast.

Feature 1 (Figure 12) is a stone-ringed hearth made up of seven visible stones. It is slightly oval in shape, measuring roughly 1.1 × 1.0 m (3.6 × 3.1 feet). The stones are approximately 50% covered in moss and are almost completely silted in. The hearth is located near the southwestern site boundary, just inside the tree line. A small amount of modern trash was observed in the vicinity of the hearth, suggesting the area is still used as a camping or resting area.

Feature 2 (Figure 13) represents a culturally modified tree with multiple cuts through the bark to remove pieces of wood for fire starter. Pitch wood is a very good source of fire starter and will burn easily in wet conditions. The stripped area of the tree is large, covering approximately one-third of the tree's circumference.

NRHP Eligibility Investigations and Recommendation: During the revisit to the site, there were two main goals: 1) establishing the site's boundary and condition and 2) gathering sufficient information to make a recommendation of eligibility for the NRHP. To these ends, surface evidence of the site was examined and limited subsurface sampling was conducted through soil and shovel probing. Some portions of the site boundary were based on topographic features that form clear limits on the extent of a garden site, such as the waterline of Favorite Bay.

In all, 27 shovel probes measuring 30–40 cm (12–16 inches) in diameter were excavated across the site. Depth of the shovel probes ranged from 28 to 70 cm (11 to 28 inches) below surface (cmbs) depending on the gravel, bedrock, and root content of 10-m (30-foot) intervals. Twelve of the probes were placed north of the site's visible boundary based on features, and eight probes were placed east of the site's previously defined boundary. The site's south and west boundaries are established by tidal waters. Soils were sifted through ¼-inch-mesh screen and inspected for cultural materials. The shovel probes were supplemented by 50 soil probes excavated with a 1-inch auger. See Figure 10 for the location of the shovel probes and Appendix A for a table of relevant information for all shovel probes.

Figure 12. Feature F1, stone-ringed hearth, at SIT-00302, view facing northwest.

Figure 13. Feature F2, a CMT with pitch cuts, at SIT-00302, view facing north.

Seven evenly spaced shovel probes were placed along a north–south line within the previously defined western perimeter of the site. An additional 20 shovel probes were excavated on a north–south grid, spaced at 10-m (30-foot) intervals. Twelve of the probes were placed north of the site's visible boundary based on features, and eight probes were placed east of the site's previously defined boundary. The site's south and west boundaries are defined by tidal waters. Soils were sifted through ¼-inch-mesh screen and inspected for cultural materials. A minimum of two consecutive negative shovel probes beyond the site's previously defined boundary were deemed appropriate to verify the established site boundary. Soil probes using the auger were randomly placed throughout the site.

During shovel probing six lithic artifacts were uncovered. All were found in the seven shovel probes placed within the western perimeter of the previously defined site boundary. No artifacts were found during excavation of the additional 20 shovel probes excavated beyond the boundary defined by surface features.

Of the six artifacts uncovered within the site, one is chert, one is obsidian, and four are silicified sediment. Three of the artifacts are tertiary flakes and three are secondary reduction flakes. One of the artifacts is size class 2 (1–2 cm); three artifacts are size class 3 (2–3 cm); and two artifacts are size class 4 (3–4 cm). Of particular importance is the obsidian artifact, which is an obsidian microblade midsection (Figures 14 and 15). The artifact was found in shovel probe 145. Microblade technology is known to be associated with the early prehistory of Alaska, and this is the first documented microblade known to be found on Admiralty Island. Microblades have also been found roughly 30 miles to the southwest across Chatham Straight, at the Hidden Falls archaeological site. The microblade assemblage at Hidden Falls was dated to approximately 9000 B.P. (Ackerman 2007). Groundhog Bay II Site is another Southeast Alaska microblade site. It is located at the confluence of Chatham Strait and Icy Strait, and its microblade assemblage was dated to around 10,000 B.P. (West 1996). In North America, microblades are primarily found throughout Alaska, Oregon, Washington, and western Canada. The earliest examples of microblades originate in Asia and date from 40,000 to 30,000 B.P. (Yaroslav et al. 2007).

While few of the shovel probes and none of the soil probes yielded subsurface artifacts, the presence of the microblade found in a subsurface context is significant. Shovel and soil probing can, at best, be considered a reconnaissance-level sampling of a site and not a definitive determination of the full presence/absence of cultural materials. The recovery of the microblade and other subsurface artifacts, though limited in number, suggests not only that intact cultural deposits may be present at the site but also that the site may have far greater antiquity than previously believed. The microblade, with appropriate analysis, has the potential to yield information about the obsidian source, possible trade relationships, and/or toolstone procurement strategies. Additionally, the presence of the microblade at SIT-00302 is consistent with speculation that the site may be temporally associated with the 3,000-year-old fish weir (SIT-00033) located just offshore in Favorite Bay. However, further research into site SIT-00302 will be needed to confirm such an association. Regardless of whether site SIT-00302 is indeed associated with the fish weir, it is evident from the recovery of the microblade that the site has yielded information and has the potential to yield additional information to significantly refine existing knowledge regarding the little understood prehistory of the Favorite Bay area. For these reasons, site SIT-00302 is recommended as eligible for the NRHP under Criterion D.

Figure 14. Dorsal view of microblade fragment recovered from shovel probe 145 at SIT-00302.

Figure 15. Ventral view of microblade fragment recovered from shovel probe 145 at SIT-00302.

7.3 Culturally Modified Trees within the Survey Area

Nine CMTs were identified during field surveys (see Figure 5). These trees were documented similarly to isolated occurrences. Three varieties were noted, including blazed trees, springboard trees, and pitch-cut trees. No clusters or stands of CMTs were identified. Rather, the CMTs are distributed randomly across the survey areas.

Blazed trees (Figure 16) were identified as having a small to large scar cut through the bark; they generally appear to mark trails or property boundaries based on their proximity to such features. Many of the blazed trees were found on the boundary line between stands of trees of different age classes, suggesting the blazes were used to mark old timber units.

Springboard trees (Figures 17 and 18) are typically associated with historic logging. Springboard notches are found at about chest height on large trees throughout Southeast Alaska and the Pacific Northwest. A deep notch is cut into a tree and a plank is inserted (end-in) into the notch to provide a place for a logger to stand while swinging an axe or wielding a cross-cut saw to cut the tree at an acceptable location above its base.

Pitch-cut trees are cut through the bark near their base at an angle and allowed to bleed sap or pitch (Figures 19 and 20). Pitch has many uses, including as fire starter, binding agent, glue, and waterproof sealant.

While CMTs can be eligible for the NRHP – typically under Criterion A for associations with historical events or land uses or Criterion D for information potential – the trees need to meet certain criteria. In general, CMTs associated with the early historic period or prehistoric period or those associated with significant events or themes regardless of their time period are more likely to be determined eligible for the NRHP. More recent CMTs or CMTs associated with non-significant land uses or themes are less likely to be considered eligible. Those found in association with other archaeological sites are likely to be considered to be a contributing feature of the site rather than eligible in their own right.

Of the CMTs identified during the survey and not associated with other archaeological sites, nearly all are springboard trees or blazed trees associated with historic logging activity. As noted in section 4.1.3 of this report, logging was never a significant activity in the Angoon area of the Tongass National Forest. Minor logging events did occur but did not play the role in shaping the economy or land use that such logging has played in other areas of Southeast Alaska. For these reasons, the CMTs associated with logging are not considered historically significant or eligible for the NRHP.

Two pitch-cut trees were found during the survey. One is associated with site SIT-00302, and the other was found independent of any other cultural resources. The one present on site SIT-00302 is considered a contributing feature of that site. The isolated pitch-cut tree still retains visible axe cut marks suggesting that while it may be from the historic period, it dates to the more recent part of that period. This conclusion is bolstered by the small, second-growth nature of the tree. Although pitch-cut trees are most commonly associated with Alaska Native land uses and activities, the relatively recent nature of this particular specimen in association with stands of trees logged by Euro-Americans suggests the tree could be associated with other land uses and non-native cultures. This lack of clear association supports a recommendation that this CMT is not eligible for the NRHP.

Figure 16. Close-up of a tree blaze.

Figure 17. A large springboard stump, view facing northwest; note crew member for approximate scale of stump.

Figure 18. Close-up of a springboard notch.

Figure 19. A pitch-cut tree from SIT-00302, view facing northeast.

Figure 20. A pitch-cut tree, view facing southeast.

8.0 MANAGEMENT SUMMARY

The DOT&PF has proposed a land-based airport and associated access road for the community of Angoon in Southeast Alaska. The DOT&PF has requested funding from the FAA for the proposed project. Prior to authorizing any funding or approving the proposed airport layout plan, the FAA is conducting an evaluation of potential environmental impacts through the preparation of an EIS. Through the EIS, the FAA is considering alternatives to the DOT&PF's proposed action to evaluate and compare anticipated impacts to the natural and cultural environment. The FAA is considering three airport location alternatives, including the DOT&PF's proposed location at Airport Alternative 3a, and various access alternatives to reach those locations. Because two of the airport location alternatives are located on Monument–Wilderness Area lands, which are administered by the USFS, the FAA is working closely with the USFS in fulfilling requirements under both NEPA and the Section 106 process of the NHPA.

Among the studies conducted in association with the EIS are those related to archaeological, historical, and cultural resources. The studies conducted to date are reported here and consist of pedestrian inventory with limited subsurface probing in high-sensitivity areas, interviews with local elders, and archival research. While many archaeological sites are known to be present in the general project area, only one (the Favorite Bay Garden Site, SIT-00302) was located *within* the survey area. No determination of eligibility had been made for the site prior to the investigations reported here. Based on the information gathered during these field studies, it is recommended that site SIT-00302 (the Favorite Bay Garden Site) be considered eligible for the NRHP under Criterion D. In addition to this site, several CMTs were documented during the field survey.

The exact areas that will be directly affected, and that could be indirectly affected, by any of the airport and access alternatives are not yet known. Additional refinement of alternatives, including more detailed engineering design, is necessary before the final (Phase 2 APE discussed in section 3.0) APEs for the airport alternatives and their associated access roads will be known. For these reasons, additional field investigations may be necessary prior to the FAA and USFS issuing their findings of effect and requesting comment from the SHPO and other consulting parties. The nature and timing of any additional studies will be discussed with the consulting parties as well. At the present time, the FAA proposes to conduct these studies at such time as the agency has identified its preferred alternative for both the airport and its associated access road. Any additional studies deemed necessary would focus on these alternatives rather than on all alternatives considered in the EIS.

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Acronyms

amsl	above mean sea level
APE	area of potential effects
ARPA	Archaeological Resources Protection Act
B.P.	before present
CFR	Code of Federal Regulations
cmbs	centimeters below ground surface
CMT	culturally modified tree
DOT&PF	Alaska Department of Transportation and Public Facilities
EIS	environmental impact statement
FAA	Federal Aviation Administration
FOA	Friends of Admiralty Island
GPS	global positioning system
NAD	North American Datum
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHA	Alaska Office of History and Archaeology
PA	Programmatic Agreement
SHPO	State Historic Preservation Office
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator

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APPENDIX A. SIT-00302 SHOVEL PROBE DATA

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Table A-1. SIT-00302 Shovel Probe Data

Shovel Probe No.[1]	Max. Depth (cmbs)	Stratigraphy	Material Recovered
108	70	0–20 cmbs (level 1): moss/hemlock needles and organic detritus.	Chert angular shatter (n=1)
		20–40 cmbs (level 2): very dark grayish brown silt loam (10YR 3/2) with 50% matrix configuration of organic detritus and roots.	
		40–70 cmbs (level 3): brown silt loam (10YR 4/3) with approximately 10% bedrock regolith without roots.	
112	57	0–17 cmbs (level 1): moss, roots, organic detritus with small amount of shell.	Fire-cracked rock (FCR [n=1]) and secondary silicified sediment size class 4 debitage (n=1); recovered from approximately 30 cmbs
		17–40 cmbs (level 2): very dark brown silt loam (10YR 2/2) with 50% matrix configuration of organic detritus and roots.	
		40–53 cmbs (level 3): dark brown silt loam (10YR 3/3) with approximately with a small amount of shell present.	
		53–57 cmbs (level 4): brown silt loam (10YR 4/3) with approximately 15% gravels throughout. Terminated at bedrock.	
113	49	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–40 cmbs (level 2): very dark grayish brown silt loam (10YR 3/2) with roots and 10% gravels.	
		40–49 cmbs (level 3): residual clay loam (5Y 5/2) olive gray with gravels and residual bedrock.	
114	50	0–5 cmbs (level 1): moss/hemlock needles and organic detritus.	Chert debitage (n=2); recovered from approximately 25 cmbs
		5–20 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with roots and organic detritus.	
		26–50 cmbs (level 3): bedrock regolith with small rootlets, light olive brown.	

1 Shovel probe number not necessarily sequential. This table lists all probes *inside* the final boundary of Site SIT-00302. Other shovel probes (i.e., probes 109-111 and 117-124) were excavated outside the site boundary.

Table A-1. SIT-00302 Shovel Probe Data

115	46	0–7 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		7–23 cmbs (level 2): loosely compacted dark yellowish brown silt loam (10YR 3/4) with roots and organic detritus.	
		23–25 cmbs (level 3): reddish brown silt loam with organic detritus.	
		25–46 cmbs (level 4): bedrock regolith without rootlets.	
116	62	0–12 cmbs (level 1): moss, roots, hemlock needles, organic detritus.	FCR (n=1)
		12–27 cmbs (level 2): loosely compacted very dark brown silt loam (10YR 2/2) with small amount of gravels.	
		27–40 cmbs (level 3): dark olive brown silt loam (2.5Y 3/3) with gravels.	
		40–55 cmbs (level 4): very dark brown silt loam (10YR 2/2).	
		55–57 cmbs (level 5): black silt loam (10YR 2/1).	
		57–62 cmbs (level 6): reddish brown silt loam (2.5YR 4/3).	
125	36	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–33 cmbs (level 2): loosely compacted very dark brown silt loam (10YR 2/2), matrix configuration of roots and organic detritus.	
		33–36 cmbs (level 3): light olive brown silt loam and degraded bedrock (2.5YR 5/4) with small rootlets.	
126	44	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–17 cmbs (level 2): loosely compacted dark yellowish brown silt loam (10YR 3/4) with roots and organic detritus.	
		17–40 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		40–44 cmbs (level 4): degraded bedrock without rootlets. Terminated at root impasse.	

Table A-1. SIT-00302 Shovel Probe Data

127	40	0–15 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		15–20 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with 40% roots and organic detritus throughout.	
		20–35 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		35–40 cmbs (level 4): small cobbles without rootlets. Terminated at root impasse at 40 cmbs.	
128	45	0–6 cmbs (level 1): moss/hemlock needles and organic detritus.	None Charcoal identified at 40-45 cmbs but not collected (see notes at left)
		6–30 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with 30% roots and organic detritus throughout.	
		30–40 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks, charcoal flecking, and rootlets throughout.	
		40–45 cmbs (level 4): compacted light olive brown silt loam with small amount of bedrock regolith (2.5YR 5/6) without rootlets. Thin lens of gray (10YR 3/2) calcium carbonate at 43 cmbs. Charcoal sample wrapped in aluminum foil and buried in hole. Terminated at root impasse.	
129	43	0–6 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		6–15 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with 40% roots and organic detritus throughout.	
		15–35 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		35–43 cmbs (level 4): compacted light olive brown silt loam with small amount of bedrock regolith (2.5YR 5/6) without rootlets. Thin lens of gray (10YR 3/2) calcium carbonate at 43 cmbs. Terminated at root impasse.	
130	50	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–31 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout.	
		31–42 cmbs (level 3): dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout.	
		42–50 cmbs (level 4): compacted light olive brown silt loam with small amount of bedrock regolith (2.5YR 5/6) without rootlets.	

Table A-1. SIT-00302 Shovel Probe Data

131	40	0–15 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		15–37 cmbs (level 2): dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout.	
		37–40 cmbs (level 3): dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at root impasse.	
132	40	0–5 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		5–27 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		27–40 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at bedrock.	
133	47	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–30 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		30–42 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout.	
		42–47 cmbs (level 4): compacted light olive brown silt loam with small amount of bedrock regolith (2.5YR 5/6) without rootlets. Terminated at bedrock.	
134	30	0–12 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		12–27 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		27–30 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at bedrock.	
135	43	0–9 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		9–31 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		31–40 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout.	
		40–43 cmbs (level 4): increasing bedrock regolith. Terminated at root impasse.	

Table A-1. SIT-00302 Shovel Probe Data

136	32	0–15 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		15–26 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		26–32 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at root impasse.	
137	33	0–10 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		10–28 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		28–32 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		32–33 cmbs (level 4): compacted light olive brown silt loam (2.5Y 5/6) without rootlets. Terminated at root impasse.	
138	28	0–9 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		9–22 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		22–28 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at root impasse.	
139	22	0–14 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		14–20 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		20–22 cmbs (level 3): compacted dark yellowish brown silt loam (10YR 3/4) with 20% roots and organic detritus throughout. Terminated at root impasse.	
140	44	0–7 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		7–31 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		31–40 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		40–44 cmbs (level 4): compacted light olive brown silt loam (2.5Y 5/6) without rootlets. Terminated at cobblestone.	

Table A-1. SIT-00302 Shovel Probe Data

141	35	0–17 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		17–28 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		28–32 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		32–35 cmbs (level 4): compacted light olive brown silt loam (2.5YR 5/6) without rootlets. Terminated at cobblestone.	
142	48	0–15 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		15–36 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		36–42 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		42–48 cmbs (level 4): compacted light olive brown silt loam (2.5YR 5/6) without rootlets. Terminated at cobblestone.	
143	32	0–15 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		15–20 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		20–27 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		27–32 cmbs (level 4): compacted light olive brown silt loam (2.5YR 5/6) without rootlets. Terminated at root impasse.	
144	41	0–20 cmbs (level 1): moss/hemlock needles and organic detritus.	None
		20–30 cmbs (level 2): loosely compacted very dark grayish brown silt loam (10YR 3/2) with 20% roots and organic detritus throughout.	
		30–38 cmbs (level 3): compacted light olive brown silt loam (10YR 2/3) with small rocks and rootlets throughout.	
		38–41 cmbs (level 4): compacted light olive brown silt loam (2.5YR 5/6) without rootlets. Terminated at root impasse.	

Table A-1. SIT-00302 Shovel Probe Data

145	47	0–6 cmbs (level 1): moss/hemlock needles and organic detritus.	Obsidian microblade (n=1) and chert flake (n=1); recovered between 25–30 cmbs
		6–17 cmbs (level 2): dark yellowish brown silt loam (10YR 3/6) with numerous large roots and organic detritus.	
		17–35 cmbs (level 3): light olive brown silt loam (2.5YR 5/4) with traces of bedrock regolith and small rootlets throughout.	
		35–47 cmbs (level 4): light olive brown silt loam and bedrock regolith (2.5YR 5/6) without rootlets. Terminated at bedrock.	

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APPENDIX B. SHOVEL PROBES

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Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
1	6371518	525876	0–14	Decomposing duff and wood (O horizon)
			14–20	Black, organic-rich silt with few angular pebbles (A horizon)
2	6371509	525866	0–25	Duff, roots, and other organics (O horizon)
			25–28	Organics, rotted wood
			28–33	Gray sandy silt with charcoal flecks
			33–39	Regolith
3	6371621	525785	0–24	Duff, roots, and wood (O horizon)
			24–29	Light gray silty, fine sand; clear boundaries
			29–34	Black to very dark gray fine sandy silt
			34–39	Reddish brown, silty, gravelly fine to coarse sand (regolith)
4	6371626	525777	0–23	Duff, roots, other organics (O horizon)
			23–37	Gray sandy silt with angular quartzite pebbles; saturated
5	6371665	525767	0–16	Duff, roots, and other organics (O horizon)
			16–24	Organic soil mixed with angular pebbles, one cobble
6	6371650	525773	0–22	Duff, roots, wood (O horizon)
			22–25	Very light gray, slightly silty, fine to medium sand
			25–31	Very dark gray to black, organic-rich, very fine sandy silt, pieces of charcoal
			31–52	Reddish and orangish brown fine to coarse sandy silt, oxidized
7	6371236	527171	0–22	Duff, roots, decaying wood (O horizon)
			22–28	Dark gray silty sand
			28–33	Dark gray organic-rich silt with pebbles and charcoal pieces
			33–45	Orangish brown gravelly, silty, sand
			45–75	Brown coarse sandy gravel
8	6371225	527157	0–11	Duff, roots, and other organics (O horizon)
			11–29	Light reddish brown sandy silt with angular pebbles
9	6371216	527176	0–9	Duff, organic-rich soil (O horizon)
			9–12	Gray silty sand
			12–14	Black silty buried soil horizon
			14–60	Orange red sandy silt, angular pebbles
			60–70	Small, angular pebbles
10	6371264	527171	0–20	Duff, roots, organics (O horizon)
			20–28	Light gray silty sand with angular pebbles
			28–33	Blackish-brown very compact organic-rich silt
			33–84	Light reddish brown silty sand with angular pebbles
11	6369165	528287	0–20	Duff, roots, organics (O horizon)
			20–55	Dark brown silty organic-rich soil, common roots
			55–69	Medium brown silty organic-rich soil

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
12	6369161	528301	0–7	Duff, roots, organics (O horizon)
			7–38	Dark brownish-black organic soil; very water saturated
13	6369158	528311	0–20	Dark brown water saturated organic-rich material
			20–75	Light brown organic-rich material with few pebbles, water table at 20 cmbs
14	6369162	528325	0–28	Very dark gray and brown fibrous peat becomes siltier with depth; many roots and rootlets
			28–45	Very dark gray, very silty peat, few angular pebbles
15	6369148	528333	0–15	Very dark grayish-brown, fibrous peat with few angular pebbles
			15–25	Reddish brown decaying wood, discontinuous
			25–55	Very dark brown silty peat, many rootlets
16	6369149	528319	0–5	Duff, roots, organics (O horizon)
			5–38	Dark brown water saturated organic-rich material; few pebbles; water table at 38 cmbs
17	6369163	528278	0–7	Dark brown organic layer (O horizon)
			7–35	Light brown organic-rich soil, very water-saturated
18	6369155	528295	0–19	Duff, dense organics, roots (O horizon)
			19–33	Dark reddish-orange-brown silt, many roots
			33–53	Dark brownish-orange organic-rich silt, decomposing wood; very water saturated
19	6369123	528238	0–10	Recent duff, needles, moss
			10–18	Orangish-brown silty decomposing organic material; many roots and rootlets (O horizon)
			18–45	Light gray silty, sandy, angular small pebbles to cobbles, cobbles increase with depth
20	6369103	528250	0–14	Duff, roots, decaying wood (O horizon)
			14–20	Light gray fine sandy silt with small pebbles
			20–24	Dark gray silt with few pebbles and charcoal
			24–31	Orange-brown gravelly silty sand
			31–50	Brown coarse gravelly sand
21	6369072	528253	0–7	Dark-brown organic-rich soil with roots (O horizon)
			7–12	Dark reddish-brown soil with decomposing wood, roots
			12–19	Dark brown organic-rich silty sand with subangular pebbles
			19–40	Gray coarse sand with subangular pebbles, roots
22	6369044	528247	0–4	Duff, roots, organics (O horizon)
			4–16	Light brown sandy silt with organic material
			16–28	Patches of light gray sandy silt with small pieces of charcoal
			28–61	Reddish-brown silt with angular cobbles, gravels, and pebbles

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
23	6369012	528263	0–8	Dark brown organic-rich soil, roots (O horizon)
			8–20	Medium brown silty sand, subangular pebbles, roots, water-logged wood
			20–33	Light brown clayey silt with subangular pebbles
24	6368999	528276	0–12	Moss, pine needles, duff (O horizon)
			12–20	Gray very fine to coarse sandy silty
			20–45	Brown silty gravelly sand with angular pebbles and cobbles
25	6368985	528289	0–9	Duff, roots, organics (O horizon)
			9–16	Light gray silty sand with angular pebbles
			16–18	Grayish/light brown silt
			18–50	Light reddish-brown silt with angular pebbles and cobbles
26	6368955	528290	0–15	Duff, roots, dark brown soil (O horizon)
			15–28	Gray fine sandy silt with small cobbles
			28–57	Light brown/orange sand with angular pebbles
27	6370661	526973	0–24	Dark brown decomposing wood, soil, roots, moss (O horizon)
			24–27	Dark gray fine sandy silt with small pebbles
			27–29	Dark black organic-rich soil
			30–66	Orangish-brown sand with angular pebbles and gravel
28	6370668	526984	0–25	Duff, roots, decaying wood (O horizon)
			25–29	Gray sandy silt, some organics
			29–85	Light reddish-brown silt with organic material and angular pebbles
29	6370660	526992	0–35	Duff and fibrous decayed organics, many roots (O horizon)
			35–41	Black and light gray, beds of charred organics
			41–55	Orangish-brown silty sand with angular gravels
30	6370654	526998	0–13	Very dark brown duff with roots; fine silty sand (O horizon)
			13–19	Gray fine sand with subangular pebbles, roots
			19–38	Orangish-brown silty sand, pebbles and cobbles, roots
			38–42	Light to medium brown fine sandy silt with subangular pebbles and roots
31	6370454	527116	0–20	Very dark brown to black peaty silt (O horizon)
			20–40	Dark reddish-brown fibrous peat; water table at 25 cmbs
32	6370459	527131	0–10	Light brown dense organic material; very water-saturated
			10–24	Dark brown silty soil with organic material; very water-saturated
33	6370467	527158	0–5	Duff, organics, roots (O horizon)
			5–41	Dark brown soil, water-saturated, roots, water table at 41 cmbs
34	6370483	527157	0–3	Duff, organics, roots (O horizon)
			3–85	Dark brownish-black organic-rich soil; very water saturated; water table at 75 cmbs

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
35	6369134	527882	0–9	Dark brown silty soil with roots (O horizon)
			9–22	Very dark brown sandy silt; decomposing wood; angular pebbles; roots
			22–32	Gray clayey silt with angular pebbles
			32–47	Dark orangish-red clayey silt with subangular pebbles
36	6369133	527874	0–13	Duff, roots, organics (O horizon)
			13–42	Brown soil, decaying organics, roots
37	6369143	527892	0–25	Dark brown soil, organic-rich with roots (O horizon)
			25–42	Brown silt with decaying wood and roots
			42–46	Light gray silt with pebbles
			46–70	Orangish-brown sand with small angular pebbles
38	6369145	527896	0–35	Duff, moss, decaying organics (O horizon)
			35–44	Light gray fine sandy silt, few pebbles, charcoal
			44–55	Brown, gravelly, silty, fine to coarse sand
39	6369051	527836	0–28	Dark brown soil with roots and decaying wood (O horizon)
			28–82	Dark brownish-black silty clumpy clay-textured wet silt
			82–86	Gray silt
40	6369051	527845	0–14	Darky brown clayey silty sand, many roots; very water-saturated (O horizon)
			14–60	Black clayey silt, clumpy, with many roots; very water-saturated
			60–76	Dark brown organic-rich clayey silt, few small pebbles
			76–80	Gray clayey silt; water table
41	6369046	527845	0–4	Duff, roots (O horizon)
			4–42	Very dark brown organic-rich layer; water saturated
			42–50	Very dark gray clay; water saturated
			50–60	Dark reddish-brown soil with angular gravels; water saturated
42	6369044	527842	0–30	Duff, moss, fibrous peat with large roots (O horizon)
			30–55	Black organic-rich silt; many large roots
			55–62	Gray fine to medium sandy silt
			62–75	Brown to gray fine sandy silt with angular pebbles and small cobbles
43	6369052	527937	0–50	Black silty peat with many rootlets and decaying wood fragments (O horizon)
			50–70	Dark brown fibrous peat
			70–80	Dark gray, slightly silty gravelly sand, angular to subrounded pebbles
44	6369057	527931	0–9	Root mat (O horizon)
			9–51	Dark brown organic-rich silt; water-saturated
			51–60	Gray coarse sand with angular gravels; water-saturated

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
45	6369058	527927	0–19	Dark reddish-brown silty sand with roots and organics (O horizon)
			19–32	Very dark brown clayey silt, decomposing wood, roots; water-saturated
			32–36	Gray clayey silt with sand
			36–62	Dark brownish-black clayey silt
46	6369065	527930	0–20	Dark brown silty with roots and decaying wood (O horizon)
			20–74	Brown/gray silt; water-saturated
			74–79	Light gray silt and sand with small pebbles
47	6368749	528313	0–8	Dark brown root mat, organics (O horizon)
			8–11	Light gray fine sandy silt
			11–17	Dark reddish-brown coarse sandy silt
			17–60	Reddish-brown silt with angular pebbles, gravels, and cobbles
48	6368759	528293	0–21	Dark brown silt with roots and decaying wood; water-saturated (O horizon)
			21–50	Light brown silty soil with angular gravels and cobbles
49	6368777	528279	0–6	Dark brown organic sandy silt with roots (O horizon)
			6–15	Reddish-brown organic-rich sandy silt with roots and decomposing wood
			15–18	Gray silty sand with subrounded pebbles
			18–22	Black clayey silt, roots, pebbles
			22–48	Dark reddish-orange sandy silt with subrounded pebbles and roots
			48–60	Grayish-brown sandy silt with subrounded pebbles and roots
50	6368793	528273	0–18	Duff, moss, fibrous organic debris (O horizon)
			18–28	Orangish brown silty fine sand with angular pebbles
			28–34	Very light gray slightly silty fine sand
			34–52	Brown slightly silty sand with angular to subrounded pebbles to cobbles
51	6368734	528357	0–10	Dark brown organic-rich sandy silt with roots; water-saturated (O horizon)
			10–16	Very dark brown organic-rich silt with roots and subangular pebbles; water-saturated
			16–20	Light brownish-orange clayey silt with subangular pebbles and cobbles
52	6368714	528357	0–21	Dark brown soil with roots (O horizon)
			21–33	Gray leached silt layer with pebbles
			33–63	Orangish-brown silt with angular pebbles
53	6368716	528347	0–12	Brown, organic-rich root mat (O horizon)
			12–17	Light gray silt with coarse sand
			17–40	Light reddish-brown silt with angular gravels and cobbles

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
54	6368702	528360	0–15	Duff, moss, and decaying organics (O horizon)
			15–23	Gray, fine to coarse sandy with angular pebbles to cobbles
55	6369368	527549	0–13	Dark brown silt with rootlets, moss, and decaying wood (O horizon)
			13–25	Light brown organic-rich soil with decaying wood and rootlets
			25–30	Light brown silt with few small pebbles; water-saturated
			30–57	Dark brown silt with few pebbles and decaying wood at the bottom; water-saturated
56	6369371	527551	0–32	Duff, moss, and decaying organics (O horizon)
			32–43	Reddish brown, fine sandy silt; bioturbated with worms
			43–80	Gray medium to coarse sand with subrounded to angular pebbles and gravel
57	6369370	527533	0–10	Light brown silty sand with moss and other organics (O horizon)
			10–28	Dark brown organic-rich silty sand, angular pebbles, water-logged wood; water-saturated
			28–57	Dark brown with some gray sand; very water-saturated
58	6369465	527425	0–20	Moss and fibrous peat (O horizon)
			20–36	Black, organic-rich silt with many roots and woody debris
			36–40	Brown, organic-rich silt
			40–50	Slight gray and orange very fine sandy clay with subrounded to angular pebbles
59	6369456	527418	0–15	Moss, dark soil, decaying wood, roots (O horizon)
			15–17	Water-logged wood
			17–63	Dark grayish-brown silt with gravel, pebbles, and few cobbles; water-saturated
60	6369459	527420	0–5	Root mat (O horizon)
			5–35	Very dark brown organic-rich silt with small gravels; water-saturated
			35–37	Light gray clayey silt with gravels, water table
61	6369461	527414	0–6	Light brown organic-rich sandy soil (O horizon)
			6–24	Very dark brown organic-rich silty sand
			24–42	Dark brownish-gray coarse sandy silt with small pebbles
			42–60	Gray coarse pebbly sandy clayey silt; water table
62	6369462	527419	0–16	Duff, moss, and other organics (O horizon)
			16–34	Dark brown organic-rich sandy silt; very water-saturated with water-logged wood
			34–40	Fine sandy clay
63	6369458	527418	0–12	Duff, moss, roots, dark brown silt (O horizon)
			12–32	Dark brown silt; very water-saturated with water-logged wood
			32–47	Fine dark brown silt; water-saturated; water table at 40 cmbs

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
64	6369599	527320	0–19	Light brown silt, duff, moss, roots, decaying wood (O horizon)
			20–34	Dark brown organic-rich silt with roots
			34–80	Very dark brown clayey silt with roots and few small pebbles
			80–124	Gray silty sand with dark brown silt with angular pebbles; water-saturated
65	6369609	527311	0–14	Medium brown organic duff (O horizon)
			14–50	Very dark brownish-black fine clayey silt; water-saturated
			50–80	Dark brown silt; water-saturated with water-logged wood; water table at 50 cmbs
66	6369616	527326	0–9	Moss, organics, roots (O horizon)
			9–78	Dark brown organic-rich silt with roots
67	6369607	527336	0–30	Duff, moss, organics (O horizon)
			30–75	Very dark gray to black organic-rich silt, common roots
			75–85	Brown fine sandy silt
			85–100	Gray gravelly medium to very coarse sand with organics, few decaying shell fragments
68	6369602	527332	0–20	Duff, moss, rootlets and organic debris (O horizon)
			20–80	Very dark brown organic-rich silt; one barnacle at 20-40 cmbs; decaying wood
69	6369607	527337	0–27	Dark brown duff, roots, rootlets, and other organics (O horizon)
			27–48	Dark brown organic-rich soil with rootlets
			48–60	Light orange coarse sandy silt; water-saturated
			60–100	Gray coarse sandy silt with beach-rounded pebbles, gravels, and small cobbles
70	6369615	527342	0–4	Duff, moss, roots, rootlets, decaying wood (O horizon)
			4–42	Dark brownish-black organic-rich silt with few small pebbles; water table at 34 cmbs
71	6369628	527354	0–45	Duff, moss, woody debris (O horizon)
			45–93	Very dark gray and brownish black organic-rich silt with common rootlets
			93–105	Gray, medium to very coarse sand with few subrounded pebbles
72	6369702	527272	0–19	Duff, moss, organic-rich brown silt with decaying wood (O horizon)
			19–30	Organic-rich dark brownish-black silt with rootlets
			30–59	Dark brownish-black silt with pebbles, gravels, and cobbles; water-saturated
73	6369711	527261	0–25	Duff, moss, roots and fibrous organic materials (O horizon)
			25–80	Very dark gray organic-rich silt, wet with many rootlets and one large angular cobble
			80–95	Very dark brown organic-rich, compact silt
			95–102	Gray fine to very coarse sand with angular to subrounded gravels

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
74	6369677	527264	0–28	Duff, moss, dark brown loose organics with many roots (O horizon)
			28–58	Very dark brown silt with few subrounded pebbles
			58–87	Dark gray gravelly coarse silty sand, common subrounded pebbles
			87–100	Dark brown silt with subrounded gravels; water-saturated
75	6369686	527247	0–25	Moss, root mat, rootlets, and other organics (O horizon)
			25–46	Dark reddish-brown fine sandy silt with moderate organic material and rootlets
			46–58	Coarse gray sand with rounded beach pebbles
			58–95	Medium coarse gray sand with small rounded pebbles; water table at 95 cmbs
76	6369674	527256	0–40	Duff, moss, fibrous organic debris with many roots and rootlets (O horizon)
			40–60	Very dark brown organic-rich silt/silty peat
77	6369681	527257	0–25	Organic-rich dark brown silt, decaying wood, roots, rootlets (O horizon)
			25–65	Dark brownish-black silt with subangular pebbles and gravels; water table at 56 cmbs
78	6369768	527196	0–55	Dark brown silty duff and roots (O horizon)
			55–63	Gray silty gravelly fine sand, subrounded pebbles
			63–85	Very dark brown fine to coarse sand with subrounded pebbles and few pebbles
79	6369775	527185	0–18	Dark brown organic duff with sandy silt and small subrounded pebbles
			18–25	Very dark brown silt with subrounded pebbles
			25–60	Dark brown sandy silt with subrounded pebbles
			60–80	Black clayey silt with pebbles
			80–85	Dark brown coarse sandy gravelly; very compact
80	6369786	527178	0–22	Dark silt, duff, moss, decaying wood, roots, rootlets (O horizon)
			22–42	Dark brown silt with gravel, pebbles, and small roots
			42–47	Gray leached soil layer with some small pebbles
			47–70	Dark brown silt, subrounded and rounded pebbles, one large root
81	6369748	527199	0–20	Moss, reddish-brown organic-rich layer with rootlets (O horizon)
			20–24	Light gray silt with small angular gravels
			24–87	Very dark brown very compact fine sandy silt with dense gravels; water-saturated
82	6369928	527442	0–5	Duff, light brown organic-rich sand (O horizon)
			5–16	Dark reddish-brown organic-rich silty sand
			16–57	Very dark brown fine clayey silt
			57–70	Medium brown clayey silt, few subangular pebbles, one cobble
			70–89	Very compact coarse gray sand mottled with orange sand, dense subangular pebbles

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
83	6369931	527451	0–30	Moss on fibrous organics and roots (O horizon)
			30–60	Black organic-rich silts with rootles and one large rounded cobble
			60–70	Brown, fine sandy silt
			70–90	Greenish-gray silt, very coarse sand with angular pebbles, gravels, and cobbles
84	6369935	527464	0–5	Moss
			5–21	Dark brown organics with roots and rootlets
			21–45	Very dark brown organic layer; water-saturated
			45–60	Light brown silt, few angular pebbles; water-saturated
85	6369966	527467	0–27	Moss, duff, decaying wood, dark silt, rootlets and large roots
			27–49	Dark wilt with decaying wood and rootlets
			49–60	Orange saturated very fine silt
			60–80	Gray silt with angular pebbles, one large subrounded cobble; water table at 80 cmbs
86	6371018	526499	0–20	Dark brown silt, duff, roots, rootlets (O horizon)
			20–90	Orange sand, angular pebbles, crumbly pieces of gravel-size bedrock
87	6371001	526460	0–20	Duff, moss, and fibrous organics (O horizon)
			20–35	Decaying wood and roots (O horizon)
			35–50	Brown, organic-rich silt with many roots
			50–56	Bluish-gray, slightly silty fine sand
			56–70	Brown, fine sandy silt with angular cobbles and large roots
88	6370976	526511	0–14	Dark silt, moss, duff, roots, and rootlets
			14–29	Dark black silt with decaying wood and few subangular rocks
			29–38	Dark black silt
			38–61	Light orangish-brown silt with small pebbles and larger angular pieces of regolith
89	6370980	526536	0–25	Duff, moss, decaying organics, roots, and rootlets (O horizon)
			25–30	Light gray fine sandy silt with angular gravels
			30–45	Reddish-brown compact sandy silt with degrading regolith
90	6370745	527598	0–19	Duff, moss, decaying wood, roots, rootlets, small subangular pebbles
			19–30	Light gray silt with gravel and few subangular pebbles
			30–71	Light brownish-orange silt with gravel and subangular pebbles and gravel
91	6370765	527627	0–5	Dark brown sandy duff, moss, organics (O horizon)
			5–8	Gray sand with subangular pebbles
			8–12	Dark brown fine sand with organics, subangular pebbles
			12–90	Orange silty sand with subangular pebbles; charcoal spot at 68 cmbs

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
92	6370787	527643	0–10	Moss and duff
			10–17	Bluish gray silt with organics, roots, and rootlets
			17–42	Orange-brown silt with some organics and few rootlets; degrading regolith
93	6370810	527662	0–9	Duff, moss, roots, and fibrous organics (O horizon)
			9–15	Bluish-gray silty fine sand with angular to subangular pebbles and roots
			15–38	Dark brown fine sandy wilt with angular to subangular pebbles and small cobbles
94	6370844	527504	0–14	Moss, duff, decaying wood, rootlets, roots (O horizon)
			14–27	Bluish/gray silt with moderate organics, angular pebbles, and few rootlets
			27–35	Grayish-brown sandy silt with angular pebbles
95	6370878	527520	0–18	Dark brown fine silty sand, duff, organics, decomposing wood (O horizon)
			18–81	Orangish-brown silty fine sand with angular pebbles and root
96	6370908	527527	0–15	Duff, moss, roots, rootlets, and decaying wood (O horizon)
			15–21	Light gray leached layer; silty sand with some angular pebbles
			21–40	Crumbling bedrock
97	6370895	527540	0–9	Duff, moss and fibrous organics (O horizon)
			9–12	Bluish-gray silty fine sand
			12–15	Dark brown fine sandy silt with few pebbles and organics
			15–49	Brown to yellowish-brown medium sandy silt with subangular gravels
98	6370978	527412	0–18	Duff, moss, roots, and fibrous organics (O horizon)
			18–28	Bluish-gray slightly silty fine sand
			28–55	Dark brown to brown fine sandy silt with few pebbles
			55–68	Reddish-brown very silty fine sand with angular gravels
99	6370959	527425	0–19	Dark brown silt, moss, decaying wood, roots, rootlets, angular pebbles (O horizon)
			19–23	Light gray leached layer of fine silt with dark brown silt layers interspersed
			23–28	Dark brown silt with angular pebbles and a large rock
100	6370953	527404	0–9	Dark brown duff, many rootlets and medium roots (O horizon)
			9–24	Grayish-blue very silty sand with many angular pebbles
			24–88	Orangish-reddish-brown clayey silty sand, angular pebbles, gravels, and cobbles
101	6370938	527419	0–32	Moss, duff, organics, roots, rootlets (O horizon)
			32–45	Dark reddish-brown coarse sandy silt with organics and few angular pebbles
			45–75	Reddish-brown coarse sandy silt with angular pebbles and small cobbles, very compact

Table B-1. Shovel Probe Data

Shovel Probe No.	UTM Northing	UTM Easting	cmbs	Sediment Description (no cultural material was found in any of the shovel probes)
102	6371056	527306	0–18	Duff, roots, rootlets, decaying wood, dark silt, with few gravels (O horizon)
			18–29	Light gray leached silt with sand and angular pebbles and gravels
			29–34	Black organic-rich silt with small gravels
			34–61	Light brownish-orange angular rocks and pebbles (regolith)
103	6371077	527289	0–15	Duff, moss, roots, and fibrous organics
			15–25	Brown to black fine sandy silt with few angular regolith pebbles
104	6371103	527291	0–22	Moss, duff, organics, roots, rootlets (O horizon)
			22–24	Light gray very fine sandy silt
			24–30	Black silt, water-saturated, few small pebbles
			30–40	Reddish-brown coarse sandy silt with angular pebbles; very water-saturated
			40–55	Grayish-brown fine sandy silt; very water-saturated
			55–70	Chunks of regolith with water-saturated silt in-between
105	6371109	527260	0–19	Dark brown sandy duff, moss, rootlets, medium roots, and other organics (O horizon)
			19–23	Gray fine silty sand with angular pebbles
			23–30	Dark brown dry soft silty sand, roots, pebbles, one large rock

Note: Universal Transverse Mercator (UTMs) collected in NAD83 UTM Zone 8N.

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APPENDIX C. CULTURALLY MODIFIED TREE PHOTOS

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Figure C-1. CMT with blaze (field #CU72109_1).

Figure C-2. CMT with blaze (field #AGN-2).

Figure C-3. Spit-trunk CMT with blaze on each trunk (field #AGN-5B).

Figure C-4. CMT with springboard notch (field #CU72109_1).

Figure C-5. CMT with possible springboard notch (field #AGN-4).

Figure C-6. Field crew member pointing to springboard notch (field #AGN-9).

Figure C-7. CMT with axe marks (field #AGN-5C).

Figure C-8. CMT with axe mark (field #AGN-7).

Figure C-9. CMT with axe and burn marks (field #AGN-5).

Figure C-10. CMT with stripped bark (field #AGN-6).

Figure C-11. CMT with stripped bark (field #AGN-8).

Figure C-12. Pile of cut logs (field #AGN-1).

City of Angoon
PO Box 189
Angoon, AK 99820-0189

To: Angoon Airport E.I.S. Final comments

From: Matt Kookesh, City of Angoon

First and Foremost is the Position of the Angoon City Council on Proposed Airport Sites around Angoon. The City of Angoon has chosen Site 3 A, as the preferred site for our community.

I would like to point out on the Draft E.I.S, on Page 134, Land ownership in The Angoon area is primarily owned by both Kootznoowoo Inc. and the City of Angoon. If that is the case than why does this process not include the land owners in your draft EIS process? The City of Angoon and its residents have been overlooked in the meeting and consultation process. We request that your next meeting be held at the City office so that all residents can be welcomed to participate. At the last meeting, every time someone got up to speak the local tribe would stand up and counter what was just said. This is very uncomfortable for the community to participate. Please don't have meetings at the tribe's office unless you're going to control the tribal chair from debating every testimony.

The City of Angoon requests that you address the following pages and respond as to why your stating platted parks but yet not consulting us on 12 A as a detriment to our land ownership and our right to designate a parcel of land for future use. We look forward to your explanation of our platted park and why you are overriding this designation. List below are some pages we are concerned about:

On page 133, 4.3, figure lu2: it shows platted park as being directly affected by the airport site 12 A.

On page 134, 4.3, figure lu3, it shows City of Angoon land being directly affected, including the platted park and Auk Tah Lake (our drinking water source)

On page 136, 4.3.2.3.2, compatible land use, no discussion of City of Angoon owned land in vicinity of 12 A airport site.

On page 133, table lu2: displays Killisnoo Lagoon parcel as Platted Park.

On page 141, 4.3.2.5.1 compatible land use, Angoon Peninsula: 73.18 acre area near Auk Tah Lake is designated as central park in our 14c3 reconveyance. 111.36 acres in the salt lagoon has been designated as City Park land. This area maybe contaminated from garbage dump runoff, so no berry picking in this area however between Auk Tah and the Salt lagoon over 18 deer was harvested by the community residents in 2014.

On page 153, 4.3.3.3.3 compatible land uses, affect land acquisition, right of ways, permits and or leases, figure lu11: notes that no city of Angoon land will be required for airport site 12 A, however 12a easement sits right on city park land or platted Park.

On page 162, 4.4.1.1 DOT 4 F determination summary, what is section 4 f and how does it apply to this project. Since The City owns , the platted Park and our residents use the area for recreation and it has significant values both locally and nationally.

On page 163, 4.4.2.1.1 4 F determination summary is of significant interest to the City of Angoon. We want to know how you are going to determine 4 f resources without the City of Angoons input.

City of Angoon
PO Box 189
Angoon, AK 99820-0189

On page 166, 4.4.2.1.1 DOT 4 F determination summary this section makes a determination that the city park properties are not 4 F properties. How can you make this determination without true consultation with the City of Angoon?

The City of Angoon cannot afford to relinquish any land within the Airport Site 12 A. Nor can we afford to have an outside federal or state agency condemn our platted Parks for the purpose of building an airport. Any relinquishment of lands given to the city under aboriginal claim or lands for future development of our community is unacceptable. Once we give up local land than we will never be able to replace those lands ever again.

MAYOR, CITY OF ANGOON
3/13/15

PO Box 189 Angoon, AK 99820 Phone: 788-3653 Fax:907-788-3821

City of Angoon

Fax

To: Angoon Airport EIS		**From:** Matthew Kookesh Jr Mayor	
Fax: (503) 224-1851		**Pages:**	
Phone:		**Date:** 3/13/15	
Re: Letter		**CC:**	

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

APPENDIX E

AIR QUALITY MEMORANDUM

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

DATE: April 16, 2013

TO: Brad Rolf
Mead & Hunt

FROM: Cynthia Gibbs
BridgeNet International

SUBJECT: Angoon Airport EIS Methodology

This memorandum presents the methodology and results of the air quality emissions inventory for the proposed land-based airport at Angoon, Alaska.

The Hoonah-Angoon Census Borough meets all federal and state air quality standards. As such, no General Conformity Analysis/Determination is required. However, an emissions inventory was conducted for disclosure purposes and was also compared to General Conformity *de minimis* thresholds to provide context for the results. This analysis, reported in this memorandum, indicates that emissions from any action alternative would slightly increase for carbon monoxide (CO) and volatile organic compounds (VOCs) and would result in a net decrease in emissions for the following: nitrogen oxides (NO_x), sulfur oxides (SO_x), particulate matter up to 10 micrometers in diameter (PM_{10}), and particulate matter up to 2.5 micrometers in diameter ($PM_{2.5}$). The increases for CO and VOCs are small compared to the *de minimis* thresholds, and no significant air quality impacts are expected.

The following sections discuss the air quality implications of the existing conditions and future conditions for the Angoon Seaplane Base and the proposed land-based Angoon Airport in terms of air emissions, comparing the no action alternative and any action alternative.

20201 Birch St, Suite 250, Newport Beach, CA 92660 | www.airportnetwork.com | 949.250.1222

Background

The U.S. Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of air contaminants. Air quality impacts are assessed based on the Clean Air Act of 1970 and its amendments, and their associated regulations. The principal regulatory guidance is contained in the National Ambient Air Quality Standards (NAAQS). The NAAQS consist of a primary and secondary standard for each pollutant, as presented in Table 1. Air quality standards are the levels established to protect the public health and welfare from harm within a margin of safety. All areas of the country are required to demonstrate attainment with the NAAQS. The air quality standards focus on limiting the quantity of the following criteria pollutants:

- Ozone (O_3)
- CO
- Nitrogen dioxide (NO_2)
- PM_{10} and $PM_{2.5}$
- Sulfur dioxide (SO_2)

VOCs are not a criteria pollutant, and therefore no ambient air standards have been established for this pollutant. Because VOCs react with NOx in sunlight to form O_3, however, VOCs and NOx emissions are included in this analysis. Lead emissions are not calculated by the Emissions and Dispersion Modeling System (EDMS) model that is used to calculate aviation air quality emissions. Nonetheless, given the relatively low number of aircraft that would use the airport as well as the very low levels of lead potentially emitted by small aircraft, there is no potential for exceeding the NAAQS for that pollutant.

Table 1

AMBIENT AIR QUALITY STANDARDS

Angoon Airport Environmental Impact Statement

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm	8-hour (1)	None	
	35 ppm	1-hour (1)		
Lead	0.15 $\mu g/m^3$ (2)	Rolling 3-month average	Same as primary	
Nitrogen Dioxide	53 ppb (3)	Annual (arithmetic mean)	Same as primary	
	100 ppb	1-hour (4)	None	
Particulate Matter (PM_{10})	150 $\mu g/m^3$	24-hour (5)	Same as primary	
Particulate Matter ($PM_{2.5}$)	15 $\mu g/m^3$	Annual (arithmetic mean) (6)	Same as primary	
	35 $\mu g/m^3$	24-hour (7)	Same as primary	
Ozone	0.075 ppm (8)	8-hour (9)	Same as primary	
Sulfur Dioxide	75 ppb (10)	1-hour (11)	0.5 ppm	3-hour (12)

(1) Not to be exceeded more than once per year.
(2) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(3) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(4) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
(5) Not to be exceeded more than once per year on average over 3 years.
(6) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.
(7) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).
(8) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor with an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
(9) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1..
(10) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved..
(11) To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.075 ppm.
(12) Not to be exceeded more than once per year,
Notes: mg – milligrams; m^3 = cubic meter; std = standard; ppm = parts per million; µg = micrograms
Source: (Alaska Department of Environmental Conservation, Air Quality Division 2013)

Methodology

The potential air quality impacts of a land-based airport were considered in accordance with Federal Aviation Administration (FAA) *Order 1050.1E. Policies and Procedures for Considering Environmental Impacts* (FAA 2006a) and the FAA's *Air Quality Procedures for Civilian Airports and Air Force Bases* (FAA 1997), which is cited in the FAA order to provide more detailed guidance on air quality procedures. The effects of the land-based airport were examined in relation to the current NAAQS and in relation to the general conformity guidelines established in the Clean Air Act. If an area is in attainment for the NAAQS (as is the case for this project), the FAA generally uses the numbers of passengers and aviation operations as indicators of potential future air quality concerns relative to the NAAQS to help determine whether the project requires further air quality analysis for purposes of the National Environmental Policy Act (NEPA).

FAA Order 1050.1E identifies the analysis requirements for air quality for NEPA purposes. That order relies on the FAA's *Air Quality Procedures for Civilian Airports and Air Force* (FAA 1997) to provide guidance concerning the breadth of air quality review required under NEPA. That document indicates the following:

> … not all of the steps are required for every action. Many projects at airports and air bases are too small to require detailed air quality analysis and only a few projects are both broad enough in scope and located in nonattainment or maintenance areas such that the full complement of analyses described in this handbook would be required. Screening techniques that streamline the process for many air quality assessment actions are available… (FAA 1997:7)
>
> Actions that would not increase airport capacity, lead to increased congestion of roadways or airfields, or relocate aircraft or vehicular activity closer to sensitive receptors are not likely to exceed the NAAQS for CO. For deciding whether or not a NAAQS assessment should be considered, the total number of airport passengers and general aviation/air taxi operations should be evaluated. If the level of annual enplanements exceeds 1,300,000 (or 2.6 MAP), the level of general aviation and air taxi activity exceeds 180,000 operations per year or a combination thereof, a NAAQS assessment should be considered. (FAA 1997:19–20)

Current (2011) activity levels at the Angoon Seaplane Base are approximately 1,150 annual operations. For this environmental impact statement (EIS), activity levels are expected to be 3,704 operations in 2019, which is the opening year of the Angoon Airport. This activity is well below the threshold for requiring air quality analysis under NEPA. General conformity applies if the project is within an area of non-attainment or maintenance for NAAQS. Although the project is not in a non-attainment or maintenance area, because the project relates to a new airport, in order to be conservative, an emissions inventory was completed to ensure that the air quality emissions would not exceed the *de minimis* threshold (i.e., the threshold that dictates whether an action has a potential for significant air quality impacts, thus triggering additional analysis). The EDMS is the model that was used to produce the emissions inventory for the EIS.

Existing Conditions

Existing conditions (the no action alternative) consist of all of the operations conducted at the Angoon Seaplane Base (approximately 1,150) in 2011**.** Table 2 shows the current emissions for the Angoon Seaplane Base alone.

Table 2
CURRENT EMISSIONS (2011) OF SOURCES THAT MAY BE AFFECTED BY A LAND-BASED AIRPORT (TONS/YEAR)
Angoon Airport Environmental Impact Statement

Pollutant	Aircraft/ Auxiliary Power Units	Ground Support Equipment	Total
CO	8.71	0.01	8.71
VOCs	1.20	0.00	1.20
NOx	8.94	0.02	8.96
SOx	0.67	0.00	0.67
PM_{10}	0.32	0.00	0.32
$PM_{2.5}$	0.32	0.00	0.32

Totals may be slightly higher or lower than the sum of emissions by source due to rounding.

Future Conditions with a land-based airport

The future conditions inventory assumes approximately 300 operations remaining at the Angoon Seaplane Base and 3,704 operations conducted at a new, land-based Angoon Airport**.** Table 3 shows the future emissions for any action alternative associated with a land-based airport.

Table 3
FUTURE EMISSIONS (2019) OF SOURCES THAT MAY BE AFFECTED BY A LAND-BASED AIRPORT (TONS/YEAR)
Angoon Airport Environmental Impact Statement

Pollutant	**Aircraft/ Auxiliary Power Unit**	**Ground Support Equipment**	**Total**
CO	16.11	1.91	18.02
VOC	3.55	0.06	3.62
NOx	2.68	0.17	2.84
SOx	0.34	0.01	0.35
PM_{10}	0.07	0.01	0.09
$PM_{2.5}$	0.07	0.01	0.08

Totals may be slightly higher or lower than the sum of emissions by source due to rounding.

Summary

As stated above, existing conditions is based on approximately 1,150 operations at the Angoon Seaplane Base. The future conditions inventory assumes 300 operations remaining at the Angoon Seaplane Base and 3,704 operations conducted at a land-based Angoon Airport.

The emissions inventory shows that the CO and VOCs increased between the existing no action alternative and any action alternative, whereas the other pollutants (NO_x, SO_x and PM_{10} and $PM_{2.5}$) all decreased by a small amount. This reduction is primarily due to the reduction of floatplanes; the floatplanes are primarily radial engines, whereas more of the aircraft using the land-based airport would be piston powered, which is more efficient. Because the project-related emission increases are small for CO and VOCs, with a net decrease in emissions for NO_x, SO_x and PM_{10} and $PM_{2.5}$, no significant air quality impacts are expected. *De minimis* thresholds for VOCs, NO_x, SO_x, CO, and PM_{10} are generally 100 tons per year. Because the area is not within a maintenance or non-attainment area and because none of the *de minimis* thresholds are triggered, no additional analysis is required, and no general conformity determination is required. The EDMS report is included in Table 4. No significant air quality impacts are predicted to result from a land-based airport.

Table 4
EDMS EMISSIONS MODEL
Angoon Airport Environmental Impact Statement

EDMS Emissions Model
Angoon Alaska
November 22, 2012
EDMS Version 5.1.3
Units: Short Tons
Analysis Years: 2011 and 2019

Airport	Angoon Seaplane Base (Analysis Year: 2011)										
LTO's/year 577											
Touch & Go's/year 0											
Category	*CO2 tons/year*	*CO tons/year*	*THC tons/year*	*NMHC tons/year*	*VOC tons/year*	*TOG tons/year*	*NOx tons/year*	*SOx tons/year*	*PM-10 tons/year*	*PM-2.5 tons/year*	*Fuel Consumption*
Aircraft	1,644.60	8.71	1.06	1.21	1.20	1.22	8.94	0.67	0.32	0.32	521.27
GSE	N/A	0.01	N/A	0.00	0.00	0.00	0.02	0.00	0.00	0.00	N/A
APUs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	1,644.60	8.71	1.06	1.21	1.20	1.22	8.96	0.67	0.32	0.32	521.27

Airport	Angoon Seaplane Base (Analysis Year: 2019)										
LTO's/year 150											
Touch & Go's/year 0											
Category	*CO2 tons/year*	*CO tons/year*	*THC tons/year*	*NMHC tons/year*	*VOC tons/year*	*TOG tons/year*	*NOx tons/year*	*SOx tons/year*	*PM-10 tons/year*	*PM-2.5 tons/year*	*Fuel Consumption*
Aircraft	382.59	2.72	0.25	0.29	0.28	0.29	2.08	0.16	0.07	0.07	121.26
GSE	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
APUs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	382.59	2.72	0.25	0.29	0.28	0.29	2.08	0.16	0.07	0.07	121.26

Airport	Angoon Airport (Analysis Year: 2019)										
LTO's/year 1,778											
Touch & Go's/year 74											
Category	*CO2 tons/year*	*CO tons/year*	*THC tons/year*	*NMHC tons/year*	*VOC tons/year*	*TOG tons/year*	*NOx tons/year*	*SOx tons/year*	*PM-10 tons/year*	*PM-2.5 tons/year*	*Fuel Consumption*
Aircraft	446.26	13.37	2.86	3.29	3.27	3.30	0.59	0.18	0.00	0.00	141.45
GSE	N/A	1.91	N/A	0.06	0.06	0.07	0.17	0.01	0.01	0.01	N/A
APUs	N/A	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	N/A
Total	446.26	15.29	2.86	3.35	3.34	3.37	0.77	0.20	0.01	0.01	141.45

Airport	Total Emissions from the Angoon Seaplane Base and the Angoon Airport (Analysis Year: 2019)										
Category	*CO2 tons/year*	*CO tons/year*	*THC tons/year*	*NMHC tons/year*	*VOC tons/year*	*TOG tons/year*	*NOx tons/year*	*SOx tons/year*	*PM-10 tons/year*	*PM-2.5 tons/year*	*Fuel Consumption*
Aircraft	828.85	16.09	3.11	3.57	3.55	3.58	2.66	0.34	0.07	0.07	262.71
GSE	N/A	1.91	N/A	0.06	0.06	0.07	0.17	0.01	0.01	0.01	N/A
APUs	N/A	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	N/A
Total	828.85	18.02	3.12	3.64	3.62	3.66	2.84	0.35	0.09	0.08	262.71

References Cited

Alaska Department of Environmental Conservation, Air Quality Division. 2013. *Alaska's 2013 Air Monitoring Network Plan, Chapter 1: Monitoring Plan.* Anchorage: Alaska Department of Environmental Conservation, Air Quality Division, Air Monitoring and Quality Assurance Program.

Federal Aviation Administration (FAA). 1997. *Air Quality Procedures for Civilian Airports and Air Force Bases.* Report FAA-AEE-97-03. Washington, DC: FAA.

APPENDIX F
LAND USE TECHNICAL REPORT

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

LAND USE RESOURCES EXISTING CONDITIONS TECHNICAL REPORT FOR ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration
and
Alaska Department of Transportation and Public Facilities

Prepared by

Southeast Strategies
and
SWCA Enviromental Consultants

January 18, 2012

Contents

Figures

Tables

1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF), the Sponsor, for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska. At present, there is no land-based airport runway in or near Angoon. The DOT&PF prepared the *Angoon Airport Master Plan* (DOT&PF 2007) for their proposed airport location. The EIS is evaluating two alternative airport locations in addition to the DOT&PF's proposed location.

The land-based commercial airport would be a typical of other rural airports in the region. The initial construction would include a 3,300-foot-long paved runway, with the ability to extend the runway length to 4,000 feet in the future if air traffic warrants it. The airport would have a short, perpendicular taxiway leading from the runway to a small apron area, which may eventually contain a small passenger shelter building. The airport layout is being designed to accommodate a future full-parallel taxiway, but this taxiway would not be constructed initially and would only be built if air traffic demands are sufficient to warrant this additional safety and efficiency feature. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. Regardless of the airport location under consideration, an access road would need to be constructed to connect the new airport to the existing Angoon road system. The access road would have a gravel surface and would be two lanes wide (one lane in each direction), with 9-foot-wide lanes and minimal shoulders.

The purpose of this report is to compile detailed documentation of the compatible land use resources that will be used to prepare the affected environment chapter of the EIS. Land use in the area is governed by various owners and management entities. This report discusses land ownership, land management, and land use in the analysis areas using the goals established for land use in existing corporate and municipal, state, and federal government legal and planning documents, as well as local knowledge about traditional land use.

2.0 AREAS EXAMINED FOR BASELINE CONDITIONS OF LAND USE

This report considers land ownership, management, and use in the general areas of Angoon, Favorite Bay, and the eastern portions of Mitchell Bay. Figure 1 shows the immediate areas of the airport alternatives (Airport Alternatives 3a, 4, and 12a) and their associated access road alternatives (Access Alternatives 2, 3, and 12a). The land under, adjacent to, and surrounding the airport and access road alternatives was examined for existing land use to account for direct effects from land acquisition and disturbance, indirect effects from noise associated with future airport operations, and other effects from potential land conversion. Figure 2 shows the areas for which existing land use conditions were examined.

3.0 REGULATORY SETTING

Several federal laws and policies dictate consideration of land use in federal undertakings. These laws and policies are applicable to the proposed land-based airport because 1) the FAA is the lead federal agency for the undertaking and 2) two of the possible airport locations are on lands managed by the U.S. Forest Service (USFS), including lands within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area). The broadest of the applicable federal laws is the National Environmental Policy Act (NEPA) of 1969, which requires that federal agencies evaluate and disclose the anticipated impacts of their actions on the human and natural environment. Beyond this, a host of more specific statutes, regulations, and policies address the topic of land use.

In this section, the requirements specific to the FAA are discussed first, followed by a discussion of requirements specific to the USFS, and then other federal legislation related to land use.

3.1 Federal Aviation Administration Requirements

The term "land use" refers to the ways that land in a given area is used for different purposes (residential, commercial, recreational, public, and so on). For the Angoon Airport EIS, "*compatible* land use" refers to the FAA determination about whether the construction and operation of an airport and its access road are in keeping with the way the nearby land is already used or is planned to be used, and also whether such construction and operation fit with the regulations, statutes, or ordinances regulating those uses. This determination is made keeping in mind how the airport or access road will affect uses of adjacent lands *and* how the uses of adjacent lands may affect operation of the airport and its related facilities. For airport projects, the FAA emphasizes consideration of impacts from airport noise on adjacent land uses and whether existing or planned uses of adjacent lands would create safety hazards for airport or aircraft operations.

FAA Orders 1050.1E, *Environmental Impacts: Policies and Procedures* (FAA 2004), and 5050.4B*, NEPA Implementing Instructions for Airport Actions* (FAA 2006) outline the relevant regulations and policies for assessing compatible land use in association with FAA projects (Table 1).

Table 1. Regulations and Policies for Land Use Compatibility

Regulation	Description
49 United States Code (U.S.C.) § 47106(a)(1) (Airport Improvement Project grant application approval conditioned on satisfying project requirements)	Under this section, the Secretary of Transportation (the Secretary) may approve an application for a project grant. The Secretary may do so only if the project is consistent with the plans (existing when the FAA approves the project) of public agencies authorized by the state to plan for development of the area surrounding the airport.
§ 47107(a)(10) (Airport Improvement Project grant application approval conditioned on assurances regarding airport operations)	For airport actions, the Compatible Land Use chapter of the environmental document must include documentation to support the required airport sponsor's assurance under this section. That assurance must state that appropriate action, including adopting zoning laws, has been or will be taken to the extent reasonable. Such actions are needed to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including the landing and takeoff of aircraft. The assurance must be related to existing and planned land uses.
49 U.S.C. §§ 47501–47510. (Noise Abatement) 14 Code of Federal Regulations (CFR) Part 150	These sections require the Secretary to 1) establish a single system showing a highly reliable relationship between projected noise and surveyed reactions of individuals to noise; 2) establish a single system to determine the reaction of individuals (at or near airports) to noise resulting from airport operations; and 3) identify land uses that are normally compatible with various exposures of individuals to noise levels. Regulations at 14 CFR Part 150 provide this information.
49 U.S.C. § 44718, Subsection (d) (Limitation on Landfill Construction)	Birds attracted to municipal solid waste landfill facilities (MSWLF) near airports pose aviation hazards. MSWLFs built after Congress enacted Public Law 106-181 (April 5, 2000) cannot be located within 6 miles of a public airport 1) receiving Airport Improvement Program grants; 2) chiefly serving general aviation aircraft; and 3) chiefly having regularly scheduled flights of aircraft with 60 seats or less. Note: The State of Alaska is exempt from this requirement.
40 CFR § 258.10 (Criteria for Municipal Solid Waste Landfills; Airport Safety)	The Environmental Protection Agency (EPA) recognizes that MSWLFs often attract large numbers of birds because these facilities provide food and cover. As a result, birds using MSWLFs could pose potential threats to aircraft safety. This regulation requires the following minimum separations between the airport and MSWLF: 5,000 feet for airports serving piston-powered aircraft, or 10,000 feet for airports serving turbine-powered aircraft. In addition, the owner/operator of a new MSWLF within a 5-statute-mile radius of any airport runway serving either aircraft type has certain duties. The owner/operator must notify the airport and FAA of the proposal, and show and have proof in its operating manual that the MSWLF's design and use will not pose aviation hazards.

Table 1. Regulations and Policies for Land Use Compatibility

Regulation	Description
Interagency memorandum of agreement (MOA) of July 2003 addressing wildlife hazards and airports	The FAA, U.S. Air Force, U.S. Army Corps of Engineers, EPA, U.S. Fish and Wildlife Service, and Department of Agriculture Wildlife Services signed this MOA. The MOA provides guidelines to these agencies on how they will cooperatively address wildlife habitats near public use airports.

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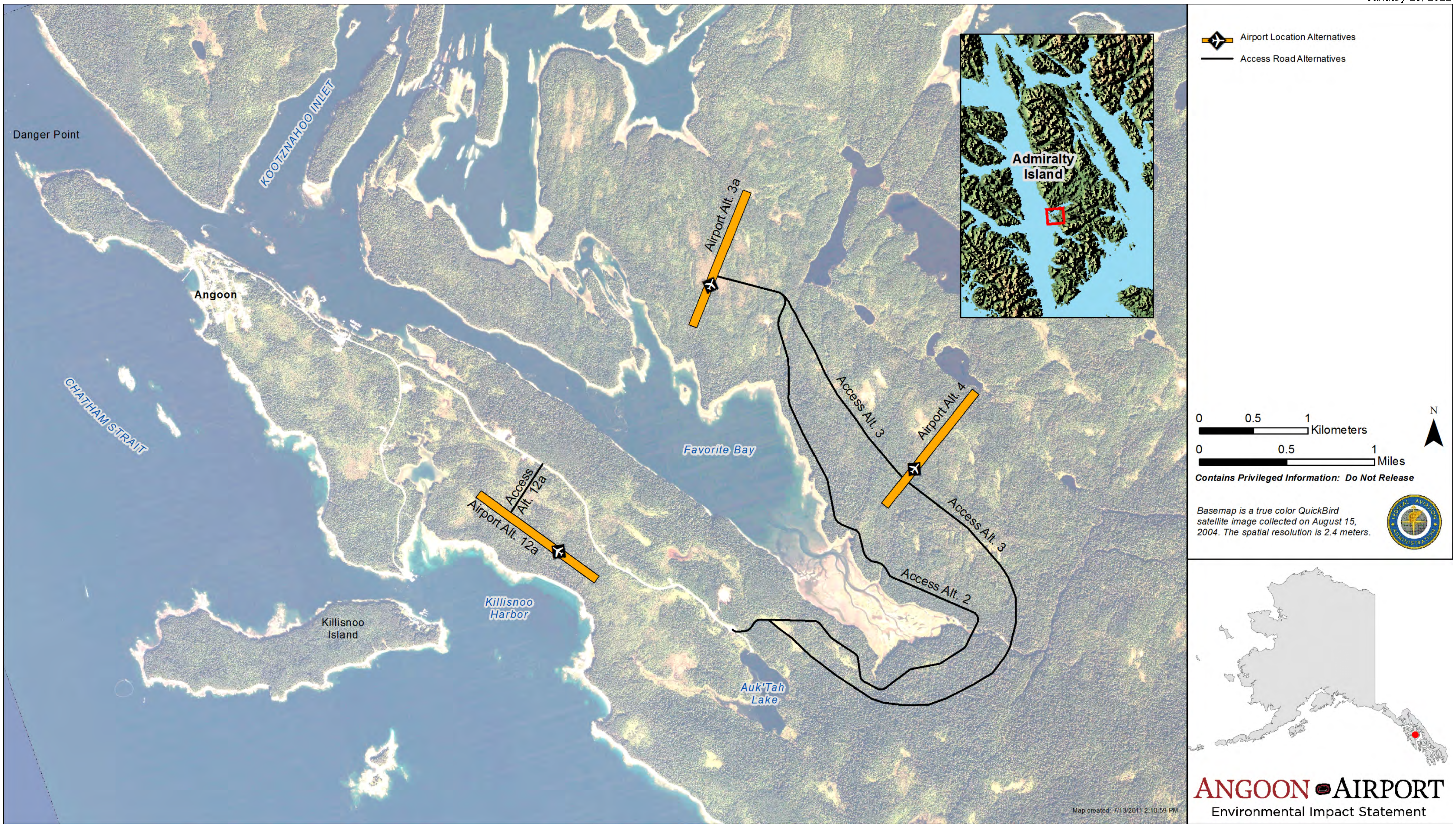

Figure 1. General area of the airport and access alternatives.

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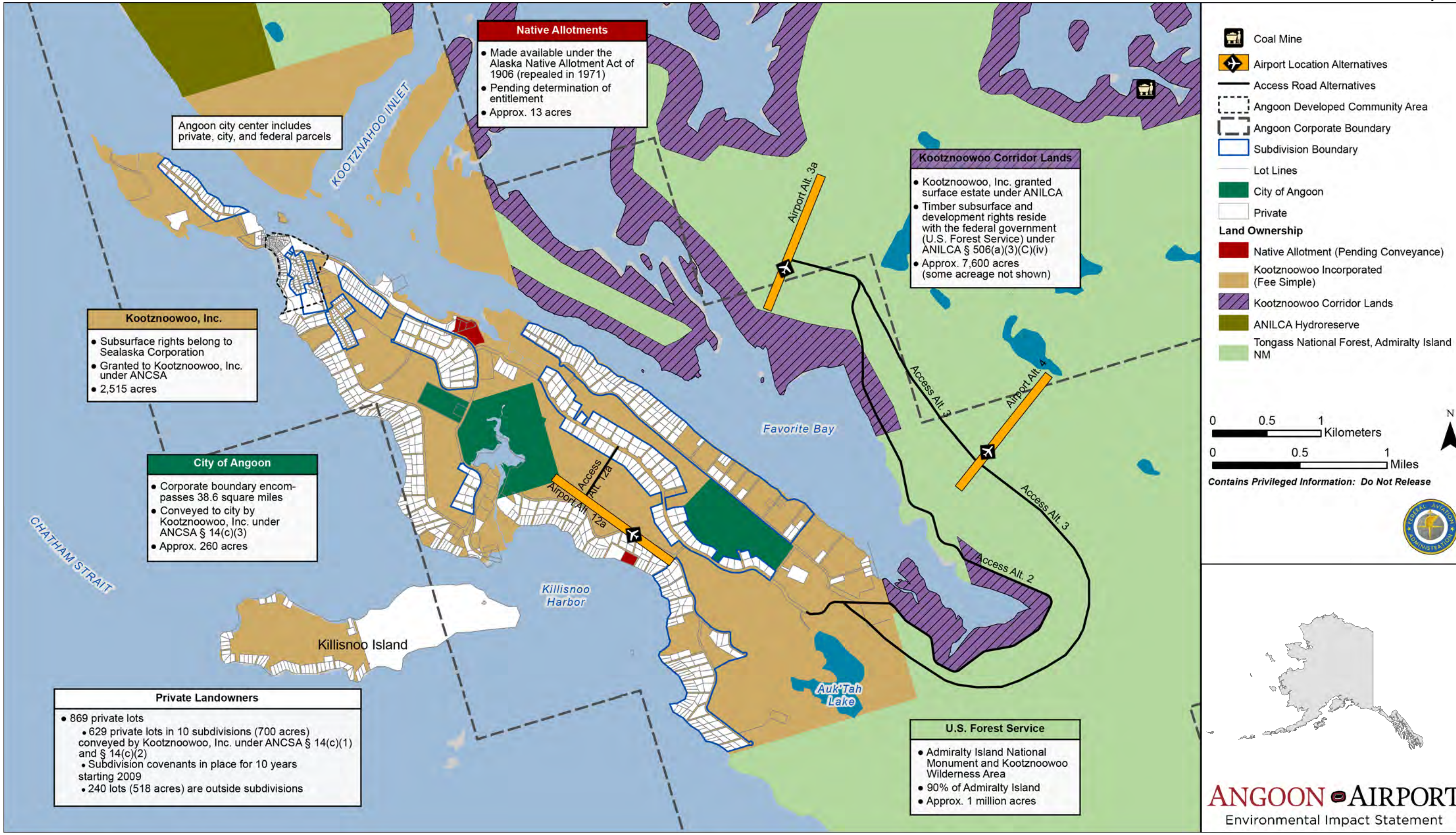

Figure 2. Locations of alternatives and land ownership. *Note*: Figure shows general runway locations only. Additional land around the runways would be needed for airport operations.

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3.2 U.S. Forest Service Requirements

Because two of the airport alternative locations and their associated access roads are located primarily on USFS-managed lands, the applicable laws and policies of this agency must also be considered relative to land use compatibility. The following USFS-related laws and policies (Table 2) apply to the proposed land-based airport project.

Table 2. U.S. Forest Service–related Laws and Policies

Regulation	Description
Multiple-Use Sustained-Yield Act (Public Law 86-517)	Directs the USFS to provide authorizations and approvals for uses of lands under their jurisdiction while maintaining long-term sustainability of that land.
Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1601–1610)	As amended by the National Forest Management Act of 1976 (U.S.C. 4729), this Act provides direction for National Forest resource planning. It states, "In developing, maintaining, and revising plans for units of the National Forest System pursuant to this section, the Secretary shall assure that such plans…provide for multiple-use and sustained-yield of products and services obtained there from in accordance with the Multiple-Use, Sustained-Yield Act of 1960, and, in particular, include coordination of outdoor recreation, range, timber, watershed, wildlife and fish, and wilderness."
Tongass Land Management Plan (amended in 2008)	Provides long-term management guidelines to the USFS for managing lands within the Tongass National Forest, including lands in the Monument–Wilderness Area. The plan is based upon multiple-use goals and designates desired land uses across the Tongass National Forest. The plan establishes criteria under which potential land uses are considered, including compatibility with land use designations. The plan provides direction to the USFS for the consideration of transportation and utility systems on USFS-managed conservation system units as allowed under Title XI of the Alaska National Interest Lands Conservation Act.
Alaska National Interest Lands Conservation Act (ANILCA) Section 810 and Title XI §1105	ANILCA directs the USFS to manage in certain ways and consider the compatibility of land uses with the purposes for which conservation system units (CSUs) were established

3.3 Other Applicable Federal Requirements

In addition to the laws, regulations, and policies specific to the FAA and the USFS, other federal laws related to federal actions and land use consideration exist and are applicable to the Angoon Airport project. Many such laws merely acknowledge that land use effects be considered but do not require a specific finding or decision, nor do they dictate the manner in which that consideration must occur. Other laws are more prescriptive in nature (Table 3).

Table 3. Other Federal Requirements Related to Compatible Land Use

Regulation	Description
Alaska National Interest Lands Conservation Act (Title XI, § 1105)	Provides for the development of transportation and utility systems on public conservation system unit lands, such as the Monument–Wilderness Area within which two of the airport alternatives and their associated access road alternatives are located; ANILCA supersedes the Wilderness Act (Public Law 88-577) with regard to allowable uses of designated wilderness in Alaska.

Table 3. Other Federal Requirements Related to Compatible Land Use

Regulation	Description
Section 4(f) of Department of Transportation Act of 1966 (as amended)	Prohibits the use of land from a publicly owned park, recreation area, wildlife or waterfowl refuge, or historic property, as defined at 36 CFR 800.16(l)(1), for federal transportation actions unless there is no feasible or prudent alternative to the use of that land and the transportation action includes all possible planning to minimize harm to the property from that use. Federally designated wilderness areas and national monuments may qualify as Section 4(f) resources depending on the major purpose for which they were established.

4.0 EXISTING DATA SOURCES

Various reports, plans, databases, and agency web sites served as sources of information used in the preparation of this report. In addition to the land management plans presented in Table 4, background documents regarding the airport (for instance, the *Angoon Airport Master Plan* [DOT&PF 2007]) and other applicable land management policies, including zoning ordinances and deed covenants and restrictions, were used to develop this report. Reports by the Alaska Department of Fish and Game (ADF&G) were used for sport fisheries data. The web-based community databases developed by the Alaska Department of Commerce, Community, and Economic Development (DCCED) were accessed for community information. Personal discussions were held with knowledgeable parties in the Angoon community, officers of Kootznoowoo, Inc. (the village Native corporation), and USFS personnel.

Table 4. Land Management Plans Governing Angoon Area Land Use

Plan	Agency	Purpose
Angoon Comprehensive Development Plan (City of Angoon 1976)	City of Angoon	Development plan for all lands within the boundary of the City of Angoon, regardless of ownership.
City of Angoon General Code, Title 18 – Zoning (City of Angoon 2009)	City of Angoon	Land use ordinance within the City of Angoon General Code. Contains City of Angoon permitting, zone, and land use regulations.
Tongass Land Management Plan (USFS 2008)	USFS	Management plan for lands within the Tongass National Forest, including the Monument–Wilderness Area.
Northern Southeast Area Plan (Alaska Department of Natural Resources [ADNR] 2002)	ADNR	Plan to protect/manage natural resources on state-owned uplands, tidelands, and submerged lands in the Angoon area. Some special management areas affect the airport project area.

In reviewing Table 4 readers may note a lack of reference to coastal zone management plans typically applicable to areas such as Angoon. With the expiration of the *Angoon Coastal Management Plan* in 2007 and the Alaska Coastal Zone Management Program and its *Alaska Coastal Management Plan* in 2011, no such management plans govern the Angoon area. See section 6.1.2 for more information about these coastal management plans and programs.

4.1 Known Data Gaps

As discussed in section 4.0 and Table 4, data regarding existing and planned land uses and management policies in the area were obtained from a number of general sources. It is important to note, however, that certain data gaps do exist. Specifically, no written documentation is available for planned land uses or transactions regarding some of the land conveyances under the Alaska Native Claims Settlement Act (ANCSA). Information regarding these issues was obtained through personal communications with individual staff members for the City of Angoon, Kootznoowoo, Inc., and other parties. Where such verbal sources were used to describe an existing or anticipated land use relevant to the airport project, they are cited in this report as personal communications. Additionally, information regarding noise-sensitive sites or areas was obtained through a combination of written records and conversations with local Angoon residents who could confirm that the locations of specific types of federally defined noise-sensitive facilities, such as schools, were correctly identified on the maps shown in this report.

In addition to the data gaps noted in the preceding paragraph, readers should be aware that certain land use data were gathered but are not fully disclosed in this report. These data relate to specific types of personal use and cultural use sites for which confidentiality was requested by the individual owners and users to protect their privacy and the uses of the lands in question. This information is known to the FAA and will be taken into consideration in decision making related to the proposed land-based airport.

5.0 Land Ownership

Angoon is the only permanently inhabited community on Admiralty Island. The community is located on a short, narrow peninsula along the west coast of Admiralty Island. Beyond the peninsula is the nearly 1-million-acre, federally owned Monument–Wilderness Area managed by the USFS. Most of the land on the peninsula is owned by Kootznoowoo, Inc., the City of Angoon, individual private landowners, and the State of Alaska. Figure 2 shows land ownership in the area.

5.1 U.S. Forest Service

The Kootznoowoo Wilderness Area was established in 1978 as a means of providing protection to the lands of Admiralty Island while the passage of the Alaska National Interest Lands Conservation Act (ANILCA) was being debated. When ANILCA was enacted in 1980, it established Admiralty Island National Monument and designated the Kootznoowoo Wilderness Area as part of the National Wilderness Preservation System. The Monument–Wilderness Area incorporates approximately 90% of Admiralty Island (nearly 1 million acres), and it is currently managed by the Tongass National Forest. These USFS-managed lands begin at the south end of the Angoon peninsula and cover most of the rest of Admiralty Island, including areas east of Favorite Bay, where Airport Alternatives 3a and 4 are located.

5.2 Kootznoowoo, Inc.

Kootznoowoo, Inc., which was established in 1973 following the 1971 enactment of ANCSA, is the for-profit Alaska Native corporation for the community of Angoon. The corporation is the single largest non-federal landowner in the area of Angoon. Kootznoowoo, Inc. was initially granted surface title to approximately 2,772 acres of land in the Angoon area through ANCSA. Subsurface rights to these lands belong to Sealaska Corporation, the regional Native corporation under ANCSA. Some of these lands were recently reconveyed as residential areas to Kootznoowoo, Inc.'s shareholders, as public lands to the City of Angoon, or as personal use sites to long-time users as required by ANCSA § 14(c). This reconveyance of land from Kootznoowoo, Inc. includes shareholder homesites (§ 14(c)2), campsites, and historic use sites (§ 14(c)1), and municipal public lands (§ 14(c)3). Surveys and plats for the land transfers were completed in 2010. The deeds to the campsites and historic use sites (§ 14(c)1) have been completed. There are approximately 20 of those sites, and they are less than 2,000 square feet each.

In addition, Kootznoowoo, Inc. was granted ownership, through ANILCA § 506, of the surface estate within a 660-foot-wide corridor along most of the shorelands of Favorite, Kanalku, and Mitchell bays. These lands are typically referred to as the Kootznoowoo Corridor Lands. They are located between the Monument–Wilderness Area and the shores of Favorite, Kanalku, and Mitchell bays, but they are not inside the Monument–Wilderness Area (see Figure 1). ANILCA § 506 includes provisions for the cooperative management of the Kootznoowoo Corridor Lands by Kootznoowoo, Inc. and the USFS.

Kootznoowoo, Inc. also owns an approximately 133-acre parcel along the shore at the end of Kanalku Bay, which is not considered part of the Kootznoowoo Corridor Lands (personal communication, Berger 2010). This parcel is known to have a coal deposit (approximate location marked in Figure 2), and it has been mined in the past. Kootznoowoo, Inc. has expressed interest in possibly mining coal and coal methane gas from that parcel in the future (personal communication, Naoroz 2010).

5.3 City of Angoon

The City of Angoon was first incorporated as a fourth-class city in 1963. In 1972, it was reclassified as a second-class city. The original city boundary encompassed about 8.5 square miles (personal communication, Bitzer 2009). In 1986, the City of Angoon annexed 30.14 square miles to the south of the City into Hood Bay and also expanded its boundaries to include Killisnoo Island (Alaska Department of Community and Regional Affairs 1986). The City's corporate boundary currently encompasses 38.6 square miles, of which 22.5 square miles are land and 16.1 square miles are water (personal communication, Bitzer 2009). The corporate boundary overlaps with lands managed by the USFS in the Monument–Wilderness Area. City-owned lands are limited to approximately 260 acres associated with City offices and future public park and recreational spaces. These lands were conveyed to the City by Kootznoowoo, Inc. under ANCSA. All lands within the City's corporate boundary, regardless of ownership, are subject to City land use and zoning policies. However, the City cannot develop or authorize third-party use of unzoned lands owned by other parties, such as the USFS or Kootznoowoo, Inc.

5.4 Private Land Owners

According to the *Angoon Airport Master Plan*, approximately 869 parcels in the area are privately owned (DOT&PF 2007). Public land records for Angoon are incomplete, leaving the exact number of parcels unclear. Of these, 629 private lots were established in 10 subdivisions through a homesite program authorized under ANILCA, and titles to these lots were conveyed to the private owners from Kootznoowoo, Inc. in early 2010.

5.5 State of Alaska

The State of Alaska owns an indeterminate number of acres around Angoon, including state-owned uplands, state-selected uplands, and most submerged lands and tidelands below mean high water (approximately 15 feet above mean sea level). Of these categories of land, only the state-owned tidelands are located in areas that could be directly or indirectly affected by the proposed airport project (meaning they are located in the area of the airport and access road alternatives). Until June 30, 2011, the Alaska Department of Natural Resources (ADNR) managed lands on behalf of the state through the Alaska Coastal Management Program (ACMP). At that time, the ACMP expired. It remains unclear as to how or whether coastal zone issues will be addressed by the state through means other than the individual oversight of the various state agencies once coordinated under the ACMP. No local coastal management plan and related enforceable polices are currently in force.

6.0 LAND USE

Like many remote areas in Southeast Alaska, Angoon is an isolated community with no road connections to other communities. The land immediately surrounding the community is coastal and relatively flat; however, a short distance away, mountains rise precipitously. Much of the area is heavily forested by Sitka spruce and hemlock trees, with numerous wetland areas and salmon-bearing streams also present. This remote location, the limited amount of non-federal lands, and the rugged but lush terrain and surrounding waters greatly influence land use in and around the community.

Land use in the area includes residential, municipal, public, commercial, and industrial use, as well as transportation corridors, recreation areas, subsistence resource harvest areas, and fish and wildlife habitat. The following sections describe land management and uses in the Angoon area and specifically in the vicinity of the airport and access alternatives. Land management and regulatory authority in the Angoon area is complicated and involves overlapping jurisdiction and authority. These overlapping authorities are discussed in more detail in the sections that follow.

6.1 Land Use Planning and Zoning Policies

Guidelines and policies for land use in the Angoon area have been developed by several different governmental agencies, including the City of Angoon and the USFS. In general, the policies refer to lands under the control of the specific agency issuing the policy; however, there is some overlap in jurisdiction. The plans listed in Table 4 dictate how land is used in the area. In addition, lands owned by Kootznoowoo, Inc., the community's Native corporation, are managed under ANCSA and ANILCA guidelines and according to policies developed by Kootznoowoo, Inc. These policies are described later in this report.

6.1.1 CITY OF ANGOON

Land use and zoning policies for lands within the corporate boundary of the City of Angoon were initially established through the *Angoon Comprehensive Development Plan*, which was completed in 1976 (City of Angoon 1976). The plan has not been comprehensively updated since that time. The City zoned the lands within the corporate boundary for a variety of residential, public, and other purposes (Figure 3).

In general, the *Angoon Comprehensive Development Plan* from 1976 expresses the need for available land for commercial, industrial, residential, and community facilities, and for recreation development. The plan also acknowledges the eventual need for a land-based airport to serve the community, although it was not seen as an urgent community need in 1976. At the time the plan was written, the DOT&PF had identified a potential airport site on the Angoon peninsula. Regarding a land-based airport, the plan states the following:

> The construction of a land-based airport at Angoon is not seen as an urgent community need at the present time (1976). Nevertheless, it is very important that a future airport site be identified and it is strongly recommended that the city request the Division of Aviation [currently the DOT&PF] to more clearly define the boundaries of the proposed site and the approximate alignment of the runway. The proposed airport site is within lands selected by Kootznoowoo, Inc. and it is important that development does not take place here which could impair its future operating efficiency. (City of Angoon 1976)

The City zoning ordinance is codified in the City of Angoon General Code, Title 18 (Zoning). This title describes land use districts, including definitions, permitted uses, accessory uses, conditional uses, and other regulations attached to each type of use. All land within the corporate boundary is subject to these zoning laws, regardless of ownership. Only a portion of the land within the corporate boundary is zoned (City of Angoon 2009). Figure 3 shows the zoning within the portion of the Angoon area that could be directly or indirectly affected by the airport or access road alternatives. Title 18 zoning classifications are summarized below. Readers should note that in the following zoning descriptions, all uses not specifically provided for as permitted, accessory, or conditional uses are prohibited.

- Residential Zone: New Housing Area
    - Permitted uses: Single-family structures
    - Conditional uses: Churches, schools, multi-family dwellings, public parks and recreation sites, public utility facilities, fire stations, fraternal halls, governmental buildings, mobile homes, commercial enterprises (rental, sales, professional services), and rock extraction
- Residential Zone: Town Core (a.k.a. Developed Community Area)
    - Permitted uses: Single-family dwellings; retail sales, service and maintenance, professional services, government, corporate, and private administrative offices; health clinics; and public parks and recreation sites
    - Conditional uses: Wholesale sales, open material and equipment storage, churches and fraternal halls, community centers, public docks, multi-family dwelling units, public utility facilities, and fire stations
    - Historic preservation overlay: All recognized clan houses shall be preserved, and uses within them shall include, but not be limited to, clan activities, cultural events, and residential uses, as defined by the clan
- Rural Zone
    - Permitted uses: Single-family dwellings, subsistence uses, cemeteries, helicopter landing areas, and firewood gathering
    - Conditional uses: Mining and support facilities, lodges and resorts, resource recreation, log processing and storage, public utility facilities, fire stations, solid waste disposal sites, commercial enterprises (retail sales, wholesale sales, open material and equipment storage, service and maintenance, and professional services), industrial uses, timber harvesting, seafood processing, and rock extraction
    - Waterfront development overlay: Docks, haulout grids, and boathouses. All development on lots adjacent to marine waters shall observe a setback of 50 feet from the mean high water line, except those uses subject to a conditional use permit. Structures would be located so as not to significantly block the view of the water.

In addition to the zoning categories presented above, the City has designated an area around the southeastern portion of the Salt Lagoon as a park (DOT&PF 2007). See Figure 3 for the location of the designated park property. In recent years, drainage from the Angoon landfill around and past the Salt Lagoon has made this area less desirable for recreational uses (personal communication, Thompson 2009).

As can be seen from Figure 3, a large amount of unzoned land is present within the Angoon corporate boundary. These unzoned lands include Kootznoowoo, Inc. and Monument–Wilderness Area lands located within the corporate boundary. These lands are subject to the general municipal policies of the City of Angoon, but the City does not have direct jurisdiction over the use or development of those lands.

6.1.2 Alaska and Angoon Coastal Management Programs

The *Angoon Coastal Management Plan* was developed in 1990. The plan expired on March 1, 2007, and is no longer in effect. In accordance with the Coastal Zone Management Act, in the absence of a local plan, jurisdiction and management of coastal areas and resources reverts to the ACMP within the ADNR under the most current *Alaska Coastal Management Plan*. However, the ACMP expired on June 30, 2011; therefore, there is no approved coastal management plan for Alaska, and no requirement for a consistency determination or review under the Coastal Zone Management Act.

6.1.3 Alaska's Northern Southeast Area Plan, ADNR

The ADNR manages most tidelands, submerged lands, and state-owned uplands in Alaska. Alaska's *Northern Southeast Area Plan* (ADNR 2002) is a management tool for those lands in the Angoon area. The plan discusses several special management areas in the Admiralty Island area, but only those listed below pertain to areas near the airport and access alternatives. Descriptions of those areas and their management follow.

- Large Tract Tidelands Alaska Tidelands Survey (ATS) 19—Kootznahoo Inlet. This area unit is composed of exposed tidal flats, mixed sand and gravel beaches, and intertidal marshes in the inlet and all associated bays, as well as estuarine wetlands at the head of Favorite Bay and Kanalku Bay. The unit's management intent is to protect salmon and brown bear habitat values, protect waterfowl and shorebird concentration areas, protect estuarine wetlands, maintain traditional uses by Angoon residents in this area, allow shoreline development in areas within and adjacent to the Angoon community, and consult with the *Angoon Coastal Management Plan* prior to permitting. With the expiration of both the *Angoon Coastal Management Plan* and the ACMP, the consultation requirement no longer applies. With regard to the unit's resources and uses, this unit falls within the Angoon Coastal District boundary. Juvenile coho, sockeye, pink, and chum salmon rear in estuarine areas. Adult chum, coho, and pink salmon use this unit for schooling, spawning, and migration. Resident and anadromous char, Dolly Varden, and cutthroat trout are also present within this system. This unit contains anadromous stream estuarine areas where brown bears concentrate, particularly in the spring. The anadromous streams identified are 112-67-10150, 112-67-10250, 112-67-10350, 112-67-10400, 112-67-10450, 112-67-10600, and 112-67-10800. This unit is also known as a spring and fall waterfowl and shorebird concentration area. Trumpeter swans use this unit for nesting and brood rearing. Angoon residents have historically used this area for beach seining and the subsistence harvest of brown bears, fur bearers, deer, salmon, and waterfowl. Good anchorages are present in this unit. Eagle nests are also found within this unit.
- Small Tract Tidelands—ATS 1.51 and ATS 1.52. These areas (designated as waterfront development) contain a commercial dock (ATS 1.51) and a noncommercial dock (ATS 1.52). The management intent of these areas is to foster the use of tidelands, submerged lands, or shorelands for water-dependent or water-related facilities, usually for industrial or commercial purposes. Waterfront development includes piers, wharves, harbors, mineral transfer facilities, seafood processing facilities, commercial recreation facilities, and other resource development support facilities, except for activities related to forestry, which are covered by the forestry designation. Approving authorizations in these areas were to be conducted in compliance with the coastal development standards found in Title 6, Alaska Administrative Code 80.040 of the ACMP before the program expired. This land may be available for conveyance to municipalities under Alaska Statute (AS) 38.05.820 and AS 38.05.825 but cannot be sold to individuals. It is unclear what effect the expiration of the ACMP will have on the process for acquiring approvals for actions on these lands.

6.1.4 U.S. Forest Service

Management of USFS lands in the Monument–Wilderness Area is guided by the Tongass Land Management Plan (TLMP), as updated in 2008 (USFS 2008). The management goal for the Monument–Wilderness Area is stated as follows:

> To manage the Wilderness portions of Admiralty Island and Misty Fiords National Monuments to maintain an enduring Wilderness resource, while providing for public access and uses consistent with the Wilderness Act of 1964, ANILCA, and their respective Presidential Proclamations of 1978, which designated these units as National Monuments because of their superlative combination of significant scientific and historical features.
>
> Admiralty Island, exclusive of the Mansfield Peninsula, was designated as a National Monument–Wilderness Area for the scientific purpose of preserving intact a unique coastal island ecosystem. The goal of preservation was to ensure continued opportunities for study of Admiralty Island's ecology and its notable cultural, historical, and wildlife resources, within its relatively unspoiled natural ecosystem. Protection and study of Tlingit cultural resources, other historical resources, and brown bear and bald eagle populations are specifically directed. (USFS 2008)

Within the management prescriptions for the Monument–Wilderness Area, under Special Use Administration (non-recreational) Lands, the TLMP states the following:

> H. Allow reasonable access to, operation, and maintenance of existing air and water navigation aids, communication sites, and related facilities, as well as existing facilities for national defense purposes, weather, climate, and fisheries research and monitoring. Allow the continuation of necessary motorized access at existing sites (ANILCA §1310(a)). New facilities proposed for these activities and purposes, except communication sites, shall be permitted 1) following consultation between the head of the federal agency undertaking the establishment, operation, or maintenance, and the USFS officer with delegated authority and 2) in accordance with such terms and conditions as may be mutually agreed upon in order to minimize the adverse effects of such activities on the Monument–Wilderness resources.
>
> 1. Conduct environmental analysis to evaluate the effects of such proposals on Monument–Wilderness resources and to provide the basis for determining the necessary terms and conditions under which the use will be permitted.
> 2. Mechanical transport and motorized equipment may be authorized where no other feasible alternative exists.
> 3. USFS officers with designated authority will consult with the permittees and jointly develop Operating Plans, documenting procedures that will minimize impacts to the Monument–Wilderness resources without unreasonably limiting the operation and maintenance of the proposed facilities.
> 4. Wilderness is a Transportation and Utility System (TUS) "Avoidance Area." Transportation and utility sites and corridors may be located in the Wilderness only after an analysis of potential TUS opportunities has been completed and no feasible alternatives exist outside the Wilderness. 08)

The TLMP further states, under Transportation Operations:

> A. New roads, new motorized trails, and new airstrips are not permitted in the Wilderness, except where authorized by ANILCA and to access surrounded state and private land and valid mining claims subject to stipulations to protect Wilderness resources and values. (USFS 2008)
>
> B. In addition to the designation of the Monument–Wilderness Area, the updated 2008 TLMP designates a small area near Danger Point as semi-remote recreation (see the location identified as *Recreation Area* on Figure 5).

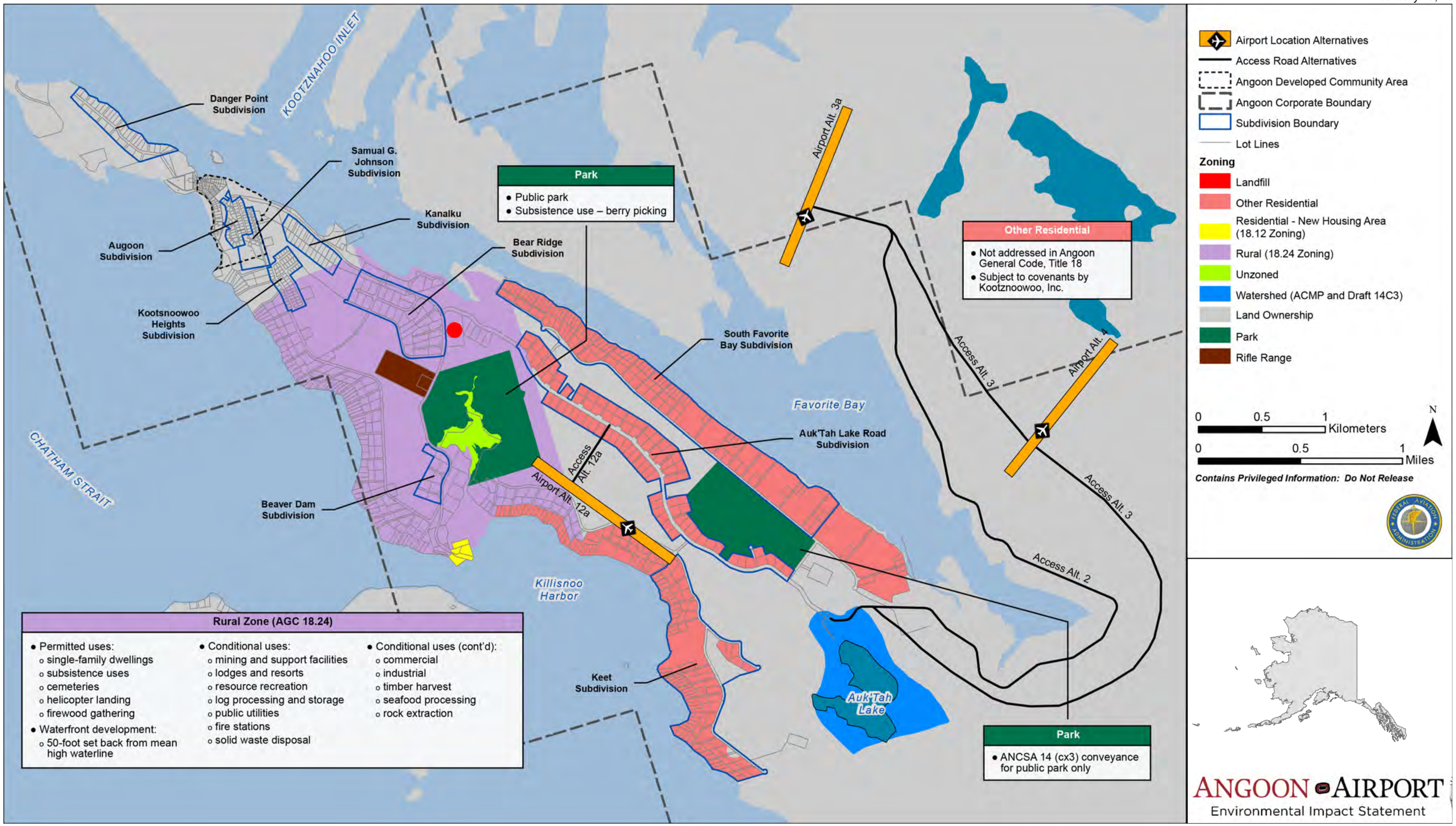

Figure 3. Non-federal land use and zoning in the immediate vicinity of Airport Alternative 12a.

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6.1.5 Kootznoowoo, Incorporated

As noted in section 5.2, Kootznoowoo, Inc. owns most of the lands on the Angoon Peninsula between Chatham Strait and Kootznahoo Inlet (see Figure 1). It also own shorelands skirting Favorite, Kanalku, and Mitchell bays. This land, known as the Kootznoowoo Corridor Lands and discussed in section 5.2, is to be managed in cooperation with the USFS under the provisions of ANILCA. The corporation's general land management philosophy is to maintain ownership of its lands for the benefit of its shareholders (personal communication, Naoroz 2009a). To this end Kootznoowoo, Inc. included a reversion clause in all the deeds recently issued to individual shareholders for private residential parcels in Angoon (see section 5.2 for more information about these deeds). This reversion clause specifies that if the lands are not used for the agreed-upon purposes, ownership of the land would revert back to Kootznoowoo, Inc. Land recipients cannot sell or change the agreed-upon use of these lands once they receive the deeds. These deeds are only for the surface estates of these lands, and subsurface rights do not transfer (personal communication, Naoroz 2009b).

Management and jurisdictional authority over the Kootznoowoo Corridor Lands is complex. Kootznoowoo, Inc. owns the surface estate to the Kootznoowoo Corridor Lands. Timber, subsurface, and development rights reside with the federal government and are managed by the USFS (USFS 2002). The lands are also within the City of Angoon corporate boundary, resulting in overlapping authorities regarding the land (Figure 4).

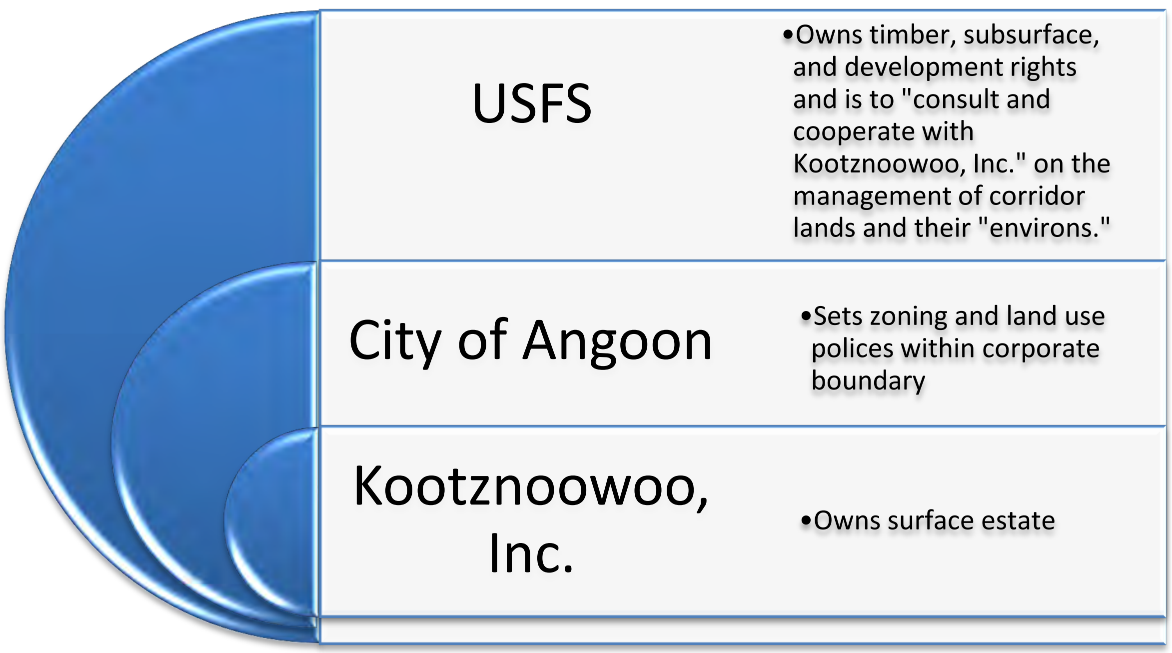

Figure 4. Overlapping authorities for the Kootznoowoo Corridor Lands.

The *Draft Angoon Airport Master Plan Background Report* (DOT&PF 2006:44) discusses potential airport development and the role Kootznoowoo, Inc. plays in land ownership and management of the Kootznoowoo Corridor Lands:

> Development of an airport and access road within corridor lands will be partly governed by clauses in The (sic) ANILCA Section 506(a)(3)(C)(iv) states that development rights within the corridor lands are reserved to the United States "except that the Secretary of Agriculture is authorized to permit construction, maintenance, and use of structures and facilities on said land which he determines to be consistent with the management of the Admiralty Island

> National Monument, provided that all structures and facilities so permitted shall be constructed of materials which blend and are compatible with the immediate and surrounding landscape."

While ANILCA § 506(a)(3)(C)(iv) reserves development rights for the Secretary of Agriculture, in this case represented by the USFS, ANILCA § 506(3)(E) states, "The Secretary of Agriculture shall consult and cooperate with Kootznoowoo, Incorporated, in the management of Mitchell, Kanalku, and Favorite bays, and their immediate environs, and the Secretary is authorized to enter into such cooperative arrangements as may further the purposes of this Act and other provisions of law, concerning, but not limited to: permits for any structures and facilities, and the allocations of revenues therefrom; regulations of public uses; and management of the recreational and natural values of the area."

A memorandum of understanding (MOU) was executed between the USFS and Kootznoowoo, Inc. committing each party to consult and cooperate on actions within a Cooperative Management Area, which includes the Kootznoowoo Corridor Lands. Airport development would include negotiations and agreements between the DOT&PF and Kootznoowoo, Inc. to ensure long-term access to and use of the airport. The level of involvement of the USFS in these negotiations remains to be seen as the process for cooperative management of the Kootznoowoo Corridor Lands outlined in the MOU has yet to be tested. Assurance of DOT&PF access to an airport using Kootznoowoo Corridor Lands could take the form of a land purchase or lease, granting of rights-of-way, purchase of easements, or other mechanisms to guarantee access and use.

6.2 Existing Land Uses as of 2010

Discussions on City zoning in previous sections of this report indicate what activities are allowed in zoned areas within the corporate boundary. Other land use plans by various state and federal agencies indicate land use in their areas of jurisdiction. This section describes what uses are *actually* occurring in those areas. Land uses within the general area include

- residential and commercial activities (mainly within the Angoon community core);
- subsistence fishing, hunting, and gathering activities;
- commercial fishing;
- commercially guided hunting, fishing, and recreational activities; and
- non-guided recreational fishing, hunting, camping, boating, and other leisure activities.

The majority of residential and commercial development in the Angoon area is either in or adjacent to the downtown core. According to the 2000 Census, 221 housing units are located within the Angoon Census Subarea, 184 of which were occupied in 2000. Of the 184 occupied units, approximately 56% (103 units) were owner-occupied. The remaining 44% (81 units) were renter-occupied. According to the DCCED business license listing (DCCED 2009), 11 Angoon residents have business licenses, and another four licenses to operate a business within the Angoon City limits are held by non-Angoon residents. Residential and commercial developments near the alternatives are discussed in a following section.

6.2.1 Subsistence Harvest Activities

Subsistence fishing, hunting, and gathering activities occur within the area. For more detailed information regarding specific areas and activities, see the *Subsistence Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement* (SWCA Environmental Consultants 2010).

Deer are also harvested for subsistence uses in the Angoon area and adjacent areas. The ADF&G issues a single type of permit for deer harvest, and the permit is for personal use, which encompasses both subsistence and sport harvest. Angoon residents hold 48 licenses issued by the ADF&G that allow hunting of deer as well as sport fishing (personal communication, Dennison 2009).

Specific harvest numbers for subsistence resources can also be found in the *Socioeconomic Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement* (Southeast Strategies 2010).

6.2.2 Commercial Fishing Activities

Commercial fishing in the general Angoon vicinity occurs mainly in Chatham Strait to the west of Angoon. Very little commercial fish harvest occurs in Mitchell Bay and interior waterways reached through Mitchell Bay. Specific harvest numbers for commercial fishing can also be found in the *Socioeconomic Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement* (Southeast Strategies 2010).

Commercially Guided Hunting, Fishing, and Recreational Activities

The Angoon area has several lodges that provide charter fishing services, and other businesses offer guided fishing, hunting, and other recreational activities in the general area of Angoon and western Admiralty Island. Four businesses are currently authorized under special use permit by the USFS to provide commercial outfitting and guiding services into the Monument–Wilderness Area near Angoon (personal communication, Berger 2009). In addition, in 2008 (the latest year with data available), 14 boats were registered to perform charter fishing in the Angoon area (ADF&G 2009). Table 5 presents estimated sport-fish catch in the Angoon area by boat for 2001–2007; it is presented here to illustrate the intensity of sport-fish land use activity in the area. These data are obtained from surveys taken by ADF&G employees as part of official studies of the Sport Fish Business and Guide Licensing and Logbook Programs (ADF&G 2009).

Table 5. Sport-fish Catch in the Angoon Area by Boat, 2001–2007

	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Anglers	1,599	1,270	1,500	1,100	1,719	1,123	895
Trips	2,704	2,146	2,832	1,920	3,317	1,629	2,023
Days fished	6,109	4,606	5,863	3,550	8,789	3,100	3,582
Species Caught (# of fish)							
Chinook salmon	1,367	707	977	546	1,178	613	244
Coho salmon	7,669	8,720	10,247	5,549	7,894	2,424	3,482
Sockeye salmon	449	151	251	11	36	0	32
Pink salmon	1,758	652	3,447	832	2,102	99	728
Chum salmon	1,057	194	466	374	274	114	114
Dolly Varden	108	104	169	128	258	0	94
Cutthroat trout	0	0	68	0	0	0	9
Smelt/capelin	0	0	1,593	0	0	0	757
Pacific halibut	3,299	3,645	5,099	2,649	4,070	1,478	2,926
Rockfish	1,908	1,333	1,388	1,544	1,169	340	1,054
Lingcod	120	216	198	114	11	157	33
Other	0	8	148	81	0	0	0

Source: (ADF&G 2009)

6.2.3 Land Use in the Vicinity of the Airport and Access Alternatives

This section discusses land ownership, land management, and land use in specific areas considered for airport and access road alternatives (see Figure 2 for locations of alternatives). Traditionally used subsistence harvesting sites occurring in these areas are discussed and mapped in the *Subsistence Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement* (SWCA Environmental Consultants 2010).

Airport Alternative 12a would be located entirely within the Angoon corporate boundary. Only portions of Airport Alternatives 3a and 4 would be within the Angoon corporate boundary in unzoned areas. Airport Alternative 12a would be located partly in unzoned areas; however, a portion of it would be located within the rural zone and within an area around the Salt Lagoon that is designated for a park by the City of Angoon and by the *Alaska Coastal Management Plan*. Although all of the land for alternative airport access routes would be within the Angoon corporate boundary, it would all be located within unzoned areas.

Airport Alternative 3a

Airport Alternative 3a would be predominantly located in the Monument–Wilderness Area; however, a portion of the needed airport property beyond the runway itself would likely extend on Kootznoowoo Corridor Lands (see Figure 2). The approach and departure paths to the south runway end would be over Kootznoowoo Corridor Lands, as well.

A portion of Airport Alternative 3a would be located within the Angoon corporate boundary where it overlaps the Monument–Wilderness Area. This area is an unzoned portion of the City to which City land use and zoning policies apply regardless of actual land ownership. The area is undeveloped. The USFS has jurisdiction over the lands within the Monument–Wilderness Area, regardless of the location of the corporate boundary line. Because the lands are within the Monument–Wilderness Area, allowable uses are limited. Lands in the area of this alternative are used for

- subsistence harvest activities;
- commercially guided hunting, fishing, and other non-motorized recreational activities; and
- non-guided sport hunting, fishing, and other non-motorized recreational activities such as hiking and camping.

Subsistence activity in the area of Alternative 3a occurs on a relatively continuous basis but is most intense during the spring, summer, and fall. Winter use is limited due to access and weather constraints. The general area was identified as a popular deer hunting location but is only reasonably available to those hunters with boats, who can cross Favorite Bay to get there; no developed overland access to this location exists, and the distance from the end of the existing road system to the general location is approximately 7 miles. The *Subsistence Resources Existing Conditions Technical Report for the Angoon Airport Environmental Impact Statement* (SWCA Environmental Consultants 2010) provides more detailed discussions of specific traditionally used locations for subsistence harvest activities.

Detailed data regarding commercial and sport activities in this area are not available, though data are available for the Angoon–Mitchell Bay area as a whole. Generally speaking, the vast majority of commercial fishing, hunting, and guided recreation, though staged out of Angoon, takes place in areas well away from the community and not in the immediate area of Airport Alternative 3a. These types of activities are mostly limited to spring, summer, and fall months.

Sport hunting, fishing, and recreational use in the area of Airport Alternative 3a occurs on a limited but routine basis during non-winter months. Participants tend to be local residents, whereas visitors tend to seek out recreational opportunities farther from the community.

Airport Alternative 4

Airport Alternative 4 would be located in the Monument–Wilderness Area (see Figure 2). Although this alternative would be located almost completely within the corporate boundary, it would be located within an unzoned portion of the City of Angoon, to which City land use and zoning policies apply regardless of actual land ownership. The area is undeveloped. The USFS has jurisdiction over the lands within the Monument–Wilderness Area, regardless of the location of the corporate boundary line.

Lands in the area of this alternative are used for

- subsistence harvest activities;
- commercially guided hunting, fishing, and other recreational activities; and
- non-guided sport hunting, fishing, and other recreational activities.

These uses occur on a scale comparable to those in the vicinity of Airport Alternative 3a. As compared to the area around Airport Alternative 3a, the general area of Airport Alternative 4 experiences slightly more intense subsistence and sport fishing use due to the presence of Favorite Creek (a salmon stream) to the south of the potential airport location.

Airport Alternative 12a

Airport Alternative 12a would be located on lands owned by Kootznoowoo, Inc. Lands recently conveyed through ANCSA § 14(c) by Kootznoowoo, Inc. to individual shareholders as homesites (§ 14(c)1) and small historic use sites (§ 14(c)2), and to the City of Angoon as public lands (§ 14(c)3), would also be involved. These areas are shown in Figure 2. Because the final design of this airport alternative is not complete, the exact number of potentially affected properties is not yet known.

Homesites conveyed to Kootznoowoo, Inc. shareholders have some restrictions. These restrictions are described by Kootznoowoo, Inc. as:

> <u>Residential Use</u>. The Property subject to these Restrictive Covenants are restricted, for a period of ten (10) years from the date of the deed to the initial Lot owner, to Single-family (including traditional extended family customs) residential occupancy; and during this period, no buildings, other than a single private residence, arranged for the occupancy by not more than one family, and other necessary outbuildings, shall be constructed or located on any Lot. Outbuildings include, but are not limited to, storage sheds and garages. (Kootznoowoo, Inc. 2009)

Other restrictions for these homesites include

- prohibition against commercial natural resource development;
- obligation to maintain and repair any developed structures;
- restriction against subdividing lots within 10 years of the original deed;
- giving timber development rights to the City of Angoon;
- restriction against building on or occupying any lot prior to installation of a legal waste disposal system; and

- compliance with laws regarding health and safety, and hazardous substances (Kootznoowoo, Inc. 2009)

These restrictions are in effect for 25 years unless the subdivision ceases to exist before that date. After the initial 25 years, the restrictions shall automatically be extended for successive periods of 10 years, unless terminated by an amendment to the covenants (Kootznoowoo, Inc. 2009).

Figure 3 shows homesites by subdivision in the Angoon area. Homesites, primarily laid out in subdivisions when reconveyed from Kootznoowoo, Inc. to shareholders, are present in the immediate area of Airport Alternative 12a. The Keet Subdivision follows the Chatham Strait shore south from the Salt Lagoon. The Auk'Tah Lake Road Subdivision follows Auk'Tah Lake Road from the Salt Lagoon area south toward Auk'Tah Lake. These and other subdivisions are shown in Figure 3. Airport Alternative 12a would cross some of the Keet Subdivision homesites. Airport Alternative 12a's approach path from the south crosses other Keet Subdivision homesites. Some Auk'Tah Lake Road Subdivision homesites are close to this airport alternative. Although very few of these homesites have been developed, in 2009 two trailers were located in the Auk'Tah Lake Road Subdivision, and three houses were located in the Keet Subdivision along the shore of Chatham Strait (see Figure 3). Although none of these residences is directly within the area of this alternative, one or more of them is close enough to be impacted by noise and/or runway protection policies.

