Task 1

LITERATURE REVIEW & GAPS ANALYSIS

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LITERATURE REVIEW & GAPS ANALYSIS

Introduction

The following document summarizes elements of relevant literature as it pertains to the Southeast Conference (SEC) High Efficiency Ferry (HE Ferry) Integration Blueprint Project, specifically exploring existing plans, attitudes, and proposed projects relating to local energy capacity and electric ferry needs.

Reviewed Documents

The following lists the primary literature and data sources that were reviewed. Each is summarized, with key points and takeaways identified in the

Summary of Literature of this document.

I. Alaska Low Emission/Electric Ferry Research Analysis
II. Alaska Marine Highway System (AMHS) 2045 Long-Range Plan
III. Alaska Statewide Long-Range Transportation Plan: Let's Keep Moving 2036 Policy Plan
IV. AP&T Hydroelectric Profile (including Goat Lake Hydroelectric Project)
V. Metlakatla Indian Community: Annette Islands Reserve Priority Climate Action Plan
VI. Proposed 2024-2028 Ketchikan Public Utilities Capital Improvement Program
VII. Southeast Alaska Power Agency (SEAPA) Load Growth Study
VIII. Pacific Northwest to Alaska Green Corridor Feasibility Study Scoping Proposal
IX. Annette Island Power System Assessment

Forthcoming Documents

X. Data and reports for communities of Metlakatla and Haines as part of the Energy Shed project, when available
    - Data requests are currently being processed by the utilities.
XI. Connelly Lake Hydro Aquatic Studies Report for 2012
    - Study is still needed for review.
XII. Relevant data and reports generated and made available through the Green Corridor Initiative
    - A green methanol feasibility report is currently under development per the Green Corridor Initiative website and should be released later this year. Status of other reports as part of the Green Corridor Initiative's Landscape Assessment and other phases are currently unknown.

Key Findings

Communities across SE Alaska are experiencing momentum toward modernization, seen in upgrades to existing technologies (such as heat pumps) and the addition of new ones (such as electric vehicles). At the same time, these communities are already strained for power, with many providers sharing between multiple communities or considering additional partnerships to expand service as much as possible. While new technologies, more housing, and updated infrastructure pose a valuable benefit for economic development and community well-being, there is only so much energy that suppliers can provide, particularly in the winter months.

The literature review pointed to projects that are introducing alternative energy sources to ease demand for energy providers like SEAPA. Hydroelectric and diesel-fired generator plants are another initiative that can help support regional providers. Intertie partnerships, as is happening between Metlakatla and Ketchikan, are other ways to consider sharing of limited power for more conscious usage.

Additionally, a wealth of existing information is available about shoreside infrastructure conditions at existing AMHS terminal locations, all of which are in good or fair condition, though less data was available for nearby marine facilities.

A few gaps in available data were identified and are discussed in the section below.

Data Gaps

After reviewing all available and relevant literature, a brief identification and analysis of key gaps was conducted to guide the recommended next steps as far as data collection to support HE Ferry Integration Blueprint development.

In short, future analysis should include stakeholder interviews with those not included in the SEAPA Load Growth Study, and interaction with local government officials to understand status on projects identified in some older reports.

Current Status of Mentioned Projects

There are several gaps in existing literature, related to the status of recent projects such as the Metlakatla-Ketchikan Intertie Project. As all the reports included in the literature are at least 2 years old, many of the projects identified within these documents are sure to have progressed by now (July 2025), but the extent of progress is currently uncertain. Lack of reliability in online documentation and missing publicly accessible information calls for additional internal support to fill in these blanks.

Future outreach with key community and utility stakeholders planned as part of this project will help fill these gaps. Key updates in project status will be noted in the memos summarizing outreach findings and will be incorporated into the applicable energy models.

Future Energy Needs & Trends

While a historical baseline is primed by the information found in the literature review, additional context is needed for the most current trends, attitudes, and projects. Some preliminary trend data and information on future energy projects have been identified for Ketchikan and Metlakatla, though trends should be updated based upon recent years' findings and project data will need verification. Projected energy consumption and generation trends for Skagway and Haines have not been found in the reviewed literature.

Missing Future Trends Data:

- Heat pump adoption goals/ projections for candidate communities
- Transit electrification goals for candidate communities
- Cruise shore power project goals
- Current consumption data for the harbors in Skagway, Haines, and Metlakatla

These data will be requested during discussions with candidate community city managers and port managers prior to site visits.

The stakeholder interviews and community survey planned as part of this project will be valuable and should focus on collecting data about trends in electricity usage and the needs and timelines of potential future high-energy projects. Key questions include:

1. What big utility projects (new generation, distribution, etc.) are underway or planned within the next 30 years?
2. What high energy usage projects (cruise ship shore power, transit electrification, etc.) are underway or planned within the next 30 years?
3. What is the level of local interest in electric vehicle and/or heat pump program participation?

Utility Data

Energy and power generation and consumption data are available for Metlakatla and Ketchikan/Saxman, though the data is broken down by sector (commercial vs residential, etc.) only for Ketchikan, meaning that additional assumptions or data breakdown by sector for Metlakatla would be beneficial. Energy data for Skagway and Haines has been received from the

utility provider and is broken down by sector. Energy Shed data about the condition of energy infrastructure in candidate communities is forthcoming and onsite utility infrastructure conditions will be confirmed during the site visits.

ANCILLARY UTILITIES

In addition to the electrical utility information available above, other information regarding water, sewer, and other ancillary utility information is available in the collected terminal drawings. As part of the terminal infrastructure analysis, this information will be investigated, and if alterations to homeporting are suggested, any additional utility changes or upgrades to support homeporting will be identified.

Missing Utility Data:

- Energy consumption data by sector for Metlakatla

Sector consumption data for Metlakatla is not available. Assumptions will be developed to split the available data by sector.

- Transmission infrastructure conditions for candidate communities

Transmission infrastructure conditions will be evaluated from Energy Shed data when available and will be analyzed and catalogued during site visits.

HE Ferry Energy Needs Inputs

Current route and vessel information outlined in the AMHS 2045 Long Range Plan and the vessel parameters outlined in the HE Ferry design request for proposals released by Alaska Department of Transportation and Public Facilities (AKDOT&PF) provide a solid basis for the HE Ferry energy needs and route profile work that will be conducted in the HE Ferry Integration Blueprint. Key data inputs on vessel characteristics will be needed from AKDOT&PF's HE Ferry designer to ensure alignment between the two projects. The HE Ferry energy analysis undertaken for the Alaska Low Emission/Electric Ferry Research Analysis will be updated and each of the input parameters will require confirmation or an update for current conditions. Example vessel characteristic information includes, but is not limited to:

- Passenger and vehicle capacity
- Length, breadth, and depth of vessel
- Weight of vessel
- Number of trips per day
- Intent for commonality of vessels for service between the various candidate port communities
- Target transit speed
- Power consumption while docked (pushing the dock)

Missing Ferry Energy Needs Data:

- Vessel characteristics from HE Ferry designer

Preliminary vessel characteristics will be taken from the vessel design RFP, but any updates and additional details established during initial ferry design.

Summary of Literature

Each reviewed report is summarized in this section, including identification of key energy projects and community energy profile data as applicable.

I. Alaska Low Emission/Electric Ferry Research Analysis (2023)[1]

The objective of this study prepared for Alaska Department of Transportation & Public Facilities (DOT&PF) was to determine how a new battery electric vessel could sustainably serve certain AMHS ports given varied Alaska weather, sea states, routes, shoreside charging, and other supporting infrastructure.

This study identifies existing power supplies and identifies the capacity for meeting additional energy demands at each community in consideration. As it was published in 2023, this report provides a current baseline of energy capacity and availability by community.