Public lands conveyed to the City of Angoon within the vicinity of Airport Alternative 12a are shown in Figure 3 and include the following:

- A 107.40-acre area located between Favorite Bay and the Auk'Tah Lake Road Subdivision. This area was designated as a "central park" in the Draft 14(c)3 plan prepared for Kootznoowoo, Inc. (Sheinberg and Associates 1997).
- A 111.36-acre area of Salt Lagoon uplands adjacent to Salt Lagoon between the road to the ferry terminal and the Keet Subdivision, and behind the Salt Lagoon toward the landfill. This area has been designated by the City as park lands, and it was slated as a berry picking area in the Draft 14(c)3 plan prepared for Kootznoowoo, Inc. (Sheinberg and Associates 1997). This and other nearby areas have not been used for berry picking or other recreation in several years because the landfill and sludge lagoon drain into this area (personal communication, Thompson 2009).
- A 2.38-acre area located at the current rifle range along the west side of the ferry terminal road, north of the Salt Lagoon. This area is currently used as a rifle range; however, it is very close to shareholder homesites, and it may not be compatible as a rifle range near residences. This land was described in the Draft 14(c)3 plan as a potential future site for a residential trailer park, recreational vehicle park, land for community boat storage or mini-storage units, parking, or other commercial uses (Sheinberg and Associates 1997). Kootznoowoo, Inc. has no agreement with the City of Angoon that would allow this site to convert to other uses (personal communication, Naoroz 2009c).

In addition, an estimated 20 small historic personal use sites were transferred to individuals (for uses such as smokehouses and campsites) by Kootznoowoo, Inc. (personal communication, Naoroz 2009c). Kootznoowoo, Inc. could not provide detailed locational information about these sites due to confidentiality issues, and the City of Angoon did not have these properties identified in plat records at the time this report was prepared.

Lands on the Angoon peninsula, where Airport Alternative 12a is located, are used for a combination of purposes:

- Residential
- Commercial and industrial
- Public utilities and services (such as the landfill and water treatment plant)

- Transportation (roads and ferry terminal)
- Personal and guided recreation (including an informal all-terrain vehicle [ATV] trail between Auk'Tah Road and Killisnoo Harbor)
- Traditional cultural practices and religious activities
- Subsistence uses
- Government (local and federal government offices)

Current residential use of the area is extremely limited, with only two temporary trailer residences present. However, the area has been platted for residential use, and landowners may construct residences, subject to the restrictions noted above, on their properties in the future.

In the past, the USFS kept records of recreational use (including commercially guided use) in the Salt Lagoon area near Airport Alternative 12a. Table 6 presents guided and non-guided uses of the Salt Lagoon from 1985 to 1993. Although no records have been kept since 1993, according to USFS staff, recreational use of this area is far less than it was prior to 1993 (personal communication, Neary 2009).

Table 6. Uses of Salt Lagoon, Guided and Non-guided, 1985–1993

Year	General Public	Outfitter/Guides
1985	520	107
1986	386	259
1987	363	183
1988	563	282
1989	504	257
1991	144	169
1992	441	425
1993	328	167

Source: (USFS 2009)

Note: Records have not been kept since 1993.

In addition, the non-guided use of Salt Lagoon between August 1 and September 14, 1992, consisted of 44% canoers and kayakers, 36% sport fishers, and 19% subsistence hunters and fishers (personal communication, Neary 2009).

The majority of non-subsistence recreational uses—except for kayaking and canoeing—are from local residents rather than non-resident visitors. Non-guided recreational use of lands in the vicinity of Airport Alternative 12a is higher than use of lands near Airport Alternatives 3a and 4 because of the proximity of Airport Alternative 12a to the resident population and the developed road system. Recreational use occurs in highest volume during the spring, summer, and fall months due to heavy winter snow. However, land on the Angoon peninsula is used somewhat more during winter months because access to it is better than it is to land near Airport Alternatives 3a and 4.

The road system also plays a significant role in the greater subsistence use of the Angoon peninsula for some subsistence resources, such as berries, which are typically harvested in the largest quantity along existing roads. Deer hunting also occurs in relatively high volume on the peninsula due to road access. Subsistence use of the peninsula occurs primarily in spring, summer, and fall months but does occur at low levels during winter months. This winter use is slightly higher than that occurring around the other airport alternatives because land access is easier on the peninsula due to the presence of the road system.

Access Alternative 2

Access Alternative 2 would consist of a two-lane, gravel road connecting to the south end of Auk'Tah Lake Road and running southwest around the south end of Favorite Bay, crossing Favorite Creek by means of a bridge, and running northwest along the west shore of Favorite Bay to reach either Airport Alternative 3a or Airport Alternative 4 (see Figure 2). The road would be located on Kootznoowoo, Inc. lands, Kootznoowoo Corridor Lands, and Monument–Wilderness Area lands.

Land uses in the areas crossed by this alternative include

- subsistence fishing, hunting, and gathering activities, year-round;
- commercially guided hunting, fishing, and recreational activities, primarily during spring, summer, and fall months; and
- non-guided recreational fishing, hunting, camping, and other leisure activities, year-round.

The frequency and intensity of the aforementioned land uses for those portions of this access road located adjacent to and between Airport Alternatives 3a and 4 are consistent with that previously described for those airport alternatives. Subsistence and recreational use of the road terminus on the peninsula (that is, at the end of the existing Angoon road system) is higher than use of the portion of the proposed road east of Favorite Bay. This is due, in part, to the increased access to the area immediately adjacent to the existing road. Additionally, this access alternative would cross Favorite Creek, a subsistence and recreational fishing area. In comparison with Access Alternative 3, subsistence and recreational use of Favorite Creek is higher in the vicinity of Access Alternative 2 due to the potential road's location in flatter terrain closer to the outlet of the Creek into the Favorite Bay estuary.

Access Alternative 3

Access Alternative 3 would consist of a two-lane, gravel road connecting to the south end of Auk'Tah Lake Road. It would follow a similar route to Access Alternative 2 but would be located farther inland and entirely on Monument–Wilderness Area lands around the south end of Favorite Bay (see Figure 2). The road could provide access to either Airport Alternative 3a or Airport Alternative 4.

Land uses in the areas crossed by this alternative include

- subsistence fishing, hunting, and gathering activities;
- commercially guided hunting, fishing, and recreational activities; and
- non-guided recreational fishing, hunting, camping, and other leisure activities.

The frequency and intensity of the aforementioned land uses for those portions of this access road located adjacent to and between Airport Alternatives 3a and 4 are consistent with that previously described for those airport alternatives. Subsistence and recreational use of the road terminus on the peninsula (that is, at the end of the existing Angoon road system) is higher than use of the portion of the proposed road east of Favorite Bay. This is due, in part, to the increased access to the area immediately adjacent to the existing road. Additionally, this access alternative would cross Favorite Creek, a subsistence and recreational fishing area.

Access Alternative 12a

Access Alternative 12a would consist of a two-lane, gravel road extending southwest from Auk'Tah Lake Road just south of an existing gravel quarry to Airport Alternative 12a (see Figure 2). This alternative would be located entirely on Kootznoowoo, Inc. lands and shareholder homesites. As the alternative design was under development at the time this report was prepared, the exact number of potentially affected properties is not yet known. The alternative would be located in the unzoned portion of the corporate boundary. Land uses in the areas crossed by this alternative include

- potential residential areas;
- subsistence hunting and gathering activities;
- commercially guided hunting and recreational activities; and
- non-guided recreational hunting, camping, and other leisure activities.

The frequency and intensity of the aforementioned land uses for this access road are identical to those described above for Airport Alternative 12a.

6.3 Noise-sensitive Facilities

FAA policy at Federal Aviation Regulations Part 150 and outlined in the regulations discussed in section 3.1 of this document requires consideration of airport-related noise impacts on land uses adjacent to airport facilities. Certain types of land uses are afforded special consideration because those uses are more sensitive to disturbances from elevated noise levels than are other uses. A *noise-sensitive area* is a place where noise interferes with normal activities associated with the area's use. Typical noise-sensitive areas include residences, schools, health or medical facilities, religious properties, parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and certain cultural and historical sites. Generally speaking, noise-sensitive areas are incompatible with noise levels above a 65-A-weighted-decibel (dBA) day-night average level (DNL).

Several areas in and near Angoon have been identified as being noise-sensitive. They are shown in Figure 5 and include the following:

- Two schools
- Four churches
- Two cemeteries/graveyards
- The Angoon medical clinic
- The Angoon Senior Center
- The Angoon Community Center
- Three clan (tribal) houses
- Four lodges
- Three parks or recreation areas
- The Kootznoowoo Wilderness Area
- Residential areas, including existing homes and platted subdivisions (see Figure 2 above for locations of subdivisions)

In addition to these properties, approximately 20 camping, smokehouse, and other historically used sites have recently been conveyed to the long-time land users from Kootznoowoo, Inc. through ANCSA § 14(c)1. Generally speaking, these properties are considered noise-sensitive sites; however, due to the unavailability of specific locational information for these sites as well as owner privacy issues, these sites are not illustrated on figures in this document.

Based on noise studies conducted for the EIS, existing noise levels in and around Angoon are of low intensity (BridgeNet International 2010). The most intense noise levels were recorded in the downtown area of Angoon (49 dBA DNL) and at Airport Alternative 12a (48 dBA DNL). The higher noise levels in town and near Airport Alternative 12a are caused by existing periodic commercial floatplane service into and out of the Angoon

Seaplane Base near town. Occasional vehicle traffic near the post office, the site of the in-town noise monitor, also contributed to higher noise levels in town.

The noise levels at Airport Alternative 3a (38 dBA DNL) and Airport Alternative 4 (42 dBA DNL) were similar to natural forest sounds, such as bird calls and wind blowing through trees and vegetation (which would measure approximately 44 dBA). It should be noted, though, that floatplane noise from the Angoon Seaplane Base can be heard and is measurable at these two sites.

7.0 SUMMARY

Lands in the areas surrounding the community of Angoon, including those in the areas of the proposed airport, its alternatives, and the associated access roads, are primarily owned and managed by a variety of local, state, and federal government agencies. Private landowners, as well as Kootznoowoo, Inc., also hold lands in the area. These lands are chiefly located on the peninsula on which the community of Angoon is located. The City of Angoon has zoning jurisdiction over private and municipal lands within its corporate boundary. The State of Alaska has jurisdiction over most submerged and coastal lands in the area. The USFS manages areas within the Monument–Wilderness Area and has an assigned role under ANILCA to cooperate with Kootznoowoo, Inc. to manage certain lands around the margins of Favorite, Kanalku, and Mitchell bays. Kootznoowoo, Inc. owns large tracts of land in the Angoon area. These lands are managed according to the strategic goals adopted by its shareholders.

Lands within the vicinity of the Angoon community core are used for residential, business, and public purposes. Lands farther from the core are sparsely populated and mainly used for subsistence harvest and recreational activities, with limited residential, commercial, and public use. Monument–Wilderness Area lands are mainly used for recreational and subsistence purposes. Kootznoowoo, Inc. recently reconveyed large plots of its land outside the community core to shareholders for homesites and some personal and cultural uses, and to the City of Angoon for public purposes. Some of these lands are located in areas potentially impacted by airport alternatives.

Noise-sensitive facilities within the general Angoon area include schools, churches, and community and cultural buildings near the community core, and cultural, subsistence, and recreation facilities and areas (including commercial lodges) farther from the core. A few existing residences, and some areas designated for future residential and public recreation development, are located close to airport and access alternatives.

Figure 5. Noise-sensitive receptors.

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Acronyms

ACMP	Alaska Coastal Management Program
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
AS	Alaska Statute
ATS	Alaska Tidelands Survey
dBA	decibels (A-weighted)
DNL	day-night average level
CFR	Code of Federal Regulations
DCCED	Alaska Department of Commerce, Community, and Economic Development
DOT&PF	Alaska Department of Transportation and Public Facilities
EIS	environmental impact statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
MOA	memorandum of agreement
MOU	memorandum of understanding
MSWLF	municipal solid waste landfill facilities
NEPA	National Environmental Policy Act
TLMP	Tongass Land Management Plan
TUS	transportation and utility system
USFS	United States Forest Service

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APPENDIX G
NOISE ANALYSIS

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

NOISE ANALYSIS FOR
ANGOON AIRPORT
ENVIRONMENTAL IMPACT STATEMENT
ANGOON, ALASKA

Prepared for:

Federal Aviation Administration
Alaska Department of Transportation and Public Facilities

Prepared by:

BridgeNet International

May 2013

Noise Analysis for
Angoon Airport
Environmental Impact Statement
Angoon, Alaska

Prepared for:

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Contents

Attachments

Figures

All figures are in Attachment B.

Tables

1.0 INTRODUCTION AND BACKGROUND

The Federal Aviation Administration (FAA) sponsored the preparation of this noise analysis for the *Angoon Airport Environmental Impact Statement* (EIS). The FAA is preparing the EIS in response to a request from the Alaska Department of Transportation and Public Facilities for funding and approvals for a new land-based airport near the community of Angoon. At present, there is no land-based airport in or near Angoon. The initial construction of the airport would include a 3,300-foot-long paved runway, associated facilities, and an access road. The EIS evaluates four airport alternatives: a “no action” alternative, in which a land-based airport would not be built and operations would continue at the Angoon Seaplane Base, and three “action” alternatives, in which the seaplane base would continue to operate under reduced volume and a land-based airport would be built at one of three locations known as Airport 3a, Airport 4, and Airport 12a. The land-based airport would be a relatively small airport typical of other rural airports in Southeast Alaska.

Aviation activity forecasts were developed for the proposed land-based airport during planning efforts leading up to the EIS. The airport is forecast to accommodate approximately 3,704 annual aircraft operations, which would average between four and five aircraft arriving and departing each day. The airport is expected to accommodate approximately 3,855 annual aircraft operations 5 years after opening. Aviation activity would primarily consist of scheduled and charter passenger and cargo flights using small single- and twin-engine propeller aircraft. General aviation activity involving primarily single-engine aircraft would also take place at the airport.

The noise analysis is based on the *Noise Analysis Protocol* (Attachment A), which was approved by the FAA’s Office of Environment and Energy. Because two of the alternatives would be located in an area in which natural quiet is a key characteristic—the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area)—the analysis also adheres to the *Guidance on Procedures for Evaluating the Potential Noise Impacts of Airport Improvement Projects on National Parks and Other Sensitive Park Environments*, Version 1.0, published in June 2007 (herein referred to as FAA’s *Sensitive Park Environmental Noise Guidance*[1]).

The *Noise Analysis Protocol* establishes two types of noise analyses, and these are described in section 2.1 below. The area for the noise analysis comprises the airport alternatives and covers the entire Angoon peninsula and the town and portions of the Monument–Wilderness Area. Figure B-1 shows the general area, the locations of the airport alternatives, and the designated water landing area for the existing Angoon Seaplane Base.

[1] This guidance provides FAA regional offices with appropriate methodology and procedures for evaluating agency actions that could affect the sound environments of national parks and other eligible 4(f)/303c and cultural properties. The guidance is intended for use on actions sponsored by the FAA Office of Airports in compliance with the National Environmental Policy Act (NEPA). The information and procedures presented in the guidance provide the best available approach to airport supplemental noise analyses of park overflights. Use of the guidance has been coordinated with the Office of Airport Planning and Programming, Planning and Environmental Division (APP-400) and the Office of Environment and Energy, consistent with the standards set forth in FAA Order 1050.1E (Appendix A, Section 14.5g) and FAA Order 5050.4B for airports.

2.0 NOISE ANALYSIS APPROACH

This section discusses the noise protocol, area of analysis, airport operations and flight tracks, and methodology developed for this noise analysis.

For this analysis, the term "existing conditions" is defined as operations at the seaplane base in 2011. The term "future conditions" is defined as operations in 2019 and 2024 for each of the proposed airport alternatives and includes reduced operations at the Angoon Seaplane Base. Project-related and cumulative noise exposure results are provided for both existing conditions and future conditions in this analysis. Project-related results are those noise effects from operation of the seaplane base and land-based airport. Cumulative effects evaluation results combine project-related results with noise effects from overflights.

2.1 Noise Protocol

The FAA's *Sensitive Park Environment Noise Guidance* typically requires that a noise screening analysis be completed to determine if the opening of a new airport creates a change of exposure greater than 3 dB between the existing conditions and the airport alternatives. If the initial screening analysis shows there was such a change, a more detailed assessment is required. For the Angoon Airport EIS, because there was no existing land-based airport, there would automatically be a change of exposure of greater than 3 dB; therefore the noise screening process was not conducted and a detailed noise analysis was conducted.

To ensure that noise analyses follow an agreed-upon approach, the FAA's *Sensitive Park Environment Noise Guidance* document recommends the preparation of a noise analysis protocol. The FAA's third-party independent consultant prepared a draft protocol for review by the FAA Alaskan Region Airports Division. Once accepted, the division forwarded the protocol to the FAA Office of Environment and Energy. Upon final FAA approval by the Alaskan Region Airports Division and Office of Environment and Energy, the document was forwarded to the National Park Service. A copy of the *Noise Analysis Protocol* is included in Attachment A.

The *Noise Analysis Protocol* established two categories of analysis:

1. FAA-required standard noise contour analysis using the day-night average sound level (DNL) noise exposure contours to show aircraft noise exposure above DNL 60 decibels (dB).
2. Supplemental grid point analysis using 1 nautical mile (NM) separation among grid points to calculate the following metrics (defined in section 2.5.2 below):
    - DNL
    - Maximum sound level (Lmax)
    - Equivalent noise level (Leq)
    - Time above ambient (TAA) using the median-measured L50 (meaning noise level exceeded 50% of the time) for ambient noise levels

    These noise metrics were modeled for existing conditions and future conditions with and without consideration of overflights. The protocol stated that the analysis would include the following:

    - +/- 3-dB change of exposure for single event loudness (Lmax)
    - +/- 5-dB change of exposure for cumulative noise descriptions between ambient and 60 dB (DNL, Leq)
    - +/- 3-dB change of exposure for cumulative noise descriptors between 60 and 65 dB (DNL)

- o +/- 1.5-dB change of exposure for cumulative noise descriptors above 65 dB (DNL)
- o TAA using existing L50 ambient noise levels

The change in exposure associated with the airport alternatives was identified by subtracting the existing conditions from the future conditions. Existing conditions were based on data described in section 3.

2.2 Area Analyzed for Noise Effects

The analysis area for changes in noise exposure covers the geographic area that could experience a decrease or increase in noise exposure due to aircraft operations. This area measures 16 × 20 NM, as shown in Figure B-1, encompasses the three airport alternatives, and covers the entire Angoon peninsula (including residential areas, business areas, and Alaska Native allotments) and areas in the Monument–Wilderness Area, including specific points identified by the U.S. Forest Service.

The existing Angoon Seaplane Base is on private property. Two of the airport alternatives are within the Monument–Wilderness Area, and the third is located on a combination of private and Alaska Native corporation lands.

2.3 Airport Operations

Each airport alternative would be consistent regarding aircraft operations for time of day, fleet mix, aircraft type, and runway length. Table 1 shows the operations under future conditions.

Flight tracks to and from the airport alternatives were developed. These flight tracks reference typical approach and departure tracks flown by aircraft types common at airports with similar characteristics, such as runway length and field altitude. Figure B-2 shows the flight tracks for each of the three airport alternatives.

Airport 3a would be located east of Favorite Bay. Runway 2/20 would be 3,300 feet long. Most of the aircraft would use Runway 2, arriving from the south and departing to the north approximately 67% of the time. The remaining 33% of the time, aircraft would use Runway 20, arriving from the north and departing to the south.

Airport 4 would be located east/southeast of Favorite Bay. Runway 3/21 would be 3,300 feet long. Most of the aircraft would use Runway 3, arriving from the south and departing to the north approximately 67% of the time. The remaining 33% of the time, aircraft would use Runway 21, arriving from the south and departing to the north.

Airport 12a would be located west of Favorite Bay, south of the Angoon city center. Runway 12/30 would be 3,300 feet long. Most of the aircraft would use Runway 12, arriving from the north and departing to the south approximately 67% of the time. The remaining 33% of the time aircraft would use Runway 30, arriving from the south and departing to the north.

Table 1. Future Annual Operations by Aircraft Category for Future Conditions

Operations Category	Integrated Noise Model Aircraft Type	Daily Arrivals (no. of operations)		Daily Departures (no. of operations)		Touch and Go (no. of operations)	No. of Operations
		Day	Night	Day	Night	Per Day	Per Year
Local: SE/ME Piston	CNA150	–	–	–	–	0.0579	21
	CNA172	–	–	–	–	0.3476	127
Itinerant: SE Piston	CNA150	0.0266	0.0023	0.0266	0.0023	–	21
	CNA172	0.2236	0.0193	0.2236	0.0193	–	177
	CNA182	0.0257	0.0022	0.0257	0.0022	–	20
	CNA206	0.0334	0.0029	0.0334	0.0029	–	26
	PA28	0.0085	0.0007	0.0085	0.0007	–	7
Itinerant: ME Piston	BEC58P	0.0534	0.0014	0.0534	0.0014	–	40
	PA31	0.0123	0.0014	0.0123	0.0014	–	10
Itinerant: Turbo Prop	CNA208	0.0152	0.0010	0.0152	0.0010	–	12
	CNA441	0.0051	0.0003	0.0051	0.0003	–	4
	PA42	0.0440	0.0028	0.0440	0.0028	–	34
Helicopters	R22	0.0123	0.0014	0.0123	0.0014	–	10
Air Taxi	BEC190	1.7758	–	1.7758	–	–	1,296
	BEC9F	1.1839	–	1.1839	–	–	864
	CNA441	0.6164	0.0685	0.6164	0.0685	–	500
	DHC6	0.4493	–	0.4493	–	–	328
	EMB120	0.2603	0.0137	0.2603	0.0137	–	200
Coast Guard	EC130	0.0027	0.0041	0.0027	0.0041	–	5
Total		**4.75**	**0.12**	**4.75**	**0.12**	**0.41**	**3,704**

2.4 Overflights

The overflight flight tracks consist of two northwest-southeast tracks and one north-south track. Each track has five dispersed sub-tracks that are 0.6 NM apart. The operations are divided equally among the flight tracks and dispersed sub-tracks. Most of the operations are on the northwest-southeast tracks, which have traffic going from Seattle to Juneau; approximately 85% of the traffic is on these two flight tracks, and the remaining 15% is on the north-south flight track. This results in flight tracks that have 100% dispersion of the en route noise throughout the area.

2.5 Noise Modeling Methodology

In accordance with the *Noise Analysis Protocol*, DNL noise contours are used for existing conditions and future conditions. The supplemental grid point analysis is also used for existing conditions and future conditions and employs a grid based on the Cartesian coordinate system. The grid points are spaced at 1.0 NM over the 16 × 20–NM grid area to display the possible changes in noise exposure across the area.

The analysis for both the standard and supplemental metrics was generated using the FAA's Integrated Noise Model (INM) Version 7.0c. The INM was used to predict noise from en route activity and cumulative activity for each of the required noise metrics. The INM supports the input of high altitude overflight paths; the profiles used for high altitude overflight operations were level flight procedural profiles developed per guidelines contained in the INM user manual. These high altitude paths were entered into the INM and were distributed evenly throughout the area using the average fleet mix of aircraft operating on these airways.

2.5.1 FAA-Required Standard Noise Contour Analysis

Based on the operational conditions described above in section 2.3 and later in section 3.1, DNL noise contours were developed for existing conditions and future conditions.

- DNL describes noise experienced during an entire (24-hour) day. The DNL calculations account for the sound exposure level of aircraft and the number of aircraft operations, and include a penalty for nighttime operations. In the DNL scale, noise occurring between 10 pm and 7 am is weighted by an additional 10 A-weighted decibels (dBA; decibels adjusted to measures the range of loudness and sound frequency that humans hear) to account for lower ambient thresholds during nighttime hours.

2.5.2 Supplemental Grid Point Analysis

INM was used to support the supplemental grid point analysis, providing project-related and cumulative noise levels. The change of exposure is described for DNL, Leq, and Lmax. TAA was reported as the total time grid points would be exposed to noise levels above ambient.

- DNL supplemental grid point analysis identifies grid points where 1) sound level is above existing ambient but below DNL 60 dBA, and experiences a change of exposure of 5 dBA or greater; 2) the change of exposure exceeds 3 dBA for points exposed to DNL 60–65 dBA; or 3) the change of exposure exceeds 1.5 dBA for points exposed to DNL 65 dBA or greater.
- Lmax is the loudest sound level reached during a sound event. For example, as an aircraft approaches, the sound increases over ambient noise levels. The closer the aircraft gets, the louder its sound becomes until the aircraft is at its closest point directly overhead. As the aircraft passes, the noise level decreases, eventually settling back to ambient levels. The grid analysis shows all Lmax grid points where the sound level is above existing ambient levels, and identifies change of exposure of 3 dBA or greater.

- **Leq** is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal (noise that constantly changes over time) throughout a given sample period. Leq is the “energy” average taken from the sum of all the sound that occurs during a certain time period. However, it is based on the observation that the potential for a noise to affect people depends on the total acoustical energy content. Leq can be measured for any time period, but is typically measured in increments of 15 minutes, 1 hour, or 24 hours.

  This evaluation is for a 24-hour Leq. The 24-hour Leq is similar to the DNL, but does not include a nighttime penalty. The grid analysis shows all Leq grid points where the sound level is above the existing ambient noise level and experiences a change of exposure of 5 dBA or greater.

- **TAA** is the total time in seconds or minutes that aircraft noise exceeds existing ambient noise levels in a 24-hour period. The ambient noise level for the area is 27 dBA (see section 3.1.3. below).

3.0 Existing Conditions Noise Analysis

This section presents the existing data available for noise in the Angoon area and the noise analysis for each required metric for the year 2011, which in the Angoon Airport EIS represents existing conditions, especially as related to operations at the Angoon Seaplane Base.

3.1 Inventory of Existing Data

3.1.1 Angoon Seaplane Base Aircraft and Flight Tracks

The Angoon Seaplane Base is located in Favorite Bay, near the small boat harbor southeast of the Angoon city center. The State of Alaska is responsible for the operational and development needs of the seaplane base, as well as its daily management and compliance with all federal and state regulations that pertain to the base.

The main users of the Angoon Seaplane Base are small, single-engine piston and radial-engine aircraft equipped with pontoons; uses include medical transport, cargo transport, and sightseeing. In 2011, there were 1,150 operations at the Angoon Seaplane Base, or an approximate average of three operations per day over the year. Approximately 62% of the operations were by single-engine variable-pitch piston aircraft such as the De Havilland Otter. The remaining 38% of the operations were by single-engine fixed-pitch piston aircraft such as the Cessna 182. Table 2 shows a breakdown of the number of aircraft operations by the category of aircraft.

Table 2. Number of Annual Operations by Aircraft Category for Existing Conditions

Category	Angoon Seaplane Base
Single-engine propeller, fixed pitch	432
Single-engine propeller, variable pitch	718
Total	**1,150**

The seaplane base operates a designated water landing area that is approximately 3,500 feet long with room to taxi to the small boat harbor. Aircraft typically arrive from the northwest over the channel of Favorite Bay and depart over the same area; this is referred to as a *contra-flow* operation, where an aircraft lands and departs in the same direction.

A standard part of a noise analysis includes generating flight tracks, which depict how aircraft approach and depart an airport. Existing flight tracks for the seaplane base are shown in Figure B-3. These flight tracks were based on discussions with aircraft operators, observations of aircraft operations, local topographic characteristics, and locations of ground-based navigational aids (known as VOR), which are used throughout a flight by aircraft for navigation to and from their destination airports. Because aircraft that use the Angoon Seaplane Base conduct visual operations, no radar flight track data were gathered.

3.1.2 En Route/Cumulative Overflights

Radar data for 2011 were collected for overflights of the area by aircraft not operating at the seaplane base. Aircraft Situational Display Data to Industry (ASDI) radar data are FAA-generated long-range surveillance radar that is combined with local terminal radar data, where available. However, there is no local terminal area radar coverage of the area, and availability of low-altitude flight track data in the area is minimal.

Most of the surveillance data available are for aircraft operating at or above 18,000 feet above mean sea level (MSL) on en route airways. Figure B-4 shows these airways over the Angoon area. Two airways go through the area: 1) V-428 is oriented north-south and 2) V-317 is oriented northwest-southeast. Although there are only two airways that intersect the area, there is also a VOR to the north of the area that two other airways navigate to, and a VOR to the south that four other airways navigate to.

The ASDI data indicate that on an average day, there are approximately 10 en route operations over the area navigating to and from these ground-based aids. Most of these aircraft are at altitudes of 30,000 feet MSL or higher and are generally flying to Juneau or Anchorage. The most common type of en route aircraft is the Boeing 737-400 aircraft, accounting for approximately 27% of the en route traffic.

3.1.3 Ambient Noise Measurements

Noise monitoring was conducted from August 20, 2009, through August 27, 2009, at four sites to determine existing ambient noise levels in the area. Three of the sites were located in either the Monument–Wilderness Area or Kootznoowoo Incorporated land at proposed action alternative sites. These three sites were in areas with minimal existing exposure to aircraft noise.

The fourth site (the city site) was located in the town of Angoon near a city building to capture the ambient noise levels in the city environment. The city site was on private land, across from the city post office and emergency room, northwest of a small area of residential land use. The city site was able to produce noise events from seaplane activity in Favorite Bay, correlating seaplane events with corresponding noise data.

For each site, portable noise measurement equipment was used to record 1-second noise levels on a continuous basis. These data were then analyzed to compute other noise metrics. The ambient sound level at each site was identified using the noise level measured as a percentage of time. This is expressed as Ln: *n* being the number representing the percentage, and *L* being noise level in dBA (decibels adjusted to measures the range of loudness and sound frequency that humans hear). L50 (meaning noise level exceeded 50% of the time) was selected to represent the existing median ambient noise level for the area. Figure B-5 shows the location of each site, and Table 3 shows the L50 at each site. The L50 measurements ranged from a low of 24 dBA to a high of 36 dBA. The median L50 for the sites located within the Monument–Wilderness Area (27 dBA) was used to present a conservative approach to the ambient noise levels at each site.

Table 3. Measured Ambient Noise Levels at each Monitoring Site

Site	Name	L50 Median Noise Level (dBA)
Site 4	Airport 4	27
Site 3a	Airport 3a	24
Site 12a	Airport 12a	32
City	City of Angoon	36

3.2 FAA-Required Standard Noise Contour Analysis

Based on the operational conditions presented in the existing conditions data inventory, DNL noise contours were developed. The existing 2011 DNL noise exposure contours are presented in Figure B-6 for the Angoon Seaplane Base showing the DNL 60 dBA and DNL 65 dBA contours. Table 4 shows the area within the DNL 60 and 65 dBA noise exposure contours (in acres).

Table 4. Existing Conditions DNL Noise Contours in Acres

DNL Noise Contour	Acres
DNL 60 dBA and greater	4.1
DNL 65 dBA and greater	1.3

The DNL 65 dBA and greater noise contours for existing conditions fall entirely on the designated water landing area for the Angoon Seaplane Base. The existing DNL 65 dBA noise contour is concentrated at the ends of the landing area, or what would traditionally be a runway end, which is the dominant area of noise.

3.3 Supplemental Grid Point Analysis

This section presents grid results by metric for existing conditions with and without overflights. For existing conditions, noise exposure above ambient conditions is concentrated near the seaplane base and existing flight tracks to and from the seaplane water landing area.

3.3.1 Existing Conditions Without Overflights

3.3.1.1 DNL

The DNL was plotted at each 1.0-NM grid point in the area. Figure B-7 shows the DNL grid results for existing conditions. There are seven grid points, ranging from 27.0 to 39.0 dBA, where the DNL is at or above the ambient noise level. These points are concentrated near the seaplane base and along existing flight tracks.

3.3.1.2 Lmax

Figure B-8 shows the existing Lmax conditions. Color gradients are used in the figure to distinguish among the various intensities of sound, using increments at or above existing ambient of Lmax 27.0–39.9 dBA, 40.0–49.9 dBA, 50.0–59.9 dBA, 60.0–69.9 dBA, 70.0–79.9 dBA, and 80.0–89.9 dBA.

The aircraft used to determine Lmax is the Cessna 206 aircraft, which represents the loudest aircraft operating at the Angoon Seaplane Base. The existing Lmax shows that noise generated by aircraft events is closest to the Angoon Seaplane Base. In areas to the east, the Lmax levels decrease to below 60 dBA within 2 miles, whereas in areas to the west, north, and south of the base, the Lmax noise levels remain at 60–70 dBA for approximately 3 miles to the west and north and 4 miles to the south.

3.3.1.3 Leq

Using a similar system of presenting existing conditions, Figure B-9 presents the Leq grid analysis. Color gradients are used in the figure to distinguish among the various intensities of sound, using increments above existing ambient of Leq 27.0–34.9 dBA, 35.0–39.9 dBA, and greater than 40.0 dBA. There are 11 grid points where the Leq is higher than the ambient noise level. These points follow the same pattern as DNL.

3.3.1.4 TAA

The TAA was evaluated for the existing conditions (Figure B-10). The TAA was divided into time "bins" of 0.0–4.9 minutes and 5.0–8.5 minutes. The TAA for existing conditions shows that there are 26 points that experience noise above ambient for up to 4.9 minutes per day and 117 points that experience noise above ambient for between 5.0 and 8.5 minutes per day. These points cover the Angoon peninsula and small portions of the Monument–Wilderness Area.

3.3.2 EXISTING CONDITIONS WITH OVERFLIGHTS

The following sections describe the cumulative effects evaluation conducted for existing conditions.

3.3.2.1 DNL

Figure B-11 shows the DNL cumulative grid results for existing conditions. There are nine grid points where the DNL is higher than the median L50 noise level.

3.3.2.2 Lmax

For the cumulative conditions, the same aircraft is used to represent Lmax, the Cessna 206. As such, the Lmax remains the same (Figure B-12). The Cessna 206 was used for Lmax cumulative effects because it operates at lower altitudes and generates noise levels higher than the typical en route aircraft, which in this study is the B737-400 aircraft.

3.3.2.3 Leq

Figure B-13 presents the existing conditions Leq results for the cumulative effects evaluation. Color gradients are used in the figure to distinguish among the various intensities of sound, using increments above existing ambient of Leq 27.0–34.9 dBA, 35.0–39.9 dBA, and greater than 40.0 dBA. Similar to the DNL analysis, the Leq results show that 11 points near the Angoon Seaplane Base are above ambient.

3.3.2.4 TAA

The TAA was evaluated for existing conditions (Figure B-14). The TAA was divided into time "bins" of 0.0–4.9 minutes, 5.0–9.9 minutes, 10.0–19.9 minutes, and 20.0–25.2 minutes. The areas to the north and east of the Angoon Seaplane Base show that most of the area is exposed to greater than 20 minutes per day of cumulative aircraft noise; in areas to the west and south, the range is 5.0–19.9 minutes per day, with areas over the water exposed to less than 5.0 minutes per day.

4.0 Future Conditions Noise Analysis

In addition to the evaluation of existing conditions, this analysis presents the future conditions results for 2019, the year of implementation. FAA guidance requires that noise analysis also consider noise effects 5–10 years after airport opening. However, for the Angoon Airport, operations are forecasted to increase by only 4 percent between 2019 and 2024, which would not result in an appreciable change in noise exposure; therefore, a separate analysis for 2024 is not necessary. All reported findings for 2019 would be applicable to 2024.

Future conditions include an assessment of a no action alternative and airport alternatives (Airports 3a, 4, and 12a) that include a reduced number of operations at the Angoon Seaplane Base. For future conditions under the no action alternative, operating conditions would remain consistent with existing conditions; the FAA's terminal area forecast does not show any growth for operations at the Angoon Seaplane Base. Figures 6–10 show existing conditions.

Under the future conditions for all action alternatives, operations at the seaplane base would be reduced. The number of operations at the Angoon Seaplane Base under future conditions would be 300 operations per year, or approximately ¼ of the 1,150 annual operations occurring under existing conditions. The time of day, fleet mix, aircraft type, flight tracks, and flight track use would remain consistent between 2011 and 2019 (see section 3.1.1). Effects of this reduction in seaplane operation on noise exposure are discussed in the following sections.

4.1 FAA-Required Standard Noise Contour Analysis

DNL noise exposure contours are presented in Figure B-15 for future conditions that include each of the identified airport alternative and reduced operations at Angoon Seaplane Base. These figures show the DNL 60 and 65 dBA noise levels.

Table 5 shows the areas within each of the noise contours for the future conditions.

Table 5. Future Conditions DNL Noise Contours in Acres

Airport Alternative	DNL 60 dBA	DNL 65 dBA
No action alternative	4.1	1.3
Seaplane base, reduced operations	2.3	0.3
Airport 3a	12.9	3.7
Airport 4	12.6	2.6
Airport 12a	12.8	3.7

Under future conditions, the DNL 60 dBA noise contours for the Angoon Seaplane Base and the three airport alternatives fall entirely within each airport property boundary. For each alternative, the DNL 65 dBA noise contour does not extend past the runway/water landing area.

4.2 Supplemental Grid Point Analysis

The following sections summarize the analysis of future conditions using the supplemental metrics. All figures can be found in Attachment B.

4.2.1 Future Conditions Without Overflights

4.2.1.1 DNL

In addition to the noise contours described in the standard analysis section, a DNL grid point evaluation was conducted for future conditions. The DNL was plotted at each of the grid points in the area. Figure B-7 shows the DNL grid results for the no action alternative, which is the same as existing conditions. Figure B-16 shows the DNL grid results for Airport 3a, Figure B-17 shows the grid results for Airport 4, and Figure B-18 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-19 for Airport 3a, Figure B-20 for Airport 4, and Figure B-21 for Airport 12a.

The DNL change of exposure results show that all changes in DNL noise levels would be an increase in noise of 5 dBA above existing ambient. For Airport 3a, 23 grid points would experience a DNL change of exposure increase, mostly along the arrival and departure paths. For Airport 4, 24 grid points would experience an increase of at least 5 dBA, to the north and southwest of the site, and three grid points would experience a decrease of at least 5 dBA to the north of the Angoon Seaplane Base. For Airport 12a, 22 grid points would experience an increase in noise to the south of the site.

4.2.1.2 Lmax

For the future conditions, the same aircraft used to represent Lmax for existing conditions was used (Cessna 206). As such, the Lmax remains the same. Figure B-8 shows the Lmax grid results for the no action alternative, which is the same as existing conditions. Figure B-22 shows the Lmax grid results for Airport 3a, Figure B-23 shows the grid results for Airport 4, and Figure B-24 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-25 for Airport 3a, Figure B-26 for Airport 4, and Figure B-27 for Airport 12a.

The Lmax change of exposure results show that all changes in noise levels would be an increase of 3.0–29.7 dBA above existing ambient. These are shown on the grid maps in 'bins' of 3.0–4.9 dBA, 5.0–9.9 dBA, 10.0–19.9 dBA, and 20.0–29.7 dBA.

For Airport 3a, 12 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 19 grid points would experience an increase of 5.0–9.9 dBA, 27 grid points would experience an increase of 10.0–19.9 dBA, and 55 grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the east and northeast of Airport 3a.

For Airport 4, 18 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 51 grid points would experience an increase of 5.0–9.9 dBA, 41 grid points would experience an increase of 10.0–19.9 dBA, and 62 grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the north and northeast of Airport 4 as well as directly to the south and southwest.

For Airport 12a, 19 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 30 grid points would experience an increase of 5.0–10.0 dBA, 34 grid points would experience an increase of 10.0–19.9 dBA, and 54 grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the north and northeast of Airport 12a as well as directly to the south.

4.2.1.3 Leq

The 24-hour Leq was plotted at each of the grid points in the area. Figure B-9 shows the Leq grid results for the no action alternative, which is the same as the existing conditions. Figure B-28 shows the Leq grid results for Airport 3a, Figure B-29 shows the grid results for Airport 4, and Figure B-30 shows the grid results for Airport 12a.

The Leq change of exposure results show that all changes in Leq noise levels would be either increases or decreases in noise of 5 dBA above existing ambient. The Leq change of exposure is shown in Figure B-31 for Airport 3a, Figure B-32 for Airport 4, and Figure B-33 for Airport 12a.

Similar to the DNL analysis, the Leq shows that for Airport 3a, 28 points would experience a Leq 5-dBA increase where noise levels are above Leq 27 dBA. For Airport 4, 31 grid points would experience a daytime Leq 5-dBA increase where noise levels are above Leq 27 dBA. For Airport 12a, two grid points would experience a 5-dBA increase where noise levels are above Leq 27 dBA.

4.2.1.4 TAA

The TAA was evaluated for the no action alternative (see Figure B-10), which is the same as existing conditions. The TAA was divided into time “bins” of 0.0–4.9 minutes, 5.0–9.9 minutes, 10.0–19.9 minutes, and 20.0–25.9 minutes. Figure B-34 shows the TAA grid results for Airport 3a, Figure B-35 shows the grid results for Airport 4, and Figure B-36 shows the grid results for Airport 12a.

The change of exposure between the existing and future conditions was then computed for each airport alternative. The TAA change of exposure is shown in Figure B-37 for Airport 3a; 63 grid points would experience a TAA increase of 5.0–9.9 minutes, 20 grid points would experience an increase of 10.0–19.9 minutes, and one grid point would experience an increase of 20.0–25.9 minutes.

Figure B-38 for Airport 4 shows that 70 grid points would experience a TAA increase of 5.0–9.9 minutes, 35 grid points would experience an increase of 10.0–19.9 minutes, five grid points would experience an increase of 20.0–29.9 minutes, and one grid point would experience an increase of 30.0–31.1 minutes.

Figure B-39 for Airport 12a shows that 32 points would experience a TAA increase of 5.0–9.9 minutes, 31 grid points would experience an increase of 10.0–19.9 minutes, nine grid points would experience an increase of 20.0–29.9 minutes, and five grid points would experience an increase of 30.0–39.2 minutes. Most of these grid points that experience an increase are over water, with less than a third of the increase on land areas.

4.2.1.5 Summary for Future Conditions without Overflights

Table 6 summarizes the change of exposure for each metric.

Table 6. Change of Exposure Grid Points by Alternative for Future Conditions without Overflights

Metric	Change of Exposure, Future Conditions	Grid Points		
		Airport 3a	Airport 4	Airport 12a
DNL	>+5 dBA	23	24	22
Lmax	>+3 to +4.9 dBA	12	18	19
	+5.0 to +9.9 dBA	19	51	30
	+10.0 to +19.9 dBA	27	41	34
	+20 to +29.9 dBA	55	62	54
Leq	>+5 dBA	28	31	24
TAA	5.0–9.9 minutes	63	70	32
	10.0–19.9 minutes	20	35	31
	20.0–29.9 minutes	1	5	9
	30.0–39.2 minutes	–	–	5

4.2.2 Future Conditions With Overflights

The following sections describe the change of exposure associated with the cumulative effects evaluation for the future year. En route operations in 2019 were derived from the FAA's Aerospace forecast (Fiscal Year 2012–2032). The forecast assumes a 1.2% annual growth for commercial operations. All other assumptions remained the same.

4.2.2.1 DNL

A DNL evaluation was conducted for the future year for areas that might be exposed to levels of DNL 27 dBA or greater. The DNL was plotted at each of the grid points in the area. Figure B-11 shows the DNL grid results for the no action alternative, which is the same as existing conditions. Figure B-40 shows the DNL grid results for Airport 3a, Figure B-41 shows the grid results for Airport 4, and Figure B-42 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-43 for Airport 3a, Figure B-44 for Airport 4, and Figure B-45 for Airport 12a.

The DNL change of exposure results show that all changes in DNL noise levels would be an increase in noise of 5 dBA above existing ambient. For Airport 3a, 21 grid points would experience a DNL change of exposure increase, mostly along the arrival and departure paths. For Airport 4, 21 grid points would experience an increase of at least 5 dBA to the east and southwest of Airport 4. For Airport 12a, 21 grid points would experience an increase in noise to the south and north of Airport 12a.

4.2.2.2 Lmax

For the future cumulative conditions, the same aircraft used to represent Lmax for existing conditions was used (Cessna 206). As such, the Lmax remains the same. Figure B-12 shows the no action alternative. Figure B-46 shows the Lmax grid results for Airport 3a, Figure B-47 shows the grid results for Airport 4, and Figure B-48 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-49 for Airport 3a, Figure B-50 for Airport 4, and Figure B-51 for Airport 12a.

The Lmax change of exposure results show that all changes in noise levels would be an increase in noise of 3.0–29.7 dBA above existing ambient. These are shown on the grid maps in four 'bins' of 3.0–4.9 dBA, 5.0–9.9 dBA, 10.0–19.9 dBA, and 20.0–29.7 dBA.

For Airport 3a, 11 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 16 grid points would experience an increase of 5.0–9.9 dBA, 28 grid points would experience an increase of 10.0–19.9 dBA, and 11 grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the east and northeast of Airport 3a.

For Airport 4, 14 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 27 grid points would experience an increase of 5.0–9.9 dBA, 39 grid points would experience an increase of 10.0–19.9 dBA, and 14 grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the north and northeast of Airport 4 as well as directly to the south and southwest.

For Airport 12a, 15 grid points would experience an Lmax change of exposure increase of 3.0–4.9 dBA, 22 grid points would experience an increase of 5.0–9.9 dBA, 39 grid points would experience an increase of 10.0–19.9 dBA, and three grid points would experience an increase of 20.0–29.7 dBA. Most of the increase of at least 10.0 dBA would occur to the north and northeast of Airport 12a as well as directly to the south.

4.2.2.3 Leq

Figure B-13 presents the existing conditions Leq results for the cumulative effects evaluation. Color is used in the figure to distinguish among the various intensities of sound, using increments above existing ambient of Leq 27.0–34.9 dBA, 35.0–39.9 dBA, and above 40 dBA. Figure B-52 shows the Leq grid results for Airport 3a, Figure B-53 shows the grid results for Airport 4, and Figure B-54 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-55 for Airport 3a, Figure B-56 for Airport 4, and Figure B-57 for Airport 12a.

The Leq change of exposure results show that all changes in noise levels would be an increase or decrease in noise of 5 dBA. For Airport 3a, 31 grid points would experience an Leq change of exposure increase of 5 dBA; for Airport 4, 32 grid points would experience an Leq change of exposure increase, and for Airport 12a, 25 grid points would experience an Leq change of exposure increase. The decreases in noise are not shown on the figure because they are less than 5 dBA, which is the required threshold used to measure change for Leq.

4.2.2.4 TAA

The TAA was evaluated for the no action alternative (Figure B-14), which is the same as existing conditions. The TAA was divided into time “bins” of 0.0–4.9 minutes, 5.0–9.9 minutes, 10.0–19.9 minutes, and 20.0–28.0 minutes. Figure B-58 shows the TAA grid results for Airport 3a, Figure B-59 shows the grid results for Airport 4, and Figure B-60 shows the grid results for Airport 12a. The change of exposure is shown in Figure B-61 for Airport 3a, Figure B-62 for Airport 4, and Figure B-63 for Airport 12a.

The TAA change of exposure results show that all changes in noise levels would be an increase in noise of 5.0–39.9 dBA above existing ambient. These are shown on the grid maps in five ‘bins’ of less than 5 minutes, 5.0–9.9 minutes, 10.0–19.9 minutes, 20.0–29.9 minutes, and 30.0–39.9 minutes.

For Airport 3a, 62 grid points would experience a TAA change of exposure increase of 5.0–9.9 minutes, 19 grid points would experience an increase of 10.0–19.9 minutes, and one grid point would experience an increase of 20.0–25.5 minutes. Most of the increase of at least 15 minutes would occur to the east and northeast of Airport 3a.

For Airport 4, 70 grid points would experience a TAA change of exposure increase of 5.0–9.9 minutes, 36 grid points would experience an increase of 10.0–19.9 minutes, four grid points would experience an increase of 20.0–29.9 minutes, and one grid point would experience an increase of 30.0–31.0 minutes. Most of the increase of at least 15 minutes would occur to the north and northeast of Airport 4 as well as directly to the south and southwest.

For Airport 12a, 31 grid points would experience a TAA change of exposure increase of 5.0–9.9 minutes, 31 grid points would experience an increase of 10.0–19.9 minutes, seven grid points would experience an increase of 20.0–29.9 minutes, and five grid points would experience an increase of 30.0–39.0 minutes. Most of the increase of at least 15 minutes would occur to the north and northeast of Airport 12a as well as directly to the south.

4.2.2.5 Summary of Future Conditions with Overflights

Table 7 shows the change of exposure for each metric.

Table 7. Change of Exposure Grid Points by Alternative for Future Conditions with Overflights

Cumulative Metric	Change of Exposure, Future Conditions	Grid Points		
		Airport 3a	Airport 4	Airport 12a
DNL	>+5 dBA	21	21	21
Lmax	>+3 to +4.9 dBA	11	14	15
	+5.0 to +9.9 dBA	16	27	22
	+10.0 to +19.9 dBA	28	39	39
	+20 to +29.9 dBA	11	14	3
Leq	>+5 dBA	31	32	24
TAA	5.0–9.9 minutes	62	70	31
	10.0–19.9 minutes	19	36	31
	20.0–29.9 minutes	1	4	7
	30.0–39.9 minutes	–	1	5

5.0 Summary of Change in Noise Exposure

The purpose of this evaluation was to determine the existing noise levels in the area and the change of exposure between the existing and future conditions (with and without the addition of overflights) to aircraft operations at the seaplane base and land-based airport.

5.1 FAA-Required Standard Noise Contour Analysis

Under future conditions, acreage within the DNL 65 dBA contour at the seaplane base would be reduced by 1 acre, as compared to existing conditions. However, this contour would remain on the water landing area for both existing and future conditions.

Each of the three airport alternatives would also generate new noise contours on Monument–Wilderness or private/native corporation lands under future conditions. The DNL 60 and 65 dBA noise contours for each of the three airport alternatives are essentially the same in size because the operations would be the same; slight variability in contour size between each land-based airport is due to its location and associated topography.

5.2 Supplemental Grid Point Analysis

5.2.1 Future Conditions Without Overflights

Most supplemental metrics grid point analysis, including DNL and Leq, show a reduction in noise at the seaplane base under the future conditions. This reflects fewer operations at the seaplane base. For Lmax, there is no change because the same aircraft types and procedures are assumed to be the same for both existing and future conditions.

For the future conditions, there is a commensurate increase of noise at the airport alternatives. Each airport alternative would use similar flight track modeling; therefore, the locations of the change of exposure increases are 1) the immediate area around each airport alternative and 2) in similar locations relative to each airport, including the predominant departure and arrival paths in and out of the area.

For the future conditions, the following would experience the most change of exposure for each metric:

- For the DNL change of exposure, Airport 4 would experience the most grid point changes, with 24 grid points experiencing an exposure increase of at least 5 dBA.
- For the Lmax change of exposure, Airport 4 would experience the most grid point changes, with 172 points experiencing an exposure increase of at least 3.0 dBA.
- For the Leq change of exposure, Airport 4 would experience the most grid point changes, with 31 points experiencing an increase of 5 dBA.
- For the TAA change of exposure, Airport 4 would experience the most grid point changes, with 110 points experiencing an increase above ambient levels for at least 5 minutes per day.

Under future conditions, some areas close to the seaplane base would experience a noise exposure decrease due to the reduction in operations. These reductions in noise are below the approved noise analysis–reporting thresholds for this analysis, and therefore are not reported as part of this analysis.

5.2.2 Future Conditions With Overflights

For the cumulative supplemental metrics grid point analysis, the noise reductions at the seaplane base and land-based airport alternatives are the same as presented in the section 5.2.1 summary. The cumulative future noise exposure for DNL, Lmax, and Leq would be highest at grid points near each airport alternative, indicating areas subject to noise from the airport alternative activity combined with overflight noise.

Under future conditions, the following would experience the most cumulative change of exposure for each metric:

- For the DNL change of exposure, each of the three alternatives would experience a change of exposure of 21 grid points experiencing an increase of at least 5 dBA.
- For the Lmax change of exposure, Airport 4 would experience the most grid point changes, with 94 points experiencing an increase of at least 3.0 dBA.
- For the Leq change of exposure, Airport 4 would experience the most grid point changes, with 32 points experiencing an increase of 5 dBA.
- For the TAA change of exposure, Airport 4 would experience the most grid point changes, with 111 points experiencing an increase above ambient levels for at least 5 minutes per day.

6.0 LITERATURE CITED

Federal Aviation Administration. 2007. *Guidance on Procedures for Evaluating the Potential Noise Impacts of Airport Improvement Projects on National Parks and Other Sensitive Park Environments.*

Attachment A. Noise Analysis Protocol

ANGOON AIRPORT
Environmental Impact Statement

NOISE ASSESSMENT PROTOCOL FOR ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration

and

Alaska Department of Transportation and Public Facilities

Prepared by

BridgeNet International 20201 SW Birch St., Suite 250 Newport Beach, CA 92660	Barnard Dunkelberg & Company 1743 Wazee St., Suite 400 Denver, CO 80206

April 18, 2012

Contents

Figures

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1.0 INTRODUCTION

This report has been prepared in conjunction with the *Angoon Airport Environmental Impact Statement* (EIS) to document and coordinate the protocol for assessing aircraft noise impacts to National Forest wilderness land within the Admiralty Island National Monument. The protocol described herein will be used to guide the main noise analysis and will follow the procedures in the *Guidance on Procedures for Evaluating the Potential Noise Impacts of Airport Improvement Projects on National Parks and Other Sensitive Park Environments*, Version 1.0 (DOT&PF 2007). The following noise assessment protocol describes the noise-sensitive lands and resources that will be considered in the EIS noise analysis. Additionally, the types of noise analyses and noise metrics that will be used are described.

2.0 BACKGROUND

Angoon is located in Southeast Alaska on Admiralty Island, near the midway point between Sitka and Juneau. Angoon has no road connections to any other communities in the region. Existing transportation consists of scheduled, charter, and private floatplane service to Favorite Bay and other nearby water bodies within the National Forest wilderness; the Alaska Marine Highway System; and private boat traffic.

Scheduled air transportation services to Angoon are currently provided by Alaska Seaplane Services, which operates two or three scheduled daily flights to and from Juneau (depending on the season) from the seaplane terminal in Favorite Bay. In addition to the scheduled seaplane service, on-demand charter seaplane service is provided on a seasonal basis, as are private planes. The scheduled and charter aircraft that serve Angoon are propeller-driven, single-engine piston aircraft. Alaska Seaplane Services operates the Cessna 180, which is capable of seating up to four passengers and cargo, and the de Havilland Beaver aircraft, which can seat up to eight passengers and cargo, depending on the configuration.

The Federal Aviation Administration (FAA) is preparing an EIS in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF) for funding and other approvals for a new land-based airport near the community of Angoon. At present, there is no land-based airport runway in or near Angoon. The initial construction of an airport for the community of Angoon would include a 3,300-foot-long paved runway and associated facilities. The EIS is evaluating three alternative airport sites: the DOT&PF proposed action and two alternative sites. See Figure 1 for the locations of the airport alternatives. The proposed land-based airport would be a relatively small airport typical of other rural airports in Southeast Alaska.

Aviation activity forecasts were developed for the proposed Angoon Airport during planning efforts leading up to the EIS. The airport is forecast to accommodate approximately 3,189 annual aircraft operations, which averages to between four and five aircraft arriving and departing each day. Ten years after opening, the airport is expected to accommodate approximately 3,473 annual aircraft operations (BDC 2008a). Aviation activity would primarily consist of scheduled and charter passenger and cargo flights using small single- and twin-engine propeller aircraft. General aviation activity involving primarily single-engine aircraft would also take place at Angoon Airport. The aviation activity forecasts anticipate very limited use of Angoon Airport by business jets capable of operating there.

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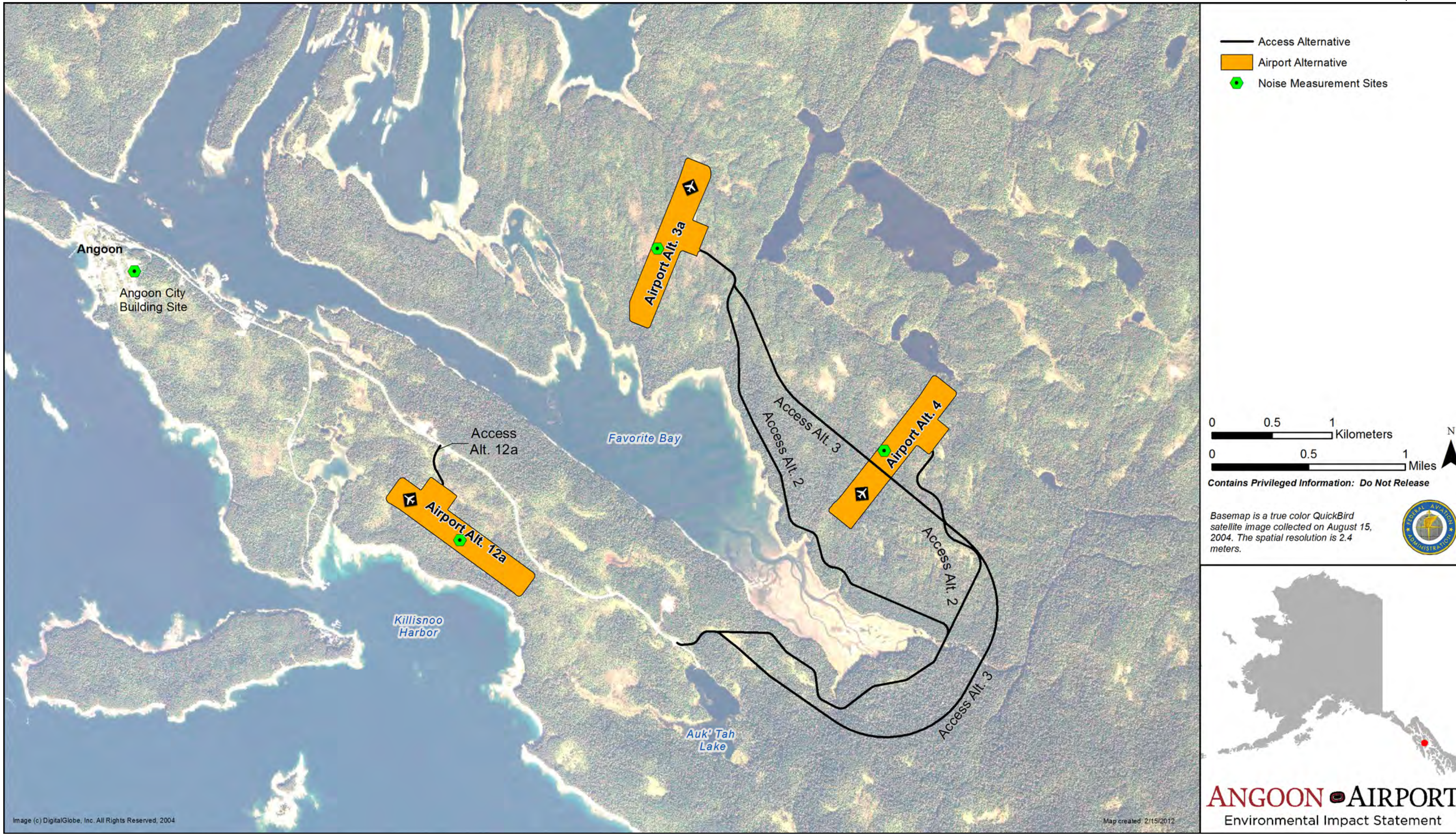

Figure 1. Airport alternative sites.

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The FAA is the lead federal agency with statutory authority over airports and airways in the United States. The FAA administers the Airport Improvement Program, through which the DOT&PF has applied for approval of the airport layout plan and a grant to fund design and construction. Before the FAA can decide whether to provide the requested funding or approval for the airport layout plan, they are required by the National Environmental Policy Act (NEPA) to evaluate and publicly disclose the potential social and environmental effects of building and operating the proposed airport.

The U.S. Forest Service manages the Admiralty Island National Monument and Kootznoowoo Wilderness Area (Monument–Wilderness Area). The location of the DOT&PF's proposed action is almost entirely on lands managed by the U.S. Forest Service as wilderness. In addition, one of the other airport location alternatives and its access road alternative are also on wilderness managed by the U.S. Forest Service. Because the U.S. Forest Service manages these lands, they must be consulted during the preparation of the noise assessment protocol.

3.0 Noise Screening Assessment

The total number of aviation operations at the proposed Angoon Airport would be low (between four and five aircraft taking off and landing each day). However, because there is currently no airport in the Monument–Wilderness Area (the proposed location of the Angoon Airport), increased aircraft noise over wilderness lands immediately adjacent to the proposed airport facility would occur. Because a preliminary noise analysis has been conducted to confirm increases in noise over wilderness lands, a more detailed noise screening assessment is not necessary, and the process has proceeded directly to the preparation of this noise assessment protocol for the main noise assessment.

4.0 Coordination of Noise Assessment Protocol

Throughout the EIS process, the FAA continues coordination with a broad range of stakeholders, including federal agencies, federally recognized tribal organizations, regional and village native corporations, local governments, members of the community, and other interested stakeholders. The U.S. Forest Service is the agency with primary jurisdiction over the monument and wilderness lands potentially affected by the proposed project. The FAA has entered into a memorandum of understanding with the U.S. Forest Service to formalize the cooperative efforts between the parties for this project.

The assessment of noise effects was included in the list of items for agencies and stakeholders to consider during the scoping process for the EIS. Since initiation of the EIS process, the FAA has conducted meetings and teleconferences with the U.S. Forest Service to introduce the noise protocol assessment process. Further, the FAA has provided the U.S. Forest Service and other stakeholders with the *Noise Existing Conditions Technical Report for Angoon Airport Environmental Impact Statement* (BNI 2011).

The FAA has an internal coordination process for this noise assessment protocol, per FAA Order 1050.1E and Order 5050.4B. After the FAA has completed its internal review, the FAA will provide this noise assessment protocol to the U.S. Forest Service prior to starting the analysis.

5.0 Noise Assessment Protocol

The following sections describe the noise assessment protocol proposed for the Angoon Airport EIS. The data inventory shall include the proposed new Angoon land-based airport site alternatives, the Angoon Seaplane Base, and other locations where aircraft—specifically seaplanes—land regularly. Beyond the Angoon Seaplane Base, there are no other designated airports within 30 miles of the community of Angoon.

5.1 Inventory Existing Information

In addition to the baseline information gathered for the initial noise screening assessment, the inventory of existing information includes gathering information about the location of seaplane aircraft relative to Admiralty Island National Monument boundaries, and a brief background of each. The data will be estimated from public records, past studies, other existing documentation, and discussion with the aircraft operators. Additionally, further information for over-flights by private and commercial aircraft operators will be gathered. Over-flights include commercial jet aircraft transiting to and from Juneau and Sitka, as well as smaller, regional wheeled and floatplane aircraft transiting between Southeast Alaska communities.

The data will be presented in text form, with supporting tables and graphics, and will include the following information:

- Typical arrival and departure routes for commercial aircraft operating between Juneau and Sitka
- Typical high-altitude routes for over-flights transiting the region
- Typical arrival and departure routes for floatplanes operating from the Angoon Seaplane Base
- Typical arrival and departure routes for floatplanes operating at other locations in the initial area of investigation
- Annual operations and aircraft fleet mix
- Time of day for operations

5.2 Ambient and Aircraft Noise Measurements

Limited noise measurements were collected at the three airport alternative sites in the study area, as well as at one site in the community of Angoon to capture existing aircraft noise events associated with the Angoon Seaplane Base as well as ambient noise data (BNI 2011). One of the noise measurement sites was located near the DOT&PF's proposed airport site (Airport Alternative 3a). Two additional sites for measurements were located near the proposed sites for Airport Alternative 4 and Airport Alternative 12a. The results of the existing conditions noise analysis include a description of cumulative and single event metrics, as well as correlation of actual aircraft events with single event noise data.

The noise measurement survey served to

- identify noise levels for individual aircraft operations, both on the ground and in the air, specific to the local Angoon seaplane environment and its unique conditions, and
- identify ambient noise levels at multiple locations around the project area using a variety of noise metrics.

The field noise measurement program conducted for this study included the use of portable noise measurement sites that recorded the 1-second noise levels on a continuous basis and were later analyzed to compute other noise metrics.

5.3 Main Noise Analysis

There are two levels of noise analysis for the Angoon Airport noise assessment: standard required noise contour analysis and supplemental grid point analysis. The standard noise contour analysis is responsible for Day Night Average Sound Level (DNL) analysis, and the supplemental grid point analysis provides additional information to support the cumulative noise findings. Because the aircraft noise contours will generally be limited to areas very near the airport, the second noise analysis will focus on the supplemental metrics.

The following noise metrics will be calculated and presented in the main noise analysis:

- ***Day Night Average Sound Level (DNL)*.** DNL calculations describe noise experienced during an entire (24-hour) day. They account for the sound exposure level of aircraft and the number of aircraft operations, and include a penalty for nighttime operations to account for higher sensitivity to nighttime noise (noise occurring between the hours of 10 p.m. and 7 a.m. is weighted by an additional 10 decibels [dB]).
- *Equivalent Sound Level (L_{eq})*. L_{eq} is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal (noise that constantly changes over time) throughout a given sample period. L_{eq} is the "energy" average taken from the sum of all the sound that occurs during a certain time period; however, it is based on the observation that the potential for a noise to affect people depends on the total acoustical energy content. L_{eq} can be measured for any time period, but is typically measured in increments of 15 minutes, 1 hour, or 24 hours.
- *Maximum Sound Level (L_{max})*. L_{max} is the loudest sound level reached during a sound event. For example, as an aircraft approaches, the sound increases over ambient noise levels. The closer the aircraft gets, the louder its sound becomes until the aircraft is at its closest point directly overhead. As the aircraft passes, the noise level decreases, eventually settling back to ambient levels.
- *Time Above Ambient (TAA).* TAA is the total time in seconds or minutes that aircraft noise exceeds ambient noise levels in a 24-hour period.

The main noise analysis will be guided by the change of exposure analysis for project-related and cumulative impacts, as follows:

- +/- 3 dB change of exposure for single event loudness (L_{max})
- +/- 5 dB change of exposure for cumulative noise descriptors below 60 dB (DNL, L_{eq})
- +/- 3 dB change of exposure for cumulative noise descriptors between 60 and 65 dB (DNL)
- +/- 1.5 dB change of exposure for cumulative noise descriptors above 65 dB (DNL)

The standard noise contour analysis involves generating the 65 DNL noise contour to identify areas of expected changes around the airports. This would include noise generated by both the proposed airport and the Angoon Seaplane Base. The operations at each airport are generated mostly by small, single-engine piston aircraft. Due to the size of the aircraft and the relatively small number of operations, the 65 DNL noise contours are not expected to extend far beyond the airport boundary.

The data will be presented on an aerial base map with supporting tabular data and text describing the specific inputs.

5.4 Noise Analysis Results and Reports

The results of each step will be gathered into a report and chaptered as each step is shown in this protocol. The report will serve as the basis for assessing aircraft noise impacts in the EIS. A draft main noise analysis will be presented to the FAA for review, providing information in the following structure: Background; Inventory of Existing Data; Inventory of Ambient Aircraft Noise Measurements; and Noise Analysis (Standard Noise Contour Analysis and Supplemental Noise Analysis). The FAA will review and comment on the document. A revised version will be prepared for the cooperating agency review and comment.

6.0 LITERATURE CITED

BDC. 2008a. *Angoon Airport Environmental Impact Statement, Supplemental Airport Planning Memorandum, Working Paper One*. On file with the Federal Aviation Administration, Alaskan Region Airports Division, Anchorage.

BridgeNet International (BNI). 2011. *Noise Existing Conditions Technical Report for Angoon Airport Environmental Impact Statement*. Available at: www.angoonairporteis.com.

DOT&PF. 2007. *Angoon Airport Master Plan*. Available at: www.angoonairporteis.com.

ATTACHMENT B. FIGURES

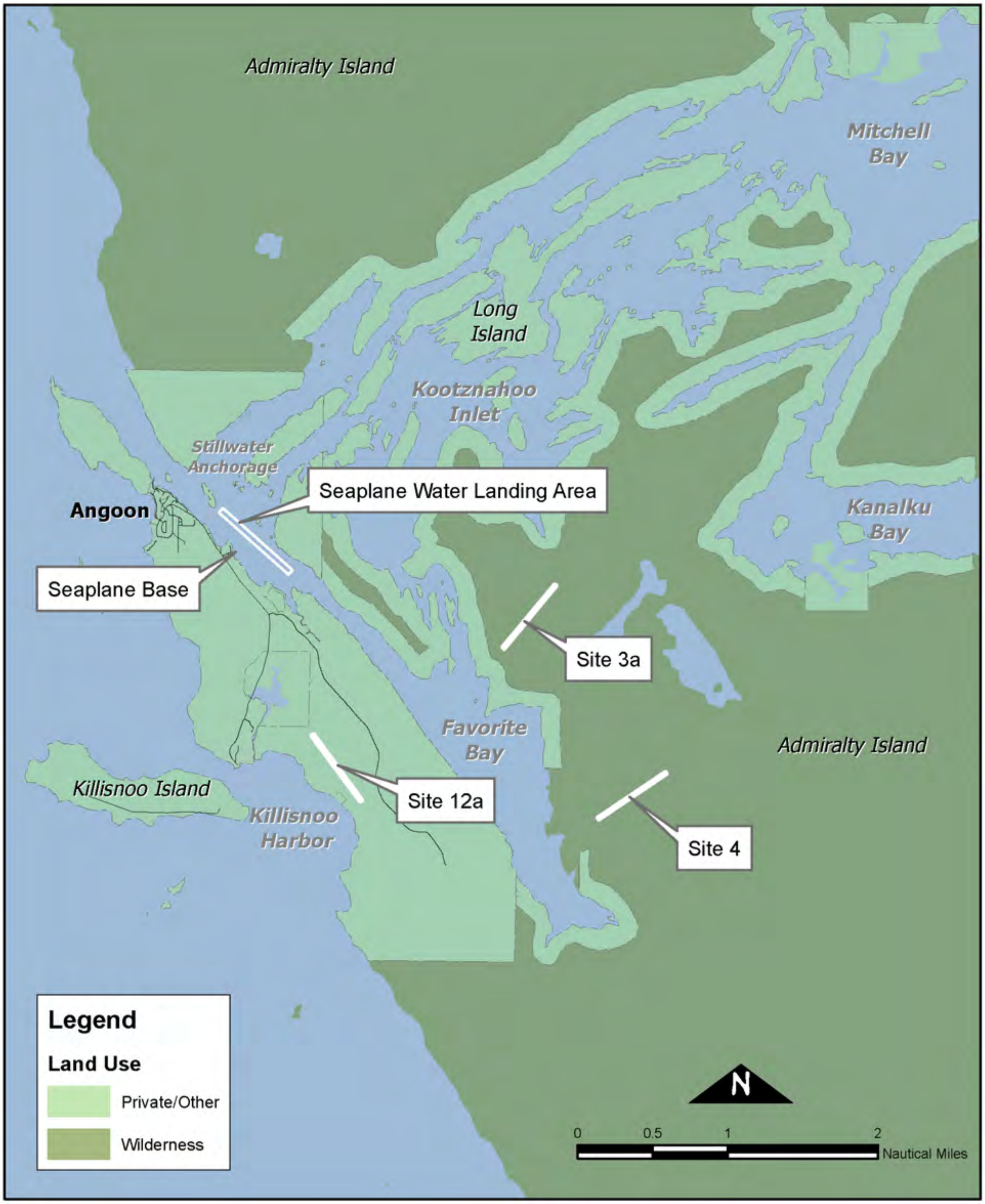


Figure B-1. Existing Seaplane Base and Alternative Airport Sites

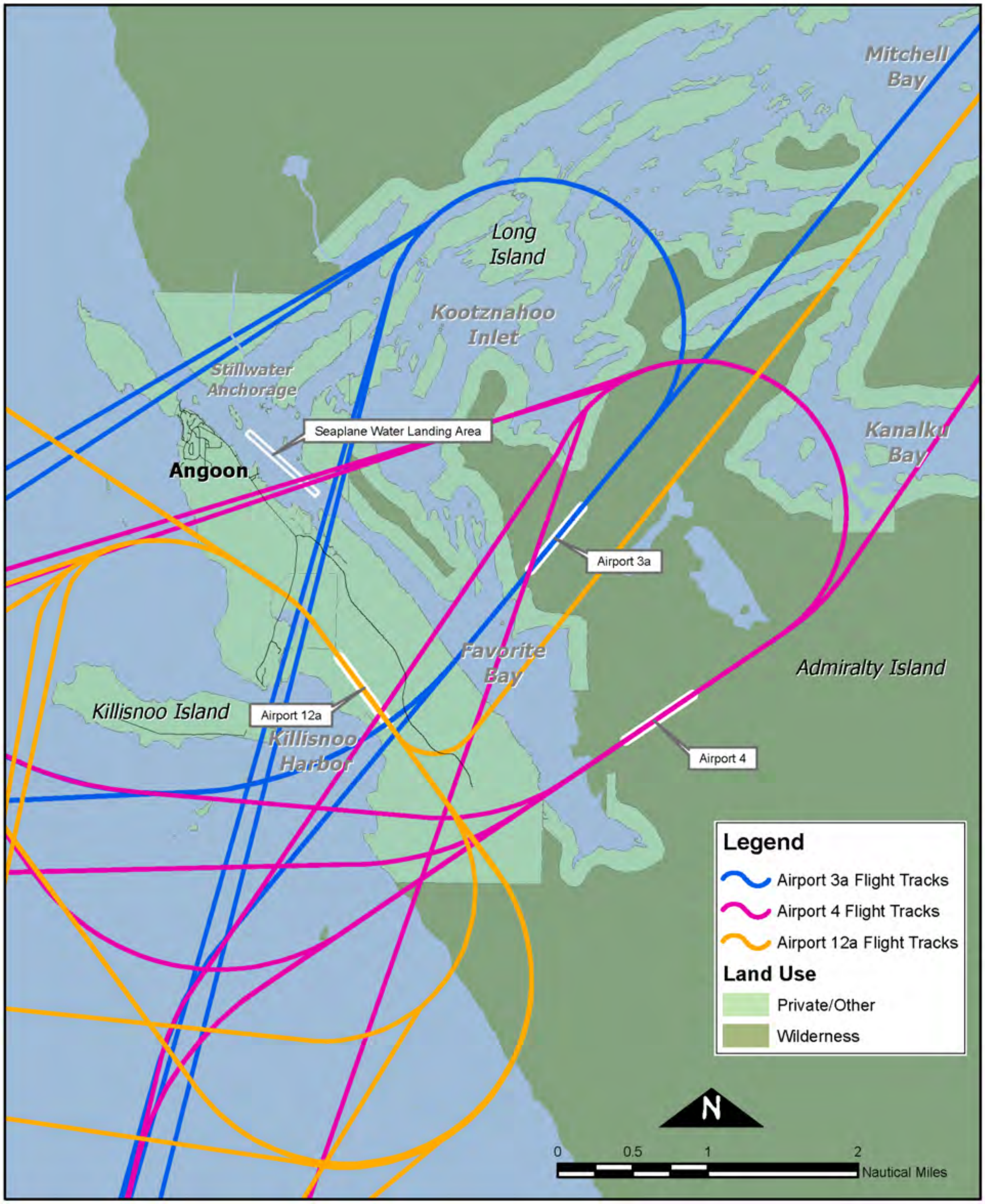


Figure B-2. Flight Tracks for Airport Alternatives

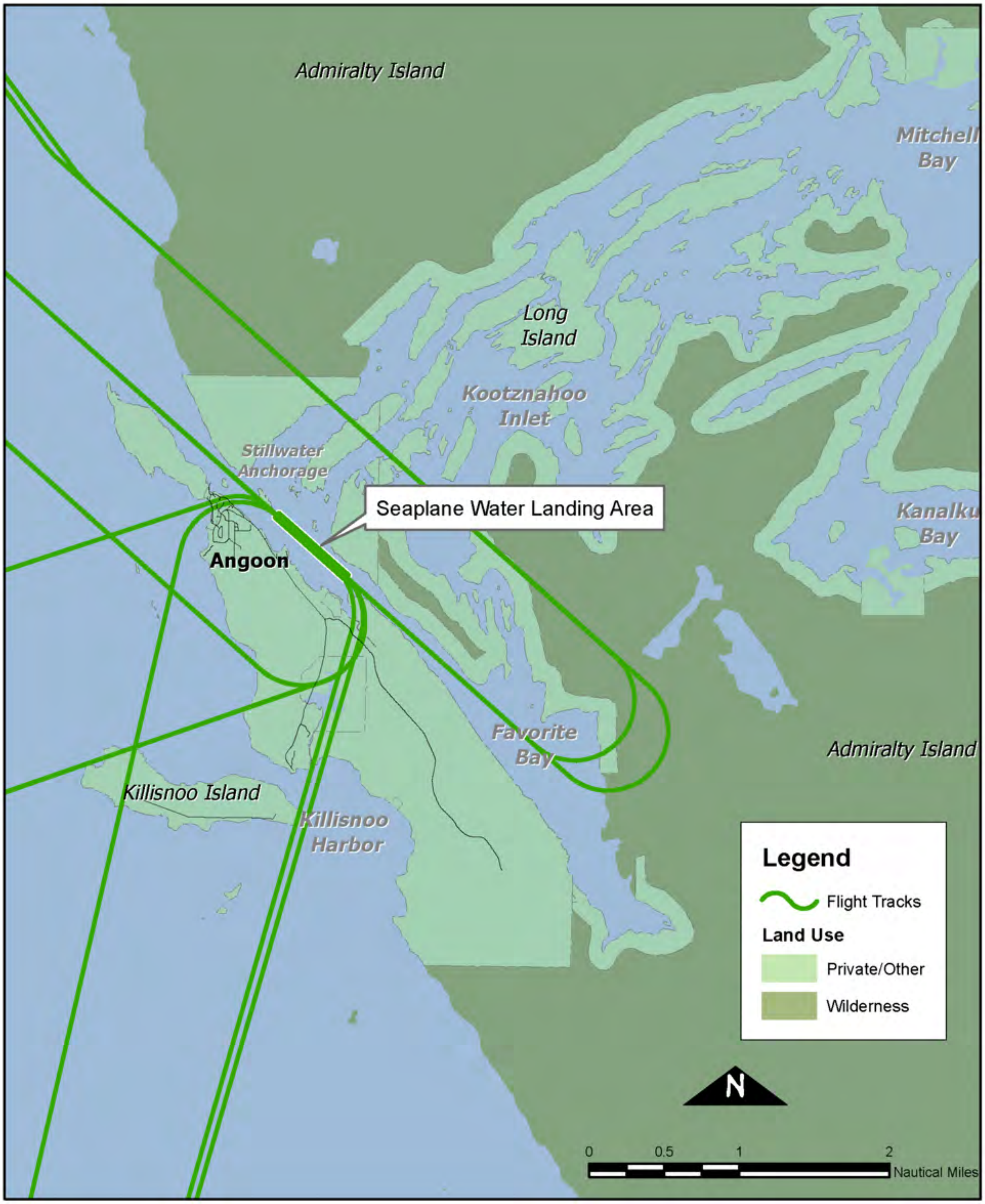


Figure B-3. Existing Seaplane Base Flight Tracks

Figure B-4. Enroute Airways

Figure B-5. Monitoring Sites

Figure B-6. Existing Conditions DNL Noise Contours

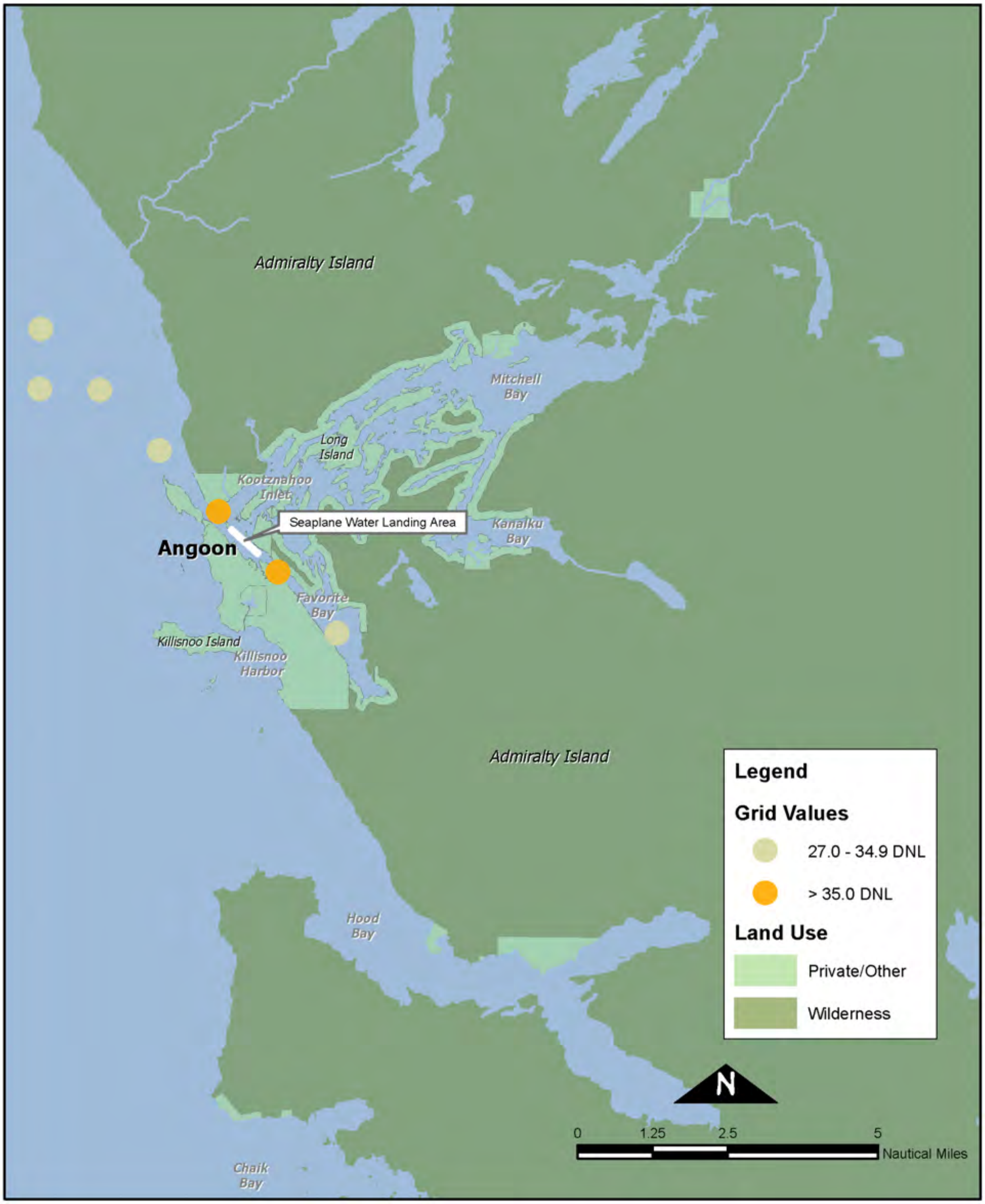


Figure B-7. Existing Conditions DNL Grid Analysis

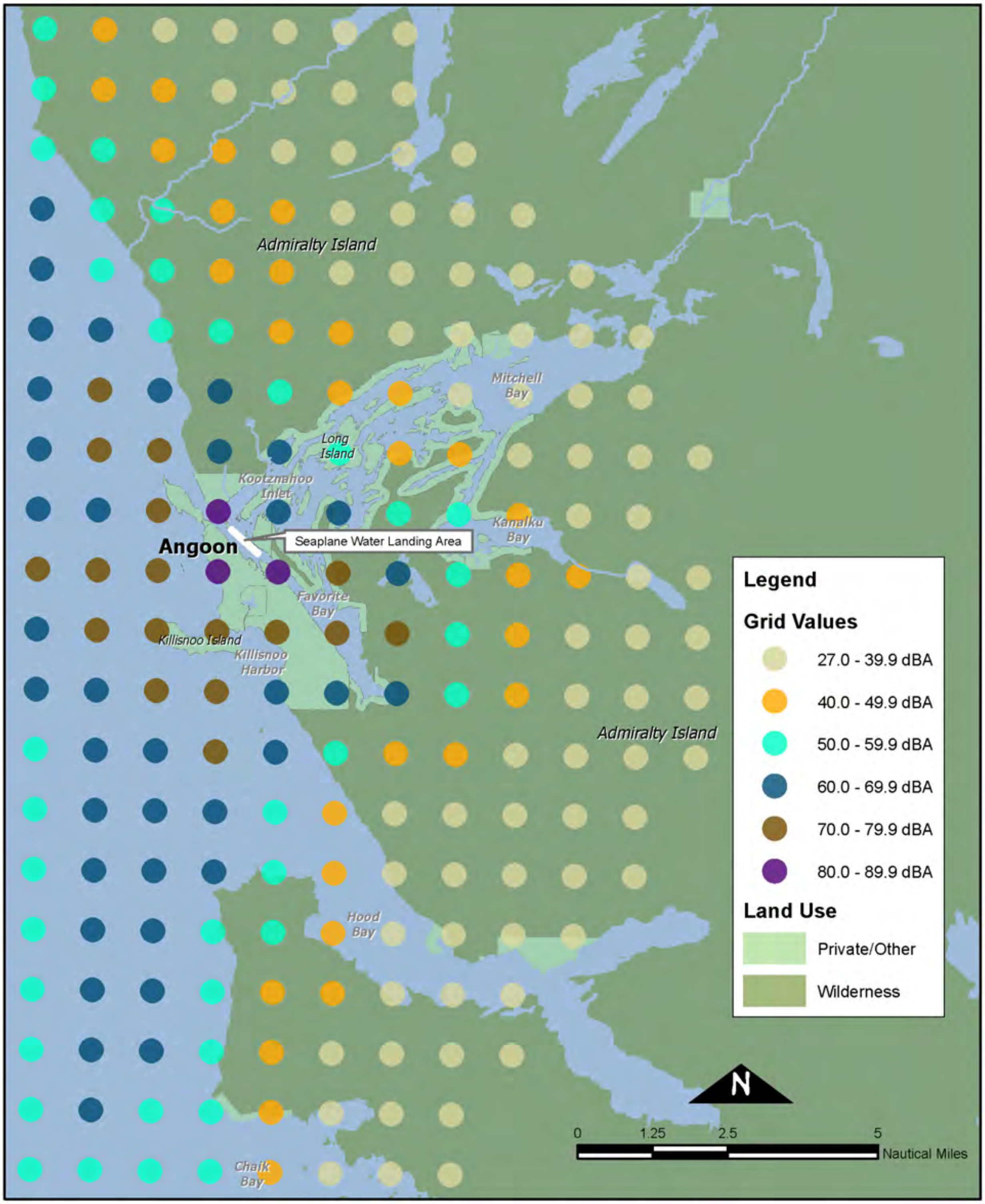


Figure B-8. Existing Conditions Lmax Grid Results

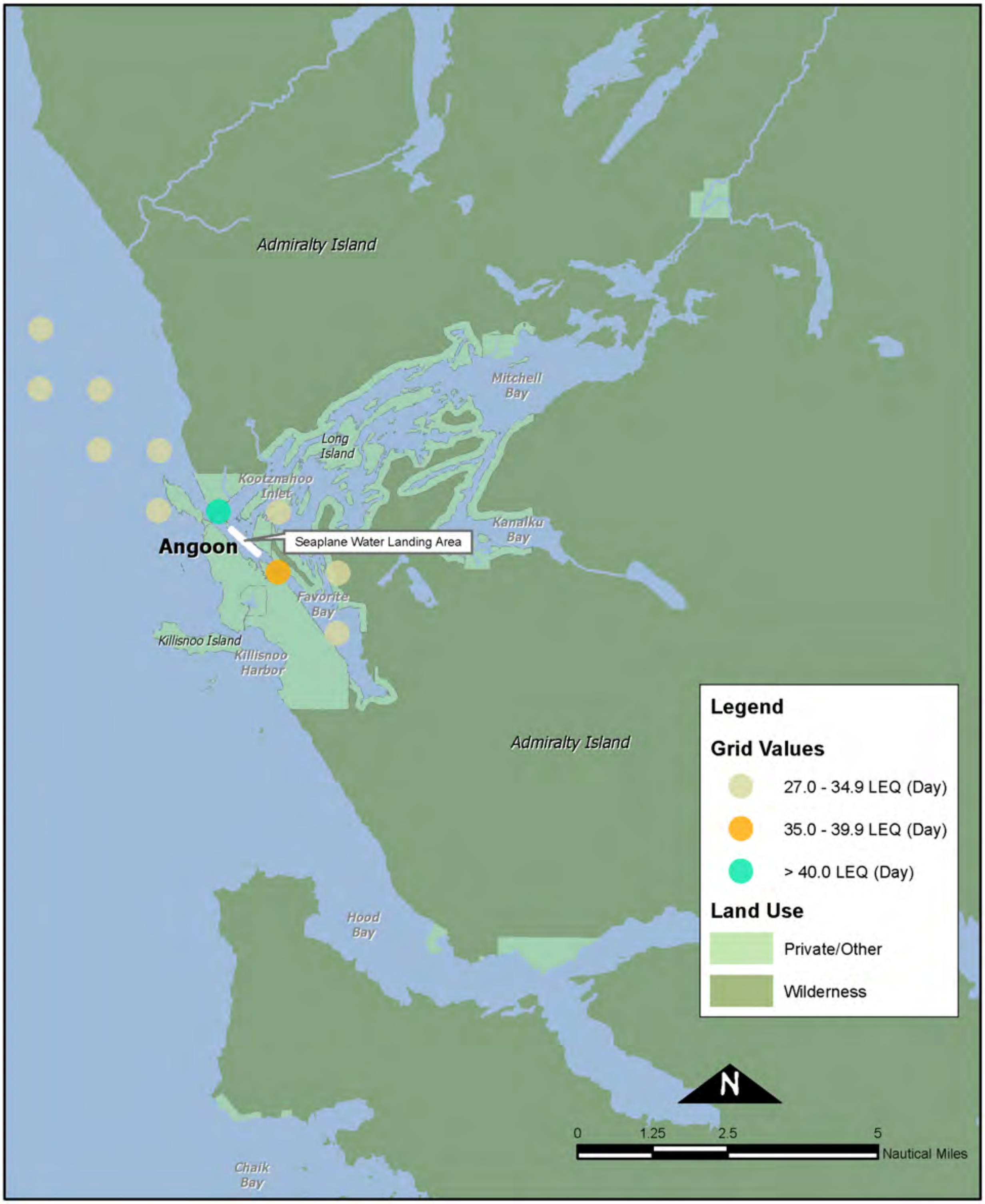


Figure B-9. Existing Conditions Leq (Day) Grid Analysis

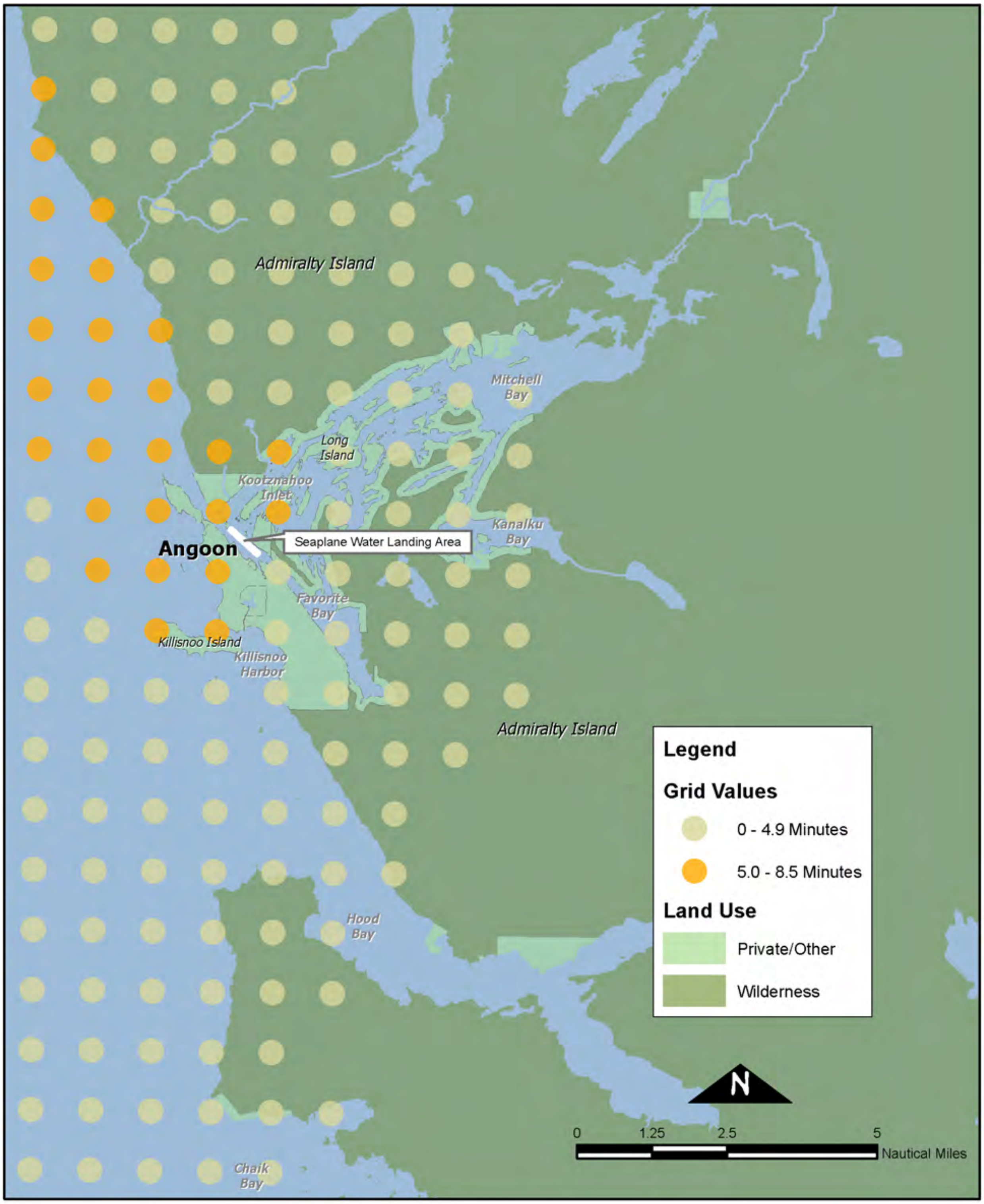


Figure B-10. Existing Conditions Time Above Ambient

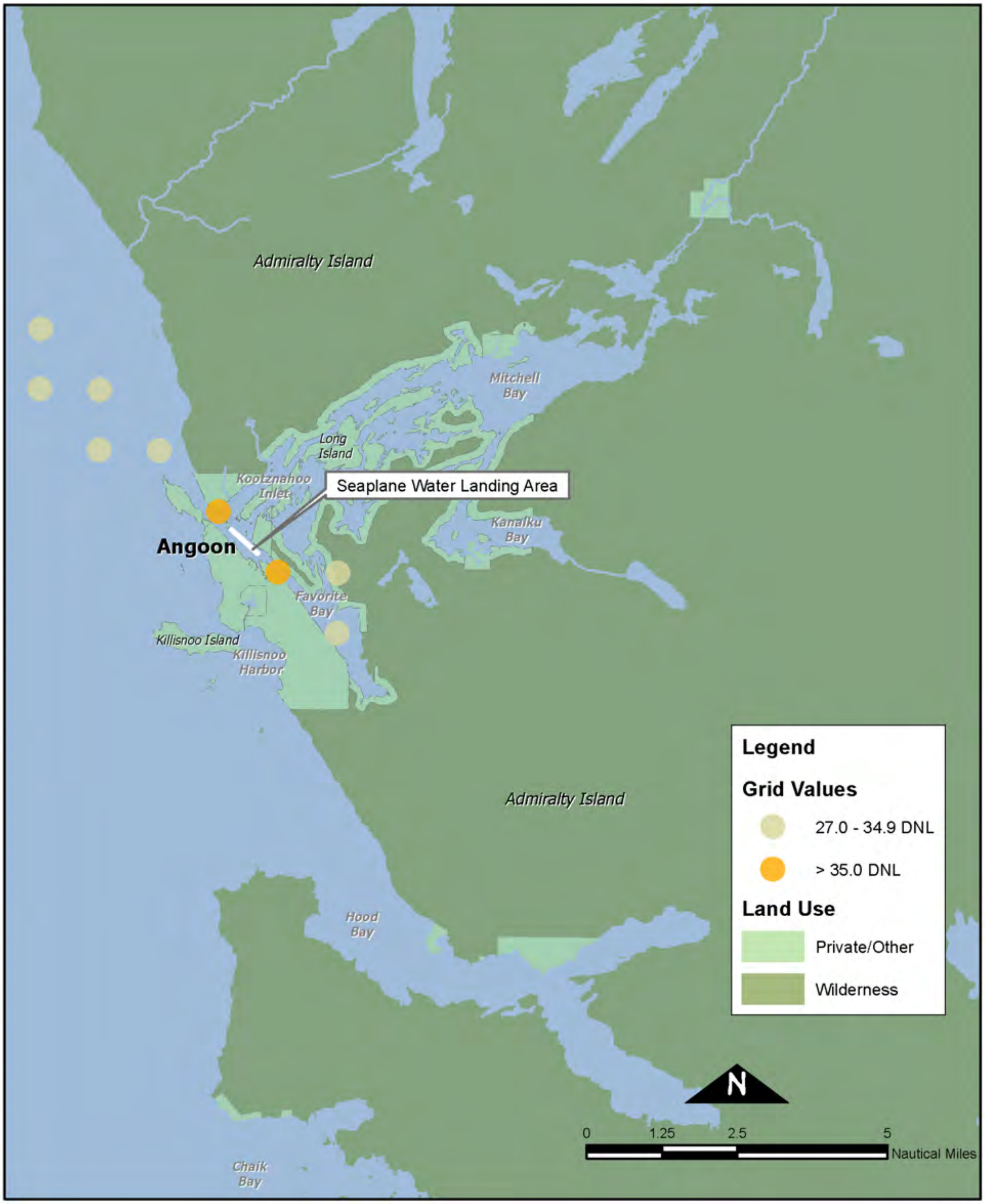


Figure B-11. Existing Conditions DNL Cumulative Grid Analysis

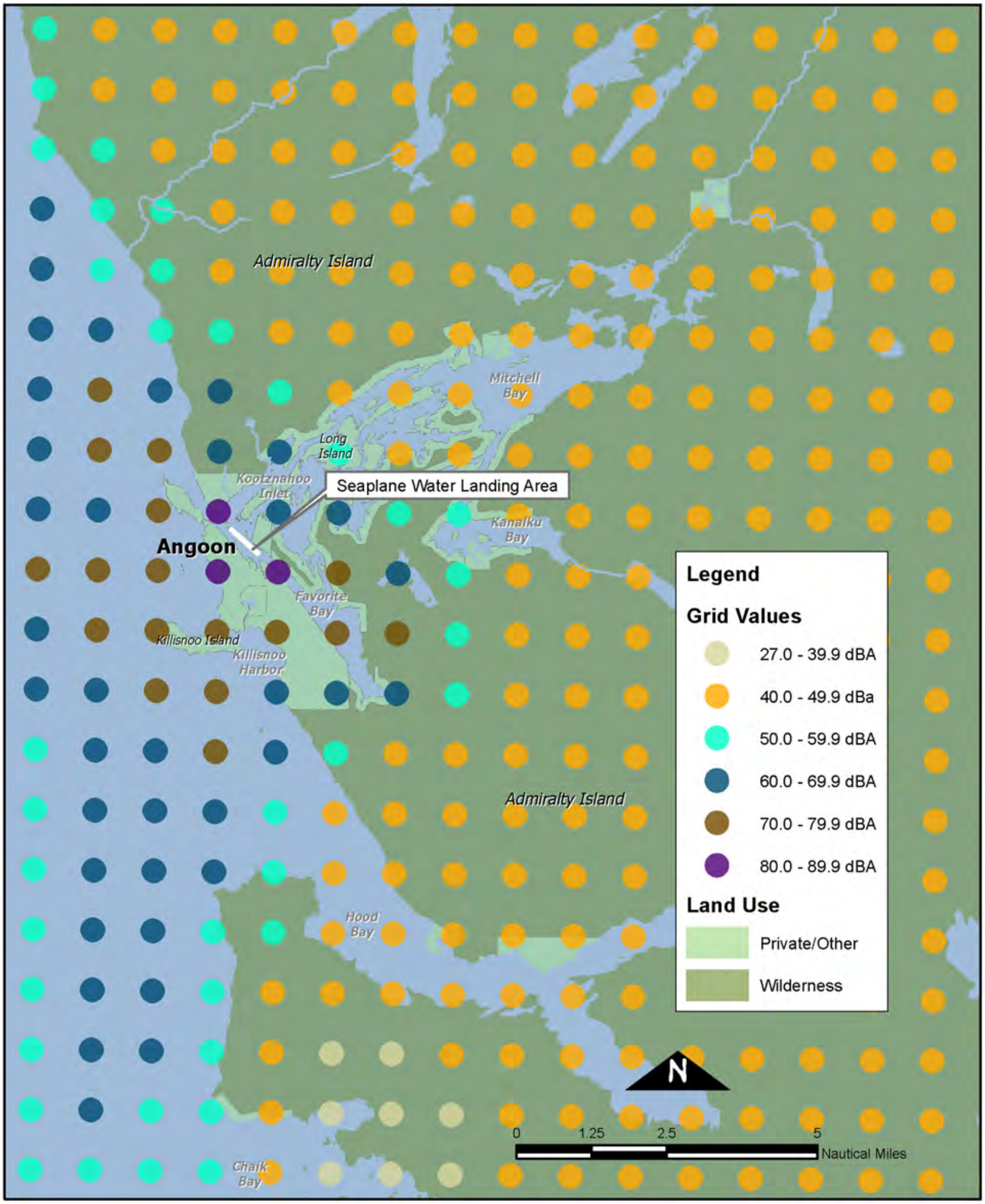


Figure B-12. Existing Conditions Cumulative Lmax Grid Results

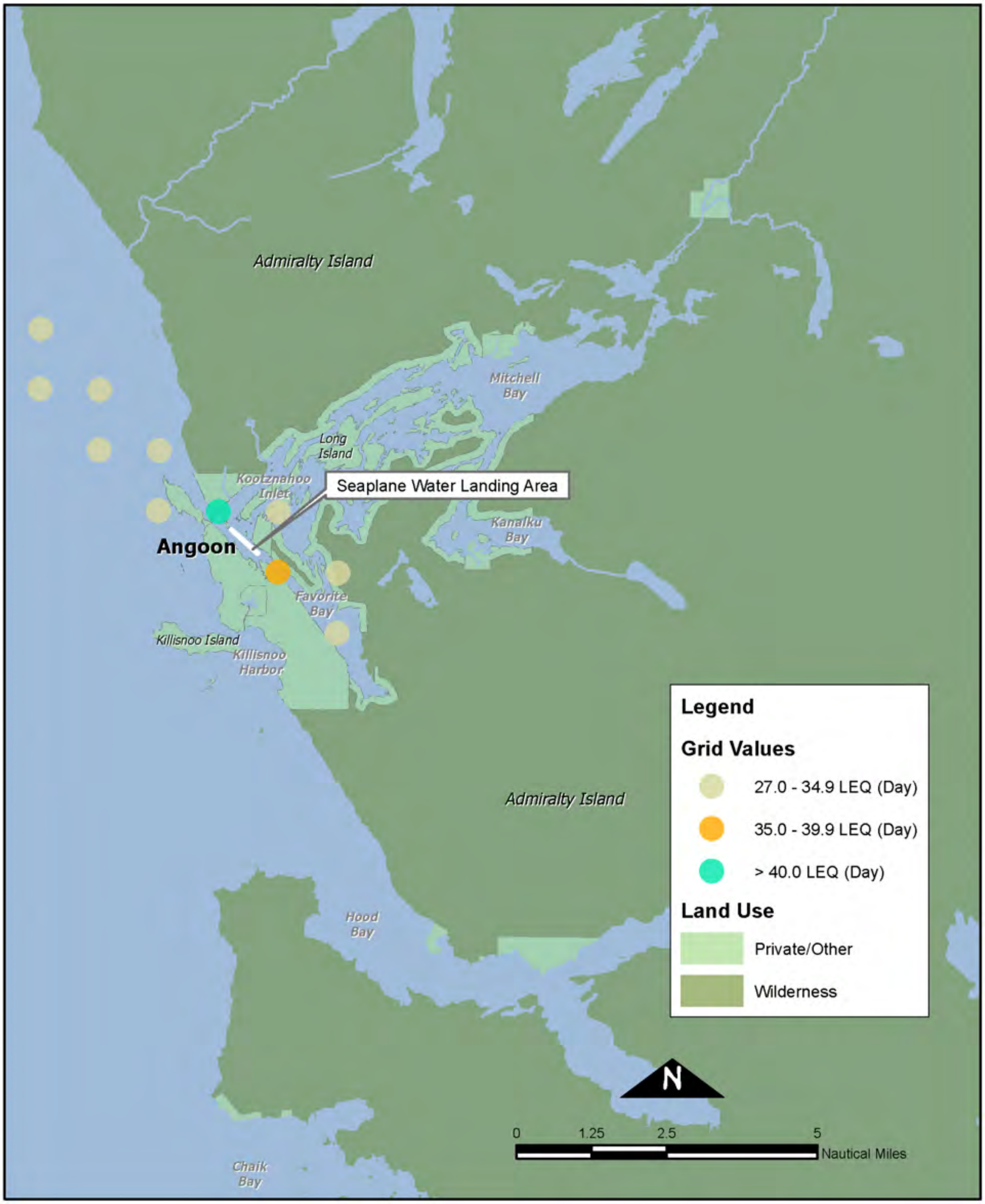


Figure B-13. Existing Conditions Cumulative Leq Grid Analysis

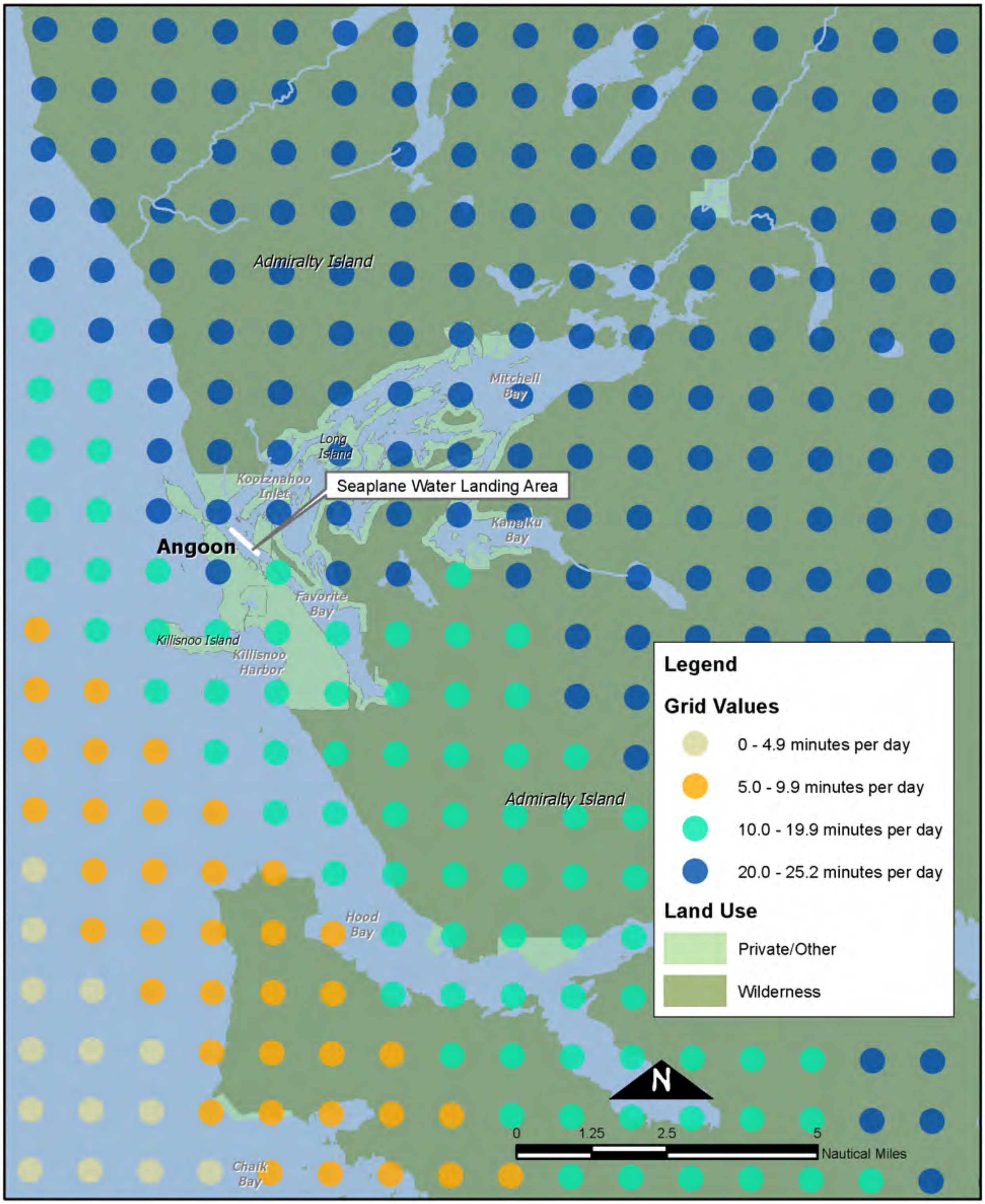


Figure B-14. Existing Conditions Cumulative Time Above Ambient

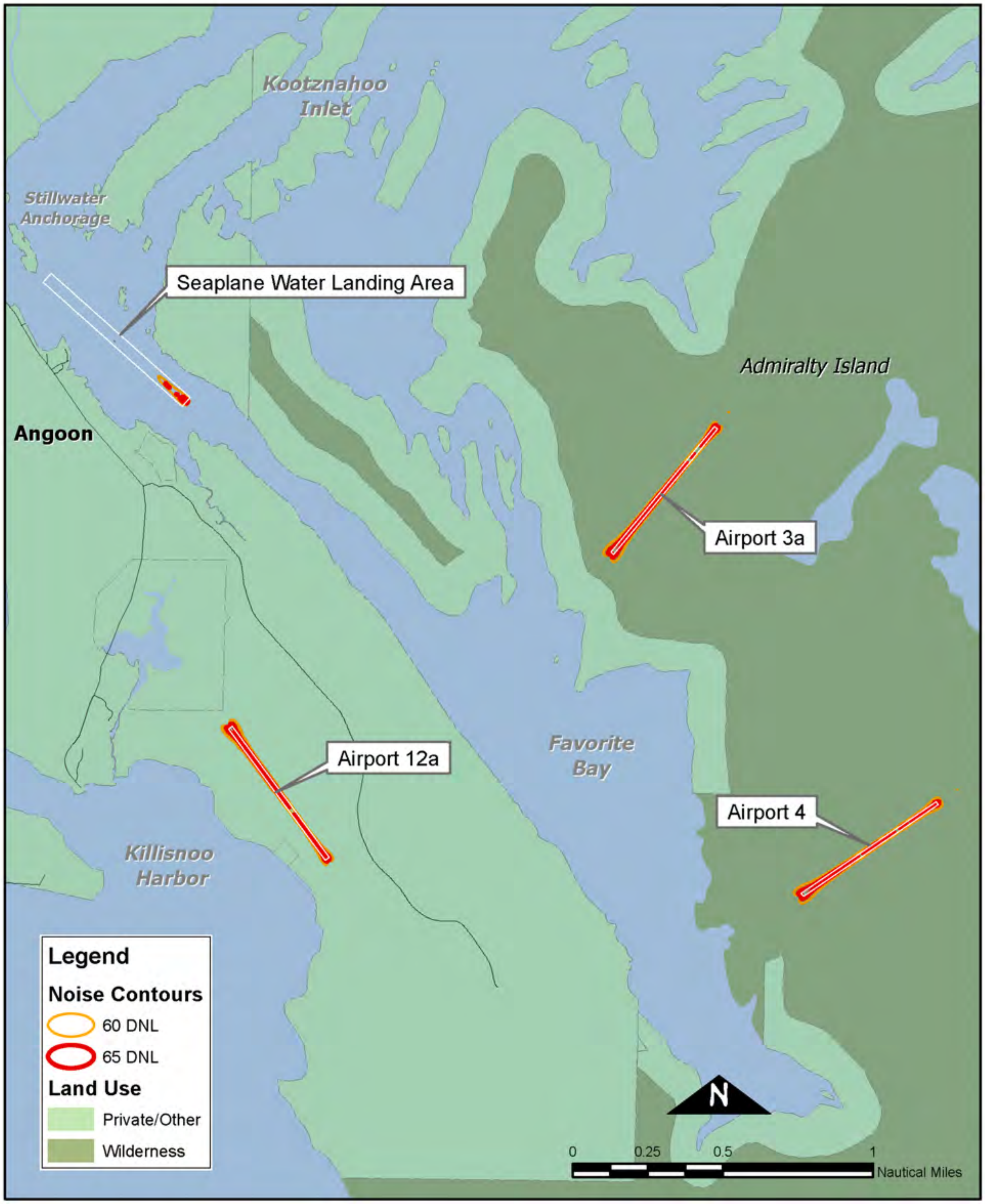


Figure B-15. Future Conditions DNL Noise Contours (2019)

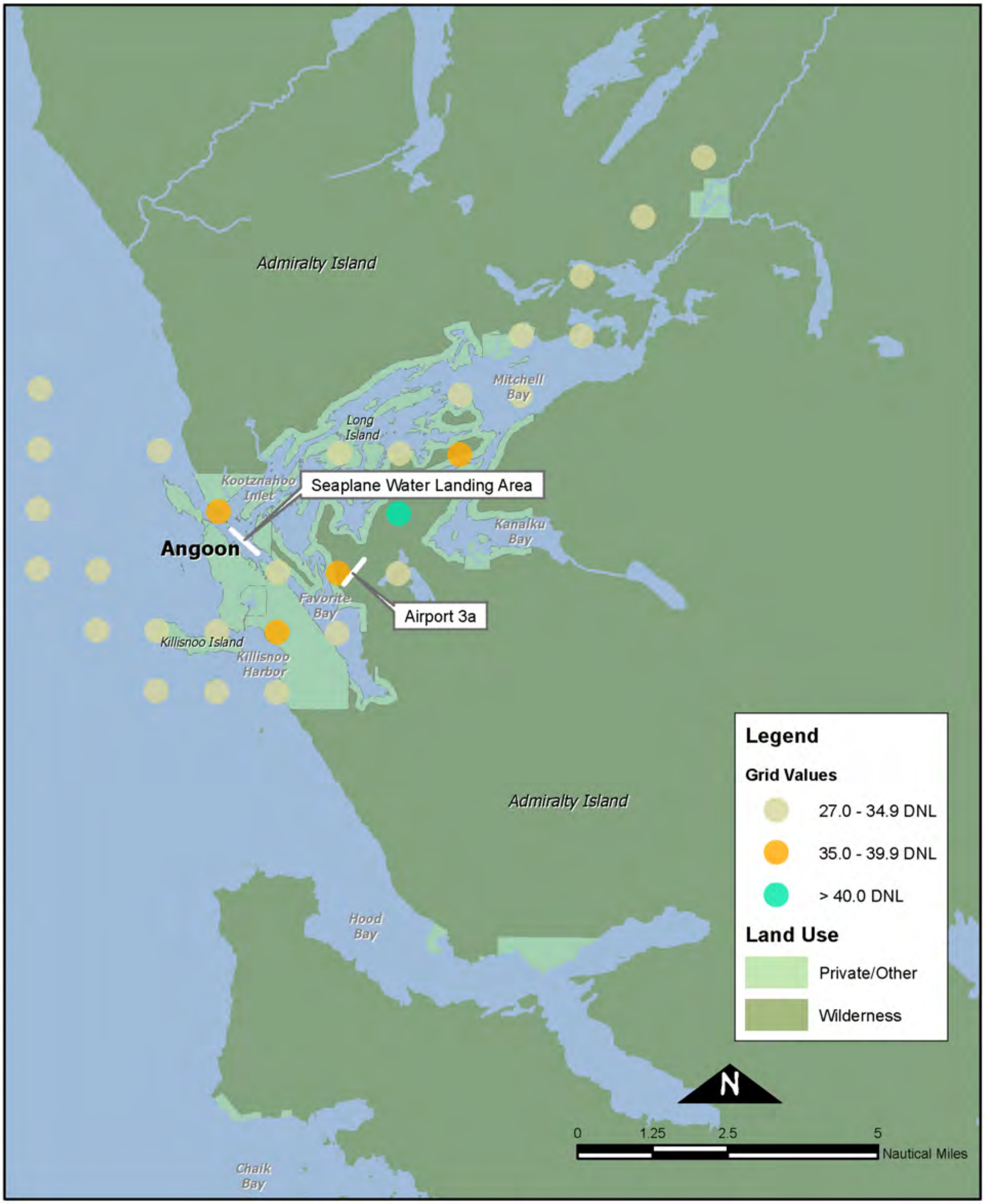


Figure B-16. Future Conditions DNL Noise Contour Grid Results – Airport 3a

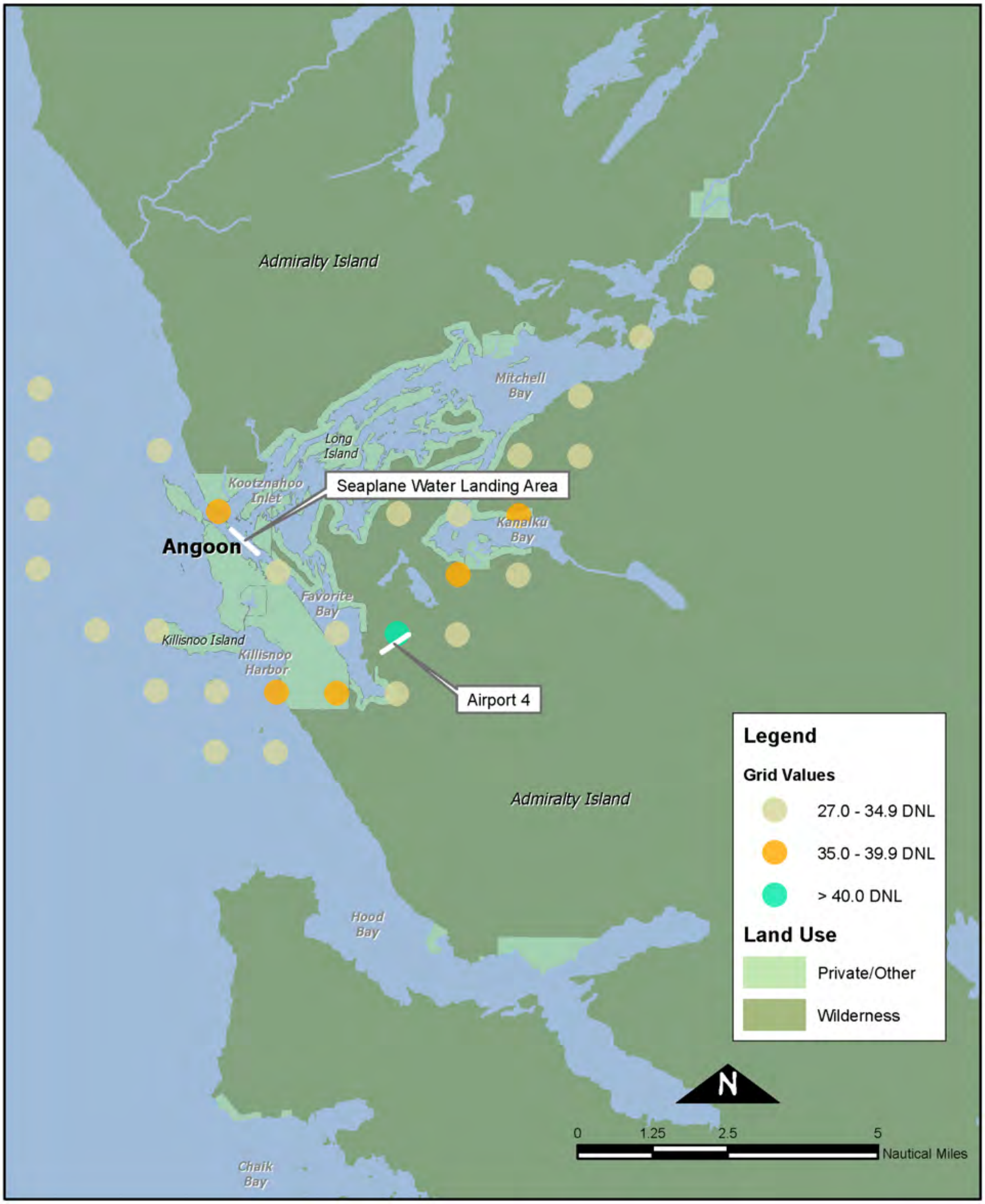


Figure B-17. Future Conditions DNL Noise Contour Grid Results – Airport 4

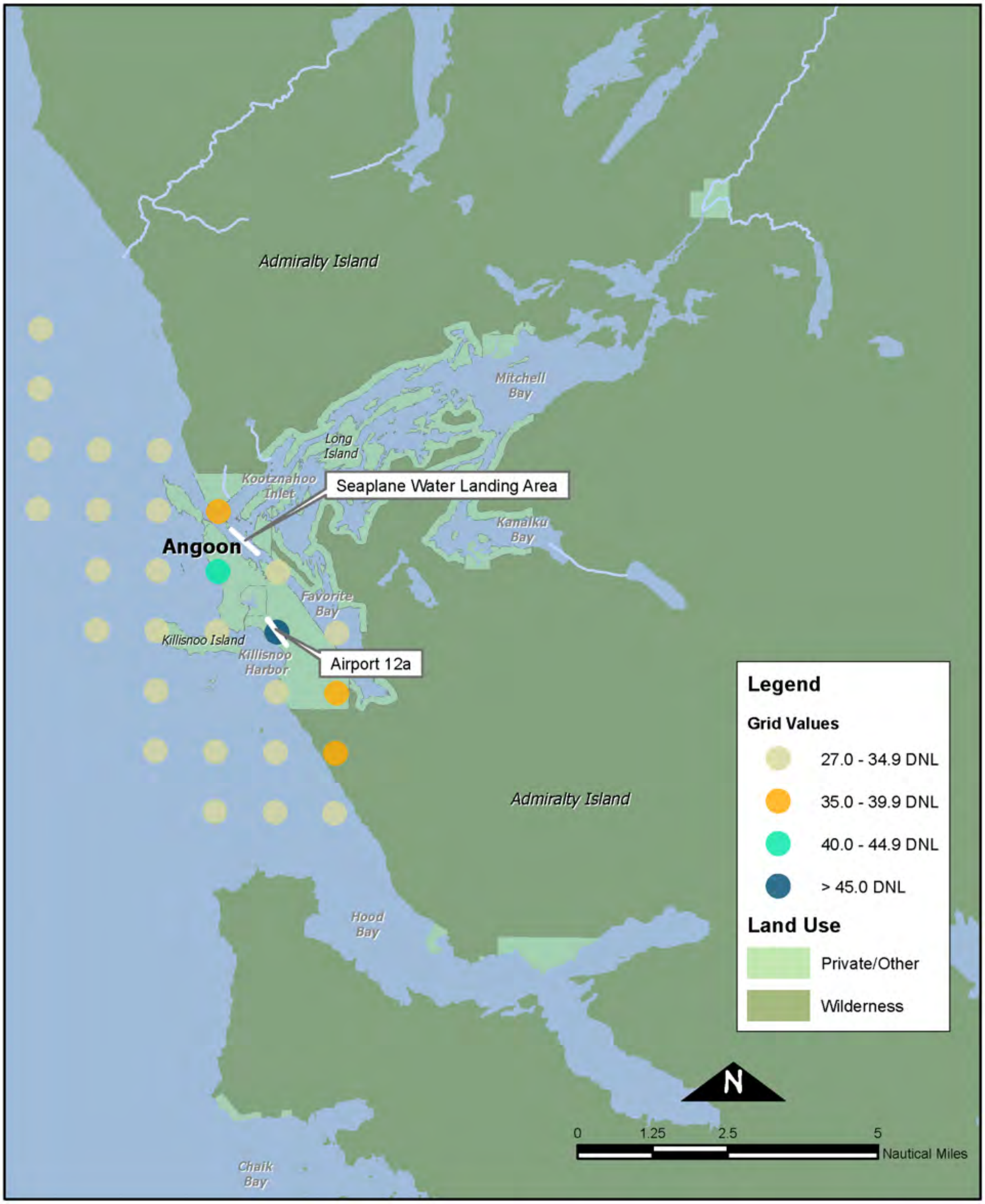
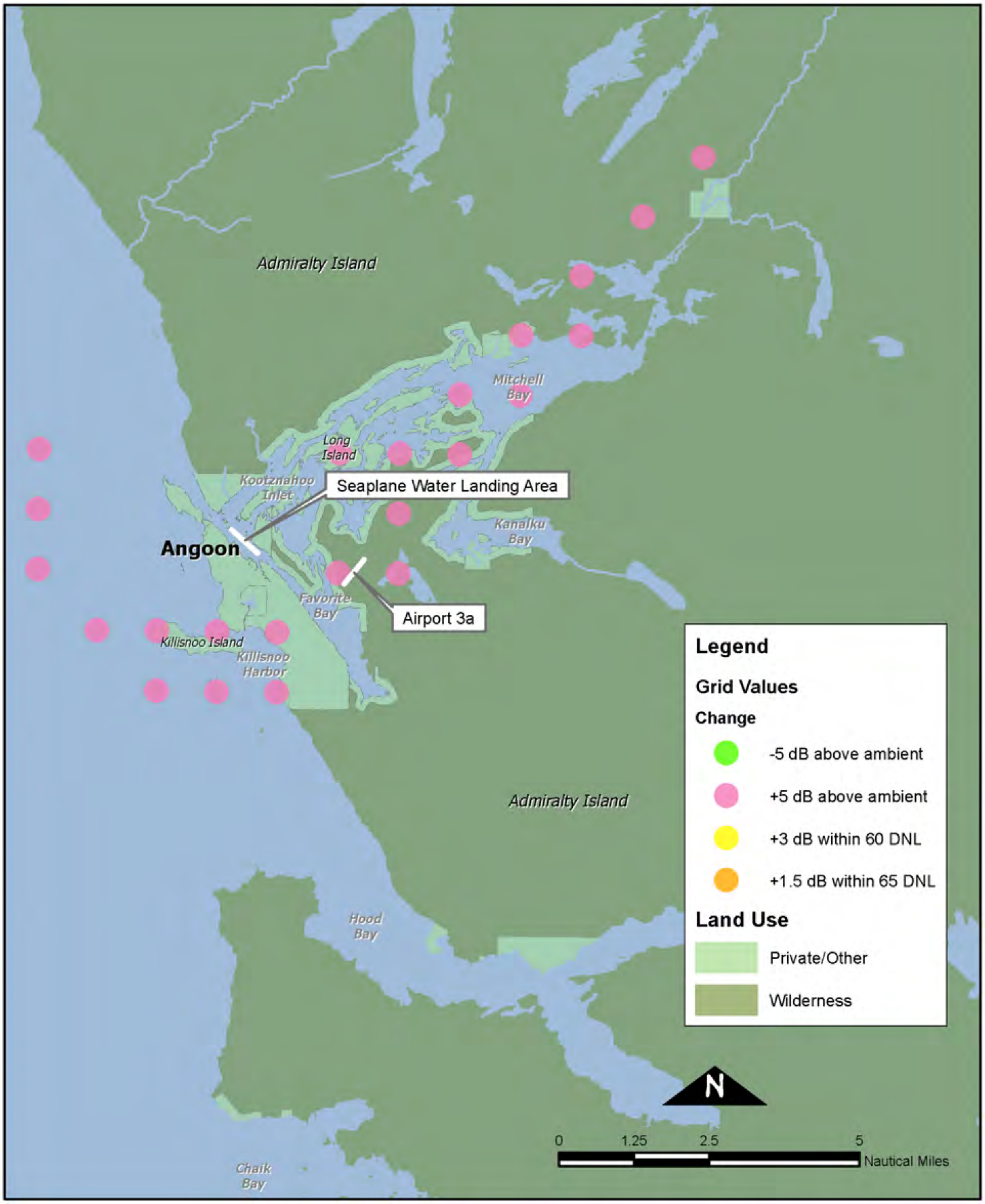


Figure B-18. Future Conditions DNL Noise Contour Grid Results – Airport 12a



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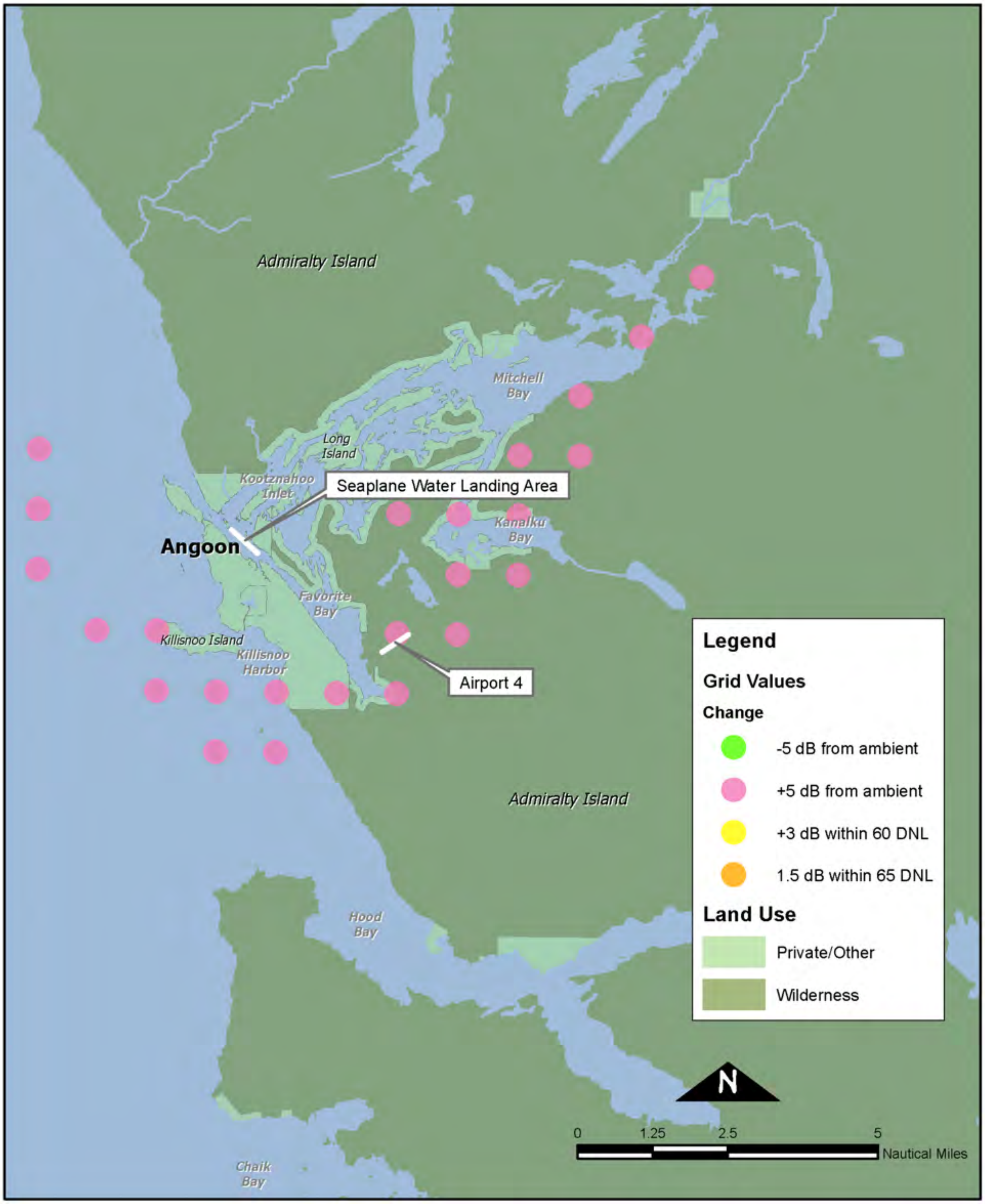

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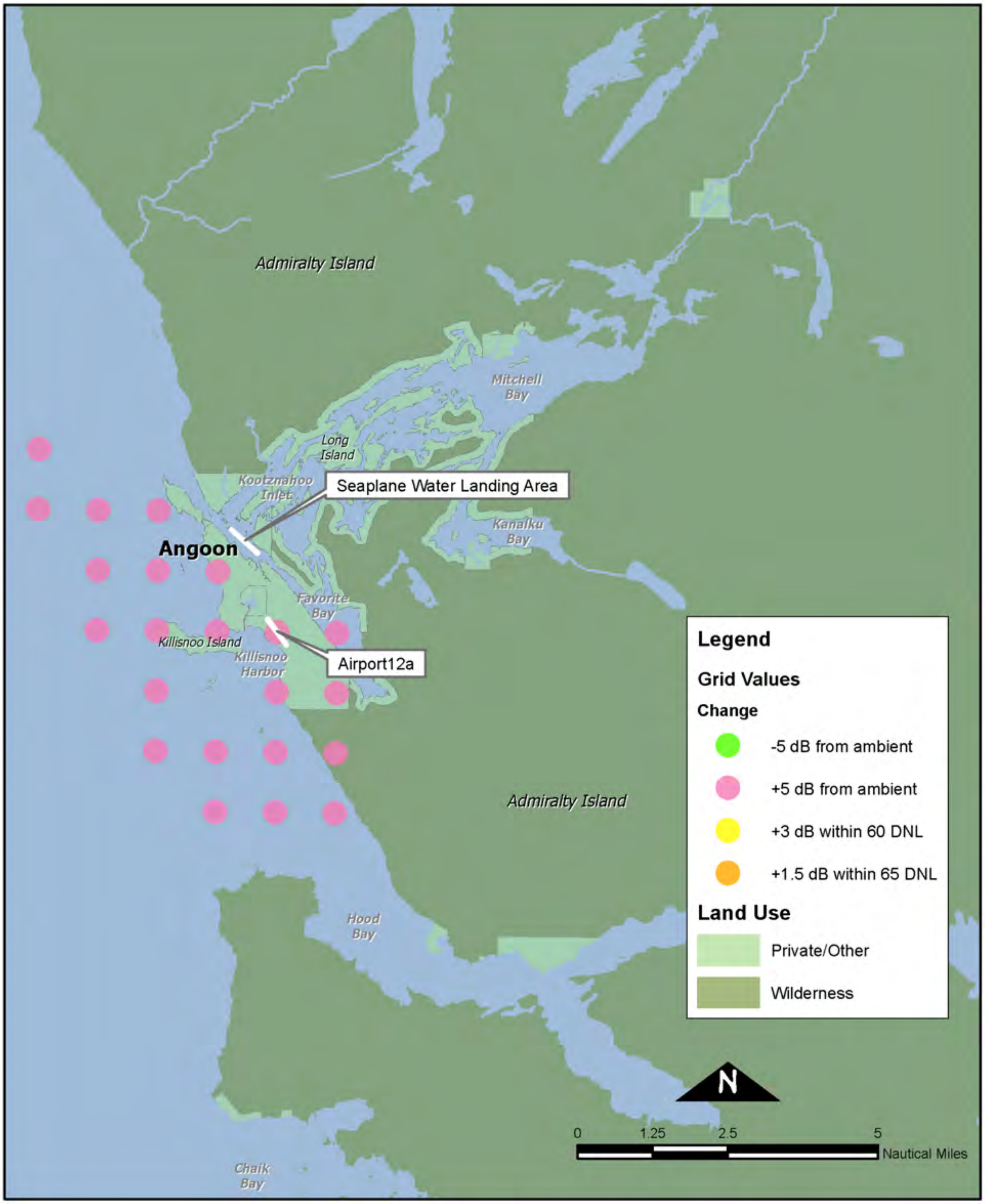

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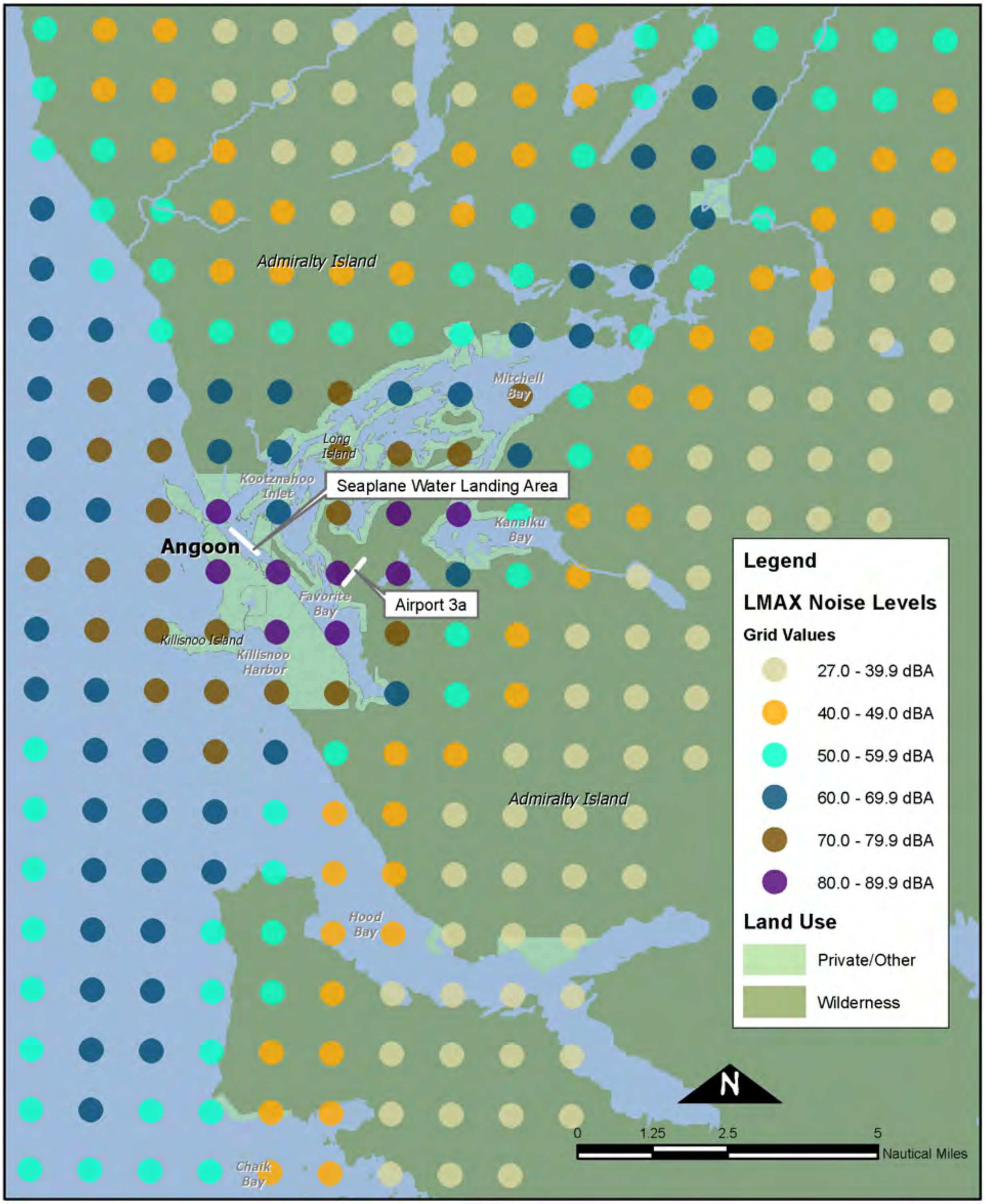
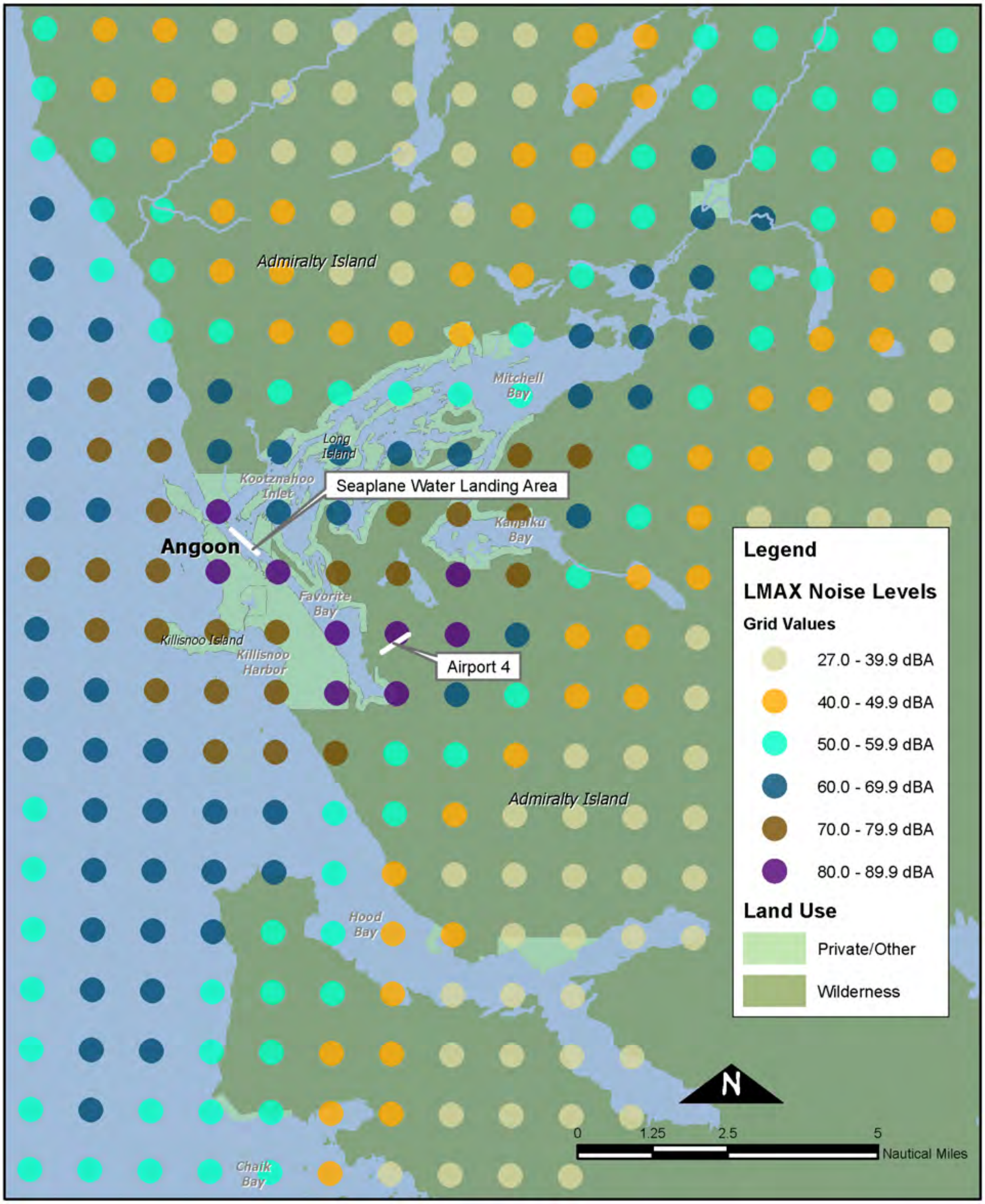


Figure B-22. Future Conditions Lmax Grid Results – Airport 3a



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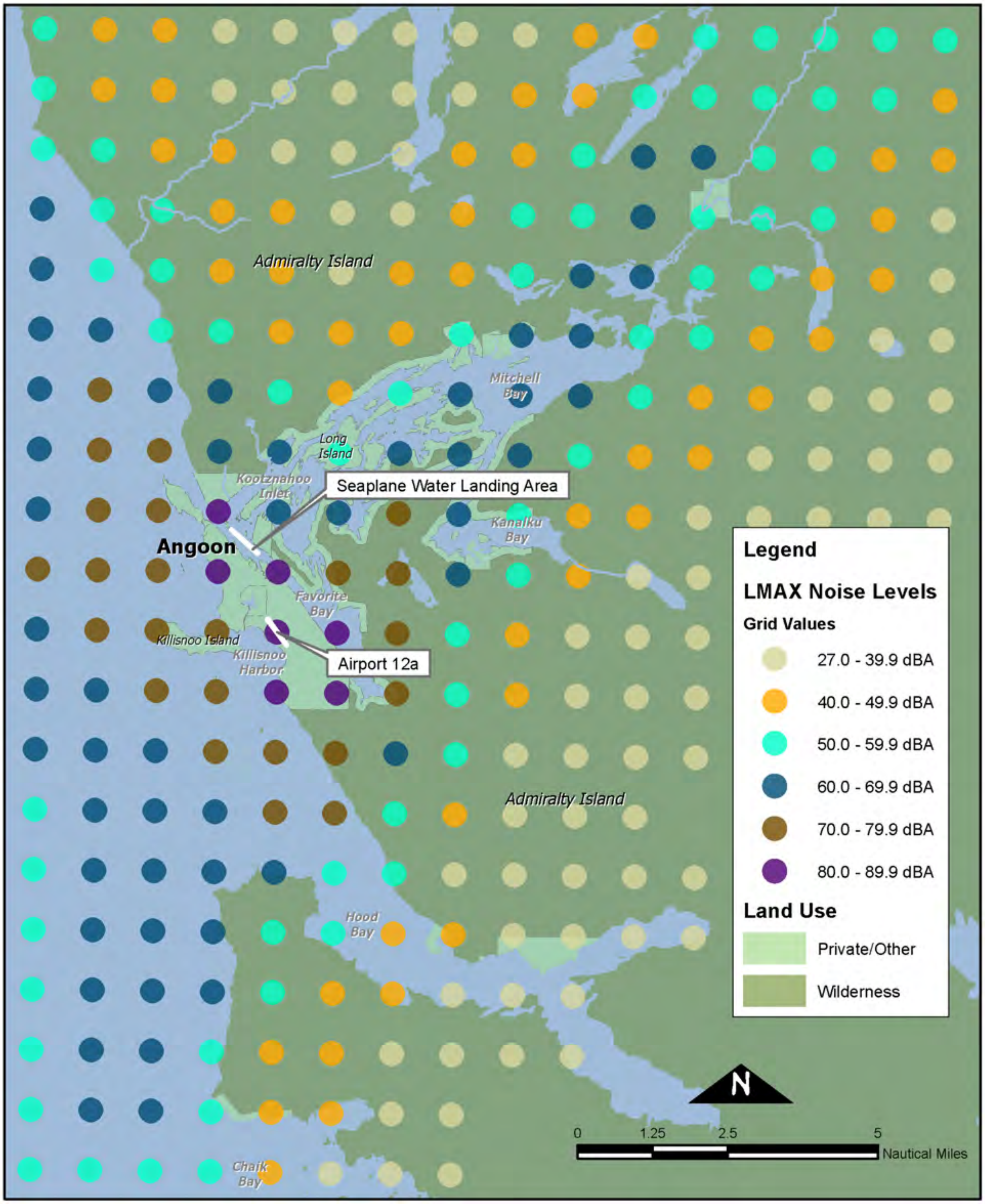

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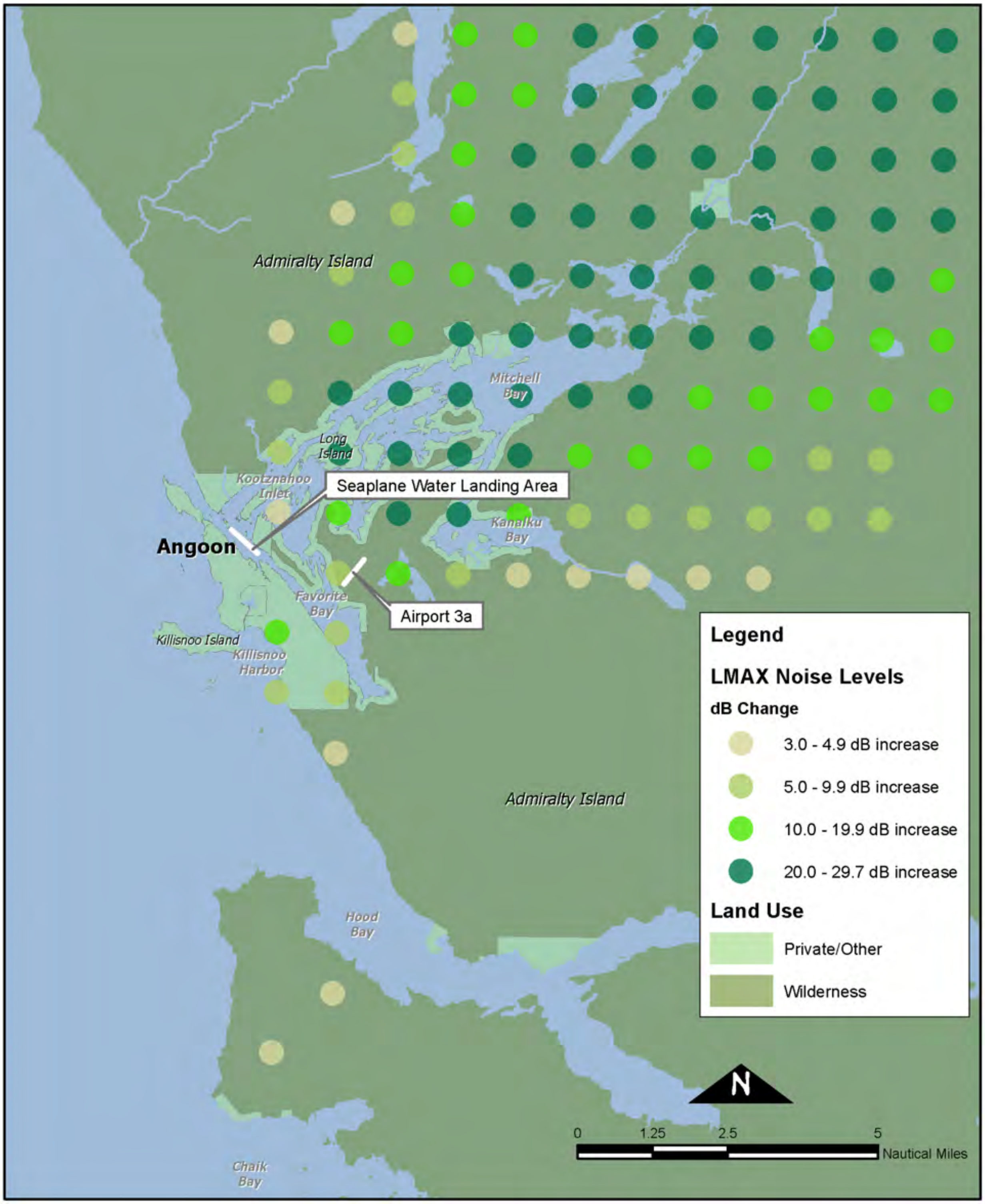

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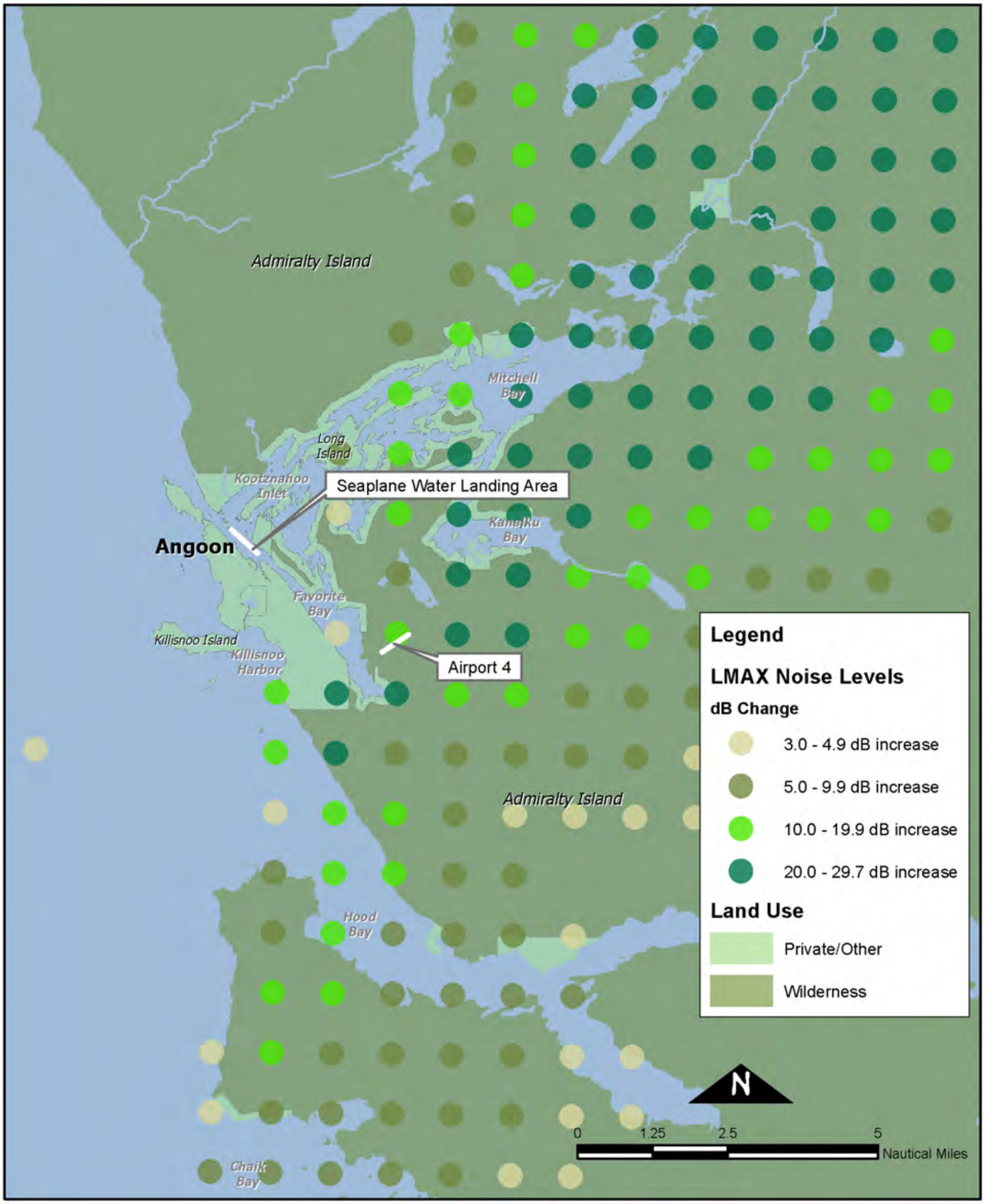

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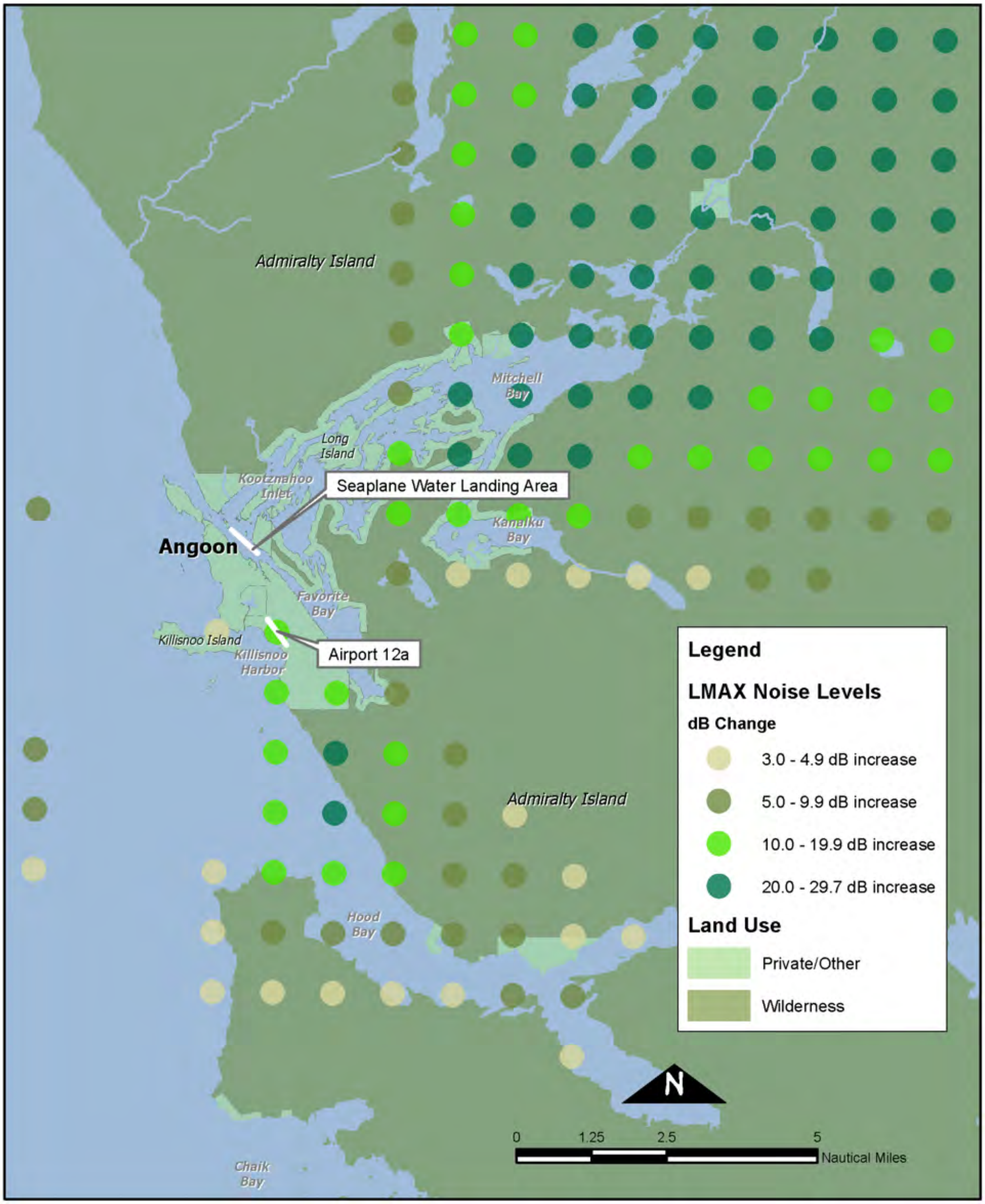

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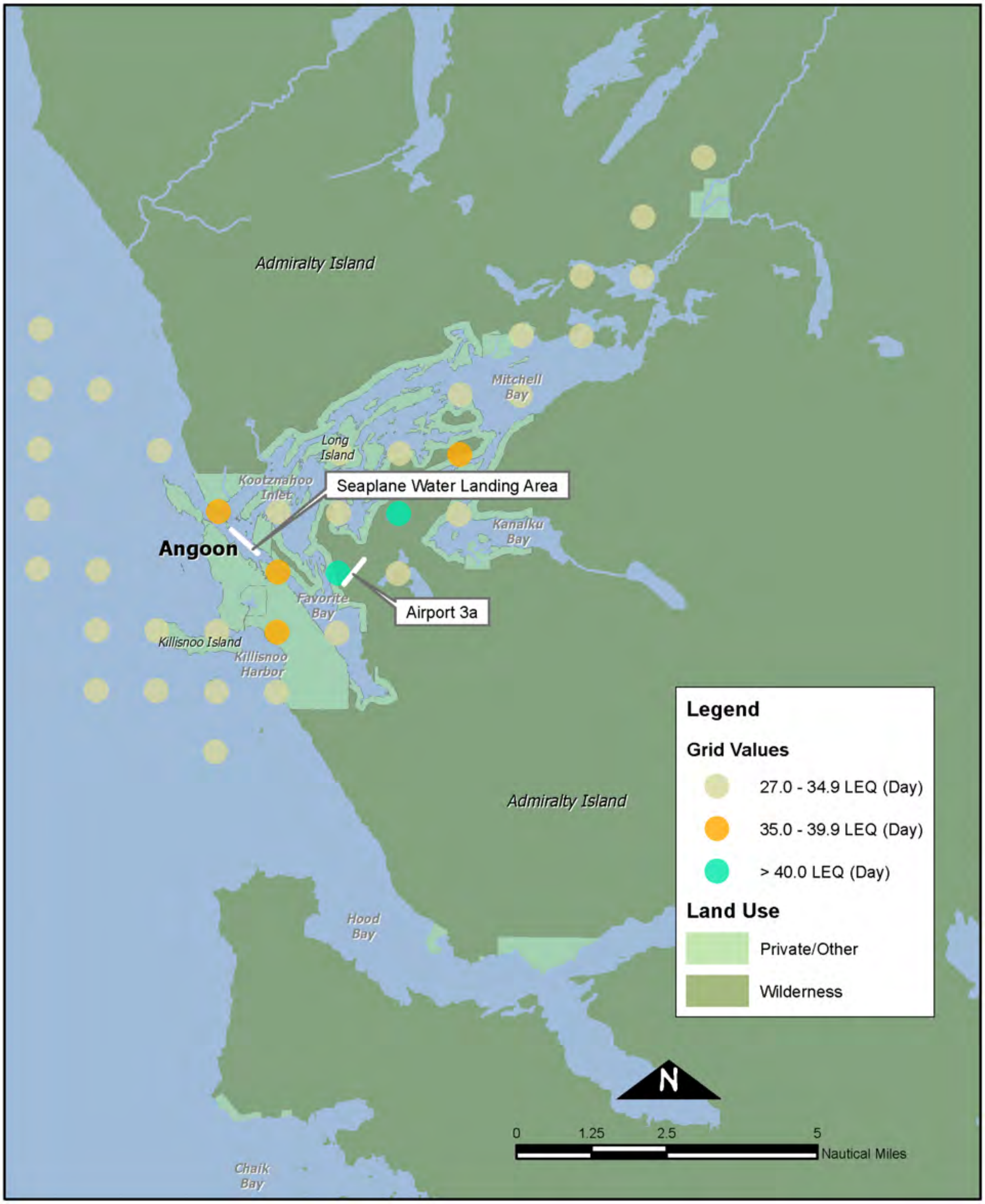

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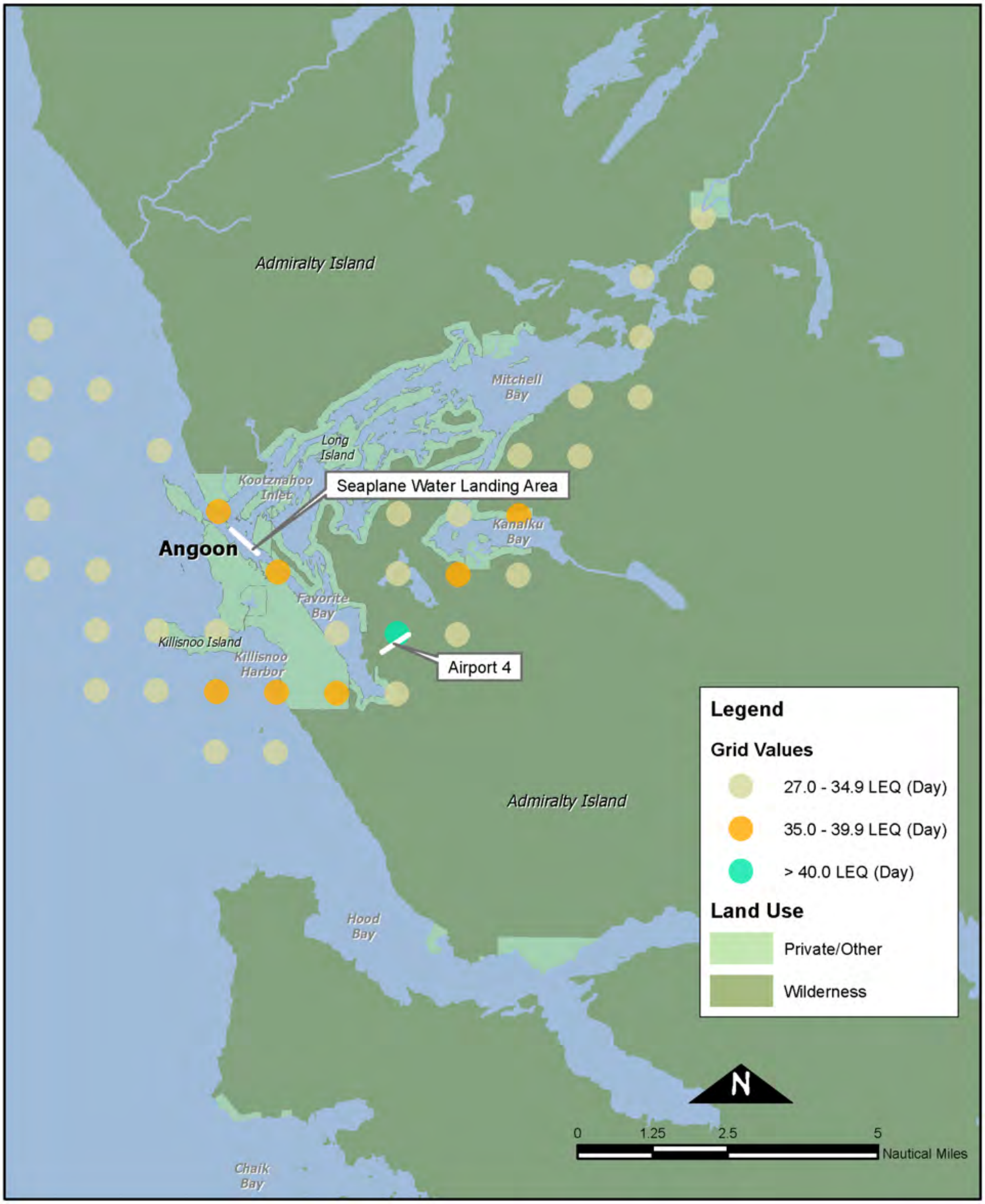

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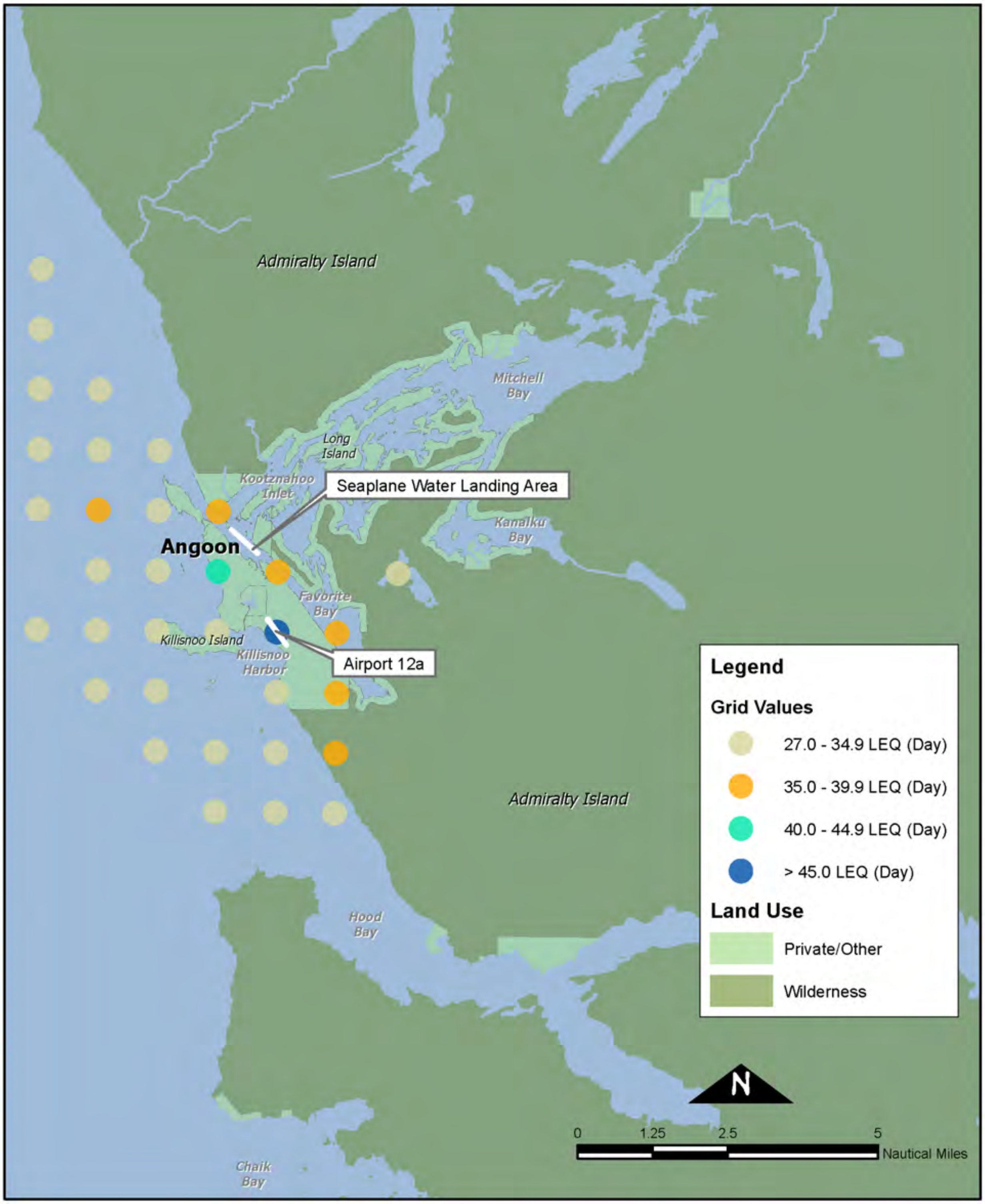

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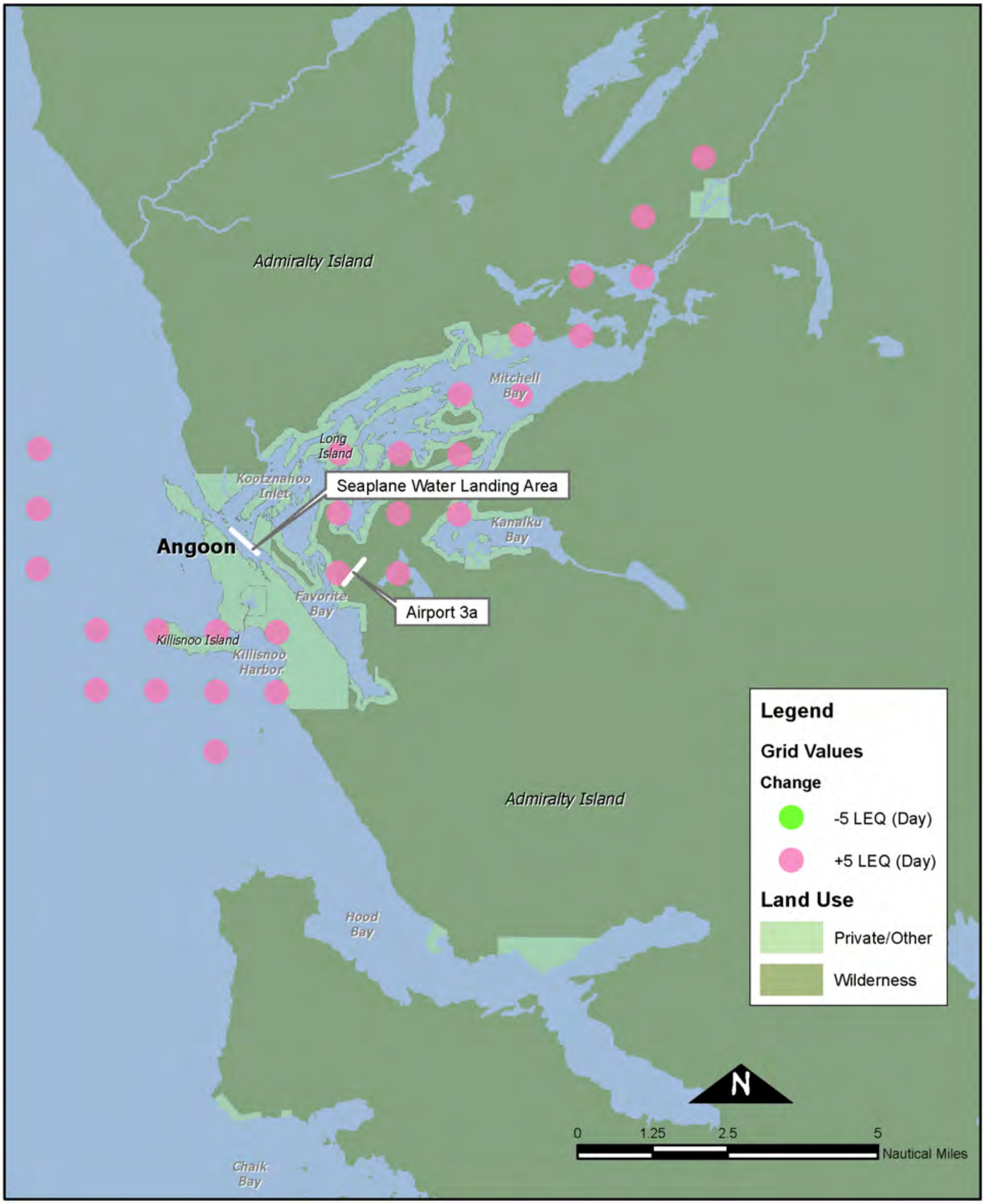

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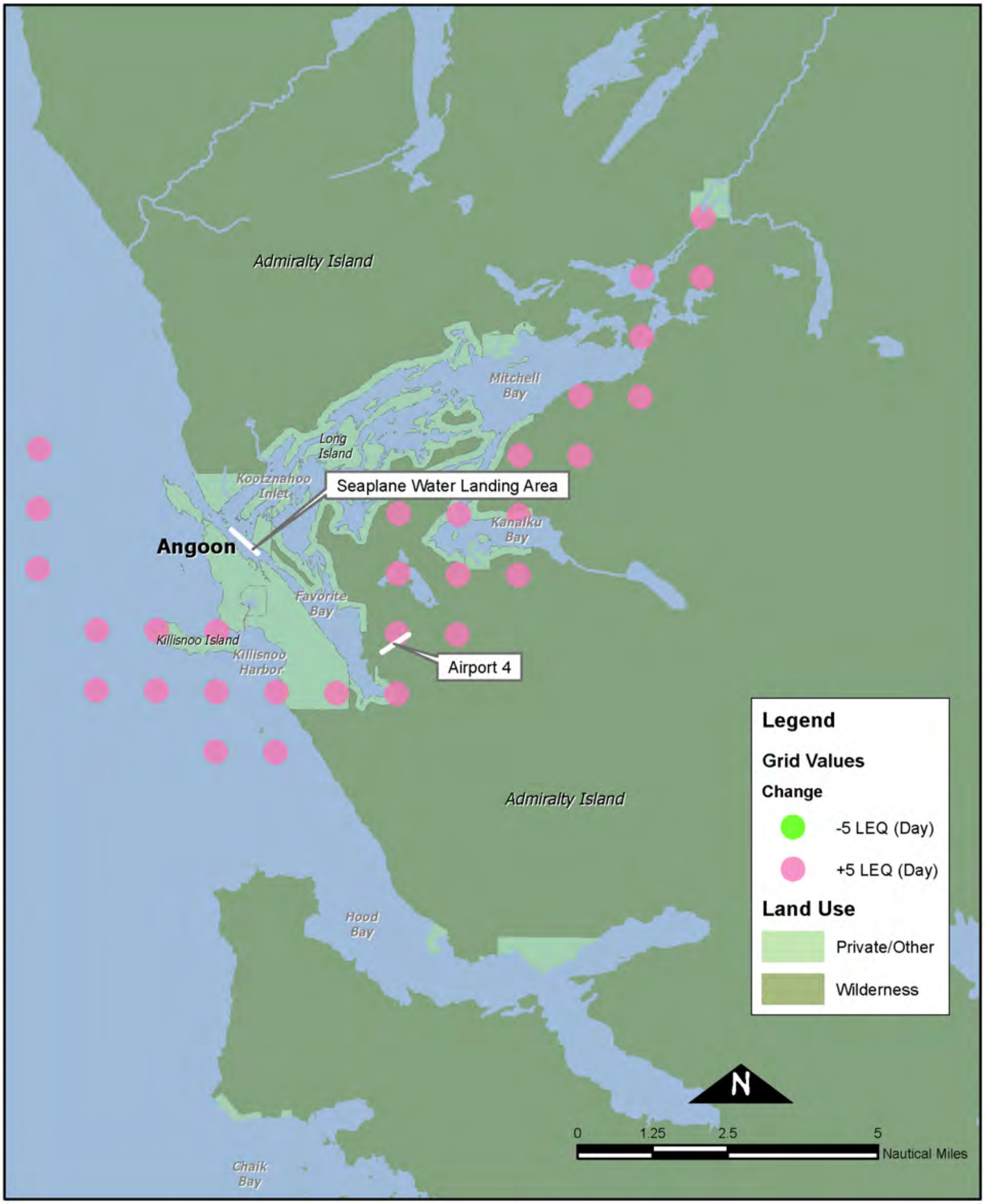

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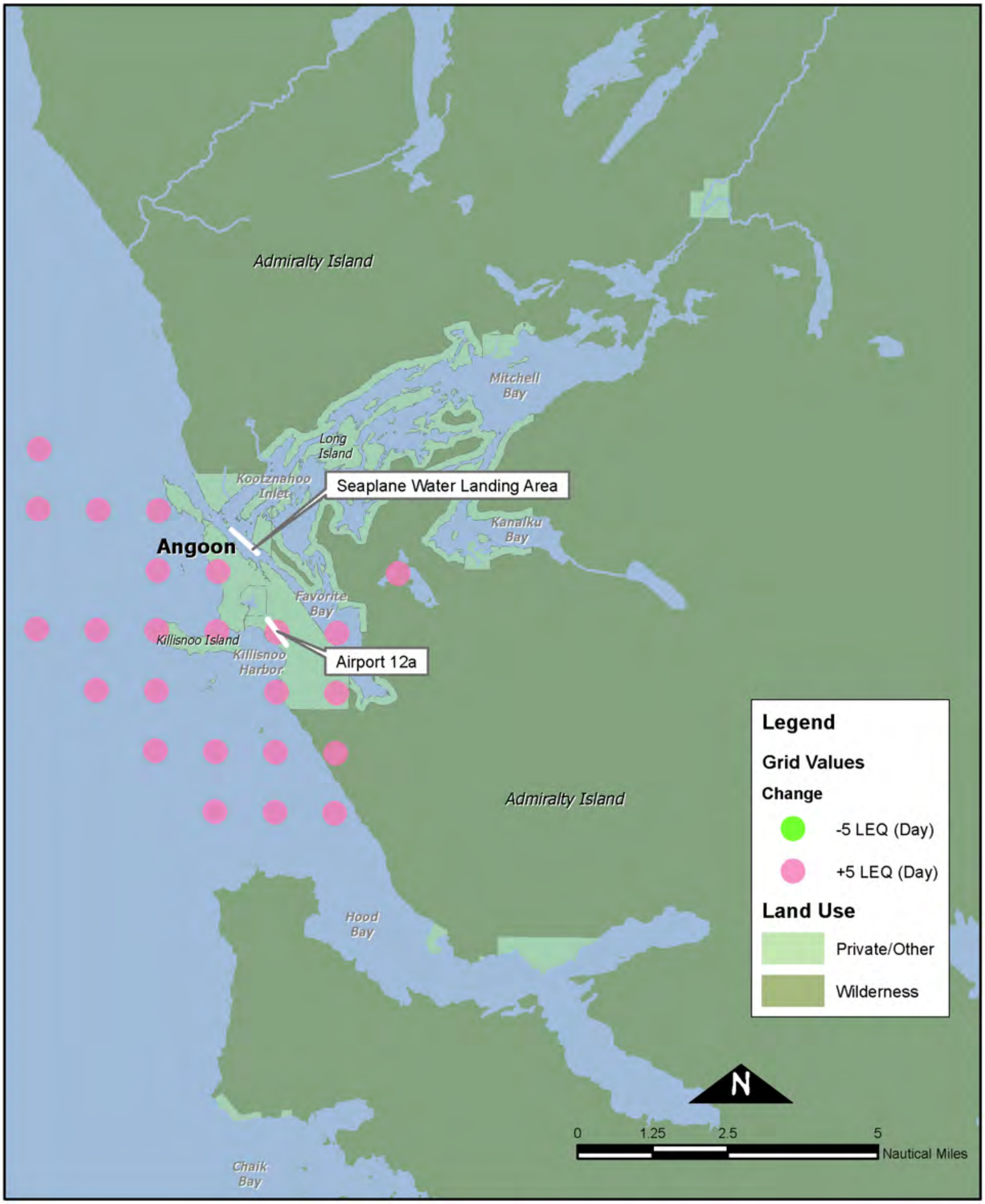

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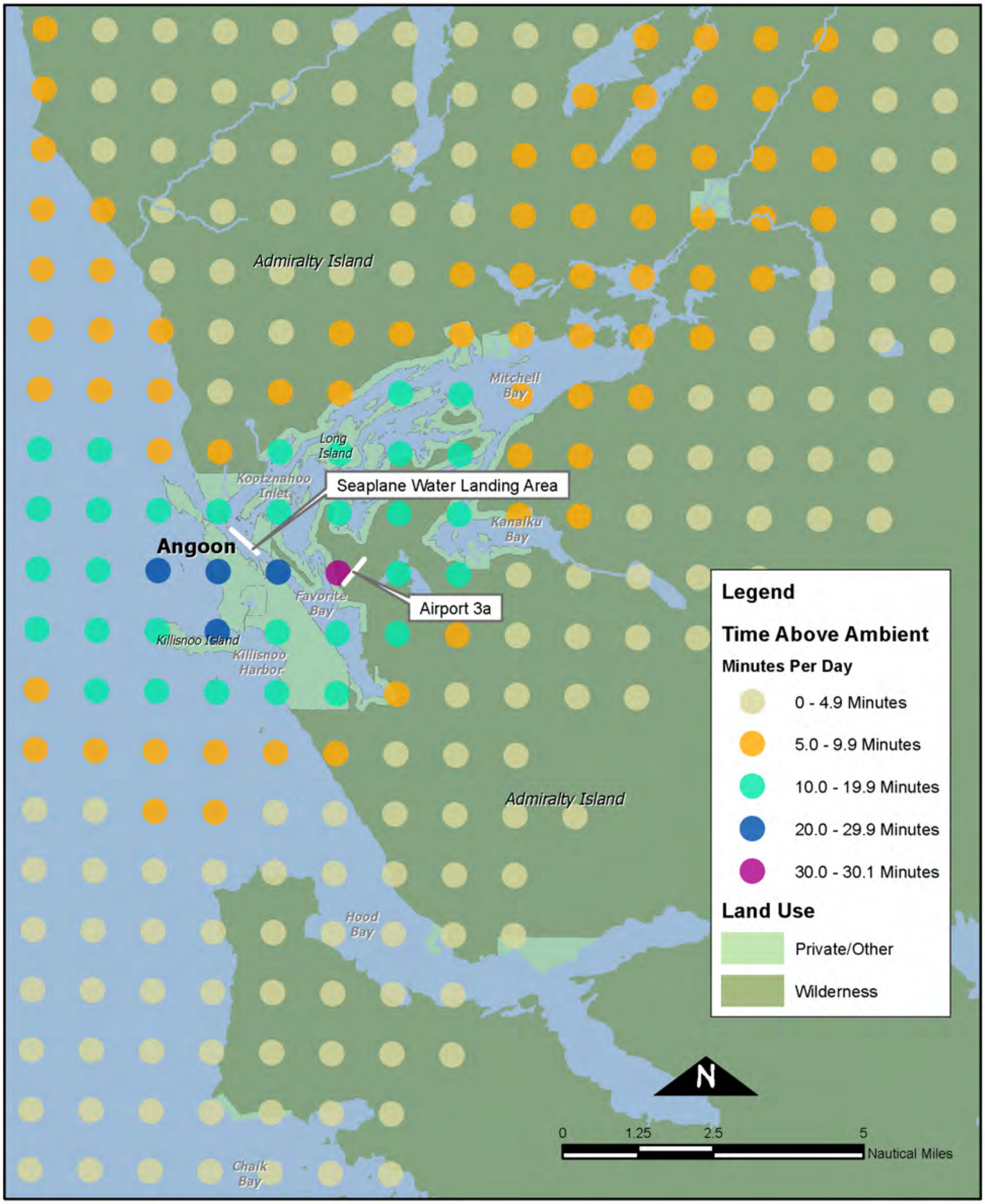
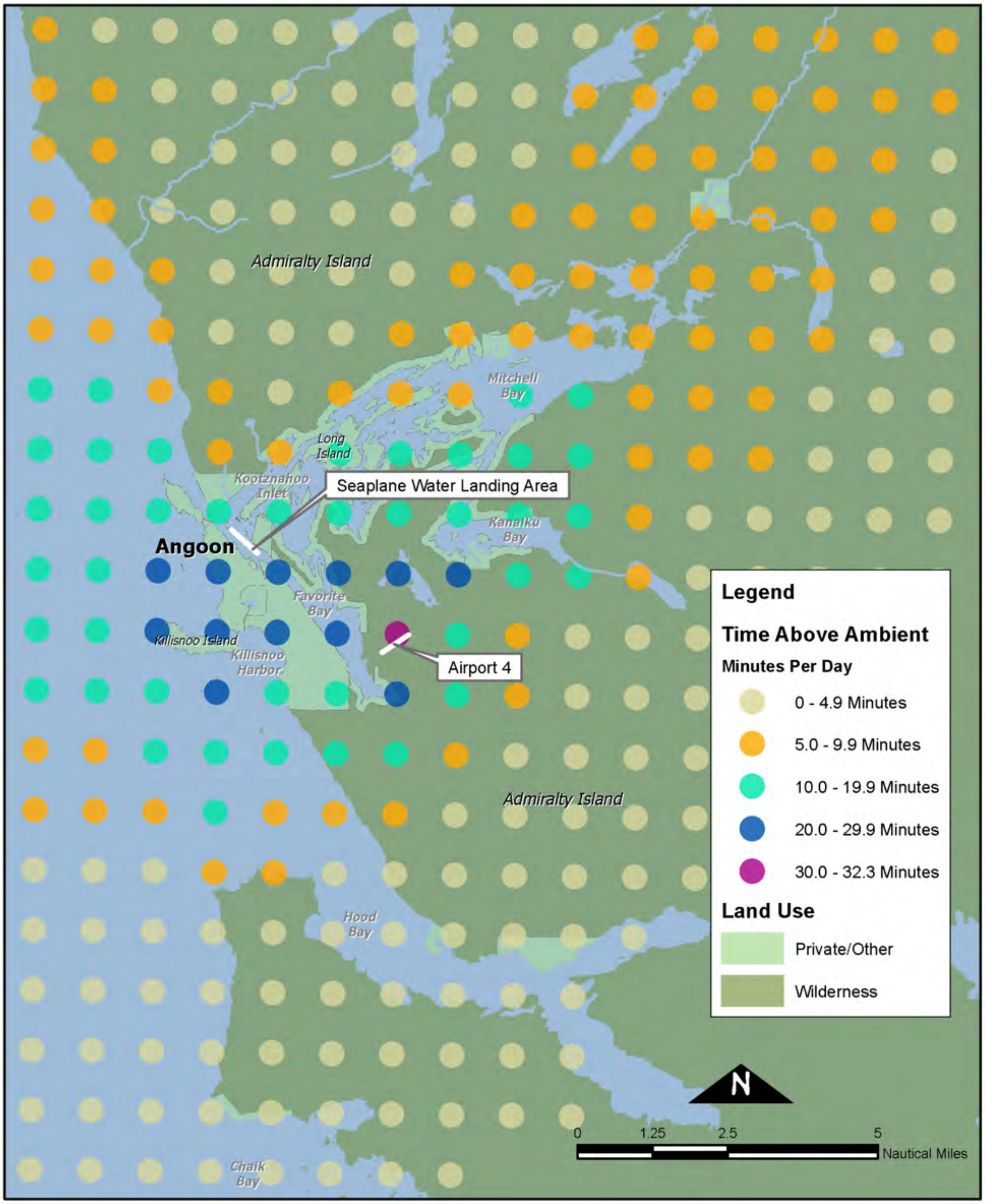


Figure B-34. Future Conditions TAA Grid Results – Airport 3a



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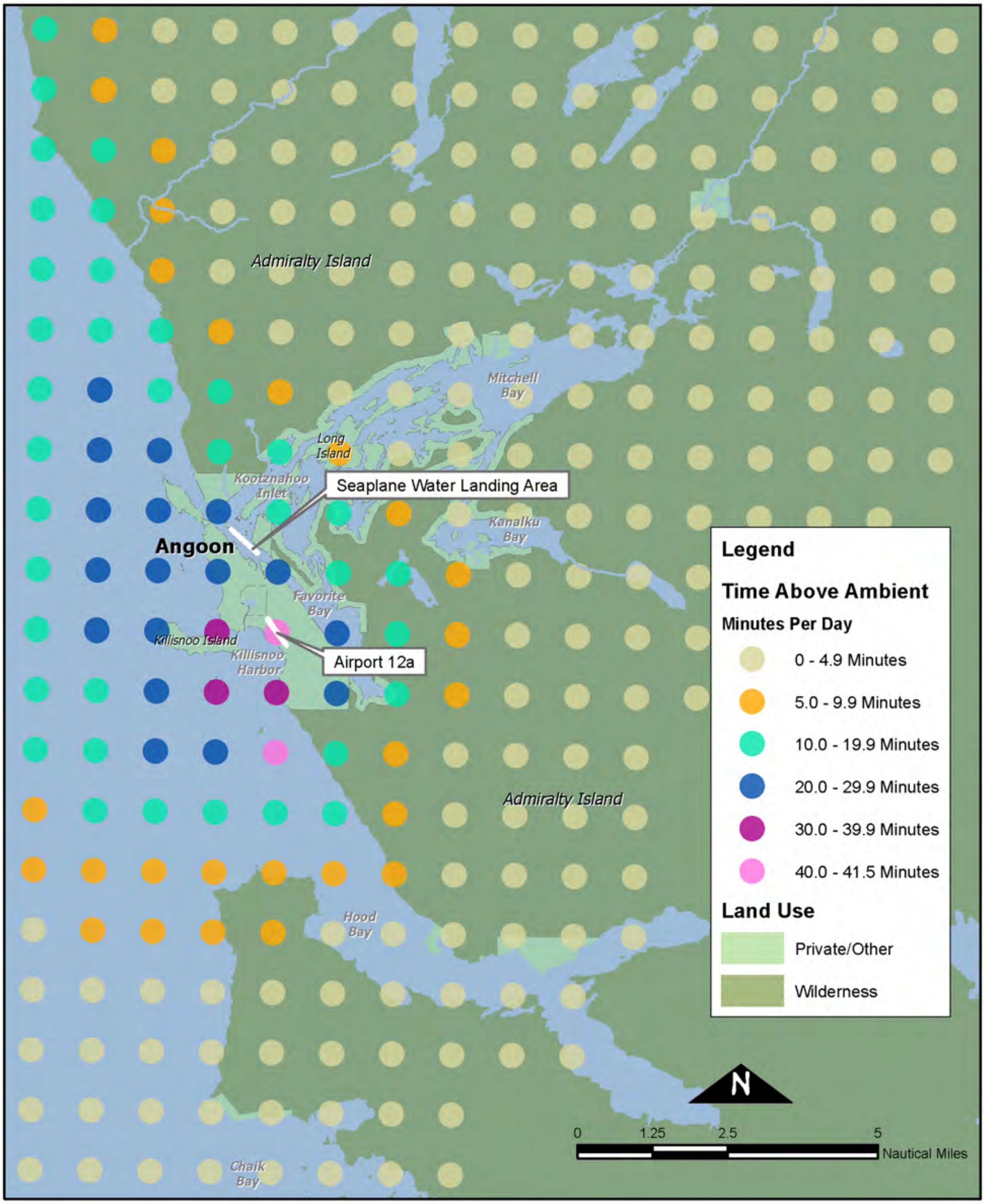

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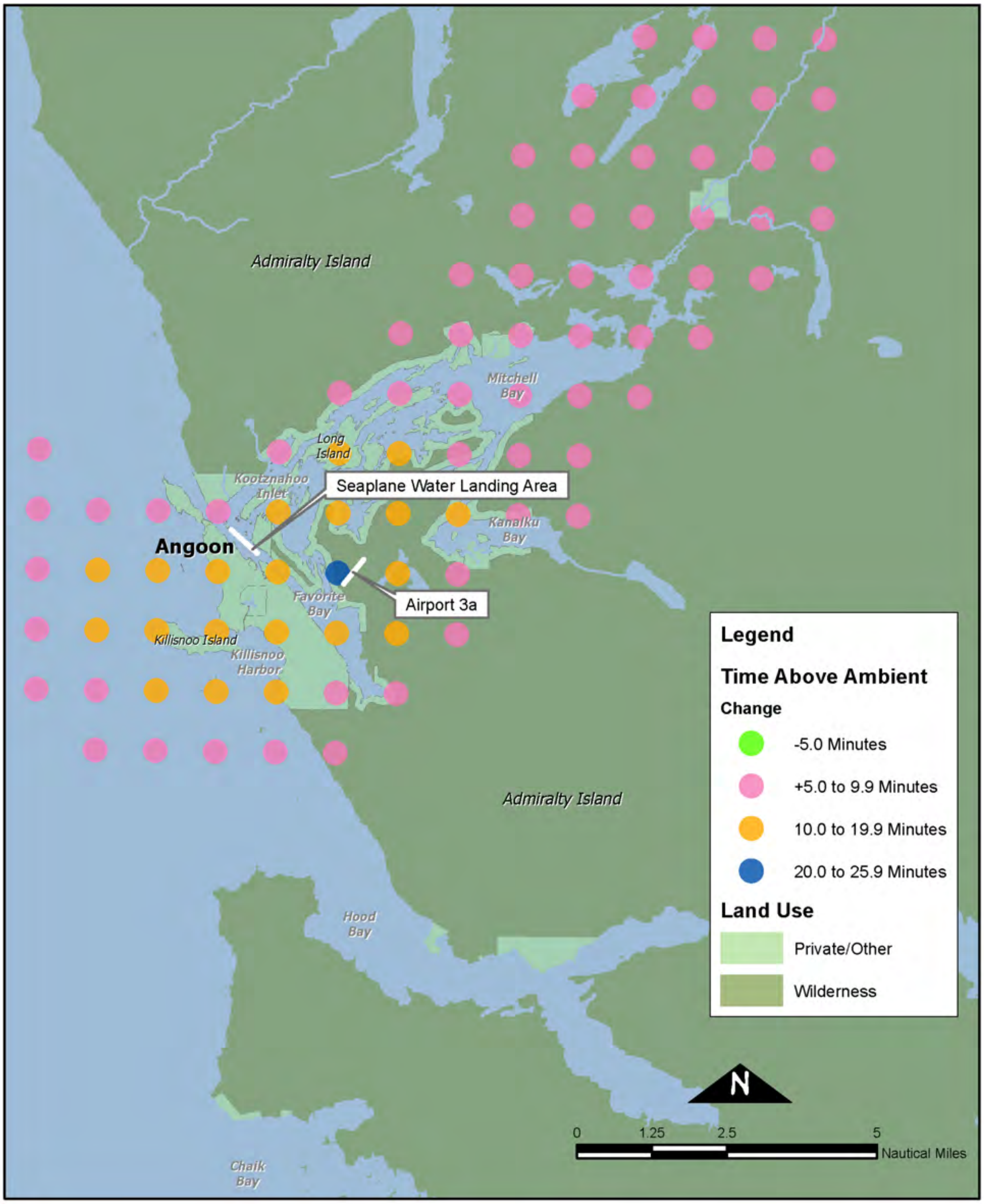

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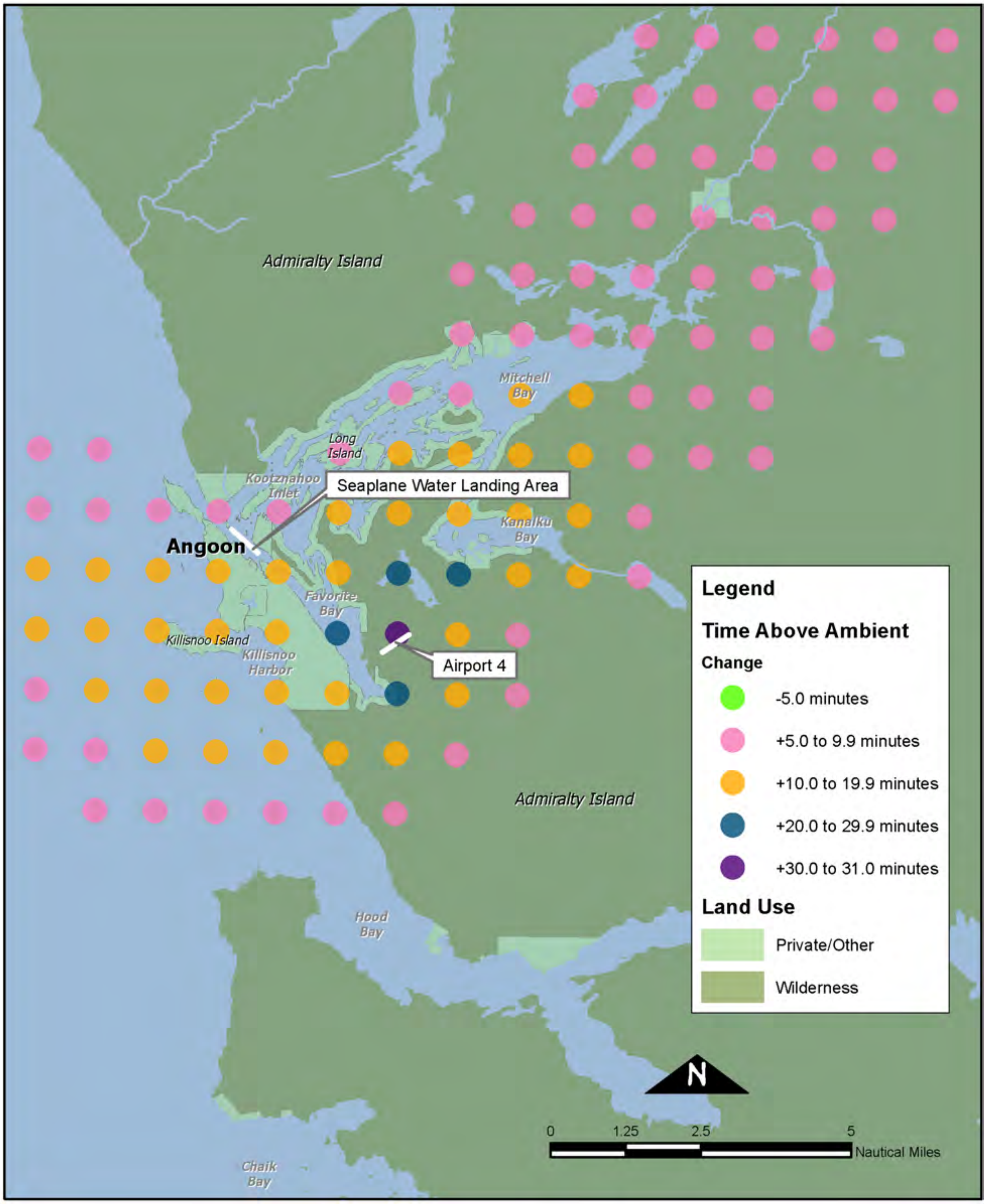

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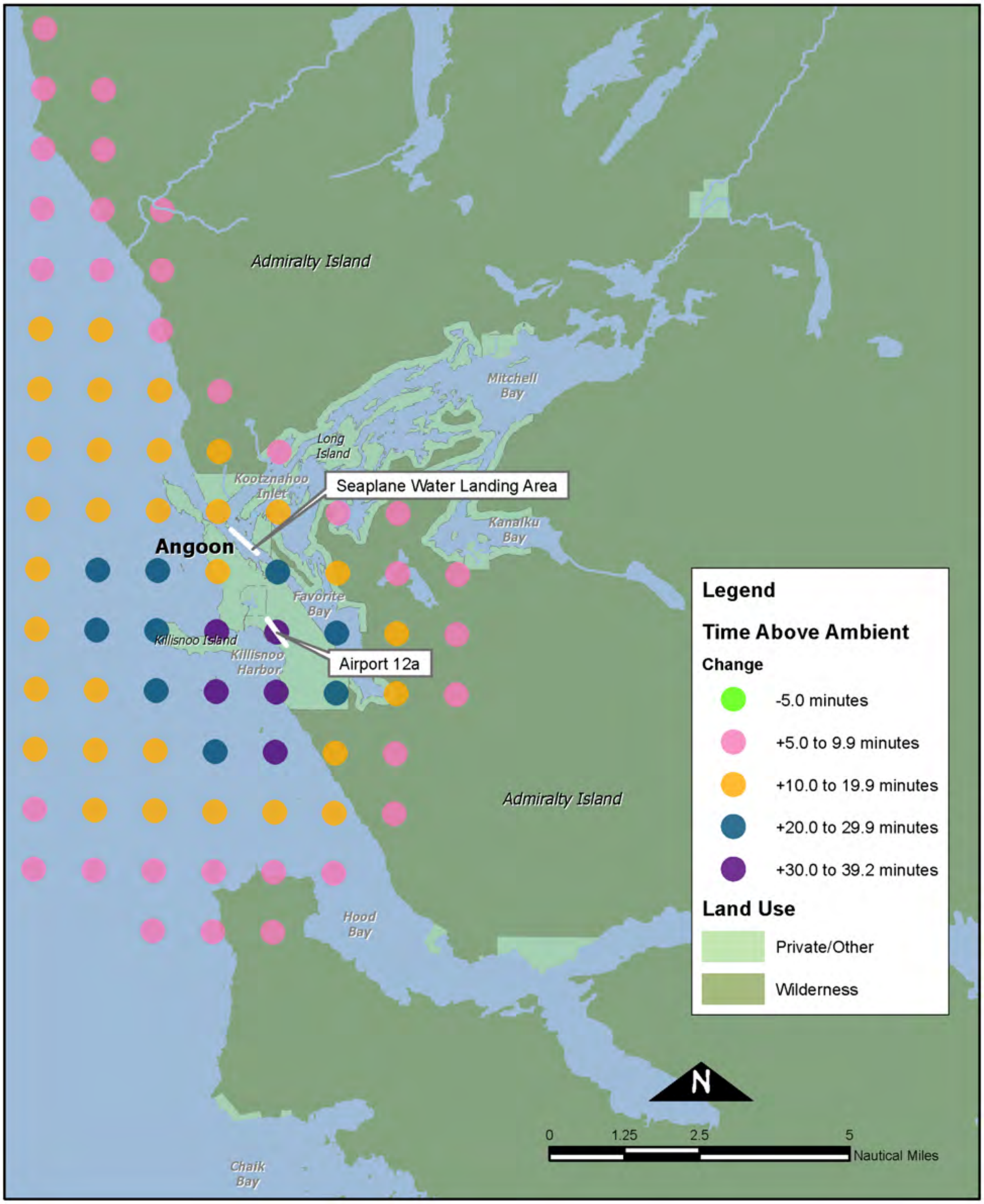

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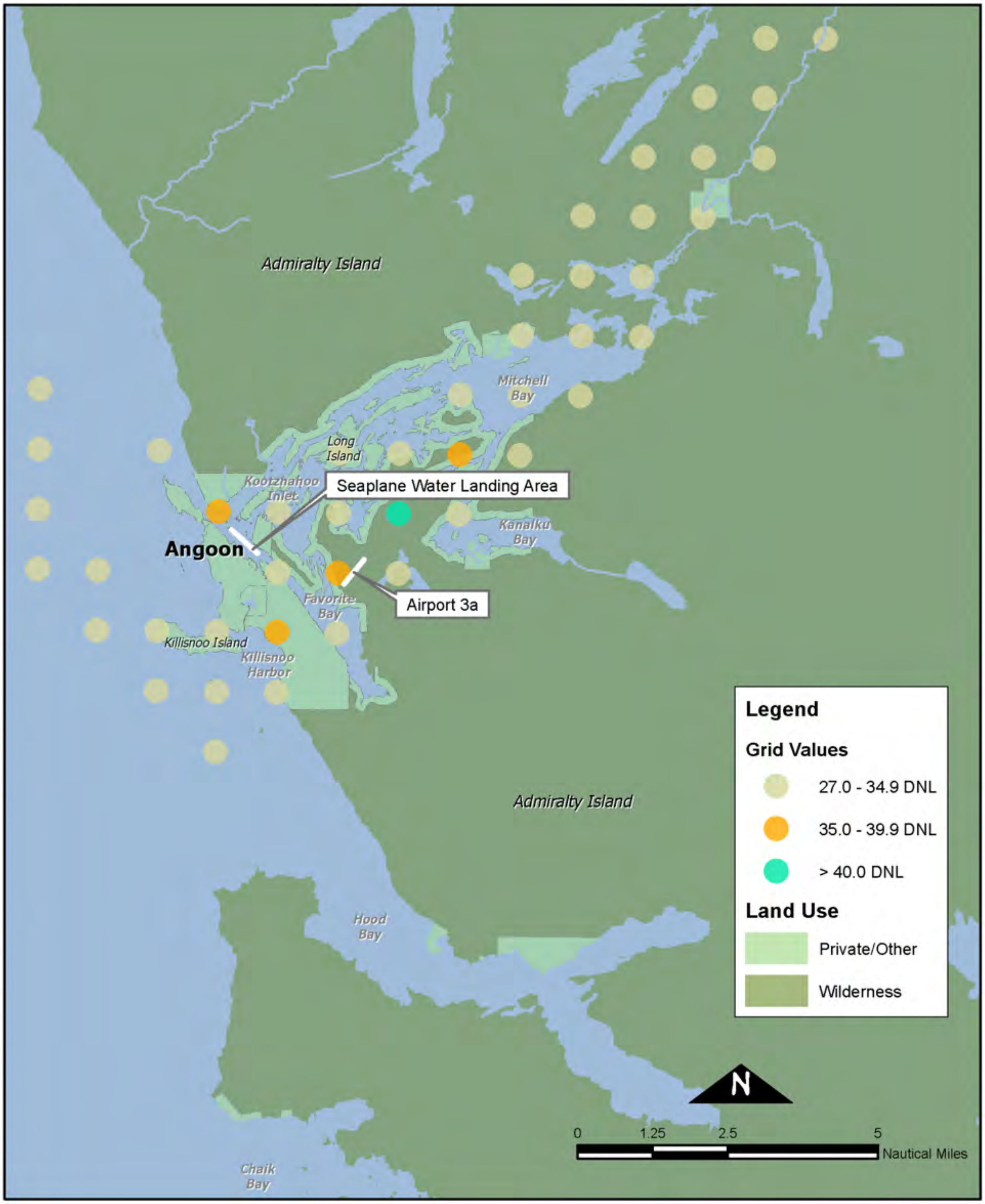
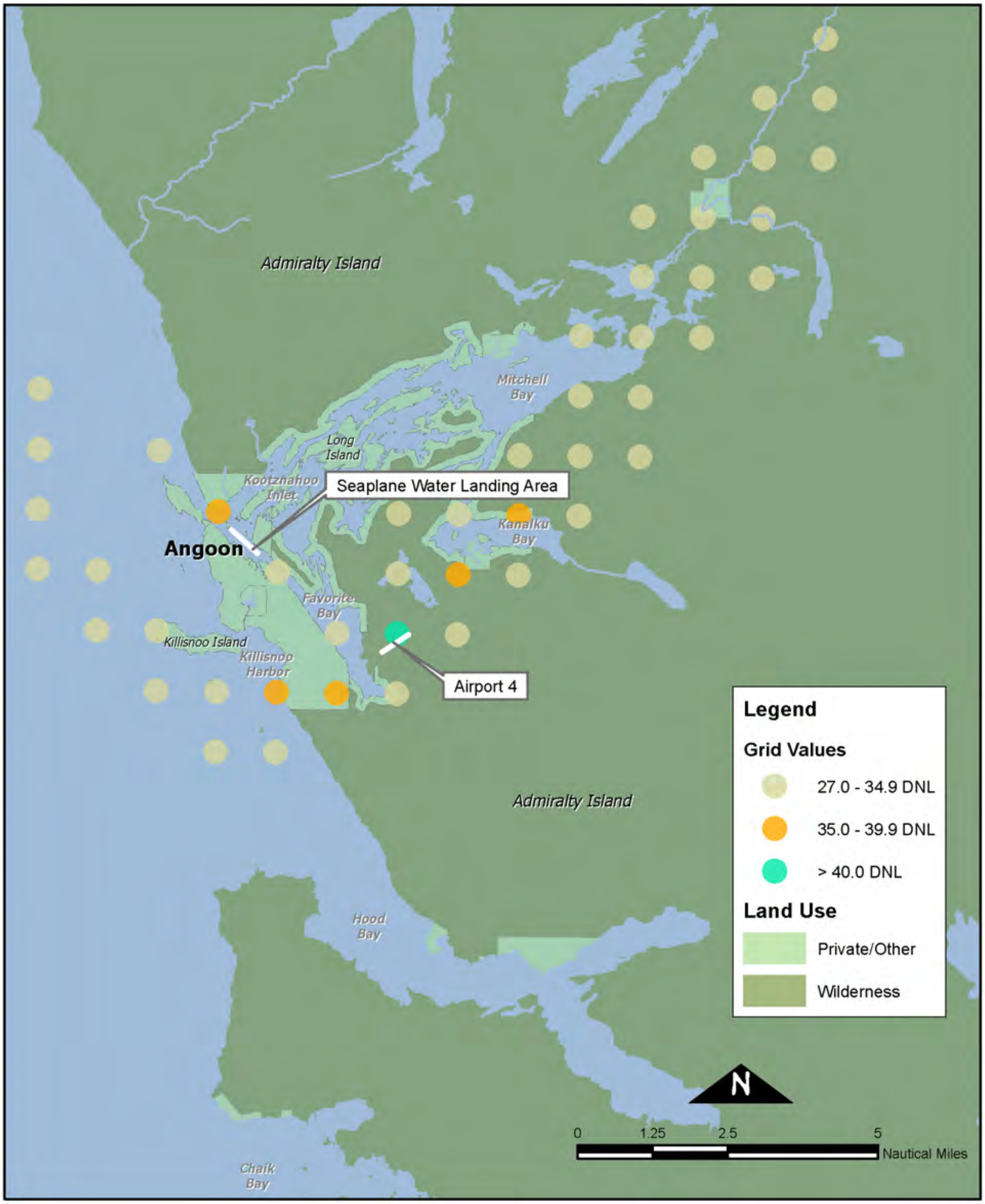


Figure B-40. Future Conditions DNL Cumulative Grid Results – Airport 3a



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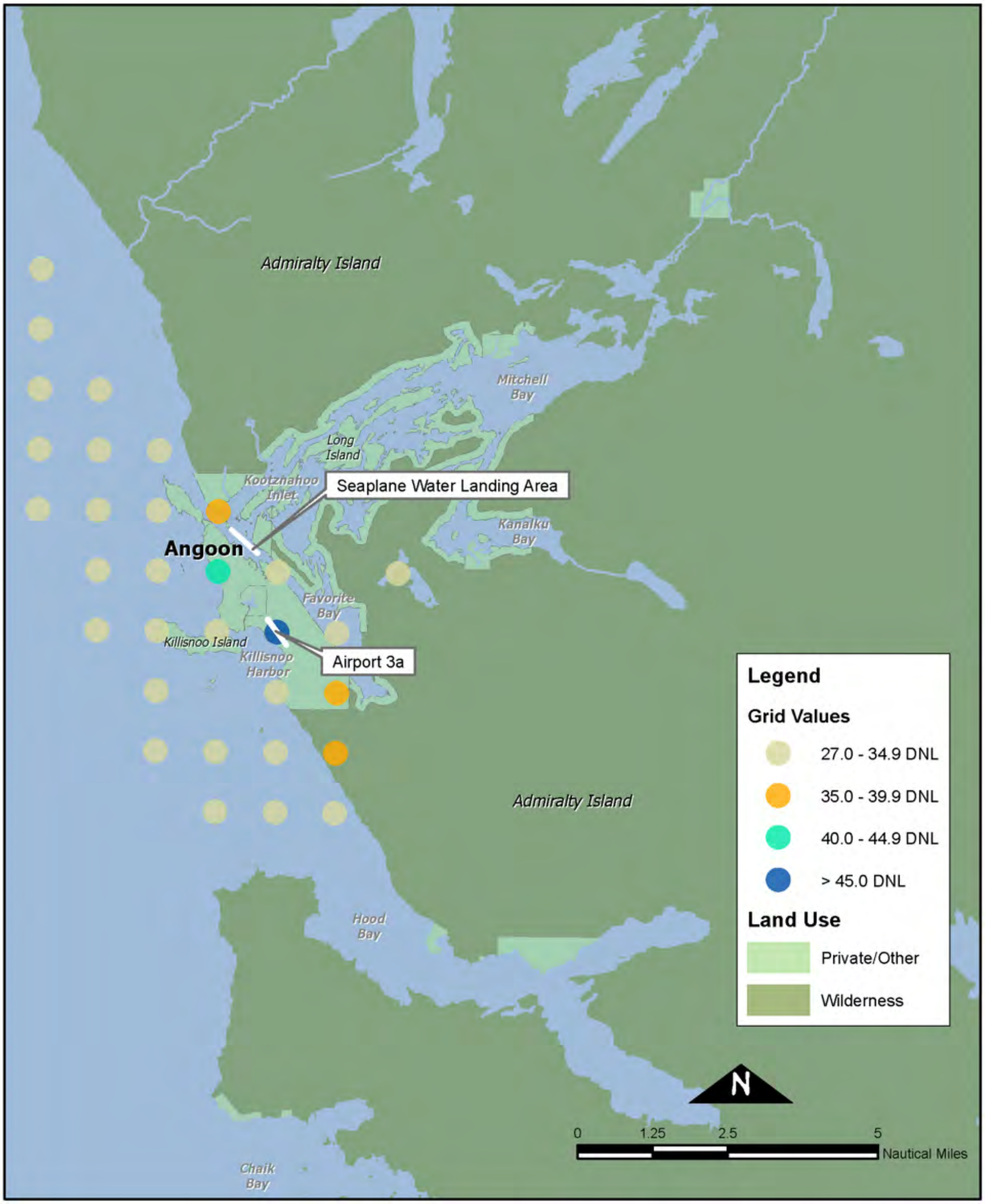

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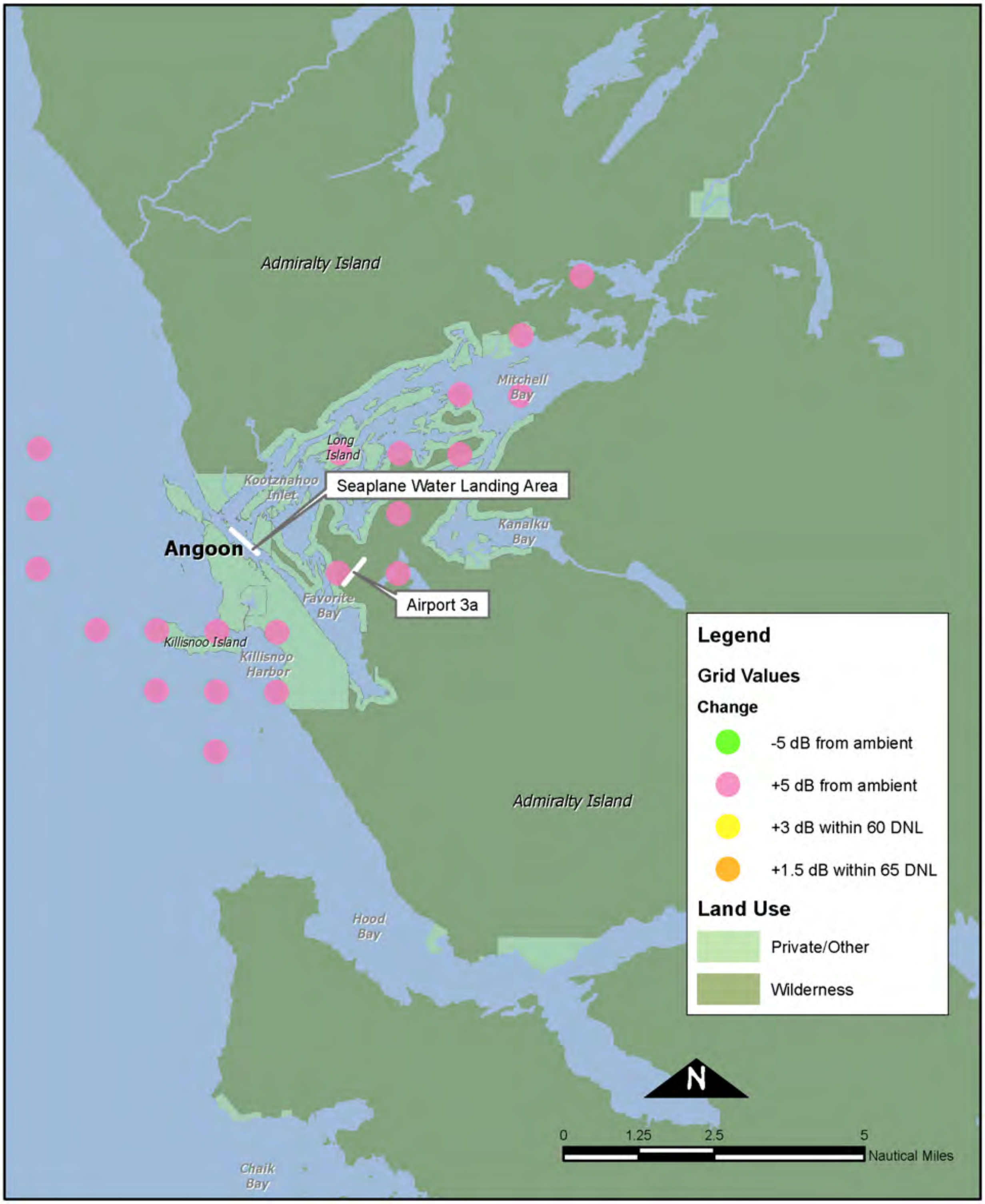

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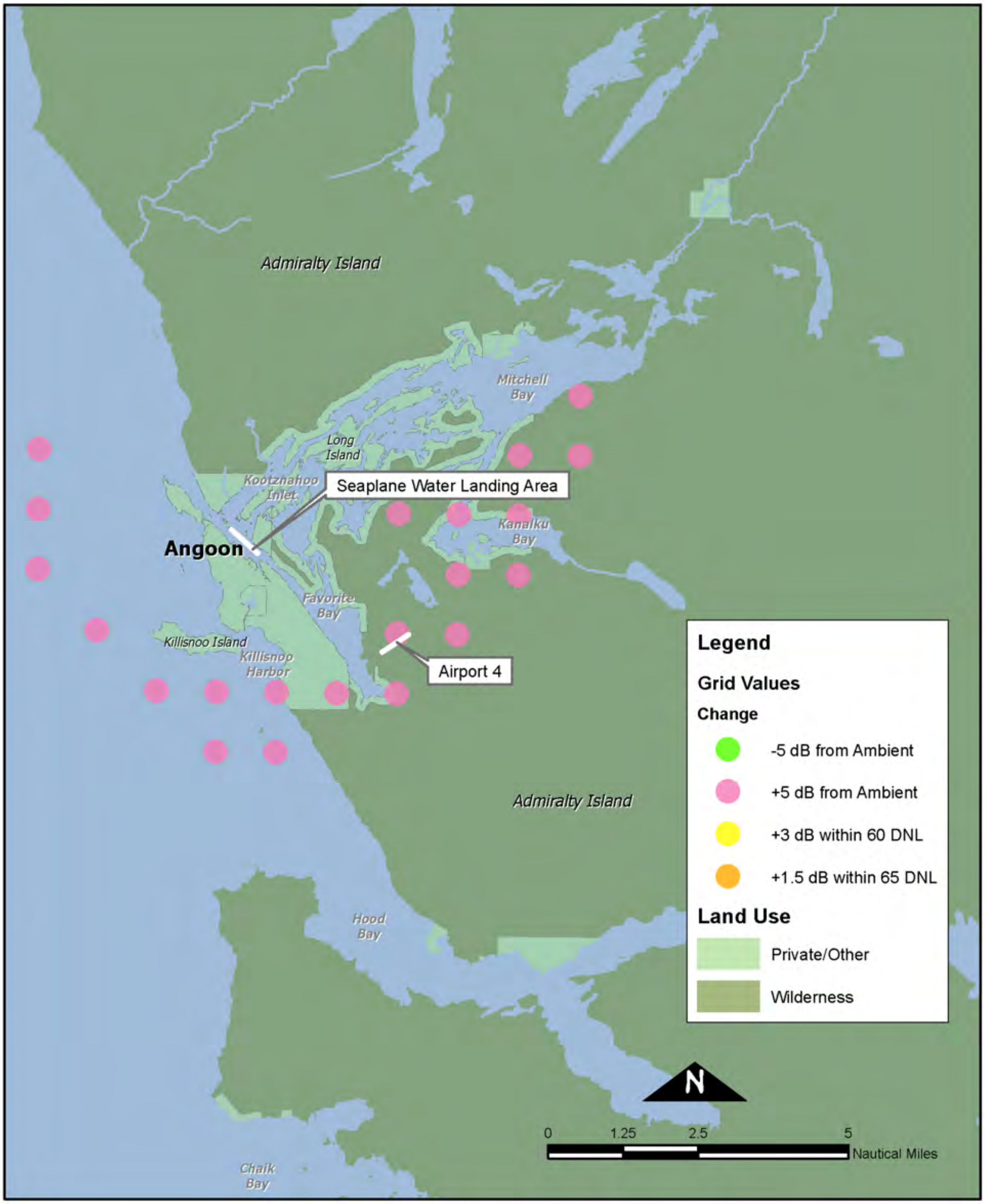

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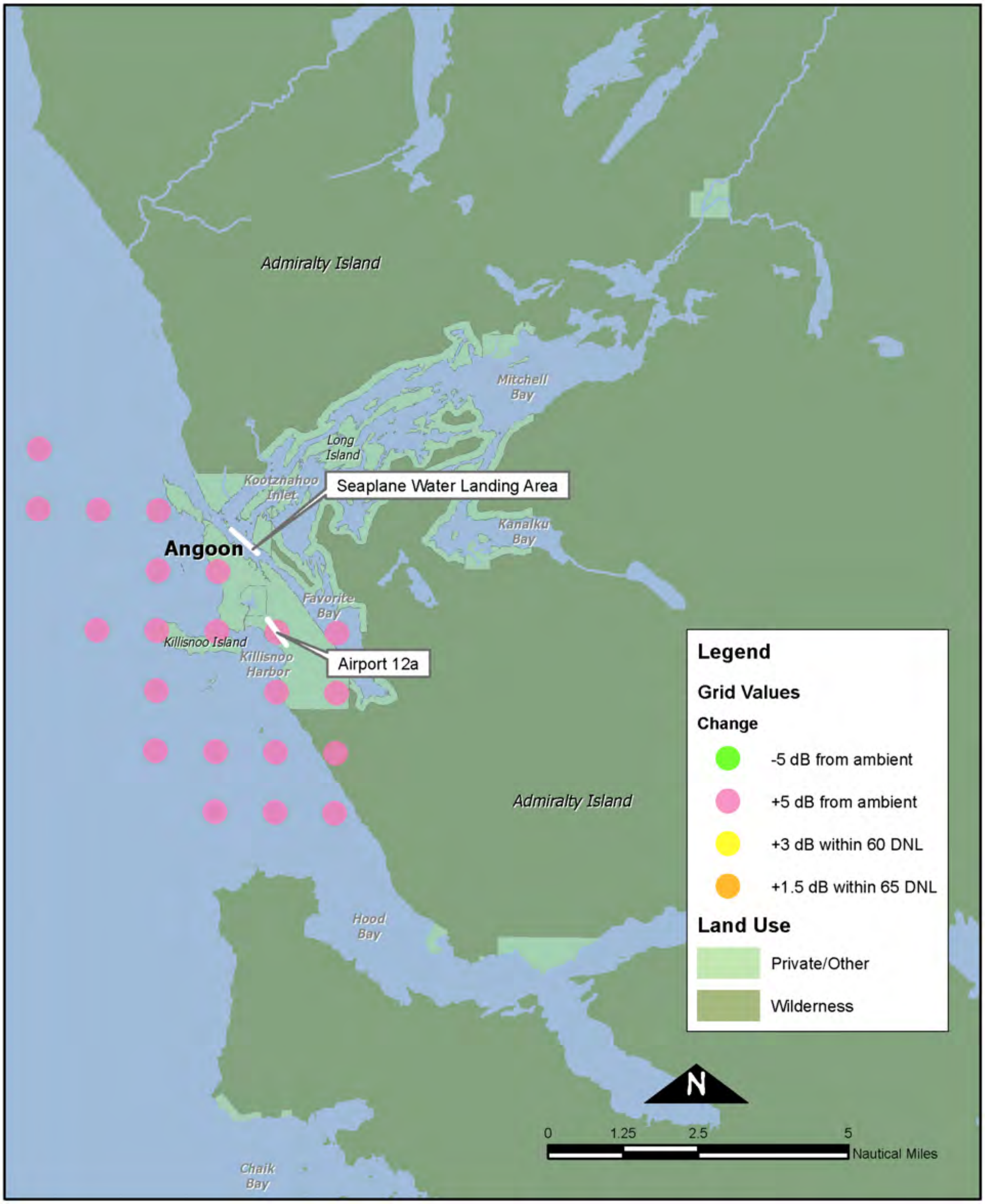

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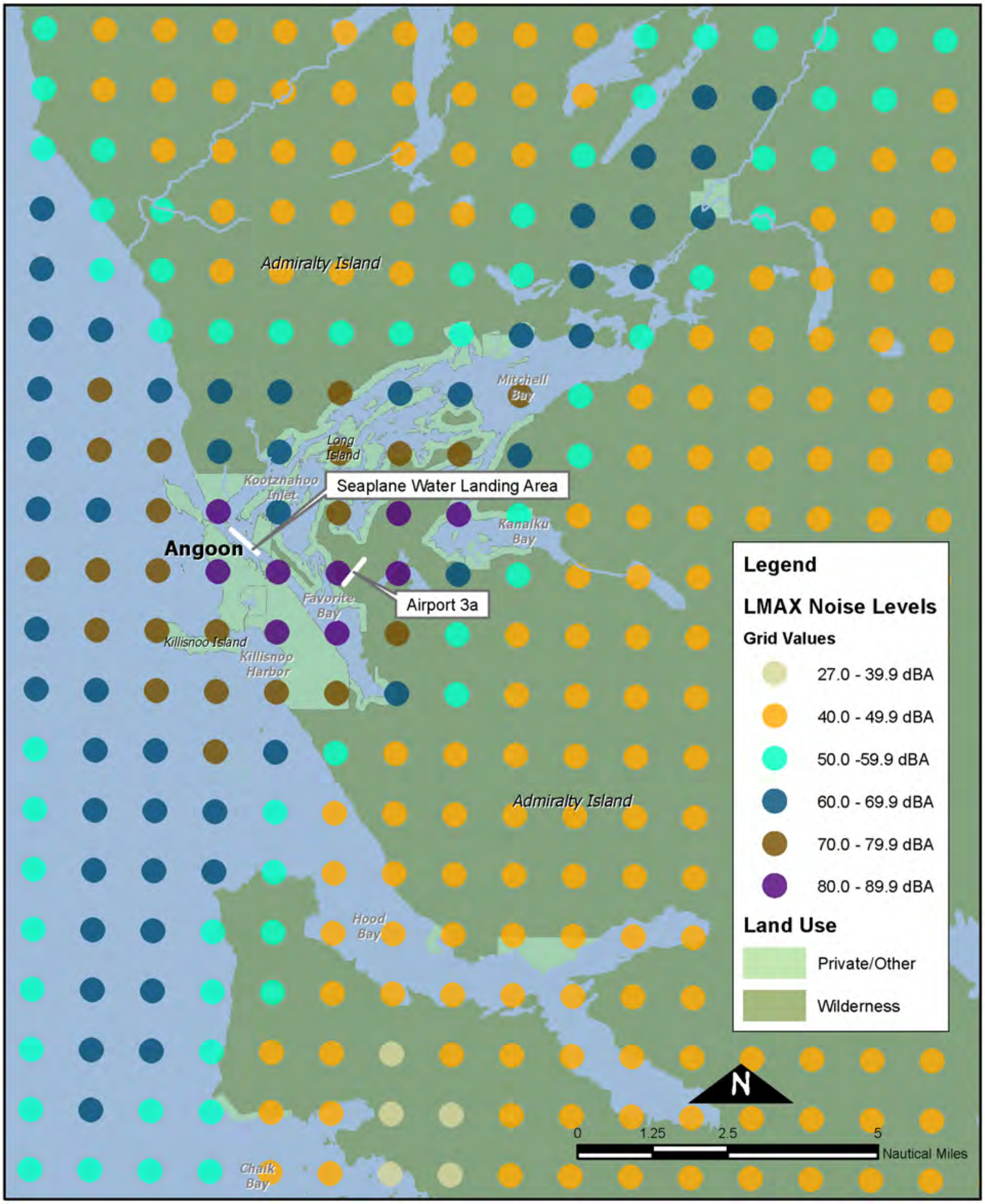

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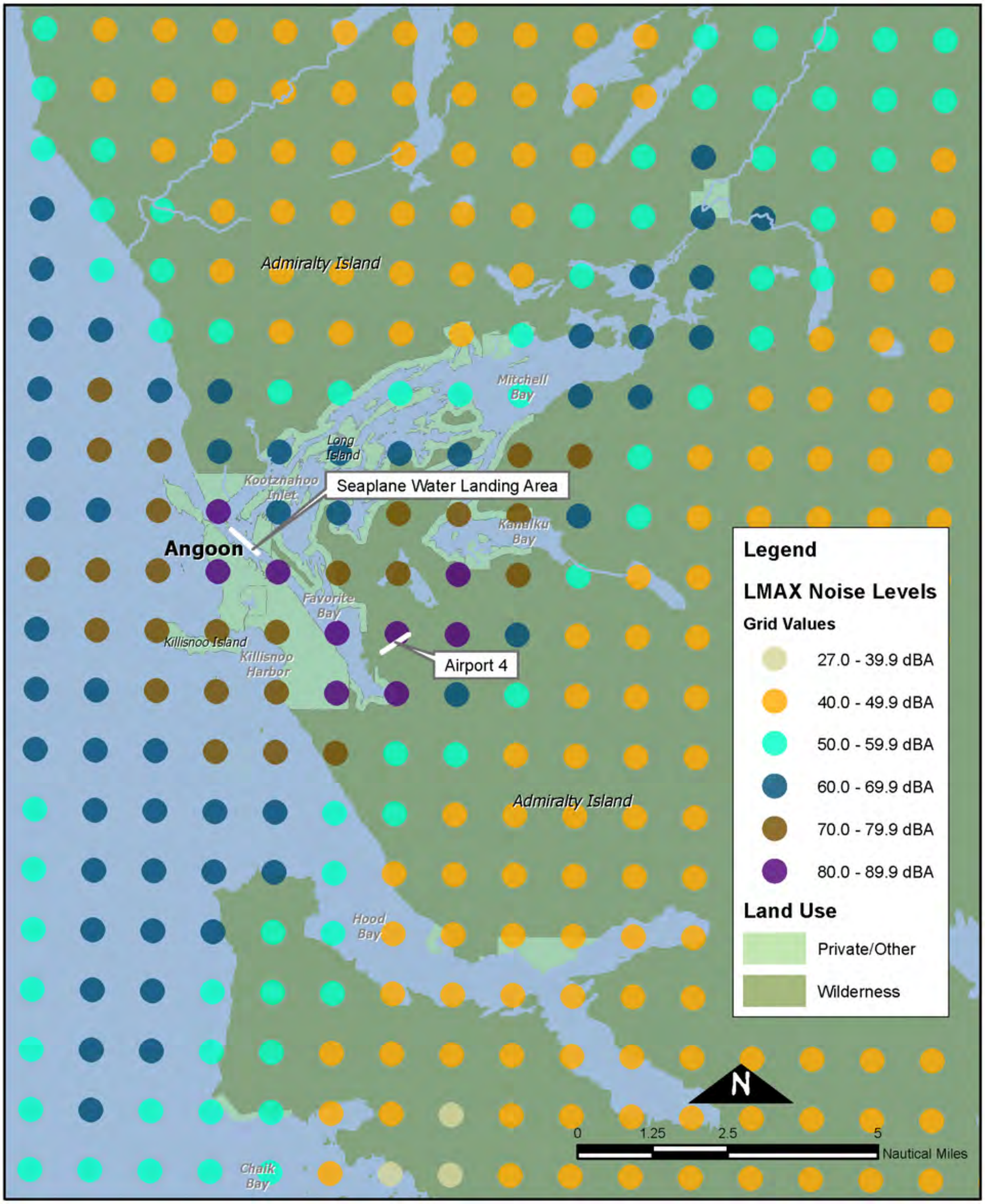

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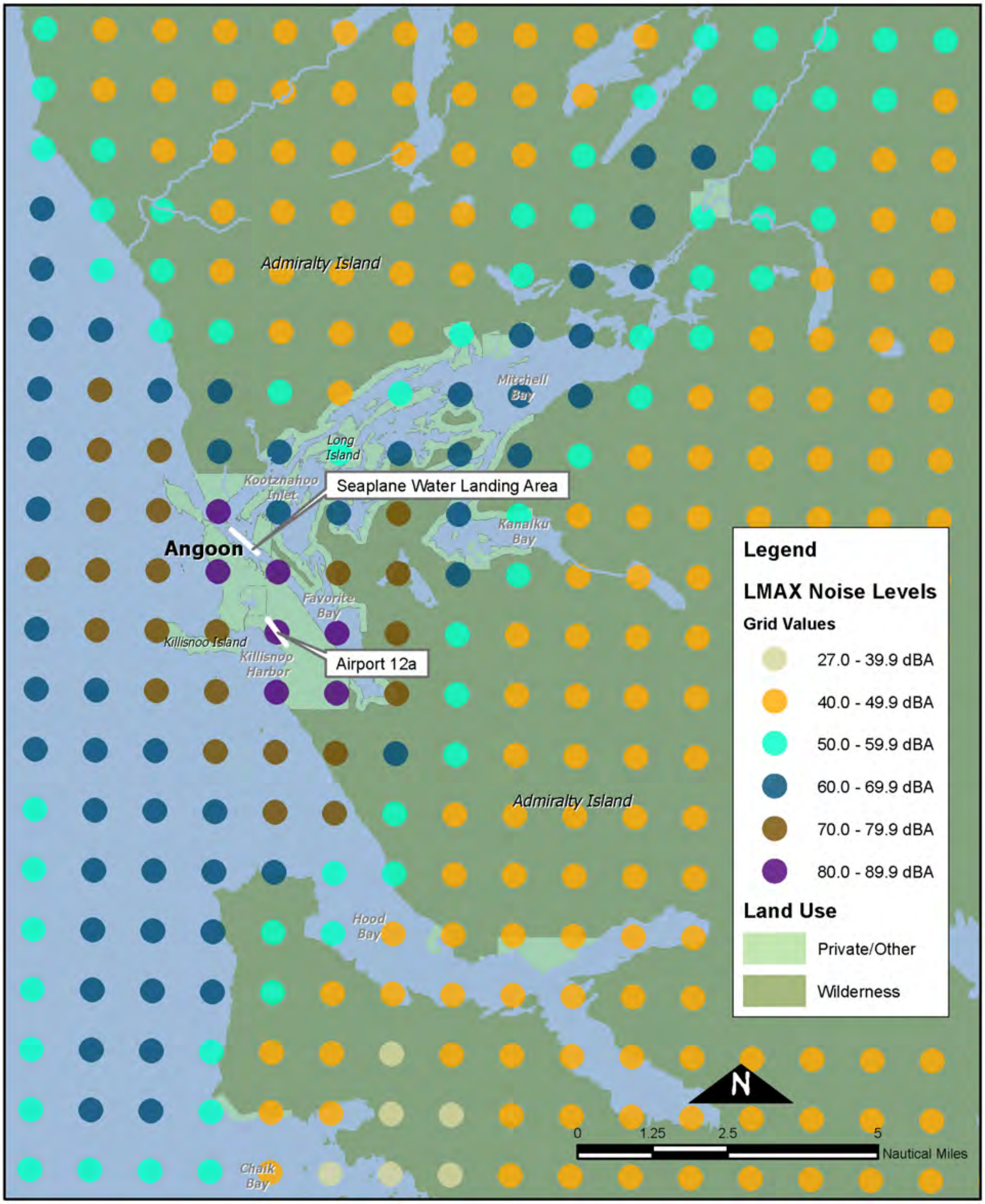