The report concludes that there is an environmental and community benefit to adding new low/no emissions vessels to the fleet. It finds that utilizing a hybrid propulsion arrangement would provide valuable flexibility to the currently limited fleet, allowing the vessel to support other routes with power from either low emissions diesel engines or from power systems running on sustainably produced alternative fuels.

Lastly, the report identifies the need for most ports to have shoreside energy storage systems to support new low/no emissions vessels.

The following sections summarize community profiles developed as a part of the analysis, identifying existing utility sources and capacity.

Community Profiles – Port Electrical Infrastructure

Multiple community energy profiles were included in this study including Skagway / Haines, Metlakatla, Ketchikan, Homer, and Seldovia. As Homer and Seldovia are not candidate communities for this study, a summary of that community profile was not provided.

SKAGWAY & HAINES

- **Utility:** Alaska Power & Telephone (AP&T)

[1] AMHS_Low_Emissions_Ferry_Analysis.pdf

- **Key Energy Generation Sources**: Hydroelectric power plants (primary); diesel-drive powerplants (back-up)
- **Distribution Infrastructure Highlights:**
  - 34.5kV submarine transmission cable connecting the communities
  - Skagway Distribution System: 2.4kV delta and 19.9/34.5kV wye
  - Haines Distribution System: 7.2/12.47kV wye and 34.5kV wye
- **Capacity for electric vehicle (EV) ferries?** Yes, with application of a Battery Energy Storage System (BESS)

METLAKATLA

- **Utility:** Metlakatla Power & Light (MP&L)
- **Key Energy Generation Sources**: Purple Lake and Chester Lake hydroelectric power plants; MP&L utilizes a diesel generator power plant for peaking requirements and during hydroelectric plant outages.
- **Distribution Infrastructure Highlights:**
  - Metlakatla Distribution System: 12.47kV
  - Existing distribution line connecting Metlakatla community and ferry terminal at Waldon Point
- **Capacity for electric vehicle (EV) ferries?** Yes, with application of a Battery Energy Storage System (BESS)

KETCHIKAN

- **Utility:** Ketchikan Public Utilities (KPU)
- **Key Energy Generation Sources**: Local hydroelectric power plants (primary); Southeast Alaska Power Agency, SEAPA (primary); diesel-drive powerplants (back-up)
- **Distribution Infrastructure Highlights:**
  - KPU Distribution System: 12.47kV
  - 34.5kV distribution line along community corridor.
  - 12.47kV distribution system with utility transformer at ferry terminal
- **Capacity for electric vehicle (EV) ferries?** Yes, possible without a BESS depending on required charge time.

Note: Metlakatla and Ketchikan are actively pursuing power intertie arrangement. Construction is underway.

Key Projects

This study identifies projects being funded and pursued by the AMHS, including:

Table 1: Key Projects Identified in the AMHS Low Emissions Ferry Analysis

Project	Description/Status
Electric Ferry Pilot Program (2024)	The purpose of this award is to design a low-no emission shuttle ferry and associated charging infrastructure for the Alaska Marine Highway System (AMHS). Since publication of the analysis, this project has started and is ongoing. It includes the HE Ferry Integration Blueprint effort.
Tustumena Replacement Vessel Propulsion System	AMHS is in the final stages of the technical design, and it is anticipated an RFP to shipyards for vessel construction will be issued in the Fall of 2025.
Planning & Design for Replacement Mainline Vessel	Not currently identified.
Mooring dock upgrades at Auke Bay, Pelican, and Prince William Sound	Not currently identified.
M/Vs Columbia, Tazlina, Matanuska, and Kennicott Vessel Upgrades	Not currently identified.

II. Alaska Marine Highway System 2045 Long-Range Plan (2025)[2]

The Alaska Marine Highway System 2045 Long-Range Plan (AMHS 2045 LRP) has been in development since 2022, identifying the first modern long-range strategy for terminal and vessel operations and maintenance system. The plan, in its final draft stage as of July 2025, includes goals and strategies in four focus areas: Service, Workforce, Vessel and Terminal Infrastructure, and Financial Sustainability.

A key component of the 20-year vessel plan identifies the action to construct six new vessels with varying degrees of hybrid propulsion. Terminal upgrades to support modernization and shore power are also recommended. The AMHS 2045 LRP has also identified key terminal upgrades to include vehicle charging stations to be used after vehicles have disembarked from the vessels.

Investing in terminal improvement projects that address asset conditions and aging terminal infrastructure will reduce the risk of service outages, promote a sustainable and reliable service, and reduce repair and maintenance costs.

[2] 2045_AMHS_Long_Range_Plan.pdf

Adding EV charging stations at key ports will expand statewide EV charging infrastructure, enabling light-duty EV travel and providing confidence for EV travelers when commuting throughout the state for work, recreation, and tourism.

The AMHS Long-Range Plan also calls for sustainable transportation research to be performed to identify opportunities for AMHS to reduce its impact and implement improvements when feasible, including:

- HE Ferry vessel designs (targeting deployment on the Skagway – Haines and Ketchikan – Metlakatla routes)
- Shoreside charging and port electrification
- Renewable diesel
- Automation through digitization
- Emissions and exhaust upgrades to existing vessels (i.e., Kennicott)

Included in the Plan, IIJA authorized a cumulative $250 million in funding upon creation of the Electric or Low-Emitting Ferry Pilot Program to be allocated between the federal fiscal year (FFY) 2022 and FFY2026.

The LRP identifies the vessel upgrades and identifies the need for terminal upgrades projects. Figure 1 shows the proposed LRP vessel replacement timeline.

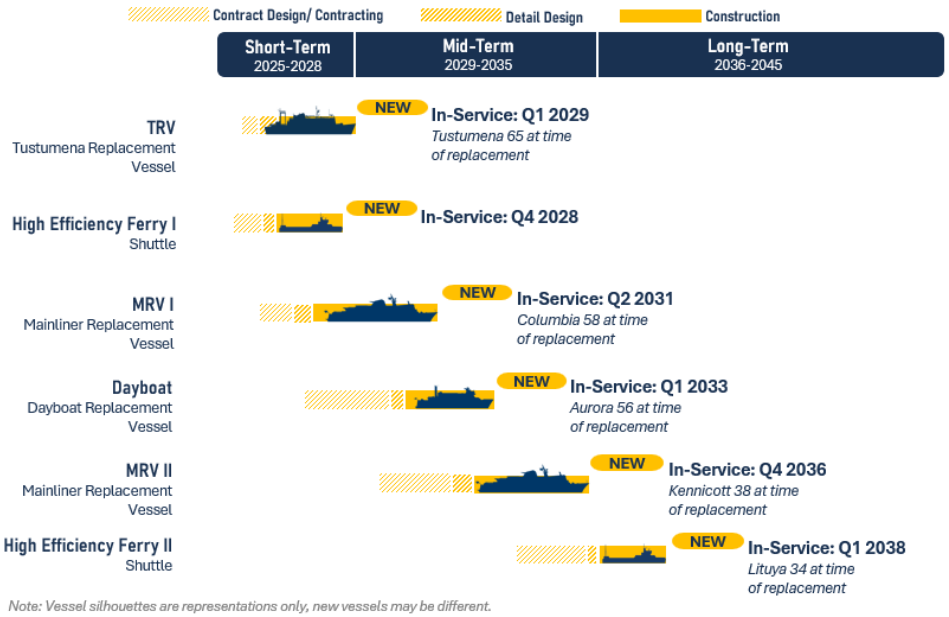

Figure 1: AMHS 2045 LRP Vessel Replacement Schedule

Terminal Infrastructure Information

Beyond review of the 2045 LRP document, additional review was of the identified terminal infrastructure conditions assessment information and availability of terminal drawings. Findings from this review are summarized below and the detailed review can be found in Appendix A.

Table 2- Summary of Condition Assessment Data Gathering Status for Each Site

Location	Site	Existing Structures Condition Data Gathering Status
Ketchikan	Ketchikan Ferry Terminal	According to AMHS condition assessment, overall, the three berths are in satisfactory condition showing minor deterioration. Further investigation is required to evaluate the facilities' condition.
	Port of Ketchikan	No record of condition assessment of the existing structures has been obtained yet.
Saxman	South Tongass Ferry Terminal	Given that this is a new project scheduled for completion in 2030, with planned development of terminal facilities both upland and in-water, the site can be considered to be in good condition.
Metlakatla	Annette Bay Ferry Terminal	The bridge, float, apron, and mooring structures at the site were all reported to be in good condition, with only minor issues identified. Further investigation is required to evaluate the nature of these issues and to assess the facility's suitability for meeting the requirements of the new HE vessel route.
Skagway	Skagway Ferry Terminal	According to AMHS condition assessment, overall, the deck and superstructure are rated in fair condition, indicating that the primary structural elements remain intact but exhibit minor corrosion, cracking, and chipping. The substructure, however, is in poor condition and its structural elements show advanced corrosion, deterioration, and cracking. Further investigation is required to evaluate the terminal condition.
Haines	Haines Ferry Terminal	According to AMHS condition assessment, overall, the marine structures are all in good condition with minor problems, the superstructure received the lowest rating of a fair condition noting that primary structural elements are in good condition but may have minor corrosion, cracking, or chipping.

Table 3- Summary of Record Drawings Data Gathering Status for Each Site

Location	Site	Drawings Data Gathering Status Summary
Ketchikan	Ketchikan Ferry Terminal	Majority of record drawings of past terminal projects were obtained and provide sufficient information regarding current conditions. However, due to the sheer number of past projects that AMHS has undertaken at this terminal, the available drawings were not exhaustive of all projects, with some drawings for older past projects listed in the AMHS condition assessment not found in the AKDOT&PF public portal.
	Port of Ketchikan Cruise Docks	No record drawings have been obtained yet; additional research needs to be conducted to obtain any publicly available data, and request from privately owned docks.

Location	Site	Drawings Data Gathering Status Summary
Saxman	South Tongass Ferry Terminal	Considering this is a new project scheduled to be completed in 2030, only conceptual drawings for the proposed ferry terminal at Saxman Seaport are available.
Metlakatla	Annette Bay Ferry Terminal	All record drawings for all past terminal projects listed in the AMHS condition assessment were obtained from the AKDOT&PF public portal.
Skagway	Skagway Ferry Terminal	Majority of record drawings of past terminal projects were obtained, but some of the past projects listed in the AMHS condition assessment were not found in the AKDOT&PF public portal.
	Skagway Cruise Terminals	Record drawings of the cruise terminals are available and have been obtained.
Haines	Haines Ferry Terminal	Majority of record drawings of past terminal projects were obtained, but some of the past projects listed in the AMHS condition assessment were not found in the AKDOT&PF public portal.
	Port Chilkoot Cruise Ship Dock	No record drawings have been obtained yet; additional research needs to be conducted to obtain any publicly available data.

III. Alaska Statewide Long-Range Transportation Plan: Let's Keep Moving 2036 Policy Plan (2016)[3]

This Statewide Long-Range Transportation Plan (Let's Keep Moving 2036) establishes transportation policies, goals, and implementing actions for the Alaska Department of Transportation and Public Facilities (DOT&PF) through 2036.

The Plan recognizes the need to balance the competing needs between developing and preserving the system. System preservation is addressed in the Policy and Actions section of the Policy Plan.

The plan does not identify specific projects to pursue, rather, it provides policy direction and specifies priorities and implementing actions that align capital and maintenance expenditures with goals for the preservation and modernization of Alaska's "as-built" transportation system.

[3] 2016_DOT_Long_Range_Plan.pdf

Multiple Policies and Actions identified in the Plan point to energy needs and the policy direction to upgrade infrastructure to align with goals of modernization and conservation, including:

- Action 2.7 – "*Support local transit agencies/systems in the application of new technologies and transit asset management plans to improve the efficiency and effectiveness of transit operations."*
- Policy 4.A – "*Identify new construction and modernization needs that address travel demand growth, economic development, travel and tourism needs and funding strategies through area and metropolitan plans and other long range transportation planning efforts.*"
- Action 5.3 – "*Address lack of redundancy and climate change resiliency in asset management plans, project identification, and prioritization within area, corridor and metropolitan plans."*
- Policy 6.C – "*Support energy conservation, specifically in our consumption of fossil fuels to address climate change. We will implement strategies for energy conservation of our transportation system that are identified in area plans, metropolitan plans, and community plans*."

IV. AP&T Hydroelectric Portfolio

To meet the energy demands of Skagway and Haines, three hydroelectric sources are utilized. These facilities vary in capacity, operational constraints, and seasonal availability, collectively forming a dynamic and responsive power generation system. This hydroelectric portfolio is designed to balance seasonal variability, regulatory constraints, and community demand. The combination of storage and run-of-the-river systems, supplemented by diesel generation, when necessary, ensures a resilient and adaptive energy supply for Skagway and Haines.

GOAT LATE HYDROELECTRIC PROJECT[4]

This report was published in 2003, detailing the specifications of the Goat Lake Hydroelectric Project and its mandate to monitor the resulting impact to grayling access to their spawning stream. The purpose of the plan is to determine if fish passage measures are necessary for providing access for grayling to the inlet stream to Goat Lake.

[4] Goat_Lake_HydroProject-Description.pdf

The Goat Lake Hydroelectric Project is located approximately 6.5 miles northeast of Skagway, Alaska. This project is a 4.0-megawatt hydroelectric facility located seven miles north of Skagway that started operations in 1997. The 204-acre glacially fed lake has the winter storage necessary to sustain year-round hydro generation. The Lake is used as a reservoir without any dam. It was certified as a Low Impact Hydropower project by the Low Impact Hydropower Institute in 2007. AP&T operates the Goat Lake facility, which provides power to Skagway and Haines.

- **Capacity**: 4 MW
- **Type:** Storage-based hydroelectric plant
- **Storage:** Goat Lake serves as the reservoir, with a licensed annual drawdown limit of 40 feet
- **Performance monitoring:** Storage levels are tracked using two key graphs—one shows the long-term average and the other reflecting the past five years of data.
- **Role:** As a primary generation source, Goat Lake provides consistent output and flexibility due its storage capacity

Project Status

The Goat Lake facility is known to be currently operational, though the status of equipment and any future expansion plans are not known currently. Engagement with AP&T is recommended to confirm information about the facility's conditions and any future expansion plans.

KASIDAYA HYDROELECTRIC PROJECT

Kasidaya hydroelectric project is a conventional hydropower facility located on Kasidaya Creek, which flows into the Taiya Inlet, a few miles south of Skagway, Alaska. It is owned by Alaska Power & Telephone (AP&T) and is used to generate electricity for the town of Haines, Alaska. While the facility can provide power during the summer, Haines relies on a connection to the Goat Lake hydroelectric plant for winter power due to the creek's reduced water flow in the colder months.

- **Capacity:** 3MW
- **Type:** Run-of-the-river
- **Runtime Date:** Refer to the attached Kasidaya runtime chart for historical operation patterns

- **Backup strategy:** When Kasidaya is offline due to low waterflow, diesel generators are used to maintain supply reliability for both communities.