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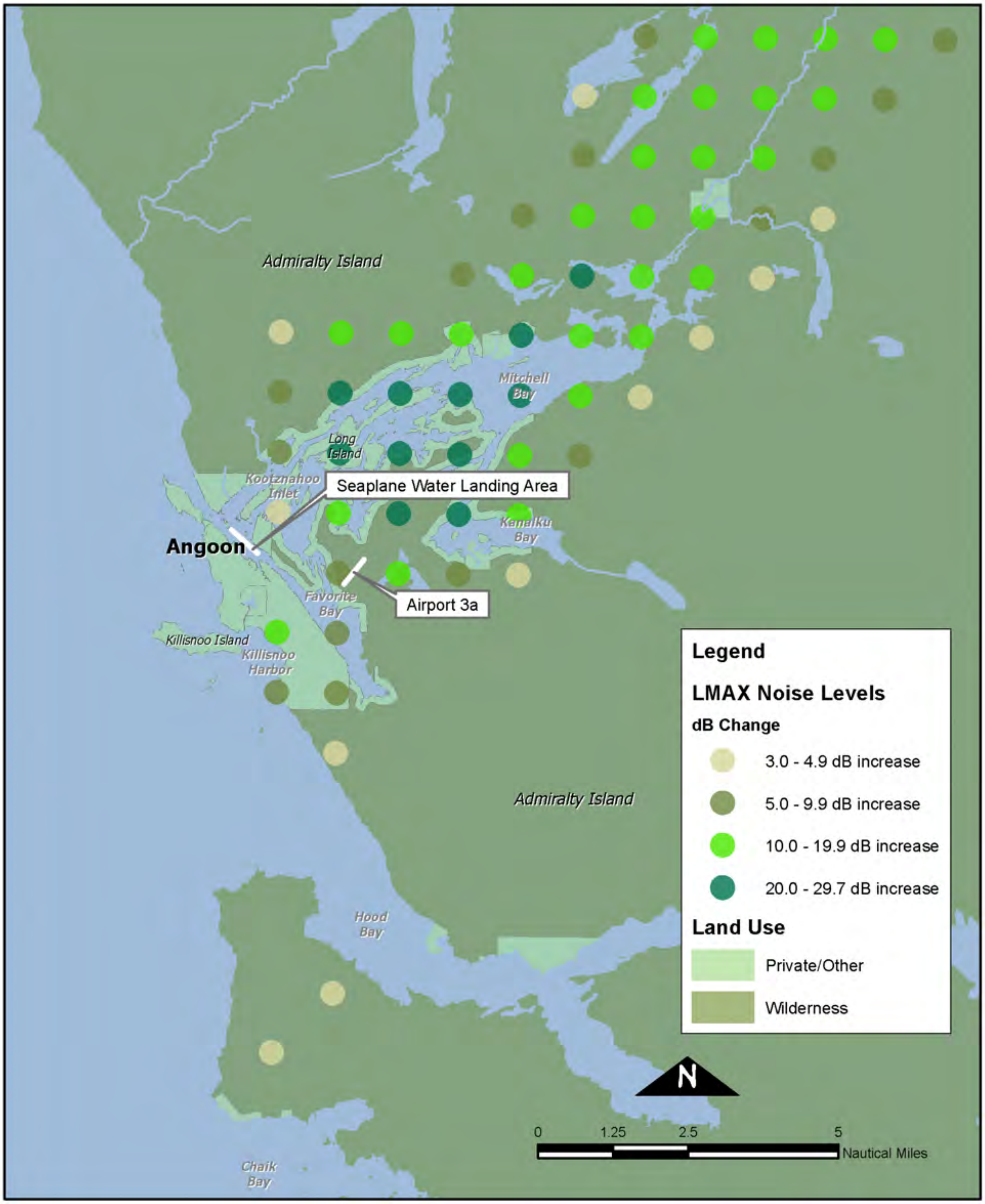

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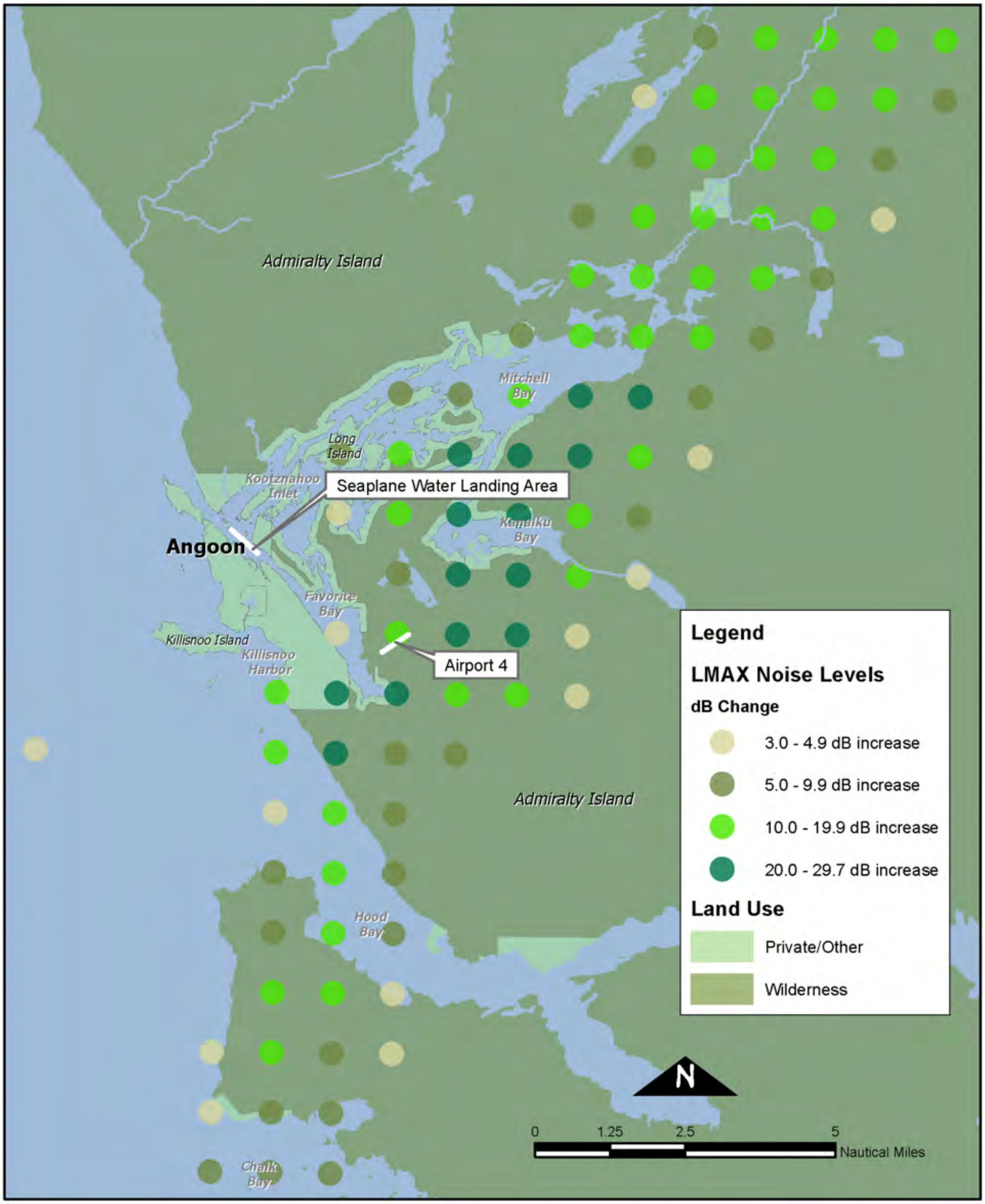

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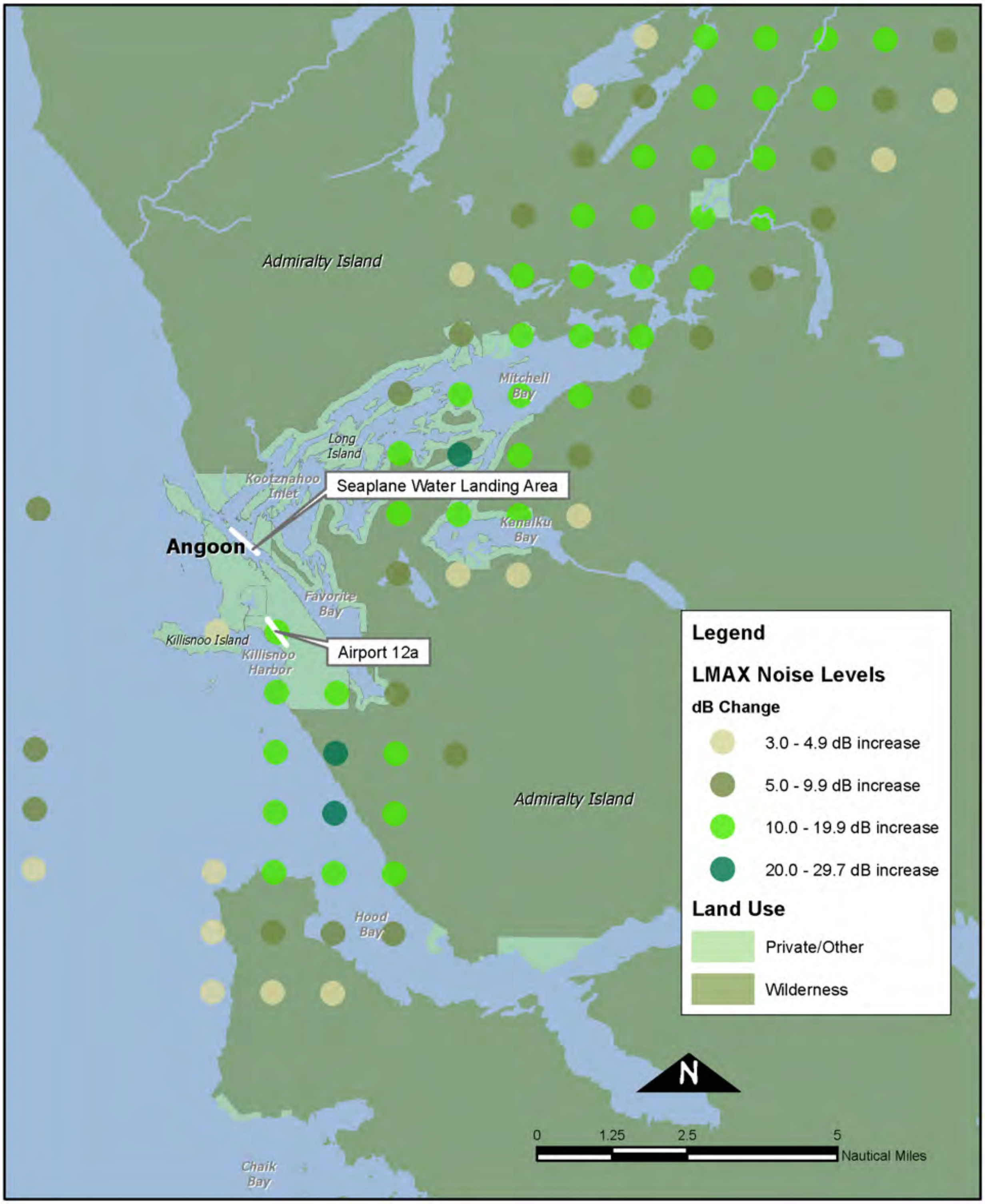

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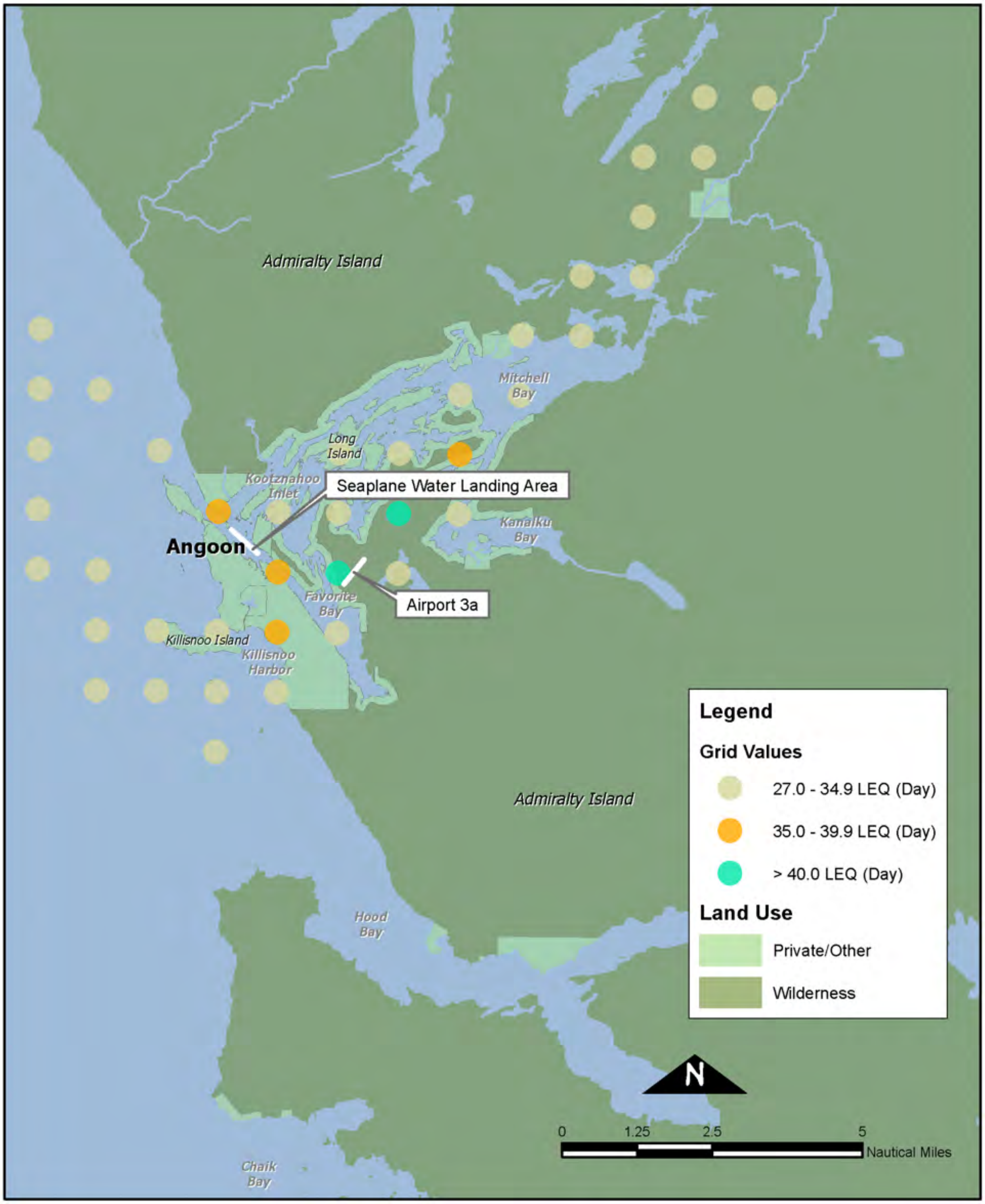

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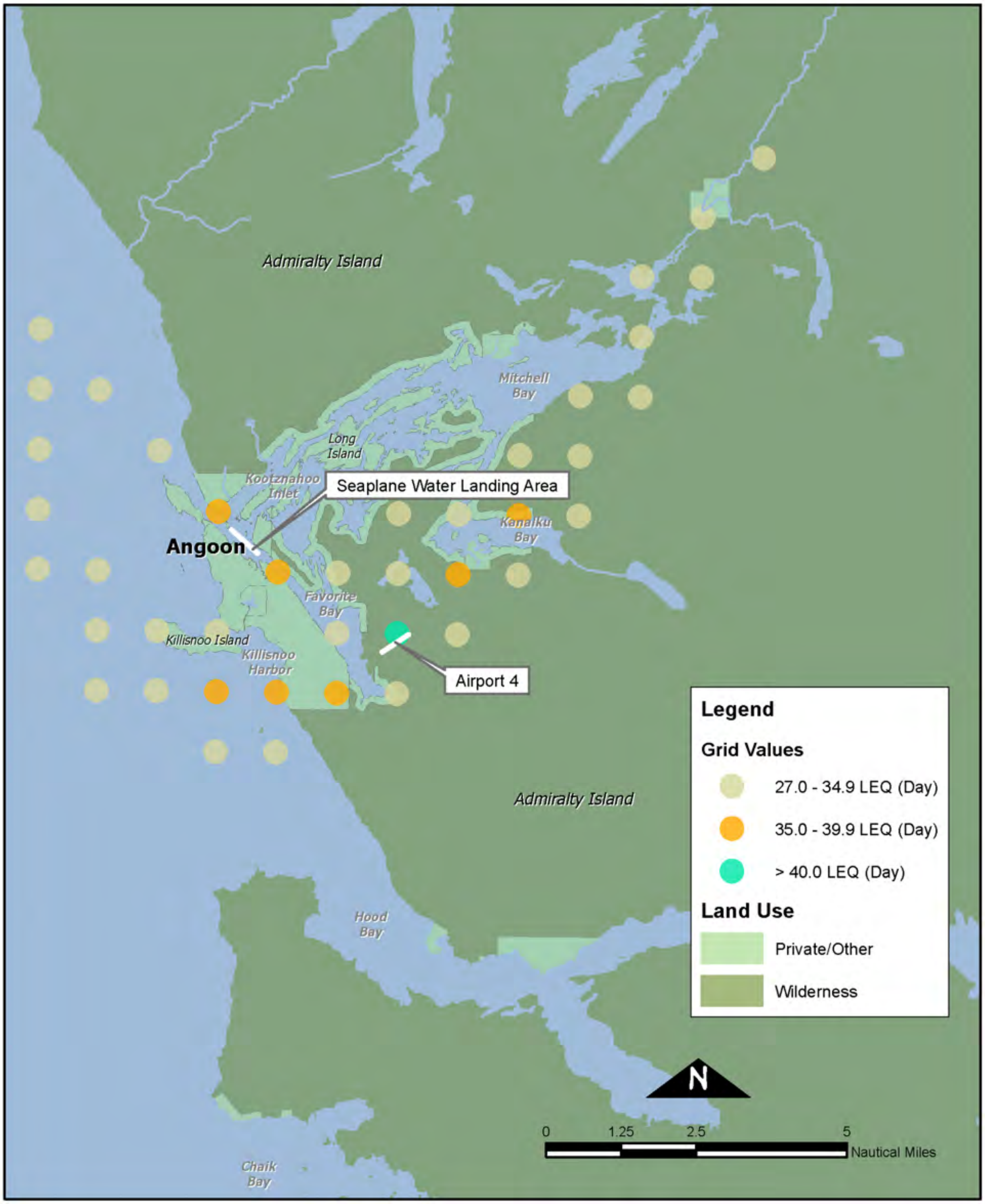

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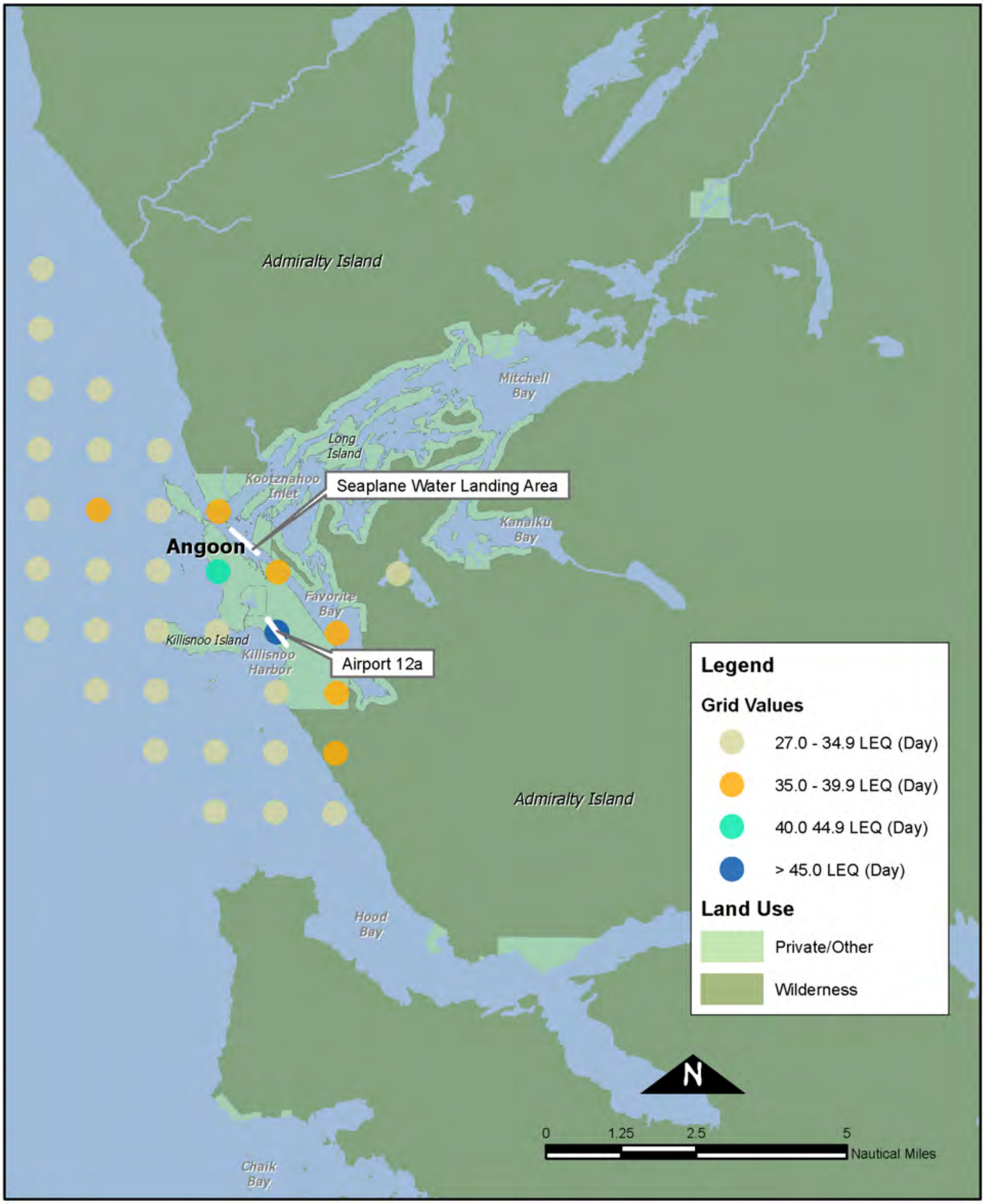

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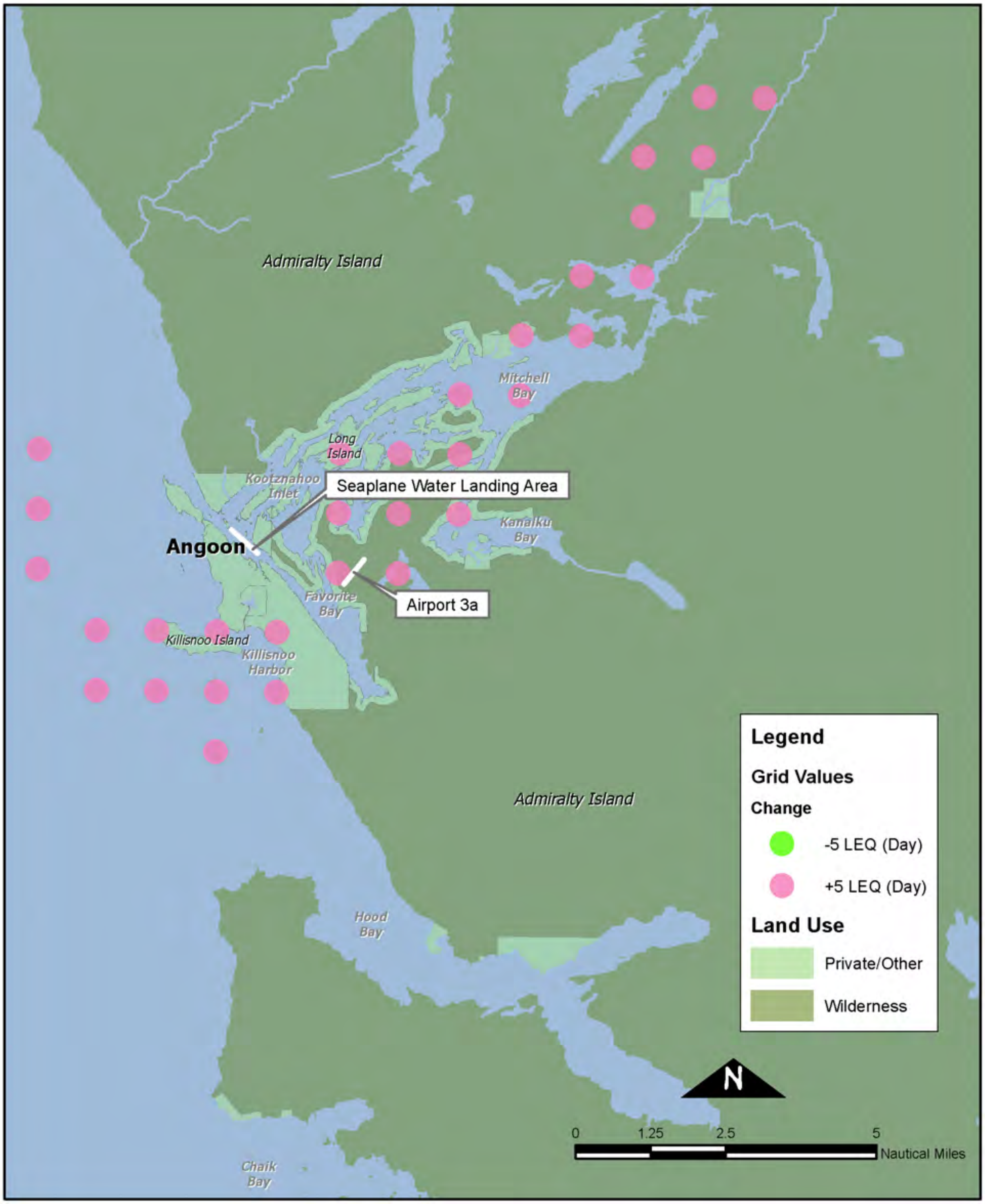

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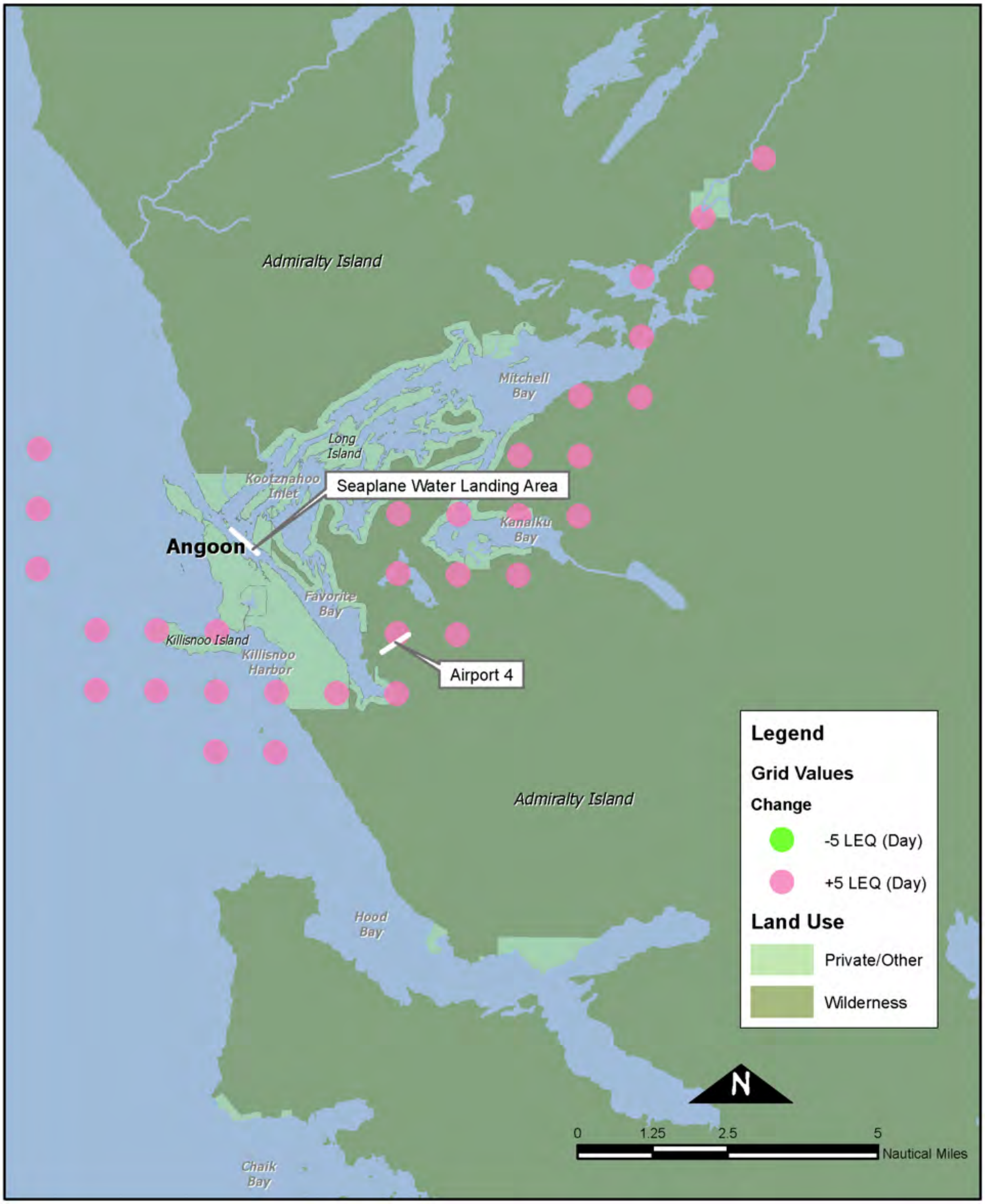

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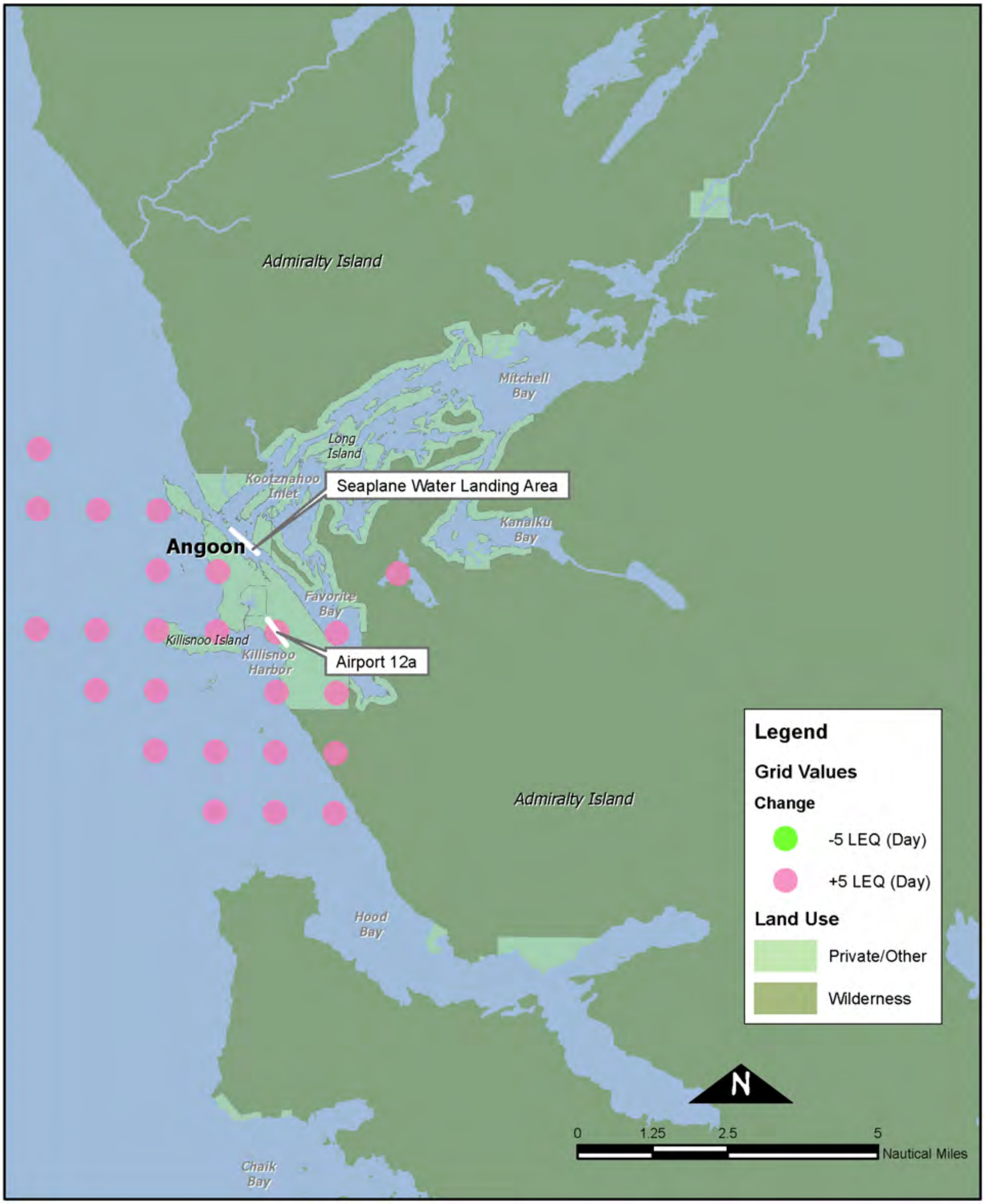


Figure B-57. Future Conditions Leq (Day) Cumulative Grid Comparison Results – Airport 12a

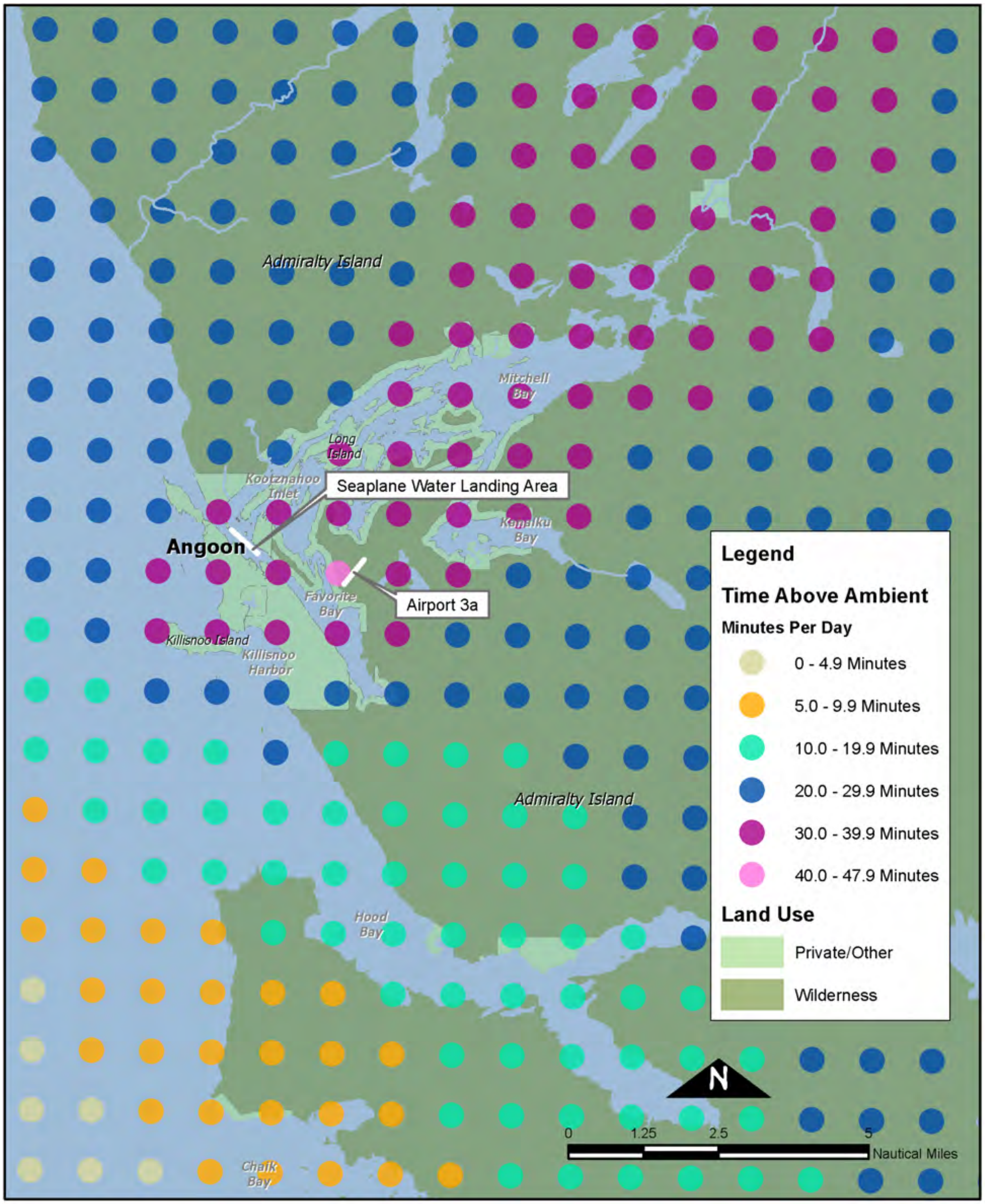
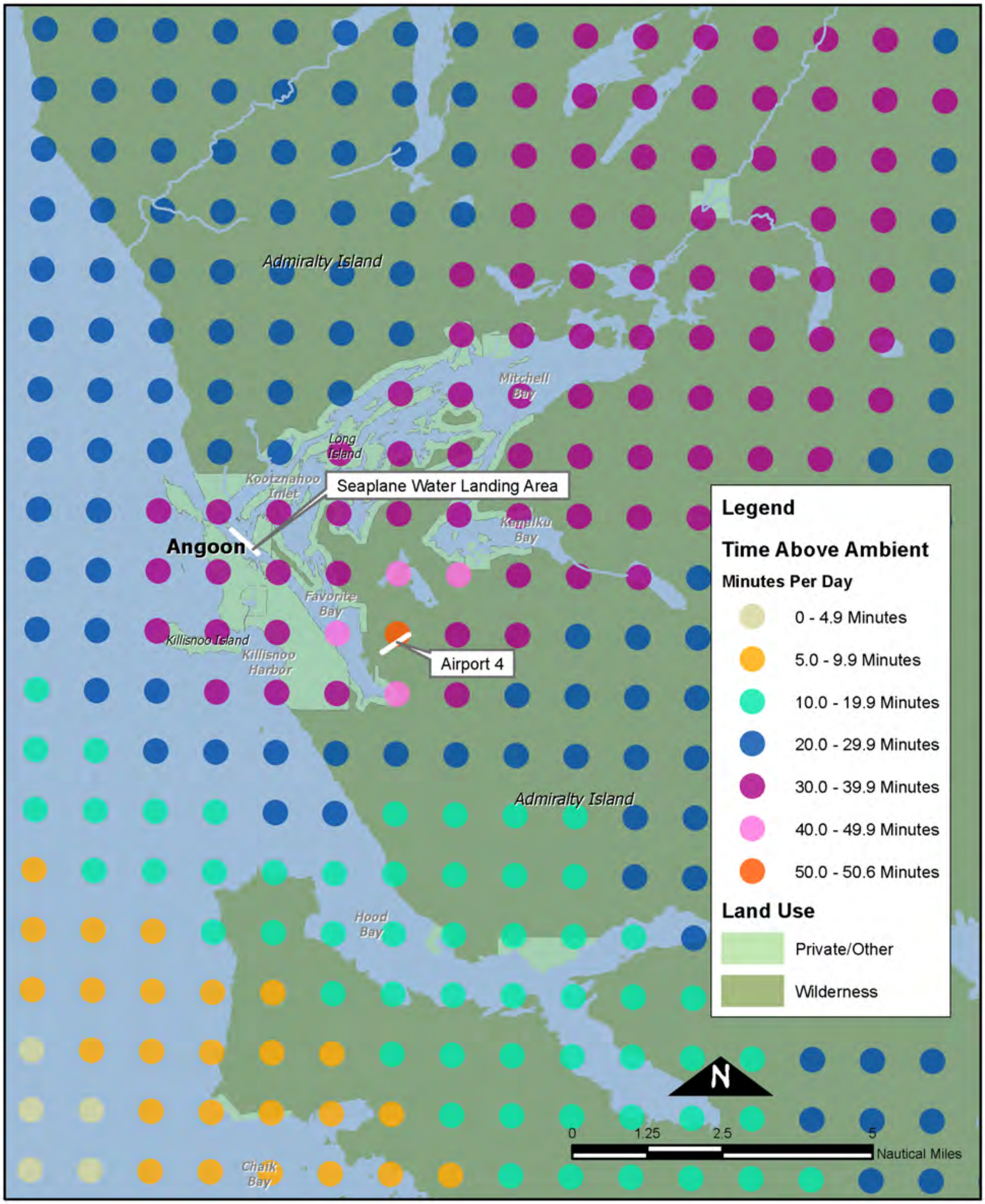


Figure B-58. Future Conditions TAA Cumulative Grid Results – Airport 3a



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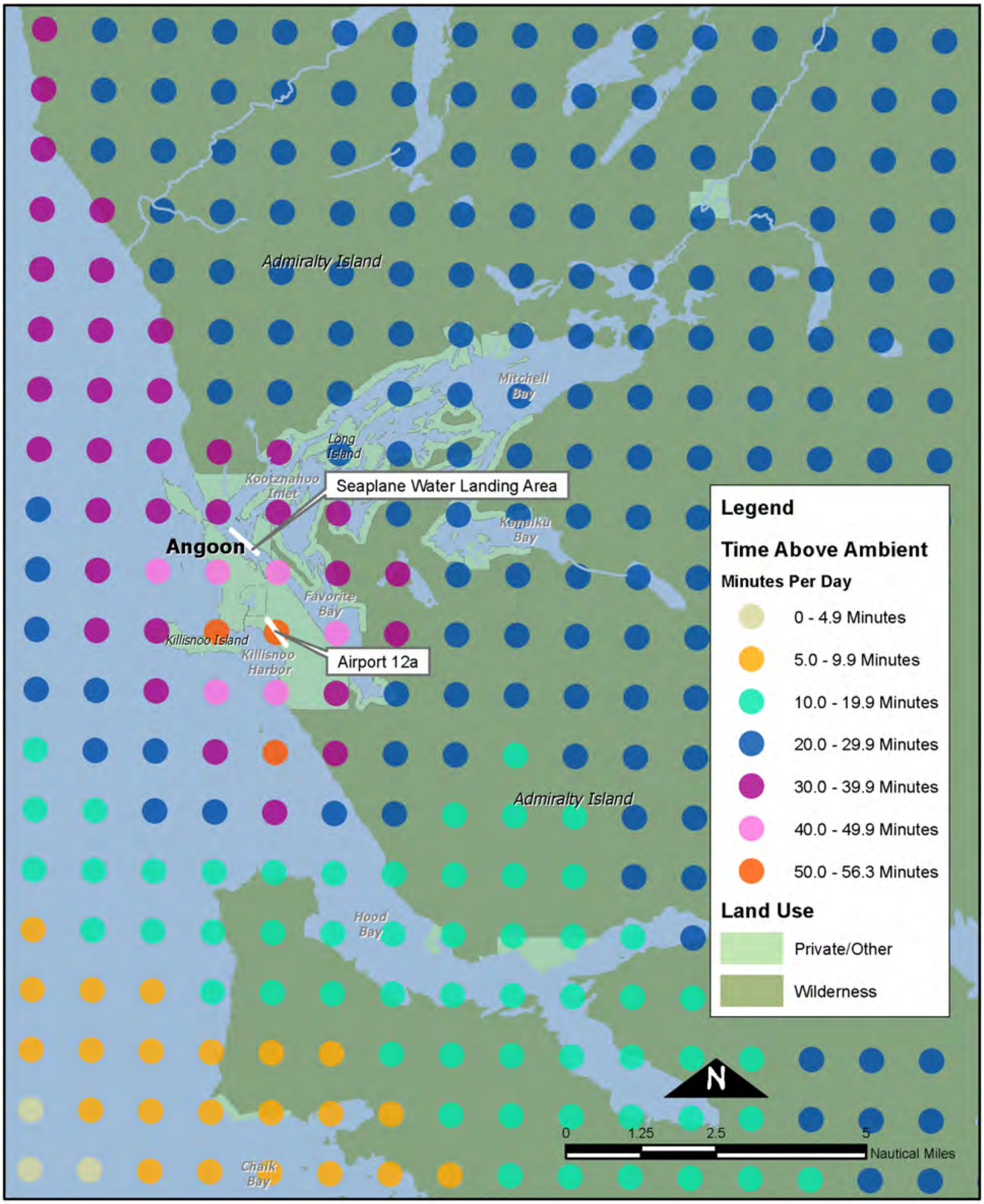
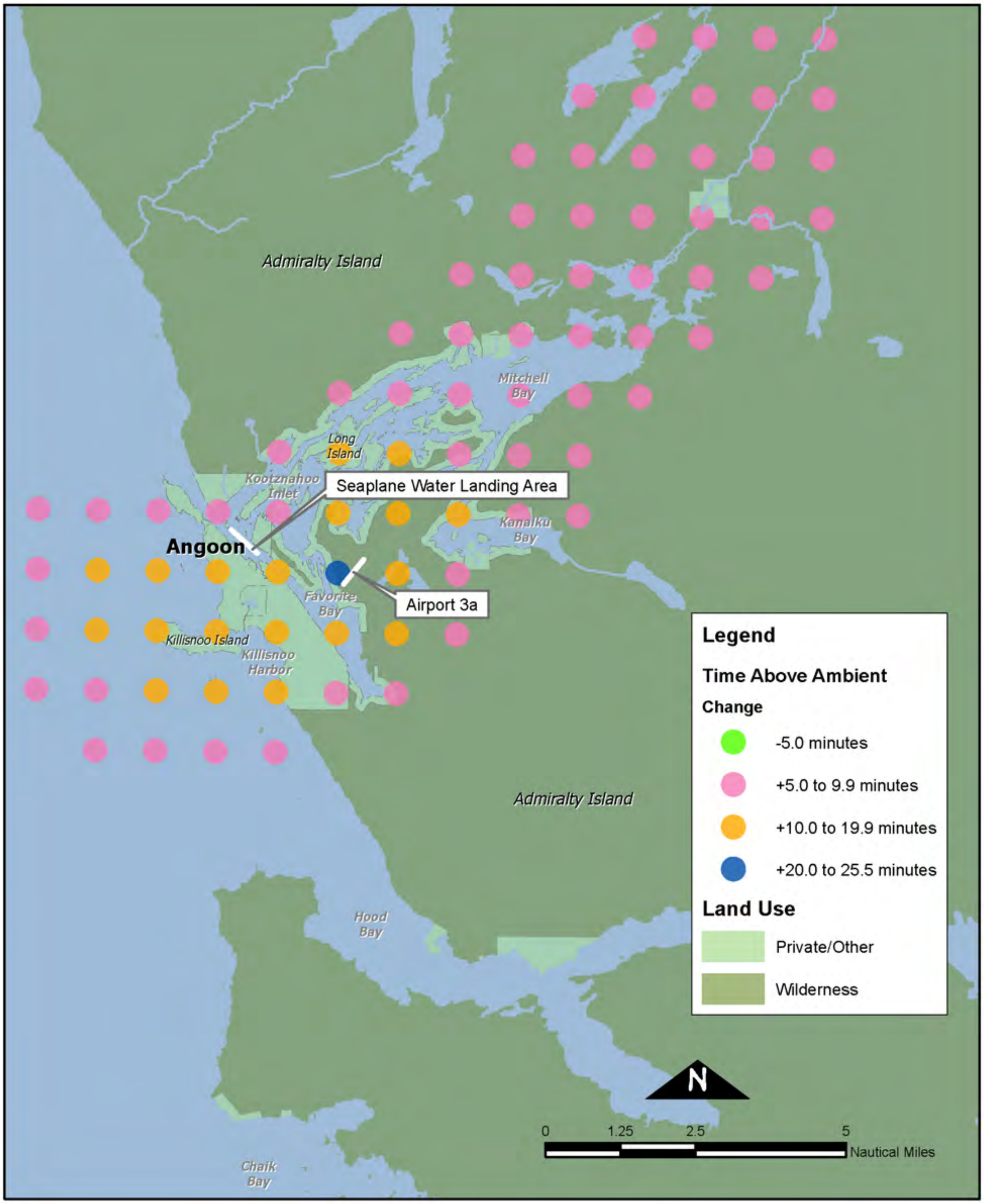


Figure B-60. Future Conditions TAA Cumulative Grid Results – Airport 12a



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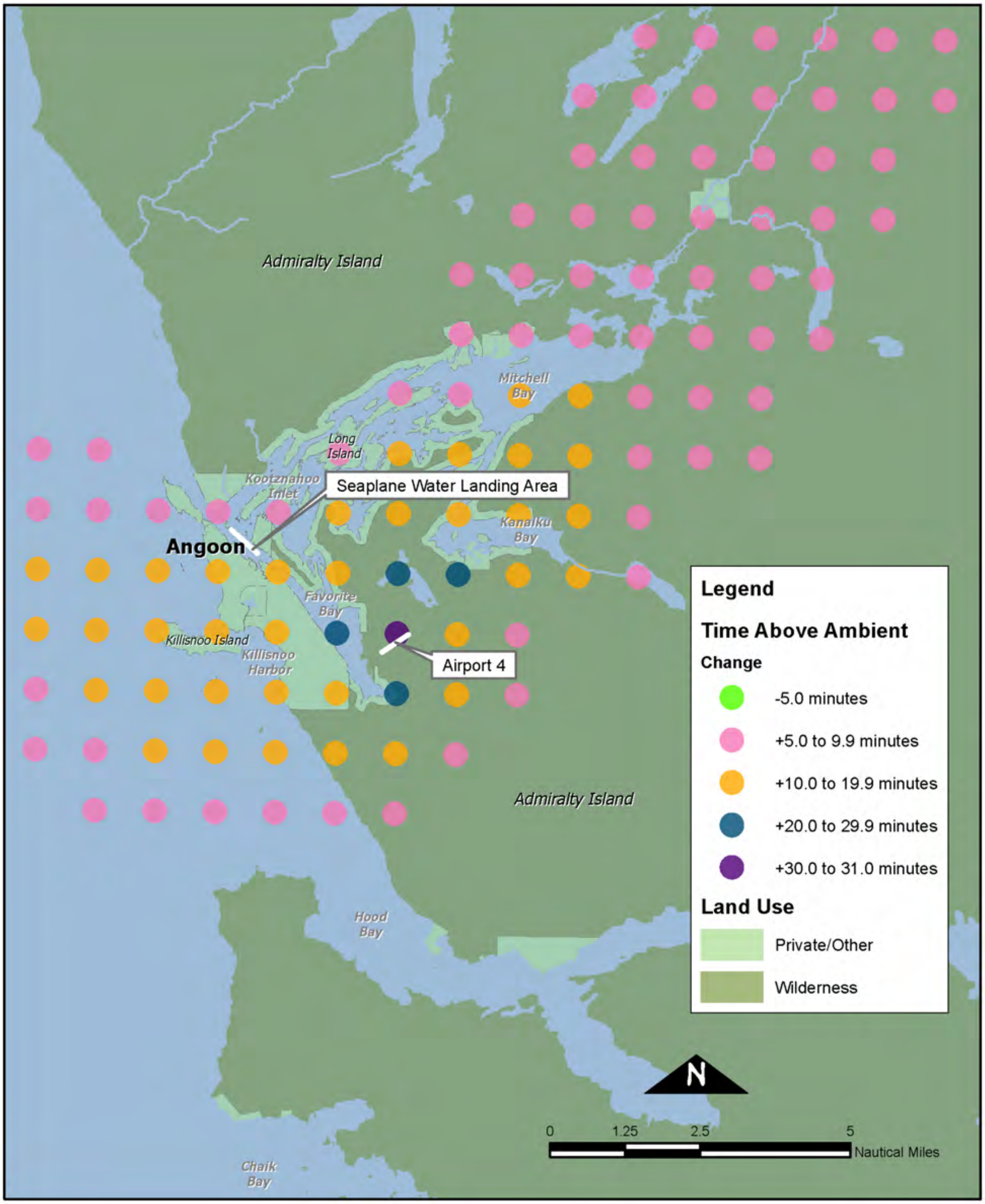

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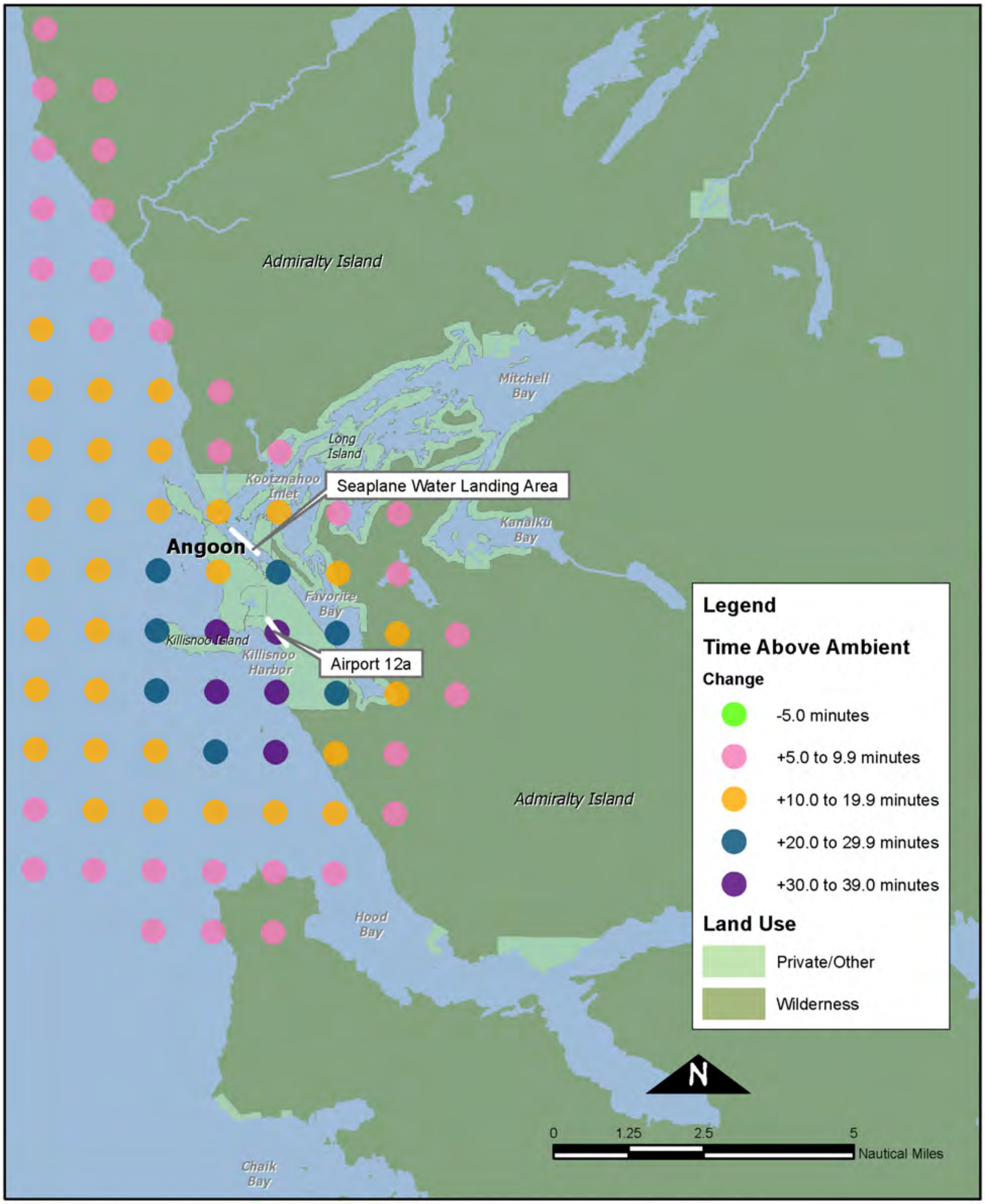

Figure B-63. Future Conditions TAA Cumulative Grid Comparison Results – Airport 12a

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APPENDIX H

VEGETATION, WETLANDS, AND WILDLIFE TECHNICAL REPORT

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

VEGETATION, WETLANDS, AND WILDLIFE RESOURCES EXISTING CONDITIONS TECHNICAL REPORT FOR ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for
Federal Aviation Administration
and
Alaska Department of Transportation and Public Facilities

Prepared by
SWCA Environmental Consultants

September 16, 2011

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Chapter 1 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF), the Sponsor, for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska. At present, there is no land-based airport runway in or near Angoon. The DOT&PF prepared the Angoon Airport Master Plan (DOT&PF 2007) for their proposed airport location. The EIS is evaluating two alternative airport locations in addition to the DOT&PF's proposed location and multiple access road alternatives associated with those airport locations (Figure 1). (Note: Access Alternative 5 was studied and is shown on maps throughout this report, but it was subsequently dropped from consideration in the EIS.) Two of the airport alternatives and portions of their associated access roads are located on lands administered by the U.S. Forest Service (USFS) within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area).

The proposed land-based airport would be a small, commercial airport typical of other rural airports in the region. The initial construction would include a 3,300-foot-long paved runway, with the ability to extend the runway length to 4,000 feet in the future if air traffic warrants it. The airport would have a short, perpendicular taxiway leading from the runway to a small apron area, which may eventually contain a passenger shelter building. The proposed airport is being designed to accommodate a future full-parallel taxiway, but this taxiway would not be constructed initially and would only be built if air traffic demands are sufficient to warrant this additional safety and efficiency feature. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. Regardless of the airport location under consideration, an access road would need to be constructed to connect the new airport to the existing Angoon road system. The proposed access road would have a gravel surface and would be two lanes wide (one lane in each direction) with 9-foot-wide lanes and minimal shoulders.

This report provides a detailed description of the terrestrial (upland) vegetation, wetlands, and wildlife resources (including terrestrial species, marine mammals, and waterbirds) potentially affected by implementation of the proposed project. It includes information on federally listed threatened and endangered species and other species of conservation concern known to occur or with potential to occur in the vicinity of the Airport. The data collected during the various field studies described below are available for agency review. Upon request, the FAA will provide these data in electronic spreadsheet format. Separate technical reports provide information on other components of the area's biota, such as freshwater, estuarine, and marine fish and invertebrate resources (SWCA Environmental Consultants [SWCA] 2010a) and subsistence resources (SWCA 2010b).

1.1 Analysis Areas

The analysis areas for this Angoon Airport EIS technical report consist of a study area and a landscape area. The study area is that area analyzed as the existing affected environment surrounding the alternatives. This area is meant to show the context of the impacts in terms of the existing resources in the immediately adjacent area. The landscape area is a larger area that establishes the context of the project impacts on the landscape scale.

1.2 Study Area

The study area is approximately 5,276 acres in size. It consists of the locations of alternatives and a 500-meter (m) buffer around the estimated edge of disturbance for the alternatives. It also includes Favorite Bay (Figure 1). The 500-m buffer width was determined using existing information on the typical extent of proximity impacts on native plant communities (Rose and Hermanutz 2004; Harper et al. 2005), grizzly bears (Mattson et al. 1987), breeding birds (Rail et al. 1997; Kissling and Garton 2008), and wetlands from adjacent habitat disturbance.

1.3 Landscape Area

The landscape area encompasses the study area, is approximately 79,970 acres in size, and comprises the southwestern half of the Mitchell Bay watershed and potentially suitable marine mammal and seabird habitat in Killisnoo Harbor (Figure 2). On land, the boundaries of the landscape area are consistent with those used in the *Mitchell Bay Watershed Landscape Assessment* (USFS 2002). In Killisnoo Harbor, the landscape area boundary has been modified to include marine waters that could be impacted by project-related activities associated with construction of one of the alternatives. The Killisnoo Harbor boundary used in this report is consistent with that used in the *Freshwater, Estuarine, and Marine Resources Technical Report for Angoon Airport Environmental Impact Statement* (SWCA 2010a).

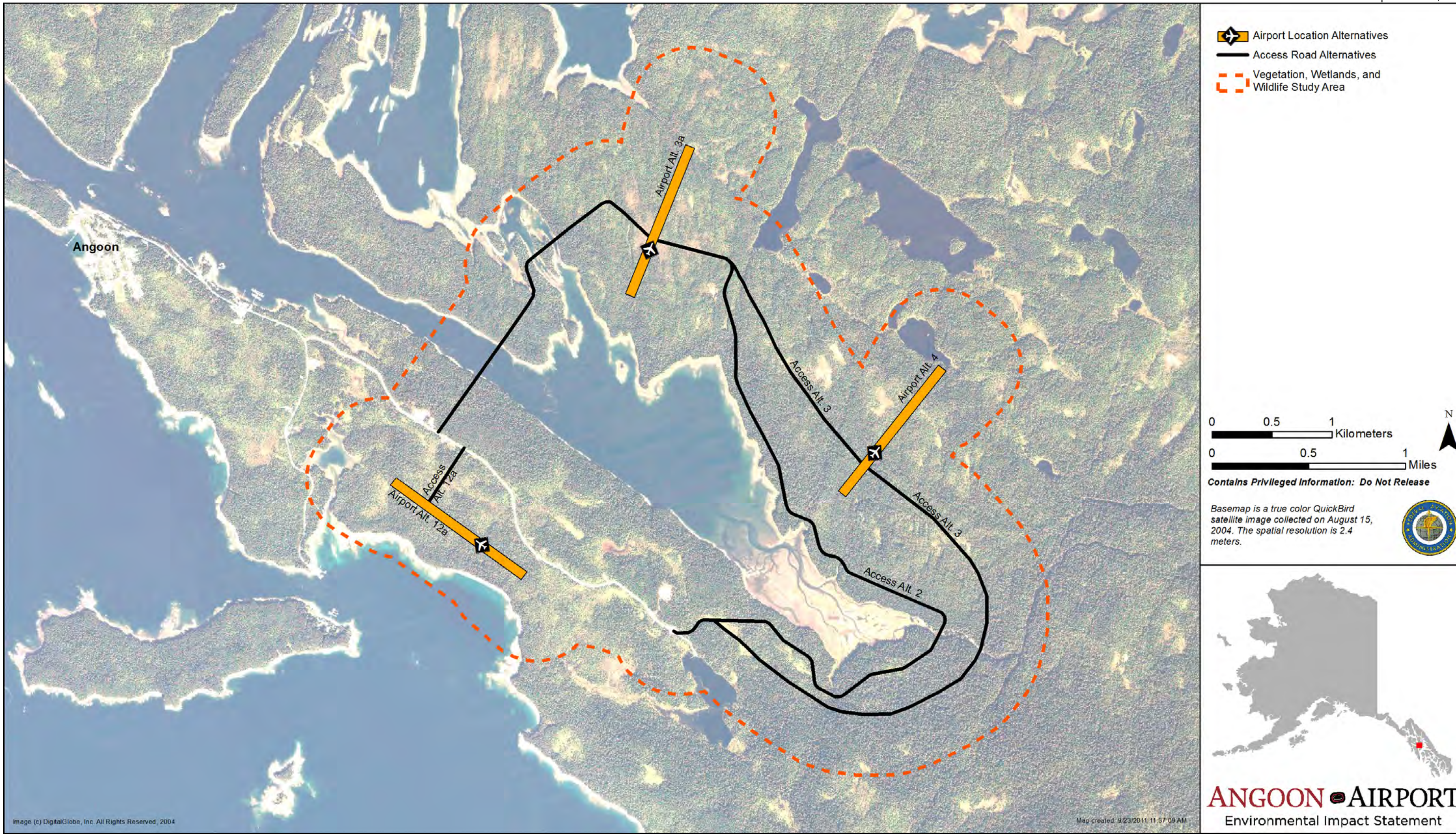

Figure 1. Vegetation, wetlands, and wildlife study area. Note: Airport alternatives illustrated on figures in this report represent locations only and do not depict final areas of disturbance.

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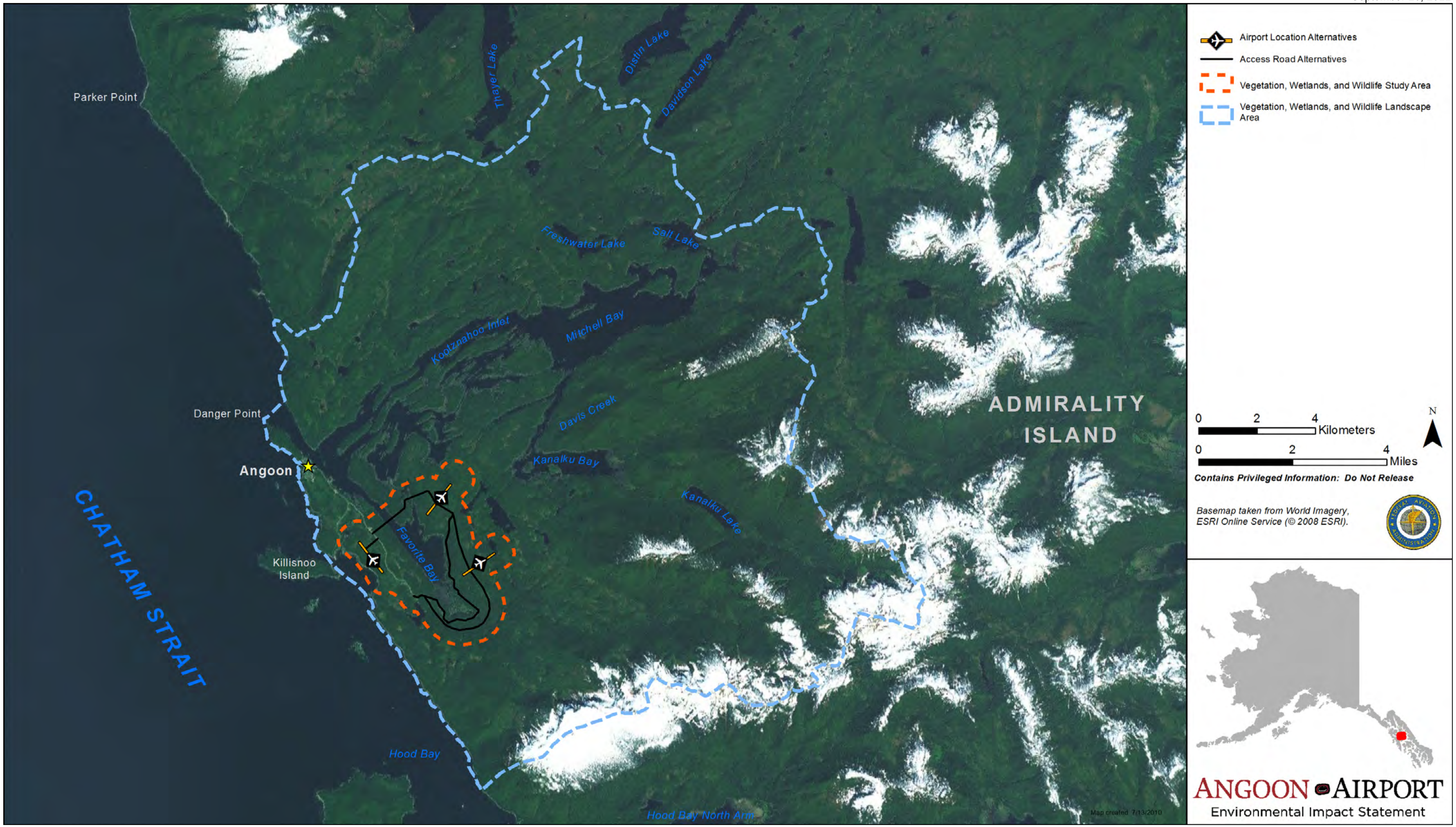

Figure 2. Vegetation, wetlands, and wildlife landscape area.

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Chapter 2 VEGETATION RESOURCES

This section of the technical report describes the various cover types and land types that occur in the study and landscape areas. Cover types within the study area were identified in the field and mapped to describe the plant communities and non-vegetated cover types. This information provides a description of baseline conditions that will be used in the EIS for assessing potential impacts to plant communities and wildlife habitats resulting from the proposed project and its alternatives. The land types in the landscape area were identified using the existing USFS data sources (USFS 2002).

2.1 Regulatory Setting

2.1.1 FEDERAL REGULATIONS AND POLICIES

The Endangered Species Act (ESA) of 1973 (as amended; 7 U.S. Code [U.S.C.] 136, 16 U.S.C. 1531 et seq.) includes provisions for the conservation of threatened and endangered plants and animals and the habitats in which they are found. This act prohibits federal agencies from authorizing, funding, or carrying out actions that may a) "jeopardize the continued existence of" listed endangered or threatened species or b) cause "adverse modification" to designated critical habitat without a permit to do so. Section 7 of the ESA applies to federal agency actions and sets forth requirements for consultation to determine if the proposed action "may affect" an endangered or threatened species.

Pursuant to Executive Order 13112 Invasive Species (February 3, 1999), federal agencies whose actions may affect the status of invasive species (alien species whose introduction does or is likely to cause economic or environmental harm to human health) are directed to a) use relevant programs and authorities (to the extent practicable and subject to available resources), b) prevent the introduction of invasive species, and c) provide for restoration of native species and habitat conditions in ecosystems that have been invaded.

The Presidential Memorandum on Economically and Environmentally Beneficial Landscaping encourages the use of native plants at federal facilities and in federally funded landscaping projects.

40 CFR 1507.2(e) and 1508.8(b) provide CEQ guidance on incorporating biodiversity considerations into environmental impact analyses under NEPA. This involves evaluating the impacts of a project in the regional context.

FAA Orders 1050.1E and 5050.4B both require compliance with the above-mentioned orders and acts. Additionally, Chapter 2 of the *Environmental Desk Reference for Airport Actions*, a supplement to FAA Order 5050.4B, specifically notes that the FAA must consider the potential effect of its actions on biotic resources, including vegetation. The *Desk Reference* also notes that the FAA's environmental document must address state-listed endangered and threatened resources and establishes thresholds of significance for determining project impacts.

The National Forest Management Act (NFMA) (USFS 1976) provides direction for the analysis of project impacts to rare plant populations, with the evaluation of each rare plant observed and documented in a USFS resource report.

U.S. Department of Agriculture (USDA) Departmental Regulation 9500-004 directs the USFS to "provide habitat for all existing native and desired non-native plants", and "to maintain at least a viable population of such species" on lands in the National Forest System (USDA 2008).

Forest Service Manual 2080 (USFS 2001) provides guidelines to prevent the introduction of noxious weeds, as well as how to contain and suppress existing noxious weed problems on National Forest System lands.

Forest Service Manual 2000 (chap. 2080): Supplement No. R10 TNF-2000-2007-1 (USFS 2007) is based on previous laws, regulations, and policies, most specifically Forest Service Manual 2080 (1995) , Noxious Weed Management, and Executive Order 13112 (1999) Invasive Species. This supplement provides comprehensive direction for noxious weed and invasive plant management on USFS lands.

Tongass National Forest Land and Resource Management Plan (USFS 2008b) requires that an invasive species risk assessment be conducted and that, where practicable, infestations of priority weed species be treated.

2.1.2 STATE AND LOCAL REGULATIONS

Alaska Statute 03.05.027 Noxious Weed, Invasive Plant, and Agricultural Pest Management and Education: The Alaska Department of Natural Resources (DNR) Division of Agriculture is authorized to prevent the importation and spread of noxious weeds or other agricultural pests that could harm the public interest and the agricultural industry. A list of noxious weeds is located in 11 Alaska Administrative Code 34.020, State of Alaska Prohibited and Restricted Noxious Weeds.

2.1.3 DEFINITIONS

AKNHP Rank: The Alaska Natural Heritage Program (AKNHP) ranks all invasive species in Alaska on a scale of 0 to 100, with 100 being the most invasive.

Canopy: The uppermost layer in the forest formed by mature tree crowns.

Endangered Species: A species in danger of extinction throughout all or a significant portion of its range (U.S. Fish and Wildlife Service [USFWS] 1973).

Groundcover: The lowest layer in the forest consisting of grasses, short herbs and shrubs, and bryophytes.

State of Alaska Prohibited and Restricted Noxious Weed: A plant species designated as noxious by the State of Alaska. These plant species are aggressive, difficult to manage, sometimes poisonous, and generally non-native (USFS 2007).

Threatened Species: A species that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range (USFWS 1973).

Tongass National Forest High Priority Invasive Plant Species: A non-native plant species whose introduction does or is likely to harm the economy, environment, or human health (Executive Order 13112). These species are actively controlled on Tongass National Forest lands.

Understory: The middle layer in the forest consisting of tree saplings, shrubs, and medium and tall herbaceous plant species (herbs).

USFS Sensitive Species: A plant or animal species (identified by a regional forester) whose population viability is a concern, as evidenced by either a significant downward trend in population size or density, or a significant downward trend in habitat capability that would result in reduced species distribution (USFS 2005).

2.2 Methods

2.2.1 EXISTING DATA SOURCES

The documents listed below provided the majority of existing information relevant to vegetation in the study and landscape areas.

- *Mitchell Bay Watershed Landscape Assessment* (USFS 2002)
- *Background Report: Planning & Facility Requirements, Access & Apron Alternatives Analysis* (DOT&PF 2006)
- *Risk Assessment for Invasive Plants Thayer/Angoon Hydroelectric Project* (Anderson 2008)
- QuickBird 4-band pan-sharpened satellite imagery. This combines the visual information of four multispectral bands (blue, green, red, and infrared), with the spatial information of the panchromatic band. QuickBird satellite images were collected on August 15, 2004. The spatial resolution is 2.4 m (pan-sharpened to 0.6-m resolution image).

Other data sources, including scientific literature used to describe vegetation in the study and landscape areas, are cited in this report as appropriate.

2.2.2 Field Data Collection

In June and August 2009, botanists on the FAA's consultant team conducted sensitive plant, invasive species, and general vegetation surveys in the study area (see Figure 1). To survey access alternatives, botanists walked the centerline of each proposed access alternative under consideration at the time of the field surveys. To survey airport alternatives, botanists walked two approximately parallel transects within the footprint of each (Figure 3). Surveys included walking through the locations of the alternatives and stopping at regularly spaced intervals to collect information about plant types and plant communities. More information about specific methods is provided in the Vegetation Mapping and Sensitive Plant Survey sections, below.

Vegetation Mapping

Vegetation mapping was accomplished through a combination of fieldwork and geographic information system (GIS) mapping. From June 18 to 26, 2009, botanists used GPS units and satellite imagery to identify different recognizable plant communities in the study area. Wetland and vegetation specialists collected 237 data points in June 2009 and 48 points in August 2009. These vegetation characterization points were recorded with a GPS unit in the field and include notes on the plant species composition within an approximately 20-foot radius of the recorded point. These points were then used to link land cover and plant community type data taken in the field with the different colors and textures of vegetation apparent in the satellite imagery. Boundaries were then digitized around polygons of similar color and texture, and community types were assigned according to the GPS data and field notes. The minimum mapping unit used was 1 acre. Field verification and refinement of the vegetation mapping was completed during a second round of field surveys from August 16 to 21, 2009. Plant community names and species compositions are generally consistent with the cover types described for the *Angoon Airport Master Plan* (DOT&PF 2006). The landscape area land type map was generated from (see Figure 5) existing data sources (USFS 2002).

Sensitive Plant Surveys

There are 17 plant species listed on the 2009 USFS Alaska Region Sensitive Species List (Goldstein et al. 2009). Although there are no known populations of sensitive plant species on Admiralty Island, there is potentially suitable habitat in the study area for 12 species of sensitive plants (section 3.4.1). Potentially suitable sensitive plant habitat in the study area was surveyed in June 2009. The survey methods used are described by Goff et al. (1982). These methods are in accordance with the "Level 5 Intuitive Controlled" survey method. This method involves walking throughout the survey area looking for potentially suitable sensitive plant habitat (see Figure 3). When such habitat is found, the area is thoroughly examined for the presence of individual plants. All plant species encountered during the surveys are recorded, including non-native species. Botanists on the FAA's consultant team walked throughout the study area, visually scanning for sensitive plants along the way.

The botanists stopped in potentially suitable habitats and thoroughly surveyed for sensitive plant species, none of which were found.

Weed Surveys

All plant species encountered during field surveys were recorded, including non-native species.

2.3 Vegetation Cover Types and Land Types in the Analysis Areas

2.3.1 *Study Area*

Nine cover types were mapped in the study area; cover types include both vegetated and non-vegetated lands and water. The plant communities associated with vegetated cover types are described below. The acres of each cover type in the study area are provided in Table 1. In general, the spruce-hemlock and bog forest cover types correspond to productive forested habitat; the bog woodland cover type corresponds to low productivity forest habitat; and the remaining cover types correspond to non-forested habitat. Refer to Appendix A for a more complete list of plants in the study area, including their scientific names and associated cover types.

Table 1. Cover Types in the Study Area

Cover Types	Acreage	Percent of Study Area[1]
Bog forest	169	3%
Bog woodland	300	6%
Disturbed lands	34	<1%
Estuary	584	11%
Fen	95	2%
Fresh water	80	2%
Salt marsh	44	<1%
Spruce-hemlock forest	3,577	68%
Unvegetated tidal	393	7%
Total	**5,276**	**100%**

Note: Cover types observed in 2009.
[1] Total does not equal 100% due to rounding.

Descriptions of the cover types, including dominant species (if vegetated) and their general location in the study area, are provided below. Figure 4 shows the distribution and abundance of cover types in the study area.

Bog Forest

This cover type occurs on flat terrain and in basins and is often a buffer between bog woodlands and spruce-hemlock forests. This cover type is characterized by a greater than 30% canopy cover of shore pine (*Pinus contorta*) and Western hemlock (*Tsuga heterophylla*). The most common species in the understory are lady fern (*Athyrium filix-femina*) and skunk cabbage (*Lysichiton americanum*). The most common groundcover species are dwarf dogwood (*Cornus canadensis*), peat moss (*Sphagnum* spp.), and oak fern (*Gymnocarpium dryopteris*). Bog forest covers approximately 169 acres (3%) of the study area. Additional information on the wetland characteristics of this cover type is available in section 4.3 of this report.

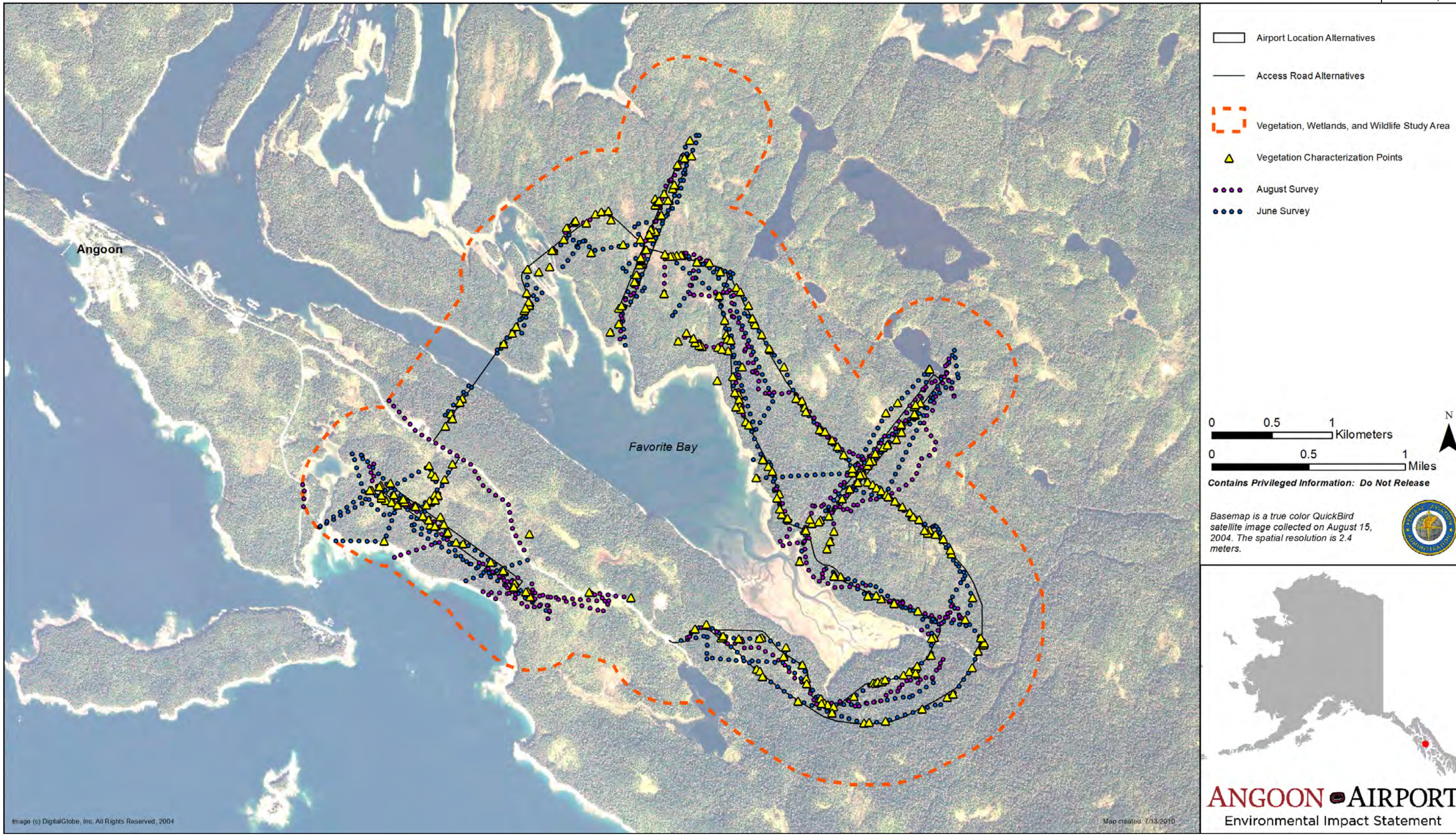

Figure 3. Vegetation characterization points and survey paths walked in the study area.

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Figure 4. Distribution and abundance of cover types in the study area.

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Bog Woodland

This cover type occurs on flat terrain and in basins and is usually surrounded by bog forest. This cover type is defined as having a canopy cover of less than 30% consisting of shore pine and Western hemlock. The understory in this cover type is sparse and includes shore pine and Western hemlock seedlings, lady fern, skunk cabbage, and blueberries (*Vaccinium* spp.). The dense groundcover is dominated by dwarf dogwood, crowberry (*Empetrum nigrum*), bog blueberry (*Vaccinium uliginosum*), sedges (*Carex* spp.), Labrador tea (*Ledum groenlandicum*), peat moss, and bog cranberry (*Oxycoccus oxycoccos*). Bog woodland covers approximately 300 acres (6%) of the study area. Additional information on the wetland characteristics of this cover type is available in section 4.3 of this report.

Disturbed Lands

This cover type includes buildings, graded areas, and gravel roads associated with the community of Angoon, on the peninsula west of Favorite Bay. Disturbed lands cover approximately 34 acres (<1%) of the study area.

Estuary

This cover type includes the Favorite Bay and Pea Hen channel linking Favorite and Mitchell bays. Estuarine and marine waters cover approximately 584 acres (11%) of the study area. Information on the biota of these waters is available in the *Freshwater, Estuarine, and Marine Resources Technical Report for Angoon Airport EIS* (SWCA 2010a).

Fen

This cover type occurs on flat terrain and in basins located in forest canopy openings and areas on the lacustrine fringe. This cover type consists of a dense groundcover of sedges and grasses with scattered forbs. The dominant species are sedges (*Carex sitchensis* and *C. aquatilis*), small-flowered bullrush (*Scirpus microcarpus*), bog buckbean (*Menyanthes trifoliata*), and bluejoint (*Calamagrostis canadensis*). Fen covers approximately 95 acres (2%) of the study area. Additional information on the wetland characteristics of this cover type is available in section 4.3 of this report.

Fresh Water

This cover type includes freshwater lakes and streams in the study area. Fresh water covers approximately 80 acres (2%) of the study area. Additional information on freshwater systems is available in the *Freshwater, Estuarine, and Marine Resources Technical Report for Angoon Airport EIS* (SWCA 2010a)

Salt Marsh

This cover type consists of tidally influenced vegetated areas adjacent to estuarine waters. The substrate varies with location and can be sandy, gravelly, or rocky. This plant community is dominated by sedges and grasses. The low intertidal zone is dominated by more salt-tolerant plant species, including sea arrow-grass (*Triglochin maritimum*), Lyngby's sedge (*Carex lyngbyei*), and sea milk-wort (*Glaux maritima*). The areas in the upper limits of tidal influence are dominated by dunegrass (*Elymus mollis*), bluejoint, common sweetgrass (*Hierochloe odorata*), and beach pea (*Lathyrus japonicus*). Salt marsh covers approximately 44 acres (<1%) of the study area. Additional information on the wetland characteristics of this cover type is available in section 4.3 of this report.

Spruce-hemlock Forest

This cover type occurs on slopes and ridges throughout the study area. The canopy cover in this plant community ranges from 50% to 80% and is dominated by Sitka spruce (*Picea sitchensis*) and Western hemlock. The shrub layer is a mosaic of two blueberry species (*Vaccinium ovalifolium* and *V. alaskaense*) and fool's huckleberry (*Menziesia ferruginea*). The most common species in the low-growing herbaceous layer are dwarf dogwood, five-leaved bramble (*Rubus pedatus*), and two species of twisted stalk (*Streptopus amplexifolius* and *S. roseus*). This is the prevalent cover type and covers approximately 3,577 acres (68%) of the study area.

Unvegetated Tidal

This cover type refers to unvegetated lands associated with the bottoms of estuarine sloughs and flats regularly scoured by tidal action. Substrates can be sandy or silty, and a minor algal or seaweed vegetation component may be present. The unvegetated tidal cover type covers approximately 393 acres (7%) of the study area.

2.3.2 LANDSCAPE AREA

Seven land types were mapped in the landscape area (Figure 5). Vegetated land types in the landscape area are characterized by physiographic factors or land type in combination with dominant plant species (Table 2). Plant community descriptions, land type descriptions, and acreages are based on surveys and mapping conducted for the *Mitchell Bay Watershed Landscape Assessment* (USFS 2002). The extent of each land type in the landscape area is mapped on Figure 5.

Table 2. Landscape Area Land Types, Cover Types, Acreages, and Percent Cover

Landscape Area Land Type	Cover Type	Landscape Area (acres)	Percent of Landscape Area[1]
Alpine summits and brushfields	None	3,530	4%
Steep to moderate steep slopes	None	22,193	28%
Hills and plateaus	Predominantly spruce-hemlock forest, bog woodland, fen	16,336	20%
Valley floor	None	1,703	2%
Lowlands	Predominantly spruce-hemlock forest with bog woodland, bog forest, and fen	25,807	32%
Coastal estuaries	Salt marsh, unvegetated tidal	451	<1%
Open water	Estuary, freshwater, unvegetated tidal	9,950	12%
Total		79,970	100%

Note: Land and cover types observed in 2009.

[1] Total does not equal 100% due to rounding.

Alpine Summits and Brushfields

This land type includes avalanche chutes and mountaintops covering approximately 3,530 acres (4%) of the landscape area. The brushfields are usually located on slopes steeper than 50%. Alpine summits are located on mountaintops 1,500 feet above sea level or higher. The groundcover in this land type consists of rock, heath, shrub, and alpine scrub.

Steep to Moderate Steep Slopes

This land type is located on convex or broken slopes on approximately 22,193 acres (28%) of the landscape area. Steep slopes are defined as having a slope greater than 50% and moderately steep slopes as having a slope of 35% to 50%. The dominant trees associated with this land type are Sitka spruce and Western hemlock.

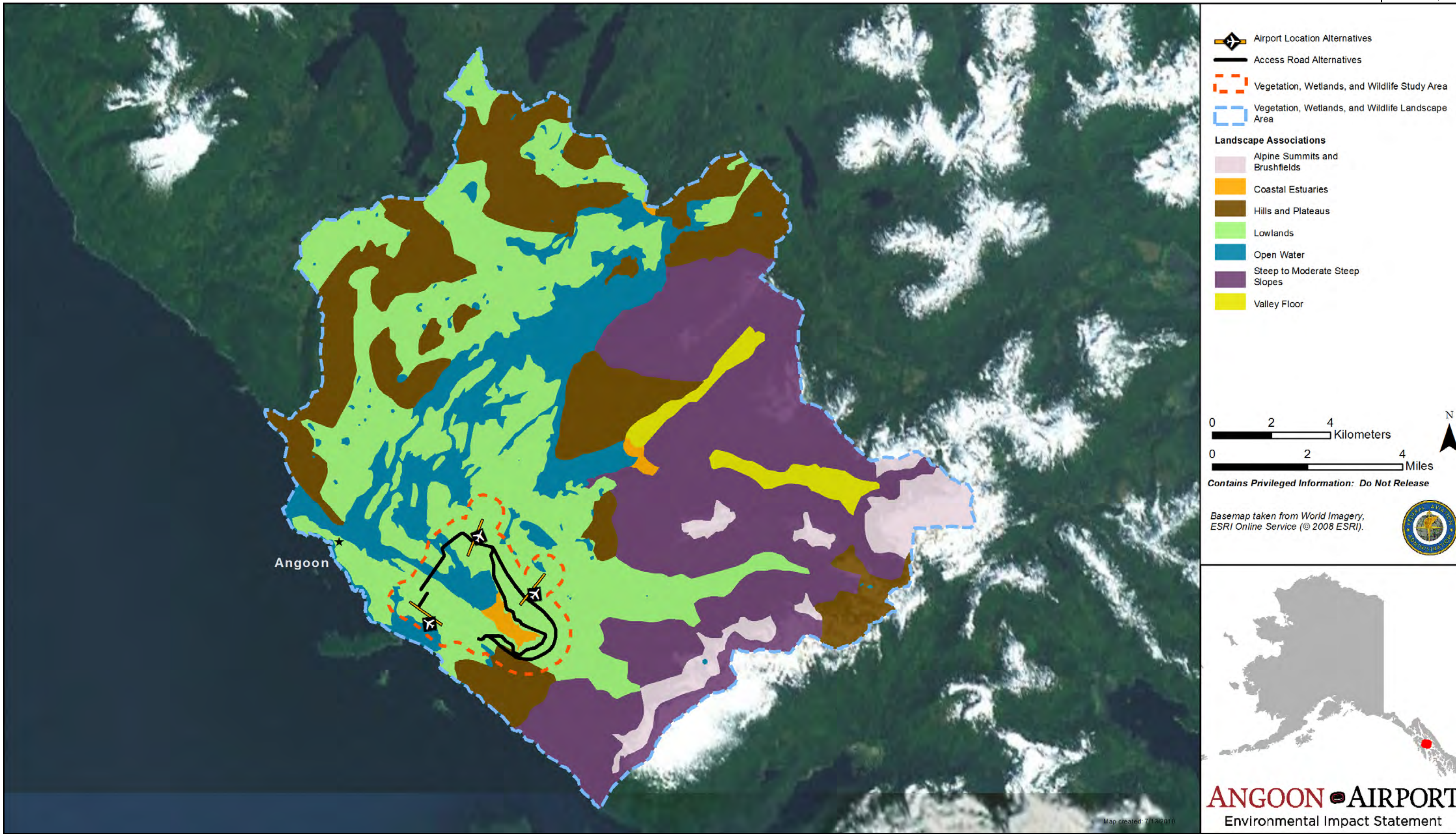

Figure 5. Land types in the landscape area.

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Hills and Plateaus

This land type only includes hills that are isolated and therefore separate from mountain slopes. Approximately 16,336 acres (20%) of the landscape area consists of this land type. This land type is present on slopes greater than 35%. The spruce-hemlock forest cover type, along with a few small bog woodlands and fens, dominates this land type. Of note, approximately 214 acres (1%) of the 16,336 acres of this land type present in the broader landscape area are found within the boundaries of the study area, as defined for this report.

Valley Floor

This land type includes river bottoms and larger outwash fans covering approximately 1,703 acres (2%) of the landscape area. Valley floors have a slope of less than 35%. The dominant overstory species are Sitka spruce and Western hemlock.

Lowlands

This land type consists of glacial till plains, terraces, and glacially scoured benches covering approximately 25,807 acres (32%) of the landscape area. Lowlands have a slope of less than 15%. The dominant cover type in this land type is spruce-hemlock forest with small areas of bog woodland, fen, and bog forest scattered throughout. Approximately 3,966 acres (15%) of the 25,807 acres of this land type present in the broader landscape area are found within the boundaries of the study area defined for this report.

Coastal Estuaries

This land type includes areas with tidal and wave-influenced sediment deposits located between mean high tide and 6 feet below mean low tide. This land type covers approximately 451 acres (<1%) of the landscape area. Coastal estuaries have a slope of less than 10%. The dominant cover types in this land type are salt marsh and unvegetated tidal. Of note, more than half of the acreage of this land type in the landscape is found within the boundaries of the smaller study area defined for this report; approximately 274 acres (61% of landscape total) of this land type are found in the study area.

Open Water

Freshwater lakes and streams along with Favorite Bay cover approximately 9,950 acres (12%) of the landscape area. Only approximately 821 acres (8%) of the 9,950 acres of this land type in the overall landscape area occur within the study area.

2.4 Threatened, Endangered, and Sensitive Plants in the Analysis Areas

2.4.1 Study Area

Table 3 provides the names, general habitat types, known locations, and potential to occur in the study area for the USFS Alaska Region sensitive species. There are no known federally listed plant species with potential to occur in the study or landscape areas.

Table 3. USFS Alaska Region Sensitive Species and Their Potential to Occur in the Study Area

Scientific Name	Common Name	Habitats and Known Locations	Potential to Occur in Study Area
Aphragmus eschscholtzianus	Eschscholtz's little nightmare	Alpine tundra, mossy areas, seeps, heath, by rivulets and in wet places, alpine scree slopes, and rocky ridges. Known in Cordova, Seward.	None. Habitat not present in study area.
Botrychium spathulatum	Spatulate moonwort	Upper beach meadows, alpine. Known in Sea Lion Cove (Kruzof Island), White Stripe Mountain (Chichagof Island), Wrangell-St. Elias Mountains.	Potential to occur in salt marsh habitat in study area.
Botrychium tunux	Moosewort fern	Maritime beach meadows, upper beach meadows, and well-drained open areas. Known in Yakutat, Hoonah, Sitka, Craig.	Potential to occur in salt marsh habitat in study area.
Botrychium yaaxudakeit	Moonwort fern	Maritime beach meadows, upper beach meadows, and well-drained open areas. Known in Yakutat, Haines.	Potential to occur in salt marsh habitat in study area.
Cirsium edule v. macounii	Edible thistle	Forest edges, along glacial streams, wet meadows, avalanche tracks, open forest, upper montaine to lower alpine meadows. Known in Hyder.	None. Habitat not present in study area.
Cochlearia sessilifolia	Sessileleaf scurvygrass	Low-energy estuarine sites, in the intertidal zone, on gravel bars or spits, inundated at high tide. Known in Nuka Bay in Kenai Fjords, Shoup Bay, Valdez, Kodiak, and Sitkalidak islands.	Potential to occur in salt marsh habitat in study area.
Cypripedium guttatum	Spotted lady's slipper	Open forests. Known in Palmer, Portage Valley.	Potential to occur in spruce-hemlock forest habitat in study area.
Cypripedium montanum	Mountain lady's slipper	Open forests, beach meadows. Known in Haines, Glacier Bay, Endicott River, Stikine River, Etolin Island.	Potential to occur in spruce-hemlock forest and salt marsh habitats in study area.
Cypripedium parviflorum v. pubescens	Large yellow lady's slipper	Peatlands, sometimes on limestone substrate. Known in Klukwan, northern Prince of Wales Island.	Potential to occur in fen/bog habitat in study area.
Ligusticum calderi	Calder's lovage	Subalpine boggy meadows, meadows, and forest edges. Known in Kodiak, Dall, Suemez, and southern. Prince of Wales islands.	Potential to occur in fen/bog meadow habitat in study area.
Papaver alboroseum	Pale poppy	Open areas, rock outcrops, sandy, gravelly, well-drained soils, mesic to dry alpine, recently de-glaciated areas. Sea level to ~6,000 feet. Known in Portage Glacier, Kenai Peninsula.	None. Habitat not present in study area.

Table 3. USFS Alaska Region Sensitive Species and Their Potential to Occur in the Study Area

Scientific Name	Common Name	Habitats and Known Locations	Potential to Occur in Study Area
Piperia unalascensis	Alaska rein orchid	Dry open sites, under tall shrubs in riparian zones, mesic meadows, and drier areas in coniferous and mixed evergreen forests from low elevation to subalpine. Known in Duke Island (on ultramafic rocks), Doolth Mountain (Chichagof Island), Gavina Island, Red Bluff Bay (Baranof Island), Rio Roberts (Prince of Wales Island).	Potential to occur in spruce-hemlock forest and fen/bog meadow habitats in study area.
Platanthera orbiculata	Lesser round-leaved orchid	Wet coniferous forest, damp rich humus in deep shade, low-elevation forested wetlands, medium- to high-volume old-growth hemlock forests, slopes between 15% and 75%, high bryophyte cover, low forb cover, forest edges or near gaps, near open water or boggy areas. Known in Duke and Revillagigedo islands and Cleveland Peninsula, Etolin, Prince of Wales Island, Gravina.	Potential to occur in spruce-hemlock and bog forest habitats in study area.
Polystichum kruckebergii	Kruckebuerg's swordfern	In sheltered cracks in the dunite rock of ultramafic outcrops. Known in Red Bluff Bay (Baranof Island), Redtop Mountain (Cleveland Peninsula), Gold Hill (Annette Island)	None. Habitat not present in study area.
Romanzoffia unalaschcensis	Unalaska mist-maid	Gravely areas along streams and in rock outcrop crevices. Known in Bald Mountain on Heceta Island.	Potential to occur in gravely streams in the study area.
Sidalcea hendersonii	Henderson's checkermallow	Estuarine habitats at the ecotone of the estuary and forest. Known in Howard Bay.	Potential to occur in salt marsh habitat in study area.
Tanacetum bipinnatum ssp. *Huronense*	Dune tansy	Sand dunes. Known in Shelikof Bay on Kruzof Island	None. Habitat not present in study area.

Source: (Goldstein et al. 2009)

The 12 sensitive species with potential to occur in the study area (moosewort fern, moonwort fern, Calder's lovage, sessileleaf scurvygrass, spatulate moonwort, spotted lady's slipper, mountain lady's slipper, large yellow lady's slipper, Alaska rein orchid, lesser round-leaved orchid, Henderson's checkermallow, and Unalaska mist-maid) were not found during the June or August 2009 study area surveys.

2.4.2 *Landscape Area*

There are no additional sensitive species, beyond those described in Table 3, with potential to occur in the landscape area.

2.5 Tongass National Forest High Priority Invasive Plant Species in the Study Area

The Tongass National Forest maintains a list of high-priority invasive plant species that contains noxious weeds and other invasive plant species that are actively being controlled on Tongass National Forest lands. Table 4 provides the name, rank, and size of infestation of each of these species in the study area. Plants are ranked on a scale of 0 to 100, 100 being the most invasive. The ranking process includes an assessment of each plant species, including biological characteristics and dispersal ability of the plant, climatic requirements, and feasibility of controlling the species. Plants ranked higher than 60 are usually a high priority for control (USFS 2007). The State of Alaska Prohibited and Restricted Noxious Weeds list is in Appendix B.

Table 4. Tongass National Forest High Priority Invasive Plant Species

Scientific Name	Common Name	Rank 0–100 (low–high)[1]	Species Present? Y or N	Area of the Infestation 2009
Actively controlling these plants where feasible on Tongass National Forest lands				
Alliaria petiolata	Garlic mustard	70	N	–
Centaurea biebersteinii	Spotted knapweed	86	N	–
Cirsium arvensis	Canada thistle	76	N	–
Cirsium vulgare	Bull thistle	61	N	–
Hieracium aurantiacum and H. caespitosum	Orange hawkweed, devil's paintbrush, meadow hawkweed	79	N	–
Hieracium lachenalii	Common hawkweed	NR[2]	N	–
Linaria vulgaris	Yellow toadflax, butter and eggs	69	N	–
Polygonum cuspidatum	Japanese knotweed	87	N	–
Senecio jacobaea.	Tansy ragwort	63	N	–
Sonchus arvensis. ssp. uliginosis	Perennial sowthistle	61	N	–
Actively controlling these plants *only in certain locations* on Tongass National Forest lands				
Brassica rapa	Field mustard	NR[2]	Y	68 square feet
Brassica rapa var. rapa	Purple-topped turnip	NR[2]	N	–
Cotula coronopifolia	Common brass buttons	42	N	–
Crepis tectorum	Narrow-leaf hawk's beard	54	N	–
Galeopsis bifida and G. tetrahit	Split-lip hemp-nettle	40	N	–
Hieracium umbellatum	Narrow-leaved hawkweed	46	N	–
Leucanthemum vulgare	Oxeye daisy, white daisy	61	N	–
Melilotus alba	White sweetclover	80	N	–
Melilotus officinalis	Yellow sweetclover, king's crown	65	N	–
Phalaris arundinacea	Reed canarygrass	83	N	–
Polygonum convolvulus	Black bindweed	NR[2]	N	–
Tanacetum vulgare	Common tansy	57	N	–

[1] (AKNHP 2008)

[2] NR - Not ranked by AKNHP

2.5.1 STUDY AREA

Although there were no noxious weeds found in the study area during the June or August 2009 surveys, populations of two non-native plant species were recorded (Table 5; see Figure 4).

Table 5. Non-native Plants found in the Study Area

Scientific name	Common name	Location
Brassica rapa	Field mustard	On upper level of salt marsh
Taraxacum officinale	Common dandelion	On upper level of salt marsh

Field Mustard

Field mustard (no AKNHP rank) is the only high-priority invasive plant species found in or near the study area (see Figure 4). This type of species is primarily selected for treatment in land-use designations where the USFS is managing for natural and near-natural desired conditions (e.g., wilderness and wilderness national monument land-use designations). Many southern Admiralty Island beaches are known to be heavily infested with field mustard (Anderson 2008). Control efforts on these large populations have been successful. The small infestations (two stems and 13 stems) discovered during the June 2009 survey effort were pulled and removed from the area.

Common Dandelion

Common dandelion (AKNHP rank 62) is one of the most widespread non-native plant species in North America. This plant is one of the earliest colonizers of disturbed areas, competes with native plants for light, water, nutrients, and pollinators, and may moderately impact natural succession. The *Forest Service Handbook Tongass National Forest Ketchikan, Alaska, Chapter 2080-Noxious Weed Management* states that common dandelion is well established, impossible to eradicate, and therefore is not a high priority for control (USFS 2007). In August 2009, botanists located a small population of dandelion (10 stems) in the study area. Given the small size of infestation, ease of dispersal of propagules, and proximity to wilderness, this population should be assessed for monitoring and control.

2.5.2 LANDSCAPE AREA

In August 2004 and August 2008, Ellen Anderson, USFS botanist, recorded locations of non-native plant populations while conducting sensitive plant surveys for the Thayer/Angoon Hydroelectric Project located on Admiralty Island north of the study area. She identified populations of common chickweed (*Stellaria media*), field mustard, foxtail barley (*Hordeum jubatum*), Kentucky bluegrass (*Poa pratensis*), and common dandelion (Anderson 2008).

Chapter 3 WETLANDS

This section of the technical report describes the location, extent, and functionality of wetland resources found in the study area. It includes a discussion of pertinent wetland regulations, methods of wetland mapping and functional assessment, and maps and narrative descriptions of the wetland types that occur in the study area. The analysis conducted to date for wetlands in the analysis area does not include a formal delineation. The appropriate timing for a formal wetland delineation using the U.S. Army Corps of Engineers (USACE) *Alaska Regional Supplement to the 1987 Delineation Manual* is after an alternative is approved at the end of the NEPA process.

In this document wetlands are analyzed at two scales: the landscape scale, demarcated as the southwestern half of the Mitchell Bay watershed, and at the scale of the study area, which comprises the buffered alternatives (see Figure 1). Many of the environmental processes and characteristics associated with wetlands in these areas are documented in the literature about the Tongass National Forest and Southeast Alaska. For example, landforms within the Tongass National Forest range from coastal estuaries to alpine summits. Variation in soils, hydrology, microclimate, and water chemistry, among other factors, contribute to a range of wetland types (approximately 4 million acres or 24% of the Tongass National Forest) and contribute a variety of ecosystem services.

Based on the USFWS National Wetland Inventory (NWI) database, the USFS (USFS 2008b) estimates that 53% of wetlands on Tongass National Forest lands are palustrine forested wetlands. Large areas of emergent wetlands, including peatlands and muskegs (25%) and scrub-shrub wetlands (13%), contribute to the overall wetland resource mosaic on Tongass National Forest lands. Other wetland classes that make up a smaller percentage of the overall wetland acreage include lacustrine (5%), estuarine 2%), riverine (<2%), and marine (<1%) classes.

Muskeg, a colloquial term familiar in Southeast Alaska, is synonymous with peat bog. Muskegs consist of sphagnum moss and sedges tolerant of wet, acidic, and low-nutrient soils that develop when the primary source of water is precipitation (USFS 2000). Climatic conditions in the region consist of abundant rain and cool summers, which slow the rate of decomposition, resulting in an accumulation of peat. The USFS estimates that peat bogs represent 10% of the Southeast Alaska landscape (USFS 2000).

Another regional condition that applies to the study and landscape areas is disturbance on various spatial and temporal scales. For example, retreating glaciers leave behind areas of poorly drained substrate, usually fine sands or silts, that allow for the development of freshwater marshes and wet meadows (O'Clair et al. 1998) Uplifting shorelines caused by glacial rebound, thought to be between 0.25 and 0.50 inches per year in the Angoon area (Carstensen 2009), expose new mudflats to hydrophytic plant colonization and push the upper limits of existing estuarine areas beyond the extent of tidal and storm surge influence.

On a shorter time scale and smaller spatial scale, wind plays a significant role in forest and wetland succession. Blowdowns create gaps in the forest canopy that cause soil disturbance. Soil mixing associated with uprooting during blowdowns breaks apart impermeable horizons that may otherwise lead to paludification (Nowacki and Kramer 1998), which is the process of bog expansion resulting from the rising water table as a consequence of peat growth. Conversely, the resulting depression left from uprooting may allow for the development of small "pocket" wetlands where surface and groundwater accumulate if deep soil mixing does not occur. Understanding the processes that occur with the larger regional environmental context is important when conceptualizing the wetland resources in both the landscape and study areas.

3.1 Regulatory Setting

Federal regulations and executive orders direct agencies to avoid and minimize adverse impacts to wetlands and other waters of the U.S. This section describes federal regulations in so far as they are pertinent to the National Environmental Policy Act (NEPA) process and associated regulatory agencies, including the USACE, Environmental Protection Agency (EPA), the FAA, and the USFS.

3.1.1 Federal Regulations and Policies

Section 404 of the Clean Water Act was enacted in 1972 by the U.S. Congress, which recognized the potential for continued or accelerated degradation of the nation's waters. The objectives of the act are to maintain and restore the chemical, physical, and biological integrity of the waters of the U.S. Section 404 of the act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits authorizing discharge of dredged or fill material into the waters of the U.S., including wetlands.

Preceding and complementing the Clean Water Act, Section 10 of the Rivers and Harbors Act (RHA) of 1899 is an example of early legislation regulating navigable waters of the U.S. and authorizing the USACE to issue permits for work in or placement of structures over these resources. The intent of the law is to address concerns regarding navigation and not water quality. In addition, jurisdiction is limited to waters affected by tidal flow. Section 10 of the RHA regulates "any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking" (USACE 2010). Other activities regulated by this law include, but are not limited to, "mooring structures such as pilings, aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, aids to navigation, and any other permanent, or semi-permanent obstacle or obstruction."

Executive Order 11990 was issued in 1977 and instructs federal agencies to provide active leadership to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibilities on federal lands. Both long-term and short-term impacts to wetlands are to be avoided wherever possible.

Order DOT 5660.1A, Preservation of the Nation's Wetlands: This order provides Department of Transportation (DOT) policy that transportation facilities should be planned, constructed, and operated to assure wetland protection and enhancement.

33 CFR part 320, General Regulatory Policies, and 33 CFR Part 325, NEPA Implementation Procedures for the Regulatory Program: These policies and procedures help integrate the NEPA and 404 permitting processes.

FAA Order 1050.1E and 5050.4B: These orders both require compliance with the above-mentioned orders and acts. Additionally, Chapter 21 of the *Environmental Desk Reference for Airport Actions*, a supplement to FAA Order 5050.4B, establishes the applicability of federal wetlands regulations to airport actions, procedures for agency consultation and coordination, and methods for evaluating the significance of anticipated project impacts. These Orders also dictate that the FAA must delineate and avoid non-jurisdictional wetlands and provide mitigation for impacts to those resources.

The NFMA of 1976 reorganized, expanded, and amended the Forest and Rangeland Renewable Resources Planning Act of 1974 and is the primary statute governing the administration of national forests. In general, it requires the Secretary of Agriculture to assess forest lands; develop a management program based on multiple-use, sustained-yield principles; and implement a resource management plan for each unit of the National Forest System. It specifically directs the USFS to protect wetlands.

Under the requirements of the NFMA, the ***Tongass National Forest Land and Resource Management Plan*** (TLMP) (USFS 2008b) outlines activities occurring on the forest. Similar to a community zoning plan, it allocates various land-use designations, e.g., wilderness, to certain areas of the Tongass National Forest. Specific objectives for wetlands include avoiding alteration of or new construction on wetlands wherever there is a practicable environmentally preferred alternative and implementing best management practices and estuarine, riparian, soil, and water standards and guidelines specific to wetlands.

3.1.2 State and Local Regulations

Alaska Coastal Management Act of 1977: In 1972, the U.S. Congress passed the federal Coastal Zone Management Act, which encourages states with coastal waters to develop a coastal management program. In response in 1977, the Alaska State Legislature passed the Alaska Coastal Management Act, which establishes the Alaska Coastal Management Program and is implemented through coastal districts. Under this program the City of Angoon created an Area Meriting Special Attention Plan for Mitchell, Hood, and Chaik-Whitewater bays in 1992. However, in January 2007 the DNR Coastal Management Program rescinded this district plan. At present, Angoon falls within the larger Alaska Coastal Zone Management Plan. Relevant polices protecting wetlands in this plan pertain to sections on air, land and water quality, firewood, and coastal development, among others.

3.1.3 Definitions

Waters of the U.S.: The USACE defines the term waters of the U.S. as “all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide. These include a) interstate waters, including wetlands and b) intrastate waters, including lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce, as well as impoundments of waters, tributaries, territorial seas, and wetlands otherwise defined as waters of the United States under the definition above” (Title 33 Code of Federal Regulations [CFR] Part 328.3).

Wetlands: The USACE defines wetlands as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (40 CFR 230.3(t)). The components of this definition are reflected in the USACE’s delineation protocol, which requires hydric soil, hydrophytic vegetation, and hydrology to be present for a site to be considered a wetland. Wetlands are recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. Therefore, they are identified in Section 230.3 of the CFR as a subclass of special aquatic sites.

The USACE assumes jurisdiction over any waters that are adjacent to navigable waterways. For example, a freshwater wetland perched on a terrace above a river would likely share a surface and groundwater connection to the river, and it would fall under USACE jurisdiction. Because of their close proximity to and likely surface and groundwater connection with the navigable waters of Favorite Bay, all of the wetlands in and immediately adjacent to the study area are assumed to be under USACE jurisdiction.

3.2 Methods

3.2.1 EXISTING DATA SOURCES

QuickBird satellite imagery in both true color and color infrared (collected on August 15, 2004) was reviewed. This imagery allowed for the identification of potential wetlands in the study area based on different color and texture signatures of vegetation in the imagery. In addition, the NWI, which is a common data set that maps the extent and location of wetland resources, was also reviewed. Recently, for many parts of the country, including the Tongass National Forest, these data are available in electronic format. Overlaying NWI data on aerial photography identified the location of potential wetlands and provided information on wetland type. Additional sources that reference the type of wetlands found in the study area and the location and composition of specific hydrophytic plant communities include the *Mitchell Bay Watershed Landscape Assessment* (USFS 2002) and *Angoon Airport Master Plan* (DOT&PF 2006) wetland delineation.

Other wetland data sets developed for Southeast Alaska that reflect regional hydrology, hydric soil formation, and hydrophytic vegetation community associations are based on the USFS soil and plant association wetland classification system (DeMeo and Loggy 1989). This resource was developed prior to the existence of NWI data for the Tongass National Forest (personal communication, Landwehr 2009), which were not available until approximately 1998 (personal communication, Michaelson 2010). This USFS data layer does not include the Airport study area.

3.2.2 FIELD DATA COLLECTION

From June 18 to 26, 2009, and August 16 to 21, 2009, wetland specialists conducted field reconnaissance to a) confirm the location and extent of wetland habitats based on NWI data, b) identify dominant plant communities, and c) estimate the proportion of wetlands to uplands in large forested mosaics that are not identifiable using remote sensing techniques. Field data were used to build on and improve the existing NWI wetland resource map.

Wetland Characterization Points and Wetland Mapping

Wetland characterization points are the same as those used to map vegetation communities, as described in section 3.2.2. This field-based method was implemented to record wetland characteristics. Data include cover type, wetland type, wetland size, and dominant plant species. These points were established in the field in wetland habitats and on ecotones to identify wetland boundaries. Using GIS analysis, wetland polygons were created based on the field reconnaissance and a second review of true color and color infrared imagery, which was used to help identify low spots and depressions. Wetland polygons are differentiated into types based on the Cowardin et al. (Cowardin et al. 1979) classification system and numbered for reference purposes and used in the functional assessment method. The minimum mapping unit used was 0.1 acre.

Wetland Mosaic Sampling Protocol

The spruce-hemlock forest cover type comprises a complex mosaic of wetland and upland areas; within this cover type, it was not practical to map wetlands individually over a large area. The point-intercept sampling method, which is described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region* (USACE 2007), was used to estimate the percentage of wetland in the spruce-hemlock forest cover type.

Within the spruce-hemlock forest cover type, starting locations of 20 transects were randomly selected on a map of the study area. Transect starting points were created using a random point generator feature of GIS software. The 50-m transect length was used as a constraint, so that no two transect starting points would be within a distance of twice the transect length to each other and would not overlap.

The fieldwork for this project was completed in August 2009 by a team of three wetland specialists. A Trimble GeoXT GPS unit was used to locate the starting point of each transect in the field. In the field, a number was randomly generated between 0 and 360 to establish the transect bearing. If the randomly generated bearing caused the transect to go into a physical barrier or outside of the study area, a new number was generated until an acceptable transect was established. The actual starting and ending points were recorded with a GPS unit in the field. The wetland specialist followed the compass heading approximately 50 m (50 paces). The second wetlands specialist, using a long pole, would then walk toward the first, calling out the wetland status based on the presence of hydrophytic vegetation and wetland hydrology approximately every meter along each transect. In spruce-hemlock forest, wetland points identified using this technique typically had saturated soils and contained skunk cabbage, an obligate wetland plant.

The percentage of wetlands in the spruce-hemlock forest was then calculated using the following formula:

$$\%\ \text{wetland} = \frac{\#\ \text{of wetland points on all transects}}{\text{total}\ \#\ \text{of points sampled on all transects}} \times 100$$

By combining satellite image and field data to create a revised inventory and map of wetland resources, the FAA's consultant team established an accurate baseline from which to conduct a functional assessment and wetland impact analysis. As noted previously, the appropriate timing for a formal wetland delineation using the *USACE Alaska Regional Supplement to the 1987 Delineation Manual* is after an alternative is approved at the end of the NEPA process. However, the FAA will seek concurrence from the USACE with the analysis contained herein.