DEWEY LAKES HYDROELECTRIC PROJECT[5]

- The 700-kW Dewey Lakes Hydroelectric Project is located within the Klondike-era gold rush community of Skagway. It first began operations in 1902 and now holds the honor of being inducted into the Hydro Hall of Fame, having been in continuous operation for more than 100 years. **Capacity**: 700kW
- **Type**: Technically a storage facility, but we have to operate as a run of the river due to water availability and licensing constraints
- **Seasonal output**: Mid-May to October is the peak generation period, October to May minimal operation to comply with winter drawdown limits.
- **Constraints**: Licensing requirements restrict winter drawdown, limiting it flexibility during colder months.

Distribution/Transmission Infrastructure

In addition to the information above on generation infrastructure, AP&T also provided maps of current transmission infrastructure adjacent to Skagway and Haines, which are shown below to indicate the pathing of infrastructure.

[5] https://www.renewableenergyworld.com/hydro-power/dams-civil-structures/the-dewey-lakes-project-in-alaska-has-been-generating-electrity-for-113-years/

Figure 2: AP&T Infrastructure near the AMHS Terminal in Skagway (provided by AP&T)

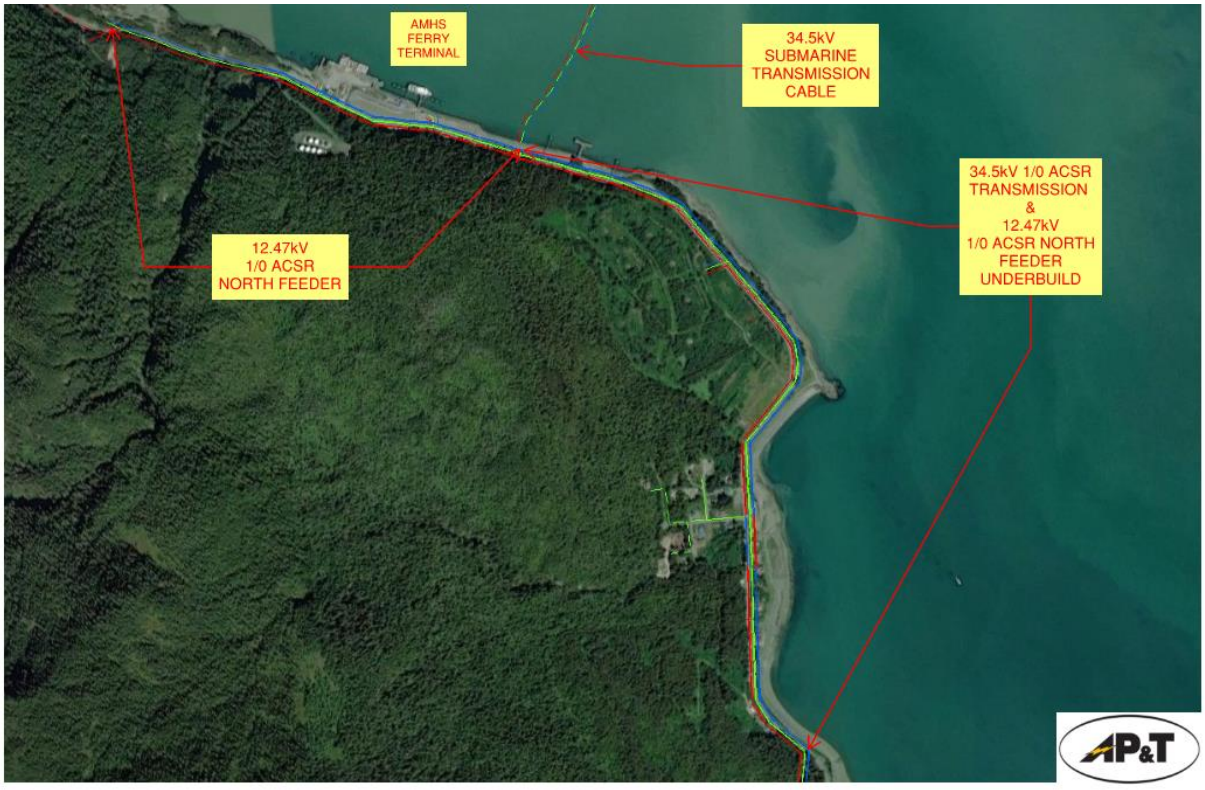

Figure 3: AP&T Infrastructure near the AMHS Terminal in Haines (Provided by AP&T)

V. Metlakatla Indian Community: Annette Islands Reserve Priority Climate Action Plan (PCAP) (2024)[6]

The Metlakatla Indian Community (MIC) developed the Priority Climate Action Plan (PCAP) to expand on climate action policies, programs, and projects to reduce greenhouse gas (GHG) pollution in the near term, including a focus on the community's current and future renewable energy systems. The PCAP includes a focused list of near-term, high-priority, and implementation-ready measures to reduce GHG pollution.

Current Supply

MP&L is the electric utility serving the MIC and has been doing so since 1927. MP&L's main generation sources include hydroelectric power from nearby dams on the Chester and Purple Lakes, with a combined average generation potential of 20,407 megawatt hours (MWh). The facilities include

- Chester Lake: one 1.2 MW unit
- Purple Lake: three 1,000 kW units

Both facilities are impacted by drought, which limits their capacities, and both have been affected by lower precipitation levels in recent years. For example, in 2016, MP&L only generated 19,052 MWh from hydro power, requiring 3,309 MWh from backup power sources, in this case MP&L's diesel generators. MP&L currently has two such generators (one 5MW and one 1.5MW) to provide supplemental energy and power to the MIC.

Current Demand

MIC's daily energy demand averages between 2.5 to 3.0 MW, with a peak demand of 4MW observed in recent years.

Key Projects

The PCAP identifies the following projects as Climate Pollution Reduction Grant (CPRG) Priority Greenhouse Gas (GHG) Reduction Measures. In addition to those identified directly in the PCAP and in the table below, the MIC has a collection of Tribal plans adopted by the MIC Tribal Council that prioritize investing in new renewable energy projects including wind, solar, and small hydro to meet the community load and support additional energy banking, intended to diversify the MPL's current energy portfolio and increase hydroelectric capacity.

[6] metlakatla-indian-community-pcap.pdf

Table 4: Projects Identified in the Metlakatla Indian Community: Annette Islands Reserve PCAP

Project	Description/Status
Chester Lake Dam Extension Project	Raise Chester Lake Dam to increase energy storage systems on government-owned facilities. As of 2024, the Tribe was in the process of completing the final design engineering and working to secure final funding.
Tamgas Creek Hatchery Water Line and Small-Scale Hydroelectric Facility	Promote electrification of government-owned buildings through the incorporation of a small-electric hydroelectric facility element in the hatchery water line design and construction. Final engineering and construction documents are expected to be completed in mid- to late-2024.
Metlakatla-Ketchikan Intertie Project	Installation of a 2.1-mile submarine transmission line that will connect the electric systems of MP&L in Metlakatla on Annette Island to KPU in the nearby community of Ketchikan on Revillagigedo Island. As of 2025, the submarine cable is installed. MP&L and the MIC were in the process of coordinating to secure final phase funding for this project to support infrastructure upgrades necessary for completion.

VI. Proposed 2024-2028 Ketchikan Public Utilities Capital Improvement Program (2024)[7]

The Ketchikan Public Utilities (KPU) Capital Improvement Program (CIP) details projects by funding source and total cost per project. As it relates to the HE Ferry Integration Blueprint Project, the CIP outlines several projects in the Electrical Division, shown in Figure 4 below.