3.2.3 Wetland Functional Assessment

Different wetland types range in function and anthropogenic disturbance, among other factors, can affect a wetland's functional capacity. Therefore, assessing wetland function will aid in Section 404 permitting and the mitigation process should the project be implemented. This section describes wetland functions and the qualitative wetland functional assessment process. To assess wetland function in the study area, the FAA's consultant team used the modified Wetland Evaluation Technique (WET) developed for the Juneau International Airport EIS process (SWCA 2007). Building on the original work by Adamus et al. (1987), the FAA's consultant team, in collaboration with an interagency working group, modified the WET to create a rapid assessment method and better reflect the functional characteristics of estuarine wetlands. For a detailed description of the original WET method and its assumptions, refer to Adamus et al. (1987). The use of this method was coordinated with the USACE, Environmental Protection Agency, and USFS prior to conducting fieldwork.

A fundamental step in the wetland assessment process is grouping wetlands into assessable functional areas or minimum units of analysis. The unit of analysis is the wetland assessment area that is based on subwatershed boundaries and wetland class. Subwatershed demarcation is the result of a GIS process by which a digital elevation model is categorized into drainage areas. Because watershed context and an emphasis on hydrology are important in the functional assessment method, a wetland should not occupy more than one subwatershed, although these boundaries may not be apparent from a vegetation community perspective. Wetland assessment areas are labeled alphanumerically to illustrate inclusion in a specific subwatershed and differences between wetland class which often vary in the functions they perform. Similarly, because different classes of wetlands perform different functions, wetland units are divided and numbered based on the Cowardin et al. (1979) classification system.

Wetland Functions

In simple terms, wetland functions are those ecological processes that take place in wetlands. They are relevant to the wetland system itself and/or the surrounding ecosystem and include a wetland's capacity to transform nutrients into bioavailable forms and provide habitat for wildlife. Wetland functions can also relate to societal values such as recreation opportunities or economic concerns. However, it is important to realize that not all wetlands perform the same function, nor do they perform all functions equally well. In addition, wetland functions can be degraded as a result of natural and anthropogenic disturbance.

The following 12 wetland functions are included in the WET (Adamus et al. 1987) developed under the auspices of the USACE, and all but recreation were applied to wetlands in the study area:

Groundwater Recharge and Discharge: Groundwater recharge is the net downward flow of surface water into an underlying aquifer—a process important to water filtration and cleansing and to resupplying aquifers. Recharge wetlands are often hydrologically linked with other wetlands such that their disturbance can have far-ranging, indirect impacts to other associated wetlands.

Surface Hydrologic Control: Surface hydrologic control refers to the capacity of wetlands to a) reduce the magnitude of peak flows and associated floods, b) delay the release of water to downslope/downstream areas following storms, c) sustain streamflows during dry seasons by producing a steady outflow, and d) reduce bank erosion and channel scour. Accordingly, the hydrologic control function is important in a) minimizing flood damage and maintaining proper drainage in developed areas, b) maintaining aquatic habitats and fisheries during periods of low surface flows, and c) maintaining the balance between fresh water and salt water and their associated plant communities in estuarine zones.

Sediment/Toxicant Retention: Sediment and toxicant retention refers to the ability of wetlands to remove inorganic sediments from aqueous suspension and/or toxic metals and organic compounds from solution. This function is usually prevalent in flat, vegetated areas. The location of wetlands downstream of potential sediment and toxicant sources is also an indicator of their value for this function (Adamus et al. 1987; USACE 2000). This function may benefit downstream water quality at the expense of habitat quality in wetlands where the sediment or toxicant is accumulating. Sediment retention has economic value in that it can help prevent or reduce the frequency of dredging to maintain navigable waterways in certain areas (Adamus et al. 1987).

Nutrient Transformation/Export: This function refers to a wetland’s capacity for transforming and/or exporting organic forms of nitrogen and phosphorous. In many environments, the removal or retention of these nutrients is important to maintaining water quality in downstream areas. Wetlands are also capable of transforming these nutrients into forms more available to aquatic and marine food webs. The value of this function to other natural resources or to the human environment can vary and therefore can be a benefit in some locations and under some conditions (e.g., reduced water treatment effort) and a liability in others.

Riparian Support: Wetlands, regardless of whether they are important fish habitats, may have a critical influence on aquatic habitat quality in adjacent streams, downstream areas, and estuaries. The riparian support function refers to the positive influence wetlands may have on regulating stream temperatures and exporting decaying plant material that provides nutrients to aquatic and estuarine habitats.

Fish Habitat: The fish habitat function refers to the existing suitability of a wetland to produce any of the local salmonid and marine fishes. Local fisheries are a key component of the area’s economy with respect to commercial and sport fisheries and tourism. Estuarine and riparian wetlands provide important breeding, rearing, and foraging habitat for fishes and their prey. Additional information regarding fisheries will be described in the draft EIS.

Wildlife: This function refers to the extent to which a given wetland supports wildlife species. Wetlands that rate high for this function are those in which the most wildlife are likely to occur. Salt marsh is a key staging and foraging area for migratory birds, shorebirds, waterfowl, raptors, and passerines. Waterbird species are the number one indicator of high wildlife value. Gulls, corvids, and songbirds, although important, are not themselves indicators of high function for the purposes of this analysis.

Regional Ecological Diversity: In general, regional ecological diversity refers to the number of species (flora and fauna) native to a given region. With respect to this function, wetlands that support rare species contribute more to regional ecological diversity than wetlands with a high number of relatively common or widespread species. The rating criteria for this function depend on the frequency of occurrence of various uncommon bird species in a given wetland, and whether or not the wetland contains the types of habitat typically associated with these species.

Erosion Sensitivity: Erosion sensitivity refers to a wetland's capacity to stabilize soils and sediments as a function of its vegetative cover, slope and soil type, and probable groundwater situation. Although erosion is a natural process, this function refers to the potential for accelerated erosion resulting from human activity in or adjacent to wetlands.

Ecological Replacement Cost: Ecological replacement cost refers to the cost of restoring or re-creating the ecological characteristics of a given wetland, should it be developed or disturbed. Older (i.e., later successional) plant communities such as forested wetlands and peat bogs are usually more difficult to replace than younger (i.e., early successional) communities. Wetlands with older plant communities rank high in terms of ecological replacement costs, whereas ponds, emergent, and scrub-shrub wetlands are more easily re-created and rate low for this function.

Downslope Beneficiary Sites: This wetland function is based on the ecological services that wetlands provide to downslope or downstream sites in terms of reducing peak flows and thereby providing flood protection. Wetlands that are geographically situated higher in the watershed are more likely to generate these cost-saving services and are assigned a higher rating for this function.

Recreational Use: Previous applications of the (Adamus et al. 1987) WET method relied on administration of a public survey to assess recreational use. Due to lack of data, this function was not evaluated for study area wetlands. Information regarding recreational use in the study area will be described in the draft EIS.

In the TLMP, wetland functions have been combined with societal values into broad categories of ecosystem services that define the full suite of goods and services that are vital to human health and livelihood provided by these ecosystems (USFS 2008b). This framework, outlined below, includes many of the same functions analyzed using the modified Adamus assessment technique but also attaches a human dimension component that may be important for supplemental analysis in Angoon due to the Alaska Native population and subsistence economy. Ecosystem services provided by wetlands as identified in the TLMP include:

Provisioning: Food, fresh water, fiber, timber, fuel

Regulating: Climate regulation, hydrological regimes, pollution control and detoxification, erosion protection, natural hazards

Cultural: Spiritual, recreational, aesthetic, educational

Supporting: Biodiversity, soil formation, nutrient cycling

Wetland Functional Assessment Protocol

The WET method provides a means of evaluating key wetland functions inherent to single wetlands or groups of wetlands in the study area. Wetland functions and values are evaluated in the study area using the Wetland

Functional Assessment Data Form (Appendix C). The form requires the user to select a description of functional capacity from a range of possible conditions. These conditions form a rating scale from very low to very high, although specific functions may only use from two to six rating categories. For example, nutrient transformation has three possible rating categories, Low, Medium, and High, whereas fish habitat has six categories.

To complete the qualitative assessment, wetland function data were gathered in conjunction with the vegetation, wetland, wildlife, and fisheries field surveys completed during the summer of 2009. Field data used in this process include but are not limited to breeding bird and plant survey findings, Bald Eagle (*Haliaeetus leucocephalus*) nest locations, and fish habitat characteristics. Supplemental landscape data, such as percent slope, distance to streams or topographic divides, and percent forest cover, were obtained remotely using GIS, existing topographic data, and the satellite imagery described above.

3.3 Wetlands in the Analysis Areas

3.3.1 Study Area

Under the Cowardin wetland classification method, four different wetland systems occur in the study area: estuarine, lacustrine, palustrine, and riverine wetlands. Each system can be divided into several subsystems that are further divided into classes and subclasses following the Cowardin et al. (Cowardin et al. 1979) alphanumeric coding method (Figure 6). Figure 7 illustrates the extent and location of these wetland systems in the study area.

Wetland classes occurring in the study area are summarized in Table 6, which includes information on water regime, water source vegetation community, and substrate information.

Prior to beginning fieldwork, wetland classes in the study and landscape areas were identified based on existing NWI data. In some cases, field reconnaissance resulted in reclassification of wetland types. For example, some palustrine emergent marshes in the NWI data set were found in the field to have a distinct shrub component and were reclassified as palustrine scrub-shrub to reflect this vegetation characteristic. Open-water pond nomenclature was retained in most cases except when analysis of total acreage required a shift from palustrine to lacustrine system. Class attributes such as aquatic bed were typically left unchanged.

Few true bogs or muskegs were identified in the study area. Using a strict definition, these are acidic, low-nutrient systems with a water source that is primarily the result of precipitation. Very slow rates of decomposition build peat from sphagnum or sedge (the dominant plant forms). Within the study area, wetlands that resemble these sphagnum and sedge peat-forming systems were visited and were found to be dominated by other herbaceous and woody plants and/or receive inputs of surface water from the surrounding drainage area.

Wetland polygons can be cross-referenced to match cover types found in section 3.3 and Table 7. Therefore, wetlands and non-wetlands illustrated in Figure 7 match vegetation cover types in Figure 4 (section 3.3.). Because the wetland classification is a product of hydrology, vegetation communities, and vegetation structure, many cover types in the vegetation analysis are subdivided into different wetland classes that reflect the Cowardin et al. (Cowardin et al. 1979) classification system. For a more complete list of plant species found in these wetland types, refer to Appendix A. Wetland assessment areas identified by an alphanumeric code, wetland class, and acreage are listed in Table 8 and illustrated in Figure 8.

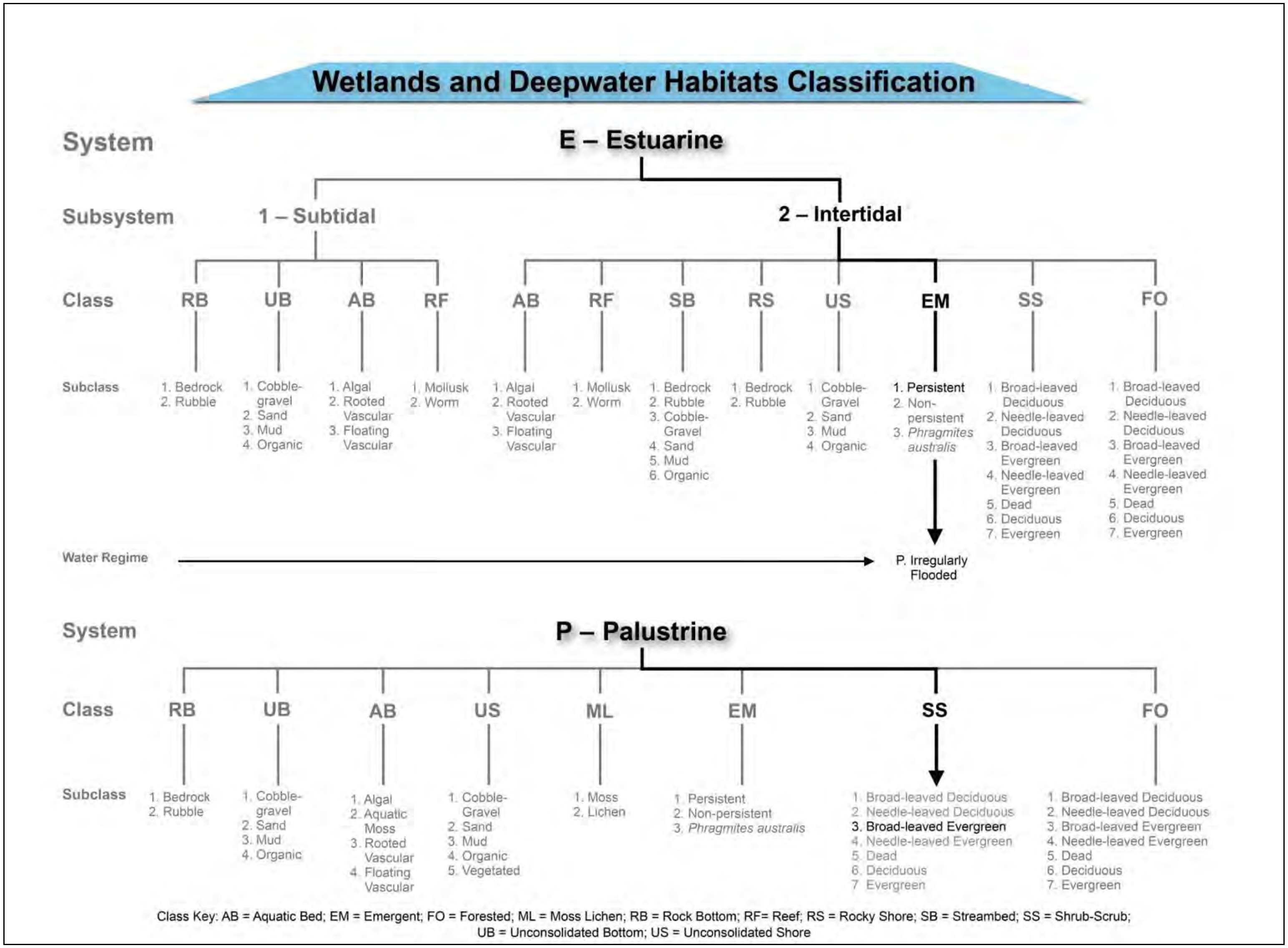

Figure 6. Cowardin et al. (1979) wetlands classification alphanumeric nomenclature.

Figure 7. Extent and location of wetland systems in the study area.

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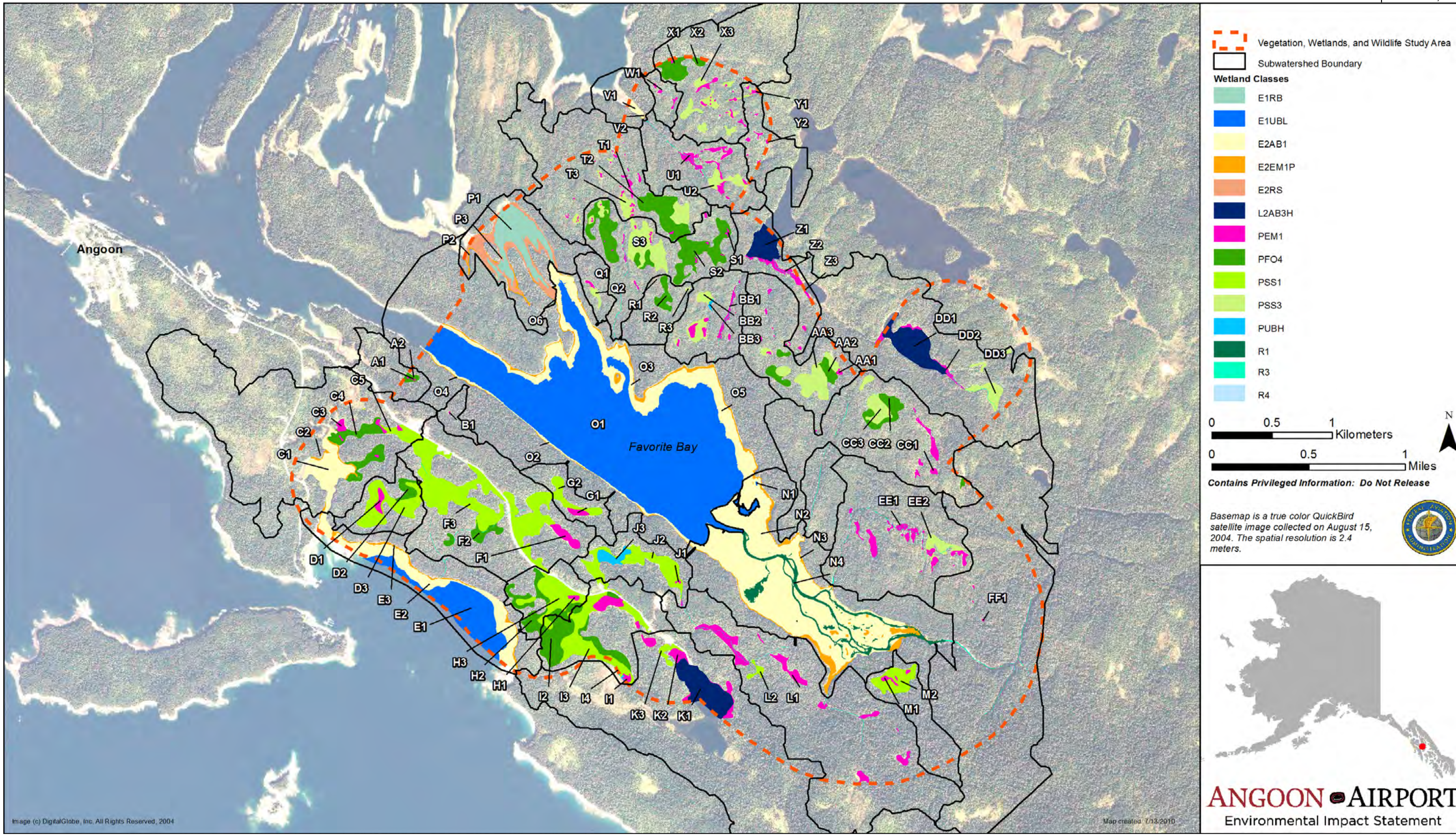

Figure 8. Wetland functional areas.

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Table 6. Wetland Classes in the Study Area

Wetland Class	Hydrology Description	Vegetation/Substrate Description	Percent of Study Area[1]	Acreage
E1UBL	Estuarine (E), Subtidal (1) below extreme low water, Subtidal (L)	Unconsolidated Bottom (UB)	10%	522
E1RB	Estuarine (E), Subtidal (1)	Rocky Bottom (RB)	<1%	35
E2AB1	Estuarine (E), Intertidal (2) between extreme low water and extreme high water, including splash zone	Aquatic beds (AB), Algal (1)	7	369
E2EM1P	Estuarine (E), Intertidal (2), between extreme low water and extreme high water, including splash zone; Irregularly Flooded (P)	Emergent (EM) Persistent (1) Vegetation Species: dunegrass, bluejoint, common sweetgrass, and beach pea	<1%	44
E2RS	Estuarine (E); Intertidal (2) between extreme low water and extreme high water, including splash zone	Rocky Shore (RS)	<1%	25
L2AB3H	Lacustrine (L) >20 acres, <2m deep, Littoral (2); Permanently Flooded (H)	Aquatic beds (AB), Rooted Vascular (3) Species: yellow pond lily (*Nuphar polysepalum*) and pondweed (*Potamogeton* sp.)	1%	64
PEM1	Palustrine (P) <20 acres; <2 m deep; salinity <0.5 ppt	Emergent (EM) and Persistent (1), erect, rooted hydrophytes, excluding mosses or lichens Species: sedges (*Carex sitchensis, C. aquatilis, Carex* spp.), small-flowered bullrush, bog buckbean, and bluejoint	2%	95
PFO4	Palustrine (P) <20 acres; <2 m deep; salinity <0.5 ppt; Needle-leaved Evergreen (4)	Forested (FO) woody vegetation >6m Overstory species: shore pine and Western hemlock Understory species: dwarf dogwood, lady fern, skunk cabbage, and oak fern	3%	169
PSS1	Palustrine (P) <20 acres; <2 m; salinity <0.5 ppt	Scrub-Shrub (SS), woody vegetation <6m; Broad-leaved Deciduous (1) Species: Sitka alder (*Alnus crispa*) and Oregon crabapple (*Malus fusca*), sedges (*Carex* spp.), salmonberry (*Rubus spectabilis*), bog buckbean, and shore pine	4%	202

Table 6. Wetland Classes in the Study Area

Wetland Class	Hydrology Description	Vegetation/Substrate Description	Percent of Study Area[1]	Acreage
PSS3	Palustrine (P) <20 acres; <2 m; salinity <0.5 ppt	Scrub-Shrub (SS), Woody vegetation <6m; Broad-leaved Evergreen (3) Species: crowberry, peat moss, sedges (*Carex* spp.), Labrador tea, bog cranberry, shore pine, and dwarf dogwood	2%	98
PUBH	Palustrine (P) <20 acres; <2 m; salinity <0.5 ppt; Permanently Flooded (H)	Unconsolidated Bottom (UB) least 25% cover of particle smaller than stones and vegetation cover less than 30% Species: yellow pond lily and pondweed	<1%	7
R1	Riverine (R), Tidal (1) Tidal influence extends from the upper boundary of the estuarine system to the extreme upper limit of tidal fluctuation.	–	<1%	28
R3	Riverine (R), Upper perennial (3) No tidal influence	Rock, cobble or gravel	<1%	7
R4	Riverine (R) Intermittent (4)	Rock, cobble or gravel	<1%	2
Upland forest/ wetland mosaic	–	Overstory species: Sitka spruce and Western hemlock Understory species: lady fern, skunk cabbage, and peat moss	68% Approximately 5.8% of the study area (306.0) is wetlands under forest overstory	3,611 8.5% (448.5) of the upland forest is wetland
Total			100%	5,276

Note: ppt = parts per thousand

[1] Total does not equal 100% due to rounding.

Table 7. Wetland Categorization by Cover Type

Cover Type	Wetland Class
Bog forest	PFO4
Bog woodland	PSS1, PSS3
Disturbed lands	Upland forest/wetland mosaic
Estuary	R1, E1UBL, E1RB
Fen	PEM1
Freshwater	R3, R4, L2AB3H, PUBH
Salt marsh	E2EM1P
Spruce-hemlock forest	Upland forest/wetland mosaic
Unvegetated tidal	E2AB1, E2RS

Table 8. Wetland Resources in the Study Area

Wetland ID[1]	Wetland Class	Acreage
A1	PEM1	0.2
A2	PFO4	1.7
B1	PEM1	0.1
C1	E2AB1	23.9
C2	E2EM1P	2.3
C3	PEM1	3.1
C4	PFO4	16.4
C5	PSS1	6.1
D1	PEM1	2.2
D2	PFO4	4.9
D3	PSS1	23.0
E1	E1UBL	54.5
E2	E2AB1	44.6
E3	E2EM1P	5.2
F1	PEM1	4.6
F2	PFO4	6.3
F3	PSS1	75.2
G1	PEM1	1.8
G2	PSS1	7.7
H1	PEM1	0.7
H2	PFO4	17.2
H3	PSS1	19.0
I1	PEM1	6.1
I2	PFO4	28.0
I3	PSS1	30.8
I4	PUBH	0.5
J1	PEM1	0.4

Table 8. Wetland Resources in the Study Area

Wetland ID[1]	Wetland Class	Acreage
J2	PSS1	22.5
J3	PUBH	5.3
K1	L2AB3H	26.7
K2	PEM1	7.6
K3	PSS1	3.0
L1	PEM1	18.4
L2	PSS1	2.0
M1	PEM1	1.3
M2	PSS1	12.8
N1	E1UBL	0.1
N2	E2AB1	200.2
N3	E2EM1P	19.0
N4	R1	27.4
O1	E1UBL	467.0
O2	E2AB1	8.6
O3	E2AB1	89.0
O4	E2EM1P	2.1
O5	E2EM1P	12.8
O6	E2RS	0.1
P1	E1RB	35.3
P2	E2EM1P	2.9
P3	E2RS	24.8
Q1	PEM1	0.5
Q2	PSS3	1.5
R1	PEM1	0.0
R2	PFO4	5.4
R3	PSS3	0.2
S1	PEM1	2.2
S2	PFO4	41.2
S3	PSS3	20.8
T1	PEM1	3.1
T2	PFO4	18.3
T3	PSS3	10.9
U1	PEM1	7.3
U2	PSS3	5.6
V1	E2AB1	2.3
V2	E2EM1P	0.1
W1	PEM1	0.8
X1	PEM1	3.0
X2	PFO4	10.3

Table 8. Wetland Resources in the Study Area

Wetland ID[1]	Wetland Class	Acreage
X3	PSS3	10.3
Y1	PEM1	1.8
Y2	PSS3	0.6
Z1	L2AB3H	13.2
Z2	PEM1	5.0
Z3	PUBH	0.1
AA1	PEM1	1.4
AA2	PFO4	8.7
AA3	PSS3	18.3
BB1	PEM1	4.8
BB2	PSS3	7.0
BB3	PUBH	0.6
FF1	PEM1	0.2
EE1	PEM1	10.5
EE2	PSS3	5.8
CC1	PEM1	4.6
CC2	PFO4	10.1
CC3	PSS3	9.2
DD1	L2AB3H	24.2
DD2	PEM1	2.8
DD3	PSS3	8.0
Total		1,656.1

[1]The Wetland ID is composed of the subwatershed (letter) and wetland class (number).

3.3.2 LANDSCAPE AREA

The landscape area (as described in section 2.2) contains many of the same wetland classes as those found in the study area (USFS 2002). To assess wetland resources at this scale, the NWI data layer (Figure 9) was used. Acreages and percent cover of different wetland classes in the landscape area are found in Table 9.

Table 9. NWI Wetland Coverage in the Landscape Area

Wetland Class	Acres	Percent of Landscape Area[1]
E1AB1L	14	<1%
E1UBL	6,772	9%
E2AB	2,871	4%
E2EM1	283	<1%
E2RS	141	<1%
E2USN	56	<1%
L1UBH	618	<1%
L2AM3H	100	<1%
PAB3	88	<1%
PEM1	2,419	3%
PFO4	16,151	20%
PFO5	27	<1%
PML1	110	<1%
PSS1	167	<1%
PSS4	2,092	3%
PUBH	287	<1%
Uplands	47,773	60%
Total	79,970	100%

[1] Total does not equal 100% due to rounding.

As can be noted from Figures 8 and 9, there are differences between wetlands mapped by the FAA's consultant team in the study area and those identified in NWI mapping. The NWI data layer identifies small areas of palustrine moss-lichen wetlands (PML1) and dead palustrine forested wetlands (PFO5) in the landscape area that were not classified in the study area based on field observations. Other differences include large areas of limnetic (>2 m deep) lacustrine habitat (L1UBH) and needle-leaved palustrine scrub-shrub (PSS4) classes. In the study area, lacustrine systems were lumped into the littoral subsystem (L2-shoreline to 2 m in depth) due to the lack of bathymetric data. Similarly, PSS4 wetlands are classified as PSS3, based on the dominant, broad-leaved, evergreen woody understory. Finally, the large areas of needle-leaved palustrine forest wetland (PFO4) in the landscape area were extended to include all spruce-hemlock forest cover types and were classified as upland forest/wetland mosaic.

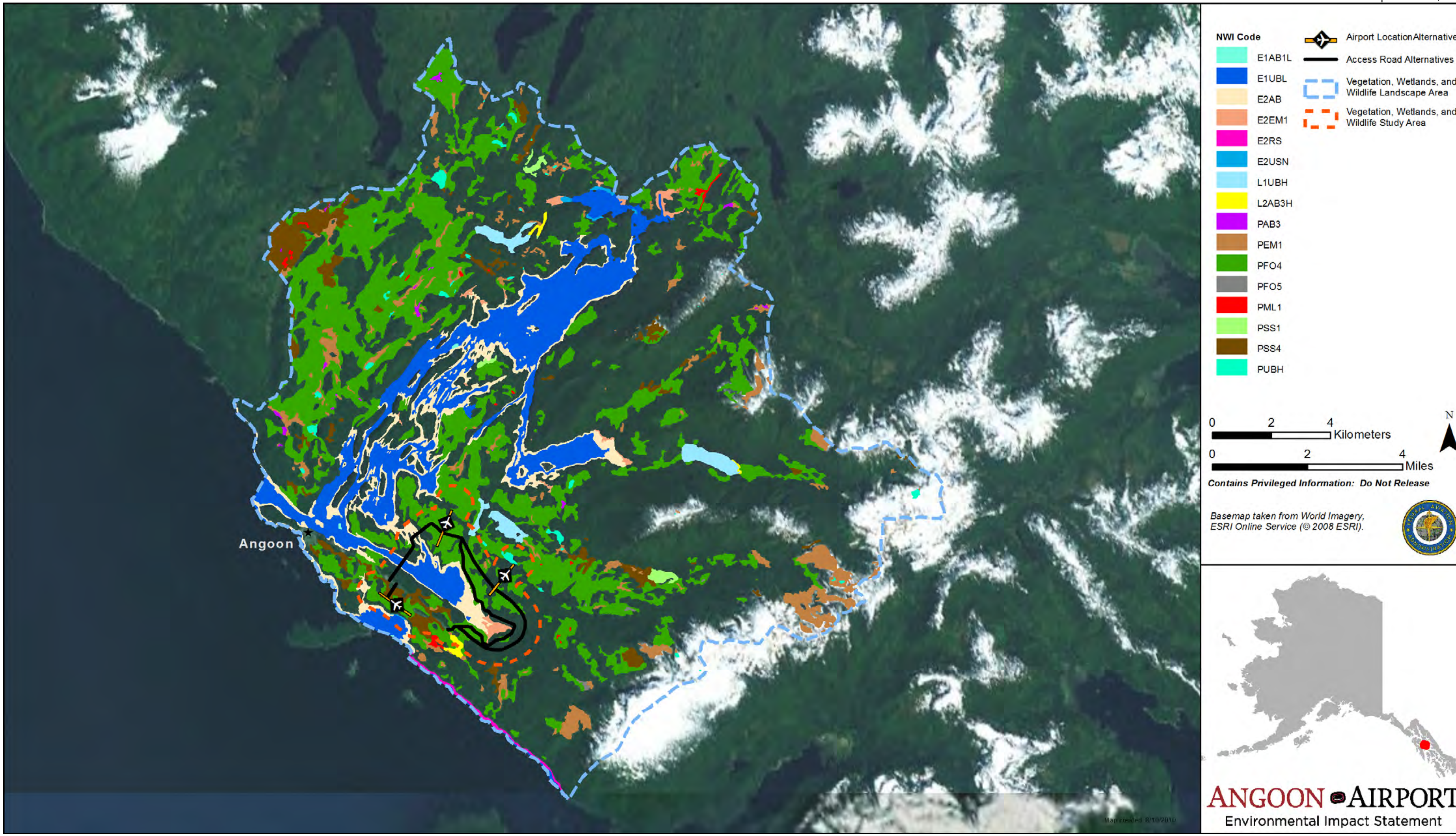

Figure 9. National Wetlands Inventory data for landscape area.

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3.3.3 QUALITATIVE WETLAND FUNCTIONAL ASSESSMENT RESULTS

Table 10 summarizes the qualitative results of the functional assessment and includes wetland ID, functional group number, wetland class, and rating for each of the 12 functions.

Wetland Functions

Groundwater Recharge

Criteria used to rate the groundwater recharge function include infiltration potential of the substrate, location of the wetland in the watershed, and wetland class. Wetlands with substrates of bedrock or marine sediments score low. Muskeg wetlands, wetlands near the top of a topographic divide and estuarine wetlands with gravel or alluvial substrates score high. Wetlands with the capacity to recharge groundwater but that do not meet criteria described in the high rating are scored as moderate. In general, due to their position at the bottom of a watershed and their more impervious substrates, estuarine systems are rated low except in the case of emergent systems with alluvial, gravel, or sandy substrate.

Groundwater Discharge and Lateral Flow

High functioning wetlands, relative to groundwater discharge and lateral flow, are located within 200 feet of a stream (discharge) and approximately halfway on a slope between a topographic divide and a stream. Wetlands considered moderate satisfy one of these two criteria. Low functioning wetlands have substrates with bedrock or marine sediments. Ratings are not associated with wetland type except in the case of estuarine emergent wetlands which are assumed have alluvial, gravel, or sandy substrate. These wetlands are rated high.

Surface Hydrologic Control

This function is primarily associated with slope. Tidal wetlands and wetlands with >7% slope are considered to be low functioning. Non-tidal wetlands within 25 vertical feet of sea level and a slope of <3% are rated moderately low. Wetlands with slopes between 3% and 7% that occupy greater than 5% of the drainage area are considered to function in a moderately high capacity. High functioning wetlands have slopes of <3% and no permanent or tidal outlet. Ratings do not appear to be associated with specific wetland classes, except in the case of tidal wetlands, which have limited capacity to control surface water given their location at the base of a watershed. Subtidal wetlands are not scored in this function.

Sediment or Toxicant Retention

Ratings for this function have criteria similar to those used for surface water control (i.e., slope and the presence or absence of a hydrologic outlet). However, in this function, tidal and lacustrine wetlands are rated moderately high. Subtidal wetlands are not scored in this function.

Nutrient Transformation and Export

A wetland is considered high functioning if it is connected by a channel to a creek or river and it is large relative to its drainage area, if it has deep open-water habitats or dense vegetation, or if it is a mudflat with algae mats. Moderately functioning wetlands are mostly vegetated with an intermittent or permanent outlet to an estuary or directly abut an estuary. Wetlands with no surface water outlet to an estuary are low functioning. In general, estuarine wetlands (except mudflats) are not scored in this function because rating criteria reflect wetland connectivity to an estuary.

Riparian Support

In general, this function is rated based on a wetland’s proximity to streams, lakes, or estuaries. Estuarine emergent areas score high because of their transitional nature between forested areas and open water. Other wetland classes that are adjacent to or contiguous with a mostly permanent stream, lake, or estuary score moderately high. Wetland classes drained by intermittent streams score moderately low. Low functioning wetlands are isolated from lakes, stream, and estuaries. Open-water systems are not scored in this function.

Fish Habitat

Rating criteria for the fish habitat function include suitability for rearing, migration, and spawning, which among other characteristics considers fish accessibility to the wetland. Wetlands considered excellent fish habitat are rated very high, whereas good fish habitat or a wetland designated as essential fish habitat (EFH) by the National Marine Fisheries Service (NMFS) receives a score of high. Fair habitats, poor habitat with access, poor habitat with restricted access, and wetlands with no access are rated moderately high, moderately low, low, and very low, respectively. Information regarding wetlands/streams designated as EFH was obtained for this analysis. In addition, stream assessments and fish inventories conducted in the study area informed the wetland ratings. Ratings do not appear to be correlated with any particular wetland class, but are based on the characteristics and connectivity of perennial streams to a specific wetland.

Wildlife

No wetlands were scored very high for wildlife because of the lack of data on bird use during migration. Forested wetlands adjacent to open water are considered to be high functioning wildlife habitat (e.g., Bald Eagles nest or roost in these areas). Estuarine wetlands between 0.1 and 1.0 acre or those wetlands with documented occasional use by Vancouver Canada Geese (*Branta canadensis fulva*), Bald Eagles, and Belted Kingfishers (*Megaceryle alcyon*) scored moderately high. Wetlands without standing water but that are adjacent to forested areas or within 300 feet of permanent water scored moderately low. Low-scoring wetlands did not meet any of the criteria above nor were any sensitive species or species of concern observed in these wetlands. Given these criteria, estuaries and forested wetlands near open water scored higher than other wetland classes.

Regional Ecological Diversity

Important or high functioning wetland classes with respect to regional ecological diversity include tidal wetlands that abut emergent marshes, nontidal wetlands that abut tidal wetlands, wetlands with aquatic beds, needle-leaved forested wetlands, and scrub-shrub wetlands. Estuarine emergent marshes unconnected to nontidal wetlands are considered to be moderately high functioning as are deciduous scrub-scrub wetlands within 300 feet of a stream or pond. All other wetland classes without open water or other special features and that do not meet any of the above criteria are considered to have low regional ecological diversity. Subtidal wetlands are not scored in this function.

Erosion Sensitivity

The criteria for this function are based on slope and vegetation cover. Wetlands with high erosion sensitivity generally have slopes of greater than 20%. Those with moderately high sensitivity have slopes that range from 3% to 20% and are not dominated by forest. However, for a wetland with the same range in slope that is dominated by forest cover, erosion sensitivity is considered to be moderately low. Wetlands with slopes of less than 3% have low erosion sensitivity. These ratings do not appear to be correlated with any particular wetland class. Estuarine wetlands are not scored in this function.

Ecological Replacement Cost

This function considers both forest cover and the presence of peat soils when rating wetlands. Due to the lack of soil data, wetland class is used as a surrogate criterion. Wetlands considered to have high ecological replacement costs are those with greater than 50% forest cover and either peat soils or trees with a diameter of at least 40 cm diameter at breast height (dbh, that is 4.5 feet [1.37 m] above ground), for example, palustrine forested wetlands. Other high scoring wetland classes include estuarine emergent marshes, those with salmon rearing pools, or rearing habitat for marine forage fish. Moderately high scoring wetlands have forest cover of between 25% and 50% and peat soils. In the case of the study area, palustrine broad leaved evergreen scrub-shrub wetlands (PSS3) are included in this category. Deciduous scrub-shrub wetlands (PSS1) generally received a rating of moderate unless other criteria apply. Non-peat forming wetlands with no forest cover, such as ponds and emergent wetlands, are considered to have a low ecological replacement cost.

Downstream/Coastal Beneficiary Sites

All wetlands in the study area are rated low due to the lack of downstream structures or residences that could benefit from flood attenuation or drinking water provision.

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Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
A1	PEM1	High	Low	Low	Low	Mod	Mod Low	ND	Low	Low	Mod High	Low	Low
A2	PFO4	High	Low	Low	Low	Mod	Mod Low	ND	Low	High	Mod Low	High	Low
B1	PEM1	High	Low	High	High	Low	Low	Very Low	Low	Low	Low	Low	Low
C1	E2AB1	Low	Low	Low	Mod High	NA	NA	High	High	High	NA	High	Low
C2	E2EM1P	High	High	Low	Mod High	NA	High	High	High	High	NA	High	Low
C3	PEM1	High	Mod	Mod Low	High	Mod	Mod High	Low	Mod High	High	Low	Low	Low
C4	PFO4	Mod	Mod	Low	Low	Mod	Mod High	Very Low, High	Mod Low	High	Mod Low	High	Low
C5	PSS1	High	Low	Low	Low	Low	Mod Low	Very Low	Low	Mod High	Mod Low	Mod	Low
D1	PEM1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Low	Mod High	Low	Low
D2	PFO4	High	Low	Low	Low	Low	Mod Low	Very Low	Low	High	High	High	Low
D3	PSS1	High	High	Low	Low	Mod	Mod Low	Very Low	Low	Mod High	High	Mod	Low
E1	E1UBL	Low	Low	NA	NA	NA	NA	High	High	NA	NA	High	Low
E2	E2AB1	Low	Low	Low	Mod High	NA	NA	High	High	High	NA	High	Low
E3	E2EM1P	Low	High	Low	Mod High	NA	High	Mod Low	High	Mod High	NA	High	Low
F1	PEM1	High	Low	Low	Low	Low	Mod Low	Low	Mod High	Low	Mod High	Low	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
F2	PFO4	Mod	High	Low	Low	High	Mod High	Mod Low	Low	High	High	High	Low
F3	PSS1	High	High	Low	Low	High	Mod High	Very Low, Mod Low	Low	Mod High	High	Mod	Low
G1	PEM1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Low	High	Low	Low
G2	PSS1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Mod High	High	Mod	Low
H1	PEM1	High	Low	Low	Low	Low	Mod Low	Very Low	Low	Low	Mod High	Low	Low
H2	PFO4	Mod	High	Low	Low	Mod	Mod Low	Very Low, Low	Mod Low	High	High	High	Low
H3	PSS1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Mod High	High	Mod	Low
I1	PEM1	High	Mod	Low	Low	Mod	Mod Low	Very Low, Low	Low	Low	Mod High	Low	Low
I2	PFO4	High	Low	Low	Low	Low	Mod Low	Very Low	Mod Low	High	High	High	Low
I3	PSS1	High	Mod	Low	Low	High	Mod High	Very Low	Mod Low	Mod High	Mod High	Mod	Low
I4	PUBH	Mod	Mod	High	Mod High	High	NA	Mod Low	Mod High	Low	NA	Low	Low
J1	PEM1	High	Mod	Low	Low	High	Mod High	Low	Low	Low	Mod High	Low	Low
J2	PSS1	High	Mod	Low	Low	High	Mod High	Low	Mod Low	Mod High	Mod High	Mod	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
J3	PUBH	Mod	High	High	Mod High	High	NA	Mod Low	High	Low	NA	Low	Low
K1	L2AB3H	Mod	Mod	High	Mod High	High	NA	Mod High	High	High	NA	High	Low
K2	PEM1	High	Mod	Low	Low	Mod	Mod High	Mod Low	Mod Low	Low	High	Low	Low
K3	PSS1	High	Mod	Low	Low	Mod	Mod Low	Very Low	Low	Mod High	High	Mod	Low
L1	PEM1	High	High	Low	Low	High	Mod High	High, Low, Very Low	Low	Low	High	High	Low
L2	PSS1	High	Mod	Low	Low	High	Mod High	High, Very Low	Low	Mod High	High	High	Low
M1	PEM1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Low	High	Low	Low
M2	PSS1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Mod High	High	Mod	Low
N1	E1UBL	High	High	NA	NA	NA	NA	Very High	High	NA	NA	High	Low
N2	E2AB1	High	High	Low	Mod High	High	NA	High	High	High	NA	High	Low
N3	E2EM1P	High	High	Low	Mod High	NA	High	Mod High	High	Mod High	NA	High	Low
N4	R1	High	High	Low	Mod High	NA	Mod High	High, Very High	High	High	NA	High	Low
O1	E1UBL	Low	Low	NA	NA	NA	NA	Very High	High	High	NA	High	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
O2	E2AB1	Low	Low	Low	Mod High	NA	NA	ND	High	High	NA	High	Low
O3	E2AB1	Low	Low	Low	Mod High	NA	NA	High	High	High	NA	High	Low
O4	E2EM1P	Low	High	Low	Mod High	NA	High	Mod High	High	Mod High	NA	High	Low
O5	E2EM1P	Low	High	Low	Mod High	NA	High	Mod High	High	Mod High	NA	High	Low
O6	E2RS	Low	Low	Low	Mod High	NA	NA	High	Mod High	Mod High	NA	High	Low
P1	E1RB	Low	Low	NA	NA	NA	NA	Very High	High	High	NA	High	Low
P2	E2EM1P	Low	High	Low	Mod High	NA	High	Mod High	High	Mod High	NA	High	Low
P3	E2RS	Low	Low	Low	Mod High	NA	NA	High	High	Mod High	NA	High	Low
Q1	PEM1	High	High	Low	Low	Low	Mod Low	Very Low	Mod Low	Low	Mod High	Low	Low
Q2	PSS3	High	High	Low	Low	Mod	Mod Low	Low	Low	High	High	Mod High	Low
R1	PEM1	High	Low	Mod High	High	Low	Mod Low	Very Low	Low	Low	Low	Low	Low
R2	PFO4	High	Low	Low	Low	Low	Mod Low	Very Low	Low	High	Mod Low	High	Low
R3	PSS3	High	Low	Low	Low	Low	Mod Low	Very Low	Low	High	High	Mod High	Low
S1	PEM1	High	High	Low	Low	Low	Mod Low	Low	Low	Low	High	Low	Low
S2	PFO4	Mod	High	Low	Low	Low	Mod Low	Very Low	Low	High	Mod High	High	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
S3	PSS3	High	Mod	High	High	Low	Mod High	Very Low	Low	High	Mod High	Mod High	Low
T1	PEM1	High	High	Low	Low	Low	Mod High	Very Low	Low	Low	Mod High	Low	Low
T2	PFO4	High	Low	Low	Low	Low	Mod Low	Very Low	Low	High	Mod Low	High	Low
T3	PSS3	High	High	Low	Low	Mod	Mod Low	Very Low	Low	High	Mod High	Mod High	Low
U1	PEM1	High	High	Low	Low	Mod	Mod High	Mod Low	Low	Low	High	Low	Low
U2	PSS3	High	Mod	Low	Low	Mod	Mod Low	Low	Low	High	Mod High	Mod High	Low
V1	E2AB1	Low	Low	Low	Mod High	NA	NA	High	Mod High	High	NA	High	Low
V2	E2EM1P	Low	High	Low	Mod High	NA	High	Mod Low	Mod Low	Mod High	NA	High	Low
W1	PEM1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Low	High	Low	Low
X1	PEM1	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	Low	Mod High	Low	Low
X2	PFO4	Mod	Low	Low	Low	Low	Mod Low	Very Low	Low	High	Mod Low	High	Low
X3	PSS3	High	Mod	Low	Low	Low	Mod Low	Very Low	Low	High	Mod High	Mod High	Low
Y1	PEM1	High	Low	Low	Low	Low	Mod Low	Very Low	Low	Low	High	Low	Low
Y2	PSS3	High	Low	Low	Low	Low	Mod Low	Very Low	Low	High	High	Mod High	Low
Z1	L2AB3H	Mod	Mod	Mod High	Mod High	High	NA	High	High	High	NA	High	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
Z2	PEM1	High	High	Low	Low	High	Mod High	High, Very Low	High	High	Mod High	High	Low
Z3	PUBH	Mod	Mod	High	Mod High	High	NA	High	High	Low	NA	High	Low
AA1	PEM1	High	High	Low	Low	Mod	Mod Low	Very Low, Low	Low	Low	High	Low	Low
AA2	PFO4	High	Mod	Low	Low	Mod	Mod Low	Very Low	Low	High	Mod Low	High	Low
AA3	PSS3	High	Mod	Low	Low	Mod	Mod Low	Very Low	Low	High	Mod High	Mod High	Low
BB1	PEM1	High	High	Low	Low	Mod	Mod Low	High, Low	Mod Low	Mod High	High	High	Low
BB2	PSS3	High	High	Low	Low	Mod	Mod Low	Low	Mod Low	High	Mod High	Mod High	Low
BB3	PUBH	Mod	High	High	Mod High	Mod	NA	Low	Mod High	Low	NA	Low	Low
FF1	PEM1	High	High	Low	Low	Low	Mod Low	Very Low	Low	Low	Mod High	Low	Low
EE1	PEM1	High	High	Low	Low	High	Mod High	High, Mod Low, Very Low	Low	Mod High	Mod High	High	Low
EE2	PSS3	High	High	Low	Low	High	Mod High	Mod Low, Very Low	Low	High	Mod High	Mod High	Low

Table 10. Functional Assessment Results

Wetland ID	Wetland Class	Groundwater Recharge	Groundwater Discharge/ Lateral Flow	Surface Hydrologic Control	Sediment Retention	Nutrient Export	Riparian Support	Fish Habitat	Wildlife	Regional Ecological Diversity	Erosion Sensitivity	Ecological Replacement Cost	Downslope Beneficiary Sites
CC1	PEM1	High	High	Low	Low	Mod	Mod High	Mod Low, Very Low	Low	Low	Mod High	Low	Low
CC2	PFO4	Mod	Mod	Low	Low	Low	Mod Low	Very Low	Low	High	Mod Low	High	Low
CC3	PSS3	High	Low	Mod High	Mod High	Low	Mod Low	Very Low	Low	High	Mod High	Mod High	Low
DD1	L2AB3H	Mod	High	High	Mod High	High	NA	High	High	High	NA	High	Low
DD2	PEM1	High	High	Mod High	Mod High	High	Mod High	High	Mod High	High	Mod High	High	Low
DD3	PSS3	High	Mod	Low	Low	High	Mod High	Mod	Low	High	Mod High	Mod High	Low

Note: NA = not applicable. In this case wetland type is not captured in the rating category description.

ND = no data. Lack of data limits accurate characterization of wetland.

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Chapter 4 WILDLIFE RESOURCES

This section of the technical report provides information concerning terrestrial, aquatic, and marine wildlife in the study and landscape areas. Wildlife habitat type definitions located in the study area are based on the vegetation cover types described in section 2.3.

4.1 Regulatory Setting

4.1.1 FEDERAL REGULATIONS AND POLICIES

The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668c) 1940, prohibits taking of Bald Eagles, including any eggs, nest material, or any of their parts without a permit. The act defines *take* as “pursue, shoot, shoot at, wound, kill, capture, trap, collect, molest, or disturb.” *Disturb* is defined as “to agitate or bother a Bald or Golden Eagle to the extent that it is likely to cause 1) injury, 2) decrease in its productivity by interfering with normal biological functions such as feeding, breeding, thermal regulation of chicks/eggs, or 3) nest abandonment” (USFWS 2008).

The Migratory Bird Treaty Act of 1918 (amended in 1936, Mexico, and 1972, Japan) prohibits the taking, killing, or possessing of migratory birds, unless authorized by the Secretary of Interior. *Take* is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) requires the United States to accept significant responsibility to provide for the conservation of migratory birds and their habitats, with an emphasis on federal species of concern. Federal agencies are also required to support the objective of the migratory bird conventions by incorporating bird conservation values, standards, and practices when engaging in activities and to attempt to minimize adverse impacts to migratory birds when conducting agency acts. There are approximately 100 bird species that migrate from the lower 48 states and Central and South America to nesting, breeding, and rearing grounds in Alaska. Most of these birds use the Pacific flyway to the interior or northern Alaska and only pass through Southeast Alaska on their way to the breeding grounds. However, many species are also known to breed in the study area.

The intent of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems on which they depend. The USFWS and NMFS are responsible for its administration. In general, terrestrial and freshwater organisms are the responsibility of the USFWS, whereas threatened and endangered marine and anadromous species are managed by NMFS. The ESA prohibits federal agencies from authorizing, funding, or carrying out actions that may a) risk the survival of listed endangered or threatened species or b) adversely modify designated critical habitat, unless the agency has a permit. An important caveat to the ESA is the designation of critical habitat. *Critical habitats* are defined as important geographic areas that have biological elements that are crucial to the preservation of the species and therefore need to be protected or managed properly (USFWS 2008). (Section 5.1.3 contains definitions of the categories.)

Marine Mammal Protection Act (MMPA) contains regulations regarding the interactions with marine mammals (16 U.S.C. 1361–1421; Public Law 92-522). It also establishes a moratorium, with exceptions, on the taking or harassment of marine mammals and the importing of marine mammals and marine mammal products into the United States.

Under the Fish and Wildlife Coordination Act (16 U.S.C. 661–667e, as amended), a department or agency of the United States that plans construction within the waters or channel of a body of water must consult with the USFWS and the state agency that administers the wildlife resources of the state where construction will occur. The act’s objectives include ensuring that wildlife conservation receives equal consideration and is coordinated with other features of water resource development programs. The USACE would coordinate with the USFWS under this act as part of the Clean Water Act Section 404 permit process.

40 CFR 1507.2(e) and 1508.8(b) provide CEQ guidance on incorporating biodiversity considerations into environmental impact analyses under NEPA. This involves evaluating the impacts of a project in the regional context.

The Sikes Act Amendments of 1974 authorize states to prepare statewide wildlife conservation plans. It is necessary to check project-related actions with any state wildlife conservation plans.

FAA Order 1050.1E and 5050.4B both require compliance with the above-mentioned orders and acts. Additionally, Chapters 2 and 8 of the *Environmental Desk Reference for Airport Actions*, a supplement to FAA Order 5050.4B, specifically note that the FAA must consider the potential effect of its actions on biotic resources, including wildlife and federally listed threatened and endangered species. The *Desk Reference* also notes that the FAA's environmental document must address state-listed endangered and threatened resources and establishes thresholds of significance for determining project impacts.

USFS Sensitive Listed Species (Forest Service Manual 2670) is intended to prevent further federal listing under the ESA for those species whose populations occur on National Forest System lands. The USFS listed species have been identified and approved by the regional forester (Goldstein et al. 2009). Their population capabilities have become a concern on National Forest System lands. The reasons for the concern are usually due to a suspected or active, long-term decline in population or habitat required for the species' conservation. These species are managed according to the TLMP (USFS 2008b).

The NFMA of 1976: This act is a reorganized, expanded, and amended Forest and Rangeland Renewable Resources Planning Act of 1974 and is the primary statute governing the administration of national forests. In general, it requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It specifically directs the USFS to provide maintain fish and wildlife habitats.

4.1.2 State and Local Regulations

Alaska Department of Fish and Game Alaska (ADF&G) Species of Special Concern lists species and subspecies as species of special concern when the population has experienced a declining trend period. Once a species has been listed, the ADF&G can be proactive in protecting and mitigating actions that may threaten the population before said actions become critical. The listing allows the ADF&G to take actions to prevent the population from declining to the point that it becomes listed on the state endangered species list or becomes a federally listed species under the ESA. In addition, the listing allows the ADF&G more options for recovery efforts and maintains focus on the conservation of the ecosystem that may affect additional species or habitats.

4.1.3 Definitions

ADF&G Species of Special Concern: Wildlife species whose population abundance has been in a long-term downward trend or whose population could be at risk due to a potential decline in number, restricted habitat availability, sensitivity to disturbance, or limited distribution (ADF&G 1998).

Candidate Species: Species that are under consideration for federal listing as threatened or endangered but for which no listing rule has been proposed, or species for which the USFWS or NMFS has sufficient information to list but issuance of a proposed rule is precluded by other, higher priority listing decisions.

Federally Listed Endangered and Threatened Species: Species listed under the ESA can be categorized as endangered or threatened. Endangered species are those at risk of becoming extinct throughout their entire range or a considerable portion of their range. Threatened species are those that are likely to become listed as endangered at some point in the near future (USFWS 2008).

Proposed Species: Species that have been proposed in the *Federal Register* to be listed as threatened or endangered but for which a final listing rule has not yet been published.

USFS Management Indicator Species (MIS): Species whose population dynamics can be used to assess ecosystem health and responses to land management actions and predict responses of similar species with comparable habitat necessities (USFS 2008a). The NFMA has required that MIS habitats for these species be maintained to ensure viable populations.

USFS Sensitive Species: Native plant and animal species designated by the regional forester for which there is special management emphasis to a) ensure species viability and b) preclude trends toward endangerment that would result in the need for federal listing (Goldstein et al. 2009). There must be no impacts to a sensitive species without an analysis of the significance of adverse effects on its population, habitat, and on the viability of the species as a whole.

4.2 Methods

The methods by which information on wildlife in the study and landscape areas was collected or compiled are described below.

4.2.1 Existing Information

Existing information was used in developing a preliminary understanding of wildlife known to occur or with potential to occur in the study and landscape areas. Key, over-arching sources consisted of the following documents:

- *Angoon Airport Master Plan, Background Report: Planning and Facility Requirements, Access and Apron Alternatives Analysis* (DOT&PF 2006)
- *Mitchell Bay Watershed Landscape Assessment* (USFS 2002)
- *Angoon Hydroelectric Project Final EIS.* Tongass National Forest document R10-MB-628 (USFS 2009)
- *The Coastal Forests and Mountains Ecoregion of Southeastern Alaska and the Tongass National Forest: A Conservation Assessment and Resource Synthesis* (Schoen and Dovichin 2007)

Additional information was obtained through internet searches and conversations with scientists at state and federal agencies and with Angoon residents. Additional sources of existing information included the personal observations of project staff. Existing information sources are cited, as appropriate, in the results sections below.

4.2.2 Field Data Collection

A variety of species-specific and guild-specific wildlife surveys was conducted in the study area to obtain empirical data on the occurrence of special-status wildlife, breeding birds, and small mammals. These surveys are described in the sections below. Information on general wildlife in the study area was obtained largely through observations by wildlife biologists on the FAA's consultant team of individual animals and wildlife sign (e.g., tracks, scat) during the aforementioned species-specific field survey efforts.

Black Oystercatcher Surveys

The Black Oystercatcher (*Haematopus bachmani*) is listed as a USFS Sensitive Species for the Tongass National Forest (Goldstein et al. 2009). Black Oystercatcher surveys were conducted on May 26 and 27, 2009, during the estimated peak of brooding season, when the birds are most conspicuous. The survey dates were based on the estimated peak brooding time for Prince William Sound (personal communication, Goldstein 2009). Surveys followed the USFS protocol *Methods for Black Oystercatcher Shoreline Surveys* (Brown et al. Unpublished). See Appendix D for the complete protocol. This protocol was used to survey potentially suitable shoreline habitat in the study area and a 0.5-mile study area buffer.

Biologists observed the shore from a small boat traveling roughly 5 knots. Survey locations can be found on Figure 10. Surveys were conducted during high tide when possible. When conditions allowed, the boat was within 10 to 15 meters (m) of the shore. This was often not possible, due to the timing of the tides and other sea conditions, and therefore the traveling speed of the boat was reduced to compensate for the greater distance from shore. Surveys at lower tides have a higher likelihood of missed nests because observers are at a greater lateral distance from potential nest locations. Walking searches were completed in areas where boat surveys were not possible.

Bald Eagle Surveys

The Bald Eagle in Southeast Alaska is listed as an MIS by the USFS. Admiralty Island has some of the best Bald Eagle nesting habitat in Alaska (King et al. 1972; Stenhouse 2007). Bald Eagle nest location data for Admiralty Island have been collected and managed by the USFWS. The majority of the nest data for the study area was collected in 1971 and 2009, with a single nest located in 1993, 1997, and 2002 (personal communication, Schempf 2010). The USFWS data set shows eagle nests located in the study area at approximately 0.5-mile intervals along the shoreline of Favorite Bay.

Two survey methods were used to search for Bald Eagle nests within 0.5 mile of each airport and access road alternative. The first method used a fixed-wing aircraft to fly the shoreline and search for nests. The aerial survey was designed to cover a larger area than could be adequately surveyed from the water or ground. Two observers, one GPS technician, and a pilot conducted this survey. The GPS technician monitored and recorded aircraft location in relation to the study area. When a nest was detected, whether active or inactive, its location was recorded via a GPS unit so that the nest could be relocated from the ground. The fixed-wing survey was conducted on May 25, 2009.

The second survey method consisted of slowly cruising the shoreline in a small motorized boat, roughly 100 m from the shore and visually scanning the trees with binoculars for nests and eagles exhibiting breeding behaviors (e.g., carrying nesting materials and/or frequently returning to the same location). Three observers and a boat captain conducted the survey. The 100-m distance from the shore was necessary to be able to scan beyond the first row of trees along the shoreline. For portions of the shoreline that could not be adequately observed from the boat, biologists walked the shoreline to survey adjacent trees. Boat and shoreline pedestrian surveys were conducted on May 25 and 26 and on June 25, 2009.

Historical data collected by the USFS and USFWS were used as a starting point to search for nests. Nest data used as a baseline for the 2009 surveys were collected in 1971 and in 1993. Even though these data may be outdated, Bald Eagles often display a high degree of nest site fidelity. These historic nest locations indicated potential present-day nest locations (Smith 1936; Stahlmaster 1987). In addition, the USFWS conducted a Bald Eagle nest survey of the Favorite Bay area in 2009 (personal communication, Schempf 2010), which was used to supplement field data gathered by the FAA's consultant team for the Airport EIS.

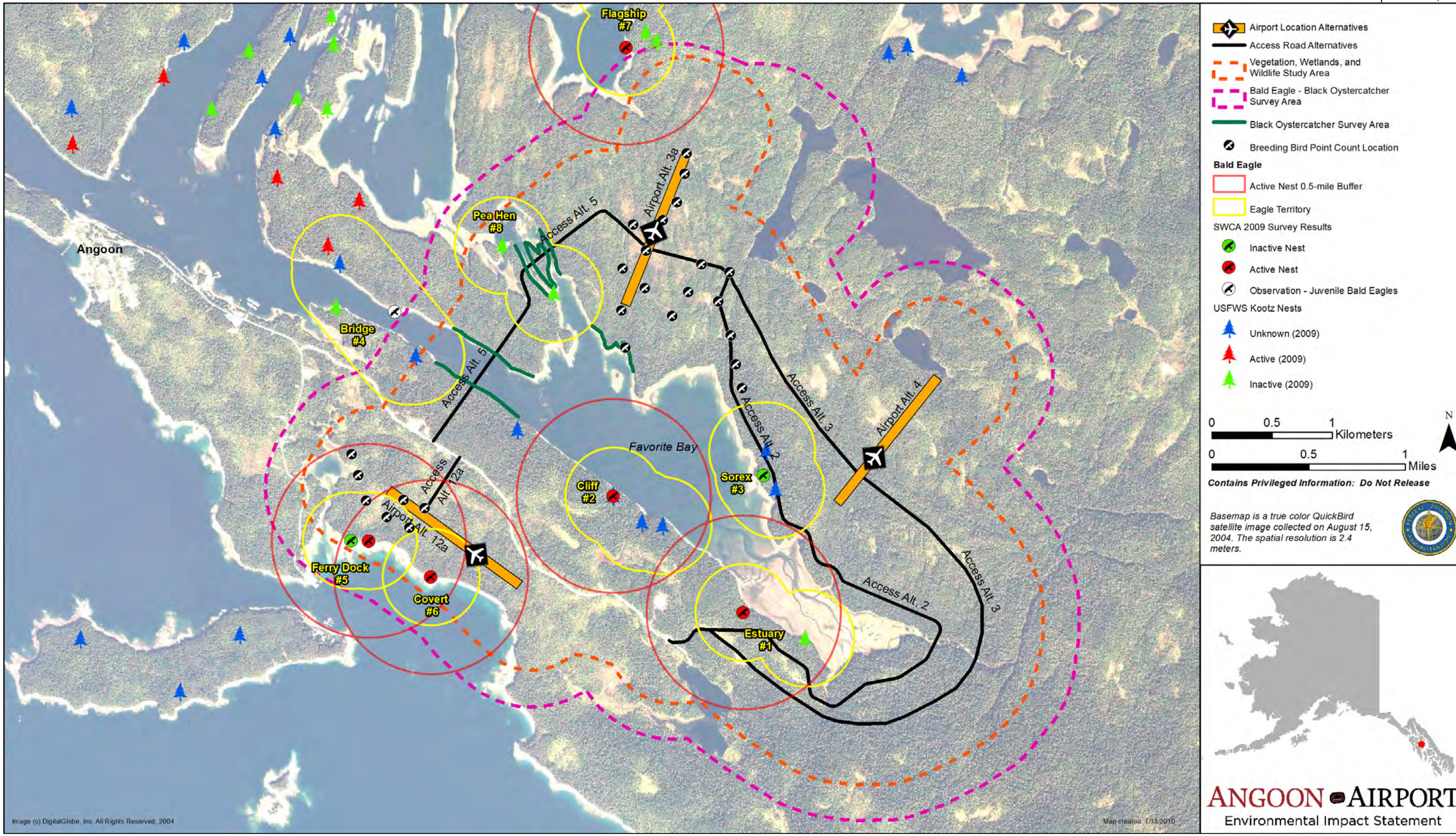

Figure 10. Bird surveys.

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To gain a further understanding of Bald Eagle use of the study area for breeding, the FAA's consultant team delineated Bald Eagle territory boundaries based on techniques described by Stalmaster (1987) and the data previously collected in the study area by the USFWS. Each territory includes an active nest and usually one or two alternate nests. The purpose of looking at the study area as potential territories, and not just as active or inactive nests, is twofold. First, it is an attempt to understand the distribution and density of breeding eagles in the study area. Secondly, identification of breeding territories provides a good starting point for nest searching if and when preconstruction surveys are needed. Territory delineations began with nests that were active in 2009. For each inactive nest, a determination was made about the most likely active associated territory with it. These determinations were based on proximity to the active nest and other nests, and on local topography.

Queen Charlotte Goshawk Surveys

The Queen Charlotte Goshawk (*Accipiter gentilis laingi*), a subspecies of the Northern Goshawk (*A. gentilis*), is listed as a USFS Sensitive Species for the Tongass National Forest (Goldstein et al. 2009). All airport and access alternatives were surveyed for the presence of the Queen Charlotte Goshawk. The broadcast acoustical and stand search methods outlined in the USFS publication *Northern Goshawk Inventory and Monitoring Technical Guide* (Woodbridge and Hargis 2006) were followed in surveying for Northern Goshawks in the study area. Survey points were established 250 m apart on the locations of the airport and access alternatives under consideration at the time of the surveys (Figure 11). Recorded goshawk vocalizations were broadcast at these points according to the survey protocol. Due to the potential for bear encounters, surveyors were encouraged to speak loudly during the time spent walking between points, making more noise than is typical for most goshawk surveys. However, surveyors actively looked for nests and goshawk sign while walking between points and engaged in a silent period prior to conducting the callback survey at any given data point.

The entire study area was surveyed twice, from June 18 to 26 and from August 20 to 26, 2009. This timing was planned to coincide with the nestling and fledgling life stages of goshawks in Southeast Alaska, respectively. According to protocol, the adult alarm call was broadcast during the June survey (nestling stage), and the wail call was broadcast during the August survey (fledgling stage). The Intensive Search protocol (Woodbridge and Hargis 2006) was employed after a vocal approach by an adult goshawk was elicited.

Breeding Bird Surveys

Breeding bird point count surveys were conducted to identify bird species likely to be nesting in the study area and their respective habitat associations. The breeding bird surveys were conducted on Airport Alternatives 12a and 3a and Access Alternative 2 (see Figure 10). Because of the similarity in habitat types, this information can then be extrapolated to the remainder of the study area to identify the types and extents of habitats likely to be used by breeding birds. Five habitat types were selected for bird surveys: bog forest, bog woodland, estuarine intertidal, fen, and spruce-hemlock forest (Table 11). Point counts were distributed among these habitat types in general proportion to the prevalence of each habitat type in the study area.

Table 11. Study Area Habitat Types Selected for Bird Surveys and Number of Point Count Stations

Habitat Type	Number of Point Count Stations	Acreage in Study Area	Percent of Study Area
Bog forest	1	169	3%
Bog woodland	2	300	6%
Estuarine intertidal	1	584	11%
Fen	2	95	2%
Spruce-hemlock forest	18	3,577	68%

The breeding bird survey point count protocol was largely based on *Managing and Monitoring Birds using Point Counts: Standards and Applications* (Ralph et al. 1995). From June 19 to June 21, 2009, 24 fixed-radius point counts were conducted. Each point count lasted 10 minutes in which all bird species seen or heard were recorded. The point counts were divided into 0–3, 3–5, 5–8, and 8–10 minute intervals. The breeding bird surveys were conducted in the morning during peak bird activity in acceptable weather conditions. Acceptable weather conditions are described as having winds that are light or nonexistent, little or no precipitation, and good visibility. Each bird observation was recorded on a data sheet with its approximate distance from the observer, and any evidence of territorial defense (e.g., singing) or breeding (e.g., carrying nest material or food). In addition, the following information was recorded for each point count station: date, observer, temperature range, sky condition, wind speed, point ID, UTM coordinates, and start time. See Appendix D for the complete protocol and a sample data sheet.

Small Mammal Surveys

Small mammal trapping was conducted in three habitat types: fen, spruce-hemlock forest, and estuarine habitat. Trap arrays were set up in all three habitats simultaneously, using 3.0×3.5×9.0-inch collapsible Sherman live capture traps. Each array consisted of 15 traps with 10-m spacing between them. Traps were individually numbered, and their location was marked with vinyl flagging to aid in relocation during trap checks. Traps were left in place with doors closed from August 21 to 22, 2009, to allow a period of acclimation for any small mammals in the area. Traps were then baited and set each morning between 0800 and 0900 hours on the mornings of August 22, 23, 24, and 25, 2009. Bait consisted of molasses horse feed loosely thrown onto the treadle of the trap. Two or three cotton balls were also added to each trap to provide insulation and nesting material for any trapped animals. Trap doors were then placed in an open position and tested several times for sensitivity before placing the trap on the ground. Traps were placed near signs of rodent activity, when possible (e.g., near burrows, trails, or vegetative cover), while remaining near their flagged location. Traps were left during the day and checked that same evening between 1630 and 1730 hours. Weather throughout the survey was wet and cool, with daily high temperatures of approximately 55°F.

During evening checks, all traps containing animals were opened using a gloved hand. The traps were tipped forward at an angle to transfer any captured animals into a large, ventilated, zipped plastic bag. Captured animals were then identified to species and released at the trap site. Traps were closed overnight to avoid trapping animals during the coldest parts of the night. Traps were baited as needed prior to setting for the next trap day.

Incidental Observations

All incidental wildlife observations were noted and documented on data sheets. Incidental observations of wildlife during the 2009 field surveys were the main source of field data on brown bears (*Ursus arctos*), Sitka black-tailed deer (*Odocoileus hemionus sitkensis*), and marine mammals in the study area. For brown bears and Sitka black-tailed deer, observation of sign was as significant as animal observations in determining high-use areas.

4.3 Wildlife in the Analysis Areas

This section of the report provides a description of wildlife known to occur in the study and landscape areas. The information provided below has been obtained from existing information, the field survey efforts described above, input received from state and federal agency biologists and the public during scoping, subsequent conversations with agency biologists, and incidental or anecdotal field observations by biologists on the FAA's consultant team. Wildlife species observed in the study and landscape areas are described in six categories: 1) general wildlife; 2) threatened, endangered, and sensitive species; 3) MIS; and 4) breeding birds; 5) small mammals; and 6) marine mammals.

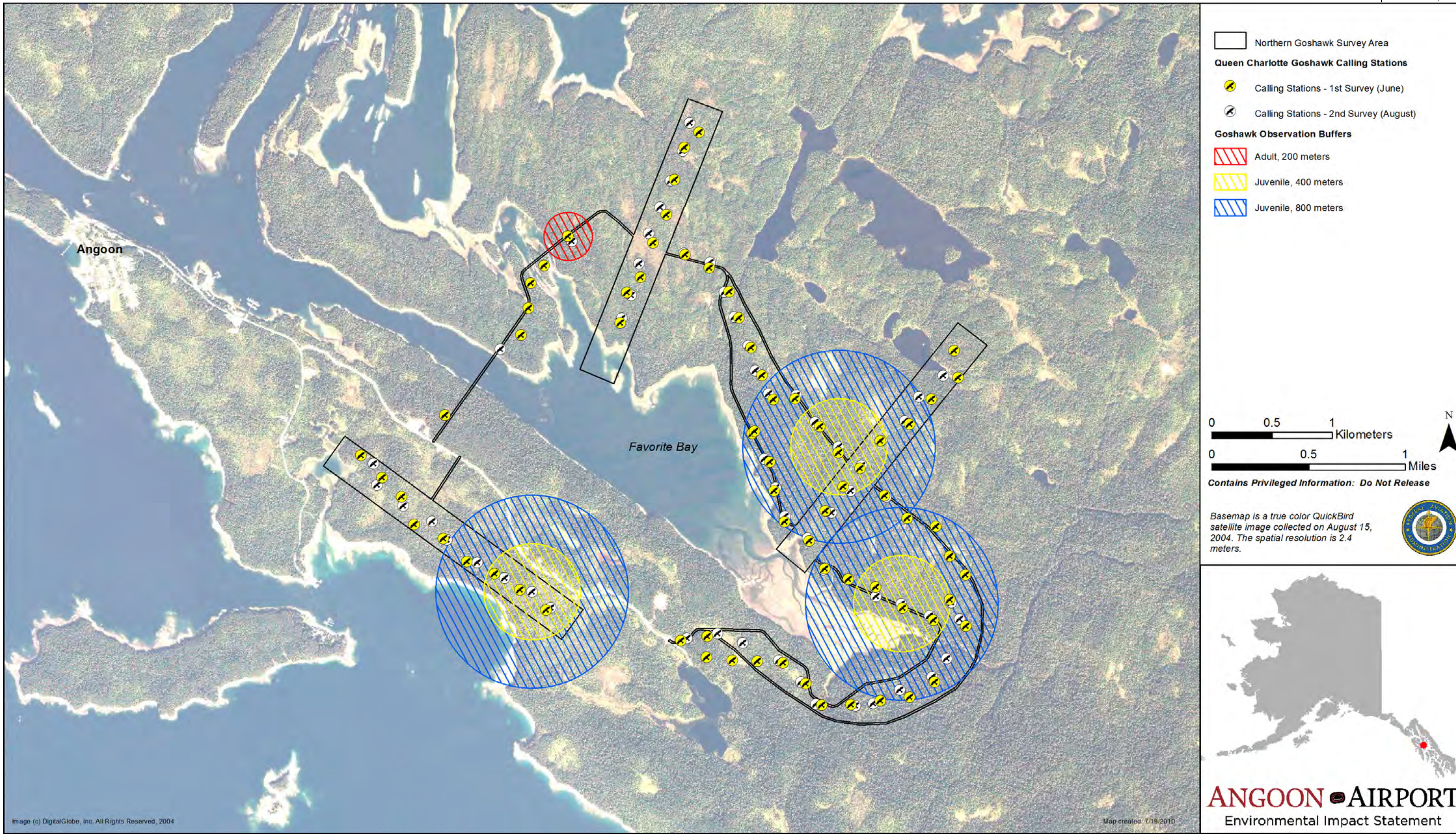

Figure 11. Queen Charlotte Goshawk survey locations.

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Wildlife species that are common to and/or characteristic of these habitats are identified below. A comprehensive list of wildlife observed during field surveys or otherwise known to occur in the study area, their scientific names, season of occurrence, relative abundance, habitat affiliations, and conservation status is provided in Appendix E.

Characteristic wildlife is a term used to describe species that are associated with a specific habitat type and may be considered fairly common in that habitat type during at least one season or significant timeframe a year (e.g., summer/breeding season or fall migration). Characteristic wildlife may also include species that, if not fairly common, are closely associated with one or more elements (e.g., plant communities, water features) of the habitat type, or species that are disproportionately abundant in one habitat type relative to others.

4.3.1 General Wildlife by Habitat Type

As previously mentioned, wildlife habitat types parallel the cover types discussed in section 3.3.1 of this document (see Figure 4). The estuary and unvegetated tidal cover types were combined for the wildlife habitat discussion because the wildlife species associated with both cover types are similar. The marine wildlife habitat is not defined as a cover type but is included as a wildlife habitat type due to high species richness. The landscape is dominated by spruce-hemlock forest with adjacent freshwater and estuarine habitat types. The habitats throughout the landscape are generally pristine, with human-made impediments to habitat connectivity limited to the single roadway from Angoon to Auk'Tah Lake and associated disturbance areas. That is, habitat connectivity is very high in areas away from the developed infrastructure of the peninsula on which the Angoon community is located.

Locally common species of birds, such as the Bald Eagle, Northwestern Crow (*Corvus caurinus*), and Common Raven (*Corvus corax*), are associated with a wide variety of habitats, which they inhabit on a year-round basis.

Wildlife by Habitat Type in the Study Area

Table 12 lists the wildlife habitat types and acres of each present in the study area, and lists common and characteristic wildlife species associated with them. Details on these species are discussed by habitat type.

Table 12. Habitat Types in the Study Area

Habitat Type	Common and Characteristic Wildlife	Study Area (acres)
Bog forest	Ermine, brown bear, Sitka black-tailed deer, Varied Thrush, Red-breasted Sapsucker, Winter Wren	1,689
Bog woodland	Ermine, meadow vole, Sitka black-tailed deer, brown bear, Hermit Thrush, Orange-crowned Warbler, Lincoln's Sparrow	300
Disturbed Lands	Northwestern deer mouse, brown bear, red squirrel, Common Raven, Bald Eagle, American Robin	34
Estuary and unvegetated tidal	Steller sea lion, harbor seal, harbor porpoises, Dall's porpoise, Marbled Murrelet, Pacific Loon	977
Fen	Ermine, mink, long-tailed vole, meadow vole, Sitka black-tailed deer, brown bear, western toad, Pacific-slope Flycatcher	95
Freshwater	Beaver, muskrat, river otter, mink, black bear, roughskin newt, western toad, American Dipper, Common Loon, Belted Kingfisher	80
Salt marsh	Meadow voles, river otters, mink, brown bear and Sitka black-tailed deer, Great Blue Heron, Lincoln's Sparrow, Mallard	44
Spruce-hemlock forest	Sitka black-tailed deer, red squirrel, ermine, Pacific marten, brown bear	3,577

Table 12. Habitat Types in the Study Area

Habitat Type	Common and Characteristic Wildlife	Study Area (acres)
Marine	Marbled Murrelet, Pacific Loon, Steller sea lion, harbor seal	–

Bog Forest

The bog forest has a >30% density canopy cover dominated by shore pine and Western hemlock with an understory containing dwarf dogwood, ferns, and skunk cabbage. Because of its dense canopy structure, this habitat supports more forest-interior birds, such as the Dark-eyed Junco (*Junco hyemalis*), Winter Wren (*Troglodytes troglodytes*), and Red-breasted Sapsucker (*Sphyrapicus ruber*), during the breeding season. Year-round residents are likely to include Varied Thrush (*Ixoreus naevius*) and Chestnut-backed Chickadee (*Poecile rufescens*).

Mammals that are likely to occur in this habitat include ermine (*Mustela erminea*), long-tailed vole (*Microtus longicaudus*), meadow vole (*M. pennsylvanicus*), Sitka black-tailed deer, and brown bear. The western toad (*Bufo boreas*) also occurs in these habitats.

During the 2009 field studies, Sitka black-tailed deer and brown bear sign (in the form of scat, tracks, and bedding areas) was found in this habitat type in the study area. Voles were also observed in this habitat, although it was not possible to identify them to species during the brief, incidental encounters in which they were observed.

Bog Woodland

The bog woodland habitat has a <30% density canopy cover and a complex understory of crowberry, peat moss, sedges, and bog cranberry. This habitat provides nesting and foraging for birds that have a preference for sedge-dominated habitats with dense shrub cover and for species that inhabit openings in forests. Species using this habitat during the breeding season include Hermit Thrush (*Catharus guttatus*), Swainson's Thrush (*Catharus ustulatus*), Orange-crowned Warbler (*Vermivora celata*), MacGillivray's Warbler (*Oporornis tolmiei*), Wilson's Warbler (*Wilsonia pusilla*), Tree Swallow (*Tachycineta bicolor*), and Lincoln's Sparrow (*Melospiza lincolnii*). The Song Sparrow (*Melospiza melodia*) is likely a year-round resident.

Mammals and amphibians that are likely to be found in the bog forest habitat type would also likely be found in the bog woodland habitat. During the 2009 field surveys, biologists the FAA's consultant team observed similar wildlife sign in the bog forest and bog woodland habitat types.

Disturbed Lands

Disturbed habitat in the study area includes dirt roads, the rock quarry, and the water tank area. Disturbed areas near Angoon tend to attract year-round residents, including the Common Raven, Northwestern Crow, Bald Eagle, American Robin (*Turdus migratorius*), and Chestnut-backed Chickadee. During the breeding season, Barn Swallows (*Hirundo rustica*) are also characteristic of disturbed lands. When human trash is associated with a disturbed area, brown bears are also likely to occur there along with the northwestern deer mouse (*Peromyscus keeni*) and red squirrel (*Tamiasciurus hudsonicus*).

Estuary and Unvegetated Tidal

The estuary habitat type is a partially enclosed body of water where freshwater streams and rivers mix with the ocean. These areas are transitions from land to water and from freshwater to salt water. Typical vegetation in this habitat includes aquatic beds, algae, dunegrass, and bluejoint. This habitat type includes Favorite Bay and the Pea Hen channel linking Favorite and Mitchell bays. Estuarine and marine waters cover approximately 977 acres (19%) of the study area. The unvegetated tidal habitat is the unvegetated lands associated with the bottoms of estuarine sloughs and flats, which are regularly scoured by tidal action. Substrates can be sandy or silty, and a minor algal or seaweed vegetation component may be present. These two land habitat types are combined to describe wildlife habitat because wildlife use of both habitat types is similar.

These habitat types are host to many species of wildlife. Bird species characteristic of the estuary habitat include year-round residents such as the Great Blue Heron (*Ardea herodias*), Mallard (*Anas platyrhynchos*), and Northern Pintail (*A. acuta*). Glaucous-winged Gull (*Larus glaucenscens*), Herring Gull (*L. argentatus*), Mew Gull (*L. canus*), and Arctic Tern (*Sterna paradisaea*) may breed in estuaries. Shorebird numbers likely peak in May and September, coinciding with spring and fall migration. Characteristic shorebirds that are likely to use this habitat during migration include Western Sandpiper (*Calidris mauri*), Least Sandpiper (*Calidris minutilla*), and Semipalmated Sandpiper (*Calidris pusilla*). The Rock Sandpiper (*Calidris ptilocnemis*) occurs during migration periods and also in the winter.

A variety of mammals can occur in both estuary and unvegetated tidal habitats. Semi-aquatic mammals such as river otter (*Lontra canadensis*) and mink (*Mustela vison*) are common in the estuary. Marine mammals such as Steller sea lions (*Eumetopias jubatus*) and harbor seals (*Phoca vitulina*) will beach in these areas, but they are more common in open-water habitat.

Fen

Pockets of fen habitat are interspersed throughout the study area. The fauna of this habitat therefore overlaps considerably with that of adjacent habitats, particularly the bog forest and bog woodland habitats. Birds that use fen habitat for breeding include Mallard, Song Sparrow, and Lincoln Sparrow. Breeding birds likely to occur in the adjacent forest edge habitat include the Dark-eyed Junco, Pacific-slope Flycatcher (*Empidonax difficuli*s), and Hermit Thrush. The Chestnut-backed Chickadee occurs in fen habitat year-round. Mammals that likely occur in this habitat include ermine, mink, long-tailed vole, meadow vole, Sitka black-tailed deer, and brown bear. The western toad also occurs in these habitats.

During 2009 field surveys, Sitka black-tailed deer and brown bear sign (in the form of scat, tracks and bedding areas) was found in fens in the study area. Voles were also seen in this habitat type, though due to the brevity of these incidental observations, it was not possible to identify the voles to species.

Freshwater Streams, Lakes, and Ponds

Freshwater habitats, including streams, lakes, and ponds, are all present in the study area. Examples of these habitat types include Favorite Creek and the lakes at the east end of Airport Alternative 4. Characteristic bird species that occur in this habitat year-round include the American Dipper (*Cinclus mexicanus*), Song Sparrow, and Belted Kingfisher (*Megaceryle alcyon*). During spring and fall migration, the bird diversity in these habitat types can be much higher than during the breeding season. The Common Loon (*Gavia immer*) is a species likely to be seen during migration periods. Mammals that are associated with this habitat type include the muskrat (*Ondatra zibethicus*), river otter, and mink as well as the island-endemic American beaver (*Castor canadensis phaeus*). The roughskin newt (*Taricha granulosa*) and the western toad, which are the only amphibian species found on Admiralty Island, also occur in these habitats.

Beaver trenches and an old but still active beaver dam were observed in the study area near Airport Alternative 4. Though no beavers were seen during field studies, the presence of the active beaver dam suggests that beavers are present in the study area. No muskrat sign was detected in the study area, although muskrats could occur there because of suitable habitat. During salmon runs, Favorite Creek becomes a very important food resource for brown bears foraging in the area. The August 2009 field surveys were conducted during the pink salmon (*Oncorhynchus gorbuscha*) run, and an abundance of bear sign was detected along Favorite Creek, just upstream of where the creek enters spruce-hemlock forest.

Salt Marsh

Estuarine intertidal salt marsh is a very productive habitat. Tides bring in nutrients to stimulate plant growth and carry out organic material, which is a source of food for fish and other organisms. This habitat type consists of tidally influenced vegetated areas occurring in estuaries and beach areas adjacent to the spruce-hemlock forest. This habitat is dominated by sedges and grasses. There is little transition from estuarine to the adjacent dense forest.

Characteristic bird species of salt marsh habitats include waterfowl, shorebirds, and birds that use the adjacent forest or forest edges during part of their lifecycle. Mallards are likely to be found in these habitats, especially during the winter. Northern Pintails use these areas during spring and fall migration. A common year-round resident are Canada Geese (*Branta canadensis*), which forage in the marsh and nest in the adjacent forest. Spotted Sandpipers (*Actitis macularia*), and Lincoln's Sparrow are likely to occur during the breeding season. Characteristic mammals include meadow voles, river otters, mink, brown bears, and Sitka black-tailed deer.

Spruce-hemlock Forest

Year-round bird species characteristic of this habitat include the Red Crossbill (*Loxia curvirostra*), Chestnut-backed Chickadee, Steller's Jay (*Cyanocitta stelleri*), Red-breasted Sapsucker, Brown Creeper (*Certhia Americana*), Common Raven, Varied Thrush, Winter Wren, Bald Eagle, and Northern Goshawk. Characteristic breeding birds include Swainson's thrush, Hermit Thrush, Pacific-slope Flycatcher, Golden-crowned Kinglet (*Regulus satrapa*), Rufus Hummingbird (*Selasphorus rufus*), and Lincoln's Sparrow.

Mammal species characteristic of spruce-hemlock habitat include the Sitka black-tailed deer, red squirrel, ermine, Pacific marten (*Martes caurina*), and brown bear. Sitka black-tailed deer use the forest for refuge and thermal cover. Red squirrels were originally introduced to Admiralty Island (MacDonald and Cook 2007) and are now relatively abundant in the forest habitat. The Pacific marten only occurs on two islands in Southeast Alaska, and it is the only marten that occurs on Admiralty Island. During 2009 field studies, one marten was observed moving north along the east side of the east channel of Pea Hen.

Marine

Acreage of this habitat type in the study area was not calculated because it is not a cover type. However, it remains an important wildlife habitat because of its high species richness.

This habitat is host to many species of wildlife. Bird species characteristic of the open-water marine habitat include Marbled Murrelets (*Brachyramphus marmoratus*), Pacific Loons (*Gavia pacifica*), Mallards, and Northern Pintails. Marine and terrestrial mammals both occur in this open-water marine habitat. Terrestrial mammals are generally more common in close proximity to the shoreline and include river otter and mink. The more open-water marine habitat is dominated by marine mammals. Several marine mammals were detected in Mitchell and Favorite bays during the 2009 field studies including Steller sea lions, harbor seals, harbor porpoises (*Phocoena phocoena*), Dall's porpoises (*Phocoenoides dalli*), and humpback whales (*Megaptera novaeangliae*). River otters can also be seen in the open-water habitat. Sea otters are not generally observed in this area; however, during the summer of 2009, one sea otter was spotted outside of Danger Point (personal communication, Frederickson 2009).

Marine mammals such as Steller sea lions, harbor seals, and Dall's porpoises appear to be more common in the mouth of Mitchell and Favorite bays once the salmon start running. Likewise, humpback whale visits to the mouth of Kootznahoo Inlet appear to coincide with herring abundance.

Wildlife by Habitat Type in the Landscape Area

The land type associations of the landscape area are derived from existing data sources (USFS 2002). As defined in this assessment, each land type association corresponds with a group of environmental factors, including a dominant vegetation community. Characteristics of land type associations are described in more detail in section 3.3.2. Characteristic wildlife species present in each of the landscape area land type associations correspond to those present in the associated study area habitat types (cover types).

The only land type association found in the landscape area but not found in the study area is the alpine summits and brushfields land type. This land type occurs in avalanche chutes and on mountaintops and is often located on slopes steeper than 23 degrees. Vegetation in this land type includes heath, shrub, and alpine scrub (USFS 2002). Birds that may occur in this land type include Water Pipit (*Anthus spinoletta*), MacGillivray's Warbler, Wilson's Warbler, Gray-crowned Rosy Finch (*Leucosticte tephrocotis*), Common Redpoll (*Carduelis flammea*), Savannah Sparrow (*Passerculus sandwichensis*), and Fox Sparrow (*Passerella iliaca*). Mammals likely to be found in alpine summits and brushfields include ermine, brown bear, and Sitka black-tailed deer.

4.3.2 Threatened, Endangered, and Sensitive Species in the Analysis Areas

The federally listed threatened, endangered, and sensitive species discussed in this report include one federally listed endangered species, one federally listed threatened species, and several species considered by the ADF&G, Tongass National Forest, the USFWS, and the National Marine Fisheries Service to be species of special concern (ADF&G 1998; Chester 2008; Goldstein et al. 2009; NMFS 2011). These species, their status, a brief description of the range of habitat requirements, and known and/or suspected uses of the study and/or landscape areas are presented in Table 13. Detailed information about each species is provided in the sections below. For those species for which specific field surveys were conducted, additional discussion is provided about those surveys and their results.

Table 13. Threatened, Endangered, and Sensitive Species with Potential to Occur in the Study Area and Landscape Area

Common Name	Scientific Name	Stock	Status[1]	Occurrence[2]
Humpback whale	*Megaptera novaeangliae*	Central North Pacific	E	LA
Steller sea lion	*Eumetopias jubatus*	Western	E, SS	NL
Steller sea lion	*Eumetopias jubatus*	Eastern	T, SS	LA
Kittlitz's Murrelet	*Brachyramphus brevirostris*	–	C, FS	NL
Yellow-billed Loon	*Gavia adamsii*	–	C, FS	NL
Queen Charlotte Goshawk	*Accipiter gentilis laingi*	–	SS, FS	PA
American Peregrine Falcon	*Falco peregrines anatum*	–	SS	NL
Arctic Peregrine Falcon	*Falco peregrines tundrius*	–	SS	NL
Olive-sided Flycatcher	*Contopus cooperi*	–	SS	NL
Townsend's Warbler	*Dendroica townsendi*	–	SS	LA
Blackpoll Warbler	*Dendroica striata*	–	SS	NL
Black Oystercatcher	*Haematopus bachmani*	–	FS	NL

[1] E = endangered, T= threatened, C = candidate, SS = state sensitive, FS = USFS Sensitive Species

[2] LA = observed in landscape area, NL = not likely; there have been regional sightings but none in the landscape area, PA = observed in study area.

Humpback Whale

The humpback whale is federally listed as endangered throughout its range. It is distributed seasonally throughout the world's oceans, from the Arctic to the Antarctic, with distinct populations located in virtually every sea. The historic feeding range of the North Pacific population includes coastal and inland waters around the Pacific Rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and southwest to the Kamchatka peninsula and the Sea of Okhotsk (various authors cited in Angliss and Allen 2008). Humpback whales are often just outside of the mouth of Mitchell Bay, in marine waters near Danger Point. They also occasionally enter Mitchell Bay and have been observed near the floatplane dock heading toward the mouth of Favorite Bay. This movement seems correlated with herring concentrations just outside of Mitchell Bay.

Humpbacks are known for their vast migration routes between breeding and feeding sites. The humpback population found in Southeast Alaska is known for one of the longest migration routes in the world, extending 6,000 miles between Alaska and their breeding grounds in Hawaii. In Southeast Alaska, this population feeds on herring, sand eel (*Hyperoplus* sp.), capelin (*Mallotus villosus*), and mackerel (*Scomberomorus* sp.) (Bryant et al. 1981; Dolphin 1987a, b).

Humpback whale populations have been diminished from the commercial whaling that began in the early 1800s. Approximately 15,000 humpbacks were estimated to swim the oceans prior to the commercial whaling era. In 1964, an estimated 1,000 individuals remained, and the international ban on whaling prevented further decline of the species. Presently, population estimates are about 2,000 individuals in Southeast Alaska (Allen and Angliss 2009). Ship strikes and fisheries-related mortalities (i.e., tangling in fishing gear) are currently the most common threats to humpback whale populations, but the demand for recreational whale watching is fast becoming a threat (Allen and Angliss 2009). Orcas (*Orcinus orca*) have been known to prey on humpback whales (Jefferson et al. 1991). Species-specific standards and guidelines for the protection and maintenance of humpback whale habitats are provided in the Tongass National Forest Plan (USFS 2008b).

Steller Sea Lion

The eastern stock of the Steller sea lion is federally listed as threatened and listed as sensitive by the ADF&G. This species occurs across the North Pacific from northern Japan, through the Kuril Islands and Okhotsk Sea of Russia, to the Aleutian Islands, central Bering Sea, southern coast of Alaska, and southward through the Pacific Northwest coast to the Channel Islands off the coast of California. The world population is separated into two stocks divided at 144° west longitude, or Cape Suckling, Alaska, based on differences in mitochondrial DNA and differing population trends in the two regions (Angliss and Allen 2008). The western stock of the Steller sea lion is federally listed as endangered, and is listed as sensitive by the ADF&G. Steller sea lions found in Southeast Alaska are part of the eastern stock, but individuals from the western stock occasionally occur in southeast Alaska in the eastern stock range. Steller sea lions gather on well-defined, traditionally used haulouts and rookeries to rest and breed, respectively. One major haulout is in the general vicinity of Angoon. It is called Lull Point and is on the eastern side of Baranof Island across Chatham Strait to the west of Angoon. Steller sea lions are often observed in Favorite Bay, perhaps more so when herring are spawning and when the salmon start moving into the bay in mid July.

Steller sea lions are opportunistic predators and feed on a variety of fishes and cephalopods. Prey species tend to vary seasonally and geographically. Preferred prey species vary more in Southeast Alaska than the rest of Alaska and include walleye pollock (*Theragra chalcogramma*), Pacific herring (*Clupea pallasii*), Pacific sand lance (*Ammodytes hexapterus*), Pacific salmon (*Oncorhynchus* spp.), arrowtooth flounder (*Atheresthes stomias*), rock fish (*Sebastes* sp.), skates, and cephalopods such as squid (*Loligo* sp.) and octopus (*Octopus* sp.) (NMFS 2008). For the sea lion population near Angoon, small forage fishes and salmon make up the majority of sea lion diet in the summer, whereas other fishes and cephalopods are eaten more frequently in the summer and fall. Steller sea lions have also been known to prey on other pinnipeds such as the harbor seal, fur seal, ringed seal, and possibly sea lion pups, but these prey are considered to be a minor, supplemental component to their diet. Threats to the population include death from illegal shooting and entanglement in fishing nets. Species-specific standards and guidelines for the protection and maintenance of Steller sea lion habitats are provided in the Tongass National Forest Plan (USFS 2008b).

Kittlitz's Murrelet

The Kittlitz's Murrelet is a small and elusive diving bird that lives year-round in coastal Alaska and the Russian Far East (Stenhouse et al. 2008). It has been listed by the USFWS as a candidate species since 2004 (USFWS 2007b). It is known to winter in Canada's Northwest Territories. The majority of its breeding habitat occurs in Alaska (USFWS 2007b). Within the landscape area, potentially suitable nesting habitat may be present along the ridgelines of Hood Mountain and other peaks south and east of the study area. There are no known records of occurrence for Kittlitz's Murrelets in the study and landscape areas, and none were observed during 2009 field surveys. Regional sightings of Kittlitz's Murrelet approximately 50 to 100 miles from Admiralty Island have been logged with Audubon Alaska. These sightings have been in low frequency, less than six individuals at an individual sighting.

This species is thought to nest on unvegetated scree fields, coastal cliffs, barren ground, and rock ledges in remote areas, but there are no alpine habitats or scree fields in the study area. Nesting and foraging habitat is located close to marine waters, often near tidewater glaciers (Stenhouse et al. 2008). Research suggests a preference for nesting on high elevation scree slopes due to lack of mammalian predators (Day et al. 1999). Foraging habitat availability is critical because this species relies mostly on a fish diet. Studies have shown that the Kittlitz's Murrelet diet consists of approximately 70% fish and 30% krill (Vermeer et al. 1987). Their winter diet has not been documented. They concentrate their summer foraging near glaciers or glacier-fed streams and bays but will also forage in unglaciated areas (Day et al. 1999). The species is thought to move offshore into less sheltered waters for the winter.

Potential avian predators of Kittlitz's Murrelet include Bald Eagles, Peregrine Falcons, and Common Ravens (Day et al. 1999). Species-specific standards and guidelines for the protection and maintenance of Kittlitz's Murrelet habitats are provided in the Tongass National Forest Plan (USFS 2008b).

Yellow-billed Loon

The Yellow-billed Loon is a large diving bird that occurs in the northernmost coastal habitats of the world. This species has recently been listed as a candidate species for federal listing (*Federal Register* 74:12931) and a sensitive species on Tongass National Forest lands (personal communication Chester 2009). In North America, the Yellow-billed Loon breeds on the arctic plains of Alaska and northern Canada. In the winter, it migrates to the marine waters of Alaska and British Columbia, from the Alaska Peninsula, through Southeast Alaska, to Puget Sound (North 1994). Migration takes place within several hundred meters from shore where the birds fly low over the water (North 1994). No Yellow-billed Loons were observed during visits to the study area.

Wintering habitat for this species consists of sheltered, shallow marine waters, where they occur very close to shore, from 1 to 20 m (Schmutz 2008 as cited in USFWS 2009). This species eats mostly small fish and marine invertebrates.

Threats to this species include a) oil and gas development in breeding habitat, including the associated potential for environmental contamination, habitat fragmentation, and sea vessel strikes; and b) a depletion of the prey base in migratory and wintering habitats (*Federal Register* 74:12931).

Queen Charlotte Goshawk

The Queen Charlotte Goshawk is listed as a USFS sensitive species for the Tongass National Forest (Goldstein et al. 2009). It is also considered a species of special concern by the ADF&G (ADF&G 1998) and is on the Alaska WatchList (Audubon 2005). It has been proposed for federal listing as threatened in British Columbia, Canada. The Queen Charlotte Goshawk is a subspecies of Northern Goshawk. Although the exact range boundaries of this subspecies are not known, for the purposes of this document, the range defined by *The USFWS Queen Charlotte Goshawk Status Review* (USFWS 2007a) will be applied. The Queen Charlotte subspecies ranges from northern Oregon along the Pacific coast of Washington and mainland British Columbia to Skagway, Alaska (USFWS 2007a). It also inhabits the coastal islands of Vancouver Island, Queen Charlotte Island, and the Alexander Archipelago of Southeast Alaska, including Admiralty Island (USFWS 2007a). At the extremities of this range, it is unclear whether Queen Charlotte goshawks hybridize with the continental subspecies. This subspecies is generally smaller and darker than the continental Northern Goshawk (*A. gentilis atricapillus*). The Queen Charlotte Goshawk is found in low densities throughout the Tongass National Forest, including in the study area (Cotter 2007). The Queen Charlotte Goshawk does not migrate and remains year-round in Southeast Alaska and coastal British Columbia.

This species is aggressively territorial toward other raptors and will defend a large nesting territory. A monitoring study of northern goshawks in Southeast Alaska (Flatten et al. 2001) identified a home range of 3.2 km diameter. The exact density of territories in a given habitat is likely dependent on many factors, such as resource availability, forest habitat characteristics, topography, and proximity to water (Hargis et al. 1994; Woodbridge and Detrich 1994).

The habitat within a territory is typically composed of mixed deciduous/coniferous old-growth forest with natural meadow openings and water sources (Hargis et al. 1994; Greenwald et al. 2005; Cotter 2007; USFS 2008b). The goshawk habitat in Southeast Alaska comprises conifer rainforest, with tree species such as Sitka spruce and Western hemlock. Goshawk territories are typically interspersed with a patchy distribution of fens and boggy openings (USFWS 2007a). The topography is generally steep and rugged, except in coastal areas such as the study area. Nesting territories contain active nests, alternate nests, and foraging habitat (Cotter 2007). Goshawks are known to build a series of nests and use them alternately among years (Squires and Reynolds 1997). A single nesting territory may include 10 or more nests, with up to 0.5 mile between them (Woodbridge and Hargis 2006). Nests are often located in the largest trees in the stand and are composed of large sticks and pieces of bark. Nests can be up to about 3 feet in diameter, but the size of the nest depends on the frequency of use (Cotter 2007).

In Alaska, goshawks begin courtship and nest site selection in early April, and typically lay a clutch of eggs by early May. Eggs take approximately 30 days to hatch (Squires and Reynolds 1997). By mid to late July, the chicks are ready to fledge. During the six to eight weeks post-fledging, the juvenile birds remain near the nest, but venture progressively farther away from it (Kennedy et al. 1994). The post-fledging area (PFA) is the term used to describe the area that contains the active nest and a surrounding area of highly productive foraging habitat in which the juveniles remain for a time after fledging (Reynolds et al. 1992; Kennedy et al. 1994). During the time spent in the PFA, the adult birds continue to provide some prey, whereas the juveniles learn to hunt on their own. By about eight weeks after fledging, the juveniles are self-sufficient and disperse from the area. In Alaska, the juveniles would remain in the PFA until mid to late September.

Goshawks consume a variety of small to medium-size birds and mammals. They are known to specialize on locally available prey. In the northern part of Southeast Alaska, goshawks were often observed delivering the following species to young at the nest: Sooty Grouse (*Dendragapus obscurus*), red squirrel, Steller's Jay, Varied Thrush, and unidentified passerines (Lewis et al. 2006). These species made up 74% of the total observed nest deliveries (Lewis et al. 2006). Species-specific standards and guidelines for the protection and maintenance of northern goshawk habitats (including the Queen Charlotte goshawk subspecies) are provided in the Tongass National Forest Plan (USFS 2008b).

<u>Goshawk Survey Results and Discussion</u>

Four goshawk responses were detected during the 2009 study area surveys (see Figure 11). These responses are described in detail below.

During the June survey, an adult goshawk responded to the broadcast calls on the access road to the west of Airport Alternative 3a. The goshawk flew into the tree directly above the surveyor and vocalized. According to the USFS protocol (Woodbridge and Hargis 2006), a vocal approach response by an adult goshawk typically indicates that the nest is within 200 m. On August 21, an intensive stand search was conducted in an area with a radius of 200 m that was centered on the vocal approach response. No sign (goshawk prey remains, plucking perches, or nest locations) was found during the intensive stand search.

During the August survey, three separate responses of juvenile goshawks were observed. Two responses were non-vocal approaches and one was a vocal approach. These responses occurred on the access road to the west of Airport Alternative 4, on the lower access road to the east of Airport Alternative 4, and on Airport Alternative 12a (see Figure 11). During all three responses, the goshawks flew very near to the calling stations and perched in trees almost directly above the surveyors. No further action was taken to discover a nest location after eliciting responses from juvenile birds.

The vocal approach response of the adult goshawk during the June survey indicated that a nest could be less than 200m away. However, when an intensive stand search was conducted, no goshawk sign indicating nesting was discovered. It is suspected that there is no nest within 200 m of the response, and it is possible that nest location was located greater than 200 m away. There is also a possibility that a nest attempt had failed by August, when the stand search was conducted. Alternatively, it is possible that this territory was occupied by a nonbreeding adult at the time of the response.

The response of the three juvenile birds during the August survey suggests that there are two to three nests in the vicinity of the study area that fledged young in 2009. Because of the survey timing, it is likely that these juvenile birds were approximately three to six weeks post-fledging at the time of the survey. According to Kennedy et al. (1994), the majority of fledglings monitored with radio-transmitters were venturing approximately 100 m from the nest at three weeks post-fledging, up to 400 m away from the nest site at four and five weeks post-fledging, and 400 to 800 m away from the nest at six weeks post-fledging. Note, however, that the Kennedy et al. (1994) study was conducted in northern New Mexico, and these distances may not be representative for Southeast Alaska. The juvenile that was observed on Airport Alternative 12a was located greater than 800 m from the other juvenile observations. Unless this individual was traveling unusually far from the nest, it seems likely that it came from a nest located near Airport Alternative 12a.

The two juvenile goshawk responses near Airport Alternative 4 were located approximately 1,400 m apart. The exact age of the observed juveniles is not known, and according to Kennedy et al. (1994), if these individuals were less than six weeks post-fledging, they would most likely be venturing only up to 400 m from the nest location, which would indicate two active nests near Airport Alternative 4. However, it is possible that an active nest is located somewhere in between the two sightings and both birds were venturing 800 m in opposite directions from the nest. Furthermore, because these observations were made on different days, it is also possible that the same individual was attracted to separate locations by the broadcast calls. Owing to the distance between the responses together with the uncertainty of the exact age of the individuals, it is likely that there are two to three active nest locations near Airport Alternative 4.

It is evident that the forest habitat of the study area supports nesting and/or foraging goshawks. Some of the habitat in the study area likely contributes to a portion of two to three goshawk nesting territories, which were occupied in 2009. Furthermore, it is likely that portions of the study area contribute to the PFA for up to three nesting territories.

Peregrine Falcon

The American and Arctic Peregrine Falcons are listed as species of special concern by the ADF&G (ADF&G 1998). They occur in suitable habitat throughout the United States, Canada, and Mexico. These subspecies may occur in the landscape area and near the study area.

Although the American Peregrine Falcon nests in forested interiors, it prefers cliffs associated with rivers or lakes. There is no preferred nesting habitat for this subspecies in the study area, but there is potential for nesting habitat in the landscape area. Both the study and landscape areas may be used as foraging habitat for this subspecies. The Arctic Peregrine Falcon nests on the ground in tundra habitat in northern and western Alaska. This subspecies is not known to nest in the landscape area, but may pass through during migration (USFS 2002). There is potential for a third subspecies of falcon, Peale's Peregrine Falcon (*Falco peregrinus pealei*), to occur in the landscape area; however, this subspecies is no longer listed by the ADF&G or the Tongass National Forest and will not be discussed further in this document.

In the early 1970s populations of Peregrine Falcon were dramatically declining due to high levels of pesticide use (i.e., DDT). Populations have rebounded because the use of DDT was banned in the United States. Current threats to the species include human disturbance; shooting, trapping, and egg-collecting; collisions with structures or objects; and habitat degradation (White et al. 2002). Species-specific standards and guidelines for the protection and maintenance of American Peregrine Falcon habitats are provided in the Tongass National Forest Plan (USFS 2008b).

Olive-sided Flycatcher

The Olive-sided Flycatcher is listed as a species of special concern by the ADF&G (ADF&G 1998). This species occurs primarily in the montane and northern spruce forests of the western United States and Canada (Altman and Sallabanks 2000). The spruce-hemlock forest in the study area is potential habitat for this species; however, no Olive-sided Flycatchers were detected during the breeding bird surveys or during any 2009 site visits.

This species nests almost exclusively on conifer limbs, though it can occasionally be found in mixed deciduous/coniferous forest. It is considered an indicator species of the coniferous forest biome. The Olive-sided Flycatcher is often associated with forest openings and forest edges, and it frequently occurs along wooded shores of rivers, bogs, and lakes. In early successional forests, it depends on snags for foraging and singing (Altman and Sallabanks 2000). It needs abundant insect resources and canopy openings for hunting these resources (Fitzpatrick 1978).

The Olive-sided Flycatcher will raise one brood per season (Altman and Sallabanks 2000). The date of clutch initiation is dependent on latitude, elevation, and possibly weather. Habitat loss and alteration on wintering grounds are suspected as factors that may limit populations (Altman 1997).

Townsend's Warbler

The Townsend's Warbler is listed as a species of special concern by the ADF&G (ADF&G 1998). This species breeds in Alaska, western Canada, and parts of Oregon and Washington. It breeds in the treetops of mature forests. Potential habitat exists in the study area's spruce-hemlock forest; however, no individuals were detected during the breeding bird surveys or during any 2009 site visits.

Townsend's Warblers nest predominately in coniferous and mixed coniferous-deciduous forests and are most abundant in unlogged, old-growth, or late-successional stage forests (Wright et al. 1998). In Southeast Alaska they are found in temperate rain forests dominated by Sitka spruce (Dellasala 1996). Townsend's Warblers typically glean foliage for insects (Tramer and Kemp 1980). Their main prey includes caterpillars, moths, winged insects, and other invertebrates usually found on foliage (Gabrielson and Lincoln 1959.). In Alaska this species attempts one nest annually with nest building beginning in mid to late May. The clutch is usually initiated late May to mid June, and nestlings fledge mid June to mid July (Wright et al. 1998). Potential threats to this species are not clearly understood and little information is available. Some threats could include predation, competition, food availability, and unpredictable weather events (Wright et al. 1998).

Blackpoll Warbler

The Blackpoll Warbler is listed as a species of special concern with the ADF&G (ADF&G 1998) and is included on the Alaska Audubon WatchList (Audubon 2005). The breeding range for this species includes Alaska, Canada, and the northeastern United States but does not include Southeast Alaska. Overall, this species is rarely seen in Southeast Alaska; occasionally it is seen during spring and fall migration. Potential foraging habitat exists in spruce-hemlock and riparian habitats in the study area. No individuals were detected during the breeding bird surveys or during any 2009 site visits.

Blackpoll Warblers tend to be found in low-growing spruce-alder-willow thickets in riparian areas, the transition zone between taiga and tundra, or boreal black spruce forests. Foraging efforts are usually concentrated on the inner portions of limbs of conifers, dead, or deciduous trees, gleaning for adult and larval insects at mid-canopy level (Hunt 1999). Threats to this species likely include habitat loss; however, little is known about the biology of this species and so exact threats have not been determined (Hunt 1999).

Black Oystercatcher

The Black Oystercatcher is listed as a USFS Sensitive Species for the Tongass National Forest (Goldstein et al. 2009). It is also a USFWS focal species for priority conservation action and is on the Alaska WatchList and the Audubon Nationwide WatchList (Audubon 2005). The focal species for priority conservation action is a USFWS migratory bird program that identifies migratory bird species in need of focused conservation action. The program leads targeted campaigns to return a species to healthy and sustainable levels, enabling it to better measure success in conservation priority achievements. The global population of this species is estimated to be between 6,800 and 11,000 birds, and roughly 65% of the population breeds in Alaska (Andres and Flaxa 1995). Although this species is a year-round resident of Southeast Alaska, its distribution and breeding practices on Admiralty, Baranof, and Chichagof islands of Southeast Alaska are largely unknown (personal communication, Goldstein 2009). Prior to 2009, no surveys for this species had been conducted in Favorite Bay or in the vicinity of Angoon on Admiralty Island.

The Black Oystercatcher is a rather large (42–47 cm long, 500–700 grams) conspicuous bird. Throughout its lifecycle, it is completely dependent on marine shorelines. It nests just above the highest high-tide level and is therefore susceptible to both human and natural disturbance on its breeding grounds (Andres and Flaxa 1995). Black Oystercatchers can be found in rocky shore habitat and adjacent intertidal flats. They feed primarily on bivalves and other mollusks, as well as crabs, sea urchins, isopods, and barnacles. They are typically found where these food sources are present.

Black Oystercatcher nests are susceptible to predation from various land mammals, including bears, wolverines, fox, and mink (Jehl 1985). This species prefers non-vegetated rocky shorelines (Vermeer et al. 1992). General standards and guidelines for migrating or nesting shorebird habitats are provided in the Tongass National Forest Plan (USFS 2008b).

Black Oystercatcher Survey Results and Discussion

The 2009 surveys in Favorite Bay and the other coastal areas within 0.5 mile of the study area yielded no Black Oystercatcher detections, which is consistent with the information gathered from local fishermen who claim to never see Black Oystercatchers in or around Favorite Bay (personal communication, James 2009; personal communication, Powers 2009). The Black Oystercatcher is a rather large and conspicuous bird, likely precluding the possibility that birds were missed during the survey or that this species frequents the area but is not seen by local fishermen.

The absence of this species in the survey areas is likely related to the habitat quality and/or the potential predators in the study area. The majority of the potentially suitable Black Oystercatcher habitat in Favorite Bay is made up of a small strip of rocky beach that quickly transitions into vegetation (e.g., grasses and sedges) and then into spruce-hemlock forest. The density of local predators in Favorite Bay likely has a negative impact on any Black Oystercatchers attempting to nest in the study area. There appears to be a large population of mink around Favorite Bay. Multiple mink were observed along the shoreline during the 2009 boat surveys, and locals have trapped the area in the past for mink (personal communication, James 2009). The mink is a major predator of Black Oystercatcher nests (Spiegel et al. unpublished) and may be a factor in the absence of oystercatchers in the Angoon area.

4.3.3 MANAGEMENT INDICATOR SPECIES IN THE ANALYSIS AREAS

NFMA regulations require that fish and wildlife habitats be managed to maintain viable populations of species well distributed across a national forest. Population viability is defined as a fish or wildlife population that has the estimated number and distribution of reproductive individuals to insure the population's continued existence in a given area (USFS 2008a). Analysis of impacts to MIS is one way to address this management direction. MIS are wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements (USFS 2008a).

Thirteen MIS have been identified for the Tongass National Forest (USFS 2008a), and one additional species, the Marbled Murrelet, has been added to the MIS list for this project at the request of the USFS. Three of the Tongass National Forest MIS (black bear, wolf, and mountain goat) do not occur on Admiralty Island (MacDonald and Cook 2007: 71, 76, and 104), and are not addressed in this report.

Under the MIS concept, responses to management activities of a relatively few species are studied and monitored in an effort to ascertain the impacts to entire assemblages of species and associated habitats. MIS are often identified because of their specialization in a habitat type and/or their high-level predatory position. For example, the marten is a forest-obligate species that is strongly associated with old-growth forest habitat. Through the analysis of this species, an inference can be made about the quality and health of the forest habitat and the presence of sufficient prey populations in this habitat to support this species. In this case, marten prey species include small mammals and forest bird species. If the marten population in an area were observed to be in decline, one could infer that the quality of old-growth forest habitat had also declined for prey species and other forest obligates. Although habitat and species associations are not specifically discussed below, this concept can be applied to all MIS.

All 11 MIS analyzed in this section not only have potential habitat in the study area, but they were also observed in the study area during the 2009 field surveys. Most of the species (brown bear, Sitka black-tailed deer, Bald Eagle, river otter, Red-breasted Sapsucker, red squirrel, and Vancouver Canada goose) were commonly observed.

Brown Bear

Male brown bears may reach nearly 1,000 pounds and can reach a shoulder height of 5 feet when on all four legs. Females are significantly smaller, weighing only up to 450 pounds. Brown bears are extremely fast in short bursts. They are also surprisingly agile and can move over difficult terrain very quickly. They are true omnivores. Within the Angoon area they feed on salmon, berries, skunk cabbage, and human trash. The brown bear density on Admiralty Island is estimated to range from 1.0 bear per square mile to 1.1 bears per square mile (Schoen and Beier 1990). This brown bear density estimate makes Admiralty Island one of the most densely populated brown bear areas in the world. Whitman (2003) estimated 1,560 bears on Admiralty Island.

During 2009 field surveys, brown bears and brown bear sign were observed throughout the study area (Figure 12). Although more bears were directly observed in the Angoon dump (and in the adjacent areas) than anywhere else, there were multiple areas that suggested high use by bears. During the spring green-up period when the bears emerge from hibernation and head to low elevations to eat the early green vegetation (March through May), the tidal flats at the mouth of Favorite Creek provide good forage for bears. During field surveys in late May, bears were seen almost daily in this habitat, foraging on vegetation. When salmon runs begin in mid July, Favorite Creek becomes a very important food source for bears in the area. The spruce-hemlock forest surrounding Favorite Creek and the estuary also are used heavily by brown bears, and bear sign is very concentrated in these areas. This area is excellent bear habitat because there are several seasonal food sources in the area as well as mature forest that bears use for cover. The area also seems to be used as a travel corridor for bears.

The landfill near Angoon provides a readily available food source for bears and fosters the development of both habituated and food-conditioned bears. Therefore the density of brown bears in the Angoon area is probably higher than on the rest of the island. Bears dependent on the dump as a food source learn to ignore the normal deterrence methods humans use to keep them away. The bears that feed at the dump are often seen in and around the community of Angoon. Although there is forest cover, the bears often become bold and less skittish near humans, which can result in human-bear conflict. Habituated and food-conditioned bears are more likely to occur in the Airport Alternative 12a area, although they can be found throughout the study area.

Sitka Black-tailed Deer

The Sitka black-tailed deer is a subspecies of mule deer and is endemic to the wet coastal rainforests of Southeast Alaska and north-coastal British Columbia. Southeast Alaska's highest deer densities usually occur on the Admiralty, Baranof, and Chichagof islands (Kirchhoff 2003). On Admiralty Island, Sitka black-tailed deer are found throughout the island, though use of habitat types and elevations changes seasonally. Table 14 presents a summary of locations where deer were most often found during Schoen and Kirchhoff's five-year study on Admiralty Island (1990). Table 14 also presents an interpretation of the habitat type or land type in which the elevation, slope, aspect, and cover type conditions for seasonal deer use as defined by Schoen and Kirchhoff (1990) would be found in the study and landscape areas.

Table 14. Seasonal Deer Habitat Use on Admiralty Island

	Highest Percent Deer Use			
	Spring	**Summer**	**Fall**	**Winter**
Elevation (m)	0–300	300–600	300–600	0–100
Slope (degrees)	0–10	0–10	0–10	0–10
Aspect	South	South	South	South
Cover type (as defined by Schoen and Kirchhoff 1990)	Old growth	Sub alpine	Old growth	Old growth
Timber volume (million board feet/hectare)	High (>74)	Scrub (<20)	High (>74)	High (>74)
Interpreted study area/landscape area habitat type or land type	Spruce-hemlock	Alpine summits and brushfields	Spruce-hemlock	Spruce-hemlock

Adapted from Schoen and Kirchhoff (1990)

The same study also differentiates between a group of resident deer and a migratory group. The resident deer remained at a low elevation year-round, whereas the migratory group traveled to high elevations during the summer.

Although Sitka black-tailed deer are found in a range of locations throughout the year, the quantity, quality, distribution, and arrangement of winter habitat is considered the most limiting factor for deer in Southeast Alaska (Schoen and Kirchhoff 2007). High-volume old-growth forest habitats that are low in elevation and that occur on gentle, south-facing slopes are particularly important to deer, especially during severe winters (Kirchhoff and Schoen 1987; Doerr et al. 2005; Person 2009). These mature old-growth stands intercept snow, provide thermal cover, and support the largest biomass of herb and shrub forage for deer (Hanley and McKendrick 1985; Schoen and Kirchhoff 2007; White et al. 2007). Person (2009) claims that the selection for gentle slopes in winter may be unique to Admiralty Island, because there are no wolves. On islands in Southeast Alaska that have healthy wolf populations, deer select steeper slopes in winter (Person 2009). During winters with extreme snow depth, deer can also be forced to use the narrow strip of land adjacent to beaches, where the snow levels remain low (Klein and Olsen 1960).