Division/Project	Prior Years	2024	2025	2026	2027	2028	Five Year Total	Project Total
Electric Division								
Silvis Road Repair	22,150	363,600					363,600	385,750
Ketchikan Lakes Project Relicensing		303,000	500,000	500,000	200,000	200,000	1,703,000	1,703,000
Ketchikan Tunnel Penstock Valves Replacement	100,000	303,000					303,000	403,000
Whitman Dam Crack Repair		80,000					80,000	80,000
Whitman Tailrace Modification	36,291	200,000					200,000	236,291
Whitman Incubation Pipe Flow Meter		50,000					50,000	50,000
Penstock Inspections		100,000					100,000	100,000
Ketchikan Lakes Utilities	25,350	195,000	250,000				445,000	470,350
Watershed LiDAR Survey			250,000				250,000	250,000
Beaver Falls Powerhouse Exterior	36,070	757,500					757,500	793,570
Bailey Title V Renewal		40,000					40,000	40,000
Beaver Falls Switch Gear Replacement	105,000		1,372,150				1,372,150	1,477,150
Transmission & Distribution Line Maintenance		252,500	150,000	500,000			902,500	902,500
Ketchikan International Airport & Pennock Island Upgrade	225,977	429,250	550,000				979,250	1,205,227
Transformer Purchase		200,000	250,000	250,000	250,000	250,000	1,200,000	1,200,000
Bailey Mooring Dolphin Replacement			200,000				200,000	200,000
Port West Substation Reconfiguration & Site Mod.			175,000	950,000			1,125,000	1,125,000
Beaver Falls Relicensing	670,000	30,000					30,000	700,000
Bailey Generator No. 4 Wartsilia PLC Upgrade		115,000					115,000	115,000
Battery Systems & Chargers	172,000	46,000	50,500	50,500	50,500	50,500	248,000	420,000
Feeder Protective Relay Upgrades	50,000	100,000	50,000	50,000	50,000	50,000	300,000	350,000
System Sectionalizers		100,000	100,000	100,000			300,000	300,000
Digital Radio Replacement	6,000		120,000				120,000	126,000
Vehicles & Moving Equipment		115,000	425,000	175,000		350,000	1,065,000	1,065,000
Operating Equipment		344,410	300,000	300,000	300,000	300,000	1,544,410	1,544,410
North Tongass Tree Removal			200,000				200,000	200,000
AMI, Meters and Meter Replacement Parts		185,000	125,000	125,000	125,000	125,000	685,000	685,000
Spare Substation Class Transformer Refurbishment		50,000					50,000	50,000
Security Fencing and Gates		45,000					45,000	45,000
ESRI Trouble Ticket Solution		40,000					40,000	40,000
Bailey Generator Radiator Replacement		40,000	300,000				340,000	340,000
Bailey Fuel Tank Painting		100,000					100,000	100,000
Additional Projects		164,000	164,000	164,000	164,000	164,000	820,000	820,000
Reimbursable Projects		25,000	25,000	25,000	25,000	25,000	125,000	125,000
Bailey Exhaust Stack Re-Coating		90,000					90,000	90,000
Electric Division Service Center			2,000,000	500,000	5,100,000		7,600,000	7,600,000
Silvis Tunnel Valve Replacement			40,000	400,000			440,000	440,000
Generator Rewind & Repair			650,000	700,000			1,350,000	1,350,000
34.5 kV Breaker and Relay Spares			105,000				105,000	105,000
Beaver Falls Governor Rehabilitation			250,000				250,000	250,000
Silvis Shaft & Turbine Overhaul			750,000				750,000	750,000
Bailey Unit No. 1 Rehabilitation	11,921				850,000		850,000	861,921
Clam Cove 3-Phase Upgrade				500,000	2,000,000		2,500,000	2,500,000
Mountain Point Substation Replacement			750,000	7,600,000			8,350,000	8,350,000
Bailey Substation Replacement					1,500,000	15,300,000	16,800,000	16,800,000
Ward Cove Substation						800,000	800,000	800,000
Diesel Generator Replacement					4,125,000	40,750,000	44,875,000	44,875,000
Electric Division Total	1,460,759	4,863,260	10,101,650	12,889,500	14,739,500	58,364,500	100,958,410	102,419,169

Figure 4: Projects Identified in the 2024-2028 KPU CIP

[7] 2024-2028 Proposed KPU CIP.pdf

Table 5: Key Projects in the 2024-2028 KPU CIP

Project	Description/Status
Ketchikan Lakes Project Relicensing	Renew the Federal Energy Regulatory Commission (FERC) license for Ketchikan Lakes
Bailey Title V Renewal	Renewal of air quality permit. Failure to renew the permit will result in no longer being able to operate the emergency diesel generators.
Beaver Falls Switch Gear Replacement	The Beaver Falls powerhouse switchgear needs replacement and is an operating risk to the power plant.
Transmission & Distribution Line Maintenance	Provides a means for engineering assessments of existing poles, engineering and design work for replacement poles, and if needed to augment KPU crew to hire contract linecrew or National Electrical Contractors Association (NECA) linemen to conduct pole replacement projects.
Beaver Falls Relicensing	Renew the FERC license for Beaver Falls.
Electric Division Service Center	Acquire property for future construction of an Electric Division Service Center.
Silvis Tunnel Valve	Replace the leaking valve in the Silvis tunnel as it is no longer capable of shutting off water to the penstock and Silvis Powerhouse.
Generator Rewind & Repair	Rewind and complete other necessary repairs to 7 generators.
Silvis Shaft & Turbine Overhaul	Complete repairs on the seal rings, shaft bearing, wicket gate assembly and other major components as required on the turbine.
Bailey Unit No. 1 Rehabilitation	Rehabilitate the components that were damaged in 2018 by a main bearing failure.
Mountain Point Substation Replacement	Design and build a new substation to replace the Mountain Point Substation which is nearing its end of life.
Bailey Substation Replacement	Replace the diesel generator transformers, grounding transformer, 34.5kV breakers, bus work, gang-switches, grounding, conductors, communications, oil containment, and fencing.
Ward Cove Substation Replacement	Design and build a new substation to replace the Ward Cove Substation which is nearing its end of life.
Diesel Generator Replacement	Replace both Worthington generators at the Bailey Powerhouse with a large co-generation turbine unit with secondary steam generation, in the order of magnitude of 25MW. Extensive work to the powerhouse structure, fuel tank farm and delivery system, exhaust & cooling system, control & communication systems, and adjoining Bailey Substation electrical equipment will also need to be completed.

VII. Southeast Alaska Power Agency (SEAPA) 30 Year Load Growth Study (2023)[8]

This Load Growth Study projects an estimate of anticipated load growth and identifies new energy sources or upgrades to existing sources. This study gathered data from the communities to profile the electrical power demands and energy consumption characteristics of Wrangell, Metlakatla, Petersburg, and Ketchikan. This study also considers fuel data to help visualize trends toward the transition from use of fossil fuels to electrified methods of heating and transportation.

The study considers three energy sectors to better understand their effect on electrical growth in the communities supported by SEAPA. The three sectors include Heating, Transportation, and Tourism. Within these sectors, this study observes three clear trends that relate to potential load growth:

1. The conversions of heating systems from fossil fuels toward the use of electrically based heating systems.
2. The trend toward the use of electrified vehicles. Very few are in use in any of the communities considered at this time. Growth is expected, though impact on load is minimal.
3. On the marine side, a greater interest in supporting cruise ships with shore power and using electrified ferries has surfaced.

In summary, this study projects an estimate of anticipated load growth that SEAPA and its supported communities will experience over the next 30 years.

Existing Conditions

An existing conditions report within this study helps establish a baseline understanding of current conditions of energy demand and supply. The following points summarize the findings.

- SEAPA provides electrical energy to three communities: Petersburg, Wrangell, and Ketchikan. The energy delivered to these communities is generated at their Tyee Lake and Swan Lake hydroelectric plants and connected to the communities via transmission line.