Deer are an important subsistence and general (sport) harvest species (SWCA 2010b). Construction of roads fundamentally changes the way deer are harvested in Southeast Alaska (Mazza 2003; Brinkman et al. 2009). Road construction can increase harvest by increasing efficiency and opening previously unharvested areas up to hunting pressure. However, by opening new areas up for hunting, hunting pressure, and hunter competition may be reduced in other areas, such as areas accessible only by boat (Brinkman et al. 2009).

The majority of the study area constitutes suitable wintering habitat for Sitka black-tailed deer. This habitat consists of forested and beach habitats. Deer also use the forested habitats of the study area in the spring, while preparing to migrate to summer range. Based on 2009 observations, it is likely that a resident group of deer use the forested habitat of the study area year-round. During field visits in May, June, and August 2009, biologists observed both fresh and aged deer sign throughout the study area in the form of scat, tracks, and bedding areas. Spotted fawns were observed by biologists in June and August, and adult deer were observed in October.

Bald Eagle

The Bald Eagle is the only eagle common to Southeast Alaska, where it occurs in great numbers both in breeding and wintering populations. It generally nests in coniferous forests, but may be observed in deciduous woodlands, near rivers and streams, on beaches and tidal flats, along rocky shores and reefs, and atop alpine ridges (Armstrong 1995). Primarily a fish eater, the Bald Eagle is usually observed in relatively close proximity to water bodies (Stahlmaster 1987). It prefers salmon, but will also eat herring and other available fish species. When fish are not readily available, eagles will eat birds (e.g., ducks, auklets), crabs, shellfish, and mammals (e.g., rabbits and muskrats) (Kaufman 1996).

Survey Results and Discussion

During the 2009 surveys, five active nests and two inactive nests were detected within 0.5 mile of the study area. Two active nests were located in Favorite Bay, two active nests were located along the shores of Killisnoo Harbor, and one active nest was located in the Mitchell Bay area (see Figure 10). Two inactive nests were also detected within 0.5 mile of the study area. The USFWS also conducted aerial Bald Eagle nest surveys in the Angoon area in 2009. These data are provided in Table 15. The territories outlined on Figure 10 are not meant to be absolute; they are an educated guess based on all past and current data and are open to reinterpretation based on new findings. Territories were given names for ease of reference.

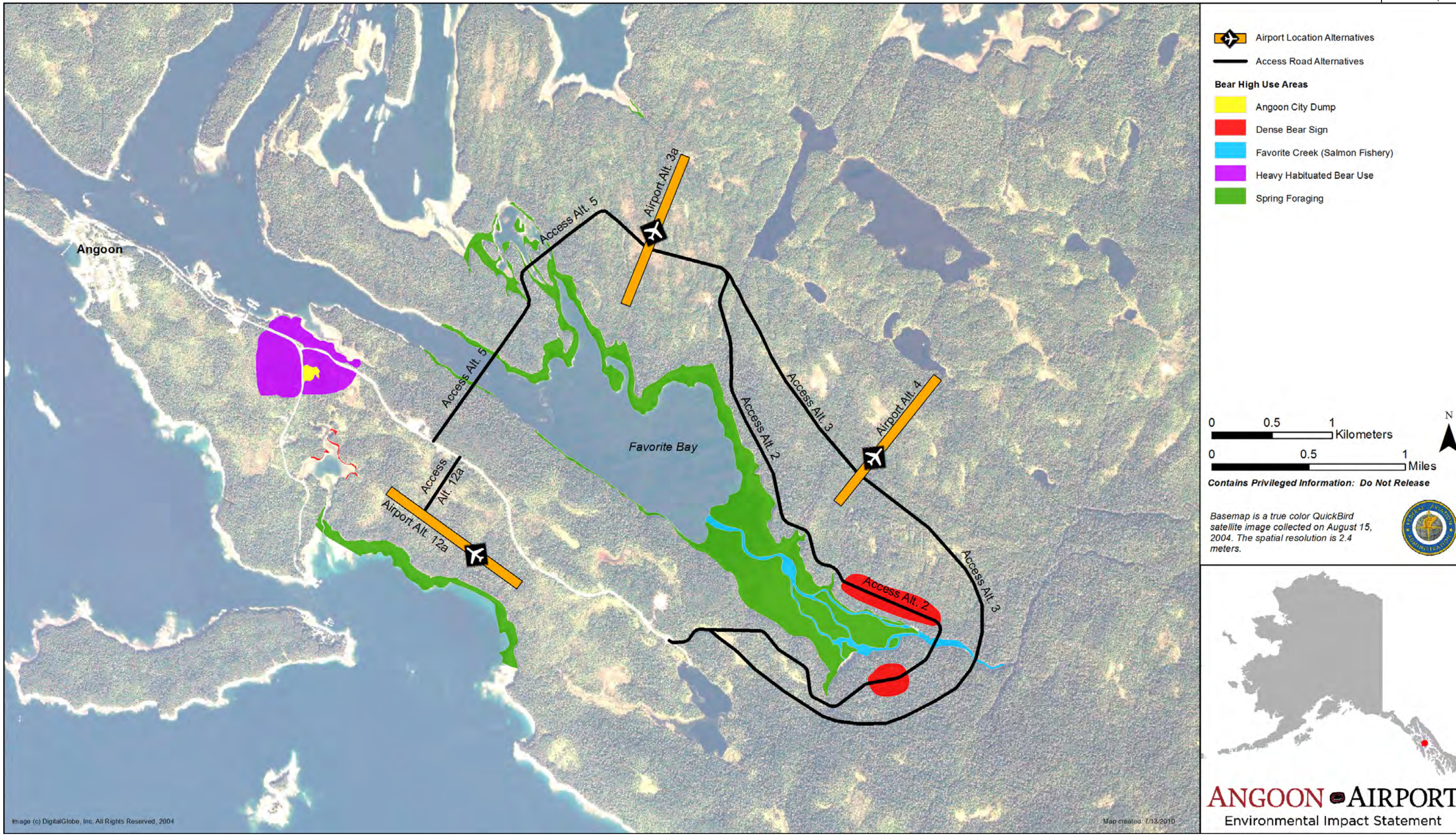

Figure 12. Bear use.

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Table 15. Bald Eagle Data within 0.5 Mile of the Study Area

Territory No.	General Location	Territory Name	Number of Nests Detected in 2009	Date Observed Active	Notes
1	Favorite Bay	Estuary	1 active, 1 inactive by USFWS[1]	May 25	This territory was discovered by the FAA's consultant team in 2009.
2	Favorite Bay	Cliff	1 active	May 25	This territory was discovered in 1971.
3	Favorite Bay	Sorex	1	Not active	This territory was discovered in 1971, with a new nest observed in 1993. The FAA's consultant team observed an inactive nest, but eagles were often in the vicinity.
4	Favorite Bay	Bridge	1 active, 1 inactive, by USFWS[1]	Not observed by the FAA's consultant team	This territory was discovered in 1971. In late August 2009 two juveniles and one adult were detected multiple days in the same location. The nest that these juveniles fledged from was never detected; though it was probably very near the location they were observed.
8	Favorite Bay	Pea Hen	2 inactive	2009 by USFWS[1]	Biologists on the FAA's consultant team observed an eagle heading into this area with nesting material but were never able to detect a nest.
5	Killisnoo Harbor	Ferry Dock	1 active, 1 inactive	June 25	Likely the same territory that, according to locals, a few years ago had an active nest right by the ferry dock. There is one inactive nest very near the active nest.
6	Killisnoo Harbor	Covert	1 active	June 25	This territory was discovered by the FAA's consultant team in 2009, only one nest was observed.
7	Mitchell Bay	Flagship	1 active, 2 inactive by USFWS[1]	June 25	This nest was discovered by the FAA's consultant team on May 26, 2009 but was not observed active until June 25. There are data for two more nests that were discovered in 1971 within 0.5 mile of this nest on a peninsula. These nests may be part of the same territory.

[1] (personal communication, Schempf 2009)

Admiralty Island is known to have a very high population of nesting eagles (King et al. 1972; Stenhouse 2007), and the results of the 2009 survey support these findings. Generally the same territories that were active during the USFWS "Kootz Nests" surveys of 1971 were still active in 2009. The Sorex territory was not found to be active, although an old nest was discovered and a pair of eagles was often present in the area. It appears that there is an active nest located in this territory that was not observed during the aerial, boat-based, and ground-based survey efforts. Although no active nest was found in the Bridge territory by the FAA's consultant team, two juveniles and one adult were located multiple times in the area, suggesting the juveniles may have fledged from an active nest in the area. The USFWS 2009 Bald Eagle nest surveys detected one active nest in the Bridge territory (personal communication, Schempf 2009). The juveniles that the FAA's consultant team observed could have fledged from this nest. However, this nest is farther than 0.5 mile from the study area. The active nest in the Estuary territory was discovered in 2009, and may represent a separate territory because it is more than a 0.5 mile from the Sorex territory and on the opposite side of the bay. Two inactive nests were detected in the Pea Hen territory by the USFWS 2009 surveys. Although the FAA's consultant team detected no nests in this territory, a Bald Eagle carrying nesting material was observed flying in this territory. It is possible that an active nest in this territory was missed.

Two active nests were detected in the Killisnoo Harbor area. The Ferry Dock territory appears to be well established. Angoon locals reported that there had been a nest that was active for many years that was located on the western side of the Ferry Dock, and afforded those at the Ferry Dock an excellent view of an eagle nest. The nest tree was blown down during an exceptionally large storm (personal communication, Powers 2009). It is likely that this pair has re-located to the eastern side of the Ferry Dock. The Covert territory, just east of the Ferry Dock territory, contains a nest that was observed for the first time in 2009. This territory is located less than 0.5 mile from the Ferry Dock territory, which is unusually close.

One active nest and territory (Flagship) were detected in the Mitchell Bay area. This active nest was first detected as an inactive nest and later proved to be active. The Pea Hen territory may contain the two nests that were discovered by USFWS and USFS, which are located on a nearby peninsula (see Figure 10).

The most common method for outlining Bald Eagle territories in a saturated habitat (which the Angoon area likely is) is to locate all nests and then plot a circle around each nest (Stahlmaster 1987). In the case of Angoon, previous studies have shown generally one to two alternate nests within 0.5 mile of the active nest (personal communication, Powers 2009), therefore inactive nests within the 0.5 mile distance were also considered part of the same territory. A circle was then plotted around these nests until it abutted the neighboring territory.

River Otter

Habitat selection by river otters appears to be related to the availability of food resources and adequate cover (Larsen 1984; Woolington 1984; Ben-David et al. 1996). The river otter hunts on land, in fresh water, and in estuaries and ocean water. Its diet consists of snails, mussels, fish, birds, mammals, and vegetable matter. Old-growth forests adjacent to aquatic habitats such as streams and ponds have the highest habitat value, providing canopy cover, large-diameter trees and snags, and burrow and den sites. Throughout most of the year, the majority of river otter activity occurs within 100 feet of the shoreline (Larsen 1984; Woolington 1984). However, in Southeast Alaska from May to July, female river otters use inland habitats generally within 0.5 mile of the coastline as natal denning sites (Woolington 1984). Natal dens occur on well-drained sites near streams in old-growth habitats. Stream courses are used as travel corridors between natal den sites and foraging areas on the coastline.

This species is relatively common on Admiralty Island as well as throughout Southeast Alaska. During 2009 fieldwork, multiple individuals were observed from the shore and from boats in and around Favorite Bay. River otter sign in the form of feeding sites, scat, and tracks was seen along the shoreline of Favorite Bay.

Pacific Marten

The Pacific marten, distinct from the American marten (*Martes americana*), occurs only on two islands in Southeast Alaska: Admiralty and Kuiu islands. Martens are strongly associated with old-growth forest and feed on small mammals, which they depend on to attain fat stores to get them through the winter. During 2009 field studies, one marten was observed moving north along the east side of the east channel of Pea Hen, and another, which had been killed by a vehicle, was observed in the community of Angoon. This species appears to be susceptible to trapping along roadsides (Carstensen 2009), and marten trapping has taken place near Angoon in the past (personal communication, James 2009).

Cavity-Dependent MIS (Brown Creeper, Hairy Woodpecker, Red-breasted Sapsucker, Red Squirrel)

The Brown Creeper is a year-round resident of Southeast Alaska and is considered uncommon. This species can be difficult to detect because of its cryptic plumage and high-pitched vocalizations. This forest-interior species is dependent on old-growth and mature forest habitats (Hejl 1994). Late-successional coniferous and mixed-coniferous forest provides large-diameter trees and snags for foraging and nesting microsites (Hejl et al. 2002). Microsites for nest locations are usually in the middle of the trunk and have a loose section of bark on a large, dead, or dying tree (Mariani 1987). Three Brown Creepers were detected during the 2009 breeding bird surveys. Therefore, it is assumed that a breeding population of Brown Creepers exists in the study area.

The Hairy Woodpecker (*Picoides villosus*) is also an uncommon, permanent resident of Southeast Alaska. Similar to the Brown Creeper, the Hairy Woodpecker is found in old-growth forests with adequate dead and dying trees, which are used as foraging and nesting habitat (Jackson et al. 2002). The Hairy Woodpecker is a principal cavity excavator for other cavity nesters and therefore was chosen as a MIS for cavity nesters (USFS 2008a). One Hairy Woodpecker was detected during the June 2009 breeding bird surveys.

Red-breasted Sapsuckers are common in Southeast Alaska during spring, summer, and fall but are rare during winter (Armstrong 1995). They use coniferous and mixed coniferous-deciduous forests for foraging and nesting (Walters et al. 2002). Red-breasted Sapsucker choose nest sites that are relatively close to a foraging area, rather than choosing nest sites based on the characteristics of the tree stand. (Crockett 1975). Adults may exhibit site fidelity and use the same tree and cavity as previous year (Fleury 2000).

The Red-breasted Sapsucker was the most commonly detected cavity nester during the 2009 breeding bird surveys. Twelve Red-breasted Sapsuckers were detected during the breeding bird surveys in June 2009. Juvenile Red-breasted Sapsucker begging calls were heard during the breeding bird surveys and other biological surveys, indicating breeding by this species in the study area. The begging calls may explain the higher frequency of detection in comparison to the Brown Creeper, which has a very low detectability due to its inconspicuous nature. The high frequency of begging calls could be an indication of an unusually successful breeding season.

The red squirrel is only one of two arboreal rodents in Southeast Alaska. Red squirrels require forests that have cone-producing trees and cavities in trees and snags for denning and nesting. Large spruce trees have root systems that are ideal for den sites. Red squirrels represent a species that can do well in seed-producing early successional stands; therefore, they were selected as an MIS. Red squirrels are not native to Admiralty Island and are thought to have been introduced sometime after the 1990s, and they have since spread across the entire island (MacDonald and Cook 2007). Red squirrels were thought to be an important prey item for martens (Burris and McKnight 1973), but research has shown that voles are martens' preferred prey (Lensink 1955).

Brown Creepers, Hairy Woodpeckers, Red-breasted Sapsuckers, and red squirrels were all observed during field surveys in 2009. Red-breasted Sapsuckers were particularly abundant in 2009. Red squirrels, while observed throughout the study area, were most common along roadways.

Vancouver Canada Goose

This subspecies of the Canada Goose occurs in coastal-southern Alaska and western British Columbia. They tend not to migrate and live in the Pacific Northwest year-round. The Vancouver Canada Goose has a dark breast and is the largest of the dark forms of Canada Goose. On Admiralty Island this subspecies breeds in coastal temperate rainforest in spruce-hemlock habitat (Lebeda and Ratti 1983). Nests tend to be located approximately 400 m inland from coastal areas, and less than 50 m from fresh water. The fresh water tends to be small pools on poorly drained soils and not lakes, ponds, or bays (Lebeda and Ratti 1983). Canada Geese were observed in the study area multiple times in late May and early July. Given the timing of these observations, these geese were likely Vancouver Canada geese, because migrants would not be in the area at that time. They were probably a combination of males, failed breeders, and nonbreeders (personal communication, Hodges 2010).

Marbled Murrelet

The Marbled Murrelet is one of the smaller common alcids along Alaska's southern coast. In summer, they tend to forage in bays, inlets, fjords, and open ocean, usually within 50 kilometers of the shore. Their summer diet consists of small schooling fish, and their winter and spring diets are predominately smelt, invertebrates, and herring.

The Marbled Murrelet typically breeds in coastal forests, sea-facing talus slopes, or cliffs on islands. They construct their nests in mature coniferous trees in old-growth stands. Less than 3% of the Alaska population nests on the ground. In Alaska, the main habitat factors associated with nesting habitat are the location relative to heads of bays, percent moss cover on trees, tree diameter, presence of suitable nesting platforms, and amount of cover of large old-growth trees (Kuletz et al. 1995).

Southeast Alaska contains one of the largest populations of Marbled Murrelets (144,190 birds) (Piatt et al. 2007). Trend information from population studies suggests a decline in worldwide populations.

4.3.4 Breeding Birds in the Analysis Areas

Eighteen species of birds were detected during the 2009 breeding bird surveys. Due to the timing of the surveys, it is assumed that these birds were breeding or attempting to breed in the analysis areas. The species composition did not vary greatly between habitat types. The dominant habitat type in the study area is spruce-hemlock forest. Spruce-hemlock forest accounts for approximately 67.8% of the study area. A plausible explanation for the lack of variety in species between habitats could be the comparatively small size of the less common habitat types (e.g., fen and woodland bog) in the locations of the alternatives.

The most common species detected were birds that use coniferous forest for the majority of their biological functions (e.g., foraging and nesting). The Dark-eyed Junco was the most detected species during the breeding bird surveys and accounted for 17.13% of detections, or 31 individuals (see Appendix E). The Pacific-slope Flycatcher and the Chestnut-backed Chickadee were the second most detected species during the breeding bird surveys and each accounted for 11.60% of all detections, or 21 individuals for each species.

4.3.5 Small Mammals in the Analysis Area

Four species of small mammals were detected on Admiralty Island: long-tailed vole, meadow vole (*Microtus pennsylvanicus*), northwestern deer mouse (*Peromyscus keeni*), and dusky shrew (*Sorex monticolis*) (MacDonald and Cook 2007). The meadow vole on Admiralty Island may constitute an endemic subspecies (*Microtus pennsylvanicus admiraltiae*), although MacDonald and Cook (2007) suggest that this should be reevaluated using modern techniques. Small mammals provide prey for raptors and a variety of mammalian predators and therefore provide an indicator of habitat quality for these species.

4.3.6 Marine Mammals in the Analysis Area

In addition to Steller sea lions and humpback whales described above, a number of non-federally listed marine mammals are known or have potential to occur in Favorite Bay and adjacent estuarine and marine waters. The following section describes marine mammals known to occur in the landscape area, including sightings in the study area. All marine mammals are protected by the MMPA of 1972, as amended. Marine mammals also protected under the ESA are described in section 5.3.2. Table 16 lists marine mammals known to occur or with potential to occur in the study area and landscape area and their current conservation status.

Table 16. Marine Mammals Known to Occur in or near the Study and Landscape Areas

Scientific Name	Common Name	Stock	Status[1]	Occurrence[2]
Enhydra lutris kenyoni	Northern sea otter	Southeast Alaska	NL	LA
Eumetopias jubatus	Steller sea lion	Eastern	T	PA
Megaptera novaeangliae	Humpback whale	Central North Pacific	E	LA
Orcinus orca	Orca	Eastern North Pacific Northern Resident	NL	LA
Phoca vitulina	Harbor seal	Southeast Alaska	NL	PA
Phocoena phocoena	Harbor porpoise	Southeast Alaska	NL	PA
Phocoenoides dalli	Dall's porpoise	Alaska	NL	PA

[1] E = endangered; T = threatened; NL = not listed

[2] PA = observed in study area, LA = observed in landscape area

Northern Sea Otter

The Southeast Alaska population of the northern sea otter is not listed under the ESA. However, it has been petitioned for listing. Sea otters were first afforded protection by the International Fur Seal Treaty in 1911, by which time no remnant colonies of sea otters existed in Southeast Alaska. Sea otters were therefore translocated to Southeast Alaska. These translocation efforts initially met with varying degrees of success. Eventually these populations grew in numbers and expanded their range (Pitcher 1989). The most recent stock assessment report for the Southeast Alaska stock of sea otters estimates the population to be stable (Allen and Angliss 2009). Sea otters usually occur within the 40-m depth contour because they require frequent access to benthic foraging habitat in subtidal and intertidal zones (Riedman and Estes 1990). Sea otters are not usually observed around Angoon; however, one sea otter was reported near Danger Point in August 2009 (personal communication, Frederickson 2009).

Harbor Seal

Harbor seals occur in coastal and estuarine waters from Baja California, north along the west coast of the United States and Canada, west through the Gulf of Alaska and the Aleutian Islands, and into the Bering Sea north to Cape Newenham and the Pribilof Islands. Although young harbor seals have been known to disperse up to 190 miles, the harbor seal is nonmigratory and makes only limited movements for foraging and breeding (Nowak 2003). Harbor seals live primarily along shorelines and estuaries and commonly rest on sandbanks, easily accessible beaches, reefs, and protected tidal rocks (Nowak 2003). Newly weaned young feed primarily on shrimp and other small, benthic crustaceans. Older animals subsist on octopus and on a variety of fish, including herring, trout, cod, flounder, and salmon (Nowak 2003).

Although harbor seals are typically solitary, several hundred may aggregate onshore during the breeding season (June–July), and individuals may also come together at favored haulouts. The current statewide harbor seal population estimate is approximately 180,000, based on surveys conducted between 1996 and 2000 (Angliss and Allen 2008). The harbor seals of Angoon are part of the Southeast Alaska stock, as defined by NMFS. The most recent stock assessment report for harbor seals names a current abundance estimate of 112,391 for this stock (Allen and Angliss 2009). Harbor seals were commonly observed in Mitchell Bay and Favorite Bay during the 2009 surveys.

Harbor Porpoise

In the eastern North Pacific Ocean, the harbor porpoise frequents coastal waters, bays, estuaries, and the mouths of large rivers from Point Conception, California, north to Point Barrow, Alaska (Nowak 2003; Angliss and Allen 2008). Their diet consists of smooth, nonspiny fish, approximately 10 to 25 cm long, such as herring, pollock, and cod (Gaskin et al. 1974 as cited in Nowak 2003). Genetic testing and pollutant load investigations along the west coast of North America suggest that harbor porpoises from California to British Columbia are nonmigratory. Whether this is true of the Alaska population is currently unknown due to insufficient sample sizes. The harbor porpoise was observed multiple times in Mitchell Bay and Favorite Bay during the 2009 surveys.

Dall's Porpoise

Dall's porpoise are widely distributed in the North Pacific, occurring from Baja California north to the Gulf of Alaska and Bering Sea and south to Japan (Nowak 2003;Angliss and Allen 2008). The only apparent gaps in their distribution in Alaskan waters are upper Cook Inlet and the shallow eastern flats of the Bering Sea (Angliss and Allen 2008). Although Dall's porpoise sometimes occur near land, they are generally found well offshore in seas more than 180 m deep (Nowak 2003). Throughout most of the eastern North Pacific, Dall's porpoise are present year-round, although there is a tendency for Dall's porpoise to concentrate near the shore and to the south during the autumn and winter and offshore and to the north in the spring and summer. These seasonal movements are likely related to distributional changes in prey organisms (Nowak 2003). Dall's porpoise commonly prey on squid and small, unarmed fish (e.g., herring) that live at depths in excess of 180 m (Nowak 2003). This species was observed on multiple occasions by biologists the FAA's consultant team outside of Danger Point and in Favorite Bay.

Orca

The killer whale (or orca) is the largest species of the dolphin family and is the most widely distributed cetacean species (Nowak 2003; Angliss and Allen 2008). Although they do occur in tropical and offshore waters, they occur in higher densities in colder, more productive waters of both hemispheres, with the highest concentrations found at high latitudes (Angliss and Allen 2008). They will often frequent shallow bays, estuaries, and mouths of rivers (Nowak 2003). Killer whale diets include a variety of marine life, including fish, seals, squid, sea lions, and other members of the cetacean family (dolphins and whales) (Nowak 2003).

Killer whales occur year-round in Southeast Alaska. There are three ecotypes of killer whales: resident, transient, and offshore. These three ecotypes are genetically distinct and there is also evidence of genetic distinction within the populations of residents and transients (Allen and Angliss 2009). Killer whales in the Angoon area fall into the resident and transient ecotypes. The Alaska resident type preys mostly on fish and occurs from Southeastern Alaska to the Aleutian Islands and to the Bering Sea. The eastern North Pacific transient stock is a trans-boundary stock and ranges down to British Columbia. It predominately preys on marine mammals (Allen and Angliss 2009). This species was not observed by during the 2009 surveys.

Chapter 5 SUMMARY

The information on vegetation, wetlands, and wildlife presented in this report will be used in the preparation of the Affected Environment section of the EIS. This report provides a detailed description of the terrestrial (upland) vegetation, wetlands, and wildlife resources (including terrestrial species, marine mammals, and waterbirds) potentially affected by implementation of the proposed project and establishes the baseline conditions against which potential impacts from the proposed project will be measured. The report includes information on federally listed threatened and endangered species and other species of conservation concern known to occur or with potential to occur in the vicinity of the airport and access road alternatives. This report also included the extent and location of wetlands, which are regulated under the Clean Water Act. Key results of the 2009 vegetation, wetlands, and wildlife surveys are briefly summarized below.

Vegetation survey results summary:

- Nine vegetation cover types mapped in the project area.
- No noxious weeds found, but populations of non-native common dandelion and field mustard were recorded.
- No federally listed threatened or endangered plant species in the study area.

Wetland Survey results summary:

- The FAA's consultant team refined the National Wetland Inventory data layer within the project area upon completing field work and GIS aerial photo interpretation. These data should be sufficient for making a jurisdictional determination.
- Fifteen wetland classes based upon vegetation and hydrology characteristics are found within the project area.
- The results of a qualitative wetland functional assessment indicate a range of functionality that is related to wetland type and location within a watershed rather than any impacts due to human-caused disturbance.

Wildlife survey results summary:

- No threatened or endangered wildlife species were observed in the study area.
- No Black Oystercatchers, a USFS Sensitive Species, were detected.
- Four Queen Charlotte Goshawk, a USFS Sensitive Species, were detected.
- Six active Bald Eagle nests were detected within 0.5 miles of the project area.
- High levels of activity by brown bear and Sitka black-tailed deer, both USFS Management Indicator Species, were identified in the project area.
- Marine mammals protected under the Marine Mammal Protection Act were observed in waters within the analysis area and include sea lions, harbor seals, harbor porpoises, Dall's porpoises, and humpback.
- Four species of small mammals were identified in the analysis area.
- Eighteen species of birds were detected in the analysis area during breeding bird surveys.

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Acronyms

ADF&G	Alaska Department of Fish & Game
AKNHP	Alaska Natural Heritage Program
AS	Alaska Statute
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dbh	diameter at breast height
DNR	Alaska Department of Natural Resources
DOT	Department of Transportation
DOT&PF	Alaska Department of Transportation and Public Facilities
EFH	essential fish habitat
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
GIS	geographical information system
IUCN	International Union for Conservation of Nature
LUD	land use designation
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NWI	National Wetland Inventory
P.L.	Public Law
PFA	post-fledging area
ppt	parts per thousand
RHA	Rivers and Harbors Act
TLMP	Tongass Land Management Plan
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WET	Wetland Evaluation Technique

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APPENDIX A. PLANTS OBSERVED IN THE STUDY AREA, INCLUDING THEIR SCIENTIFIC NAMES AND ASSOCIATED STUDY AREA COVER TYPES

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Table A-1. Plants Observed in the Study Area and their Cover Types

Scientific Name	Common Name	Cover Type
Achillea millefolium	Yarrow	Bog woodland Salt marsh
Agrostis exarata	Spike bentgrass	Salt marsh
Agrostis spp.	Bentgrass	Salt marsh
Alnus crispa ssp. *sinuata*	Sitka alder	Bog woodland
Alnus rubra	Red alder	Bog forest Bog woodland
Athyrium filix-femina	Lady fern	Bog forest Bog woodland Fen Spruce-hemlock forest
Atriplex patula	Orache	Salt marsh
Brassica rapa	Field mustard	Salt marsh
Calamagrostis canadensis	Bluejoint	Bog forest Bog woodland Salt marsh Fen
Caltha palustris ssp. *asarifolia*	Yellow marsh-marigold	Bog woodland
Carex aquatilis	Water sedge	Fen
Carex lyngbyei	Lyngby's sedge	Salt marsh
Carex sitchensis	Sitka sedge	Fen Fen
Carex spp.	Sedge	Bog woodland Fen Spruce-hemlock forest
Castilleja miniata	Common red paintbrush	Bog woodland Salt marsh
Clintonia uniflora	Queen's cup	Bog forest
Conioselinum pacificum	Pacific hemlock-parsley	Bog woodland Spruce-hemlock forest
Coptis asplenifolia	Fern-leaved goldthread	Bog forest Bog woodland Spruce-hemlock forest
Coptis trifolia	Three-leaf goldthread	Fen
Corallorhiza maculata ssp. *Maculata*	Spotted coralroot	Spruce-hemlock forest
Cornus canadensis	Dwarf dogwood	Bog forest Bog woodland Spruce-hemlock forest
Dicranum scoparium	Broom moss	Spruce-hemlock forest
Dodecatheon pullchelum	Few-flowered shootingstar	Bog woodland

Table A-1. Plants Observed in the Study Area and their Cover Types

Scientific Name	Common Name	Cover Type
Drosera rotundifolia	Round-leaved sundew	Bog woodland
Elymus mollis	Dunegrass	Salt marsh
Empetrum nigrum	Crowberry	Bog woodland Fen
Equisetum arvense	Common horsetail	Bog woodland Fen Spruce-hemlock forest
Equisetum fluviatile	Swamp horsetail	Bog woodland Salt marsh Fen Spruce-hemlock forest
Eriophorum angustifolium	Narrow-leaved cotton-grass	Bog woodland
Fontinalis antipyretica	Common water moss	Fen
Galium aparine	Cleavers	Salt marsh
Galium trifidum	Small bedstraw	Fen
Glaux maritima	Sea milk-wort	Salt marsh
Gymnocarpium dryopteris	Oak fern	Bog woodland Spruce-hemlock forest
Heracleum lanatum	Cow-parsnip	Bog woodland
Hierochloe odorata	Common sweetgrass	Salt marsh
Hippuris vulgaris	Common mare's-tail	Salt marsh
Hordeum brachyantherum	Meadow barley	Salt marsh
Hylocomium splendens	Step moss	Bog woodland Spruce-hemlock forest
Juncus arcticus	Arctic rush	Salt marsh
Lathyrus japonicus	Beach pea	Salt marsh
Ledum groenlandicum	Labrador tea	Bog forest Bog woodland Spruce-hemlock forest Fen
Listera cordata	Heart-leaved twayblade	Spruce-hemlock forest
Lobaria pulmonaria	Lungwort	Spruce-hemlock forest
Luzula spp.	Wood-rush	Bog woodland Spruce-hemlock forest
Lycopodium annotinum	Stiff clubmoss	Bog forest Bog woodland
Lysichiton americanum	Skunk cabbage	Bog forest Bog woodland Fen Spruce-hemlock forest

Table A-1. Plants Observed in the Study Area and their Cover Types

Scientific Name	Common Name	Cover Type
Maianthemum dilatatum	False lily-of-the-valley	Bog forest Bog woodland Fen Spruce-hemlock forest
Malus fusca	Pacific crab apple	Bog forest Bog woodland Spruce-hemlock forest
Menyanthes trifoliata	Bog buckbean	Bog woodland Fen Fen
Menziesia ferruginea	Fool's huckleberry	Bog woodland Spruce-hemlock forest
Moneses uniflora	Single delight	Bog woodland Spruce-hemlock forest
not known	Lichen	Spruce-hemlock forest
	Liverwort	Spruce-hemlock forest
Oplopanax horridus	Devil's club	Bog woodland Spruce-hemlock forest
Osmorhiza purpurea	Purple sweet-cicely	Fen
Oxycoccus oxycoccos	Bog cranberry	Bog forest Bog woodland Fen
Picea sitchensis	Sitka spruce	Bog woodland Spruce-hemlock forest
Pinguicula vulgaris	Common butterwort	Bog woodland
Pinus contorta	Shore pine	Bog forest Bog woodland
Plagiochila porelloides	Cedar-shake liverwort	Spruce-hemlock forest
Plagiothecium undulatum	Wavy-leaved cotton moss	Spruce-hemlock forest
Plantago maritima ssp. *juncoides*	Sea plantain	Salt marsh
Platanthera stricta	Slender bog-orchid	Bog woodland Fen
Potentilla anserina ssp. *pacifica*	Silverweed	Salt marsh
Potentilla palustris	Marsh cinquefoil	Bog woodland Fen
Pteridium aquilinum	Bracken fern	Bog woodland Spruce-hemlock forest
Pyrola asarifolia	Pink wintergreen	Spruce-hemlock forest
Ranunculus occidentalis	Western buttercup	Salt marsh
Ranunculus pacificus	Pacific buttercup	Bog woodland
Rhizomnium glabrescens	Fan moss	Spruce-hemlock forest

Table A-1. Plants Observed in the Study Area and their Cover Types

Scientific Name	Common Name	Cover Type
Rhytidiadelphus loreus	Lanky moss	Bog woodland Spruce-hemlock forest
Rubus arcticus	Dwarf nagoonberry	Bog woodland
Rubus chamaemorus	Cloudberry	Bog woodland
Rubus parviflorus	Thimbleberry	Bog woodland Spruce-hemlock forest
Rubus pedatus	Five-leaved bramble	Bog forest Bog woodland Spruce-hemlock forest Fen
Rubus spectabilis	Salmonberry	Bog forest Bog woodland Spruce-hemlock forest
Sanguisorba canadensis ssp. *latifolia*	Sitka burnet	Bog woodland
Scirpus microcarpus	Small-flowered bullrush	Bog forest Bog woodland Fen Spruce-hemlock forest
Sphagnum spp.	Peat moss species	Bog forest Bog woodland Fen Spruce-hemlock forest
Streptopus amplexifolius	Clasping twistedstalk	Bog woodland Spruce-hemlock forest
Streptopus roseus	Rosy twistedstalk	Spruce-hemlock forest
Swertia perennis	Alpine bog swertia	Fen
Taraxacum officinale	Common dandelion	Salt marsh
Thalictrum occidentale	Western meadowrue	Bog woodland
Tiarella trifoliata	Foamflower	Bog forest Bog woodland Fen Spruce-hemlock forest
Tofieldia glutinosa	Sticky false asphodel	Bog woodland
Trientalis arctica	Northern starflower	Bog woodland Fen
Triglochin maritimum	Sea arrow-grass	Salt marsh
Trisetum cernuum	Nodding trisetum	Salt marsh
Tsuga heterophylla	Western hemlock	Bog forest Bog woodland Fen Spruce-hemlock forest

Table A-1. Plants Observed in the Study Area and their Cover Types

Scientific Name	Common Name	Cover Type
Vaccinium alaskaense	Alaskan blueberry	Bog forest Bog woodland Spruce-hemlock forest
Vaccinium caespitosum	Dwarf blueberry	Fen
Vaccinium ovalifolium	Oval-leaved blueberry	Bog forest Bog woodland Spruce-hemlock forest
Vaccinium uliginosum	Bog blueberry	Bog woodland
Veratrum viride	Indian hellebore	Bog woodland
Viburnum edule	High-bush cranberry	Bog woodland
Viola glabella	Stream violet	Fen
Viola langsdorfii	Alaska violet	Bog woodland
Viola palustris	Marsh violet	Fen

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APPENDIX B. STATE OF ALASKA PROHIBITED AND RESTRICTED NOXIOUS WEEDS

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State of Alaska Prohibited and Restricted Noxious Weeds

(A) The following are prohibited noxious weeds:

Bindweed, field (*Convolvulus arvensis*)
Fieldcress, Austrian (*Rorippa austriaca*)
Galensoga (*Galensoga parviflora*)
Hempnettle (*Galeopsis tetrahit*)
Horsenettle (*Solanum carolinense*)
Knapweed, Russian (*Centaurea repens*)
Lettuce, blue-flowering (*Lactuca pulchella*)
Quackgrass (*Agropyron repens*)
Sowthistle, perennial (*Sonchus arvensis*)
Spurge, leafy (*Euphorbia esula*)
Thistle, Canada (*Cirsium arvense*)
Whitetops and its varieties (*Cardaria draba, C. pubescens, Lapidium latifolium*)
Purple loosestrife (*Lythrum salicaria*)
Orange hawkweed (*Hieracium aurantiacum*)

(B) The following are restricted noxious weeds, with their maximum allowable tolerances:

Annual bluegrass (*Poa annua*), 90 seeds per pound
Blue burr (*Lappula echinata*), 18 seeds per pound
Mustard (*Brassica juncea*, *Sinapis arvensis*), 36 seeds per pound
Oats, wild (*Avena fatua*), seven seeds per pound
Plantain, buckhorn (*Plantago* sp.), 90 seeds per pound
Radish (*Raphanus raphanistrum*), 27 seeds per pound
Toadflax, yellow (*Linaria vulgaris*), one seed per pound
Vetch, tufted (*Vicia cracca*), two seeds per pound
Wild Buckwheat (*Polygonum convolvulus*), two seeds per pound.
(In effect before 7/28/59; am 3/2/78, Reg. 65; am 10/28/83, Reg. 88)

Authority: AS 03.05 010

AS 03.05.030

AS 44.37.030

11AAC 34.020

(Available at: http://dnr.alaska.gov/ag/ag_pmc.htm. Accessed October 2, 2009)

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APPENDIX C. WETLAND FUNCTIONAL ASSESSMENT DATA FORM

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(Based on 2002 Modifications[1] to Adamus 1987)

SWCA Wetland ID ____________________
Wetland Survey Point(s) ____________________
Adamus Wetland ID ____________________
Description / Veg. Type ____________________
Date of Assessment ____________________
Observer(s) ____________________

Function	Rating	Field[2] Criteria (check all that apply)
Groundwater Recharge	High to Moderate	☐ Located at or near topographic divide ☐ Evidence of varying water levels: drift lines, watermarks, etc. ☐ Estuarine wetland with alluvial, gravel or sandy substrate ☐ Muskeg wetlands
	Low	☐ Estuarine wetland with substrate of fragipan, bedrock, or marine sediments
Groundwater Discharge & Lateral Flow	High to Moderate	☐ Completely or partly located within 200 feet of stream (discharge) ☐ Located ~halfway on slope between topo divide & stream (lateral flow) ☐ Estuarine wetland with alluvial, gravel or sandy substrate (lateral flow)
	Low	☐ Estuarine wetland with substrate of fragipan, bedrock or marine sediments ☐ Enclosed on all sides by development
Surface Hydrologic Control	High	☐ Wetland has no permanent or tidal outlet (though edge may be ditch which leads to permanent waters) and has a slope angle of <3% or ☐ Wetland is nontidal and groundwater discharge = low (i.e. soils not saturated for most of year), wetland is located above urban development, an outlet may or may not be present and a) wetland has peat or other hydric soils and shrubby vegetation and slopes <3% or b) slope is 3-7% but wetland is large relative to its watershed (either 5+% by area or smaller and wetlands generally absent upslope)
	Moderate-High	☐ Wetland is nontidal and groundwater discharge = low (i.e. soils not saturated for most of year), wetland is located below urban development, an outlet may or may not be present and a) wetland has peat or other hydric soils and shrubby vegetation and slopes <3% or b) slope is 3-7% but wetland is large relative to its watershed (either 5+% by area or smaller and wetlands generally absent upslope) ☐ Wetland is nontidal and groundwater discharge = low and slope angle<7% ☐ Outlet is constricted or absent and wetland does not meet criteria above for High
	Moderate - Low	☐ Wetland is usually or mostly nontidal but is within 25 vertical feet of sealevel and slope angle is <3%, or ☐ Groundwater discharge is rated Moderate or High and slope <7%
	Low	☐ Tidal wetlands and wetlands with >7% slope

Sediment or Toxicant Retention	High	☐ Wetland has no permanent outlet, has a slope of 0-3%, is in a landscape depression (at least 25% of abutting land slopes into the wetland w/o being intercepted by a ditch or berm), and is downstream of potential sediment and/or toxicant sources, or ☐ Peat soils prevail, much of wetland is in a landscape depression, and slope angle is 0-3%
	Moderate - High	☐ Slope is less than 7%, dense vegetation is present, the wetland has an outlet and is: a) in the lower 2/3 of a watershed with typically too high turbidity (Duck, Casa del Sol, Lemon, Mendenhall, or Jordan), or b) downstream of potential or known toxicants. ☐ Wetland is tidal or primarily lacustrine or regularly supports beaver
	Moderate - Low	☐ Wetland has an outlet, is primarily vegetated and slope is generally <7%, it is not located downstream of potential sediment or toxicant sources.
	Low	☐ Slope is generally >7% or wetland is mostly unvegetated
Nutrient Transformation & Export	High	☐ Wetland is connected by channel flow to a creek or river, and it: Is large relative to its watershed (5+% by area or smaller), or Has deep or open water habitats with low flow velocities, or Has dense emergent and/or dense woody vegetation, or Is a mudflat with algae mats, or Has a restricted outlet.
	Moderate	☐ Wetland is mostly vegetated and has an outlet (intermittent or permanent) to the estuary or directly abuts and runs off into the estuary but does not meet criteria listed for high function.
	Low	☐ Wetland has no surface water outlet (not even intermittent) to the estuary

Riparian Support	High	☐ Upslope or downslope, nontidal areas mostly urban/open land, stream (if any) contains several densely shaded reaches, or ☐ Upslope or downslope areas are mostly forested, stream (if any) contains several unshaded reaches, or ☐ It's an estuarine emergent wetland
	Moderate - High	☐ Wetland contains or is neighboring, bordering, or contiguous with (i.e, there is hydrologic and/or habitat connectivity) a mostly permanent stream, lake, or estuary
	Moderate - Low	☐ Wetland is drained by intermittent streams (excluding artificial ditches) or has a lateral flow or groundwater discharge rating of High
	Low	☐ Wetland is hydrologically isolated from streams and estuaries

Fish Habitat (anadromous, resident, and marine finfish; also shellfish)	Very High	☐ Excellent habitat for rearing, migration, and/or spawning; utilized by key lifestage of high value or unique stock of fish or shellfish,
	High	☐ Good habitat for rearing, migration, and/or spawning, used by substantial numbers of fish during at least one season (e.g. overwinter rearing, spring migration, fall spawning), or ☐ NMFS has designated the wetland as essential fish habitat (EFH) for one or more species of fish.
	Moderate - High	☐ Fair habitat for rearing, migration, and/or spawning.
	Moderate - Low	☐ Access is restricted[3] (e.g., obstacle(s) present, very limited frequency and duration of inundation) but habitat is at least fair, or ☐ Access is not restricted, but habitat is poor.
	Low	☐ Access is restricted and habitat is poor even for resident fish.
	Very Low	☐ No access to any part of the wetland, even during the highest water levels in an average year; or access is purposely excluded (e.g. fish screen).

Wildlife	Very High	☐ Existing survey data (e.g., Cain et al. 1988, USDA 2001, SWCA 2002) indicate that the wetland receives disproportionately high use by waterfowl and shorebirds during migration, or ☐ The wetland is used for winter survival feeding by VACG, or ☐ The wetland receives heavy seasonal or year-round use by species of conservation concern
	High	☐ Existing survey data indicate that the wetland is frequently used by waterfowl and shorebirds and/or a high number of GBHE, VACG, MALL, or BAEA relative to other, similar wetlands in the area, or ☐ The wetland has, or recently had, an active BAEA nest, or ☐ The wetland is used by otter or mink, or ☐ The wetland contains *Carex lyngbyei*, *Plantago maritima*, *Triglochin maritimus*, or *Ruppia maritimus*, or 3 The wetland contains > 2 contiguous acres of permanent standing fresh or brackish water or permanently flooded fresh emergent marsh (or is within 300 feet of such) and is adjacent or connected to spruce/hemlock forest, deciduous shrub-scrub (trees < 6m) or, deciduous forest (trees > 6m).
	Moderate - High	☐ Existing survey data indicate that GBHE, VACG, MALL, or BAEA use this wetland on an occasional basis, or ☐ Permanent standing water or permanent emergent freshwater or brackish water marsh is present but is 0.1-1.0 ac in area and the wetland is adjacent or connected to spruce/hemlock forest, deciduous shrub-scrub (trees < 6m) or, deciduous forest (trees > 6m), or ☐ Breeding bird surveys indicate at least occasional use by any of the following spp: Red-throated Loon, Green-winged Teal, Greater Yellowlegs, Least Sandpiper, Common Snipe, Solitary Sandpiper, Belted Kingfisher.

	Moderate - Low	☐ Existing survey data indicates infrequent use by GBHE, VACG, Mallard, or BAEA, or ☐ The wetland is frequented by domestic dogs, or ☐ There is no standing water but the wetland contains or abuts a permanent stream, lake, or estuary, or is within 300 feet of such and is adjacent or connected to spruce/hemlock forest, deciduous shrub-scrub (trees < 6m) or, deciduous forest (trees > 6m).
	Low	☐ Wetlands not meeting any of the above criteria and/or frequented by domestic dogs
Regional Ecological Diversity	High	☐ Existing data shows that this wetland supports the highest seasonal concentrations of migratory birds, or ☐ This wetland is known to have seasonal or year-round importance to federally listed threatened or endangered species and/or other species of conservation concern, or ☐ Less common migratory bird species, i.e., those rated as uncommon or rare by Armstrong and Gordon (2002) (e.g., Blue-winged Teal, Gadwall, American Golden Plover, Killdeer, Semipalmated Sandpiper, Snow Bunting, Red-winged Blackbird, etc.) have been observed in the wetland at least once, or ☐ This wetland is important to eulachon, herring, steelhead, Montana Creek chum salmon, Mendenhall sockeye, or Dolly Varden; or ☐ One of the following plant species is present: Lyngbye sedge (*Carex lyngbyei*), smooth sedge (*C. laeviculmus*), Bebb's sedge (*C. bebbii*), Chara (*Chara sp.*), sweet gale (*Myrica gale*), Kamchatka spike-rush (*Eleocharis kamtschatica*), green-keeled cottongrass (*Eriophorum viridi-carinatum*), Kamchatka alkali grass (*Puccinellia kamtschatica*), farnorthern buttercup (*Ranunculus hyperboreus*), ditch grass (*Ruppia maritima*), common eel-grass (*Zostera marina*), narrow-leaved burreed (*Sparganium emersum*), marsh cinquefoil (*Potentilla palustris*); or the Burreed community ☐ The wetland is a needle-leaved evergreen seasonally flooded scrub-shrub type; needle-leaved evergreen semipermanently flooded scrub-shrub; Nonpersistent emergent saturated; Nonpersistent emergent permanently flooded; Floating vascular aquatic bed; Needle-leaved evergreen seasonally flooded forested, or ☐ The wetland is tidal (estuarine) emergent and directly abuts a nontidal (palustrine) emergent wetland, or is nontidal emergent and abuts a tidal emergent wetland.

	Moderate - High	☐ This wetland supports moderate to high seasonal concentrations of the more common (as per Armstrong and Gordon, 2002) migratory birds, or ☐ One of the following communities is present: Deciduous Woodland, Deciduous Scrub-Shrub, or ☐ The wetland contains one of the following habitat features: >20 logs, >15 snags, >4 upturned trees (with root wads), largest tree >45 in. dbh, >98% evergreen canopy, >98% deciduous canopy, site dominated by deciduous trees >24 ft, presence of herbaceous veg >6 ft tall, at least 4 pools larger than 16 sq.ft., or ☐ Any wetlands not isolated from natural landcover and classified by the NWI Classification as having a shrub-scrub component bordering (within 300 ft) of a stream or pond, or ☐ The wetland is an intertidal emergent wetland but is unconnected (except for by narrow channel(s)) to a nontidal wetland.
	Moderate - Low	☐ The wetland supports low to moderate seasonal concentrations of more common migratory and resident bird species, or ☐ The wetland contains one of the following habitat features: >10 logs, >8 snags, >2 upturned trees (with root wads), largest tree >40 in. dbh, >90% evergreen canopy, >80% deciduous canopy, site dominated by deciduous trees 18-24 ft, at least 3 pools larger than 16 sq.ft., or ☐ Any wetland classified by the NWI Classification as having a forested component bordering a stream or pond
	Low	Wetlands not meeting any of the above criteria including those without open water and/or isolated from major forest tracts and without other special features.
Erosion Sensitivity	High	☐ Wetland (regardless of vegetation cover) generally contains slope angles exceeding 20%
	Moderate - High	☐ Wetland contains slopes of 3-20% and not dominantly forested, and having either: a) groundwater discharge conditions, or b) more highly erosive soils (e.g., Kupreanof, Kina, Kogish, Fu, Maybeso), or ☐ Stream has 5 or more of the following conditions: a) upper banks exceeding 60% slope or are composed of fine sediments; b) lower banks have continuous bank cutting or cutting at toe of slide areas at meander bends; c) lower banks are composed of sands, silt, clay (< 20% gravel); d) streambed composed of sands, silt, clay, fine gravel; e) stream width/depth ratio is > 25 and channel is moderately to highly sinuous, gradient < 3%; f) gravel or sand bars present, unvegetated, and > 3ft high; g) logs and debris positioned such as to cause scouring and bank cutting; h) alders, devil's club, bare ground, pavement, or open stands of spruce predominate on gentle floodplains

	Moderate - Low	☐ Wetland contains slope angles of 3-20% and is dominated by forest, or ☐ Stream has less than 5 of conditions a – h in the moderate-high category, above; or less than 5 of the following conditions: a) slope angle is less then 60% and appears stable or of bedrock; b) lower banks are predominantly vegetated and there is little or no continuous bank cutting; c) lower banks are comprised of muskeg or grasses or sediments are larger than 2.5 in diameter; d) streambed substrate is comprised of coarse, unrounded rocks or bedrock, moderately to well-packed; e) stream width/depth ratio < 15 and gradient greater than 5%; f) gravel bars are absent or densely vegetated; g) debris is incorporated into banks or streambed and influence >20% of the channel; h) vegetation comprises dense grass flats or muskeg.
	Low	☐ Contains slope angles generally < 3%, or ☐ Stream meets 5 or more of conditions a – h in the moderate-low category, above.
Ecological Replacement Cost	High	☐ Forest occupies > 50% of the wetland and either, a) peat soils are present or, b) maximum tree diameter is at least 40 dbh or ☐ Wetland is an emergent, estuarine wetland ☐ Wetland habitat includes salmon rearing pools ☐ Wetland includes rearing habitat for marine forage fish
	Moderate - High	☐ Forest occupies 25% - 50% of the wetland and peat soils are present
	Moderate	☐ Soil is peat, and wetland contains exclusively non-forest vegetation, or ☐ Soil is non-peat and forest vegetation predominates
	Moderate - Low	☐ Soil is non-peat and at least some of the wetland is forest
	Low	☐ Soil is non-peat, none of the wetland is classified as forested, e.g. many ponds, emergent (minus estuarine), and scrub-shrub wetlands

Downstream / Coastal Beneficiary Sites	High	☐ Downstream structures may be damaged by nontidal overbank flooding (this includes all structures below all nontidal wetlands in the Jordan, Duck, and Mendenhall watersheds, or ☐ Coastal structures may be damaged by tidal action in the absence of estuarine wetlands, or ☐ Local residents downslope are served by a community well
	Moderate	☐ Single residences downstream use surface water for drinking, or ☐ The wetland receives runoff which at expected exposure levels (at the wetland inlet) could occasionally be lethal to aquatic life, and the wetland is not a groundwater recharge area.
	Low	☐ The wetland rating for this function is neither High nor Moderate above.

Footnotes
[1]Modifications based on agency input (ADFG, USFWS, NMFS, ACOE, and EPA), outside peer review from local experts, and best professional judgement
[2]Adamus criteria associated with HEC modeling or long-term monitoring are not included in this rapid assessment approach
[3] Restricted access means fish have occasional access but the stream reach or wetland is inaccessible to fish a majority of the time due to tides, low or intermittent flows, waterfalls, dams, or similar obstructions.

References

Adamus Resource Assessment, Inc. (Adamus) 1987. Juneau Wetlands Functions and Values. Report prepared for the City and Borough of Juneau, Alaska.

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APPENDIX D. ANGOON AIRPORT EIS WILDLIFE SURVEY METHODOLOGY

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METHODS FOR BLACK OYSTERCATCHER SHORELINE SURVEYS

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The following describes a protocol used to conduct surveys for nesting black oystercatchers. These methods have been employed for shoreline inventory surveys to identify nesting locations in Prince William Sound, Alaska.

Timing

Surveys should be conducted during the peak of brooding season1. Ideally, boat surveys should be conducted within two hours of high tide though large survey areas and limited time often make conducting surveys during all tide cycles necessary. Surveys at lower tides increase the likelihood of missed nests as observers are at a greater lateral distance from nest locations. There is also a greater width of intertidal area to scan when searching for birds. Observers should compensate by searching shoreline at closer distances (using boats with shallower draft) and traveling at slower speeds.

Technique

Surveys are conducted by two or more observers from a small skiff traveling at about 5 knots, 10-15 m from shore. Observers scan all shoreline attempting to locate oystercatchers.2 When an oystercatcher is located, beach the skiff at the nearest convenient location, and search the area around the sighting on foot. While beaching the boat continuously scan the high-tide line for the second individual.3 If another individual is detected above the high tide line, focus search efforts where that individual was first detected, keeping in mind that it may have moved several meters prior to detection. In the absence of the above clue regarding nest location, search the beach above the high-tide line to locate the nest. When time allows walking searches of locations with optimal habitat should be conducted even if no birds are detected (especially when surveying at lower tides). Walking surveys can be conducted regardless of tide. This technique may also be necessary when coastal conditions don’t allow for survey and landing from boats.

Mark all black oystercatcher locations on an aerial photograph or USGS quad and record the GPS location. When a nest is found, give the record a unique sighting number and record the exact GPS location, number of eggs, date, and time.

Status of birds should be recorded as follows:

Non_breeder(s)- no nest found, behavior not indicative of territorial or breeding pair, most likely found on feeding grounds.

Territorial Pair - no nest found but behavior includes territorial displays (head bobbing, chasing of intruders, territorial calls); *practice* nest scrapes in area or birds seen excavating scrapes.

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1 For Prince William Sound this includes the 3-week period encompassing the last week of May through the second week in June.

2 Nesting birds may be seen from the boat but usually the sentry will be seen first as this individual is generally located in the inter-tidal zone in the vicinity of the nest.

3 Generally, the incubating bird will come off the nest as observers go ashore or shortly after they begin a search. The easiest way to find a nest is to spot the incubating individual leaving it. If this event is missed, the nest can still be found with greater effort, but the probability of finding the nest is somewhat reduced.

Breeding Pair – nest found, behavior generally similar to that of territorial pair

Suggestions and Considerations

- Generally, territorial birds with nests will attempt to lure observers away from nest locations using broken wing and fake nesting displays. Territorial birds with and without nests will be reluctant to leave the location entirely and will often move to the edges of beach farthest from observers or to adjacent rocky islets. They will remain curious about observer activity and may harass/haze observers.
- Encouraging the bird to return to incubation behavior can be one way to find a nest that is not immediately obvious. Move away from the location and try to remain out of site until their defensive behavior stops (this may take >30 minutes) and then return to the suspected nest.
- If birds seem especially protective of an area (e.g., increasingly agitated) that is well below high tide and seemingly less concerned about observer presence above high tide consider that chicks may be present instead of nests.
- All oystercatcher locations should be investigated for nests by observers on shore. Less time can be spent searching for nests in situations where birds are feeding in the inter-tidal zone (especially in groups) and do not exhibit territorial behavior (e.g., when observed or approached they completely vacate the vicinity of the beach or rocky islet with few disturbance vocalizations). Territorial behavior includes repeated vocalizations and a reluctance to move from the area.
- Avoid spending prolonged periods of time near nest locations as agitated adults may attract the attention of nest predators.

Some Habitat Variables of Importance

Collected for each nest site:

- Substrate on which nest occurs (e.g., sand, pebble, cobble, boulder, rock)
- Beach slope
- Beach aspect
- Distance to fresh water
- Distance to mussel bed
- Relative size of mussel bed (any suggestions on this?)
- Distance to high tide line (as determined by vegetation and debris)
- Beach type (in development)
- Number and proximity of rocky islets

METHODS FOR BREEDING BIRD SURVEYS

Survey Objective

Gather baseline data on breeding birds in the study area. Birds can be used to gauge the condition of the environment and may be useful in determining species richness.

Survey Protocol

The Breeding Bird Surveys (BBS) were designed and based on (Ralph et al. 1995) and the Alaska Landbird Monitoring Survey (Handel and Cady 2004).

Twenty-four point count stations were distributed throughout the study area. The points were allocated according to the proportionate amount of each major habitat type. The perimeter of each point count station was at least 200 m from the nearest point count station. At each point count station, all species of birds heard or seen were recorded for 10 minutes. Each point count was broken down into 0-3, 3-5, 5-8, 8-10 minute intervals. The start of each survey was determined by professional judgment after an acclimation period of 2 – 3 minutes.

According to protocol standards, the point counts should be conducted during peak bird activity and only during acceptable weather conditions. Point counts must be conducted under conditions of good visibility, little or no precipitation and light winds. Fog, steady drizzle, or persistent rain should be avoided, while an occasional light drizzle or brief shower may not affect bird activity and detection.

Surveys should be conducted only when wind speeds are < Beaufort 5, when larger branches and small trees begin to move in the wind (See below). In forested habitats, generally a Beaufort 4 will greatly reduce detection of birds due to ambient noise and motion of the trees.

The following information will be documented at each point count station:

Site number: General habitat and point count station number

Surveyor: Three letter initial code for surveyor's name

Date: Month/Day/Year

Helper (if any): Three Initial Code

Start Time: Military time at which the survey began

Sky Code: Number code from ALMS Bird Survey Codes (attached)

Wind Code: Beaufort number from ALMS Bird Survey codes (attached)

Temperature Range: Circle appropriate temperature range that applies to start of the survey

Time: The interval period within the 10 minute survey period that individual bird species was detected.

Species Code: Use the standard four-letter species code in published by Pyle and DeSante (2003). http://www.birdpop.org/AlphaCodes.htm.

Species Full Name: Record species common full name. This can be done after the fieldwork is completed.

Distance: The distance the bird is from the observer in meters. A range finder should be used to improve the accuracy of distance measurements (Buckland et al. 1993).

Flyover: The designation applies strictly to a bird observed flying over the study area without utilizing the habitat in any manner. Foraging, soaring, hawking, circling through the study area is not considered a flyover.

Breeding Confirmed/BEH: This category is for documenting breeding activities or daily activity that gives insight to the extent of movement of the birds. Possible activities include carrying nest materials, perching, foraging, tending a nest or fledgings, and copulation.

Incidental: List birds seen or heard while moving between point count stations.

ALMS BIRD SURVEY CODES

WIND SPEED: (Use Beaufort numbers, not mph)

Beaufort Number	Wind Speed (mph)	Indicators of Wind Speed
0	Less than 1	Smoke rises vertically
1	1 to 3	Wind direction shown by smoke drift
2	4 to 7	Wind felt on face; leaves rustle
3	8 to 12	Leaves, small twigs in constant motion; light flag extended
4	13 to 18	Raises dust and loose paper; small branches are moved
5	19 to 24	Small trees in leaf sway; crested wavelets on inland waters

Sky Codes

0 = Clear or clouds
1 = Partly cloudy (scattered) or variable sky
2 = Cloudy (broken) or overcast
4 = Fog or smoke
5 = Drizzle
7 = Snow
8 = Showers

Time Intervals

3 = 0–3 minutes
5 = 3–5 minutes
8 = 5–8 minutes
10 = 8–10 minutes

POINT COUNT FORM

Project:__________ Surveyor:___________ Date:___ - ___ - ____ Page___of____

Helper:_______________ Start Time: _____________ End Time: _____________

% Cloud Cover: _____ Wind Speed/Direction: ____________ Precipitation:_______

Temp (oF): <10 10–30 30–50 50–70 70–90 >90 Transect ID: _________ - ___________

Time (0–3, 3–5, 5–8, 8-10)	Species Code	Species Full Name	# Ind	Distance (feet)	Flyover/ Auditory/ Visual	Direction (degrees)*	Behavior	Habitat – use Codes

ADDITIONAL COMMENTS

Incidental Sightings (Seen/heard on the way to the point)

Species	Breeding (Y/N)

Total number of birds observed:_________

Total number of mammals observed:_________

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Appendix E. Avian Species Observed in the Study and Landscape Areas and Mammal and Amphibian Species with the Potential to Occur in the Study and Landscape Areas

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Table E-1. Avian Species Observed in the Study and Landscape Areas

Common Name	Scientific Name	Cons. Status[1]	Seasonal Status[2] Sp	S	F	W	Habitat[3]	Comments
Common Loon	*Gavia immer*	–	C	U	C	U	OW, SHF	Incidental
Pacific Loon	*Gavia pacifica*	–	C	R	C	C	OW, SHF	Incidental
Canada Goose	*Branta Canadensis*	–	C	C	C	C	OW, GF	Incidental
Mallard	*Anas platyrhynchos*	–	C	C	C	C	OW, RS	Incidental
Northern Shoveler	*Anas clypeata*	–	U	R	U	R	OW, GF	Incidental
Common Merganser	*Mergus merganser*	–	C	C	C	C	OW, RS	Incidental
Bald Eagle	*Haliaeetus leucocephalus*	–	C	C	C	C	RS, SHF	Breeding Bird Survey
Northern Goshawk	*Accipiter gentilis*	A	U	U	U	U	SHF	Northern Goshawk Survey
Red-tailed Hawk	*Buteo jamaicensis*	–	U	U	U	+	SHF	Incidental
Sooty Grouse	*Dendragapus obscurus sitkensis*	–	C	C	C	C	BW, SHF	Incidental
Whimbrel	*Numenius phaeopus*	A	U	R	U	-	EI	Incidental
Black-legged Kittiwake	*Rissa tridactyla*	–	U	U	U	U	EI	Incidental
Pigeon Guillemot	*Cepphus columba*	–	C	C	C	C	MW	Incidental
Marbled Murrelet	*Brachyramphus marmoratus*	A	C	C	C	C	MW	Incidental
Barred Owl	*Strix varia*	–	R	R	R	R	SHF	Incidental
Rufus Hummingbird	*Selasphorus rufus*	–	C	C	C	+	SHF	Breeding Bird Survey
Belted Kingfisher	*Megaceryle alcyon*	–	C	C	C	C	RS	Incidental
Red-breasted Sapsucker	*Sphyrapicus ruber*	MIS	C	C	C	C	SHF	Breeding Bird Survey
Hairy Woodpecker	*Picoides villosus*	MIS	U	U	U	U	SHF	Breeding Bird Survey
Pacific-slope Flycatcher	*Empidonax difficilis*	–	C	C	C	-	SHF, RS	Breeding Bird Survey
Barn Swallow	*Hirundo rustica*	–	C	C	C	-	DI	Incidental
Steller's Jay	*Cyanocitta stelleri*	–	C	C	C	C	SHF	Breeding Bird Survey
Common Raven	*Corvus corax*	–	C	C	C	C	All	Breeding Bird Survey
Chestnut-backed Chickadee	*Parus rufescens*	–	C	C	C	C	BGF, BW, SHF	Breeding Bird Survey

Table E-1. Avian Species Observed in the Study and Landscape Areas

Common Name	Scientific Name	Cons. Status[1]	Seasonal Status[2] Sp	S	F	W	Habitat[3]	Comments
Brown Creeper	*Certhia americana*	MIS	U	U	U	U	BGF, SHF	Breeding Bird Survey
Winter Wren	*Troglodytes troglodytes*	–	C	C	C	C	SHF	Breeding Bird Survey
American Dipper	*Cinclus mexicanus*	–	C	C	C	C	RS	Breeding Bird Survey
Golden-crowned Kinglet	*Regulus satrapa*	–	C	C	C	C	SHF	Breeding Bird Survey
Swainson's Thrush	*Catharus ustulatus*	–	C	C	C	-	SHF	Incidental
Hermit Thrush	*Catharus guttatus*	–	C	C	C	+	SHF	Breeding Bird Survey
American Robin	*Turdus migratorius*	–	C	C	C	R	SHF	Breeding Bird Survey
Varied Thrush	*Ixoreus naevius*	–	C	C	C	R	BGF, BW, SHF	Breeding Bird Survey
Warbling Vireo	*Vireo gilvus*	–	U	U	U	-	SHF	Incidental
Orange-crowned Warbler	*Vermivora celata*	–	C	C	C	+	BGF, BW, SHF	Breeding Bird Survey
Yellow Warbler	*Dendroica petechia*	–	C	C	C	-	SHF	Breeding Bird Survey
Song Sparrow	*Melospiza melodia*	–	C	C	C	C	EI	Incidental
Lincoln's Sparrow	*Melospiza lincolnii*	–	C	C	C	+	GF	Breeding Bird Survey
Dark-eyed Junco	*Junco hyemalis*	–	C	C	C	U	SHF	Breeding Bird Survey
Red Crossbill	*Loxia curvirostra*	–	C	C	C	C	SHF	Incidental

[1] Conservation Status:

A = Alaska Audubon Society Watchlist   MIS = Management Indicator Species (Tongass National Forest)

[2] Seasonal Status: Sp = Spring S = Summer F = Fall W = Winter. According to Armstrong (1995).

C = common (species occurs regularly in most proper habitat; sighting likelihood good)

U = uncommon (species usually present in relatively small numbers, or higher numbers unevenly distributed; sighting likelihood fair to poor)

R = rare (species occurs regularly in the area but in very small numbers; sighting likelihood poor)

+ = casual or accidental (species has been recorded no more than a few times; usually occurs singly; sighting likelihood very poor)

- = not known to occur

[3] Habitat

BGF = bog forest   BW = bog woodland   DI = disturbed   EI = estuarine intertidal

GF = graminoid fen   OW = open water   RS = rivers and streams   SHF = spruce-hemlock forest

Table E-2. Mammal and Amphibian Species with the Potential to Occur in the Study and Landscape Areas

Common Name	Scientific Name	Conservation Status[1]	Introduced/ Endemic	Habitat	Comments
Terrestrial Mammals					
Red squirrel	*Tamiasciurus husonicus*	MIS	Introduced	BGF, BW, SHF	Introduced to Admiralty Island in the late 1940s or early 1950s (MacDonald and Cook 1996). Observed near Angoon in 1993 (personal communication, Carstensen 2009)
American beaver	*Castor canadensis phaeus*	–	Endemic	BGF, BW, RS	Same subspecies may have occurred on Baranof and Chichagof islands but was eliminated. Beavers have been reintroduced to these islands but not the same subspecies (Burris and McKnight 1973).
Long-tailed vole	*Microtus longicaudus*	–	Possible endemic	GF, RS, SHF	Long tail makes it distinct from the other *Microtus* species on Admiralty Island.
Meadow vole	*Microtus pennsylvanicus*	–	–	BGF, BW, GF, RS	Short tail makes it distinct from the other *Microtus* species on Admiralty Island.
Common muskrat	*Ondatra zibethicus spatulatus*	–	Possible endemic	BGF, BW, RS	Rare on Admiralty Island and in Southeast Alaska.
Northwestern deer mouse	*Peromyscus keeni*	–	–		A coastal species in western Canada.
Dusky shrew	*Sorex monticolis*	–	–	BGF, BW, RS, SHF	Widespread throughout the western U.S. and Canada.
Long-legged myotis	*Myotis volans*	–	–	BW, RS, SHF	Known on Admiralty Island from a single individual.
Little brown bat	*Myotis lucifugus*	–	–	BGF, BW, RS, SHF	Only a few bat records for Admiralty Island.
Brown bear	*Ursus arctos*	MIS	Genetically distinct	BGF, BW, GF, RS, SHF	Genetically split from mainland brown bears roughly 700,000 years ago. Split from polar bears 300,000 years ago. Also genetically distinct from brown bears on Baronoff and Chichagof islands (Talbot and Shields 1996a, 1996b).
North American river otter	*Lontra conadensis*	MIS	–	RS	Common in Favorite Bay.

Table E-1. Avian Species Observed in the Study and Landscape Areas

Common Name	Scientific Name	Cons. Status[1]	Seasonal Status[2] Sp S F W	Habitat[3]	Comments
Pacific marten	*Martes caurina*	MIS	Possible endemic	SHF	Susceptible to roadside trapping.
Ermine	*Mustela erminea salva*	–	Possible endemic	BGW, BF, GF, RS, SHF	In Southeast Alaska known from Admiralty Island and near Yakutat.
American mink	*Neovison vison*	–	–	RS	Common in parts of Favorite Bay
Sitka black-tailed deer	*Odocoileus hemionus*	MIS	–	SHF	Important subsistence animal.
Marine Mammals					
Sea otter	*Enhydra lutris kenyoni*	–	–	M	Rare around Angoon.
Harbor seal	*Phoca vitulina*	–	–	M	Enter Favorite Bay regularly.
Steller sea lion	*Eumetopias jubatus*	T	–	M	Enter Favorite Bay regularly.
Harbor porpoise	*Phocoena phocoena*	–	–	M	Observed in the landscape area.
Dall's porpoise	*Phocoenoides dalli*	–	–	M	Observed in the landscape area.
Orca	*Orcinus orca*	–	–	M	Occur in southeast Alaska year round.
Humpback whale	*Megaptera novaeangliae*	E	–	M	Observed in the landscape area.
Amphibians					
Roughskin newt	*Taricha granulosa granulosa*	–	–	BGF, BW, GF, RS	Common in Southeast Alaska.
Western toad	*Bufo boreas*	–	–	BGF, BW, GF, RS	Specimens found in the study area.

[1] MIS = USFS Management Indicator Species

[2] Habitat:

BGF = bog forest

BW = bog woodland

DI = disturbed

EI = estuarine intertidal

GF = graminoid fen

M = marine

OW = open water

RS = rivers and streams

SHF = spruce-hemlock forest

Incidental Sightings and Other Notes

Red squirrel – This species was detected in the urban areas, along roadsides, and in the woods. It appears to be firmly established. The red squirrel may have some detrimental effects on bird species such as Blue Grouse, because they will raid nests.

American beaver – This species is relatively rare on Admiralty Island, most likely due to a limited food supply. An old beaver dam was detected near Airport Alternative 4. Beaver canals were also discovered on the north side of Favorite Bay. No actual beavers were seen during any of the 2009 fieldwork.

Long-tailed vole – This is one of the two vole species found on Admiralty Island. This species was not directly observed or trapped during the 2009 field surveys. A large number of small rodents that could not be identified were seen in various parts of the study area. It is reasonable to assume this species is found in the study area. Additionally, the large number of small mammal detections in 2009 suggest that perhaps the 2009 rodent populations on Admiralty Island, or at least around Angoon, may have been higher than normal (personal communication, Carstenson 2009). This would be consistent with 2009 findings on Baranof and Chichagof islands (personal communication, Mooney 2009)

Meadow vole – The meadow vole is the second vole species found on Admiralty Island. This species was directly observed in the field, usually in fen and beach habitats. It was also trapped during field studies within the beach habitat.

Common muskrat – This species is quite rare on Admiralty Island. No individuals or sign of this species was detected.

Northwestern deer mouse – This species was observed alongside and in the basement of a house in Angoon. It was not detected or trapped in the woods. However, it is reasonable to conclude that this species is found in the study area.

Dusky shrew – This is the only shrew species that occurs on Admiralty Island, and is widespread throughout the west. A dead specimen was found along the beach between the Airport Alternatives 3a and 4. This species is most likely somewhat common throughout the study area.

Long-legged myotis – Most likely this species is quite rare on Admiralty Island. The extensive karst system is probably an important resource for this species (McDonald and Cook 1996). No observations of this species were made during 2009 fieldwork.

Little brown bat – Most likely this species is quite rare on Admiralty Island. The extensive karst system is probably an important resource for this species (McDonald and Cook 1996). No observations of this species were made during 2009 fieldwork.

North American river otter – This species is relatively common on Admiralty Island as well as throughout Southeast Alaska. During 2009 fieldwork multiple individuals were observed from the shore and from boats in and around Favorite Bay.

Pacific marten – This species, distinct from the American marten, is presently only known on two islands in Southeast Alaska, Admiralty and Kuiu. Martens are strongly associated with old-growth forests and therefore logging practices have greatly affected their range. The possible small mammal population explosion in the summer of 2009 would bode well for the marten population on Admiralty Island for the 2009–2010 winter as martens depend on small mammals for fat storage to get them through the winter months. The roads associated with Airport Alternatives 3a and 4 would likely be detrimental to the marten population in the area as this species appears to be susceptible to trapping along roadsides (personal communication, Carstenson 2009).

Ermine – Further research needs to be done before it can be determined whether the subspecies found on Admiralty Island actually constitutes a distinct species. This species is known as a vole specialist and is adapted to many habitats although it often seems to prefer wooded areas near a water source. The possible small mammal population explosion in the summer of 2009 would bode well for an ermine population on Admiralty Island. No ermine or ermine sign were detected during the 2009 field surveys, although it is reasonable to conclude that this species occurs in the study area.

American mink – Mink are relatively common throughout Southeast Alaska and on Admiralty Island. They appear to be quite common in Favorite Bay, with multiple detections of this species along the banks during the 2009 field surveys. Several years ago they were trapped for their pelts in the Mitchell Bay/Favorite Bay area by locals (personal communication, James 2009), but this proved not to be cost effective and they have not been trapped in this area since.

Roughskin newt – This species is relatively common throughout Southeast Alaska. One crushed individual was found on the dirt road adjacent to Airport Alternative 12a during 2009 field surveys. It is reasonable to conclude that this species is relatively common in the study area.

Western toad – This species is widely distributed throughout Southeast Alaska. It is listed by the International Union for Conservation of Nature (IUCN) as “near-threatened” as the population has been decreasing. Two specimens were found in the study area during the 2009 fieldwork. One dead toad was found along the trail from Favorite Bay to the lakes and the other was found smashed by a car near the water treatment facility by Airport Alternative 12a.

Sea otter – The Southeast Alaska population of the northern sea otter is not listed under the ESA. Sea otters usually occur within the 40-m depth contour because they require frequent access to benthic foraging habitat in subtidal and intertidal zones (Riedman and Estes 1990). Sea otters are not usually observed around Angoon; however, one sea otter was reported near Danger Point in August 2009 (personal communication, Frederickson 2009).

Harbor seal – This is a relatively common species throughout Southeast Alaska and around the Angoon area. It was observed within Favorite Bay multiple times and became more common within the bay once the salmon runs began.

Steller sea lion – This species is listed as threatened (east of 144º W) and endangered (west of 144º W) under the ESA. The IUCN lists it as endangered. This species was observed within Favorite Bay especially after the salmon began staging and running.

Harbor porpoise – This species is listed as vulnerable by the IUCN. It was observed multiple times within Mitchell Bay and Favorite Bay during the 2009 surveys.

Dall’s porpoise – This species was observed outside of Danger Point on multiple occasions and even within Favorite Bay several times.

Humpback whale – This species is listed as endangered by the ESA and as vulnerable by the IUCN. Humpback whales are quite common in the waters around Angoon and were observed around Danger Point and even entering Favorite Bay on multiple occasions. It is not known how far up Favorite Bay they go but the timing seems to be correlated to herring explosions in the area of Danger Point.

APPENDIX I

AQUATIC RESOURCES TECHNICAL REPORT

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

FRESHWATER, ESTUARINE, AND MARINE RESOURCES EXISTING CONDITIONS TECHNICAL REPORT FOR ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration
and
Alaska Department of Transportation and Public Facilities

Prepared by

SWCA Environmental Consultants

October 6, 2011

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF), the Sponsor, for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska (Figure 1). At present, there is no land-based airport runway in or near Angoon. The DOT&PF prepared the Angoon Airport Master Plan (DOT&PF 2007) for their proposed airport location. The EIS is evaluating two alternative airport locations in addition to the DOT&PF's proposed location and multiple access road alternatives associated with those airport locations (Figure 2). (*Note*: Access Alternative 5 was studied and is shown on maps throughout this report, but it was subsequently dropped from consideration in the EIS.) Two of the airport alternatives and portions of their associated access roads are located on lands administered by the U.S. Forest Service (USFS) within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area).

The proposed land-based airport would be a small, commercial airport typical of other rural airports in the region. The initial construction would include a 3,300-foot-long paved runway, with the ability to extend the runway length to 4,000 feet in the future if air traffic warrants it. The airport would have a short, perpendicular taxiway leading from the runway to a small apron area, which may eventually contain a passenger shelter building. The proposed airport is being designed to accommodate a future full-parallel taxiway, but this taxiway would not be constructed initially and would only be built if air traffic demands are sufficient to warrant this additional safety and efficiency feature. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. Regardless of the airport location under consideration, an access road would need to be constructed to connect the new airport to the existing Angoon road system. The proposed access road would have a gravel surface and would be two lanes wide (one lane in each direction) with 9-foot-wide lanes and minimal shoulders.

This report describes the freshwater, estuarine, and marine habitats and resources (including fish, invertebrates, algae, and seagrasses) potentially affected by the proposed project and its alternatives. It includes information on federally designated essential fish habitat (EFH) in the vicinity of the Airport and access road alternatives. Field data presented in this report are available for agency review upon request. Separate technical reports regarding other habitats and aquatic natural resources, such as marine mammals, seabirds, and wetlands (SWCA 2010b), as well as hydrology (Vigil-Agrimis, Inc. [VAI] 2010) are also available.

1.1 Project Setting

The community of Angoon is located on the southwestern shore of Admiralty Island in Southeast Alaska, approximately 60 miles southwest of Juneau. Angoon is the only permanent settlement on the island, which consists mostly of Admiralty Island National Monument and Kootznoowoo Wilderness Area. The community is situated on a peninsula at the entrance to Kootznahoo Inlet, with the Mitchell Bay basin to the east and Chatham Strait to the west. The proposed construction and operation of the new airport (Airport project) would occur in the vicinity of Favorite Bay, a sub-basin of Mitchell Bay. According to the Western Regional Climate Center (WRCC), the area has a relatively mild maritime climate with an average annual maximum temperature of 47.7˚F and minimum temperature of 37.0˚F (WRCC 2010) and is within the temperate coastal rain forest ecosystem. Annual precipitation in Angoon averages 42 inches (WRCC 2010), which is considerably lower than other areas of Southeast Alaska.

1.2 Analysis Areas

The analysis areas for this technical report consist of a study area and a landscape area. The study area consists of the water bodies in the vicinity of the airport and access alternatives. Information about existing conditions in the study area provides a context within which to consider potential impacts to those resources within and surrounding the alternatives. The landscape area is a larger area that establishes the context of potential project impacts on a landscape scale.

1.2.1 STUDY AREA

The study area for freshwater, estuarine, and marine resources consists of the aquatic habitats in the vicinity of the airport and access alternatives (Figure 1). The freshwater and estuarine parts of the study area consists of portions of the streams and lakes that drain into Favorite Bay, several lakes and streams near the northern ends of Airport Alternatives 3a and 4 that drain to Kanalku Bay, and the estuarine areas where freshwater streams mix with marine waters. The marine parts of the study area consists of the Favorite Bay basin including the area known as Pea Hen, the area around Killisnoo Harbor extending from the shoreline south of Airport Alternative 12a to Killisnoo Island, and the Salt Lagoon near the Angoon Ferry Terminal. These areas were chosen because they include the aquatic habitats that could be indirectly or directly affected by the proposed project or its alternatives, and they allow for the assessment of potential impacts from the project alternatives at an appropriate scale to determine local effects. The actual areas of direct or indirect effects are anticipated to be small and localized.

The freshwater part of the study area was divided into seven drainage basins (Figure 3) to assess potential direct and indirect local impacts to aquatic resources from the proposed airport and access alternatives. Only one of these basins contains a named stream (Favorite Creek), and this basin was defined by that stream's watershed boundary (similar to seventh-level hydrologic unit codes [HUCs]). The remaining basins consist of first- and second-order coastal streams that drain directly to salt water. These basins were divided by geographical area for comparison purposes, and named for their geographic location (see Table 1 and Figure 3 for names of basins).

1.2.2 LANDSCAPE AREA

The landscape area for fish and aquatic invertebrates (Figure 1) covers a broad geographic area that includes the study area. Though the study area is useful in assessing potential local impacts (e.g., impacts to a sub-basin) from the proposed project, the landscape area provides information for assessing impacts on a broader scale (e.g., impacts to the entire basin including different sub-basins) and understanding the severity and context of impacts at the local level. The Mitchell Bay basin, which includes the Favorite Bay sub-basin, was chosen as the landscape area. It is the next higher order hydrologic unit that is generally similar to the local area, and contains more variable terrain, habitats, and species, such as the Hasselborg Creek/Salt Lake sub-basin (described below).

1.3 Regulatory Setting

Federal and state laws applicable to resources in the area are summarized below, as are FAA orders related to aquatic resources.

- **Magnuson-Stevens Fishery Conservation and Management Act:** The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S. Code [U.S.C.] 1801–1803) provides for the conservation and management of the coastal fishery resources, as well as the anadromous species and continental shelf fishery resources of the United States. Federal agencies must consult with the

National Marine Fisheries Service (NMFS) on all actions that may adversely affect designated EFH. All of the marine waters in the study area, including intertidal habitats, have been designated as EFH by NMFS for one or more fish species. Section 4.0 of this report provides information regarding EFH in the study area.

- **Endangered Species Act:** The Endangered Species Act (ESA) (7 U.S.C. 136, 16 U.S.C. 1531 et seq.) Section 7(a)(2) ensures that actions authorized, funded, or carried out by federal agencies will not jeopardize the continued existence of any endangered or threatened species or adversely modify their critical habitat. Several stocks of Pacific salmon listed under the ESA range throughout the North Pacific but are unlikely to occur in the study area.
- **Alaska Anadromous Fish Act:** Anadromous fish (such as salmon) spend part of their life cycle in fresh water and part of their life cycle in salt water. The Anadromous Fish Act (Alaska Statute [AS] 16.05.871) requires that an individual or governmental agency provide prior notification and obtain approval from the Alaska Department of Fish and Game (ADF&G) “to construct a hydraulic project or use, divert, obstruct, pollute, or change the natural flow or bed” of a water body used by anadromous fish.
- **Alaska Fishway Act:** The Fishway Act (AS 16.05.841) requires that an individual or government agency notify and obtain authorization from ADF&G for activities within or across a stream used by fish if the department determines that such uses or activities could represent an impediment to the efficient passage of fish.
- **Alaska Coastal Management Act:** The Alaska Coastal Management Act (AS 46.40) requires local governments to develop coastal management plans. Although Angoon does not have a local coastal management program, the area is covered by Alaska Coastal Management Program statewide standards (11 Alaska Administrative Code [AAC] 112) regarding land and water uses in Alaska’s coastal zone. These standards require avoidance or minimization of impacts to coastal habitats or subsistence uses of coastal resources.
- **The National Forest Management Act of 1976:** This act is a reorganized, expanded, and amended Forest and Rangeland Renewable Resources Planning Act of 1974, and is the primary statute governing the administration of national forests. In general, it requires the Secretary of Agriculture to assess forest lands; develop a management program based on multiple-use, sustained-yield principles; and implement a resource management plan for each unit of the National Forest System. It specifically directs the USFS to provide maintain fish and wildlife habitats.
- **Tongass Land Management Plan:** The Tongass Land Management Plan (TLMP) is a USFS zoning document that designates land use and details the goals and objectives for specific zones (USFS 2008). There are two designated land uses for the landscape area: wilderness national monument, and wilderness national monument wild, scenic, or recreational river. The TLMP also incorporates the Forest Service Handbook (FSH) on Soil and Water Conservation (FSH 2509.22), which is consistent with the Alaska Forest Resources and Practices Act (AS 41.17) regarding water quality.
- **Executive Order 12962 – Recreational Fisheries:** Executive Order 12962 directs federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities**.**
- **Clean Water Act:** The Clean Water Act of 1972 (Public Law [P.L.] 92-500) as amended in 1977 (P.L. 95-217) and 1987 (P.L. 100-4) aims to restore and maintain the chemical, physical, and biological integrity of the nation’s waters by preventing point and nonpoint pollution sources. The Act gives

authority to state and federal agencies to develop water quality standards by which to manage and regulate water quality.

- **Executive Order 11988 – Floodplain Protection:** Executive Order 11988 directs agencies to avoid long- and short-term adverse impacts associated with occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. The order also requires agencies to restore and preserve the natural and beneficial values served by floodplains.
- **FAA Order 1050.1E, Environmental Impacts: Policies and Procedures:** Appendix A, Section 8, *Fish, Wildlife, and Plants*, of FAA Order 1050.1E addresses the FAA's policy relative to the consideration of aquatic resources in the National Environmental Policy Act (NEPA) process. Section 8 incorporates by reference each of the previously listed laws and executive orders and establishes the FAA's significant impact threshold relative to aquatic resources.
- **FAA Order 5050.4B NEPA Implementing Instructions for Airport Actions:** While FAA Order 5050.4B does not specifically address aquatic resources, it reiterates the FAA's policies contained in Order 1050.1E, Appendix A. Chapter 2, *Biotic Resources,* and Chapter 8, *Federally-listed Endangered or Threatened Species*, of FAA's Environmental Desk Reference supplement to FAA Order 5050.4B provide guidance regarding FAA's consideration of aquatic resources during the NEPA process. The Desk Reference outlines FAA's policy for determining impacts, determining significance of impacts, and considering mitigation measures, and incorporates by reference the various laws and policies outlined above.

1.4 Agency Coordination

Several state and federal regulatory agencies have been contacted regarding aquatic resources in the Angoon area. This consultation included discussions regarding field methods as well as general and federally listed aquatic species in the Angoon area. The agencies were also contacted during the formal EIS scoping period and asked to provide comment on the proposed project relative to the resources under their regulatory purview. Additionally, the FAA's consultant team contacted ADF&G biologists to request information about aquatic species for the Angoon area; ADF&G permit coordinators to coordinate fish resource permits for freshwater and marine fish sampling and discuss sampling methodology; USFS biologists to request species information for the Angoon area and discuss methodology; and NMFS biologists to request information about general and listed species in the study area and general Angoon area.

2.0 Freshwater and Estuarine Resources

Freshwater and estuarine habitats were surveyed and mapped to provide a description of baseline conditions for the Angoon Airport EIS. Freshwater and estuarine fish, invertebrates, algae, and seagrasses that occur in the area and have the potential to be affected by construction and long-term use of airport facilities are described below.

2.1 Methods

Species and habitats were documented using a variety of methods including literature reviews of existing information, field surveys, interviews with local experts in biological resources, and best professional judgment.

2.1.1 EXISTING DATA SOURCES

Several reports were examined, such as the Mitchell Bay Landscape Assessment (USFS 2002) and the Angoon Hydropower EIS (USFS 2009a). The *ADF&G Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes* (Johnson and Klein 2009) was consulted regarding streams in the area.

2.1.2 FIELD DATA COLLECTION

Freshwater and estuarine habitats were surveyed in three 2-week sessions from May through August 2009 (Figure 2). Favorite Creek and small unnamed tributaries to Favorite Bay, Kanalku Bay, and Killisnoo Harbor were surveyed to document existing habitats, fish presence/absence, and potential fish passage barriers. Additionally, the Favorite Bay tidal flats and the mouths of small unnamed tributaries to Favorite Bay (Figure 2) were surveyed to document existing estuarine areas. In all, 26 stream basins, four lakes, and their associated estuarine areas (where applicable) were surveyed. Satellite imagery (DigitalGlobe 2004) was used to create preliminary habitat maps that were ground-truthed and refined through field data collection. Ground-truth points and field locations were recorded using a Trimble Geo XT handheld GPS unit with submeter accuracy.

Habitat

Streams were surveyed by walking the length of stream likely to be directly or indirectly affected by the proposed project: typically from just upstream of the point of potential impact downstream to the confluence with marine waters or to a freshwater lake where anadromous salmonid presence confirmed no passage barrier downstream. Channel morphology, substrates, bank and riparian conditions, USFS channel types, fish presence, and fish passage barriers were noted. Channel morphology and types were determined using USFS stream assessment methods (Paustian 1992; USFS 2001a). Stream surveys verified a 1980s USFS stream survey (personal communication, Schneider 2008) and a limited USFS stream GIS layer that was created by hydrologic modeling rather than by field surveys (USFS 2009b). Stream gradient was determined using a clinometer or eye level with stadia rod.

Estuarine habitats were surveyed by walking the shoreline and the intertidal reaches of stream mouths that have the potential to be indirectly affected by the proposed project. Channel morphology, substrates, bank and riparian conditions, USFS channel types (if applicable), aquatic vegetation, fish and invertebrate presence, and fish passage barriers were noted. Salinity was determined in selected locations, by using a refractometer (Sper Scientific, Scottsdale, Arizona) or a YSI water quality probe (YSI 556 MPS).

Species

Several sampling methods were used to document fish presence/absence in freshwater and estuarine habitats. For all methods of fish sampling, fish were counted (with a subsample measured), identified to species when possible, and released to the same environment.

Gee minnow traps were used to document fish presence in streams. Minnow traps with 0.25-inch mesh size were baited with sterilized salmon eggs. Eggs were treated with a 1:10 solution of Betadine for 10 minutes; borax was added to the egg mixture as a preservative and thickening agent, which also prolonged the release of scent. Baited traps were set for 0.75 to 10.5 hours, in at least 0.5 foot of water. Trap spacing varied by habitat (size of stream, number of trappable pools) and length of stream surveyed. Approximately 0.5 mile of lower Favorite Creek was sampled with 20 minnow traps; in smaller unnamed tributaries, an average of 0.21 mile per tributary was sampled using up to 10 traps (Figure 2).

Two lakes north of Favorite Bay (Figure 2) were sampled using minnow traps. Traps baited with sterilized salmon eggs were set in open water and along the shoreline at depths ranging from 4.5 to more than 6.0 feet.

Deep water traps were suspended in the middle of the lake at various depths using a buoy. Additional species presence information was obtained from interviews with local sport anglers and subsistence users.

Tidal traps and beach seines were used to document fish presence in estuarine areas. Fyke traps with a 0.08-inch mesh funnel and 0.25-inch cod end were set in tidal areas to fish both incoming and outgoing tides. Traps were set for 1.25 to 9.5 hours, in at least 2 feet of water.

Two types of beach seines were used, depending on habitat types: a 50-foot seine (with 0.25-inch mesh) was used in smaller, shallower channels, and a 150-foot seine (with 0.25-inch mesh wings and 0.13-inch mesh bunt) in wider, deeper areas. The 50-foot seine was 6 feet deep and the 150-foot seine was tapered with 7-foot deep wings and a 10.8-foot deep bunt. The larger seine was anchored on one end to the shore and deployed using a non-motorized skiff in a semi-circular arc around the sampling area. Seining occurred during low and high tides across various habitat types.

At several estuarine locations where habitat and tide levels were appropriate, gee minnow traps with 0.25-inch mesh size were used to document fish presence. Traps were baited with sterilized salmon eggs and set for 2.5 to 10.5 hours in up to 8 feet of water.

An Ocean Systems Deep Blue underwater camera was used to record fish presence/absence and distribution during adult salmonid migration in the Favorite Creek estuarine channel on an incoming tide (July 23, 2009) for one hour. The camera was placed 1 foot above the bottom adjacent to the thalweg and oriented perpendicular to the streamflow. Footage was recorded to DVD and later reviewed to quantify fish and identify species and life stage where possible.

2.1.3 DATA ANALYSIS

Freshwater streams were mapped using a combination of GPS field data points, a modeled streams layer created for the Angoon Airport EIS based on hydrology and topography (VAI 2010), USFS GIS data for Admiralty Island streams (USFS 2009b), and a modeled intertidal line based on 5-foot topographic contour data (R&M Engineering 2001). Further description of the intertidal line is provided in section 3.1.2. Mapping was limited to larger streams with both potential fish use and the potential to be directly or indirectly impacted by the proposed project. Several other small freshwater streams and seeps within the study area were not mapped, because they are not likely to be affected by the proposed project.

Streams were surveyed downstream from the upstream extent of potential project impacts to document existing habitats, stream class, channel type, fish presence, and potential fish passage barriers. Data were collected using modified USFS Tier 1 protocols (USFS 2001). Channel morphology and types were determined using Paustian (1992) and USFS (2001), and were updated after the field surveys with Paustian et al. (2009) to reflect the new channel types established by the USFS.

Stream classes are defined in detail in USFS (2008) and are summarized here.

- Class I: Contains anadromous fish populations.
- Class II: Contains only resident fish populations.
- Class III: Does not contain fish populations, but directly influences fish-bearing stream reaches by moving sediment and food sources downstream.
- Class IV: Does not contain fish populations and does not directly influence fish-bearing stream reaches. Generally small headwater streams.
- Class V (Non-stream): Does not contain fish populations. Generally intermittent with little incision and bankfull width.

Streams with suitable or potential fish habitat were also surveyed upstream of the extent of potential project impacts to assess connectivity to other habitats and populations. Fish use may extend beyond the survey boundary and likely varies by species and by season based on streamflow. Fish presence was assumed upstream of the last observed fish, unless a barrier was noted or habitat became unsuitable (e.g., continuously steep gradient or lack of pools).

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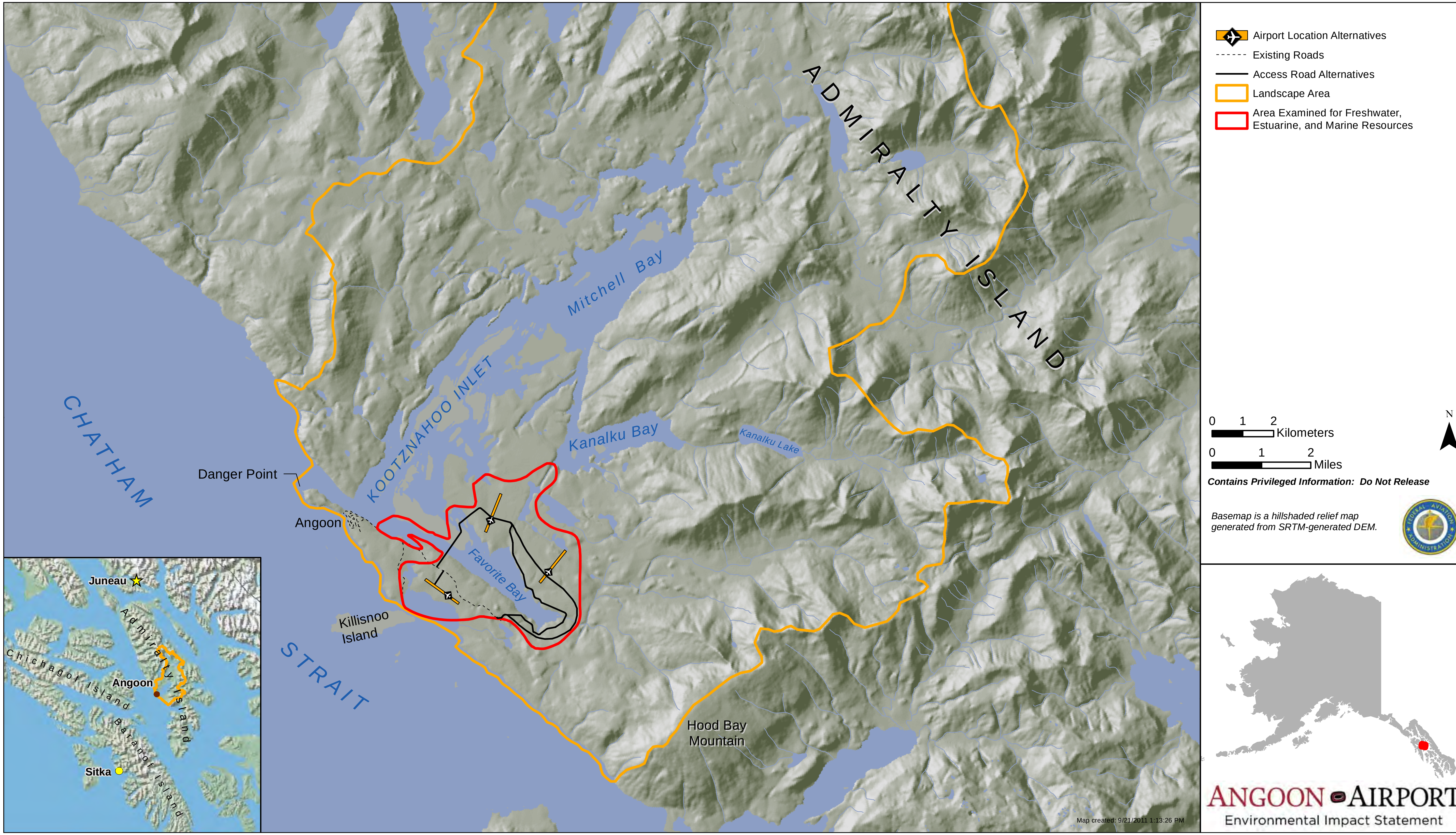

Figure 1. General location of areas studied for freshwater, estuarine, and marine resources relative to the larger landscape area. *Note*: Airport alternatives illustrated on all figures represent locations only and do not depict final areas of disturbance.

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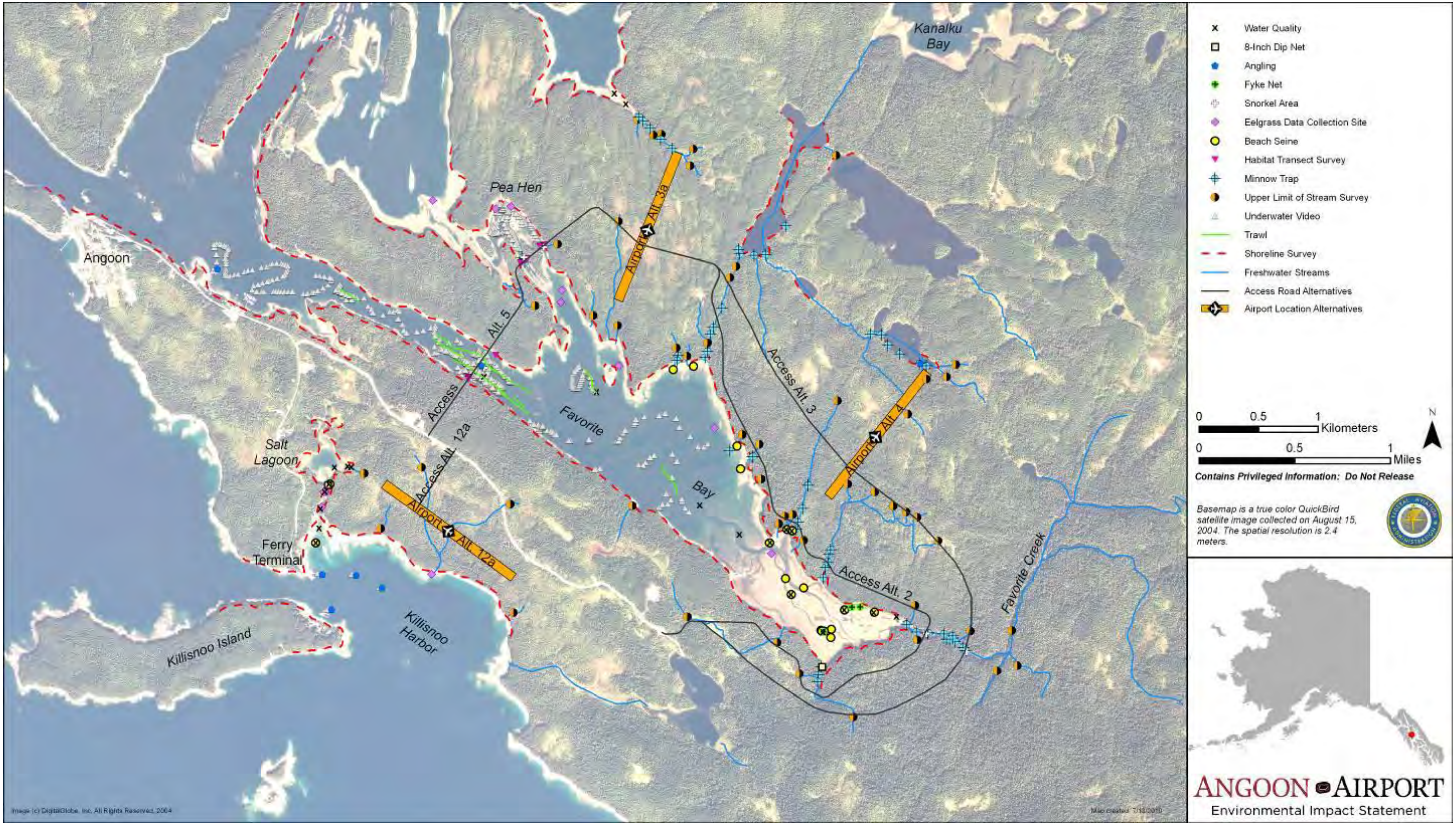

Figure 2. 2009 field survey sampling locations.

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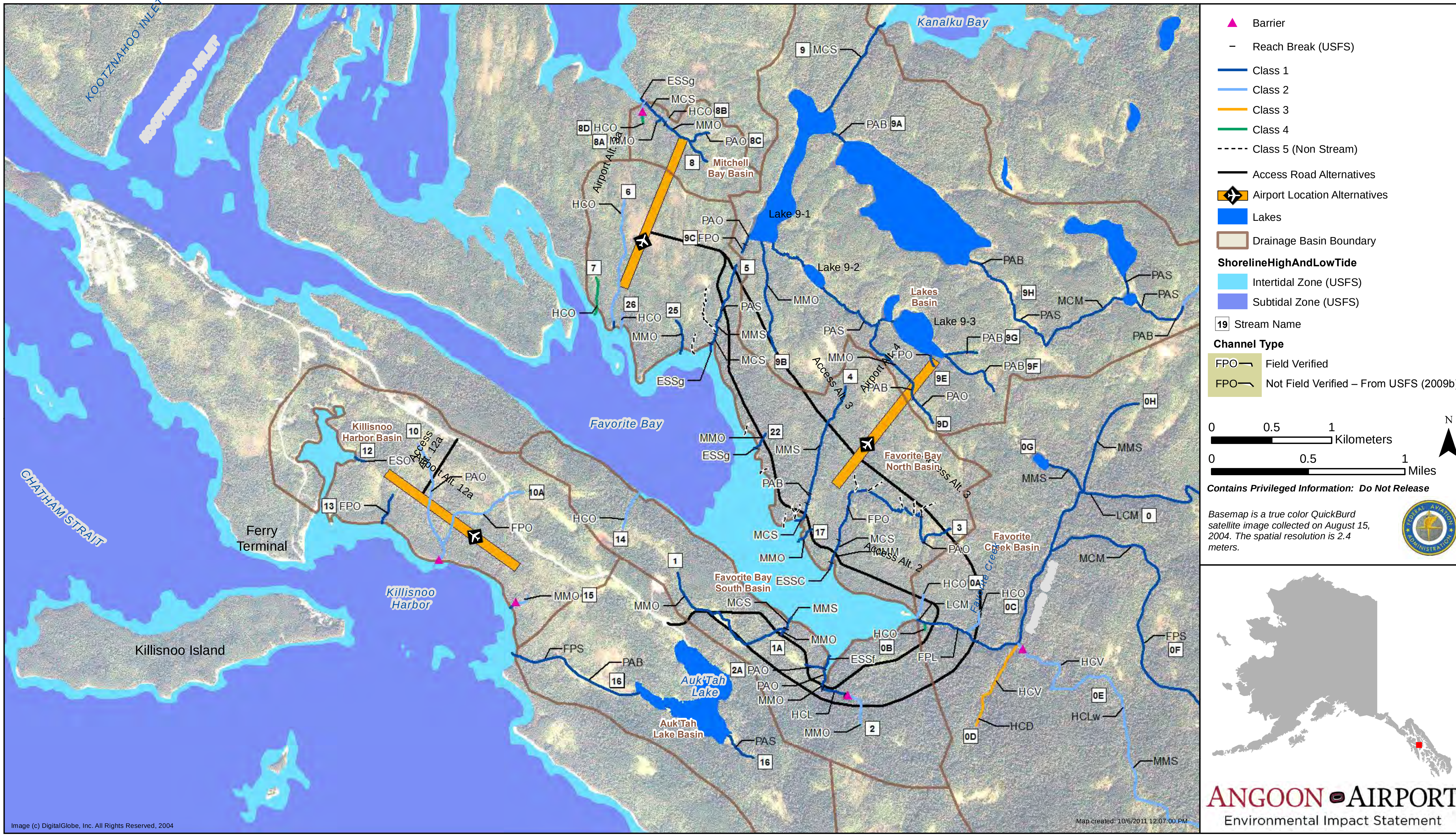

Figure 3. Freshwater parts of the study area. NOTE: See Table 2 for definitions of channel type codes.

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Table 1. Miles of Stream Class and Stream Density Summarized by Drainage Basins in the Study Area

Drainage Basin	Class I	Class II	Class III	Class IV	Total Stream Miles	Drainage Area (square miles)	Stream Density (miles/square mile)
Auk'Tah Lake Basin	1.9	0.0	0.0	0.0	1.9	1.1	1.6
Favorite Bay North Basin	2.7	0.7	0.0	0.2	3.6	1.7	2.1
Favorite Bay South Basin	1.2	0.4	0.0	0.0	1.6	1.1	1.5
Favorite Creek Basin	13.8	10.3	6.6	0.0	30.7	20.6	1.5
Killisnoo Harbor Basin	0.3	1.3	0.0	0.0	1.6	1.1	1.4
Lakes Basin	8.2	0.3	0.4	0.0	8.9	3.2	2.7
Mitchell Bay Basin	0.6	0.1	0.0	0.1	0.8	0.2	3.3
Total	28.7	13.1	7.0	0.3	49.1	29.1	NA

Note: Numbers reflect mapped streams in SWCA field data and USFS stream vector data for the Angoon, Alaska vicinity (2009b).

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2.2 Habitats and Species in the Study Area

National Forest Management Act (1976) regulations require that fish habitats be managed to maintain viable populations of species well distributed across a national forest. Population viability is defined as a fish or wildlife population that has the estimated number and distribution of reproductive individuals to ensure the population's continued existence in a given area (USFS 2008a). Analysis of impacts to USFS management indicator species (MIS) is one way to address this management direction. MIS are wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements (USFS 2008a). The study area contains four salmonid fish MIS, which are discussed here and in section 5.3 Management Indicator Species.

2.2.1 Streams

Numerous perennial and seasonal streams are found in the area; streams surveyed for the Airport project are displayed in Figure 3 and summarized in Table 1. Measurements and specifications of stream channels intersecting airport and access alternatives are provided in Appendix A.

Favorite Creek

Favorite Creek is the largest stream in the Favorite Bay sub-basin, the only stream with observed anadromous salmonid spawning and year-round rearing, and the only stream in the study area listed in the ADF&G Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes (Johnson and Klein 2009). The U.S. Geological Survey (USGS) maintained a flow gage in the Favorite Creek sub-basin from 2001 to 2003, but data are from a tributary to Favorite Creek with a limited drainage basin, and flow volumes are not comparable to those in the mainstem of Favorite Creek. The closest and most similar sub-basin with year-round flow data is Hasselborg Creek (northeast section of the landscape area). The USGS maintained a gage on Hasselborg Creek from 1951 to 1968. Average mean monthly flows in Hasselborg Creek during that time varied from approximately 140 to 540 cubic feet per second (cfs), with the range of monthly flows spanning from 30 to 768 cfs (USGS 2009a). The mean monthly flow in Favorite Creek is estimated to be less than that of Hasselborg Creek, which has a larger drainage basin (56 square miles) than Favorite Creek (21 square miles). Although the drainage basin of Hasselborg Creek is larger than that of Favorite Creek, 11% of the basin consists of lakes (versus 0.1% of the Favorite Creek basin); therefore, the Hasselborg Creek basin would likely respond more slowly to storm events than the Favorite Creek basin (VAI 2010). The predicted flow during a two-year flood recurrence interval for Favorite Creek is 1,790 cfs (VAI 2010). The annual hydrograph, which is typical for Southeast Alaska streams (Milner et al. 1997), generally peaks twice a year: in fall or early winter and again in May and June (as demonstrated by the USGS gage on an unnamed tributary to Favorite Creek described above) (USGS 2009b).

The Favorite Creek sub-basin originates between Hood Bay Mountain and Middle Mountain and drains 21 square miles. The lower 0.7 mile of the creek, within the area that may be directly or indirectly affected by the proposed project, was surveyed; the upper reaches of Favorite Creek are upstream of any potential project impacts and were not surveyed.

The USFS channel type in lower Favorite Creek (as field-verified by the FAA consultant team fisheries biologists) was FPL, with tributaries having HC0 and HCV channel types (Table 2, see Figure 3). Although bedrock sideslopes were observed on the downstream left bank, and the overriding geomorphology of the stream is LC, the channel exhibited FPL characteristics (e.g., alluvium streambanks, isolated sand substrates, and some meandering) that provide highly valuable anadromous fish spawning and rearing habitat. In May 2009, Favorite Creek had a wetted width of approximately 72 to 92 feet (22 to 28 meters [m]) in the lower half mile, and a bankfull width of 105 to 230 feet (32 to 70 m). Substrates were predominantly gravels and cobbles, with some sandy depositional areas. Streambanks and side walls were composed of alluvium, bedrock, and organic material. There was a considerable amount of overhanging vegetation, large woody debris, and undercut banks (a complete large wood survey of Favorite Creek is provided in VAI 2010). Side channels and low-flow areas were abundant in the contained valley floor. A large logjam was documented on mainstem Favorite Creek between Access Alternatives 2 and 3, where the head of a small island splits the main channel. During a period of high flow in the spring, water was impounded behind the logjam, creating a lake-like reach that stretched approximately 328 feet (100 m) upstream. In July and August, the lake was gone and the stream flowed directly under the logjam. The area upstream of the logjam contained a large amount of sand and fine sediment, likely a result of decreased water velocities due to the logjam. The areas immediately up and downstream of the logjam were the only areas where sand was documented in the lower 0.75 miles of Favorite Creek. The logjam appeared to be temporarily (in geomorphic time) creating the FPL channel type characteristics observed in the lower 0.75 miles of Favorite Creek. Channel characteristics transition at the Access Alternative 3 crossing, and immediately upstream of the crossing, the channel type becomes LCL. Three small tributaries with seasonal surface flow enter lower Favorite Creek within the study area (streams 0A, 0B, 0C in Figure 3); these tributaries were completely dry by August.

Table 2. Stream Miles and Process Groups by Drainage Basins in the Study Area

		Stream Miles by Process Group (miles in fish habitat, or Class I and II streams)									
Drainage Basin[1]	**Drainage Area Acres**	**AF**	**ES**	**FP**	**HC**	**LC**	**MC**	**MM**	**PA**	**L**	**Total Stream Miles**
Auk'Tah Lake Basin	727.9	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.7 (0.7)	0.9 (0.9)	1.9 (1.9)
Favorite Bay North Basin	1092.8	0.0 (0.0)	0.0 (0.0)	0.7 (0.7)	1.1 (0.9)	0.0 (0.0)	0.2 (0.2)	1.0 (1.0)	0.6 (0.6)	0.0 (0.0)	3.6 (3.4)
Favorite Bay South Basin	690.7	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	1.2 (1.2)	0.1 (0.1)	0.0 (0.0)	1.6 (1.6)
Favorite Creek Basin	13,153.4	0.5 (0.5)	0.0 (0.0)	4.2 (4.2)	15.4 (9.0)	3.3 (3.3)	2.2 (2.2)	3.4 (3.4)	1.5 (1.4)	0.2 (0.1)	30.7 (24.1)
Killisnoo Harbor Basin	721.0	0.0 (0.0)	0.1 (0.1)	0.8 (0.8)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.1 (0.1)	0.6 (0.6)	0.0 (0.0)	1.6 (1.6)
Lakes Basin	2076.5	0.0 (0.0)	0.0 (0.0)	0.2 (0.2)	0.7 (0.3)	0.0 (0.0)	1.0 (1.0)	1.0 (1.0)	4.1 (4.1)	1.9 (1.9)	8.9 (8.5)
Mitchell Bay Basin	147.1	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.1 (0.0)	0.0 (0.0)	0.2 (0.2)	0.4 (0.4)	0.1 (0.1)	0.0 (0.0)	0.8 (0.7)
Total	18,609.5	0.5 (0.5)	0.1 (0.1)	6.2 (6.2)	17.6 (10.5)	3.3 (3.3)	3.6 (3.6)	7.1 (7.1)	7.7 (7.6)	3.0 (2.9)	49.1 (41.8)

Note: Numbers reflect mapped streams in SWCA field data and USFS stream vector data for the Angoon, Alaska vicinity (USFS 2009b). Data reflect current conditions; in some cases, channel types vary from those previously modeled by USFS (2009b).

Note: HC= high gradient, MM= moderate gradient mixed-control, MC= moderate gradient contained, LC= large contained, FP= floodplain, PA= palustrine, AF= alluvial fan, ES= estuarine, L= lake. Process groups defined in Paustian et al. (2009).

Note: Stream miles calculated inland of the mean higher high water line , 13 feet as determined by NOAA (see Section 3.1.3 for mean higher high water line methods).

Note: Drainage basins shown in Figure 3. Specifications and channel measurements of streams intersecting airport and access alternatives are provided in Appendix A.

Fish sampling verified the presence of six species of salmonids and at least one species of sculpin in Favorite Creek (Table 3). Age 1+ juvenile coho (*Oncorhynchus kisutch*) were the most common fish documented and were almost entirely associated with the presence of undercut banks (although these areas were the most commonly sampled in the field). These areas likely provide velocity refuge for young coho, as no fish were observed (via snorkeling) in areas of higher velocity in the main channel. The majority of young-of-the-year coho had not emerged from the gravel by late May 2009; those that had emerged were observed in the channels of the estuarine tidal flats (see Figure 2). Young-of-the-year coho were abundant in Favorite Creek by mid-July 2009. Juvenile pink and chum salmon were less abundant in freshwater in late May, as they had already migrated to estuarine and nearshore marine areas, where they were relatively more abundant. Presence of age 1+ coho in Favorite Creek indicates the area is used for year-round rearing.

Spawning by adult pink and chum salmon (*O. gorbuscha* and *O. keta*) was observed in August 2009 in lower Favorite Creek. Though the Favorite Creek sub-basin is not known to have spawning or rearing populations of sockeye salmon (*O. nerka*), one adult was observed in lower Favorite Creek in August 2009. Occasional adult presence has been noted in the creek since 1960 (personal communication, Monagle 2008a). Though there is not a weir to estimate escapement in Favorite Creek, ADF&G has tracked index counts of spawning salmon in Favorite Creek since 1960. Index counts are estimated based on aerial surveys and occasionally foot surveys, and provide a relative snapshot of abundance. ADF&G index counts are the only data available regarding salmonid abundance in Favorite Creek. Index counts indicate that the range of estimated peak counts from 1960 to 2008 (in years with data) spanned from 0 to 8,500 pink salmon and from 0 to 2,000 chum salmon (personal communication, Monagle 2008a). At least 200 chum salmon were observed in the tidewater area of Favorite Creek on July 23, 2009. Approximately 2,000 to 3,000 adult pink salmon and at least 10 chum salmon were observed in the lower 0.75 mile of Favorite Creek by the FAA consultant team fisheries biologists on August 20, 2009.

Pink salmon in Favorite Creek exhibit a late-stock run type and spawn in both odd and even years. Available peak index numbers from ADF&G show no indication of odd-year or even-year run-type dominance in Favorite Creek. Salmon runs in Southeast Alaska vary in run timing and run type. For example, pink salmon runs in nearby Thayer Creek (outside the landscape area) are dominated by late-stock fish with higher runs occurring in even years (i.e., 2008, 2010), whereas Kanalku Creek is dominated by late-stock odd year runs (Halupka et al. 2000).

In mid-July 2009, hundreds of adult pink and chum salmon, Dolly Varden (*Salvelinus malma*), and cutthroat trout (*O. clarkii*) were observed staging within the estuarine channels of the Favorite Bay tidal flats (Figure 4), but they could not ascend Favorite Creek due to low streamflows. By mid-August, streamflows had increased slightly and pink and chum salmon had ascended Favorite Creek to spawn. A few redds (spawning beds) were observed in the tidally influenced freshwater area of Favorite Creek, just downstream of the Access Alternative 2 crossing on August 20, 2009 (see Figure 3). Spawning was observed up to 100 m above the Access Alternative 3 crossing (the upstream-most survey point in August 2009).

Neither Chinook salmon (*O. tshawytscha*) nor steelhead (*O. mykiss*) were observed in Favorite Creek, and there is no known documentation of these species using the creek (Alaska Department of Environmental Conservation [DEC] et al. 2006; Johnson and Klein 2009; personal communication, Schneider 2008; USFS 2002).

Table 3. Freshwater and Estuarine Fishes Observed in the Study Area in 2009

		Location			
Scientific Name	**Common Name**	**Lakes**	**Favorite Creek**	**Favorite Bay Tributary**	**Estuary**
Family Salmonidae					
**Oncorhynchus clarkii*	cutthroat trout	•J	•J,A		•A
**Oncorhynchus gorbuscha*	pink salmon		•A		•J,A
Oncorhynchus keta	chum salmon		•A		•J,A
**Oncorhynchus kisutch*	coho salmon	•J	•J	•J	•J
Oncorhynchus nerka	sockeye salmon		•A		
**Salvelinus malma*	Dolly Varden	•J		•J	•J,A
Family Gasterosteidae					
Gasterosteus aculeatus	threespine stickleback	•A			•A
Family Cottidae					
Cottus aleuticus	coastrange sculpin			•J	•J
Cottus asper	prickly sculpin	•A			•J
Leptocottus armatus	Pacific staghorn sculpin				•J
Unidentified sp.	unidentified sculpin species	•U	•U		•U
Family Pleuronectidae					
Platichthys stellatus	starry flounder				•J

Note: A= Adult, J=Juvenile, U=Age unknown based on size.
*Fish MIS

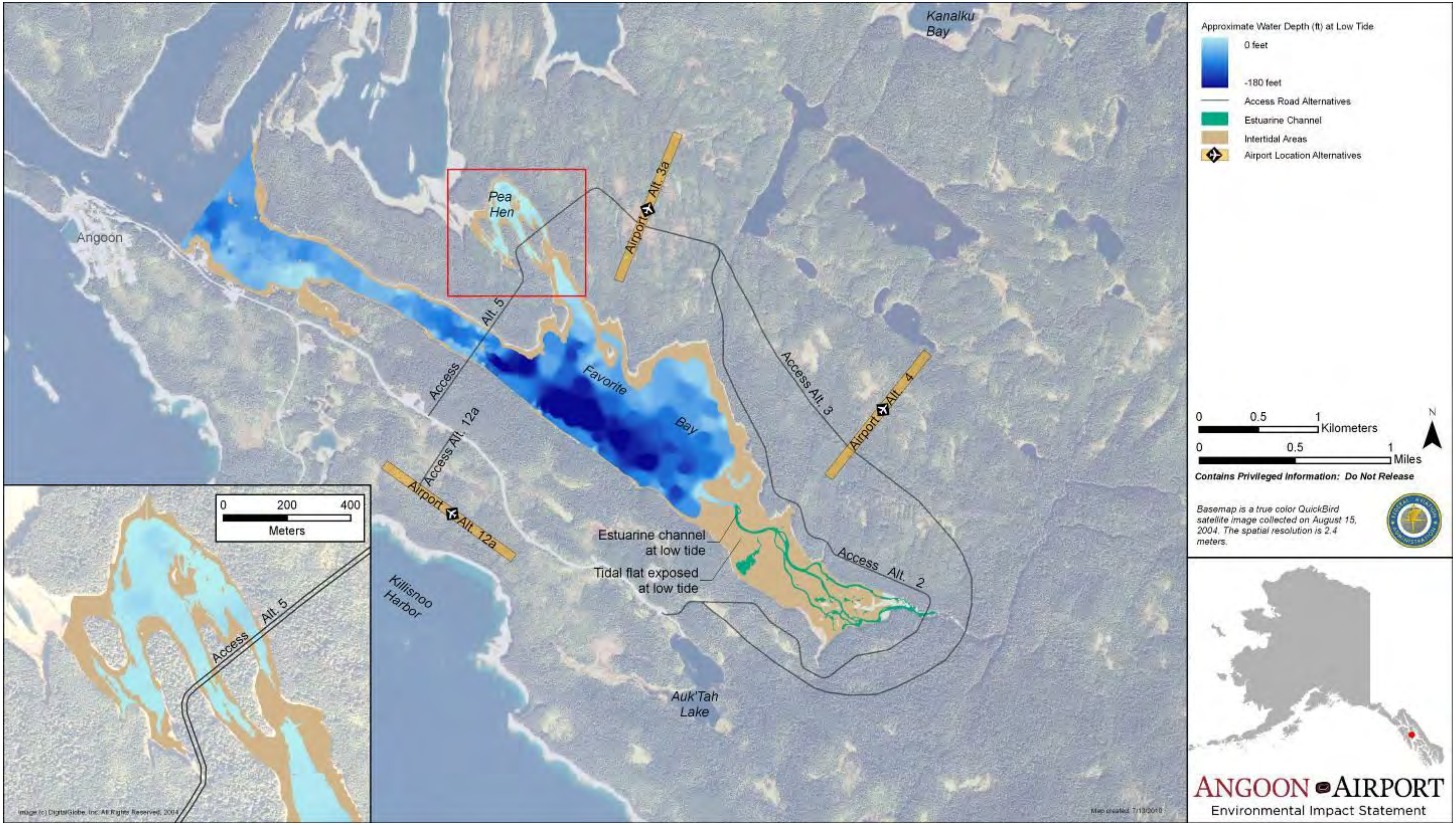

Figure 4. Favorite Bay bathymetry.

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Expected life history timing and of use of aquatic habitats by important aquatic species is presented in Table 4. Habitat requirements and life history attributes of these species are listed in Appendix B. Important species are defined for this technical report as those species that are 1) protected by the MSA or fishery management plans (FMPs); 2) commercially, culturally, or recreationally significant, with cultural significance determined from the FAA consultant team (SWCA 2010a); and/or 3) prey for sensitive marine mammals or bird species (SWCA 2010b).

Other Unnamed Freshwater Streams

Other streams documented in the study area were small (see Figure 3, Tables 1 and 2), with wetted widths ranging from 1.3 to 12.1 feet (<0.4 to 3.7 m) in June 2009. Bankfull widths ranged from 2.0 to 49.2 feet (0.6 to 15.0 m) (excluding Favorite Creek). (Specifications and measurements for stream channels intersecting airport and access alternatives are provided in Appendix A.) Habitat appeared suitable for seasonal juvenile coho rearing in most streams (see Table 1). Some of these tributaries were dry by August. Fish sampling documented a variety of species in streams and estuarine areas of the Favorite Bay basin (see Table 3). Generally, both anadromous and resident salmonids were observed in freshwater habitats throughout the study area. Juvenile salmonids were observed in 100% of streams sampled for fish presence and in 66% of all streams surveyed including streams that were not directly sampled for fish presence (though fish may have been visually observed) (see Figure 3, Table 1).

Streams on the north side of Favorite Bay typically had dark tannin-stained water, and streams on the south side were generally clear. On both sides of the bay, these small streams were surrounded by mature forests with a closed canopy that limits thermal energy accumulation in the summer and allows for year-round fish use where flows permit. Streams had a considerable amount of large wood from adjacent riparian areas (both downed logs and live tree roots), which appeared to be their main pool-forming element. Given these functions, impacts to the forest canopy adjacent to these streams could decrease their habitat value for salmonid rearing.

Several natural barriers to fish passage were documented (see Figure 3, Table 1): two waterfalls (on streams 2 and 8D) and a sink hole where surface flow converts to subterranean flow at the mouth of stream 10. The sink hole was located in beach gravels and did not appear to be a karst feature. Though karst systems occur on Admiralty Island (Prussian and Baichtal 2007), none were observed during 2009 field surveys. One human-made passage barrier was observed at the mouth of stream 15, where an improvised dam lined with tarps collects water that is likely used by residents of nearby dwellings.

Lakes

One small lake occurs in the upper Favorite Creek basin (see Figure 3) and is located approximately 1.3 stream miles upstream of the Access Alternative 3 crossing; therefore, this lake is not expected to be affected by the project. Several other lakes connected by small tributaries occur near Airport Alternative 4 (see Figure 3) and form a complex of lakes, small streams, wetlands, beaver ponds, and muskegs. This lake complex drains to Kanalku Bay. Because Kanalku Bay supports a sockeye salmon fishery (with runs primarily using Kanalku Lake), the lakes near Airport Alternative 4 were examined for juvenile sockeye presence in June 2009. Sockeye were not observed in the lake complex, though sampling was limited. However, cutthroat trout, coho salmon, Dolly Varden, threespine stickleback (*Gasterosteus aculeatus*), and prickly sculpin (*Cottus asper*) were collected in the lake complex (see Table 3). The presence of coho salmon indicates that these lakes are accessible to anadromous fish species, including sockeye. It is unknown if the coho collected at the lakes originated within the lakes' basin or migrated upstream to these lakes from other basins. No suitable spawning habitat was observed in any of the lake tributaries surveyed (upper reaches of stream 9 through 9G). The lower reach of stream 9 between Kanalku Bay and lake 9-1) was not surveyed as it is not expected to be affected by the project, but may contain spawning habitat. (Waters in the lake complex were tannin-stained and shorelines tended to drop off sharply into deep water (>20 feet).

Table 4. Life-Stage Timing for Fishes in Freshwater and Estuarine Habitats of the Study Area

Salmonid	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dolly Varden[1]	return to fresh water												
	spawning												
	adult overwintering (primarily lakes)												
	juvenile rearing (lakes and streams)												
	adult annual outmigration												
	juvenile outmigration												
pink salmon[2]	return to fresh water												
	spawning							late		mid			
	outmigration												
	estuary rearing												
sockeye salmon[3]	return to fresh water												
	spawning												
	juvenile rearing (lakes only)												
	outmigration												
	estuary rearing												
chum salmon[4]	return to fresh water												
	spawning							mid	mid				
	outmigration												
	estuary rearing												
coho salmon[5]	return to fresh water												
	spawning												
	juvenile rearing (lakes and streams)												
	outmigration												
	estuary rearing												
cutthroat trout[6]	return to fresh water												
	adult overwintering (lakes and streams)												
	spawning (headwater streams)												
	juvenile rearing (lakes and streams)												
	juvenile/adult annual outmigration												
	estuary foraging												

Notes: range of activity; greater activity; peak of activity

[1] (ADF&G 1994; Harding 2008; Yanusz 1997)

[2] (ADF&G 1994; Groot and Margolis 1991)

[3] (Conitz and Burril 2008; Conitz and Cartwright 2007; Groot and Margolis 1991; Halupka et al. 2000)

[4] (ADF&G 1994, 2009b; Groot and Margolis 1991; Halupka et al. 2000)

[5] (ADF&G 1994; Crone and Bond 1976; Groot and Margolis 1991; Halupka et al. 2000; Koski 2009)

[6] (ADF&G 1994; Yanusz 1997)

Signs of beaver (lodges, dams, gnawed wood) were ubiquitous throughout the lake complex. Numerous species of submerged aquatic vegetation were observed along the shoreline of the lakes, including yellow pond lily (*Nuphar polysepalum*) and pondweed (*Potamogeton* sp.). The shoreline supported vegetation typical of Southeast Alaska lacustrine habitats (though different from the freshwater stream habitats surveyed), such as shore pine (*Pinus contorta* var. *contorta*) and marsh five-finger (*Potentilla palustris*). Auk'Tah Lake (east of Killisnoo Harbor) would not be affected by the proposed project and therefore was not surveyed (see Figure 3).

Existing Road Stream Crossings

There is one existing road stream crossing in the vicinity of the airport and access alternatives (Figure 3), and fish passage status there is unknown. Existing roads are on the Angoon peninsula only and run from Angoon to Auk'Tah Lake. Table 5 provides a summary of existing roads and stream crossings by drainage basin.

Table 5. Existing Mapped Roads and Stream Crossings by Drainage Basin

Drainage Basin	Drainage Area (sq. miles)	Miles of Existing Roads	Road Density per Square Mile	Percentage of Basin as Roads[1]	All Existing Road Stream Crossings	Existing Road Fish Stream Crossings
Auk'Tah Lake Basin	1.1	0.6	0.5	0.4	0	0
Favorite Bay North Basin	1.7	0.0	0.0	0.0	0	0
Favorite Bay South Basin	1.1	0.0	0.0	0.0	0	0
Favorite Creek Basin	20.6	0.0	0.0	0.0	0	0
Killisnoo Harbor Basin	1.1	2.3	2.0	1.5	1	1
Lakes Basin	3.2	0.0	0.0	0.0	0	0
Mitchell Bay Basin	0.2	0.0	0.0	0.0	0	0
Total	29.1	2.9	NA	NA	0	0

[1]Assumes standard minimum clearing widths and road surface specifications for Tongass National Forest roads: 40 feet total road surface and cut slope width.

2.2.2 Estuarine Areas

Estuarine areas are at the mouths of creeks and small tributaries and in the Favorite Bay tidal flats (see Figures 3 and 4). For this technical report, estuaries are considered to be semi-enclosed coastal areas where sea water is measurably diluted with fresh water from upland areas (Pritchard 1967). The Favorite Bay tidal flats were the most extensive estuarine area surveyed. This area is influenced by Favorite Creek (with the highest discharge of any stream in the survey area) and many tributaries that create a complex inflow of freshwater and extensive estuarine channels throughout the flats. The Favorite Bay tidal flats are approximately 1.2 miles long and 0.3 mile wide (see Figures 2 and 4); fresh water appears to flow to the mouth of the flats on an outgoing or slack tide (bottom and surface salinities of 0.04 parts per thousand [ppt] in 1 foot of water, Table 6). Salty water flows up to the mouth of Favorite Creek at high tide. At an extreme high tide on May 29, 2009, during a period of high freshwater discharge, bottom salinity near the mouth of Favorite Creek was 20.50 ppt at a water depth of 2.5 feet, and surface salinity in the same location was 0.95 ppt. On an outgoing tide, the bottom salinity fell to 0.04 ppt and was similar to surface salinity. Tidal influence (e.g., fluctuating water levels or backwatering) was observed in the lower reaches of Favorite Creek (up to approximately 164 feet (50 m) above the Access Alternative 2 crossing during extreme high tides when freshwater outflow is low) in August 2009, yet established vegetation and invertebrates indicate salinity intrusion does not commonly exceed this point. Marine and estuarine species were not observed above the mouth of Favorite Creek. During low freshwater discharge from Favorite Creek, salinity may be greater near the mouth of the creek than when measurements were collected in May 2009.

Substrate in the estuarine channels of the Favorite Bay tidal flats was generally a mixture of sand, gravel, and shell and became siltier near the mouth of the flats before depths and salinities transitioned to subtidal marine waters (Figure 5). Substrate in the tidal flats was mostly mud with a mixture of shell and sand. The tidal flats support a variety of aquatic life including softshell clam (*Mya arenaria*), Pacific littleneck clam (*Protothaca staminea*), butter clam (*Saxidomus gigantea*), Nuttall's cockle (*Clinocardium nuttallii*), limpets, isopods, euphasids, hermit crabs, barnacles, eelgrass (*Zostera marina*), black pine (*Neorhodomela larix*), sea hair (*Enteromorpha intestinalis*), and loose Ahnfelt's seaweed (*Ahnfeltiopsis gigartinoides*). Further description of intertidal areas is provided in section 3.2.1.

Other small unnamed tributaries (such as streams 2, 3, and 4) had varying sizes of brackish water interface at their mouths. Salinity in these areas was variable, depending on tidal stage and freshwater outflow, which were less than that of Favorite Creek. Bottom salinities ranged from 27.00 ppt on a high tide to 0.00 on a low tide; surface salinities ranged from 9.00 to 0.00 ppt respectively (see Table 6, Figure 2). Species composition reflected fluctuating salinity levels. Algae, such as rockweed (*Fucus* sp.), green string lettuce (*Enteromorpha lindza*), and mermaid's tresses (*Ulothrix flacca*) were common at the mouth of creeks, though were increasingly less common near the mouth of Favorite Creek, indicating higher outflows of fresh water in that area.

Several species of fish were collected from the nearshore shallow-water estuarine areas: juvenile salmonids, sculpins, threespine stickleback, and juvenile starry flounder (*Platichthys stellatus*) (see Table 3).

Table 6. Estuarine Salinity in the Vicinity of the Airport and Access Alternatives

Location	Fisheries Biologists Survey Date	Time	Tide	Depth (feet)	Bottom Salinity (ppt)	Surface Salinity (ppt)
Favorite Creek						
Tidal flats near mouth	29-May-09	6:40	High	2.5	20.50[1]	0.95[1]
Tidal flats near mouth	29-May-09	7:25	Ebb	4	0.06[2]	0.07[2]
Mouth of Favorite Creek	29-May-09	8:00	Ebb	1	0.04[3]	0.04[3]
Unnamed tributaries to Favorite Bay						
Mouth of stream 2	28-May-09	7:04	Ebb	2.7	7.00	7.00
Tidal flats near stream 2	28-May-09	8:16	Ebb	2	1.00	1.00
Tidal flats near stream 2	28-May-09	9:04	Ebb	0.8	0.00	0.00
Estuary near streams 3 & 4	30-May-09	7:37	Slack/high	4.5	27.00	3.00
Mouth of stream 4	30-May-09	7:43	Ebb	2.3	25.00	4.00
Big cove at stream 4	30-May-09	8:21	Ebb	5.9	9.00	9.00
600 feet upstream of mouth of main estuarine channel	30-May-09	14:00	Slack/ low	1	0	0.2
Mouth of tidal flats	30-May-09	14:02	Slack/ low	Out of reach	Not taken	0
Mouth of stream 8 (~148 feet downstream of freshwater channel start)	2-Jun-09	13:11	Ebb	1	24.00	2.00
Mouth of stream 8 (~263 feet downstream of freshwater channel start)	2-Jun-09	13:12	Ebb	0.5	22.00	2.00

Note: Locations are shown in Figures 2 and 3; ppt= parts per thousand.

[1] Temperature 9.3˚C at bottom, 5.9˚C at surface; pH 7.3 at both bottom and surface.

[2] Dissolved oxygen 13.5 ppt, temperature 4.8˚C, pH 7.2 at both bottom and surface.

[3] Temperature 4.8˚C, pH 7.2 at both bottom and surface.

Figure 5. Favorite Bay dominant substrates.

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2.3 Habitats and Species in the Landscape Area

2.3.1 Streams and Lakes

There is a high density of perennial streams within the Mitchell Bay area; however, runoff per unit area in Mitchell Bay is relatively low in comparison to the majority of Southeast Alaska (USFS 2002).Habitats and species in the landscape area are generally similar to those in the study area. Because the landscape area is broader than the study area, it contains a larger variety of habitats that support additional species.

For example, Mitchell Bay supports a small sockeye fishery, with two primary populations or runs of fish: one using Kanalku Lake, and the other run using Salt and Freshwater lakes near Hasselborg Creek to spawn and rear (USFS 2002). A unique population of stream-spawning sockeye is present in Hasselborg Creek: juveniles of this population are not associated with a lake environment and instead rear in salt water, the only river-sea stock of sockeye on Admiralty Island (Halupka et al. 2000). ADF&G maintains a weir on Hasselborg Creek to monitor this population. The USFS reports that the sport fisheries in Kanalku Bay are healthy except for the sockeye fishery, which has been depleted due to overfishing (USFS 2002). Kanalku Lake sockeye spawning escapements were extremely low in 2001 and 2003, with 240 and 271 fish respectively (Conitz and Burril 2008). In 2006, escapement was estimated at 1,300 fish, the third consecutive year with more than 1,000 fish since 2001 (Conitz and Burril 2008). Escapement increased substantially in 2009 to 2,664 sockeye, more than twice the average escapement estimated from 2001 to 2008 (Vinzant and Bednarski 2010).

Kanalku Creek also supports pink, chum, coho (in small numbers), and Dolly Varden (Conitz and Burril 2008 DEC et al. 2006). The peak adult salmon count for all species in Kanalku Creek is 6,078 fish (DEC et al. 2006). The mean annual escapement for pink salmon in Kanalku Creek is 2,322 adults (Halupka et al. 2000).

Numerous other salmonid species similar to those found in the study area also use the landscape area for spawning, rearing, and migration. Other streams that are known to support salmonid spawning populations include Hasselborg Creek, Jims Creek, and Gabriel Creek (DEC et al. 2006). Of these streams, Hasselborg Creek is the only sub-basin known to support steelhead (DEC et al. 2006). Other lakes (besides Kanalku Lake) occur in the landscape area but are relatively small and are not known to support substantial spawning populations of sockeye.

Chinook salmon also use the landscape area for foraging and migration, but do not spawn in the area (USFS 2002). The closest spawning population of Chinook occurs at Wheeler Creek (northwest Admiralty Island, (Halupka et al. 2000), which is outside the landscape area. Although Chinook salmon have recently been noted in Hasselborg Creek, they are thought to be hatchery strays from the Chatham Strait area (Geiger and ADF&G staff 2007).

2.3.2 Estuarine Areas

Salt Lake (in the northeast portion of the landscape area) is one of the most extensive estuarine systems in the landscape area. This brackish water area is separated from Mitchell Bay by a tidal falls and can be accessed by boat only at high tide. Hasselborg Creek and Freshwater Lake flow into Salt Lake, creating a relatively sheltered estuary. The lake is also primary rearing habitat for Hasselborg Creek sockeye salmon, a unique population of stream-spawning fish that rear in the brackish waters of Salt Lake (Halupka et al. 2000) due to barriers that block passage to the upper Hasselborg Creek basin. The Salt Lake basin also is the largest coho-producing basin on Admiralty Island (Geiger and ADF&G staff 2007).

The intertidal estuarine areas associated with some creeks in the landscape area provide spawning habitat for pink and chum salmon. For example, large numbers of pink salmon spawn in the lower portion of Kanalku Creek and its associated intertidal estuarine area (Conitz and Burril 2008).

3.0 MARINE RESOURCES

Marine fish, invertebrates, algae, and seagrasses that occur in the study area and have potential to be affected by construction and long-term use of airport facilities are described below. Marine habitats in the study area were surveyed and mapped to provide a description of baseline conditions for the Airport EIS.

3.1 Methods

Species and habitats were documented using a variety of methods: literature reviews of existing information, field surveys, interviews with local experts in biological resources, and best professional judgment.

3.1.1 EXISTING DATA SOURCES

Several existing reports were examined, such as the Mitchell Bay Landscape Assessment (USFS 2002) and the Angoon Hydropower EIS (USFS 2009a).

3.1.2 FIELD DATA COLLECTION

Marine habitats in the study area were surveyed in three 2-week field sessions from May through August 2009 (see Figure 2 for survey locations). Intertidal and subtidal habitats were examined to document existing habitats and species presence/absence. Satellite imagery (DigitalGlobe 2004) was used to estimate habitat conditions that were ground-truthed by field surveys. Locations were documented with a Trimble Geo XT handheld GPS unit with submeter accuracy.

Habitat

Intertidal habitats that could be directly affected by the project were quantitatively surveyed with transects. Transects were placed in the area of potential direct impact at the Access Alternative 5 bridge crossings (see Figure 2) and were marked with a measuring line. (Note: Access Alternative 5 was dropped from consideration in the EIS after aquatic field studies were completed.) Quadrats of 3.2 square feet (1 m^2) were surveyed every 13 to 23 feet (4 to 7 m, depending on the total length of the transect) starting from mean lower low water (MLLW) to the high tide line (18.6 feet) or the start of persistent woody vegetation. Bank and riparian conditions, dominant substrates, percent cover by algae, seagrass, or invertebrates, as well as the presence of fish species were noted. Gradient data were collected using a clinometer or eye level and a stadia rod. Salinity was recorded at select locations (see Figure 2), by using a refractometer or a YSI water quality probe (specifications listed in section 2.1.1).

Intertidal areas that could be indirectly affected were assessed by walking the shoreline at low tide and noting habitat conditions and species. Additionally, the intertidal zone around the perimeter of Favorite Bay was also documented using a digital camera. Video of the shoreline was taken from a boat moving adjacent to the shoreline during an extreme low tide (−4.0 feet on July 24, 2009, as observed at the National Oceanic and Atmospheric Administration [NOAA] Juneau tide station). Video footage was used to ground-truth an ERDAS aerial imagery classification for intertidal habitat (described in section 3.1.2).

An underwater camera was used to document subtidal habitat and species use in Favorite Bay and estuary, Pea Hen, and Killisnoo Harbor (see Figure 2). The camera was deployed from a motorized boat or canoe and towed along a predetermined transect. The camera was lowered to the seafloor using either a downrigger or a

2-pound lead weight (depending on depth and current speed). Camera depths ranged from the surface (0 feet) to up to approximately −120 feet. Two submersible LED lights were used in deeper areas to increase visibility. Transects were performed both parallel to and perpendicular to the shoreline; a grid-like sampling pattern was used at the Access Alternative 5 Favorite Bay bridge crossing (see Figure 2). The camera was towed at approximately 0.87 knots (1 mile per hour) to acquire the best quality imagery. Video was recorded to DVD in the field while real-time video feed was monitored by crew to ensure proper camera position and data capture. GPS position, habitat type, and depth (as monitored by a Lowrance LCX fishfinder) were recorded every 1 to 2 minutes during the camera tow. Video footage was later reviewed and coded using the habitat classification system described in Data Analysis Methods (section 3.1.2) below.

Because marine habitats in Killisnoo Harbor (south of Airport Alternative 12a) would not be directly affected by the proposed project, they were not extensively mapped or classified. However, an underwater camera was used to verify fish presence and habitats in select locations. No marine bridges are proposed for this area and potential marine impacts would be limited to indirect effects related to run-off from streams. Therefore, this area is not included in the figures of marine habitats mapped for the project.

Fish and Invertebrates

An otter trawl was used to document fish presence in Favorite Bay. The trawl measured 4.1 by 3.9 feet (1.25 by 7.9 m) at the mouth and consisted of a 1.2-inch (3-centimeter [cm]) mesh funnel with a 0.4-inch (1-cm) mesh inner liner in the cod end. The inner liner is a soft nylon weave designed to reduce abrasion of fish scales and slime. Trawls were conducted during both incoming and outgoing tides, with tows lasting for 5 to 15 minutes in areas with water depths of 32 to 125 feet. Trawls occurred near the surface (15 feet), at various midwater depths, and on the bottom at depths of 35 to 55 feet. The maximum depth fished was 55 feet. Initial tows were short, with duration prolonged if catch was low. Tow length and location were measured with a Trimble Geo XT GPS unit. Depth of the net, length of the sampling line, tidal stage, and vessel speed were noted. Vessel speed was minimized during net retrieval to reduce mortality due to net impingement. Trawl catch was placed in coolers filled with site water for sorting and processing. Fish were counted (with a subsample measured), identified to species when possible, and released to the same environment.

The volume of water fished was determined as the product of the area of the net mouth and the linear distance towed. It is assumed that the area of the net mouth during tow is 80% of the maximum stretched mouth area, or 12.8 square feet (7.9 m^2).

Marine Vegetation

To address scoping comments from the U.S. Fish and Wildlife Service and NMFS regarding marine vegetation, algae and seagrasses in the study area were mapped (Figures 6 and 7). Subtidal eelgrass beds were located using an underwater video camera and mapped using a GPS unit. Intertidal eelgrass beds were located in the field and mapped using a combination of GPS data and QuickBird infrared satellite imagery (DigitalGlobe 2004). Elevation relative to tidal height was noted, and surface area was estimated using GIS.

Due to morphological variation in seagrass samples, and concerns regarding potential documentation of an invasive species, specimens were sent to Sandra Talbot, USGS Alaska Science Center, Anchorage, for positive species determination via genetic analysis. Samples were preserved in silica powder and DNA extracted and amplified via polymerase chain reaction (PCR) using methods outlined in Talbot et al. (2006). This genetic screening uses sequence differences at nuclear ribosomal internal transcribed spacers to differentiate *Zostera marina* (native species) from the non-native *Z. japonica* and other exotic species. Results were verified using microsatellite screening, with markers that amplify DNA only from *Z. marina*.

3.1.3 DATA ANALYSIS

Subtidal Bathymetry

Depths recorded from boat sonar in the field were corrected based on the predicted tidal heights at the NOAA Juneau tide station (NOAA 2009) to determine depth relative to MLLW. The correction value for Favorite Bay (relative to the Juneau tide station) is −2.8 feet at high tide and +0.3 feet at low tide. The time correction for Favorite Bay is +11 minutes for high tide and +15 minutes for low tide relative to the predicted times for Juneau. Depth data were augmented with the NOAA (2007) nautical chart for Hood Bay and Kootznahoo Inlet. Mapped bathymetric values are approximate and should not be used for navigation purposes.

Intertidal and Subtidal Boundaries

Little to no bathymetric or elevation data were available to estimate the lower boundary of the intertidal zone. Therefore, a combination of satellite imagery interpretation, sample point interpolation from shoreline field data, and five-foot topographical contours (R&M Engineering 2001) were used to determine boundaries for the intertidal and subtidal zones. The lower boundary of the intertidal zone (intertidal-subtidal boundary) was estimated from satellite imagery interpretation of low-tide conditions and corrected for predicted tidal heights at the NOAA Juneau Tide Station (NOAA 2009) based on the date and time the imagery was acquired. The 8.01-feet (2.44-m) resolution QuickBird satellite image (DigitalGlobe 2004) was taken on April 24, 2008 and georeferenced to a 2004 image from the same provider. The tidal height at the time of satellite imagery capture was +3 feet above MLLW. Therefore, the lower limit of the intertidal zone, which was clearly visible, was determined to be approximately +3 feet above MLLW (0 feet) for cartographical purposes.

The upper boundary of the intertidal zone was determined by interpolating and analyzing a 13-foot contour (representing mean higher high water as determined by NOAA (personal communication, Ehret 2009), based on five-foot topographical contours (R&M Engineering 2001). This level was then modified further based on ground observations and GPS field data that indicated that the contours were inaccurate in some locations. Therefore, the contour layer was amended in certain areas, primarily at the mouth of Favorite Creek and in the tidal flats, where landforms were particularly complex and diverse. Tidal sedge meadows and tidally influenced pools were identified using satellite imagery. Where direct field observations were lacking, the existing contour data were used. Other obvious errors from interpolation methods were omitted or smoothed based on landforms visible on the satellite imagery.

Intertidal Habitat Classification

Shoreline video and photographs of field sampling locations were used to create known sample points. Satellite imagery (DigitalGlobe 2004) was classified using a 25-class unsupervised (isodata) classification. In order to add information to the habitat classification, a normalized differenced vegetation index was calculated for the imagery. The individual classes were assigned to a habitat class based on field observations and video. The classification was then edited by hand to eliminate shadow areas and classification speckle.

Areas of algae-covered substrate were easily identified in the classifications and verified with the video. Substrate composition was also consistent between imagery classification and field observations. The intertidal classification was combined with the subtidal habitat mapping, and inconsistencies between the interpolation of the two were reconciled to make a seamless and useable data set.

Subtidal Habitat Classification

Underwater video footage from Favorite Bay was recorded and reviewed. GPS tracks and points collected in the field were spatially linked to the underwater video to create a habitat classification sample database and habitat classification maps for Favorite Bay. Several substrate classes (mud/silt, sand, gravel, cobble, boulder, bedrock or shell), depth and percent algal cover were recorded for each sample point. Substrate size was classified using the Coastal and Marine Ecological Classification Standard developed by NOAA (Madden et al. 2009). Kelp and non-kelp algae were differentiated and their relative percent cover documented in 5% increments (Figures 6 and 7). Eelgrass, invertebrate communities, and vertebrate species presence were also noted and mapped. Shallow subtidal areas were surveyed from the shoreline, and data were integrated with underwater video observations to analyze subtidal habitat below the lowest observed water line in the satellite imagery, approximately +3 feet relative to MLLW.

Substrate and Vegetation

Subtidal sample points were selected from underwater video transect data collected in Favorite Bay to model substrate and aquatic vegetation. Where direct observations from the vessel were not available, data were supplemented with intertidal and shallow subtidal shore-based foot and snorkel surveys. The analysis extent of the substrate model was restricted to subtidal areas delineated by the lowest water line visible in the satellite imagery. Inverse distance weighting was used with varying numbers of nearest neighbors and maximum distances to estimate continuous surfaces of each substrate or algal component. Estimated surfaces in the northern part of Favorite Bay were assessed to determine which models produced the best data fit. Dominant algal and substrate components were calculated and combined into one model representing all substrate and biological components. Areas where no substrate type was dominant were classified as mixed. Minor modifications to the model were made as necessary; for example, if the model generated inadequate representations of substrate or algae as compared to field data and/or satellite imagery, then the model was adjusted. In areas where substrate was not visible due to abundance of algal cover, data were not entered into the model, and were inferred based on data from surrounding nearest neighbors. Field photos, satellite imagery, GPS-linked underwater video transect data, and shoreline-based observations confirmed the relative accuracy and extents of substrate and algal habitat characterizations represented on the map.

3.2 Habitats and Species in the Study Area

3.2.1 Intertidal Areas

The intertidal zone in Favorite Bay is generally narrow in the northwest part of the bay and wider near the head of the bay (see Figure 4). In the narrow northwest part of the bay, the shoreline is mostly rocky and drops off steeply to the subtidal zone. Algal cover reflects substrate type, with rocky, algae-covered substrates occurring more frequently in the narrowest (northwest) part of the bay (see Figures 5 and 6). Substrate size tends to increase with distance from the head of the bay and the tidal flats.

One area in Favorite Bay that appears to be unique in physical characteristics and in biological diversity is Pea Hen (see Figures 4, 5, 6, and 7). It contains nearly all classes of substrate and experiences a unique flushing tidal pattern. Both the northern and southern entrances to Pea Hen are slightly elevated from the interior Pea Hen area, and act as shelves blocking tidal flow from Favorite Bay and surrounding environments until water levels are above the elevated area. As a result, water remains ponded in the interior part of the site even at low tide because the elevated entrances to the area prevent full emptying at maximum ebb flow. Therefore, the area is relatively protected from high velocity flushing and water exchange and does not experience as drastic tidal exposure as other areas in Favorite Bay.

The Pea Hen area also appeared to support relatively high biological diversity (Tables 7 and 8) as well as a wide variety and complexity of habitats (various substrates, vegetative cover, tidal exposures, flushing, etc.). Algal and seagrass cover was extensive in Pea Hen (see Figures 6 and 7), and Angoon residents report the area is a primary location for subsistence gathering of chitons or gumboots (primarily *Katharina tunicata*), green urchins (*Strongylocentrotus droebachiensis*), and cockles. A total of 43 invertebrate species was documented during intertidal transects and subtidal snorkeling at the Access Alternative 5 bridge crossings in Pea Hen, whereas 24 species were documented at the Access Alternative 5 bridge crossing of Favorite Bay using similar survey methods (see Table 7). As noted above, Access Alternative 5 has since been dropped from consideration in the EIS. The latter location has a smaller intertidal zone that drops off steeply to subtidal habitats and therefore a smaller total area was surveyed, which may account for some of the difference in species diversity between the two locations. However, due to the habitat complexity and diversity in Pea Hen it is assumed that species diversity would remain higher in Pea Hen than in Favorite Bay, even if a larger area were sampled. Of the species documented in Pea Hen, 14 were not documented elsewhere in the study area. Similarly, five species were collected at the Access Alternative 5 Favorite Bay bridge crossing that were not found elsewhere.

Figure 6. Favorite Bay aquatic vegetation: algae.

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Figure 7. Favorite Bay aquatic vegetation: kelp.

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Table 7. Marine Invertebrates Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Phylum Porifera	**Sponges**					
Haliclona permollis	purple encrusting sponge	I				
Suberites domuncula	hermit crab sponge				I	
Unidentified sp.	red sponge	I				
Unidentified sp.	yellow sponge	S				
Unidentified sp.	pink encrusting sponge	I, S				
Phylum Cnidaria	**Anemones, jellies, etc.**					
Anthopleura artemesia	burrowing anemone	I			I	
Anthopleura xanthogrammica	green surf anemone				I	
Metridium farcimen	giant plumose anemone		S	S		S
Metridium senile	short plumose anemone	S	S	S		S
Unidentified spp.	unidentified jellyfish (at least 4 spp.)	S	S	S		
Unidentified sp.	unidentified anemone	S	S	S		
Urticina crassicornis (previously *Tealia* sp.)	painted anemone	S				
Phylum Annelida	**Segmented worms**					
Class Polychaeta	**Tube worms**					
Eudistylia vancouveri	Vancouver feather duster	I, S	S			
Schizobranchia sp.	feather duster worm	S		I		
Spirorbis sp.	tube worm	I	I			
Unidentified sp.	small polychaete worm	I	S	I, S	I, S	
Unidentified sp.	scale worm	I	S			
Phylum Ectoprocta	**Bryzoans**					
Unknown sp.	encrusting bryzoan	I		S		
Phylum Mollusca	**Bivalves, snails, chitons, nudibranchs, etc.**					
Class Polyplacophora	**Chitons**					
Cryprochiton stelleri	giant Pacific chiton					I
Katharina tunicata	black leather chiton	I, S	S			
Mopalia lignosa	woody chiton				S	
Mopalia sp.	mopalia chiton	I, S				
Tonicella insignis	white-line chiton			S		

Table 7. Marine Invertebrates Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Tonicella lineata	lined chiton	I				
Class Gastropoda	**Snails and slugs**					
Littorina sp.	periwinkle snail	I	I		I	
Margarites pupillus	puppet margarite	I	I			
Nucella canaliculata	channelled dogwinkle	I			I	
Nucella lamellosa	wrinkled dogwinkle				I	
Unidentified sp.	snail eggs	I	I			
Unidentified sp.	unidentified snail	S		S		
Subclass Prosobranchia	**Limpets**					
Lottia pelta	shield limpet	I	I	I	I	
Tectura persona	mask limpet	I	I	I	I	
Unidentified sp.	unidentified limpet	S		I, S		
Subclass Opisthobranchia	**Sea slugs, nudibranchs**					
Janolus fuscus	white and orange-tipped nudibranch		S			
Unidentified sp.	nudibranch egg ribbons				S	
Unidentified sp.	unidentified wavey-margined nudibranch	I				
Class Bivalvia	**Bivalves**					
Chlamys sp.	pink scallop			S		
Clinocardium nuttallii	Nuttall's cockle	I, S		I		
Mya arenaria	softshell clam	I, S	I	I	I, S	
Mytilus trossulus	Pacific blue mussel	I	I, S	I	I	
Protothaca staminea	Pacific littleneck clam	I, S	I, S	I	I, S	
Saxidomus gigantea	butter clam		S	I	I, S	
Tresus capax	fat gaper clam			I	I	
Unidentified sp.	unidentified clam	I	S			
Unidentified sp.	unidentified tiny clam entwined in filamentous algae	I				
Class Cephalopoda	**Octopuses and squids**					
Enteroctopus dofleini	giant Pacific octopus					S
Phylum Arthropoda	**Crabs, shrimps, amphipods, etc.**					

Table 7. Marine Invertebrates Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Subphylum Crustacea	**Crabs, shrimps, etc.**					
Subclass Cirripedia	**Barnacles**					
Balanus glandula	common acorn barnacle	I	I, S		I, S	
Balanus nubilus	giant acorn barnacle	S				
Semibalanus cariosus	thatched acorn barnacle				I	
Unidentified sp.	unidentified barnacle		I	I		
Subclass Eumalacostraca	**Crabs, shrimps, lobsters, amphipods**					
Order Euphausiacea	**Krill**					
Unidentified sp.	euphasid, krill			I		
Order Decapoda	**Crabs, shrimps, lobsters**					
Infraorder Caridea	**Shrimps**					
Lebbeus sp.	lebbeid shrimp	S		S		
Pandalus danae	coonstripe shrimp (dock shrimp)			S		
Pandalus hypsinotus	humpback shrimp (coonstripe shrimp)			S		
Pandalus platyceros	Pacific prawn (spot shrimp)			S		
Unidentified sp.	unid shrimp	S		S		
Infraorder Anomura	**Hermit and lithode crabs**					
Hapalogaster mertensii	hairy crab		S	S	S	
Unidentified sp.	unidentified king crab		S			
Unidentified sp.	unidentified hermit crab	I	I	I, S	I	
Infraorder Brachyura	**True crabs**					
Cancer magister	Dungeness crab			S	S	
Cancer oregonensis	Oregon rock crab	S		S		
Cancer sp.	rock crab	S				
Chionoecetes bairdi	tanner crab		S	S		
Hemigrapsus nudus	purple shore crab				I	
Hyas lyratus	Pacific lyre crab		S			
Oregonia gracilis	graceful decorator crab		S	S		
Pugettia gracilis	graceful kelp crab	S				

Table 7. Marine Invertebrates Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Order Isopoda	**Isopods (pill bugs)**					
Idotea wosnesenskii	rockweed isopod	I				
Unidentified sp.	unidentified isopod		I	I	I	
Order Amphipoda	**Amphipods (scuds)**					
Unidentified sp.	unidentified bright red amphipod			S		
Unidentified sp.	unidentified amphipod				I	
Phylum Echinodermata	**Spiny-skinned animals**					
Class Asteroidea	**Sea stars**					
Asterina miniata	bat star	S	S			
Crossaster papposus	rose star			S		
Dermasterias imbricata	leather star					
Evasterias troschelii	mottled star			S	S	
Henricia leviuscula leviuscula	blood star	S	S			
Leptasterias hexactis	drab six-armed star	S	S			
Pisaster sp.	unidentified sea star		S	S		
Pycnopodia helianthoides	sunflower star	I, S	I, S	I, S	I, S	I, S
Solaster sp.	sun star		S			
Class Ophiuroidea	**Brittlestars**					
Unidentified sp.	unidentified brittlestar		S	S		
Class Echinoidea	**Urchins**					
Strongylocentrotus droebachiensis	green urchin	S	S	S	S	
Unidentified sp.	unidentified small urchin			S		
Class Holothuroidea	**Sea cucumbers**					
Cucumaria miniata	red sea cucumber		S			
Cucumaria vegae	tiny black sea cucumber	I				
Parastichopus californicus	giant sea cucumber		S	S		

Note: Table includes intertidal and subtidal species.
I= observation in intertidal zone; S= observation in subtidal zone.

Table 8. Marine Vegetation Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Phylum Chlorophyta	**Green algae**					
Acrosiphonia sp	green filamentous	I	I		I	
Codium ritteri	coarse spongy cushion			S		
Rhizoclonium tortuosum (previously *Chaetomorpha*)	twisted sea hair	I				
Ulva fenestrata	sea lettuce		S			
Ulva intestinalis (previously genus *Enteromorpha*)	sea hair		I	I	I	
Ulva linza (previously genus *Enteromorpha*)	green string lettuce		I	I	I	
Ulva sp.	sea lettuce	I	I	I	I	
Ulvaria obscura	dark sea lettuce	I				
Ulothrix flacca	mermaid's tresses			I		
Unidentified sp.	slimy green filamentous	I				
Unidentified sp.	unidentified green filamentous	I	I			
Phylum Phaeophyta	**Brown algae**					
Agarum sp.	sieve kelp		S	S		
Alaria marginata	ribbon kelp	I, S	S		S	
Alaria sp.	kelp	I, S	S	S		
Coilodesme bulligera	sea chip	I				
Costaria costata	seersucker kelp			S		
Cymathere triplicata	three-ribbed kelp		S			
Desmarestia sp.	acid kelp	S				
Fucus gardneri	rockweed	I, S	S	I, S		I, S
Laminaria saccharina	sugar kelp	I	S			
Laminaria yezoensis	suction-cup kelp		S			
Leathesia difformis	sea cauliflower				I	
Melanosiphon intestinalis	twisted sea tubes	I	S		I	
Nereocystis luetkeana	bull kelp			S		
Ralfsia fungiformis	sea fungus	I	I			
Unidentified sp.	brown/red finely branched filamentous algae		I			
Unidentified sp.	densely-tufted filamentous brown algae		I			

Table 8. Marine Vegetation Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Unidentified sp.	encrusting brown slime (on bedrock)	I				
Unidentified sp.	slimey brown filamentous	I				
Unidentified sp.	unbranched brown algae		I			
Phylum Rhodophyta	**Red algae**					
Ahnfeltiopsis gigartinoides	loose Ahnfelt's seaweed			I		
Constantinea sp.	saucer algae	I		I		
Cryptosiphonia woodii	bleached brunette		I			
Gloiopeltis furcata	jelly moss	I	I			
Halosaccion glandiforme	sea sac		I, S		I, S	
Neorhodomela larix	black pine			I	I	
Neorhodomela oregona	Oregon pine	I				
Palmaria callophylloides	frilly red ribbon		I			
Phycodrys riggii	common sea oak		I			
Porphyra sp.	Porphyra algae		I, S			
Odonthalia floccosa	sea brush		I		I	
Sparlingia pertusa	red eyelet silk			S		
Unidentified sp.	crustose coraline red	I, S	I, S		I, S	
Unidentified sp.	encrusting red algae		I			
Unidentified sp.	foliose red coraline	I				
Unidentified sp.	unidentified red coarse filamentous		I			
Unidentified sp.	unidentified red fine filamentous		I			
Phylum Anthophyta	**Seagrass**					
Zostera marina	eelgrass	S	I, S	I, S	S	S

Note: I= observation in intertidal zone; S= observation in subtidal zone.

In the Killisnoo Harbor portion of the study area, the Salt Lagoon near the Angoon Ferry Terminal is the most extensive intertidal area (see Figures 2 and 3). The lagoon mouth and neck drain almost entirely at low tide, except for isolated tide pools and a small subtidal pond at the head of the lagoon. Local residents report that this area is used extensively for rearing by juvenile pink salmon; several juvenile pink and chum salmon were observed in the lagoon in June 2009 (Table 9). Adult pink, chum, coho, and Chinook salmon were observed at the ferry terminal, but none were observed entering the Salt Lagoon. There is minimal freshwater inflow into the lagoon, and therefore salinities remain high (21.00–30.00 ppt) even at low tide (Table 10). It is unlikely that salmonid spawning occurs in any tributaries of the Salt Lagoon (see Figure 3), as flow and substrates are not suitable for spawning. Fish, invertebrate, and vegetation species were mostly marine or estuarine, and included kelp and other algae, shiner perch, sticklebacks, anemones, sea stars, crabs, and clams (Tables 7 and 8). Eelgrass was documented in the lagoon in small patches. The mouth of the lagoon is accessible by road, and residents commonly drive in and across the intertidal zone in this area. Evidence of this access included tire tracks and trash. This is one of the few locations in the study area that is currently accessible by road, the other locations being the Angoon floatplane and community boat basin docks. However, the latter areas do not have extensive shallow water intertidal zones.

Table 9. Marine Fishes Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Family Clupeidae	**Herrings**					
Clupea pallasii	Pacific herring		A	A		A
Family Salmonidae	**Salmon and Trout**					
Oncorhynchus gorbuscha	pink salmon	A	J, A	J, A	J	J, A
Oncorhynchus keta	chum salmon		J	J, A	J	A
Oncorhynchus kisutch	coho salmon		J	J, A		A
Oncorhynchus nerka	sockeye salmon			A		
Oncorhynchus tshawytscha	Chinook salmon			A		A
Salvelinus malma	Dolly Varden			A		A
Family Gadidae	**Cods**					
Gadus macrocephalus	Pacific cod			J, A		
Theragra chalcogramma	walleye pollock	J		J		
Family Gasterosteidae	**Sticklebacks**					
Gasterosteus aculeatus	threespine stickleback	J, A		A	A	
Family Scorpaenidae	**Rockfish**					
Sebastes ciliatus	dusky rockfish		A			
Sebastes maliger	quillback rockfish					A
Sebastes sp.	unidentified rockfish		J			
Family Hexagrammidae	**Greenlings**					
Hexagrammos decagrammus	kelp greenling		A			
Hexagrammos stelleri	whitespotted greenling		U	U		
Family Cottidae	**Sculpins**					
Hemilepidotus hemilepidotus	red Irish lord			A		

Table 9. Marine Fishes Observed in the Study Area in 2009

		Location				
Scientific Name	**Common Name**	**Pea Hen**	**Access Alternative 5: Favorite Bay Bridge**	**Favorite Bay**	**Salt Lagoon**	**Killisnoo Harbor**
Leptocottus armatus	Pacific staghorn sculpin			J, A		
Myxocephalus polyacanthocephalus	great sculpin		J, A	J, A		A
Oligocottus maculosus	tidepool sculpin	U			U	
Oligocottus synderi	fluffy sculpin				U	
Triglops pingelii	ribbed sculpin		U			
Unidentified sp.	unidentified sculpin species		U			
Family Agonidae	**Poachers**					
Pallasina barbata	tubenose poacher		A			
Family Cyclopteridae	**Lumpsuckers**					
Eumicrotremus orbis	Pacific spiny lumpsucker		A			
Family Liparidae	**Snailfish**					
Liparis callyodon	spotted snailfish				U	
Family Embiotocidae	**Surfperches**					
Cymatogaster aggregata	shiner perch			J, A	A	A
Family Bathymasteridae	**Ronquils**					
Bathymaster signatus	searcher		U			
Family Stichaeidae	**Pricklebacks**					
Stichaeus punctatus	Arctic shanny		U			
Lumpenus sagitta	snake prickleback			A		
Family Pholidae	**Gunnels**					
Apodichthys flavidus	penpoint gunnel		A		A	
Pholis laeta	crescent gunnel	A	A		A	
Family Pleuronectidae	**Righteye flounders**					
Hippoglossus stenolepis	Pacific halibut		J	J, A		J
Lyopsetta exilis	slender sole		U			
Lepidopsetta bilineata	southern rock sole		U			
Platichthys stellatus	starry flounder			J		J, A

Note: A= Adult, J=Juvenile, U=Age unknown based on size.

Table 10. Salinity in Favorite Bay and Salt Lagoon

Location	Fisheries Biologists Survey Date	Time	Tide	Depth (feet)	Bottom Salinity (ppt)	Surface Salinity (ppt)
Favorite Bay						
Favorite Bay (trawl)	3-Jun-09	9:58	Flood	42	28.41[1]	24.30[1]
Favorite Bay (trawl)	3-Jun-09	14:40	Ebb	60	28.60[2]	19.84[2]
Salt Lagoon						
Salt Lagoon	1-Jun-09	15:30	Slack	2	n/a	30.00
Salt Lagoon	1-Jun-09	15:42	Slack/ flood	2	n/a	25.00
Salt Lagoon	1-Jun-09	15:56	Flood	0.4	n/a	25.00
Eelgrass bed in Salt Lagoon	1-Jun-09	15:59	Flood	0.5	n/a	25.00
Upstream-most narrow point in Salt Lagoon	1-Jun-09	16:36	Flood	0.5	n/a	24.00
Wide area in Salt Lagoon	1-Jun-09	16:54	Flood	0.3	n/a	24.00
Mouth of stream 12 at head of Salt Lagoon	1-Jun-09	17:24	Flood	0.5	n/a	21.00
Pond behind mouth of stream 12	1-Jun-09	17:28	Flood	1	n/a	17.00

Note: Locations are shown in Figures 2 and 3; ppt= parts per thousand

[1] Dissolved oxygen 11.0 ppt at bottom and 11.1 ppt at surface; temperature 7.6˚C at bottom and 9.6˚C at surface; pH 6.7 at both bottom and surface.

[2] Dissolved oxygen 10.6 ppt at bottom and 14.5 ppt at surface; temperature 7.3˚C at bottom and 13.2˚C at surface; pH 7.2 at bottom and 7.1 at surface.

3.2.2 SUBTIDAL AREAS

Marine Vegetation

A total of 18.63 acres of eelgrass beds was documented from several locations in the study area (see Figures 6 and 7). Beds ranged in size from 0.39 acre to 8.02 acres. In addition to the eelgrass beds depicted in Figures 6 and 7, other small patches of eelgrass were documented throughout the study area. However, due to their small size, these patches are not perceptible in the vegetation mapping; they are shown as sampling points in Figure 2. One of these patches was in the Favorite Bay tidal flats, and was composed entirely of very small plants (leaf length 5.5 inches, width 0.6 inches [1.5 millimeters]) that did not appear to have definitive morphological characteristics of either *Z. marina* (a native species) or *Z. japonica* (an invasive species considered by some to belong to the genus *Nanozostera*). Due to concerns regarding potential documentation of an invasive species, specimens were sent to the USGS Alaska Science Center for genetic analysis and species determination. Photographs and details of the specimens are provided in Appendix C. Genetic analyses indicated that seagrass samples from Angoon were *Z. marina* (personal communication, Talbot 2009a). Microsatellite markers used in the genetic analyses would have indicated evidence of hybridization, had any occurred. Furthermore, there is no evidence of hybridization between *Z. marina* and *Z. japonica* in other locales (Rhode 2007). It may be that growing conditions limit growth of *Z. marina* in certain locations. Similar small *Z. marina* plants have been observed in other Southeast Alaska locations, such as Blind Slough near the South Mitkof Island Ferry Terminal (personal communication, Talbot 2009b). These plants, initially thought to be *Z. japonica* by collectors, were also genetically analyzed and found to be *Z. marina*.

Of the areas where eelgrass was observed, shoot density and biomass were visibly highest in the northern Pea Hen area and in the sheltered inlet south of Airport Alternative 3a (see Figures 2, 6, and 7). These two areas are sheltered from strong currents and tidal energy and have deeper waters where shoots remain completely subtidal even at extreme low tides. Where eelgrass occurred in the lower intertidal/upper subtidal zones, such as the Favorite Bay tidal flats and near the southern entrance to Pea Hen, shoot density and biomass were lower. Eelgrass in these areas occurred in the −2 foot to −5 foot zone, relative to MLLW. Shoots in these areas were small during surveys in late May 2009, but grew larger by mid-August 2009.

In addition to eelgrass, numerous algal species were documented in the study area (see Table 8). The most extensive algal cover occurred in Pea Hen, around the large rock near the Access Alternative 5 bridge crossing of Favorite Bay (see Figures 3, 6, and 7), and in the northwest part of the bay, primarily associated with bedrock outcroppings. The algal species in the northwest part of Favorite Bay near Angoon were dominated by marine species, such as bull kelp. The greatest diversity of marine vegetation was observed at the Access Alternative 5 Favorite Bay bridge crossing (see Table 8), where 30 species were documented by intertidal transect surveys in June 2009. This diversity is likely due to the abundance of substrates with grain sizes large enough for algae to attach. The second greatest diversity of marine vegetation was observed at Pea Hen, where 22 species were documented. Pea Hen had a wide array of substrates, depths, and habitat complexity, which likely contribute to the observed vegetation diversity.

Marine Substrates

A variety of substrates were documented in Favorite Bay (see Figure 5). Rocky substrates occurred more frequently in the narrowest (northwest) part of the bay, likely reflecting the relatively high tidal currents and velocities in this area. Substrate size tended to increase with distance from the head of the Bay and the tidal flats.

Because marine areas in the Airport Alternative 12a (Killisnoo Harbor) portion of the study area would not be directly affected by the proposed project, they were not extensively mapped or classified. No bridges are proposed for this area and potential marine impacts would be limited to indirect effects related to run-off from streams. Therefore, this area is not included in the figures of marine habitats mapped for the project. Underwater video from subtidal Killisnoo Harbor shows substrates dominated by gravels.

Marine Fishes

Various species of marine fishes were observed (see Table 9) in the study area. Several species that were collected have designated EFH. One dusky rockfish (*Sebastes ciliatus*) was collected with an extensive parasitic infection of the internal copepod *Sarcotaces* sp. Habitat requirements of species with cultural, recreational, or commercial importance that are likely to occur in the study area are described in Appendix B; timing of habitat use by these species is detailed in Table 11.

In several locations (north shore of Favorite Bay, Killisnoo Harbor), schools of adult shiner perch (estimated 3,000+ individuals) were documented. The northernmost range of this species was recently expanded after documentation of the species near Hoonah, Alaska (Johnson et al. 2003). The previous northernmost range of the species was thought to be Wrangell Island (McConnaughey and McConnaughey 1998 as cited in Johnson et al. 2003) or Sitka (Mecklenburg et al. 2002). These field data support the northward range expansion for shiner perch.

Favorite Bay is an important rearing area for Pacific herring (*Clupea pallasii*). Herring spawning has not been formally documented in Favorite Bay since the early 1980s (SWCA 2010a), though Angoon residents report observations of spawning in spring 2009. Herring spawn primarily on kelp and other aquatic vegetation (ADF&G 1994). Previous spawning locations included the big rock bisecting the narrow channel southwest of Pea Hen

Table 11. Life-Stage Timing for Fishes in Marine Habitats of the Study Area

Species	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dolly Varden[1]	nearshore presence												
	return to fresh water												
	adult annual outmigration												
	juvenile outmigration												
pink salmon[2]	return to fresh water												
	juvenile outmigration												
	estuary rearing												
sockeye salmon[3]	return to fresh water												
	outmigration												
	estuary rearing												
chum salmon[4]	return to fresh water												
	outmigration												
	estuary rearing												
coho salmon[5]	estuary rearing												
	return to fresh water												
	outmigration												
steelhead trout[6]	return to fresh water				late								
	juvenile/adult annual outmigration												
Chinook salmon[7]	adults present												
cutthroat trout[8]	adults present												
	juvenile/adult annual outmigration												
sharks (salmon shark, spiny dogfish, and others)[9]	shallow nearshore presence												
	birthing in shallow nearshore waters (spiny dogfish)												
	birthing (salmon shark)												
Pacific herring[10]	spawning in aquatic vegetation in shallow water												
	adults present												
capelin[11]	adult spawning on sand or gravel beaches												
	eggs present in gravel/sand beaches												
	larval presence/hatching												
cods[12]	walleye pollock and Pacific cod use of shallow nearshore waters												
rockfish[13]	juvenile rearing in nearshore shallows												

Table 11. Life-Stage Timing for Fishes in Marine Habitats of the Study Area

Species	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	(some species)	range of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity				
sablefish[14]	juvenile rearing in nearshore shallows	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity
greenlings[15]	lingcod spawning	peak of activity	peak of activity	peak of activity	greater activity								greater activity
	nearshore activity (multiple species)	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity
sculpins (multiple species)[16]	spawning nearshore	range of activity	range of activity	range of activity	range of activity						range of activity	range of activity	range of activity
	adult presence	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity
sandfish[17]	larvae in nearshore shallow waters			peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity				
Pacific sand lance[18]	spawning, adult and juvenile nearshore activity	range of activity	range of activity	range of activity	peak of activity	peak of activity	peak of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity
righteye flounders[19]	spawning, adult and juvenile nearshore activity	range of activity	peak of activity	peak of activity	peak of activity	peak of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity	range of activity
king crab (red, blue, golden/ brown)[20]	reproductive activity		greater activity	peak of activity	peak of activity	greater activity							
Dungeness crab[21]	reproductive activity			range of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	peak of activity	range of activity		
Tanner crab[22]	reproductive activity	peak of activity	peak of activity	peak of activity	range of activity	range of activity						range of activity	peak of activity
clams and chitons[23]	spawning							greater activity	greater activity	greater activity	greater activity		
	planktonic larvae							greater activity	greater activity	greater activity	greater activity	greater activity	greater activity

Key: range of activity; greater activity; peak of activity

Note: Timing information for skates, pricklebacks, and gunnels was not available at the time of writing.

[1] (Groot and Margolis 1991; Whalen 1991)
[2] (ADF&G 1994)
[3] (Conitz and Burril 2008; Conitz and Cartwright 2007; Groot and Margolis 1991; Halupka et al. 2000)
[4] (Groot and Margolis 1991)
[5] (ADF&G 1994; DEC et al. 2006; Johnson and Klein 2009; Pacific States Marines Fisheries Council [PSMFC] 1996)
[6] (Groot and Margolis 1991)
[7] (ADF&G 1994; DEC et al. 2006; Groot and Margolis 1991; Halupka et al. 2000)
[8] (ADF&G 1994; Yanusz 1997)
[9] (ADF&G 2009a; Carroll 2005; NOAA 2005)
[10] (ADF&G 1994)
[11] (NOAA 2005; North Pacific Fishery Management Council [NPFMC] 2009; Ormseth et al. 2008)
[12] (ADF&G 2009b; NPFMC 2005, 2009)
[13] (NPFMC 2005)
[14] (Alaska Fisheries Science Center [AFSC] 2009)
[15] (ADF&G 1994, 2006)
[16] (California Department of Fish and Game 2009; Sempier 2003; Goodson and Weisgerber 1988)
[17] (Thedinga et al. 2006)
[18] (DEC et al. 2006; NPFMC 2009; Robards et al. 1999)
[19] (AFSC 2009; DEC et al. 2006; Mecklenburg et al. 2002; NOAA 2005; Pacific Fishery Management Council 2005)
[20] (ADF&G 1985; Jewett and Onuf 1988; National Park Service [NPS] 2009)
[21] (ADF&G 1985; NPS 2009)
[22] (ADF&G 1985; NPS 2009)
[23] (DEC et al. 2006)

and the area between the big rock and Pea Hen (personal communication, Frederickson 2009), likely due to the algal cover in these areas (see Figures 6 and 7). Juvenile and adult herring use Favorite Bay and Kootznahoo Inlet year-round and are harvested for various subsistence purposes throughout the year.

No invasive fish, aquatic invertebrate, or aquatic plant species were observed in the study area during 2009 surveys by the FAA consultant team (according to lists of invasive species in Alaska Exotic Plant Information (Alaska Exotic Plant Information Clearinghouse 2010; Fay 2002; McClory and Gotthardt 2008). The softshell clam is considered a non-native species in Alaska (McClory and Gotthardt 2008), though it was present historically in the state, until glaciations in the Pleistocene era caused extinction in the Pacific Ocean (MacNeil 1965 as cited in Powers et al. 2006). Softshell clams were reintroduced to Alaska during the late 1800s via transplants of oyster (*Crassostrea virginica*) from the Atlantic Ocean and are now common throughout the state (Hanks 1963 as cited in Powers et al. 2006). They are not considered highly invasive (McClory and Gotthardt 2008) and were found in the study area (see Table 7).

3.3 Habitats and Species in the Landscape Area

3.3.1 Intertidal Areas

A large amount of intertidal area occurs throughout the landscape area due to an intricate formation of narrow channels, islands, and passages that make up Kootznahoo Inlet (see Figure 1). This network of islands and narrow passages creates a large amount of intertidal coastline. Habitats are similar to those in the study area. Kootznahoo Inlet is a popular algae harvesting area for Angoon residents. One of the most common species collected is black seaweed (*Porphyra abbottae*).

3.3.2 Subtidal Areas

No commercial clamming or scallop dredging is known to occur in the landscape area. Dungeness crab (*Cancer magister*) use mud and sand habitats at all depths of the Mitchell Bay area. Dungeness crab are harvested commercially in Favorite Bay, and shrimp are harvested commercially in Mitchell Bay (USFS 2002). The last commercial harvest of herring in Mitchell Bay occurred in 1976 (personal communication, Monagle 2008b). There are no commercial salmon fisheries in the Mitchell Bay basin (USFS 2002).

Subtidal areas in Mitchell Bay are used by numerous salmonid species for foraging and migration. Of these species, Chinook salmon are the only species that do not spawn in the landscape area (USFS 2002). The closest spawning population of Chinook occurs at Wheeler Creek (northwest Admiralty Island, (Halupka et al. 2000), which is outside the landscape area. The majority of Chinook present in Southeast Alaska originate in large trans-boundary mainland river systems (e.g., Taku, Stikine, and Alsek rivers) (Halupka et al. 2000). Chinook stocks that spawn on Admiralty Island are primarily of the spring-run type and are considered an inside-rearing stock, where rearing and growth to maturity occur almost exclusively within nearshore waters of Southeast Alaska (McPherson et al. 2003). Therefore, Chinook adults and sub-adults may be present in the landscape area throughout the year. The Admiralty Island stocks are primarily stream-type fish that spend one year in fresh water and four to six years within inshore marine waters (McPherson et al. 2003). The peak abundance of immature adult Chinook in Favorite Bay occurs in May and June (as observed by the FAA's consultant team in 2009).

Kanalku Bay supports the largest subsistence harvest of sockeye within the landscape area, primarily in July and August and is the preferred subsistence fishing area for Angoon residents (Conitz and Burril 2008). In 2001, sockeye spawning escapement in the Kanalku Creek sub-basin was extremely low (240 fish, Conitz and Burril 2008). Angoon residents voluntarily curtailed fishing during the first half of the season in 2002, and by 2006 ADF&G implemented a restricted fishing season (Conitz and Burril 2008). The average annual subsistence harvest of sockeye reported by Kanalku permit holders from 1994 to 2001 was over 1,500 fish (Conitz and Burril 2008). The USFS reports that the sport fisheries in Kanalku Bay are healthy except for the sockeye fishery, which has been depleted due to overfishing (USFS 2002).

4.0 ESSENTIAL FISH HABITAT

Essential fish habitat (EFH) is broadly defined by the Magnuson-Stevens Fishery Conservation Act (MSA) and the Sustainable Fisheries Act to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (962 *Federal Register* 66551, Section 600.10 Definitions). *Waters* include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include areas historically used by fish, if appropriate. *Substrate* includes sediment, hard bottom, structures underlying the waters, and associated biological communities. *Necessary* has been defined as the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. *Spawning, breeding, feeding, or growth to maturity* covers a species' full life cycle.

EFH is identified only for species managed under a federal fisheries management plan (FMP). In the Angoon area, most groundfish are managed under the FMP for groundfish of the Gulf of Alaska. Salmon are managed under the FMP for the salmon fisheries in the exclusive economic zone off the coast of Alaska; however, federal management has been deferred to the State of Alaska. Salmon EFH is analyzed in three parts: freshwater, nearshore, and marine. Freshwater EFH is specified by the Alaska Department of Natural Resources under AS 41.14.870(a), and salmonid streams are identified in Johnson and Klein (2009). Marine salmonid EFH includes all estuarine and marine areas used by Pacific salmon of Alaska origin (NMFS 2005). A separate EFH assessment will be completed for this project following selection of the preferred alternatives.

Marine EFH has been identified by NMFS for the following salmon species: Chinook, coho, chum, pink, and sockeye. Marine EFH has been identified by NMFS for at least one life history stage of the following non-salmonid marine species: walleye Pollock (*Theragra chalcogramma*), Pacific cod (*Gadus macrocephalus*), yellowfin sole (*Limanda aspera*), southern rock sole (*Lepidopsetta bilineata*), Alaska plaice (*Pleuronectes quadrituberculatus*), flathead sole (*Hippoglossoides elassodon*), arrowtooth flounder (*Atheresthes stomias*), sablefish (*Anoplopoma fimbria*), rockfishes, sharks, squid, skates, sculpins, and forage fish (NPFMC 2008). Favorite Creek is the only stream in the study area currently listed as having chum, coho, and pink salmon present (Johnson and Klein 2009), and was the only stream with observed pink and chum spawning during 2009 field surveys. However, other streams in the study area were identified as containing rearing habitat (Table 1) for juvenile salmonid species listed in Table 3, and will be proposed for inclusion in ADF&G's *Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes* (Johnson and Klein 2009) as stipulated by the ADF&G fish resource permit for this project. Therefore, these streams should also be considered as EFH for coho salmon. Many other species with designated EFH were documented in the study area in 2009 (see Table 9; Appendix B: Table B1).

5.0 SPECIAL STATUS SPECIES

5.1 Species Protected under the Endangered Species Act

The FAA's consultant team contacted NMFS about fish, aquatic invertebrates, and aquatic plants in the study area that are listed under the federal ESA. NMFS did not identify any such species. While not listed as threatened or endangered, forage fish and invertebrates in the area are likely to be prey of the threatened eastern U.S. stock of Steller sea lion (*Eumetopias jubatus*) and the endangered humpback whale (*Megaptera novaeangliae*). A detailed discussion on all federally protected marine mammals and seabirds is included in the *Vegetation, Wetlands, and Wildlife Resources Technical Report* (SWCA 2010b). Forage fish for ESA marine mammals and seabirds that may use the study area include Pacific herring, gunnels, pricklebacks, sand lance (*Ammodytes hexapterus*), and smelts (see Table 9; Appendix B).

5.2 Tongass National Forest Sensitive Species

The USFS has identified sensitive species in the Tongass National Forest. These are defined as "plant or animal species that are susceptible or vulnerable to habitat alterations or management activities resulting in a viability concern for the species long-term persistence. Sensitive species may be those species under consideration for official listing as endangered or threatened species, are on an official state list, or are recognized by the Regional Forester as needing special consideration to ensure viable populations and to prevent their being placed on federal or state lists" (USFS 2008).

There are no fish, invertebrate, algae, or seagrass USFS sensitive species known to occur in the study or landscape areas.

5.3 Management Indicator Species

Management indicator species (MIS) are wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements (USFS 2008a). The USFS identified the following species as fish MIS: pink salmon (*Oncorhynchus gorbuscha*) to represent anadromous fish that require freshwater gravel habitats, coho salmon (*O. kisutch*) to represent anadromous fish that require stream and lake freshwater habitats, Dolly Varden (*Salvelinus malma*) as a widely distributed freshwater species, and cutthroat trout (*O. clarkii*) due to their dependence on small freshwater stream habitats that are susceptible to management activities (USFS 1997). All four of these fish MIS occur in the study and/or landscape areas.

6.0 SUMMARY

A variety of aquatic habitats were observed in the study area. Freshwater habitats included Favorite Creek, 10 perennial stream basins, 14 seasonal stream basins, and three lakes (see Figure 3). Estuarine habitat was documented in the Favorite Bay tidal flats and at the mouths of streams 2, 3, and 4. Of the 49 streams surveyed, 15 of the streams contained suitable anadromous and resident fish habitat, two streams contained suitable resident habitat only, 12 additional streams contained potentially suitable anadromous and/or resident fish habitat, and 16 streams did not contain suitable fish habitat (see Table 1). Eleven species of fish were observed in freshwater and estuarine habitats. Marine habitats covered a wide array of depths (0 to −108 feet below MLLW), substrates (mud to bedrock), and algal cover (0 to 100% cover). Generally, water depths were greatest southeast of the Access Alternative 5 Favorite Bay Bridge (see Figure 4), substrates were coarser with distance from the tidal flats (see Figure 5), and vegetation was densest at the Access Alternative 5 Favorite Bay Bridge, Pea Hen, and the northwest part of the bay (see Figures 6 and 7). Thirty-two species of marine fish, 76 species of invertebrates, and 47 species of aquatic vegetation were noted. Additional fish and invertebrate species that are expected to use the study area but were not observed during summer 2009 field efforts are described in Appendices B and C. These species, which may be present at various times of the year, should be considered when assessing the effects of the proposed project on aquatic life due to their cultural, commercial, or recreational importance, or their protection under the MSA or an FMP. No invasive species were documented in the study area, which was relatively undisturbed by humans and appeared to be properly functioning habitat.

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Acronyms

AAC	Alaska Administrative Code
ADF&G	Alaska Department of Fish and Game
AFSC	Alaska Fisheries Science Center
AS	Alaska Statute
cm	centimeter
DEC	Alaska Department of Environmental Conservation
DOT&PF	Alaska Department of Transportation and Public Facilities
EFH	essential fish habitat
EIS	environmental impact statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FMP	fishery management plan
FSH	Forest Service Handbook
m	meter
MIS	management indicator species
MLLW	mean lower low water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPS	National Park Service
P.L.	Public Law
PCR	polymerase chain reaction
ppt	parts per thousand
PSMFC	Pacific States Marines Fisheries Council
TLMP	Tongass Land Management Plan
U.S.C.	U.S. Code
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VAI	Vigil-Agrimis, Inc.
WRCC	Western Regional Climate Center

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APPENDIX A. SPECIFICATIONS AND MEASUREMENTS OF STREAM CHANNELS INTERSECTING AIRPORT ALTERNATIVES

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Table A1. Specifications and Measurements of Field-Verified Stream Channels (Class I- IV) Intersecting Airport And Access Alternatives

Stream ID	USFS Channel Type and Stream Class	Substrate Type[1]	Bankfull Width	Wetted Width	Stream Gradient	SWCA Survey Date	Impact Area[2]	Notes on Depth
0 Favorite Creek	FPL1	CGR, SC	70 m	28 m	<2%	29-May-09	Access Alternative 2	0.45 m avg. depth
0 Favorite Creek	FPL1	CGR, SC	32 m	22 m	<2%	29-May-09	Access Alternative 3	0.65 m avg. depth, transitional area: LC2 channel type upstream of Access Alternative 3
0A	HC02	FGR, ORG	1.0 m	0.75 m	<6%	29-May-09	Access Alternative 2	0.07 m avg. depth
0C	HC02	SB, SC, MGR	1.0 m	1 m	6%	29-May-09	Access Alternative 3	0.07 m avg., 0.15 m max.
1	MM01	MGR, SC, BR	1–2.5 m	0.6–1 m	7%	8-Jun-09	Access Alternative 2	0.05 m avg., 0.3 m max.
1A	MM01	CGR, ORG	1 m	0.5 m	>6%	8-Jun-09	Access Alternative 2	0.025 m avg.
2	MM02	MGR, SC, BR	1–2 m	1–1.5 m	6–10%	25-Jun-09	Access Alternative 3	0.025–0.08 m avg.
2	MM01	SC	2 m	1.5 m	>5%	28-May-09	Access Alternative 2	0.05 m avg.
2A	PA01	MGR, SC, ORG	1 m	0.6 m	<2%	28-May-09	Access Alternative 2	0.025 m avg.
3	PA01	SS	1 m	0.7 m	<1%	13-Jul-09	Access Alternative 3	Narrow muskeg channel, 1 m avg.
3	MMM1	MGR, SC	8–10 m	3 m	1%	30-May-09	Access Alternative 2	0.2 m avg., 0.45 m max.
3	MCS1	BR, SC	10–15 m	1–1.5 m	2%	30-May-09	Access Alternative 2	0.45 m max.
4	MMS1	SS	2 m	1 m avg.	2–6%	30-May-09	Access Alternative 3	0.15 m avg.
4	MCS1	MGR, SS, SC	2 m	1.1 m	1%	30-May-09	Airport Alternative 4, Access Alternative 2	0.1 m avg.
4	MMS1	SS	2 m	0.8 m	2–6%	30-May-09	Airport Alternative 4	0.35 m avg.
4	PAB1	SS, ORG	5 m	3–3.7 m	1%	30-May-09	Airport Alternative 4	0.45 m avg.
5	PAS1	SS, ORG	1.0 m	1.0 m	<2%	31-May-09	Access Alternative 2, Access Alternative 3	Pondlike 0.5 m avg.
6	HC02	FGR, SS	1 m	0.6 m	≥6%	5-Jun-09	Airport Alternative 3a, Access Alternative 3	0.15 m max.
8	MM01	FGR, ORG	2 m	0.6 m	3%	2-Jun-09	Airport Alternative 3a	0.3 m max.

Table A1. Specifications and Measurements of Field-Verified Stream Channels (Class I- IV) Intersecting Airport And Access Alternatives

Stream ID	USFS Channel Type and Stream Class	Substrate Type[1]	Bankfull Width	Wetted Width	Stream Gradient	SWCA Survey Date	Impact Area[2]	Notes on Depth
8C	PA01	SS, ORG	1 m	1 m	1%	16-Jul-09	Airport Alternative 3a	0.5 m max.
9B	MMO1	FGR, ORG	2 m	1 m	3%	31-May-09	Access Alternative 3	
9D	PAB1	SS, ORG	4 m	2 m	2%	17-Jul-09	Airport Alternative 4	Beaver ponds 0.2 m avg.
9E	FP01	SS	1 m	<1 m	4%	31-May-09	Airport Alternative 4	0.3 m max.
9F	PAB1	SS	4 m	3 m	1%	17-Jul-09	Airport Alternative 4	1 m max.
9G	PAB1	SS	2 m	1.5 m	1%	17-Jul-09	Airport Alternative 4	0.5 m max.
10	PA02	FGR, SS	1 m	0.5 m	<2%	19-Jun-09	Airport Alternative 12a	0.1 m avg.
10A	FP02	FGR, SS	1 m	0.4 m	<2%	19-Jun-09	Airport Alternative 12a	0.1 m avg.
12	ESO1	SS	wetland	0.6 m channel	1%	1-Jun-09	Airport Alternative 12a	Pond 0.2 m max.
13	FP01	SS, FGR	2 m	0.5 m	2%	7-Jun-09	Airport Alternative 12a	0.05 m avg.
17	MM01	SS, ORG	0.6 m	0.6 m	1%	30-May-09	Access Alternative 2	Wetland pool near mouth, 0.025 avg.
22	MM01	SS, FGR, SC	2 m	1 m	2%–6%	4-Jun-09	Access Alternative 2	0.15 m max.
26	HC02	SS, FGR, SC	1 m avg.	0.6 m	8%	5-Jun-09	Airport Alternative 3a	0.3 m max.

Notes: Stream locations shown in Figure 3. Additional hydrologic descriptions of streams in VAI (2010). All units given in metric to meet USFS standards. Channel Types defined in Paustian et al (2009), stream class defined in USFS (2008).

[1] BR = Bedrock, CGR = Coarse Gravel, FGR = Fine Gravel, MGR = Medium Gravel, ORG = Organic, SB = Small Boulder, SC = Small Cobble, SS = Sand/silt

APPENDIX B. HABITATS USED BY FISH AND AQUATIC INVERTEBRATE SPECIES IN THE ANGOON AIRPORT STUDY AND LANDSCAPE AREAS

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Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
Sharks:						
salmon shark (*Lamna ditropis*) spiny dogfish shark (*Squalus acanthias*) blue shark (*Prionace glauca*) sleeper shark (*Somniosus pacificus*)	N/A	N/A	Salmon shark: pelagic; present year round; peak presence in summer during salmon and herring runs; mate in summer, birth in spring Spiny dogfish: migrate to shallow waters in summer for birthing Sep–Jan; usually near soft bottom <492 ft (<150 m)	Protected species (FMP)	(ADF&G 2009a; Carroll 2005; DEC et al. 2006; NOAA 2005)	Occasionally caught by sport anglers in Chatham Strait (anecdotal); in SE Alaska (Orsi et al. 2000; Orsi et al. 2004)
Skates:						
family Rajidae (Alaska skate, big skate, longnose skate, etc.)	N/A	Common in bays and shallow flats with little current; feed on clams and other infauna	On bottom; soft substrates; usually in deeper waters	Protected species (FMP)	(DEC et al. 2006; Mecklenburg et al. 2002)	In SE Alaska (DEC et al. 2006)
Herrings:						
Pacific herring (*Clupea pallasii*)	N/A	Occur in estuaries year-round; migratory; spawn in aquatic vegetation in shallow water Mar through Jun (peak Apr–May); present Mar through Oct	Migratory; spawn in aquatic vegetation in shallow water Mar through Jun (peak Apr–May); present year-round, peak presence Mar through Oct	Commercial, cultural, protected species (MSA)	(ADF&G 1994; DEC et al. 2006; PSMFC 1996; Thorsteinson 1962)	Adults (including fecund females) in Favorite Bay observed in 2009; historic spawning in Favorite Bay (SWCA 2010a)
Smelts:						
surf smelt (*Hypomesus pretiosus*)	Rarely	Sometimes found in brackish water	Migratory; schools spawn in surf on ocean beaches of coarse sand to fine gravel	Protected species (FMP, MSA)	(Bargman 1998; Mecklenburg et al. 2002)	In waters surrounding Admiralty Island (Johnson et al. 2005)

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
capelin (*Mallotus villosus*)	N/A	N/A	Neritic; spawn on intertidal sand/gravel beaches May–July; adults use waters 164–328 ft deep	Protected species (FMP, MSA)	(NOAA 2005)	In waters surrounding Admiralty Island (Johnson et al. 2005)
Salmons and trouts:						
cutthroat trout (*Oncorhynchus clarkii*)	Anadromous and nonmigratory types; spawn in small isolated headwater streams Apr–Jun; rear in streams, beaver ponds, sloughs, and lakes 2–4 years; adults typically overwinter in lakes	Anadromous; stay close to shoreline; may spawn 2–3 times; juveniles may rear in estuary during summer	Anadromous; stay close to shoreline; at sea 12–150 days; seldom travel more than 30–45 miles from home stream	Cultural, recreational	(ADF&G 1994; Mecklenburg et al. 2002)	In lakes, Favorite Creek, and Favorite Creek estuary (observed by SWCA in 2009)
pink salmon (*Oncorhynchus gorbuscha*)	Adults spawn in lower reaches of streams with gravel/cobbles Aug–Sep; juveniles leave fresh water soon after hatching in spring	Juvenile rearing late spring to summer; adult migration late summer; some adults observed spawning in the freshwater tidally influenced zone of lower Favorite Creek	Juvenile rearing late spring to summer; stay close to shore for several weeks (until 6–8 cm long) then move offshore; adults return in summer	Commercial, cultural, protected species (FMP, MSA), recreational	(ADF&G 1994; Groot and Margolis 1991; Mecklenburg et al. 2002)	Spawning observed in 2009 in Favorite Creek, juveniles in Favorite Bay
chum salmon (*Oncorhynchus keta*)	Adult migration late summer to fall; spawn primarily Aug–Sep in gravel areas with upwelling in lower reaches of streams or side channels; juveniles leave fresh water soon after hatching in spring	Juvenile rearing late spring to fall; adult migration late summer to fall; may spawn in the freshwater tidally influenced zone of lower Favorite Creek in gravel/cobbles	Juvenile rearing late spring to fall; stay close to shore for several months then move to open ocean; adults return after 3–6 years at sea	Commercial, cultural, protected species (FMP, MSA), recreational	(ADF&G 1994; Groot and Margolis 1991; Mecklenburg et al. 2002)	Spawning observed by SWCA in 2009 in Favorite Creek, juveniles in Favorite Bay

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
coho salmon (*Oncorhynchus kisutch*)	Adult migration late summer to fall; spawn in fall in gravels of headwater streams; fry emerge in spring and occupy shallow stream margins; rear 1–5 years in ponds, lakes, and pools with large wood or undercut banks; juveniles overwinter in off-channel areas	Smolt outmigration in spring; juvenile fry estuarine rearing spring–fall in brackish areas before returning to fresh water; adult migration late summer to fall	Smolt rearing in late spring to summer, gradually moving offshore; adults return after 1–3 years at sea	Commercial, cultural, protected species (FMP, MSA), recreational	(ADF&G 1994; Groot and Margolis 1991; Mecklenburg et al. 2002)	Adults observed in Favorite Bay, juveniles in Favorite Bay and Favorite Creek by SWCA in 2009
steelhead trout (*Oncorhynchus mykiss*)	Not known to use streams in the study area	Not known to rear in estuarine habitats in the study area	Adults may use study area for migration and foraging; may have multiple spawning migrations	Cultural, recreational	(ADF&G 1994; Mecklenburg et al. 2002)	Nearest spawning Hasselborg Creek (Geiger and ADF&G staff 2007)
sockeye salmon (*Oncorhynchus nerka*)	Adult migration in summer; spawning primarily in Sep in streams or along lake beaches with upwelling; juveniles emerge in the spring and rear in lakes 1–3 years; landlocked kokanee may be present in lakes year round	Juvenile rearing in spring and early summer; adult migration in summer	Juvenile outmigration in spring; rear close to shore before moving offshore; adults return to fresh water after 1–4 years at sea	Commercial, cultural, protected species (FMP, MSA), recreational	(ADF&G 1994; Groot and Margolis 1991; Mecklenburg et al. 2002; USFS 2006)	Primarily in Kanalku Bay and Hasselborg Creek; observed in Favorite Bay, one adult observed in Favorite Creek by SWCA in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
Chinook salmon (*Oncorhynchus tshawytscha*)	Not known to use streams in the study area	Juveniles not known to rear in estuarine habitats in the study area	Juvenile rearing year round in Chatham Strait; adults present in nearshore areas almost year-round (inside rearing stock), in Favorite Bay in spring	Commercial, cultural, protected species (FMP, MSA), recreational	(ADF&G 1994, 2008a; Groot and Margolis 1991; Halupka et al. 2000; Mecklenburg et al. 2002)	Adults in Favorite Bay observed by SWCA in 2009
Dolly Varden (*Salvelinus malma*)	Anadromous and nonmigratory types; spawn Aug–Nov in stream of origin; juveniles year-round in lakes and streams; adults typically overwinter in lakes	Juveniles present year-round, peak abundance in spring; adults migrate annually to salt water in spring, return to fresh water in fall; rarely spawn more than twice	Juveniles may be present year-round, peak abundance in spring; peak adult abundance in salt water May–Jul	Cultural, recreational	(ADF&G 1994)	In lakes, Favorite Creek estuary, and Favorite Bay observed in 2009
Cods:						
walleye pollock (*Theragra chalcogramma*)	N/A	N/A	Schools of juveniles abundant in northwest Favorite Bay in spring 2009; juveniles in upper 131 ft of water column; adults unlikely to use study area	Commercial, protected species (FMP, MSA)	(DEC et al. 2006; Mecklenburg et al. 2002; NOAA 2005)	Juveniles in Favorite Bay observed in 2009
Pacific cod (*Gadus macrocephalus*)	N/A	N/A	Benthic, demersal, and migratory: deep in winter/spring during spawning (Jan–Apr) and shallow (<328 ft [<100 m]) in summer; use mud, sand, and gravel substrates	Commercial, cultural, protected species (FMP, MSA)	(McCain et al. 2005)	In Favorite Bay observed in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use: Freshwater	Habitat Use: Estuary	Habitat Use: Saltwater-Nearshore	Importance[1]	Species Information	Documentation in Study Area
Rockfishes:						
copper rockfish (*Sebastes caurinus*) yelloweye rockfish (*S. ruberrimus*)	N/A	N/A	Demersal shelf rockfish assemblage, close to bottom in rocky, shallow-water areas; copper <393 ft (<120 m), in eelgrass and kelp; yelloweye >164 ft (>50 m)	Commercial, cultural, protected species (FMP, MSA), recreational	(Johnson et al. 2003; Mecklenburg et al. 2002)	In NMFS scoping comments (Mecum 2009), presence in study area unknown; yelloweye observed near Hood Bay by SWCA in 2009
rougheye rockfish (*Sebastes aleutianus*) shortraker rockfish (*S. borealis*) yellowtail rockfish (*S. flavidus*) Pacific ocean perch (*S. alutus*)	N/A	N/A	Slope assemblage; on bottom >328 ft (>100 m) depth (yellowtail >164 ft [>50 m] depth)	Commercial, cultural, protected species (FMP, MSA), recreational	(Mecklenburg et al. 2002)	In NMFS scoping comments (Mecum 2009), presence in study area unknown
silvergray rockfish (*Sebastes brevispinis*)	N/A	N/A	Slope assemblage; on bottom in offshore deeper waters (>328 ft [>100 m]), juveniles occasionally in bays and associated with kelp beds	Commercial, cultural, protected species (FMP, MSA), recreational	(AFSC 2009; Mecklenburg et al. 2002)	Observed in Chatham Strait in 2009
quillback rockfish (*Sebastes maliger*)	N/A	N/A	Demersal shelf; most common rockfish in Killisnoo Harbor during summer months; rocky bottom and reefs; inshore shallower than 476 ft (145 m)	Commercial, cultural, protected species (FMP, MSA), recreational	(Mecklenburg et al. 2002)	Observed in Killisnoo Harbor in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
dusky rockfish (*Sebastes ciliates*)	N/A	N/A	Pelagic shelf; in schools around rocky reefs; darker variant in waters <328 ft (<100 m); in eelgrass and kelp	Commercial, cultural, protected species (FMP,MSA), recreational	(Johnson et al. 2003; Mecklenburg et al. 2002)	Observed in Favorite Bay in 2009
black rockfish (*Sebastes melanops*)	N/A	N/A	Pelagic; rocky substrates and reefs; in schools 492 ft (150 m) to surface; juveniles nearshore in eelgrass and kelp during summer	Commercial, cultural, protected species (MSA), recreational	(Johnson et al. 2003; McCain et al. 2005; Mecklenburg et al. 2002)	Observed at Danger Point in 2009
yelloweye rockfish (*Sebastes ruberrimus*)	N/A	N/A	Demersal shelf; rocky substrates, reefs and boulder fields; 164–1,312 ft (50–400 m) deep	Commercial, cultural, protected species (FMP, MSA), recreational	(McCain et al. 2005; Mecklenburg et al. 2002)	Observed in Hood Bay in 2009
Sablefishes:						
sablefish (black cod) (*Anoplopoma fimbria*)	N/A	N/A	Soft substrates, juveniles nearshore in bays or shallow water near bottom 2–5 years; adults in deeper waters <2,297 ft (<700 m); spawn at depth in winter	Commercial, recreational, protected species (FMP, MSA)	(DEC et al. 2006; Mecklenburg et al. 2002)	Observed in Chatham Strait in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
Greenlings:						
lingcod (*Ophiodon elongates*)	N/A	Juveniles associated with kelp and eelgrass, rarely use shallow bays in SE Alaska inside waters, but may be present in estuaries	Juveniles use aquatic vegetation; spawn Dec through Apr (peak Jan–mid-Mar); inshore rocky reefs 33–328 ft (10–100 m) deep; high current areas	Commercial, cultural, recreational	(ADF&G 1994; AFSC 2009; DEC et al. 2006; McCain et al. 2005; Mecklenburg et al. 2002)	Observed in Hood Bay in 2009
kelp greenling (*Hexagrammos decagrammus*) whitespotted greenling (*H. stelleri*), etc.	N/A	Whitespotted most common greenling in bays and estuaries; around reefs and kelp beds	Shallow rocky areas and reefs; around algae and kelp beds; <328 ft (<100 m)	Cultural, juveniles important forage species in some areas, recreational	(DEC et al. 2006; Mecklenburg et al. 2002)	Kelp and whitespotted greenling observed in Favorite Bay in 2009
Sculpins:						
northern sculpin (*Icelinus borealis*)	N/A	N/A	Mud, silt, sand, gravel, pebble and shell bottoms at depths of 15–810 ft (4.6–247 m)	Protected species (MSA)	(Mecklenburg et al. 2002)	In waters surrounding Admiralty Island (Johnson et al. 2005)
silverspotted sculpin (*Blepsias cirrhosus*)	N/A	N/A	Near shore to depths of 154 ft (47 m); among seaweed and rocks	Protected species (MSA)	(Mecklenburg et al. 2002)	In waters surrounding Admiralty Island (Johnson et al. 2005)
ribbed sculpin (*Triglops pingelii*)	N/A	N/A	Sand, pebble, and rocky bottoms at depths of 66–492 ft (20–150 m)	Protected species (MSA)	(Mecklenburg et al. 2002)	Observed in Favorite Bay in 2009
buffalo sculpin (*Enophrys bison*)	N/A	N/A	Rocky and sandy areas; occasionally in tidepools; spawn in late winter–early spring	Protected species (MSA)	(Mecklenburg et al. 2002)	In waters surrounding Admiralty Island (Johnson et al. 2005)

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
red Irish lord (*Hemilepidotus hemilepidotus*)	N/A	N/A	Rocky intertidal to 328 ft, spawn in intertidal or shallow water	Protected species (FMP, MSA)	(Johnson et al. 2005; Mecklenburg et al. 2002; NOAA 2005)	Observed in Favorite Bay in 2009
Pacific staghorn sculpin (*Leptocottus armatus*)	Occasionally in lower reaches of rivers and streams	Sand/silt/shell-bottomed areas; eelgrass beds; typically in lower reaches of estuaries where salinity is high	Intertidal to subtidal sand/silt/shell-bottomed areas; eelgrass beds	Protected species (MSA)	(Mecklenburg et al. 2002)	Observed in Favorite Bay in 2009
great sculpin (*Myoxocephalus polyacanthocephalus*)	N/A	N/A	Intertidal on sand and mud bottoms; also around rocks; often near shore	Protected species (FMP, MSA)	(Johnson et al. 2005; Mecklenburg et al. 2002; NOAA 2005)	Observed in Favorite Bay in 2009
tidepool sculpin (*Oligocottus maculosus*)	N/A	Resident of tidepools and sheltered intertidal areas	Resident of tidepools and sheltered intertidal areas	Protected species (MSA)	(Mecklenburg et al. 2002)	Observed in Salt Lagoon in 2009
Surfperches:						
shiner perch (*Cymatogaster aggregata*)	Enters brackish and fresh waters	Enters brackish and fresh waters	Shallow waters in bays, near eelgrass, reefs, piers, and pilings	Potential forage fish for birds and fish	(Johnson et al. 2005; Mecklenburg et al. 2002)	Observed in Salt Lagoon and Favorite Bay in 2009
Pricklebacks:						
arctic shanny (*Stichaeus punctatus*) snake prickleback (*Lumpenus sagtta*), etc.	N/A	N/A	Shanny in shallow subtidal rocky to sandy; 180 ft (<55 m); on bottom; snake prickleback in sand with silt, pebbles, and stones 656 ft (<200 m)	Protected species (FMP, MSA)	(Mecklenburg et al. 2002)	Observed in Favorite Bay in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
Gunnels:						
crescent gunnel (*Pholis laeta*) penpoint gunnel (*Apodichthys flavidus*), etc.	N/A	N/A	Intertidal to subtidal in eelgrass, algae, or rocks	Protected species (FMP, MSA)	(Mecklenburg et al. 2002)	Crescent and penpoint gunnel observed in Favorite Bay in 2009
Sandfishes:						
Pacific sandfish (*Trichodon trichodon*)	N/A	N/A	Adults usually 328–656 ft (100–200 m) over sand or mud; spawn nearshore in algae; may school in bays; larvae and juveniles shallower, nearshore; partially bury in sand or mud; adults prey on juvenile salmon	Protected species (FMP, MSA)	(DEC et al. 2006; Froese and Pauly 2008; Mecklenburg et al. 2002; Orsi et al. 2000)	Habitat present; In waters surrounding Admiralty Island (Johnson et al. 2005)
Sand Lances:						
Pacific sand lance (*Ammodytes hexapterus*)	N/A	Euryhaline, use eelgrass beds, fine gravel and sand in shallow waters near shore	Use fine gravel and sand in shallow waters near shore; spawn Apr through Jun along sandy shorelines	Protected species (FMP, MSA)	(Conners and Guttormsen 2005; DEC et al. 2006; Johnson et al. 2005; Robards et al. 1999)	Habitat present; in waters surrounding Admiralty Island (Johnson et al. 2005)
Righteye flounders:						
arrowtooth flounder (*Atheresthes stomias*)	N/A	N/A	Juveniles rear in shallow waters; soft bottom; adults usually offshore	Commercial, cultural (bait fish), protected species (FMP, MSA)	(NOAA 2005)	Observed in Chatham Strait in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
flathead sole (*Hippoglossoides elassodon*)	N/A	N/A	Silty, muddy bottoms, near shore typically <1,201 ft (<366 m); spawn Feb–Apr at 164–984 ft (50–300 m) Inhabit deeper areas of bays, but move near shore to forage	Protected species (FMP, MSA)	(DEC et al. 2006; Mecklenburg et al. 2002; NOAA 2005; NPFMC 2008)	In NMFS scoping comments (Mecum 2009), presence in study area unknown
Pacific halibut (*Hippoglossus stenolepis*)	N/A	Adults and sub-adults in areas with sand, mud and gravel substrate	Juveniles in nearshore areas 7–164 ft (2–50 m) with soft substrates; spawns in winter 591–1,476 ft (180–450 m) along continental slope	Commercial, cultural, protected species (FMP), recreational	(ADF&G 2009a; AFSC 2009)	Observed in Favorite Bay and Killisnoo Harbor in 2009
English sole (*Parophrys vetulus*)	N/A	Soft bottom from lower intertidal to 820 ft (250 m); juveniles flourish in shallow bays and tidal flats	Soft bottom from lower intertidal to 820 ft (250 m); juveniles flourish in shallow bays and tidal flats	Protected species (FMP, MSA)	(Mecklenburg et al. 2002)	In Sitkoh Bay, Chichagof Island (Johnson et al. 2005)
yellowfin sole (*Limanda aspera*)	N/A	Spawn and rear in shallow subtidal areas of bays and estuaries	Soft bottoms, at depths of 33–1,969 ft, typically <492 ft; spawn and rear in shallow water; juveniles near shore 3–5 years	Protected species (FMP, MSA)	(DEC et al. 2006; Mecklenburg et al. 2002; NOAA 2005)	In waters surrounding Admiralty Island (Johnson et al. 2005)
southern rock sole (*Lepidopsetta bilineata*)	N/A	Sand and gravel bottom; demersal; inhabit deeper areas of bays, but often move into nearshore areas to forage	Sand and gravel bottom; demersal; juveniles can be abundant in shallow nearshore waters; spawn in summer	Protected species (FMP, MSA)	(AFSC 2009; DEC et al. 2006; NOAA 2005)	Observed in Favorite Bay in 2009

Table B1. Habitats Used by Important Fishes Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
starry flounder (*Platichthys stellatus*)	N/A	Soft-bottomed areas; spawn (late winter to early summer) and rear in shallow subtidal areas of bays and estuaries; resident in shallow flats, estuaries, and lagoons throughout their life	Soft-bottomed areas; spawn (late winter to early summer) and rear in shallow subtidal areas of bays and estuaries; resident in shallow flats, estuaries, and lagoons throughout their life	Protected species (FMP, MSA)	(DEC et al. 2006; Mecklenburg et al. 2002)	Observed in Favorite Bay and Killisnoo Harbor in 2009
rex sole (*Glyptocephalus zachirus*)	N/A	N/A	Sandy or muddy bottom; shallow water near shore to offshore; usually 164–1,476 ft (50–450 m); prefer deep portions of submarine canyons	Protected species (FMP, MSA)	(Mecklenburg et al. 2002; NPFMC 2008)	In NMFS scoping comments (Mecum 2009), presence in study area unknown

Note: [1] Table limited to species that are 1) protected (by the Magnuson-Stevens Fishery Conservation and Management Act [MSA] or Fishery Management Plans [FMP]), 2) commercially, culturally, or recreationally important; cultural significance determined from SWCA 2010b and/or 3) prey for sensitive marine mammals or bird species (SWCA 2010b).

All observations made by SWCA in 2009 were associated with this technical report. For exact locations of observations see Tables 3 and 8.

Table B2. Habitats Used by Important Invertebrates Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
Crustaceans:						
acorn barnacle (*Balanus glandula*)	N/A	Less common	Upper intertidal, mainly on rocks	Prey for sensitive bird species	(Cowles 2006)	Observed in Favorite Bay and Salt Lagoon in 2009
Dungeness crab (*Cancer magister*)	N/A	Up to head of tide in estuaries, often near eelgrass beds; juveniles in intertidal to shallow subtidal	Resident of sand/mud substrates, mate spring–fall; adults primarily subtidal to 756 ft (230 m)	Commercial, cultural	(ADF&G 1994; DEC et al. 2006)	Observed in Favorite Bay in 2009
Tanner crab (*Chionoecetes bairdi*)	N/A	N/A	Juveniles at 33–66 ft with mud substrates; diel migrations, near depth of chlorophyll maximum diurnally; mating Feb–Jun nearshore; peak hatching Apr–Jun	Commercial, cultural, protected species (FMP)	(ADF&G 1994; NOAA 2005)	Observed in Favorite in 2009
red king crab (*Paralithodes camtschaticus*)	N/A	N/A	Juveniles use boulders/cobbles at depths <164 ft; adults migratory, mate in shallow water <164 ft Jan–June	Commercial, cultural, protected species (FMP)	(NOAA 2005)	In SE Alaska (ADF&G 1997)
blue king crab (*Paralithodes platypus*)	N/A	N/A	Juveniles use gravel/cobbles with shell hash at depths 131–197 ft; adults use mud/sand at depths 148–246 ft, migrate to shallow water in late winter, mate in mid spring	Commercial, cultural, protected species (FMP)	(NOAA 2005)	In SE Alaska (ADF&G 1997)

Table B2. Habitats Used by Important Invertebrates Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
golden (brown) king crab (*Lithodes aequispinus*)	N/A	N/A	Usually >300 ft, steep sided ocean bottoms	Commercial, cultural, protected species (FMP)	(ADF&G 1997)	In SE Alaska (ADF&G 1997)
krill (order Euphausiacea)	N/A	N/A	In large swarms	Protected species (FMP, MSA)	(Conners and Guttormsen 2005)	In SE Alaska (DEC et al. 2006)
shrimp (family Pandalidae: spot, coonstripe, pink, sidestripe, humpy shrimp, etc.)	N/A	May use brackish waters	Coonstripes and spots generally near rockpiles, coral, and debris-covered bottoms; pinks, sidestripes, and humpy shrimp over muddy bottom; spawn in fall, hatch in spring	Commercial, cultural; recreational,	(ADF&G 1994; DEC et al. 2006)	Several species observed in Favorite Bay in 2009
Echinoderms:						
giant sea cucumber (*Parastichopus californicus*)	N/A	Primarily hard bottom with algae	Intertidal to subtidal: common in protected bays on hard and sandy substrates	Commercial, cultural	(ADF&G 2008b); Observed by SWCA in 2009	Observed in Favorite Bay in 2009
Mollusks:						
gumboot chiton (*Cryptochiton stelleri*) black leather chiton (*Katharina tunicata*) lined chiton (*Tonicella lineata*), etc.	N/A	Black leather chiton common in middle and low intertidal zones	Low intertidal to subtidal, on rocky substrates, especially in kelp beds	Cultural; prey for sensitive bird species	(Cowles 2006)	Observed in Favorite Bay in 2009; black leather chiton most common in study area

Table B2. Habitats Used by Important Invertebrates Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
squid (family Gonatidae)	N/A	N/A	Eggs of nearshore neritic species attached to rocks; reproduce spring–early summer; juveniles at all depths and near shore	Cultural, protected species (FMP, MSA)	(NOAA 2005)	In SE Alaska (Orsi et al. 2004)
giant Pacific octopus (*Enteroctopus dofleini*)	N/A	N/A	Eggs on rocks/cobble, adults may also use sand/mud	Cultural, protected species (FMP, MSA), recreational	(NOAA 2005)	Observed in Killisnoo Harbor in 2009
Clams: Pacific littleneck clam (*Protothaca staminea*) butter clam (*Saxidomus giganteus*) gaper clam (*Tresus capax*) Pacific geoduck (*Panopea abrupta*) softshell clam (*Mya arenaria*) cockle (*Clinocardium nuttalli*), etc.	N/A	Common in estuaries and bays; gapers and geoducks deeply embedded in sand or mud; cockles more abundant near eelgrass in Favorite Bay	Low intertidal to subtidal in sand, mud, or gravel; littlenecks may be in gravel among rocks on open coast	Commercial, cultural, recreational	(Cowles 2006; DEC et al. 2006; RaLonde 1996; Rudy and Rudy 1983); Observed by SWCA in 2009	All species except geoduck observed in Favorite Bay in 2009
Pacific blue mussel (*Mytilus trossulus*)	N/A	In quiet bays	Intertidal and subtidal up to 16 ft (5 m) deep; densely packed around rock, wood, or other solid structure	Prey for sensitive bird species and sea otters	(Cowles 2006)	Observed in Favorite Bay in 2009
mask limpet (*Tectura persona*), shield limpet (*Lottia pelta*), etc.	N/A	N/A	Upper intertidal rocky areas	Prey for sensitive bird species	(Cowles 2006)	Observed in Favorite Bay in 2009

Table B2. Habitats Used by Important Invertebrates Likely to Occur in the Study Area

Common Name (Scientific Name)	Habitat Use			Importance[1]	Species Information	Documentation in Study Area
	Freshwater	Estuary	Saltwater-Nearshore			
pinto abalone (*Haliotis kamschatkana*)	N/A	N/A	Usually along outside coast in marine waters; in thick kelp beds and near sandy bottom; primarily subtidal to 30–40 ft	Commercial, cultural	(ADF&G 1994)	In SE Alaska (ADF&G 1994)
Pacific weathervane scallop (*Patinopecten caurinus*)	N/A	N/A	Occur in beds; spawn in Jun and Jul; sand, gravel and rock bottoms 148–591 ft (45–180 m); juveniles attach to seaweed	Commercial, cultural, protected species (FMP), recreational	(ADF&G 1994; DEC et al. 2006)	In SE Alaska (ADF&G 1994)
pink scallop (bay scallop) (*Chlamys* sp.)	N/A	N/A	Occur shallower than weathervanes 49–197 ft (15–60 m)	Cultural, recreational	(DEC et al. 2006)	Observed in Favorite Bay in 2009

Note: [1] Table limited to species that are 1) protected (by the Magnuson-Stevens Fishery Conservation and Management Act [MSA] or Fishery Management Plans [FMP]), 2) commercially, culturally, or recreationally important; cultural significance determined from SWCA 2010b and/or 3) prey for sensitive marine mammals or bird species (SWCA 2010b).

All observations made by SWCA in 2009 were associated with this technical report. For exact locations of observations see Table 7.

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APPENDIX C. SEAGRASS OBSERVED IN THE STUDY AREA

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Seagrass collected June 4, 2009, in Favorite Bay, AK, preserved in ethanol.
Notched, closed leaf sheaths, blades about 1 mm wide, rhizomatous.

Table C1. A Comparison of Morphological Characteristics of Seagrasses

Parameter	Angoon Specimens (*Zostera marina*)	Pacific Eelgrass (*Zostera marina*)	Dwarf Eelgrass (*Zostera japonica*)
Habitat	Small patches (~5 square feet) documented on tidal flats (sand/silt/shell) in small depressions that held some water (≥3 inches) at extreme low tides	Sublittoral region, only rarely being exposed at low tide; occurs in more or less sheltered areas on soft mud or firm sand[1] Subtidal area[2]	Intertidal marine waters; −2 to 0 m[1] Mud flats between low and semi-high tide marks[2]
Leaf length	5.5 inches	Up to 3 feet long	4–12 inches
Leaf width	0.6 inches (1.5 mm)	Up to 3.1 inches (8 mm)	Barely 0.6 inches (1.5 mm)
Blades	3 nerved (some with flowering shoots)	3–7 nerved, and round at the apex	3 nerved
Sheath	Closed and notched	Leaf sheath tubular, without membranous flaps, rupturing with age[1]	Leaf sheath open, with 2 membranous flaps, which persist without rupturing[1], overlap each other, and may be up to 2 inches long
Notes	Collected June 4, 2009, near Angoon, Alaska; patches of *Z. marina* documented within 0.5 mile from sample collection point, with specimens much larger (18 inches long, 1.6 inches [4 mm] wide)	Native species; observed throughout study area	Not known to occur in Alaska; originally from Asia; introduced to Oregon, Washington, and British Columbia

Note: Z. marina and *Z. japonica* descriptions from Alaska Natural Heritage Program (2005). *Z. japonica* is considered by some to belong to the genus *Nanozostera*.

[1] Flora of North America Association (Flora of North America Association 2008)

[2] Burke Museum of Natural and Cultural History (Burke Museum of Natural and Cultural History 2006)

APPENDIX J
WATER RESOURCES TECHNICAL MEMORANDUM

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The FAA has made every effort to ensure that the information in the *Draft Angoon Airport Environmental Impact Statement* is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Leslie Grey at (907) 271-5453 or Leslie.Grey@faa.gov if they would like access to the information.

Angoon Airport Environmental Impact Statement
Water Resources Technical Memorandum

Prepared for

The Federal Aviation Administration,

The Alaska Department of Transportation and Public Facilities, and

SWCA Environmental Consultants

Prepared by

VIGIL AGRIMIS
design professionals

819 SE Morrison Street, Suite 310
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September 20, 2011

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1.0 Introduction

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF), the Sponsor, for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska (Figure 1 in Appendix A). At present, there is no land-based airport runway in or near Angoon. The DOT&PF prepared the Angoon Airport Master Plan (DOT&PF 2007) for their proposed airport location. The EIS is evaluating two alternative airport locations in addition to the DOT&PF's proposed location and multiple access road alternatives associated with those airport locations (Figure 2 in Appendix A). (Note: Access Alternative 5 was studied and is shown on Figure 3 [Appendix A] in this report, but it was subsequently dropped from consideration in the EIS.) Two of the airport alternatives and portions of their associated access roads are located on lands administered by the U.S. Forest Service (USFS) within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (hereafter referred to as the Monument–Wilderness Area).

The proposed land-based airport would be a small, commercial airport typical of other rural airports in the region. The initial construction would include a 3,300-foot-long paved runway, with the ability to extend the runway length to 4,000 feet in the future if air traffic warrants it. The airport would have a short, perpendicular taxiway leading from the runway to a small apron area, which may eventually contain a passenger shelter building. The proposed airport is being designed to accommodate a future full-parallel taxiway, but this taxiway would not be constructed initially and would only be built if air traffic demands are sufficient to warrant this additional safety and efficiency feature. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. Regardless of the airport location under consideration, an access road would need to be constructed to connect the new airport to the existing Angoon road system. The access road would have a gravel surface and would be two lanes wide (one lane in each direction) with 9-foot-wide lanes and minimal shoulders.

This water resources technical report was completed by the FAA's water resources consultant team (Vigil-Agrimis, Inc.) to support the development of the EIS. Angoon is located on the western side of Admiralty Island in Southeast Alaska and is the island's only permanent settlement. The community of approximately 430 residents (2008 data (DOL&WD 2009) is located approximately 60 miles south of Juneau and 50 miles northeast of Sitka. Figure 1 (in Appendix A) is a vicinity map and Figure 2 (in Appendix A) is a project location map.

For the EIS analysis, three potential locations are being investigated that were either proposed in the Master Plan or are variations of locations proposed in the Master Plan (Figure 3 in Appendix A). When the water resources fieldwork was conducted and this technical report was originally prepared, four airport alternatives were under consideration for inclusion in the EIS. Subsequently, one alternative, Airport Alternative 3, was dropped. Data gathered for water resources for Alternative 3 are presented in this report for general information purposes only and to communicate the results of the field studies in that portion of the area. This document describes the existing conditions of the water resources within the vicinity of the airport and access alternatives. This area is hereafter referred to as the study area.

1.1 Project Issues

Three airport alternatives (Airport Alternatives 3, 3A, and 4) are located across Favorite Bay from Angoon (Figure 3 in Appendix A). These alternatives would require a choice of one of two road connections that would begin at the end of the current road system and parallel the Favorite Bay shoreline or a road connection that would cross Favorite Bay. Road options that would parallel the Favorite Bay shoreline would require crossings of five unnamed streams and several additional minor short stream segments as well as a bridge crossing of Favorite Creek at the southern end of Favorite Bay. An airport alternative (Airport Alternative12a) is located closer to the community because roads already exist in this area, and fewer airport access roads would need to be built (Figure 3 in Appendix A). Five additional unnamed streams have the potential to be impacted by the required clearing and grading of the airport alternatives.

Airport Alternatives 3, 3a, and 4 are mainly within the Monument–Wilderness Area with small portions of the alternatives being within Kootznoowoo Corridor Lands. The alternative closest to Angoon is entirely within the Kootznoowoo Incorporated Lands. The Kootznoowoo Incorporated Lands are a native claim, and therefore the use of the land would be established within the requirements of the Alaska Native Claims Settlement Act (ANCSA). The Monument–Wilderness Area is federally protected, and use of the land would be established within the requirements of the Alaska National Interest Lands Conservation Act (ANILCA). Wilderness areas, by definition, are protected lands that typically provide high quality water resources.

The airport alternatives and access alternatives, collectively, have the potential to impact 10 unnamed streams, Favorite Creek, and two lakes (Figure 3 in Appendix A). Figures 3 and 4 (in Appendix A) show the airport alternatives, the access alternatives, and potential water resources impacts to streams and lakes. These water resources support subsistence, commercial, and recreational fisheries that are very important to the Angoon economy. Additionally, these areas provide important habitat for other aquatic organisms and wildlife.

Note: Airport alternatives illustrated on figures throughout this report represent locations only and do not depict final areas of disturbance.

1.2 Scope of Studies

The airport alternatives are located in a wilderness where post-glacial landforms, abundant precipitation, and wide tidal fluctuations create and sustain a hydrologic environment. This report describes existing conditions for a number of water resources in the study area. The conditions described include:

- Stream hydrology
- Stream geomorphology
- Floodplains
- Freshwater quality

The information in this document is based on reviewing existing data and reports as well as field investigations conducted in May and September 2009. This document contains discussions of methods, scope of study, and findings for the water resources associated with the Airport development.

2.0 Admiralty Island Geology and Climate

Admiralty Island is the seventh largest island in the United States at approximately 1,680 square miles. It is located in Southeast Alaska in the Alexander Archipelago approximately nine miles southwest of Juneau (Figure 1 in Appendix A). The island is part of the Tongass National Forest with most of the island being part of the Monument–Wilderness Area.

Admiralty Island is primarily composed of siltstone, limestone, greywacke, chert, and volcanic rocks and has experienced marine geosynclinal deposition and deformation during the Paleozoic and Mesozoic (570 to 66 million years ago) (Lathrum et al. 1965). Favorite Bay follows a fault trace. The area in the vicinity of Angoon consists primarily of the Devonian Gambier Bay Formation on the west side of Favorite Bay. This formation consists of thick marble lenses and schist at least a few thousand feet thick. On the east side of Favorite Bay, the Tertiary Kootznahoo Formation dominates. A conglomerate with minor amounts of sandstone and shale is generally located closer to the Bay with sandstone, siltstone, shale, and minor conglomerate. Coal dominates farther east of the bay and to the north of Kootznahoo Inlet. South of Favorite Bay, Paleozoic and Mesozoic undifferentiated metamorphic rocks dominate the Favorite Creek area.

Admiralty Island has a maritime climate, with cool summers and relatively mild winters. According to the Western Regional Climate Center (WRCC), average temperatures in Angoon range from 60 degrees in the summer to 34 degrees in the winter (WRCC 2009). From 1949 to 2005 the maximum recorded temperature was 82 degrees and the lowest recorded temperature was -7 degrees (WRCC 2009). The community of Angoon and the area around Favorite Bay are in the rain shadow of Baranof Island; therefore, the amount of precipitation on Admiralty Island varies widely by location. According to the U. S. Geological Survey (USGS), average annual precipitation (rainfall and equivalent snowfall) ranges from 65 inches in Angoon to 160 inches on the northeast side of the island (USGS 1997). In Angoon the average rainfall is 42 inches and the average snowfall is 62 inches (WRCC 2009).

3.0 Water Resources and Watershed Context

Airport alternatives, access alternatives, and the associated freshwater resources of interest are shown in Figures 3 and 4 in Appendix A. The freshwater resources of interest include Favorite Creek, Streams 1 through 10, and Lakes 9-1 through 9-4:

- Favorite Creek which flows into the southern part of Favorite Bay
- Seven unnamed streams which flow into Favorite Bay which are numbered counterclockwise around the bay from one to seven
- Stream No. 8 which flows into the inlet of Mitchell Bay
- Stream Nos. 9, 9A, 9B, and 9D-G, which flow into various unnamed lakes, referred to as Lakes 9-1 thru 9-4, and subsequently discharge into Kanalku Bay
- Stream Nos. 10 and 10A which flow into Killisnoo Harbor

The creeks, streams, and lakes of interest that could be impacted by each airport and access alternative are listed in Figures 3 and 4 in Appendix A. Table 1 summarizes the water resources of interest associated with each of the airport alternatives examined for this report. For Airport Alternatives 3, 3a and 4, Favorite Creek and Streams 1, 2A, and 2 have the potential to be impacted by two of the access road alternatives. The rest of the streams, as well as the lakes, have the potential to be affected due to possible airport development activities and site management practices.

Favorite Creek, the largest stream in the immediate area, has an approximately 20.8 square mile watershed that ranges in elevation from sea level at its mouth to 3,100 feet above sea level at the top of its drainage (Figure 4 in Appendix A). The watershed ranges from sections of steep, unvegetated bedrock in the upper watershed to a narrow, gently sloping valley at the outlet into Favorite Bay. The entire watershed is completely undeveloped with portions of the watershed being within the Monument–Wilderness Area.

The ten small streams of interest have watershed areas between 2.7 and .05 square miles (Figure 3 in Appendix A). Key characteristics of the watersheds are listed in Table 2. The entire region was previously glaciated, and Streams 8 and 9, as well as Favorite Creek, contain lakes that may have been formed during glacial retreat from the region. All of the watersheds are completely undeveloped and are primarily covered in spruce-hemlock forest. Most of the studied streams have a portion or the majority of their watershed area within Monument–Wilderness Area. Streams 8, 9, 9A, 9B, and 9D-G are completely within the Monument–Wilderness Area, and Streams 10 and 10A are entirely outside of the Monument–Wilderness Area. Lakes 9-1, 9-2, 9-3, and 9-4, and the unnamed lakes within the Favorite Creek watershed are entirely within the Monument–Wilderness Area.

Table 1. Freshwater resources of interest associated with each airport alternative

Airport Alternative	Freshwater Resources of Interest
3*	Favorite Creek and Streams 1, 2, 2A 3, 4, 5, 5A 6, 7, 8, 9, and 9A; Lake 9-1. In addition, Stream 9B will be affected if Access Alt. 3 is chosen.
3a	Favorite Creek and Streams 1, 2, 2A, 3, 4, 5, 5A, 6, 7, and 8
4	Favorite Creek and Streams 1, 2, 2A, 3, 4, and 9D-G; Lake 9-3
12a	Streams 10 and 10A

* Alternative 3 has been dropped from consideration in the EIS. Data gathered for water resources for Alternative 3 are presented in this report for general information purposes only and to communicate the results of the field studies in that part of the area.

Table 2. Key characteristics of the watersheds associated with airport alternatives

Stream	Watershed Area (Square Miles)	Watershed Lake Percentage	Elevation (Feet Above Sea Level)	
			Highest	Lowest
Favorite Creek	20.8	0.1	3,100	10
1	0.18	0.1	435	0
2 (including 2A)	0.41	0.0	425	0
3	0.41	0.0	280	0
4	0.13	0.0	160	0
5 (including 5A)	0.12	0.0	155	0
6	0.33	0.0	160	0
7	0.05	0.0	145	0
8	0.19	0.1	180	0
9 (including 9A-G)	2.72	14	235	20
9A	1.24	18	225	55
9B	0.24	0.0	170	55
9D-G	0.63	9	235	55
10 (including 10A)	0.38	0.0	220	0

4.0 Objectives and Methodology

The objective of this report is to disclose baseline hydrologic conditions in the project area. This report will assist in the analysis of the possible impacts to current hydrologic conditions under the alternatives proposed for the Angoon Airport in the FAA's environmental impact statement. The disclosure of current conditions and potential impacts is required by the National Environmental Policy Act. The existing conditions of the freshwater resources in the vicinity of airport alternatives will be discussed in terms of:

- Hydrology, which describes the amount and spatial distribution of precipitation in a watershed and its pattern and rate of discharge into streams and other receiving bodies.
- Fluvial geomorphology, which describes the process of stream or river channel evolution as well as the physical characteristics of channel form.
- Water quality, which is defined by the water's physical, chemical, and biological characteristics.

The following section outlines the objectives and methodologies used for analyzing these characteristics of the water resources.

4.1 Hydrology Objectives and Methods

Hydrology is used to determine the peak flow and low flow events that occur in a watershed. When developing public infrastructure, it is important to understand peak flow events in order to avoid or reduce impacts to floodplain and habitat functions. Damage can occur to natural resources and/or man-made facilities during flood events, particularly when infrastructure is improperly located or sized.