[8] SEAPA Load Growth Study Report - 23y08m22d.pdf

- Hydroelectric resources in Southeast Alaska have reached their capacity limits to serve these communities with power and energy year-round. Additional demand from new projects being proposed will be a challenge to meet.
- KPU and MP&L recently signed an agreement for an intertie between their two communities to allow an exchange of energy between them.
- Petersburg and Ketchikan maintain additional hydroelectric plants to help meet electrical energy needs.
  - Petersburg Municipal Power & Light (PMP&L) supplies more than 20 percent of their electrical requirements with energy from their hydroelectric plant in Blind Slough.
  - Ketchikan Public Utility (KPU) supplies approximately 50 percent of Ketchikan's electrical needs from its hydroelectric plants at Ketchikan Lakes, Whitman Lake, Beaver Creek Falls, and Upper Silvis Lake.

Community Profiles & Energy Generation

The study team carried out thorough analysis per community, including demographic information and energy usage conditions and trends. The team also performed stakeholder interviews, which lent insight into upcoming projects that may be consequential for local industries and their energy production/consumption. Key findings from the study regarding Ketchikan are detailed below. As Wrangell and Petersburg are outside the scope of the HE Ferry Integration Blueprint, more detailed findings for those communities were not provided.

KETCHIKAN

Similar to other communities, Ketchikan has participated in the switch from fuel oil and wood to electric heat. An estimated 30% of Ketchikan homeowners use heat pumps for heating currently, and contractors expect that to rise to as much as 60% in the next five years. This conversion is especially impactful in the winter months, putting KPU at a stress point for what they can provide. With 10% growth in wintertime peak in just one year, there is a 4 MW pick up at peak winter times. If SEAPA fails in any way, the community is very vulnerable, with the capacity to provide only about 34 MW without SEAPA.

Notably, Ketchikan will be the second Southeast Alaska community to take action under the Green Corridor initiative (after Juneau).

Year/Source	KPU/SEAPA Generation (MWH)				
	KPU	SEAPA	Total	KPU%	SEAPA%
2012	88,128	94,372	182,500	48.3%	51.7%
2013	86,929	91,331	178,260	48.8%	51.2%
2014	88,521	87,923	176,444	50.2%	49.8%
2015	92,917	82,277	175,194	53.0%	47.0%
2016	85,731	90,445	176,176	48.7%	51.3%
2017	85,455	98,313	183,768	46.5%	53.5%
2018	86,409	90,349	176,758	48.9%	51.1%
2019	118,184	55,044	173,228	68.2%	31.8%
2020	94,550	81,300	175,850	53.8%	46.2%
2021	98,594	83,366	181,960	54.2%	45.8%
2022	86,159	97,633	183,792	46.9%	53.1%
Avg				51.6%	48.4%

Figure 5: Ketchikan Energy Generation (2012 - 2022)

Over the 2012 to 2022 period, Ketchikan received an average of 48.4 percent of its electrical energy from SEAPA via the Swan Lake transmission line. The remaining generation came from hydroelectric generation facilities at Ketchikan Lakes, Whitman, Beaver Falls, and Upper Silvis Lake hydroelectric plants, as well as their back-up diesel-fired generators.

Key Projects

Key projects that are anticipated to have some effect on energy supply/demand, as identified in stakeholder interviews.

Table 6: Ketchikan Projects as Identified in the SEAPA study

Project	Description/Status
New Housing	Anticipated additional 100-300 units over the next 5-10 years
Airport Expansion	Not currently identified.
Electric ferry from Ketchikan/Saxman to Metlakatla	Shoreside infrastructure operated by City of Ketchikan and Ketchikan Gateway Borough
Metlakatla Intertie	Planned to allow purchase of power from KPU.
NOAA Facility	In construction
Gravina Island Ferry Berths	Not currently identified.
Ship-Shore electrification	Likely this decade, 20-30MW additional electrical load, 2 ports, 6 berths (Ketchikan has 4 docks, Ward Cove has 1 dock, 2 ships). On annual basis, 16-25 GW of interruptible energy.

Project	Description/Status
Possible Projects - *No action to date*	
KIC Treatment Facility	No concrete plans to date
Coast Guard Facility Upgrades	No concrete plans to date
Saxman Small Cruise Ship Port and ferry terminal	No concrete plans to date
Expansion of athletic fields and rec center	No concrete plans to date
DEC Wastewater Disinfection Required Upgrades	New disinfection requirements may require UV disinfection for 5-million gallons a day in the next 5-10 years.
Gravina Island Wood Pellet Mill	SE Conference is leasing space on Gravina for wood pellet mill. (Electrical requirement for the pellet mill dryer is 400amp. 480/3/60). There is discussion with a mine processing company that could locate there in 5-10 years. The mill could have 100-200 housing units there (considered in new housing above).
Senior Housing Development	No concrete plans to date
Road Extension and subdivision near Shelter Cove and Bat Cove	Road extended and connected to Shelter Cove logging roads, opening the way for tourism development, lodges, trams, and other tourism attractions. No concrete plans to date, but the State is doing a small-scale subdivision of 30 lots.

METLAKATLA

Data was gathered from MP&L to illustrate the potential future impact the community will have on KPU and SEAPA with the future installation of their intertie with Ketchikan. No interviews were conducted in Metlakatla.

	Calculated Energy Generated (MWH)												
Year/Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	Total Annual Energy
2013	2071	1833	1983	1814	1440	1252	1265	1388	1395	1680	2002	2354	20478
2014	2118	2206	2246	1947	1427	1299	1366	1366	1322	1791	1887	2066	21040
2015	2037	1870	1987	1840	1384	1239	1679	1672	1687	1784	2064	2318	21561
2016	2237	1884	2022	1751	1434	1499	1831	1647	1583	1826	1939	2304	21955
2017	1908	1251	1416	1242	924	1129	1132	1494	1414	1726	1981	2009	17625
2018	2160	1902	1658	1442	988	1070	732	989	1333	1419	1536	1946	17173
2019	1973	1917	1684	1427	1100	1025	1015	1027	1107	1525	1548	1822	17171
2020	2152	1738	1779	1574	1059	1020	1009	1058	1074	1517	1745	1810	17537
2021	1896	1948	1928	1487	1251	1035	980	1067	1255	1606	1716	2206	18375
2022	2159	1783	1832	1620	1336	1027	1119	1056	979	1390	1837	2136	18275

Figure 6: Metlakatla Energy Generation (2013 - 2022)

VIII. Pacific Northwest to Alaska Green Corridor Feasibility Study Scoping Proposal (2022)[9]

The Pacific Northwest to Alaska Green Corridor[10] project launched in May 2022 to bring together 'First Mover' ports, cities, cruise lines and their global trade association, and nonprofit experts on maritime innovation and decarbonization to explore creating the world's first cruise-led green corridor. This project is currently looking at utilizing biodiesel fuel. While this would not directly grow the electrical demand, vessels would still likely plug into shore power when in port.

Haines, Sitka, Skagway, and Juneau are included as 'First Movers'. These four cities will work to:

- Evaluate the necessary technological, economic, infrastructure, and regulatory/policy conditions to support a green corridor for cruise from the Pacific Northwest to Alaska.
- Explore near-term opportunities to accelerate decarbonization and/or to reduce emissions, leveraging this new, regional collaboration.
- Develop and regularly update shared workplans and adhere to the governance structures, terms, and frameworks needed to guide this regional effort.

Landscape Assessment

The first step is a Landscape Assessment, which will analyze cruise ships and their fuel use and necessary shore-side infrastructure upgrades for alternative fuels and shore side power. Status of the Landscape Assessment is currently unknown.