The magnitude of flood events is typically described by the event recurrence interval. The recurrence interval is the time between events equal to or greater than a given magnitude as determined statistically. For example, the recurrence interval familiar to most people is the 100-year flood. The 100-year flood will, on average, occur once in 100 years, and therefore has a 1% chance of occurring in any given year.

Determining the peak event flows is a key element of defining the spatial extent of a floodplain. Determining the spatial extent of the floodplain will be important for determining the appropriate dimensions of stream crossings associated with airport development. Determination of the spatial extent of the floodplain will be especially important for the access road crossing of Favorite Creek, which will require a bridge. Additionally, clearing of the alternatives has the potential to change the rate at which precipitation runoff moves through the watershed into streams and other water bodies.

The objectives of the hydrology assessment are to:

- Develop a planning-level understanding of watershed hydrology for Favorite Creek, streams, and lakes within the study area
- Describe the watershed characteristics of Favorite Creek, unnamed streams of interest, and lakes

The FAA's consultant team reviewed existing data and documentation describing stream discharge in Admiralty Island watersheds to meet the hydrology objectives. Sources included:

- *Estimating the Magnitude and Frequency of Peak Streamflows for Ungaged Sites on Streams in Alaska and Conterminous Basins in Canada* (USGS 2003)
- *Precipitation Map of Alaska* (USGS 1997)
- *Angoon, Alaska (500310) Period of Record Climate Summary* (WRCC 2009)
- *Favorite Creek Near Angoon, Alaska Flow Gage 15102200* (USGS 2008) (note: this gage is actually on a tributary to Favorite Creek)
- *WinTR-55*, (Natural Resources Conservation Service [NRCS] 2009a)
- *Small Watershed Hydrology WinTR-55 User Guide* (NRCS 2009b)

None of the waters of interest in the study area are currently gaged. A tributary to Favorite Creek (2.5 square mile basin area) was gaged for a brief period by the USGS between November 2000 and September 2003. However, due to the small watershed area and short period of record associated with this gage, reviewers were not able to use the data from this gage for hydrologic analysis.

Hydrologic analyses were conducted using both regional regression equations developed by Curran et al. (2003) and the WinTR-55 small watershed hydrology program developed by the NRCS (2009b) for watersheds between 0.01 mi^2 and 0.72 mi^2. The Curran et al. (2003) regional regression equations for Southeast Alaska are meant for watershed areas between 0.72 and 571 square miles (sq mi). Although most of the streams of interest for this project have watersheds that are smaller than 0.72 mi^2 (see Table 2), peak flow for watersheds greater than 0.72 mi^2 was estimated using Curran et al (2003). Hydrologic analyses of streams with watershed areas smaller than 0.72 square miles were calculated using the WinTR-55 small watershed hydrology program.

Regression equations typically use three to five parameters such as basin size, mean elevation, and annual average precipitation within the watershed to calculate streamflows ranging from two-year to 500-year recurrence intervals. These equations were used to calculate runoff for select recurrence interval flows for study area watersheds. Regional regression equations are based on gaged streams across southern coastal Alaska and have an average 40% standard error of prediction. An average annual precipitation of 65 inches and a mean minimum January temperature of 27 degrees Fahrenheit were used for the regression equation hydrologic analysis. The results of this analysis are presented in **Sections 5.1** and **6.2** of this report.

WinTR-55 is a widely used, single-event rainfall-runoff, small watershed hydrologic model. The model generates hydrographs (charts that show discharge for a specific area over time) from select sub areas throughout the watershed and routes them downstream through channels and reservoirs (NRCS 2009a). The WinTR-55 hydrologic analyses used 24-hour precipitation data provided by the model for Skagway-Hoonah-Angoon Census Area, Alaska, shown in Table 3.

WinTR-55 was originally developed for urban and agricultural areas; however, it is widely accepted in small watersheds due to its flexibility, reliability, and ease of use. Model input variables include hydrologic soils groups (A, B, C, D published for the entire United States), rainfall distribution types (1, 1A, II, III for 24-hour events published for the entire United States), curve numbers based on local ground conditions, and published rainfall intensities for Southeast Alaska as shown in Table 3.

Table 3. WinTR-55 24-hour precipitation data for Skagway-Hoonah-Angoon Census Area, Alaska

Recurrence Interval (year)	24-Hour Precipitation Amount (inches)
2	5
10	8
50	12
100	14

4.2 Fluvial Geomorphology Objectives and Methods

Fluvial geomorphic processes are described based on inputs of discharge, and the size and spatial distribution of sediment and habitat-forming large woody debris. Channel form is described based on measures of channel planform, channel slope, measures of geomorphic features such as pools and riffles, and channel cross-section characteristics. Airport access road development could affect Favorite Creek, the largest stream within the vicinity due to the need for a bridge crossing at the creek (Figure 3 in Appendix A). Streams 6, 7, 9, 9A, 9B, and 9D-G will not be directly affected by airport development, but may be indirectly affected. These streams were not in our scope for field investigation and are not included in the fluvial geomorphology analysis.

The objectives of the fluvial geomorphology assessment are to:

- Develop an understanding of the fluvial geomorphologic processes governing Favorite Creek
- Describe the channel characteristic and geomorphic features of Favorite Creek
- Develop a planning-level understanding of the Favorite Bay and Killisnoo Harbor tributaries

- Describe the basic channel characteristics and basic geomorphic features of streams with potential to be affected by one or more of the Airport and access road alternatives (Streams 1, 2, 3, 4, 5, and 10)

A field assessment was conducted from May 11th to 13th, 2009 and September 1st to 3rd, 2009 to meet the fluvial geomorphology objectives. Field methodologies used for Favorite Creek, Favorite Bay Tributaries, and Killisnoo Harbor tributaries are described in the following sections.

4.2.1 Favorite Creek

Field investigations of Favorite Creek followed the Tier Two survey procedures outlined in the USFS Aquatic Habitat Management Handbook (USFS 2001). Field investigation of Favorite Creek included:

- Observing the geomorphic features
- Measuring the geomorphic reach features throughout the lower portion of Favorite Creek
- Measuring the longitudinal profile throughout the stream reach
- Measuring nine cross sections throughout this reach
- Conducting a pebble count

Field investigations focused on the lower reach of Favorite Creek downstream of the log jam in the vicinity of Access Alt. 2 road crossing. Less-detailed field analysis was performed upstream of the log jam in the vicinity of Access Alt. 3. Several other assessments were conducted in the office. These included:

- Reviewing historic and current aerial photos to measure changes in channel sinuosity and planform characteristics over time
- Reviewing historic aerial photos to get a sense of the frequency and extent of log jams
- Processing of field analysis data to determine channel geometry and sediment gradation
- Mapping geomorphic reaches based on profile, sinuosity, entrenchment, bed material, and field observations

Favorite Creek is an alluvial system with varied flows and sediment transport patterns. Over hundreds of years these processes have formed the current channel configurations, dimensions, and profiles that are visible today. Mathematical models for predicting potential channel changes do not exist, so an analysis of pattern, dimension, and profile with attention to bed and bank conditions is used as a surrogate to describe the potential for change in these systems.

4.2.2 Unnamed Streams 1, 2, 3, 4, 5 and 10

Field investigations for unnamed Streams 1, 2, 3, 4, 5, and 10 included:

- Observing the geomorphic features between the location of the access alternative crossing and the stream outlet
- Measuring two to three cross sections at each potential channel crossing location
- Measuring stream slope at each potential channel crossing location

An analysis of channel dimensions and slope with attention to bed and bank conditions is used to describe the potential for change in these systems.

4.3 Surface Water Quality Objectives and Methods

Water quality standards for the freshwater bodies in the vicinity of the Airport and access route alternatives are based on their declared beneficial use. Under the Clean Water Act, beneficial uses are the desired uses that water quality should support. These physical, chemical, and biological standards determine if a water body is water quality-limited for their desired use. Contaminants from airport activities that might be transported into receiving water bodies could potentially present a risk to water quality. Stormwater runoff from the airport alternatives and associated roads could potentially transport contaminants and sediment into the surrounding water resources. The objectives of the water quality assessment are to:

- Review existing water quality standards for streams in the vicinity of the alternatives
- Evaluate the existing stormwater runoff at the location of each airport alternative
- Identify the potential for erosion and mass wasting in Favorite Creek and the unnamed streams in the vicinity of the alternatives

The existing surface water quality conditions near the Airport and access route alternatives were evaluated by:

- Reviewing historic and current land use in the area
- Reviewing available reports and studies conducted within the vicinity of the study area
- Conducting limited field surveys of the water resources
- Reviewing existing water quality standards

Testing the quality of all the water resources studied was outside of the scope of this report, as the project site is in a currently, and historically, uninhabited wilderness area with minimal potential for existing water quality issues.

5.0 Favorite Creek Hydrology and Geomorphology

The following section discusses Favorite Creek hydrology and geomorphic processes at the planning level. The hydrology discussion focuses on watershed characteristics and peak flow analysis while the geomorphic analysis focuses on channel planform, profile, and geometry.

5.1 Hydrology

Favorite Creek is fed by runoff and seasonal snowmelt from Kanalku Mountain, on the north side of the watershed, and Hood Mountain in the south part of the watershed. Small alpine lakes are present in the upper watershed; however, they only represent 0.1% of the entire 20.8 square mile watershed area. Three tributaries, which originate along Hood Mountain, flow north into the mainstem of Favorite Creek. The mainstem of the creek flows east to west for nine miles before it outlets into Favorite Bay. Stream systems with little storage such as Favorite Creek tend to have a wider range of flows between peak events and low flow events.

Favorite Creek is ungaged and regression equations developed by the USGS (Curran et al. 2003) were used to predict peak discharges. Peak discharges for select recurrence event flows are show in cubic feet per second (cfs) in Table 4.

Table 4. Favorite Creek discharges predicted using regression equations

Recurrence Interval (Years)	Discharge (cfs)
2	1,790
10	3,200
50	4,500
100	5,040

Hasselborg Creek is the only historically gaged waterway on Admiralty Island that would provide enough peak flow data for comparison to Favorite Creek. However, the Hasselborg Creek gage represented a much larger watershed (56 square miles) with over 11% of the watershed area consisting of lakes. Watersheds with a large lake presence express a slower response to rain events and therefore Hasselborg Creek would not respond to storm events the same way that Favorite Creek would respond.

Regression equations are generally considered to be conservative and provide a good basis for this planning-level analysis of Favorite Creek. Additionally, the channel characteristics measured in the field are in line with the predicted peak flows. Refer to *Sections 5.2, 5.6, and 5.8* for further information on the channel characteristics of Favorite Creek.

5.2 Fluvial Geomorphology

Fluvial geomorphic assessment of Favorite Creek focused on the area around the Access Alt. 2 bridge crossing. Less detailed analysis was performed in the area surrounding the Access Alt. 3 bridge crossing. Photo 1 provides an aerial view of lower Favorite Creek and Favorite Bay. The Access Alt. 2 reach ran 400 feet upstream and 750 feet downstream of the Access Alt. 2 bridge crossing location as shown in Figure 5 in Appendix A. This reach is characterized by a series of pools and riffles, with transition or glide-like features. The Access Alt. 3 bridge crossing reach was studied for 100 to 200 feet upstream and downstream of the bridge crossing. Both reaches are within and abut a wilderness area that has only been minimally changed by humans.

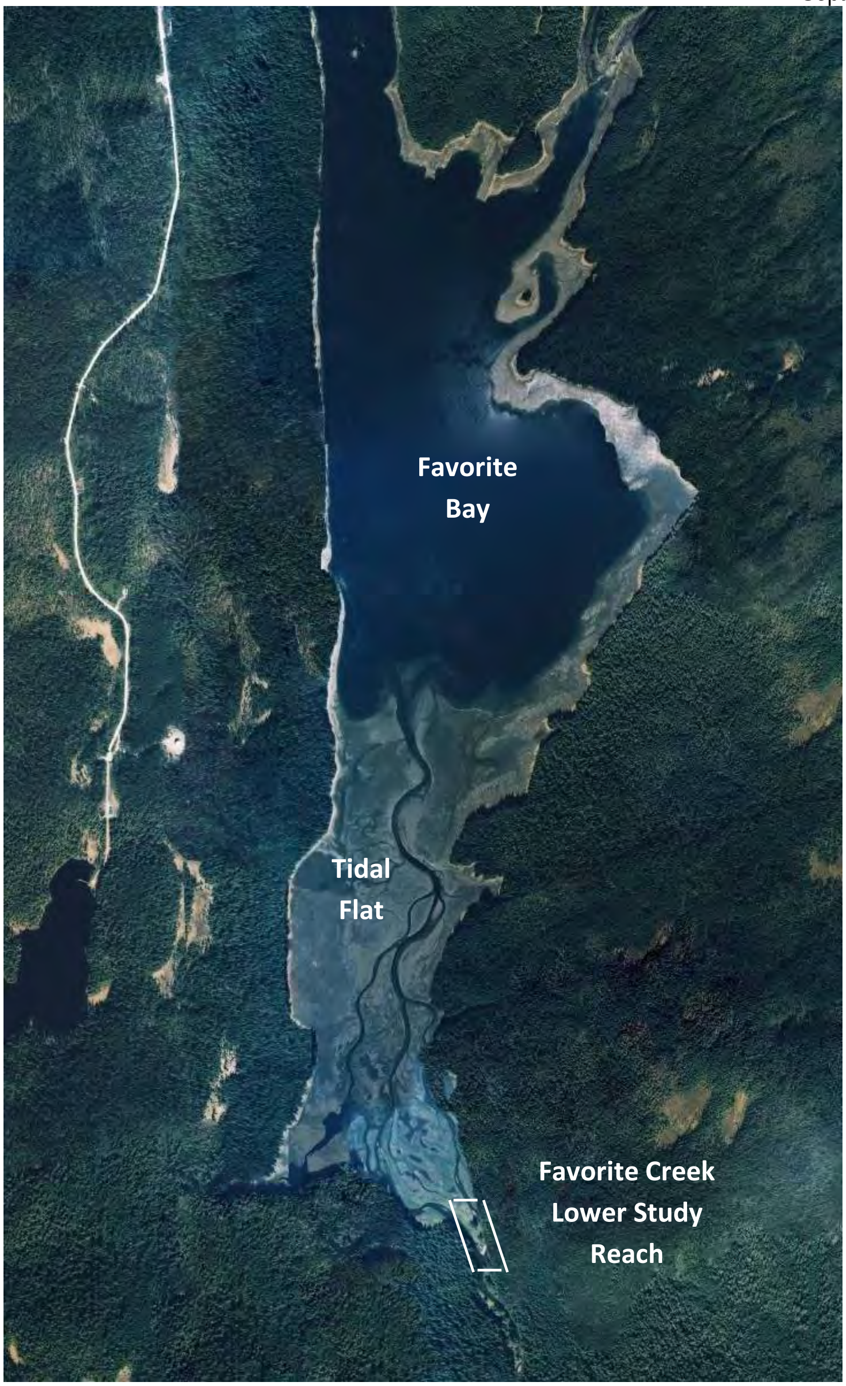

Photo 1. Aerial photograph of Favorite Bay and Favorite Creek. Top of photo is northwest.

5.2.1 Channel Sinuosity

Sinuosity is a measure of the degree of meander and is expressed as the ratio of channel length to valley length. Low sinuosity is in the range of 1.0 to 1.2, moderate sinuosity is in the range of 1.2 to 1.5, and high sinuosity is in the range of 1.5 to 4.0 (Rosgen 1996). Based on the most recently available aerial photography from 2001, the sinuosity of Favorite Creek within the Access Alt. 2

study reach is low—approximately 1.1 (Figure 6 in Appendix A). The sinuosity of the study reach is low due to its confinement between steep slopes to the north and south.

5.2.2 Channel Planform

Lateral channel migration within lower Favorite Creek (Figures 5, 6, and 7) was analyzed using aerial photos from 1948 and 2001. Figure 6 (in Appendix A) depicts the approximate centerlines of these historical channel alignments. In the vicinity of the Access Alt. 3 bridge crossing, where the river valley is confined by steep hillslopes, the path of the channel has changed very little between 1948 and 2001. Between the crossing locations, within the narrow river valley and in the current log jam area, the channel planform has also been very stable.

The major change in channel planform is the location of the channel split. Based on aerial photography, in 1948 it occurred shortly upstream of the Access Alt. 2 bridge crossing. Sometime before the 2001 imagery was taken, the channel split moved so that now it occurs approximately 500 feet lower in the system. The widening of the river valley below the log jam allows the channel to be more mobile in this area. The Favorite Creek channels in the tide flat have moved around somewhat, but altogether have remained relatively stable.

5.2.3 Channel Profile, Reach Breaks, and Large Wood

Figure 7 (in Appendix A) plots the Favorite Creek profile along the thalweg, or deepest part of the channel, and the water surface throughout the lower study area. Profiles typically alternate between steeper/shallower channel features that correspond to riffles and flatter/deeper features that correspond to pools. Transitions link riffles and pools and typically have slopes that match the mean channel slope.

The Access Alt. 2 Favorite Creek geomorphic study area can be broken into two main reaches based on their dominant hydraulic processes – the fluvial reach (near the lower road crossing) and the tidal reach. The fluvial reach is 700 feet long while the tidal reach is 450 feet long. These reaches are shown in Figure 7 (in Appendix A). The head of tide, or farthest location upstream where the creek is influenced by tidal hydraulics, is located approximately 100 feet upstream of the lower bridge crossing (Figures 5 and 7 in Appendix A). The location of the head of tide for Favorite Creek was determined based on observations of changes in stream bed material, channel slope, and vegetation.

The following section describes the Access Alt. 2 Favorite Creek geomorphic study area channel features. The lower fluvial reach is characterized by two sets of short riffles and pools which are separated by a long transition section (Photo 2; Figure 5 in Appendix A). No macro pools, as defined in the Aquatic Habitat Management Handbook (USFS 2001), were observed within the lower study reach. The Access Alt. 2 bridge crossing location is in the center of this transition section. The water surface elevation slope through the fluvial reach is approximately 0.26%. The reach is confined by two steep hillsides. Heavily vegetated floodplains with small high flow channels exist along both sides of the channel (Photo 3). Pools and transitions throughout this reach consist of gravel and cobble bed material mixed with small sections of sand deposits. Riffles consist of coarse gravel and cobble mixed with boulders. The channel form and bed material indicate that smaller material is transported downstream.

Photo 2. Long transition section in the fluvial reach at the location of Access Alt. 2 bridge crossing (looking upstream).

Photo 3. High flow channel within the right bank floodplain of Favorite Creek (looking downstream) in the vicinity of the Access Alt. 2 bridge crossing and in location of channel indicated in 1948 aerial photo.

The tidal reach is located at the outlet of Favorite Creek as it splits into two channels that flow into the wide valley of Favorite Bay (Photo 4; Figure 5 in Appendix A). The reach has a 0.14% water surface elevation slope. The upstream end of the reach consists of a long transition section as the channel splits in two. A riffle has developed along both channels at the upstream end of the island formed by the channel split. Along the western main channel the riffle extends to the end of the study reach.

At the downstream end of the study reach, large wood has accumulated across the eastern side channel and caused the formation of a deep pool (Photo 5). The top of the island contains Sitka spruce trees and appears to be a terrace (former floodplain) which is very rarely, if ever, inundated (Photo 6). The general lack of large wood deposits on the top of the island indicate that it is not affected by flooding; large woody debris (LWD) in the right channel does not extend onto the main portion of the island and is not racked against the Sitka spruce that have colonized the highest elevation area on the island. Bed material throughout this reach consists of sand and gravel mixed with cobbles. The channel form and bed material indicate that this reach is a material deposition zone.

The downstream end of the lower geomorphic study reach is part of the Favorite Creek Tidal Flat (see Photo 1). The combination of alluvial deposition from Favorite Creek outlet and tidal deposition at the upstream end of Favorite Bay has formed a large tidal flat area. This tidal flat area is much shallower than the rest of Favorite Bay and several highly meandering channels have formed to carry streamflow to Favorite Bay.

Evidence of active bank erosion was minimal throughout the lower study reach. The most apparent erosion occurred in the tidal reach, along the banks of the island. The erosion is minor and extends approximately 110 feet along the western side of the island and 150 feet along the eastern side. The island is composed of sandy material mixed with some cobble. This material is highly erodible and can become unstable during the cyclic soil saturation and drying that occurs under tidal conditions.

The Access Alt. 3 road crosses the fluvial reach of Favorite Creek upstream of the log jam complex (Photo 7). In this vicinity, the channel is made up of transitions and riffles with some pools created by channel-spanning wood. This reach is also alluvial with a substrate primarily composed of gravel, although bedrock does outcrop on the left bank in some locations. This reach is relatively similar geomorphically to the Access Alt. 2 fluvial reach.

LWD is important for geomorphic processes and stream habitat. It plays a role in forming pools, stabilizing streambanks, moderating sediment transport, and providing cover and refuge for aquatic species. LWD counts are a useful metric for describing stream habitat characteristics. Large wood was counted and classified in Favorite Creek on August 20, 2009 by the FAA’s consultant according to the guidelines in the Aquatic Habitat Management Handbook (USFS 2001) and is summarized in Table 5 (Access Alt. 2 bridge crossing) and Table 6 (Access Alt. 3 bridge crossing).

Photo 4. Favorite Creek channel split at island near outlet into Favorite Bay (looking downstream).

Photo 5. Large wood along eastern channel during low tide (looking west below the Access Alt. 2 bridge crossing).

Photo 6. Log across eastern side channel at a very high tide, looking upstream, island on right. Note that island is not inundated.

Photo 7. Location of Access Alt. 3 bridge crossing of Favorite Creek.

Table 5. LWD classification from 200 feet below to 200 feet above Access Alt. 2 bridge crossing

Piece ID#	Type	Length (ft)	Max Diameter (ft)	Zone Location	Bank (looking downstream)	Rootwad (dia.)	Key Piece*
1	conifer	30	1.0	1	RB	No	No
2	conifer	13	0.7	1	RB	No	No
3	alder	20	1.3	1, 2, 3, 4	RB	No	No
4	conifer	39	0.7	1	RB	No	No
5	conifer	16	1.0	1	RB	No	No
6	conifer	52	1.5	1	RB	No	No
7	conifer	20	0.8	1, 2	RB	No	No
8	conifer	49	0.8	1, 2, 3, 4	RB	No	No
9	conifer	36	0.8	1	RB	No	No
10	alder	23	1.0	1	RB	No	No
11	conifer	26	1.0	1	RB	No	No
12	conifer	6.6	1.0	1	RB	No	No
12a	conifer	62	1.0	1	RB	No	No
13	conifer	13	1.3	1	RB	No	No
14	conifer	82	2.1	1, 2, 3, 4	RB	Yes (3 feet)	Yes
14a	conifer	20	0.8	1	RB	No	No
15	conifer	9.8	0.7	1	RB	No	No
16	conifer	9.8	0.7	1	RB	No	No
17	conifer	9.8	0.7	1	RB	No	No
18	conifer	9.8	0.7	1	RB	No	No
19	conifer	9.8	0.7	1	RB	No	No
20	conifer	9.8	0.7	1	RB	No	No
21	conifer	36	1.7	1, 2	RB	No	No
22	conifer	30	0.5	1, 2	RB	No	No
23	conifer	43	0.6	1, 2	RB	No	No
24	conifer	6.6	0.7	1	RB	No	No
25	conifer	13	0.7	1	RB	No	No
26	conifer	13	0.7	1	RB	No	No
27	conifer	20	0.7	1	RB	No	No
28	conifer	20	0.7	1	RB	No	No
29	conifer	15	1.4	1, 2	RB	No	No
30	conifer	9.8	1.3	1, 2, 3, 4	LB	No	No
31	conifer	9.8	0.5	2	LB	No	No

Source: SWCA 2011

*Key piece definition for streams 33 to 65 ft in width = ≥2.0 ft diameter and ≥49 ft length or ≥9.8 ft diameter rootwad

Table 6. LWD classification from 200 feet below to 200 feet above Access Alt. 3 bridge crossing

Piece ID#	Type	Length (ft)	Max Diameter (ft)	Zone Location	Bank (looking downstream)	Rootwad (dia.)	Key Piece*
0	alder	11	1.3	1, 2, 3	LB	No	No
1	conifer	56	1.5	1, 2, 3, 4	Across stream	Yes (13 ft)	Yes
2	conifer	56	1.3	1, 2, 3, 4	Across stream	Yes (13 ft)	Yes
3	conifer	66	1.1	1, 2, 3	LB	No	No
4	conifer	9.8	0.7	2	RB	No	No
5	conifer	9.8	0.7	2	RB	No	No
6	conifer	36	2.0	1, 2, 3, 4	LB	No	No
7	conifer	9.8	0.7	1	LB	No	No
8	conifer	9.8	0.7	1	LB	No	No
9	conifer	9.8	0.7	1	LB	No	No
10	conifer	13	1.6	1, 2, 3, 4	RB	No	No
11	conifer	13	1.0	1, 2, 3	RB	No	No
12	conifer	16	1.3	2, 3, 4	RB	No	No
13	conifer	11	1.1	1, 2	RB	No	No
14	conifer	9.8	0.7	1, 2	RB	No	No
15	conifer	16	0.5	1, 2	RB	No	No
16	conifer	16	0.8	1, 2	RB	No	No
17	conifer	39	1.1	2, 3, 4	LB	Yes (9.8 ft)	No**
18	conifer	13	1.0	1, 2, 3, 4	LB	No	No
19	conifer	18	1.6	1, 2	LB	No	No
20	conifer	23	0.8	1, 2, 3, 4	LB	No	No
21	conifer	26	1.5	1, 2	RB	No	No
22	alder	13	1.3	1, 2	LB	No	No
23	conifer	21	1.3	1, 2	RB	No	No
24	conifer	16	0.8	1, 2	RB	No	No

Source: SWCA 2011

*Key piece definition for streams 33 to 65 ft in width = >2.0 ft diameter or >49 ft length or >9.8 ft diameter rootwad.

**USFS (2001) states that rootwad must be in excess of 9.8 feet in order to qualify as a key piece.

A technical memorandum by the FAA's primary consultant, SWCA Environmental Consulting (SWCA), further describing the LWD survey is included in Appendix B (SWCA 2009). As defined by Robison and Beschta (1990), LWD locations are broken up by zones:

- Zone 1 – within the wetted width
- Zone 2 – above the wetted width but below the bankfull height within the bankfull width
- Zone 3 – above bankfull height within bankfull width
- Zone 4 – outside of bankfull width

Each piece of wood is classified by zone. Key pieces of wood are defined as those that are relatively large compared with the channel size and have important geomorphic functions. In order to be defined as a key piece in Favorite Creek, the LWD had to be at least 2 feet in diameter, greater than 25 feet in stem length, and have a rootwad in excess of 9.8 feet in diameter (SWCA 2011). From 200 feet upstream to 200 feet downstream of the Access Alt. 2 bridge crossing, 33 pieces of LWD were counted, and one of them qualifies as a key piece based on length and diameter (see Table 5).

Upstream of the potential Access Alt. 2 bridge crossing study area, and downstream of the Access Alt. 3 bridge crossing, is a large and complex natural log jam (Photo 8). This log jam spans the entire channel for approximately 150 to 200 feet and provides habitat for both aquatic and terrestrial species. The massive log jam indicates that this reach of Favorite Creek receives abundant wood and has the potential to transport large logs downstream. It is also likely to play an important role in aquatic habitat.

Photo 8. Complex log jam between the Access Alt. 2 and Access Alt. 3 Favorite Creek bridge crossings.

Within the Access Alt. 3 bridge crossing area (200 feet downstream to 200 feet upstream), 25 pieces of LWD were classified (see Table 6). Two of the pieces met the criteria for key pieces based on rootwad diameter. These key pieces are channel-spanning logs that influence channel morphology (Photo 9) by forcing pool formation.

5.2.4 Channel Geometry

Channel cross sectional dimensions, entrenchment, and slope describe channel geometry within a given reach. Channel cross sectional dimensions vary in width, depth and flow area along the stream corridor as the channel transitions through pool and riffle zones. Dimensions also vary based on channel slope, amount of LWD, riparian area disturbances, and other factors.

Favorite Creek is an alluvial stream which builds and maintains its channel form and floodplain during high flow events. The dominant discharge or bankfull discharge is the flow that is considered to maintain the channel form. The bankfull discharge occurs when the channel begins to access its floodplain. Bankfull events typically occur about every other year.

Photo 9. Two channel-spanning logs are influencing channel morphology by forming a plunge pool.

Empirical studies by Leopold (1994) and Rosgen (1996) specify several stream indices that can be calculated using ratios of stream channel dimensions. The width to depth ratio and the entrenchment ratio are two indices that can be applied to alluvial streams such as Favorite Creek. The width to depth ratio indicates the level of channel incision, and is calculated as the bankfull width divided by the bankfull depth. Incised channels have width to depth ratios less than 12 (Rosgen 1996). The entrenchment ratio is a measure of the horizontal confinement of the stream and is calculated as the floodprone width divided by the bankfull width. The floodprone width for this analysis was determined to be the width of the channel at twice the bankfull depth. Entrenchment ratios less than 1.4 are considered entrenched, ratios between 1.4 and 2.2 are considered moderately entrenched, and ratios greater than 2.2 are slightly entrenched (Rosgen 1996).

The incision depth is measured as the height of the channel bank. The channel incision depth together with the entrenchment ratio measures “the ability of the stream channel to contain large flow events within the channel area” (USFS 2001). Channels with incision depths that are larger than the bankfull depth are considered to be more incised and have larger capacities. These channels do not spread flow across the floodplain as readily. Table 7 summarizes the cross-sectional geometry within Favorite Creek study reaches. Data for the fluvial section is from all available transition zone cross sections. The Access Alt. 2 bridge crossing fluvial reach is narrower and has a higher water surface slope than the tidal reach as the system changes from a narrower, steeper valley to a broader tidal flat. Likewise, the Access Alt. 3 bridge crossing fluvial reach is narrower and steeper than the Access Alt. 2 bridge crossing fluvial reach. Neither the

Access Alt. 3 nor the Access Alt. 2 bridge crossing fluvial reaches show signs of incision as demonstrated by an entrenchment ratio of 2.1 (slightly to moderately entrenched).

Table 7. Favorite Creek channel geometry

Channel Geometry	Access Alt. 3 Road Crossing Fluvial Reach	Access Alt. 2 Road Crossing Fluvial Reach	Tidal Reach
Incision Depth (feet)	5.1	3.1	1.7
Bankfull Width, *BFW* (feet)	63.8	103	N/A
Bankfull Depth, *BFD* (feet)	4.4	3	N/A
Floodprone Width *FPW* (feet)	131	218	N/A
Bed Width (feet)	58.4	96	195
Channel Water Surface Slope	N.D.	0.26%	0.14%
Channel Thalweg Slope	0.75%	0.43%	0.49%
Width to Depth Ratio (*BFW/BFD)*	14.7	33	N/A
Entrenchment Ratio (*FPW/BFW*)	2.1	2.1	N/A

N/A = not applicable; N.D. = not determined

5.2.5 Sediment Sampling

Bedload transport occurs along the stream bed when particles are moved by a combination of sliding, rolling, and saltation (short hops with temporary rests). The gradation of sediment samples taken within the channel provides information on current channel hydraulics. Generally, larger material deposits in areas of higher velocity and smaller materials deposit in areas of lower velocity. The purpose of the pebble count was to develop a general understanding of the size and distribution of bed material found within the study reach. This information helps to describe the velocity and sediment transport capacity of water flowing through the study area. A pebble count was conducted near transition number 1, just downstream of the Access Alt. 2 bridge crossing location at the transition between the fluvial reach and tidal reach.

Table 8 shows the gradation of the bed material from the pebble count. The percent finer is the percent of material less than the specified grain size. The dominant material is coarse gravel.

Table 8. Grain size distribution of bed material in the project reach

Percent Finer	Grain Size (mm)	Material
D_{16}	4.5	Fine gravel
D_{50}	29	Coarse gravel
D_{84}	51	Very coarse gravel
D_{95}	89	Small cobbles

5.2.6 Stream Classification

Stream classification systems are based on quantifiable field measurements and stream indices which produce consistent, reproducible descriptions of stream types. The USFS has two levels of stream classification which pertain to Favorite Creek. The upper level is the Aquatic Habitat Management Handbook Alaska Region (AHMHAR) stream value classification system which is based on subsistence, recreational, and economic fish harvest considerations (USFS 2001). The secondary level, which is based on formative geomorphic, hydrologic, and vegetative processes, is the Tongass National Forest Channel Type classification system (USFS 1992). The Rosgen classification system is also commonly used to describe geomorphic characteristics of streams (Rosgen 1996).

The FAA's consultant evaluated Favorite Creek using the USFS and Rosgen stream classification systems. Favorite Creek has anadromous fish and good quality fish habitat and therefore sections of it are considered to be a Class I stream according to the AHMHAR stream value classification system.

Based on Favorite Creek's geomorphic, hydrologic, and vegetative processes it also fits into the Tongass National Forest Channel Type FP5 (wide low-gradient floodplain channel) for the Access Alt. 2 study area. FP5 channel types are usually found in broad valley bottoms with numerous overflow side channels, extensive gravel bars, and large groups of log jams. Within the Access Alt. 2 study reach Favorite Creek has a wide bankfull width (103 feet) and low channel gradient (0.45%). The bed material consists of gravels, sands, and cobbles. Just upstream of the Access Alt. 2 study area extensive gravel bars were observed and a complex log jam exists. The watershed area is 20.8 square miles of primarily spruce-hemlock forest. Favorite Creek slightly differs from the FP5 channel type within the study area in that it has a somewhat narrow valley width (approximately 350 feet at its widest location).

At the Access Alt. 3 bridge crossing, Favorite Creek is transitioning channel types from FP5 and has some characteristics of a LC2 channel type (moderate gradient contained narrow valley channel). LC2 channels are characterized by narrow valleys in the middle to lower sections of watersheds. In LC2 channels, hillslopes and mountain slopes directly abut channels. Valley floors are narrow with little terrace development. Short falls, cascades, boulder runs, and bedrock knickpoints may be present. Upstream of the Access Alt. 3 bridge crossing, Favorite Creek becomes a LC2 channel (SWCA 2010).

According to the Rosgen classification system, Favorite Creek is a B4c stream type at both the Access Alt. 2 bridge crossing and Access Alt. 3 bridge crossing. This determination is based on the entrenchment ratio, a moderate width to depth ratio of 33 for the Access Alt. 2 bridge crossing and 14.7 for the Access Alt. 3 bridge crossing, moderate sinuosity, and gravel channel material. B4c streams are considered to be relatively stable.

5.2.7 10-Year and 100-Year Floodplains

The Federal Emergency Management Agency (FEMA) is responsible for mapping regulatory floodplain boundaries in the U.S. No FEMA mapping is available for Favorite Creek. The FAA's consultant team used the Hydrologic Engineering Center – River Analysis System (HEC-RAS, version 4.0.0) hydraulic software to create a planning-level existing conditions model of Favorite Creek. Developed by the U.S. Army Corps of Engineers (USACE 2008), HEC-RAS version 4.0.0 is a one-dimensional (1-D) hydraulic model and is one of the standard 1-D hydraulic models used in the United States. The HEC-RAS model uses site topographic information including a combination of channel cross-sections surveyed by the FAA's consultant team during May 2009 as well as five-foot contour data collected by R&M Engineering in 2002 for the Airport Master Plan (DOT&PF 2007).

This model is suitable for planning-level, but not design-level, purposes. A new HEC-RAS model using more detailed site topography and improved elevation control will be necessary during the design phase of the project. Elevation data from the field survey was tied into a survey marker with poor elevation control. Poor GPS coverage during the survey limited the accuracy of the cross-section survey locations. Five-foot contours from the 2002 Airport Master Plan survey were used to supplement the field survey, but the contour data is not detailed enough for a design-level model. In some areas the field survey and contour data yielded conflicting information. The combination of these factors makes the model quality fair at best. This model is suited for comparison purposes but not for absolute water-surface elevations, exact floodplain boundaries, or precise water velocities. In some locations modeled floodplain widths and water surface elevations were not consistent with the five-foot contour survey due to the aforementioned issues. In these instances, judgment was used to create a planning-level floodplain boundary.

The Existing Conditions model was run for the 2-, 10-, and 100-year flows for both the Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW) boundary conditions under a subcritical flow regime. MHHW is defined as 13.0 feet for Favorite Bay (Kootznahoo Inlet), and MLLW is defined as 0.0 feet (National Oceanic and Atmospheric Administration [NOAA] 2009). The existing conditions model was completed early in the project to provide an understanding of the relationship between hydrologic processes and the Access Alt. 2 bridge crossing over Favorite Creek. The model was also used to produce a 10- and 100-year recurrence interval existing conditions planning-level floodplain boundary (Figure 8 in Appendix A). The planning-level floodplain boundaries illustrate the MHHW condition, consistent with FEMA coastal floodplain guidelines. These boundaries will be used to assist in avoiding or minimizing impacts to regulated floodplains as access road plans are developed.

Proposed Conditions modeling will be conducted later in the project when the airport alternatives and access alternatives have been further developed.

The planning-level 10-year floodplain is similar in form to and coincident with or narrower than the 100-year floodplain. The steep valley walls help to control the width of the floodplain in the fluvial reach. The floodplain widens in the lowermost tidal reach where it enters Favorite Bay and is not confined by the valley walls.

6.0 Stream Hydrology and Geomorphology

The following section discusses the hydrology and geomorphic processes of the streams of interest for the EIS, with the exception of Favorite Creek, which was discussed in Section 5. The hydrology discussion focuses on watershed characteristics and peak flow analysis while the geomorphic analysis focuses on stream geometry and form in the vicinity of the access road crossings.

6.1 Hydrology

The streams of interest are fed by runoff and snow melt throughout their watersheds. As discussed in *Section 3.0 Water Resources and Watershed Context* the watershed areas of these streams vary from 0.05 to 2.65 square miles (see Table 2). Watershed elevations range from 145 to 435 feet at their highest elevations to sea level at their outlet. Streams 9, 9A, 9B, and 9D-G outlet into large lakes (Figure 3 in Appendix A). The rest of the streams are all tidally influenced at the outlet. The watershed areas of each stream are shown in Figure 3 in Appendix A. The streams are all very small; many of them have the potential to be dry during the summer months.

These streams are ungaged and regression equations developed by the USGS (Curran et al. 2003) and analysis using WinTR-55 (NRCS 2009b) were used to predict peak discharges. Peak discharges for select recurrence interval event flows are shown in Table 9. Admiralty Island does not have any gaged streams with similar watershed characteristics for comparison. However, regression equations are generally considered to be conservative and provide a good basis for this planning-level analysis. Additionally, the channel characteristics measured in the field (discussed further in **Section 6.2**) are generally consistent with channel dimensions that would be expected to support the predicted peak flows. Refer to **Section 6.2** for further information on the channel characteristics of Favorite Creek.

6.2 Fluvial Geomorphology

In addition to Favorite Creek, six small streams were examined. These streams may be grouped by their geographic location. Tributaries 1, 2, 3, and 4 drain into the southeastern tidal flat portion of Favorite Bay, in the same general area as Favorite Creek. The southern end of Favorite Bay has a very gentle gradient. During low tide, this portion of Favorite Bay drains, exposing large tidal flats, whereas during high tide the tidal flats are submerged.

Table 9. Peak discharges (cubic feet per second) predicted using regression equations for streams of interest

Stream	Recurrence Interval (years)			
	2	10	50	100
Stream 1	50	120	215	265
Stream 2	130	300	545	665
Stream 2A	15	35	65	75
Stream 3	80	190	350	460
Stream 4	25	65	120	145
Stream 5 (including 5A)	35	75	140	170
Stream 6	55	130	235	285
Stream 7	15	35	60	75
Stream 8	50	120	215	265
Stream 9 (including 9A-G)	130	230	320	360
Stream 9A	60	110	150	170
Stream 9B	55	130	240	295
Stream 9D-G	60	130	350	450
Stream 10A	35	80	140	175
Stream 10 (including 10A)	90	215	390	480

Stream 2A, also in this vicinity, drains to Stream 2 and therefore drains indirectly to Favorite Bay. Access road crossings of Tributaries 1, 2, and 2A are upstream of the tidally-influenced area of these tributaries. The crossings of Tributaries 3 and 4 are within the tidally-influenced reach. As a result, Tributaries 3 and 4 may be backwatered at high tide at their respective road crossings. All five of these crossings are low in their respective watersheds.

Tributaries 5, 6, and 7 drain to the northeastern portion of Favorite Bay beyond the main tidal flat. Tidal flats in this area are much narrower, less pronounced, and follow the shoreline closely. Stream 7 was not examined in the field as part of this study. Of these three tributaries, only Stream 5 would be likely to have a road crossing, and it would be outside of the tidally-influenced reach. This crossing would be located in the middle of the Stream 5 watershed.

Tributaries 8, 9, and 10 do not drain to Favorite Bay. Stream 8 flows into an inlet to Mitchell Bay. Stream 9A, 9B, and 9D-G drain into Lake 9-1 within the Stream 9 watershed and then into Stream 9 which discharges into Kanalku Bay. Neither Stream 8 nor anything in the Stream 9 watershed was investigated in the field. Stream 10A flows into Stream 10 which drains directly to Killisnoo Harbor as shown in Figure 3 in Appendix A. Airport Alternative 12a would cross Streams 10 and 10A outside of the tidally influenced area in the middle of the sub-watershed.

Compared with Favorite Creek, all of the unnamed streams near the alternatives are quite small. The average bankfull width, average bankfull depth, and channel slope at the various crossings are summarized in Table 10.

Table 10. Stream channel geometries

Stream	Average Bankfull Width	Average Bankfull Depth	Upstream Slope	Downstream Slope
1 Access Alt. 3 Road Crossing	3.4	0.8	3.0%	1.5%
1 Access Alt. 2 Road Crossing	4.8	0.9	2.5%	2.0%
2 Access Alt. 3 Road Crossing	10.7	1.6	~25%	~5%
2 Access Alt. 2 Road Crossing	10.6	0.6	2.5%	-
2A Access Alt. 2 Road Crossing	3.3	0.9	-	4.5%
3 Access Alt. 2 Road Crossing	10.0	-	1.0%	1.0%
4 Access Alt. 2 Road Crossing	5.8	0.8	1.0%	1.0%
5 Access Alt. 3 Road Crossing	N/A	N/A	<2%	<2%
5 Access Alt. 2 Road Crossing	3.1	-	1.0%	0.5%
10 Crossing	3.0	1.5	0.5%	0.5%

The Access Alt. 3 crossing of Stream 1 is located where the stream passes through a large wet meadow (Photo 10). It has a very narrow, incised channel within a broad, flat floodplain and has a very limited ability to convey sediment and wood. At the Access Alt. 2 crossing (Photo 11), the channel is wider, better defined, and passes through a forest with the potential for input and conveyance of LWD.

The Access Alt. 3 and Access Alt. 2 crossings of Stream 2 (Photos 12 and 13, respectively) are located in a heavily forested area with a coarse stream substrate containing many cobbles and large amounts of LWD spanning the channel. The stream is incised at the Access Alt. 3 crossing location but is not incised at the Access Alt. 2 crossing location. The channels are markedly wider than those of Stream 1 although they are also quite shallow. Stream 2A (Photo 14) is smaller than Stream 2 but is also heavily forested with a well-defined channel.

The Stream 3 Access Alt. 2 crossing has a somewhat different character due to it being so close to Favorite Bay and within the tidally influenced portion of Stream 3 (Photo 15). The stream channel appears broad and U-shaped and is confined by relatively widely spaced, gradual valley walls. The large trees adjacent to the stream do not extend down to the water's edge, presumably due to salinity, and there is essentially no underbrush near the stream (Photo 15). The substrate ranges from large cobbles to finer gravels and sand. A number of channel-spanning logs are present in this reach.

The Stream 4 Access Alt. 2 crossing (Photo 16) is surrounded by narrower, steeper valley walls than Stream 3, but is still within the tidally-influenced reach. There are large amounts of LWD in the channel and underbrush encroaches closer to the channel than at Stream 3. Again, the substrate ranges from larger cobbles to finer substrate, and channel-spanning logs are common.

The Access Alt. 3 crossing of Stream 5 is not a defined channel (Photo 17). The Access Alt. 3 crossing area is within the headwaters of Stream 5 and consists of a patchwork of seasonally-inundated wetlands and low spots vegetated with skunk cabbage and conifers with a soil substrate. Stream 5 only becomes a defined channel downstream of the Access Alt. 3 road crossing. At the Access Alt. 2 road crossing, Stream 5 (Photo 18) cuts through a wet meadow similar to that of the Stream 1 Access Alt. 3 crossing.

Stream 10 is very narrow (bankfull width is 3 feet) and is more incised than the other tributaries (Photo 19). It flows through a brushy, lightly forested area.

Photo 10. Stream 1. Photo was taken 100 feet downstream of Access Alt. 3 road crossing.

Photo 11. Stream 1. Photo was taken approximately 50 feet downstream of Access Alt. 2 road crossing. FAA's consultant team member is measuring the stream cross-section.

Photo 12. Stream 2. Photo shows vicinity of Access Alt. 3 road crossing.

Photo 13. Stream 2. Photo displays Access Alt. 2 road crossing vicinity.

Photo 14. Stream 2A. Photo was taken at Access Alt. 2 road crossing location.

Photo 15. Stream 3. Photo shows location of Access Alt. 2 road crossing.

Photo 16. Stream 4. Photo shows Access Alt. 2 road crossing location.

Photo 17. Stream 5. Photo shows the Access Alt. 3 road crossing vicinity.

Photo 18. Stream 5. Photo shows the Access Alt. 2 road crossing vicinity.

Photo 19. Stream 10. Photo shows vicinity of stream crossing.

7.0 Freshwater Quality

The quality of water is defined by its physical, chemical, and biological characteristics. These characteristics help determine the appropriateness for various beneficial uses of both surface water and groundwater. The FAA's consultant team evaluated existing surface water quality conditions near the potential airport by reviewing available documentation and limited field reviews. The following key documents were reviewed:

- *Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Database* (ADEC 2008)
- *18 AAC 70 Water Quality Standards* (ADEC 2009)

Additionally, the FAA's consultant team conducted field reviews on May 11-13 and September 1-3, 2009. These reviews included observing site conditions and drainage patterns throughout the area.

No documentation of groundwater conditions is known. No field reviews were conducted to evaluate groundwater conditions.

7.1 Beneficial Uses and Water Quality Standards

Beneficial uses are the purposes that a water body is intended to provide, such as for drinking water or the growth and propagation of fish, shellfish, and other aquatic life, or recreation. Water bodies can and often do support a number of different beneficial uses. Surface water is an important resource to the people of Angoon because it is their only source of public drinking water. The principal drinking water source for Angoon is Auk'Tah Lake (alternatively known as Tillinghast Lake Reservoir), which is shown in Figure 3 in Appendix A. Currently a 500,000 gallon water tank stores water at the Tillinghast Lake Water Treatment Plant a little over three miles from town. Water from the reservoir is treated and piped throughout the community.
The access road alternatives are mostly below the elevation of Auk'Tah Lake. However, the initial road segment of Access Alts. 2 and 3 is within the Auk'Tah Lake watershed uphill from the reservoir (Figure 3 in Appendix A).

In addition to Auk'Tah Lake, another potential future domestic drinking water source is a tributary to Favorite Creek (name and location unknown) (City of Angoon 1990).

The U.S. Environmental Protection Agency (EPA) and ADEC regulate the quality of waters in the State of Alaska by defining "beneficial uses" for each water body and setting appropriate water quality standards for these uses, as required by the Federal Clean Water Act. Table 11 is a summary of the beneficial uses for the key water bodies of interest to this study. Alaska's water quality standards (AWQS) require that all waters of the state be regulated for all freshwater beneficial uses unless they have been reclassified and are exempt from these regulations (Jim Powell, ADEC, pers. comm., 2008). Water bodies that do not meet water quality standards are termed "water quality limited." There are currently 25 water quality limited water bodies in Alaska (ADEC 2009). However, no water bodies in the study area are classified as water quality limited (EPA 2004).

Water quality standards are the reference levels (or acceptable characteristics) for individual water quality parameters that must be met in order to support the recognized beneficial uses for a waterway. For example, in order to protect the beneficial use of aquatic life, waters used by anadromous and resident fish must typically contain dissolved oxygen (DO) concentrations of more than 7 milligrams per liter (mg/L). Table 12 is a summary of the AWQS for conventional water quality parameters for fresh water.

Table 11. Beneficial uses of water bodies of interest in the vicinity of the potential Angoon Airport

Beneficial Uses	Favorite Creek	Tributaries (All)
(1) FRESHWATER USES		
(A) Water Supply	X	X
(i) drinking, culinary, and food processing		
(ii) agriculture, including irrigation and stock watering		
(iii) aquaculture		
(iv) industrial		
(B) Water Recreation	X	X
(i) contact recreation		
(ii) secondary recreation		
(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife	X	X

Source: ADEC 2009

Table 12. AWQS for conventional water quality parameters for fresh water

Parameter	Applicable Water Quality Standard	Most Restrictive "Beneficial Use" for Parameter
Fecal coliform (FC) bacteria	Mean may not exceed 20 FC/100 ml, and not more than 10% of the samples may exceed 40 FC/100 ml. For groundwater, the FC concentration must be less than 1 FC/100 ml, using the FC Membrane Filter Technique, or less than 3 FC/100 ml, using the FC most probable number (MPN) technique.	water supply*
Dissolved gas	DO must be greater than 7 mg/L in waters used by anadromous and resident fish. In no case may DO be less than 5 mg/l to a depth of 20 cm in the interstitial waters of gravel used by anadromous or resident fish for spawning. For waters not used by anadromous or resident fish, DO must be greater than or equal to 5 mg/l. In no case may DO be greater than 17 mg/l. The concentration of DO may not exceed 110% of saturation at any point of sample collection.	aquatic life
pH	May not be less than 6.5 or greater than 8.5. If the natural condition pH is outside this range, substances may not be added that cause an increase in the buffering capacity of the water.	recreation (primary contact)

Table 12. AWQS for conventional water quality parameters for fresh water

Turbidity	May not exceed 5 nephelometric turbidity units (NTU) above natural conditions when the natural turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU.	Water supply*
Temperature	May not exceed 20^{o}C at any time. The following maximum temperatures may not be exceeded, where applicable: -Migration routes 15^{o}C, -Spawning areas 13^{o}C, -Rearing areas 15^{o}C, -Egg & fry incubation 13^{o}C For all other waters, the weekly average temperature may not exceed site-specific requirements needed to preserve normal species diversity or to prevent appearance of nuisance organisms.	Aquaculture & Aquatic Life
Dissolved inorganic substances	Total dissolved solids (TDS) from all sources may not exceed 500 mg/l. Neither chlorides nor sulfates may exceed 250 mg/l.	Water supply*
Sediment	The percent accumulation of fine sediment in the range of 0.1 mm to 4.0 mm in the gravel bed of waters used by anadromous or resident fish for spawning may not be increased more than 5% by weight above natural conditions (as shown from grain size accumulation graph). In no case may the 0.1 mm to 4.0 mm fine sediment range in those gravel beds exceed a maximum of 30% by weight (as shown from grain size accumulation graph). In all other surface waters no sediment loads (suspended or deposited) that can cause adverse effects on aquatic animal or plant life, their reproduction or habitat may be present.	Aquatic life
Toxics and other deliterious (organic and inorganic substances)	The concentration of substances in water may not exceed the criteria shown in Table I or in Table V, column A of the *Alaska Water Quality Criteria Manual.* Substance concentration in water may not exceed any chronic and acute criteria established in this chapter, for a toxic pollutant of concern to protect sensitive and biologically important life stages of resident species of this state. there may be no concentration of toxic substances in water or in shoreline or bottom sediments that, singly or in combination, cause or reasonably can be expected to cause, adverse effects on aquatic life or produce undesirable or nuisance aquatic life, except as authorized by this chapter. Substances may not be present in concentrations that individually or in combination impart undesirable odor or taste to fish or other aquatic organisms, as determined by either bioassay or organoleptic tests.	Water supply* & Aquatic life
Color	May not exceed 15 color units or the natural condition, whichever is greater. Color or apparent color may not reduce the depth of the compensation point for photosynthetic activity by more than 10% from the seasonally established norm for aquatic life.	Water supply* & Aquatic life
Petroleum hydrocarbons, oils, and grease	Total aqueous hydrocarbons (TAqH) in the water column may not exceed 15 µg/l. Total aromatic hydrocarbons (TAH) in the water column may not exceed 10 µg/l. There may be no concentrations of petroleum hydrocarbons, animal fats, or vegetable oils in shoreline or bottom sediments that cause deleterious effects to aquatic life.	Aquaculture

Table 12. AWQS for conventional water quality parameters for fresh water

	Surface waters and adjoining shorelines must be virtually free from floating oil, film, sheen, or discoloration.	
Radioactivity	May not exceed the concentrations specified in Table 1 of the Alaska Water Quality Criteria Manual for radioactive contaminants and may not exceed limits specified in 10 C.F.R. 20 and National Bureau of Standards, Handbook 69.	Water supply* & Aquatic life
Residues (floating solids, debris, sludge, deposits, foam, scum, or other residues)	May not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use, or cause acute or chronic problem levels as determined by bioassay or other appropriate methods. May not, alone or in combination with other substances, cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines, or cause leaching of toxic or deleterious substances, or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.	Aquatic life

Source: ADEC 2009

7.2 Water Quality Conditions

A limited amount of information is available on existing surface water quality conditions in the area. Based on a review of the ADEC Contaminated Sites Database (ADEC 2008), there are no open contaminated sites in the Angoon vicinity; cleanup is complete at sites in the Angoon vicinity in the database.

Surface water sources have a high susceptibility to contamination. However, most of the area is undeveloped by humans and has been set aside as a wilderness area. Therefore, the risk of humans having contaminated the surface waters in this area is considerably less than in more developed, industrialized, or urbanized areas.

During high tides, marine water from Favorite Bay flows up Favorite Creek and the other Favorite Bay creeks identified for study and mixes with fresh water causing brackish conditions. The transition zone, where water mixes and shifts from brackish to fresh water, is an important habitat for salmonids.

Wetlands can provide water quality benefits by trapping sediments and pollutants as well as capturing excess nutrients. Watersheds with more wetlands have the potential for higher water quality and have more capability to filter pollutants. Table 13 shows the percentage of each watershed that is various vegetation types.

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Table 13. Percentage of vegetation type in each watershed

Watershed	Bog Forest	Bog Wood-land	Disturbed	Estuary	Fen	Fresh Water	Salt Marsh	Spruce-Hemlock Forest	Un-vegetated Tidal	No Data	Tannins Noted May 2009
FAVORITE CRK	0%	0%	0%	0%	0%	0%	0%	3%	0%	97%	No
STREAM 1	0%	2%	1%	0%	9%	1%	0%	88%	0%	0%	No
STREAM 2	0%	0%	0%	0%	3%	0%	0%	83%	0%	13%	No
STREAM 2A	0%	0%	0%	0%	11%	0%	0%	88%	0%	0%	N.D.
STREAM 3	0%	2%	0%	0%	3%	0%	0%	93%	0%	1%	Yes
STREAM 4	0%	0%	0%	0%	0%	1%	0%	99%	0%	0%	No
STREAM 5	0%	8%	0%	0%	6%	1%	0%	85%	0%	0%	Yes
STREAM 5A	0%	18%	0%	0%	6%	2%	0%	74%	0%	0%	N.D.
STREAM 6	16%	14%	0%	0%	2%	0%	0%	60%	0%	8%	N.D.
STREAM 7	0%	5%	0%	0%	1%	0%	0%	93%	0%	0%	N.D.
STREAM 8	0%	5%	0%	0%	6%	0%	0%	81%	0%	8%	N.D.
STREAM 9	1%	2%	0%	0%	1%	2%	0%	23%	0%	72%	N.D.
STREAM 9A	0%	0%	0%	0%	0%	0%	0%	4%	0%	96%	N.D.
STREAM 9B	6%	12%	0%	0%	1%	0%	0%	80%	0%	1%	N.D.
STREAM 9D-G	0%	2%	0%	0%	2%	6%	0%	56%	0%	34%	N.D.
STREAM 10	4%	31%	3%	0%	0%	0%	0%	61%	0%	0%	N.D.
STREAM 10A	5%	32%	3%	0%	0%	0%	0%	60%	0%	0%	N.D.

Source: SWCA 2010

N.D.: No data. Presence or absence of tannins not noted

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More than 20% of Stream 5A's, 6's, 10's, and 10A's watersheds are covered by water-quality-enhancing bogs and fens. Ten to 20% of Stream 1's, 2A's, 5's, 8's, and 9B's watersheds are covered by bogs and fens, while 5% to 10% of Stream 3's and 7's watersheds are covered by bogs and fens. The remainder of the watersheds, including Favorite Creek and Streams 2, 4, 9, 9A, and 9D-G are covered by less than 5% bogs and fens.

Both bog forest and bog woodlands tend to be acidic and are poor in nutrients and minerals. Bogs obtain their water and nutrients from precipitation and are therefore ombrotrophic. In contrast, fens range from slightly acidic to slightly alkaline and have mineral-rich waters which are richer in nutrients than those found in bogs. Fens obtain their water and nutrients primarily from groundwater discharge or seepage and are therefore minerotrophic. Spruce-hemlock forests are also acidic. Tannins are produced from decaying vegetation and are more abundant in acidic waters, such as those draining bogs and spruce-hemlock forests. Generally speaking, more tannins are present in the water during winter and snow melt times.

Several lakes occur within watersheds 9, 9A, and 9D-9G (Figure 3 in Appendix A). These lakes are primarily surrounded by spruce-hemlock forest. The spruce-hemlock forest shades the streams and lakeshore and helps to keep water temperatures moderate both in the tributary streams and along the lakeshore during warmer weather. In addition, the tree roots provide water-quality benefits to the lakes by stabilizing the banks of the lakes and streams, therefore inhibiting bank failure and helping to limit sediment from entering the water. The water quality benefits that the vegetation provides to the streams likewise helps to provide higher water quality to the downstream lakes (Table 13).

Watershed slope may also play a role in water quality, as slope is one factor in mass wasting susceptibility. Steeper watershed slopes are more prone to mass wasting events, such as mudflows, debris flows and debris avalanches. Debris flows and debris avalanches typically initiate on slopes steeper than 35%, and may initiate on slopes up to about 100%. These mass movements may then travel downslope where they may deposit on slopes with only a 10% or shallower slope.

Earthflows are more common on more gradual slopes between about 5% and 25%. All mass wasting can contribute considerable amounts of sediment to streams. This sediment can disturb aquatic life and may be problematic for infrastructure.

Table 14 displays the percent of each watershed belonging to various slope categories. Data are somewhat limited for watersheds 9 and 9A, with 10% and 22% lack of slope data, respectively, although they are included in this analysis.

Based solely on the percentage of watershed area with slopes steeper than 35%, 30% or more of the area of watersheds 2, 2A, and 8 may be prone to mudflows, debris flows, and debris avalanche initiation, which may make these watersheds prone to having higher sediment loads and therefore lower water quality. Twenty-two percent of Stream 1's watershed is above a 35% slope, and 10% to 20% of watersheds 3, 5, 7, 9, 9A, 9D-G, 10, and 10A have slopes in excess of 35%.

Table 14. Watershed slope by percent area.

Watershed	0-5%	5-10%	10-15%	15-20%	20-25%	25-30%	30-35%	35-40%	40-45%	45-50%	Greater than 50%	No Data
FAVORITE CREEK	8	12	11	9	7	7	6	6	5	5	25	0
STREAM 1	11	13	13	13	12	9	8	6	5	5	6	0
STREAM 2	5	9	12	12	13	9	9	8	8	9	7	0
STREAM 2A	10	10	15	11	8	5	6	8	13	10	4	0
STREAM 3	25	21	18	11	7	5	3	3	3	1	3	0
STREAM 4	23	28	21	10	5	4	4	2	1	1	0	0
STREAM 5	16	8	11	11	9	10	16	8	4	3	3	0
STREAM 5A	23	16	13	7	9	12	12	4	1	1	0	0
STREAM 6	48	20	12	7	5	3	1	1	1	1	2	0
STREAM 7	16	8	25	18	10	8	3	1	1	2	9	0
STREAM 8	19	8	12	9	8	7	7	6	5	4	15	0
STREAM 9	29	12	10	8	6	5	5	3	3	3	6	10
STREAM 9A	29	9	8	7	5	4	4	3	2	3	5	22
STREAM 9B	36	27	15	7	4	3	1	1	2	2	3	0
STREAM 9D-G	25	16	13	9	9	6	7	4	4	3	4	0
STREAM 10	19	15	15	11	8	9	8	5	4	2	5	0
STREAM 10A	19	17	14	11	7	10	9	4	3	2	3	0

Source: SWCA 2010

Note: Data is somewhat limited for watersheds 9 and 9A, with 10% and 22% lack of slope data, respectively.

All of the watersheds contain large amounts of land that is potentially prone to mass movements, such as earthflows, which may occur on more gradual slopes.

Steep stream slopes produce more stream power for water to undercut banks and transport material than do gradual stream slopes, so stream slope may also play a role in water quality. Table 15 displays average stream slopes throughout the streams' length. The majority of the streams' slopes are less than 5%, although Streams 2, 2A, and 7 have slopes of 11.5%, 5.5%, and 5.0%, respectively. These steeper stream slopes give the streams more energy to erode their banks and transport material downstream. On a whole, the combined steeper watersheds and steeper stream gradients for Streams 2 and 2A make them more prone to potentially high erosion rates than the more gradually sloped watersheds and streams.

Table 15. Average stream slope

Stream	Average Stream Slope
Favorite Creek	3.0%
1	3.0%
2	11.5%
2A	5.5%
3	2.0%
4	3.5%
5	3.0%
5A	3.0%
6	3.0%
7	5.0%
8	2.5%
9	0.4%
9A	0.5%
9B	2.4%
9D-G	0.3%
10	2.5%
10A	4.4%

7.3 Stormwater

Stormwater is defined as precipitation that encounters man-made surfaces, such as roads, runways, and rooftops, which may concentrate its flow, increase runoff, decrease infiltration, and introduce pollution. Because the airport and access alternatives are in currently undeveloped areas, all precipitation currently either infiltrates native substrate or runs off into natural streams.

7.4 Groundwater Conditions

An aquifer is a geologic formation that is sufficiently saturated to allow the movement of economic quantities of water to wells or springs. No information is available on the groundwater conditions in Angoon. No groundwater wells or injection wells are known in the Angoon area. The location of the freshwater/saltwater interface in groundwater has not been determined in the Angoon vicinity.

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Acronyms

1-D	one-dimensional
ADEC	Alaska Department of Environmental Conservation
AHMHAR	Aquatic Habitat Management Handbook Alaska Region
ANCSA	Alaska Native Claims Settlement Act.
ANILCA	Alaska National Interest Lands Conservation Act
AWQS	Alaska's water quality standards
cfs	cubic feet per second
DO	dissolved oxygen
DOT&PF	Alaska Department of Transportation and Public Facilities
EIS	environmental impact statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FC	fecal coliform
FEMA	Federal Emergency Management Agency
HEC-RAS	Hydrologic Engineering Center – River Analysis System
LWD	large woody debris
mg/L	milligrams per liter
MHHW	mean higher high water
MLLW	mean lower low water
MPN	most probable number
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity units
SWCA	SWCA Environmental Consultants
TAqH	total aqueous hydrocarbons
TAH	total aromatic hydrocarbons
TDS	total dissolved solids
USFS	U. S. Forest Service
USGS	U. S. Geological Survey
WRCC	Western Regional Climate Center

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Appendix A. Figures

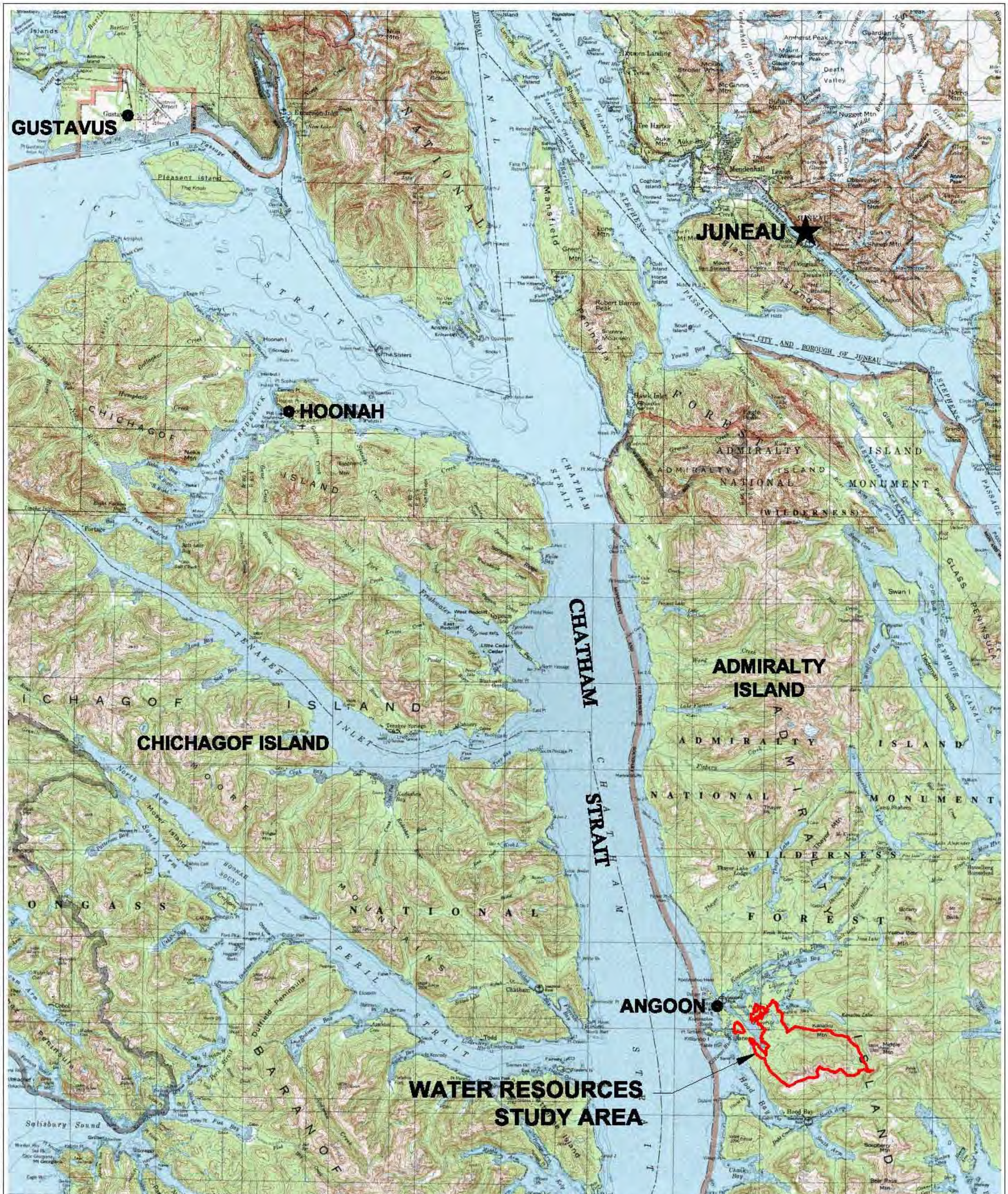

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FIGURE 1
VICINITY MAP

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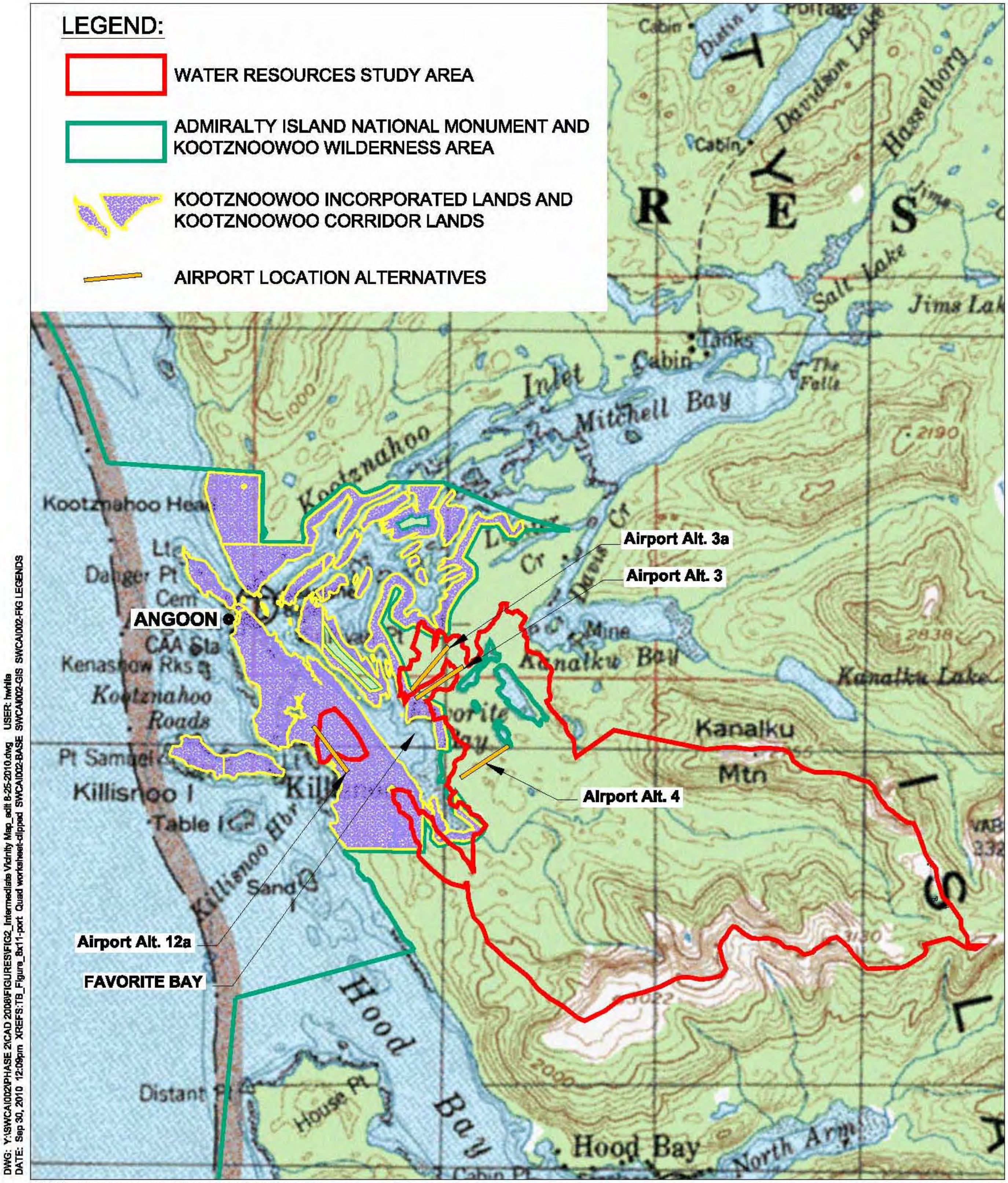

NOTE: AIRPORT ALT. 3 IS NO LONGER UNDER CONSIDERATION IN THE ENVIRONMENTAL IMPACT STATEMENT.

FIGURE 2
PROJECT LOCATION MAP

0 .50mi 1mi 2 miles 4 miles

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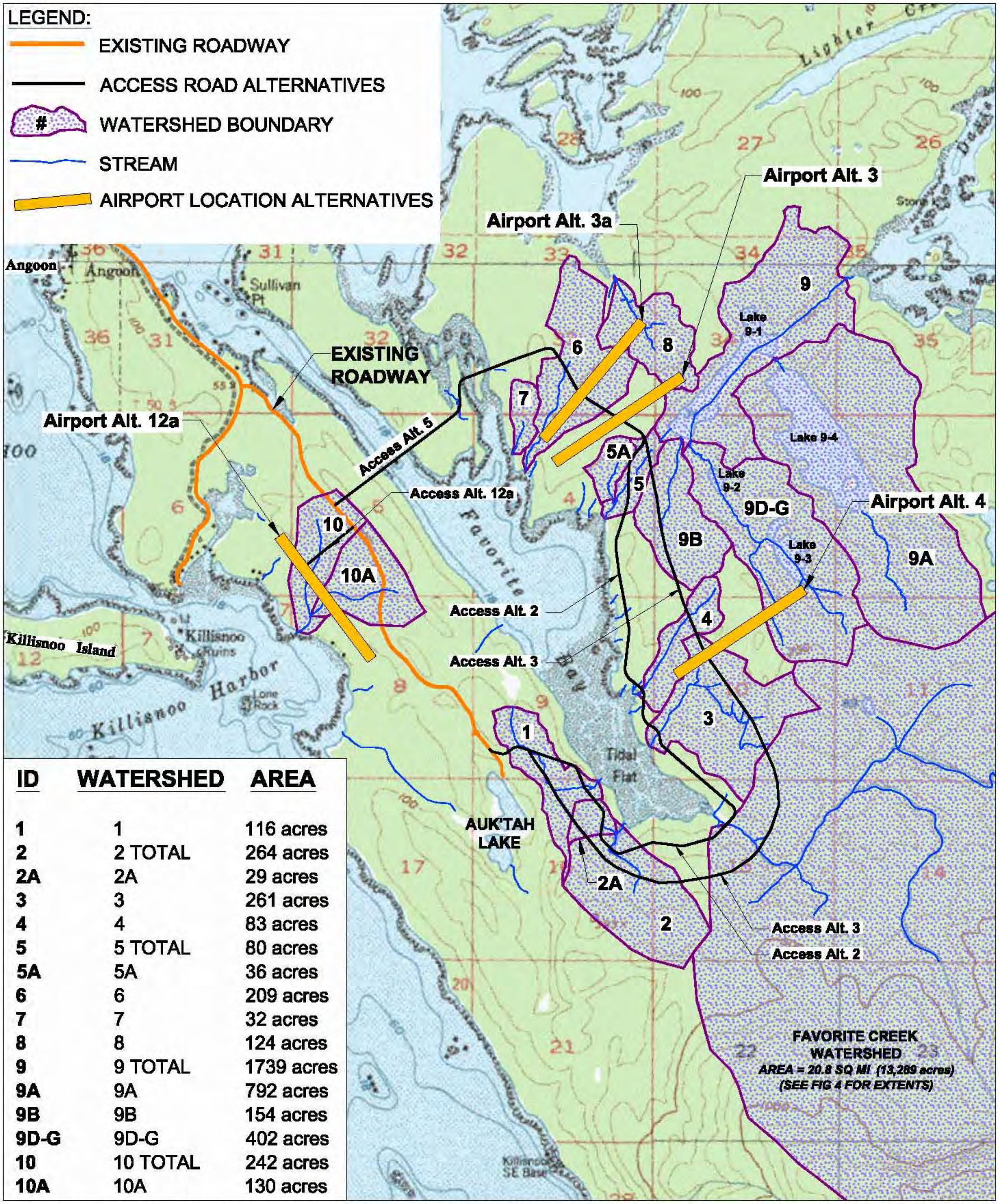

ID	WATERSHED	AREA
1	1	116 acres
2	2 TOTAL	264 acres
2A	2A	29 acres
3	3	261 acres
4	4	83 acres
5	5 TOTAL	80 acres
5A	5A	36 acres
6	6	209 acres
7	7	32 acres
8	8	124 acres
9	9 TOTAL	1739 acres
9A	9A	792 acres
9B	9B	154 acres
9D-G	9D-G	402 acres
10	10 TOTAL	242 acres
10A	10A	130 acres

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NOTE: AIRPORT ALT. 3 IS NO LONGER UNDER CONSIDERATION IN THE ENVIRONMENTAL IMPACT STATEMENT.

FIGURE 3
WATERSHEDS OF INTEREST AND POTENTIAL AIRPORT ALTERNATIVES IN THE ANGOON AIRPORT STUDY AREA
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Angoon, AK

0 1000 2000 4000 8000
SCALE: 1" = 4000 feet

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design professionals

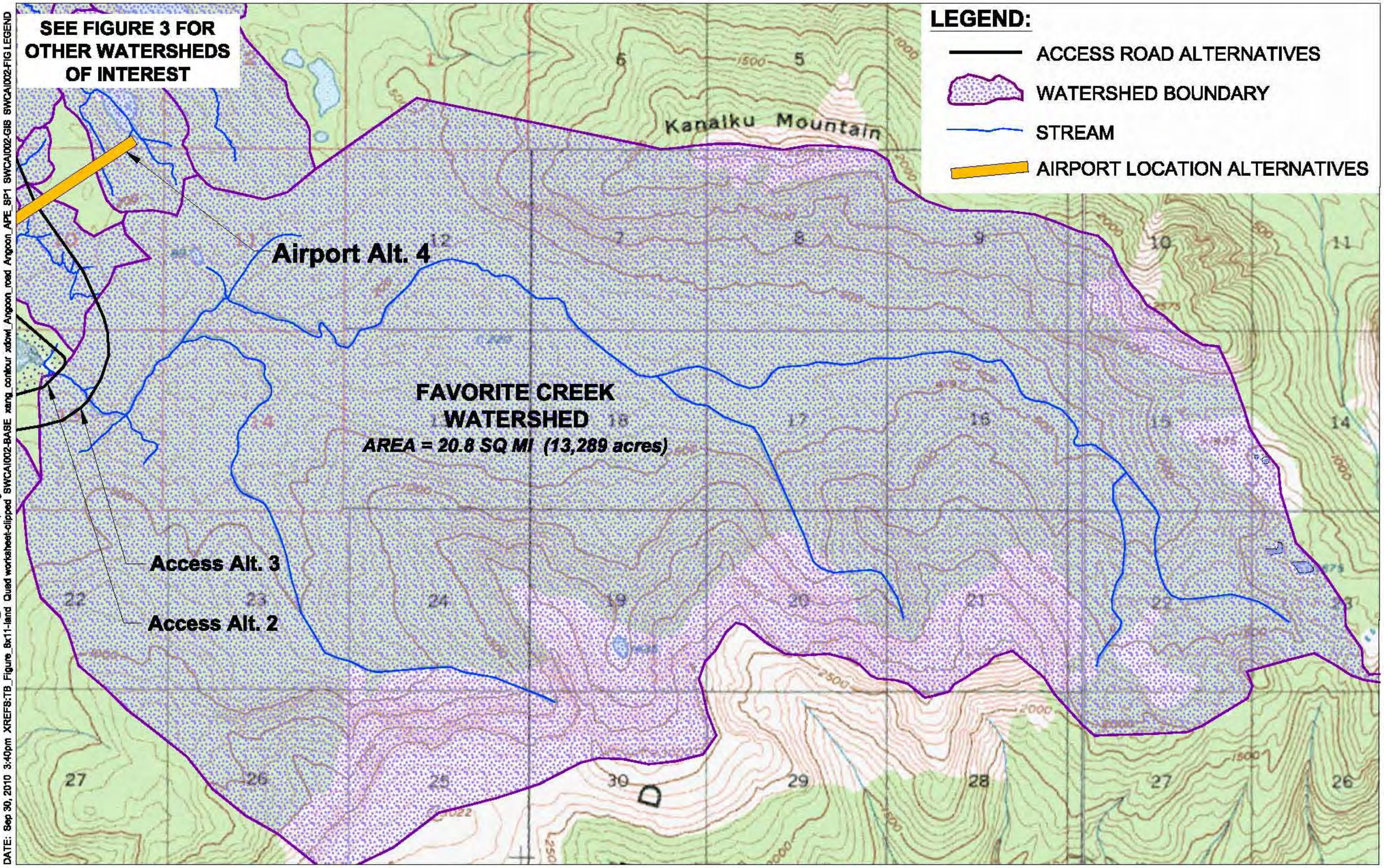

FIGURE 4
WATERSHEDS OF INTEREST - FAVORITE CREEK WATERSHED

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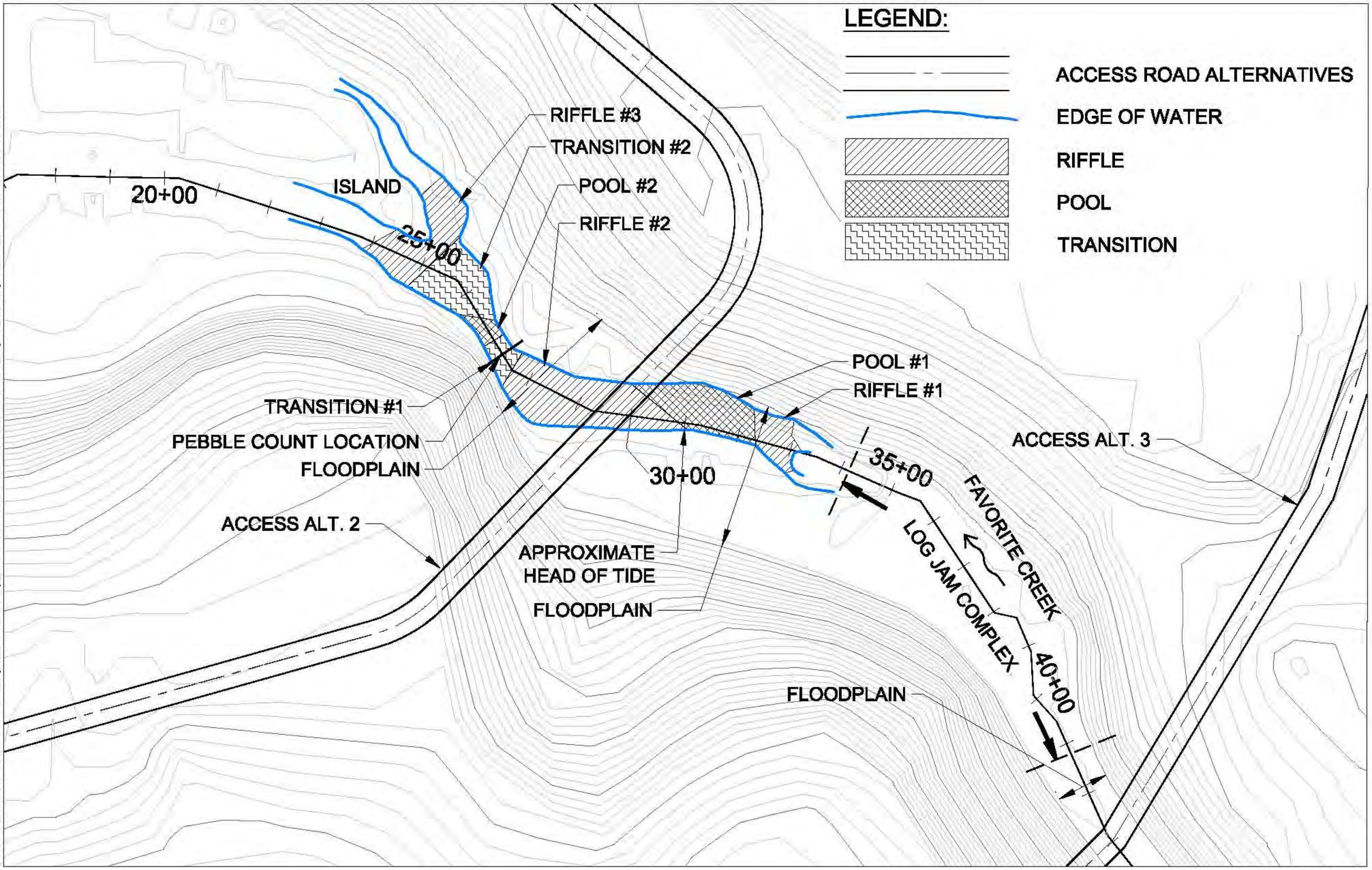

FIGURE 5
FAVORITE CREEK STUDY REACH

0 125 250 500
SCALE: 1" = 250 feet

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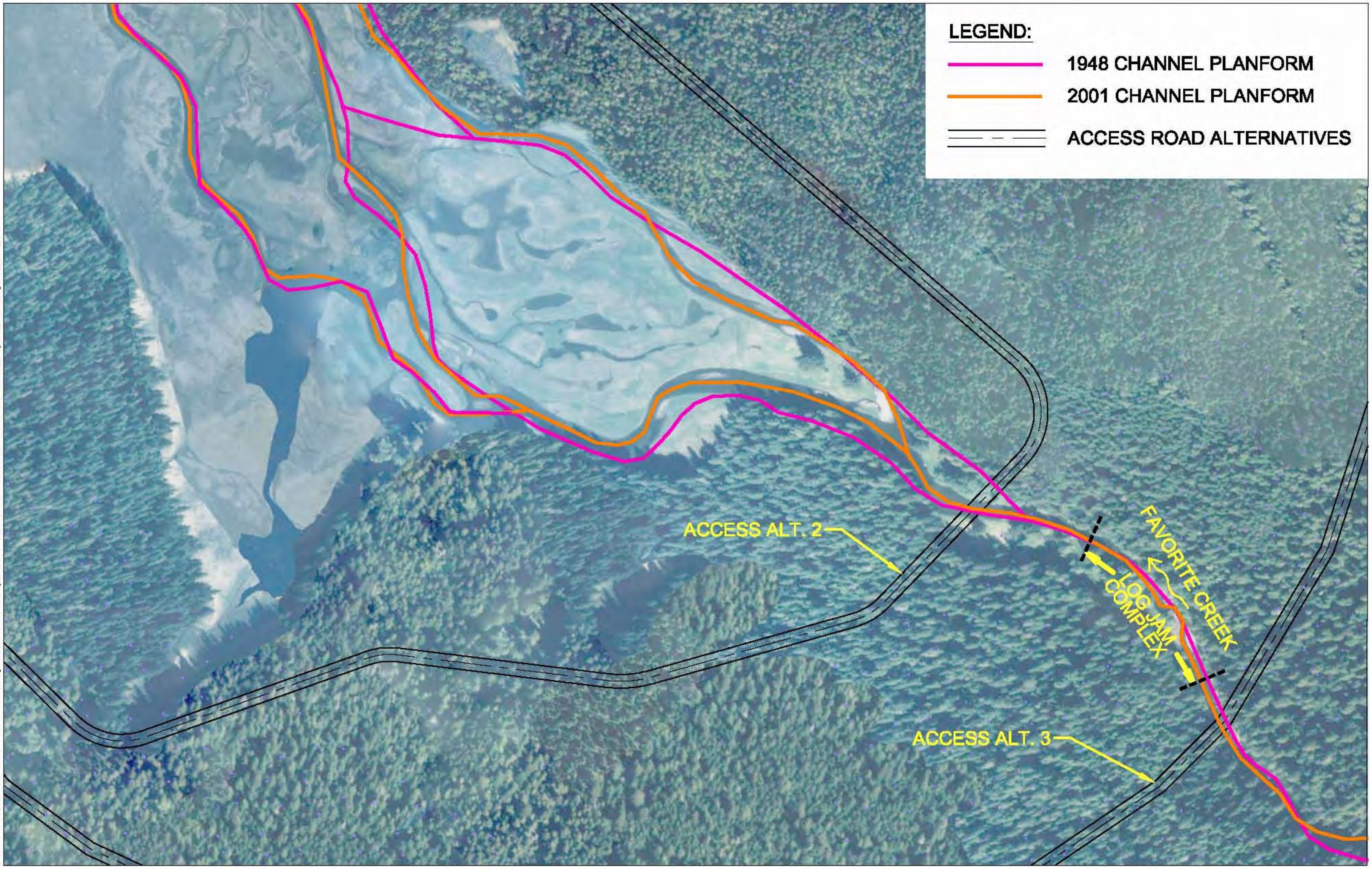

Source: 2001 Aerial Photo

FIGURE 6
FAVORITE CREEK HISTORIC PLANFORM

0 250 500 1000
SCALE: 1" = 500 feet

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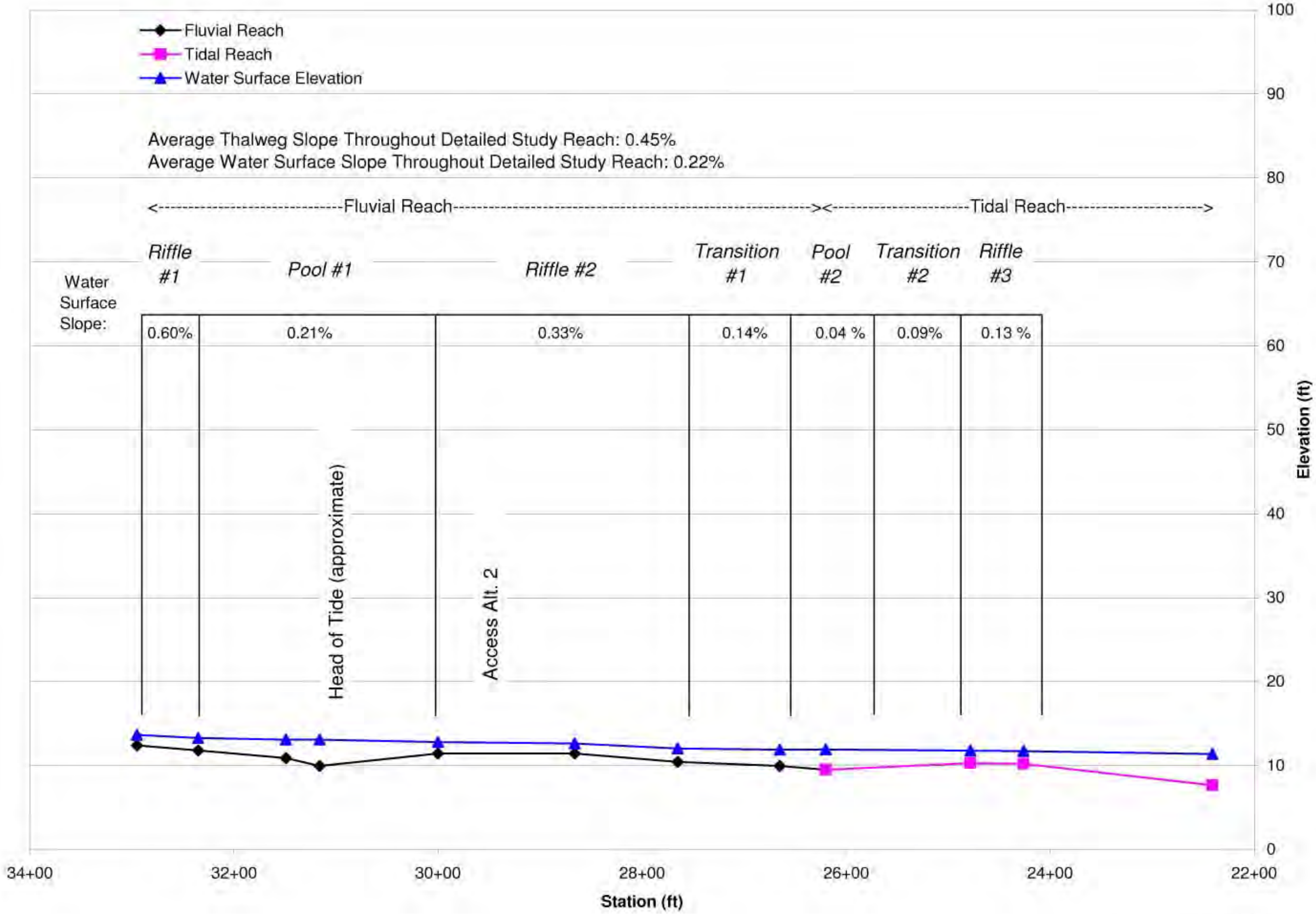

FIGURE 7
FAVORITE CREEK PROFILE

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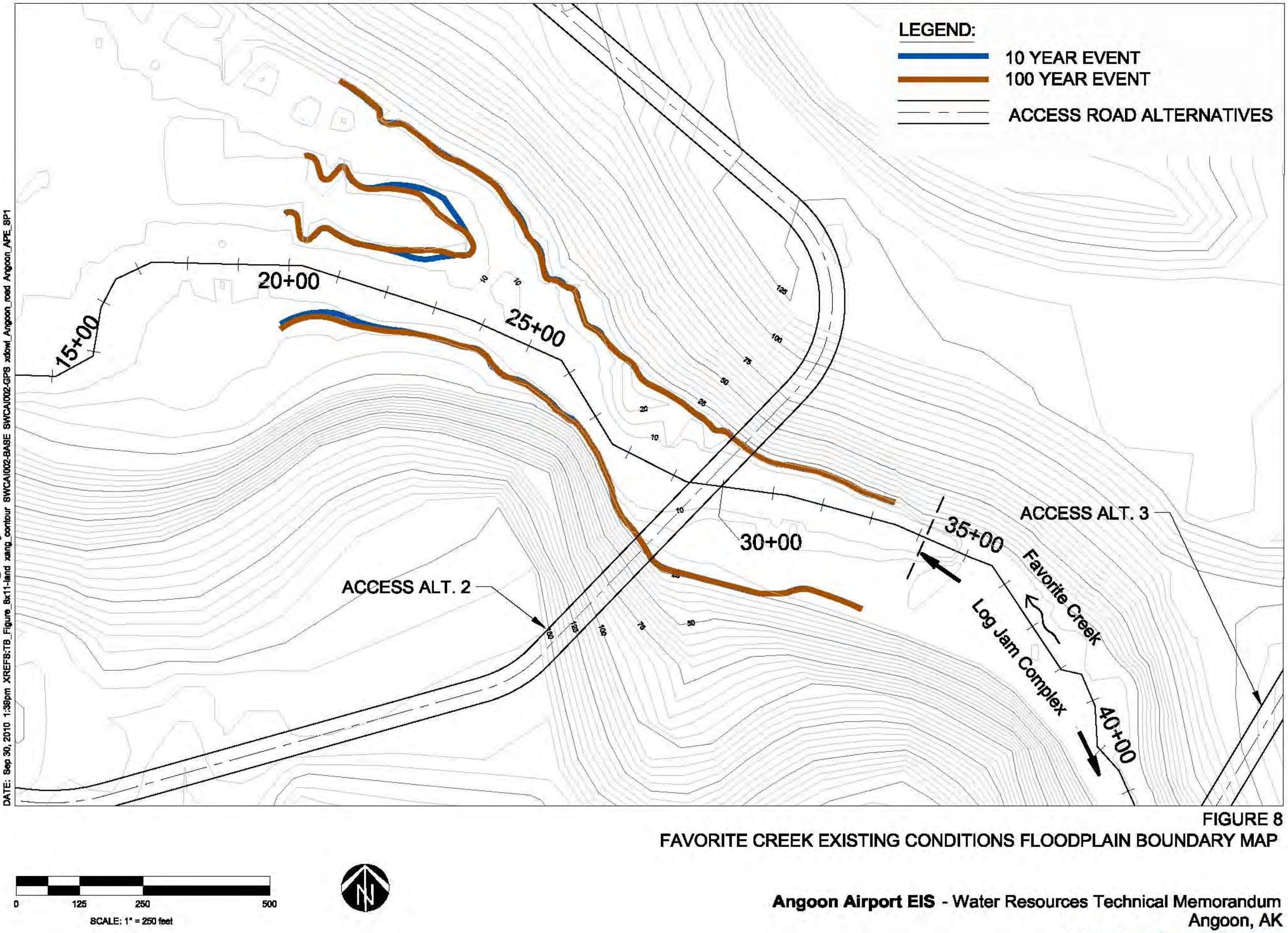

FIGURE 8
FAVORITE CREEK EXISTING CONDITIONS FLOODPLAIN BOUNDARY MAP

Angoon Airport EIS - Water Resources Technical Memorandum
Angoon, AK

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Appendix B. Angoon Airport EIS–Favorite Creek Large Woody Debris Study

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Technical Memorandum

To: Linda Mark, Vigil-Agrimis
From: Ryan French, SWCA Aquatic Biologist
Leyla Arsan, SWCA Aquatic Biologist
Date: April 12, 2011 *revision*
Subject: Angoon Airport EIS – Favorite Creek Large Woody Debris Survey

Introduction

A Tier II survey for large wood in Favorite Creek was performed by SWCA Environmental Consultants on August 20, 2009. This information was collected for Vigil-Agrimis to be used in preparing the Water Resources Technical Report for the Angoon Airport EIS. The area surveyed included 200 feet upstream and 200 feet downstream from the centerline of the proposed upper and lower road crossings on Favorite Creek, tributary of Favorite Bay, Alaska. The survey area for each road crossing was approximately 400 linear feet as determined by a Trimble GeoXT GPS unit.

Methods

As per the US Forest Service Aquatic Habitat Management Handbook (USFS 2001), only pieces that met the minimum qualifying dimensions, were within the bankfull width of the stream, and located in zones 1 and 2 were counted. The minimum qualifying dimensions were 0.1 meters in diameter (measured at the widest point) and 1.0 meters in length. Live trees or dead standing snags overhanging the channel were not counted, as none were actively creating pools or contributing to channel forming processes.

Key piece minimum dimensions vary based on stream size, which is differentiated by average channel bed width. The average channel bed width of Favorite Creek ranged from 10-19.9 meters; therefore key piece minimum dimensions were either 0.6 meters in diameter and >7.6 meters stem length, or >3 meters rootwad diameter.

Digital photos were taken of all qualifying large wood pieces and are included in Appendix 1. GPS satellite signal was not strong enough at the time of the survey to delineate each individual piece of large wood. Wood pieces were measured with a 2 meter range-pole with 1 centimeter increments. A site overview sketch of the position and orientation of qualifying large wood pieces was documented in field notes and is included in Appendix 1.

Results

Thirty-three pieces of qualifying large wood were counted at the proposed lower road crossing and 25 pieces were tallied at the proposed upper road crossing within the 400 foot survey corridors along the stream. No pieces met the minimum qualifying dimensions of key pieces for all three categories (diameter, length, and rootwad diameter) at either the upper or lower road crossings. Several pieces met the criteria for one or two categories. One piece at the lower road crossing qualified as a key piece based on length and diameter. Two pieces at the upper road crossing qualified as key pieces based on rootwad diameter.

All data are included in Appendix 2.

Discussion

Three pieces that were observed qualified as key pieces. One additional piece at the upper road crossing was very close to qualifying as a key piece (rootwad diameter = 3 meters), however the USFS (2001) states that the diameter must be greater than 3 meters to qualify.

There are a significant amount of key pieces between the proposed lower and upper road crossing, including a large logjam. The potential for recruitment of large wood downstream to the lower road crossing is high, as some of these key pieces are likely to be transported during major storm events.

Tidal influence was observed up to and slightly above the lower road crossing during high tide on August 20, 2009. The tidal influence was not apparent during earlier surveys when freshwater discharge was higher and tidal amplitude was lower. The tide height during the August 20, 2009 observation was 17.8 feet (per the Juneau tide table). Gradient and stream velocity decrease in the reach adjacent to the lower road crossing, which may allow for the deposition of large wood pieces.

References

US Forest Service. 2001. Aquatic Habitat Management Handbook. Alaska Region, R-10 2090.21-2001-1, Chapter 20 Fish and Aquatic Stream Habitat Survey.

Appendix 1. Photos and Site Overviews

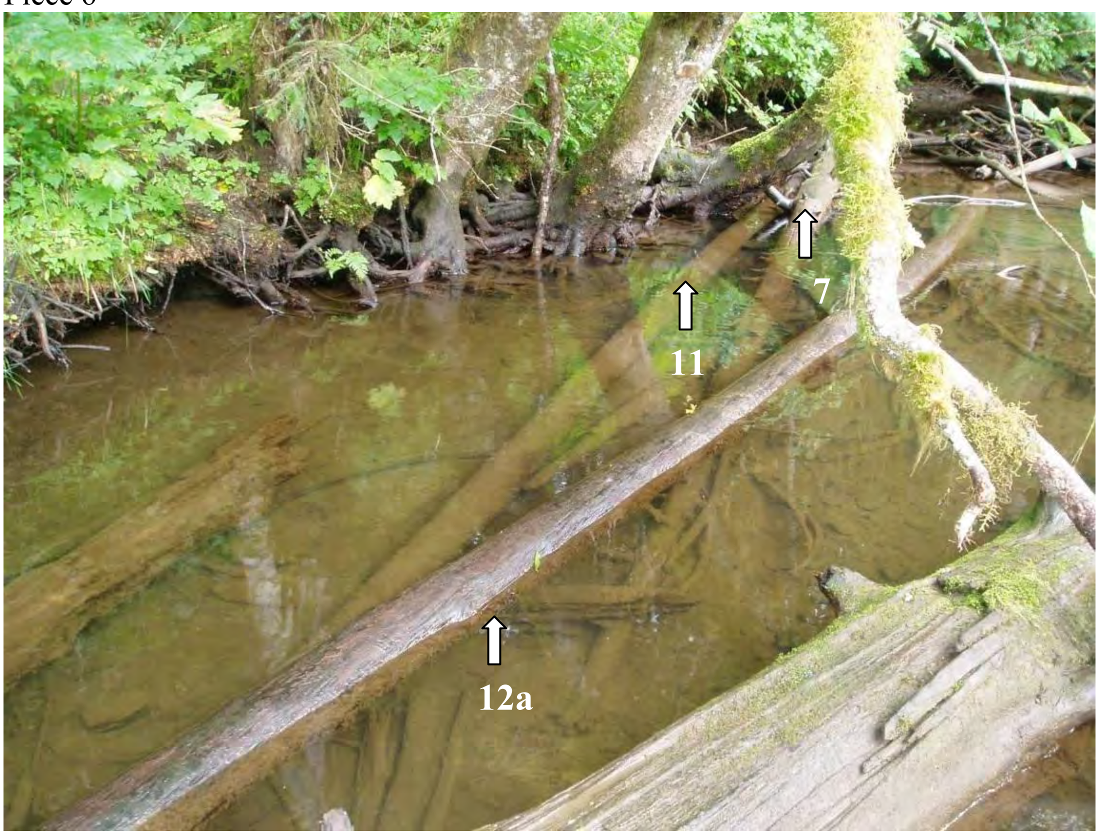
Lower Road Crossing

Piece 1

Piece 3

Piece 4, 5, 6

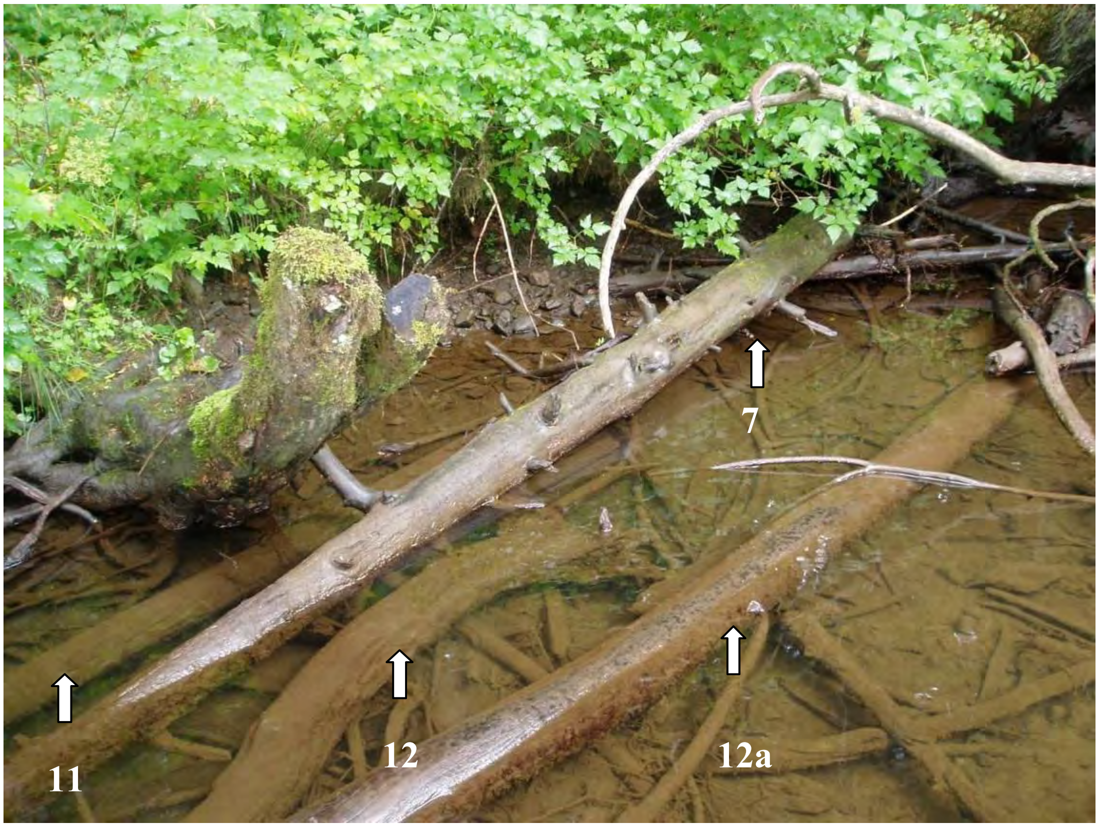
Piece 6



Piece 7, 11 and 12a

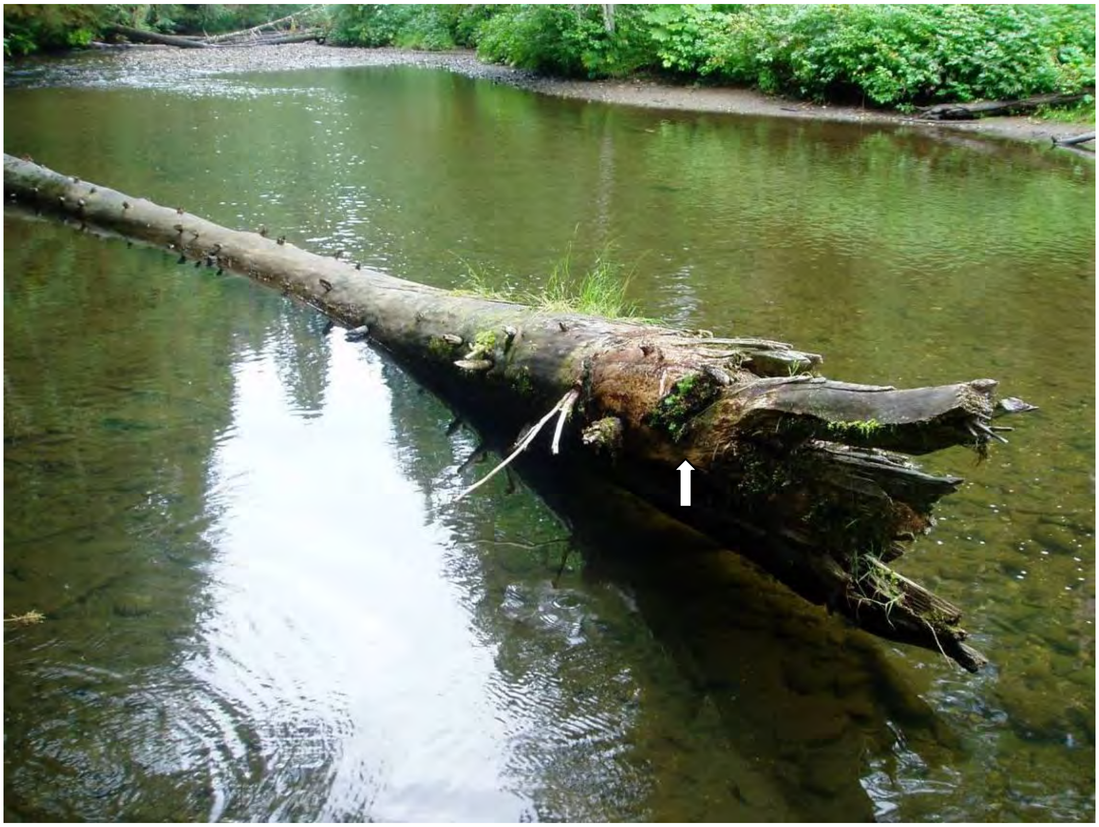
Piece 8 and 9

Piece 10 (with pink salmon)



Piece 7, 11, 12 and 12a

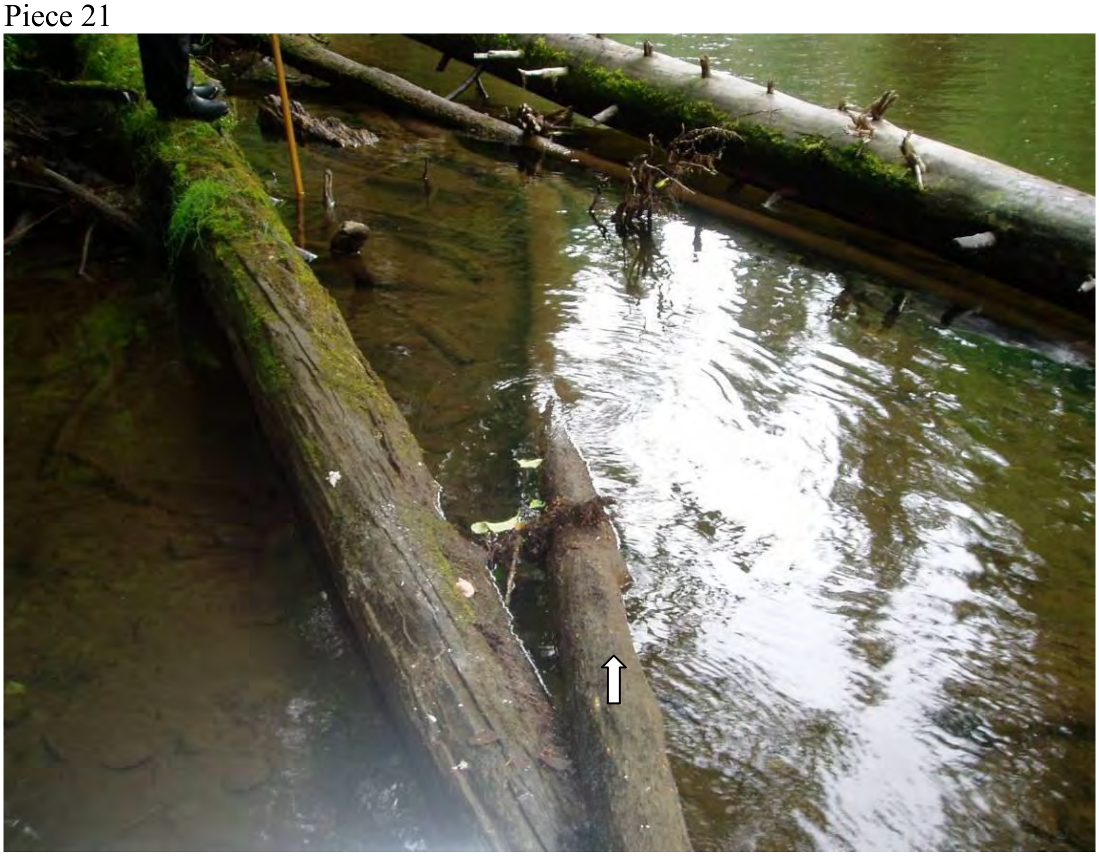
Piece 13



Piece 14* (*qualifies as key piece)

Piece 14*, 14a, 15, 16, 17, 18, 19, 20 (*qualifies as key piece)

Piece 21



Piece 22

Piece 14*, 23, 24, 25, 26, 27 and 28 (*qualifies as key piece)

Piece 29

Piece 30

Piece 31

Upper Road Crossing Photos

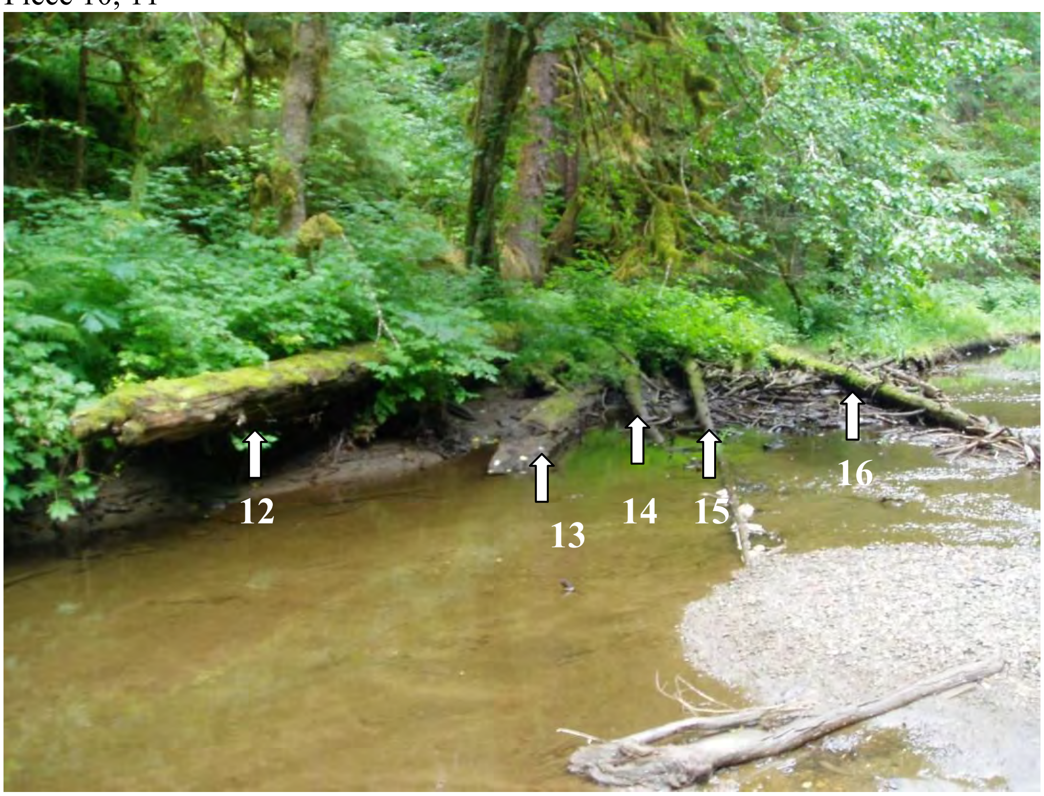
Piece 0, 1*, 2*, 3 (*qualifies as key piece)

Piece 4

Piece 5

Piece 6, 7, 8, 9

Piece 10, 11



Piece 12, 13, 14, 15, 16

Piece 17, 18, 19


Piece 20

Piece 21

Piece 22

Piece 23

Piece 24

Appendix 2. Large Woody Debris Data

From 200' below to 200' above lower road crossing

Piece ID#	Type	Length (m)	Max Diameter (m)	Zone Location	Bank (looking upstream)	Rootwad (dia.)	Key Piece*
1	conifer	9	0.3	1	LB	No	No
2	conifer	4	0.2	1	LB	No	No
3	alder	6	0.4	1,2,3,4	LB	No	No
4	conifer	12	0.2	1	LB	No	No
5	conifer	5	0.3	1	LB	No	No
6	conifer	16	0.45	1	LB	No	No
7	conifer	6	0.25	1,2	LB	No	No
8	conifer	15	0.23	1,2,3,4	LB	No	No
9	conifer	11	0.25	1	LB	No	No
10	alder	7	0.3	1	LB	No	No
11	conifer	8	0.3	1	LB	No	No
12	conifer	2	0.3	1	LB	No	No
12a	conifer	19	0.3	1	LB	No	No
13	conifer	4	0.4	1	LB	No	No
14	conifer	25	0.65	1,2,3,4	LB	Yes (1m)	Yes
14a	conifer	6	0.25	1	LB	No	No
15	conifer	3	0.2	1	LB	No	No
16	conifer	3	0.2	1	LB	No	No
17	conifer	3	0.2	1	LB	No	No
18	conifer	3	0.2	1	LB	No	No
19	conifer	3	0.2	1	LB	No	No
20	conifer	3	0.2	1	LB	No	No
21	conifer	11	0.51	1,2	LB	No	No
22	conifer	9	0.16	1,2	LB	No	No
23	conifer	13	0.19	1,2	LB	No	No
24	conifer	2	0.2	1	LB	No	No
25	conifer	4	0.2	1	LB	No	No
26	conifer	4	0.2	1	LB	No	No
27	conifer	6	0.2	1	LB	No	No
28	conifer	6	0.2	1	LB	No	No
29	conifer	4.5	0.44	1,2	LB	No	No
30	conifer	3	0.4	1,2,3,4	RB	No	No
31	conifer	3	0.15	2	RB	No	No

From 200' below to 200' above upper road crossing

Piece ID#	Type	Length (m)	Max Diameter (m)	Zone Location	Bank (looking upstream)	Rootwad (dia.)	Key Piece*
0	alder	3.5	0.4	1,2,3	RB	No	No
1	conifer	17	0.45	1,2,3,4	Across stream	Yes (4m)	Yes
2	conifer	17	0.4	1,2,3,4	Across stream	Yes (4m)	Yes
3	conifer	20	0.35	1,2,3	RB	No	No
4	conifer	3	0.2	2	LB	No	No
5	conifer	3	0.2	2	LB	No	No
6	conifer	11	0.62	1,2,3,4	RB	No	No
7	conifer	3	0.2	1	RB	No	No
8	conifer	3	0.2	1	RB	No	No
9	conifer	3	0.2	1	RB	No	No
10	conifer	4	0.5	1,2,3,4	LB	No	No
11	conifer	4	0.3	1,2,3	LB	No	No
12	conifer	5	0.4	2,3,4	LB	No	No
13	conifer	3.5	0.35	1,2	LB	No	No
14	conifer	3	0.2	1,2	LB	No	No
15	conifer	5	0.15	1,2	LB	No	No
16	conifer	5	0.25	1,2	LB	No	No
17	conifer	12	0.35	2,3,4	RB	Yes (3m)	No**
18	conifer	4	0.3	1,2,3,4	RB	No	No
19	conifer	5.5	0.5	1,2	RB	No	No
20	conifer	7	0.25	1,2,3,4	RB	No	No
21	conifer	8	0.45	1,2	LB	No	No
22	alder	4	0.4	1,2	RB	No	No
23	conifer	6.5	0.4	1,2	LB	No	No
24	conifer	5	0.25	1,2	LB	No	No

*Key piece definition for streams 10-19.9m in width = [>0.6m diameter and >15m length] or >3m diameter rootwad
** USFS (2001) states that rootwad must be >3m in order to qualify as a key piece