IX. Annette Island Power System Assessment (2010)[11]

The Annette Island Power System Assessment was created for the Metlakatla Indian Community in 2010 to provide an overview of existing and potential power system assets. This report assesses existing MP&L assets, including their diesel and generator battery facilities at Purple Lake, Chester Lake, and the Centennial Power Plant.

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[9] Pacific Northwest to Alaska Green Corridor Feasibility Study Scoping.pdf

[10] A green shipping corridor (also known as a Green Corridor) is a specific trade route where public and private action catalyzes the feasibility of zero-emission shipping.

[11] Power System Assessment - 10 October 2010 - 269-03.pdf

It also assesses potential power transmission and production facilities, considering new hydro plants and wind turbine farms. The assessment determines that there is potential to develop six more lakes for hydro-electric generation, and potential upgrades to the two presently utilized lakes, Purple and Chester. With these additional plants considered, the total energy capacity for the island will exceed 70,000 MWh, over 40,000 MWh greater than the current capacity.

Existing Facilities

At the time of this assessment, MP&L surplus capacity was between 6,000 and 7,000 MWh per year, with loads continuing to grow at a rate of roughly 7 percent per year. The load growth was largely attributed to the increased implementation of electric heat in new and existing homes and facilities. We now know that growth has slowed and loads are expected to hold steady for the next few years without change. Due to the age of this study, updated information is provided as it is available.

PURPLE LAKE HYDRO POWER PLANT

Location: Tamgas Harbor; ~20 feet above sea level

Infrastructure Highlights:

- The plant is fed by a 64-inch penstock with an underground tap into Purple Lake.
- Three turbine-generator units, each rated at 1000 KW, 0.8 power factor (1250 KVA), though units have reportedly operated at up to 1300KW in the past.
- The generators route their power through the original switchgear inside the power plant to a substation outside the plant.
- The substation steps the plant voltage up to a 12,470Y/7200 configuration.

Plant Condition: Fair to good

Lake Condition: Low – 20’ or more below upper spill level

CHESTER LAKE HYDRO POWER PLANT

Location: South end of Walden Point Road (mountain side) ~ 45 feet above sea level

Infrastructure Highlights:

- Fed from penstock in the base of a 40-foot-high dam at the outlet of Chester Lake.
- One Pelton type turbine-generator rated at 1042 KW with a power factor of 80%
- The generator feeds its power through switchgear within the plant to a pad-mount, step-up transformer outside the plant.
- The transformer steps the plant voltage up to a 12,470Y/7200 configuration.

Plant Condition: Good

Lake Condition: Low – 5’ to 10’ below upper level

CENTENNIAL POWER PLANT

Location: Northeast side of Metlakatla, Walden Point access road

Infrastructure Highlights:

- 2.2 MW Caterpillar 3500-series diesel fired engine-generator .

Plant Condition: Fair to good. The distribution substation outside the power plant is in poor condition and equipment needs to be replaced.

DISTRIBUTION SYSTEM

Infrastructure Highlights:

- 12,470Y/7200 volts
- The infrastructure between the Centennial Power Plant and downtown waterfront is sized to support large, industrial loads.

Potential Future Hydro Plants

Annette Island is home to numerous lakes, many of which have the potential for future hydro power development. The following projects are considered for their feasibility for future consideration; additional details can be found in the source document.

- Helen Todd Lakes
- Triangle (Hassler) Lake
- Cascade Lakes
- Un-named Lakes
- Kwain Lake
- Crater Lake
- Chester & Edgecumbe Lake
- Purple Lake

Potential Wind Farms

Five areas are identified as potential host sites for wind turbine application, which could contribute greatly to the local power supply, possibly exceeding power generated from the hydro power plants. Additional details can be found in the source document.

- Airport Area
- South Annette Island
- Chapeau/Davidson/Tamgas Mountains
- Hotspur Island
- Duke Island

Next Steps

The above highlighted key findings from relevant literature relating to energy demand, supply, and capacity across Southeast Alaska. Identified data will be crucial for building models as part of the HE Ferry Integration Blueprint, while strategic engagement and stakeholder coordination will be key strategies for filling identified data gaps.

Next steps in the Blueprint effort will include beginning to build utility and community energy models, identifying route profiles, and beginning work on the more detailed desktop site infrastructure assessment.

Appendix A- Preliminary Terminal Data Gathering Assessment for the High Efficiency Ferry Pilot Project

1.0 Introduction

This appendix presents a preliminary assessment of data gathering to support developing a blueprint for implementing a High Efficiency (HE) Ferry Pilot project and successfully integrating its operation into the community. The objective is to support Alaska Department of Transportation and Public Facilities (AKDOT&PF) and Alaska Marine Highway System (AMHS) in decision making regarding the development of two proposed ferry routes in Southeast Alaska.

Five candidate locations in Southeast Alaska are under consideration for establishing the two ferry routes. Route 1 is targeted for deployment in 2028 with Route 2 targeted for deployment in 2038. Determination of Route 1 and Route 2 will be based off site evaluation, energy capacity, infrastructure needs and economic benefits. An aerial image of this first proposed route is shown in Figure 1.

An aerial image of the proposed route for operation between Haines and Skagway is shown in Figure 2.

Considering the short-term plan to develop Route 1 and long-term plan to develop Route 2, this preliminary assessment focuses on identifying and presenting available data for existing ferry terminals and marine facilities that could potentially support the implementation of these routes.

Figure 1: Aerial Image from Ketchikan or Saxman to Metlakatla Route.

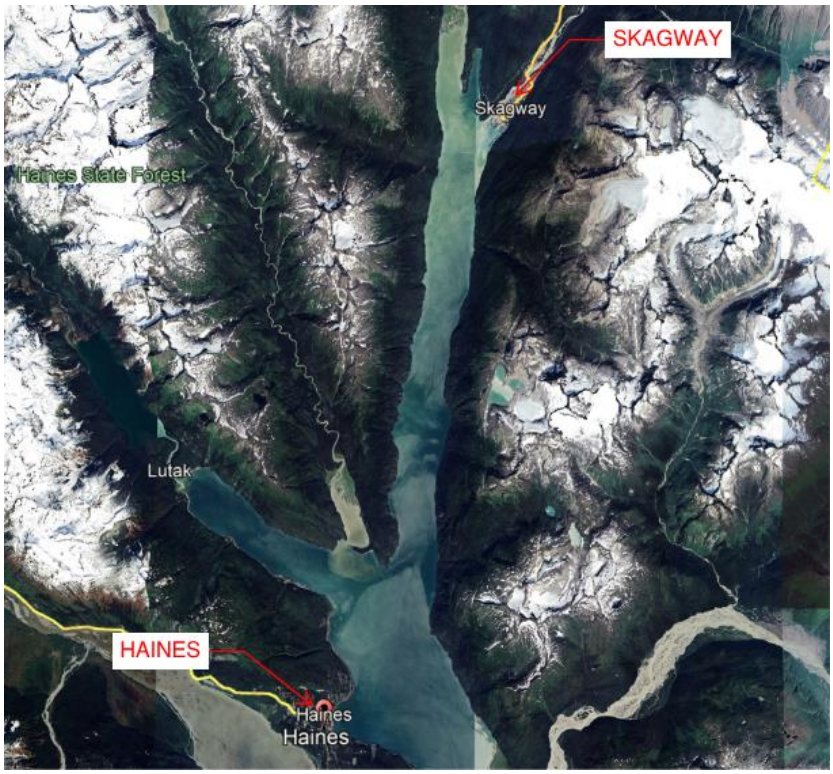

Figure 2: Aerial Image from Skagway to Haines Route

2.0 Data Gathering References

A comprehensive condition assessment of all existing Alaska Marine Highway System (AMHS) ferry terminals and marine facilities was conducted in 2022. The full report is included as Attachment 1, and a summary of the general information provided in the condition assessment report for each AMHS site is outlined below:

1. Historical data on total passenger and vehicle traffic over the past 10 years
2. Berthing configurations and vessel alignment
3. Site-specific tidal data
4. Assessment of upland area conditions
5. Evaluation of in-water terminal structures condition
6. A summary table of terminal improvement projects, including descriptions
7. A general facility evaluation with condition ratings for each major component

The 2022 condition assessment served as a key reference for evaluating the current state of AMHS facilities and identifying opportunities for supporting future ferry service. The AMHS report considers existing ferry terminals only. In addition to 2022 condition assessment being a main reference, record drawings for the sites under consideration for the two proposed routes were

obtained through AKDOT&PF public portals. The 2022 Condition Assessment Report includes a list of terminal projects for each AMHS existing terminal, referencing the project numbers listed on the AKDOT&PF public portals. The online portal was searched to retrieve available record drawings for each project, and summary tables outlining the findings have been included in this memorandum.

Supplementary search was also conducted to identify existing facilities that serve cruise ships; however, further data collection will be necessary to fully assess those facilities.

This memorandum summarizes key findings from the 2022 condition assessment and available record drawings for the AMHS terminal sites and highlights preliminary efforts to identify existing cruise ship terminals relevant to the project.

3.0 Ketchikan or Saxman and Metlakatla

3.1 Ketchikan/Saxman

Along the Ketchikan waterfront, several existing key facilities support ferry and cruise ship operations. Two primary existing sites include:

1. Ketchikan Ferry Terminal, owned and operated by the State of Alaska.
2. Port of Ketchikan, owned and managed by the City of Ketchikan.

Figure 3 presents an aerial image illustrating the locations of both facilities.

Figure 3: Route 2 Aerial Image from Skagway to Haines.

Ketchikan Ferry Terminal is an existing ferry terminal at Ketchikan. The Ketchikan Ferry Terminal serves as a critical transportation hub for both the Alaska Marine Highway System (AMHS) and

the Inter-Island Ferry Authority (IFA). The terminal facilitates connections to multiple destinations, including Prince of Wales Island via the IFA and various Inside Passage communities via the AMHS.

The ferry terminal has three existing berths. An aerial image for the site showing the three berths is shown in Figure 4.

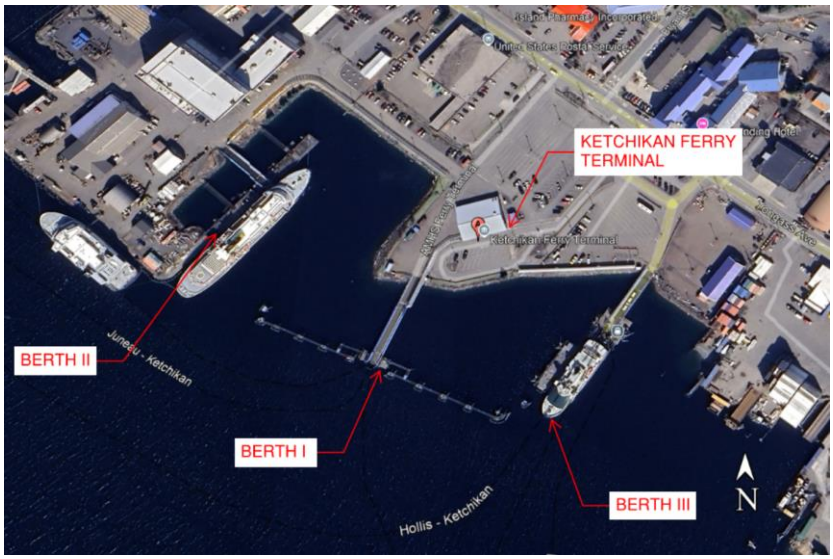

Figure 4: Ketchikan Ferry Terminal Aerial Image.

The terminal main berth is Berth I, which is a side berthing facility consisting of a transfer bridge, steel support float, and steel catwalks that provide access to 10 steel mooring dolphins. Berth II is also a side berth facility that is often used as a layup berth for off-system AMHS vessels. The facility consists of a transfer bridge, steel support float, with two mooring floats and access bridges. Additionally, a sheet pile wharf south of the bridge provides fixed moorage, in-line with the mooring float fenders.

Berth III serves both AMHS and IFA. Unlike the other two berths, Berth III is an all tide, stern loading facility. It consists of a transfer bridge, concrete pontoon, intermediate ramp and apron, breasting/mooring float and a single dolphin. The existing terminal building uplands services the three berths' passengers and provides ticketing services.

In general, the three berths are in satisfactory condition in which the structural elements show minor deterioration. Berth III mooring float received the lowest condition rating of poor, which indicates advanced corrosion or deterioration exists in the structure. For detailed facilities component rating for the Ketchikan Ferry Terminal refer to Attachment 1.

Table 1 summarizes the terminal projects identified in the condition assessment for which record drawings were available through the online portal. While not all past terminal projects outlined

in the 2022 condition assessment were found in the portal, additional research will be undertaken to locate the remaining records if deemed relevant to the project.

Table 1: Ketchikan Ferry Terminal Past Projects from the AMHS Report with Available Record Drawings in DOT Portal.

Year	Project Name	Description
1969	KTN Ferry Terminal Grading, Drainage, Paving & Slope Protection	Widened existing uplands parking and staging area, paved top surface, installed guardrail and added armor rock to seaside slopes.
1976	KTN Ferry Terminal Reconstruction	Repaired timber dolphin, dock and catwalk elements; replaced timber lift towers with concrete capped/steel piling.
1978	KTN Ferry Terminal Facility	Replaced timber dolphins with concrete capped/steel piling, timber dock with concrete and steel piling.
1980	KTN Vessel Maintenance Facility	Beginning of ASD facility, including cells for South Pier of Berth II.
1986	KTN Vessel Maintenance Facility South Berth	Dredged basin, built all structural elements of the existing facility, installed cap and fenders on 2 corner sheet pile cells of existing wharf.
1991	KTN Ferry Terminal Building	New terminal building.
1991	KTN Staging Area Expansion	Dredged areas adjacent to current Berths II & III and filled uplands next to terminal building. Adds 28 parking spaces and a larger staging area. Also removes the berth for airport shuttle and M/V Chilkat.
1994	KTN Ferry Terminal Mooring Realignment	Removed existing concrete dock, all dolphins (but W5). Held dolphin W5 and installed new dolphins along a rotated fender face that is parallel to the north pierhead line to allow both port and strbd side mooring. New bridge approach and dolphin catwalks.
1994	KTN Ferry Terminal Mooring	Built access gangway between the South mooring float and South Pier.
2016	KTN Ferry Terminal Improvements	Replaced wrap-around end dolphin W5 with two dolphins, W5 and W6 at Berth 1, modified the catwalk leading to that dolphin, built new dolphin S1 at Berth 3, installed new sewer and waterlines with heat trace at Berth 3 transfer bridge, built new covered walkway between Berth 3 and the terminal building.

The Port of Ketchikan features a high-traffic cruise terminal that includes four Panamax-sized cruise ship berths located along the downtown waterfront. Figure 5 provides an aerial view of these berths. A description of each facility is provided below:

1. Daly Float is 200 feet long and is located on the inboard side of Berth I.
2. Ryus Float is 150 feet long and is located at the north end of Berths II.
3. Berth III has a 400 foot long float on the northern, inboard side of the berth.
4. Berth IV has two floats. The first is 120 feet long and is on the southern, inboard side of the berth and the second is 70 feet long and is located on the northern, inboard side of the berth.

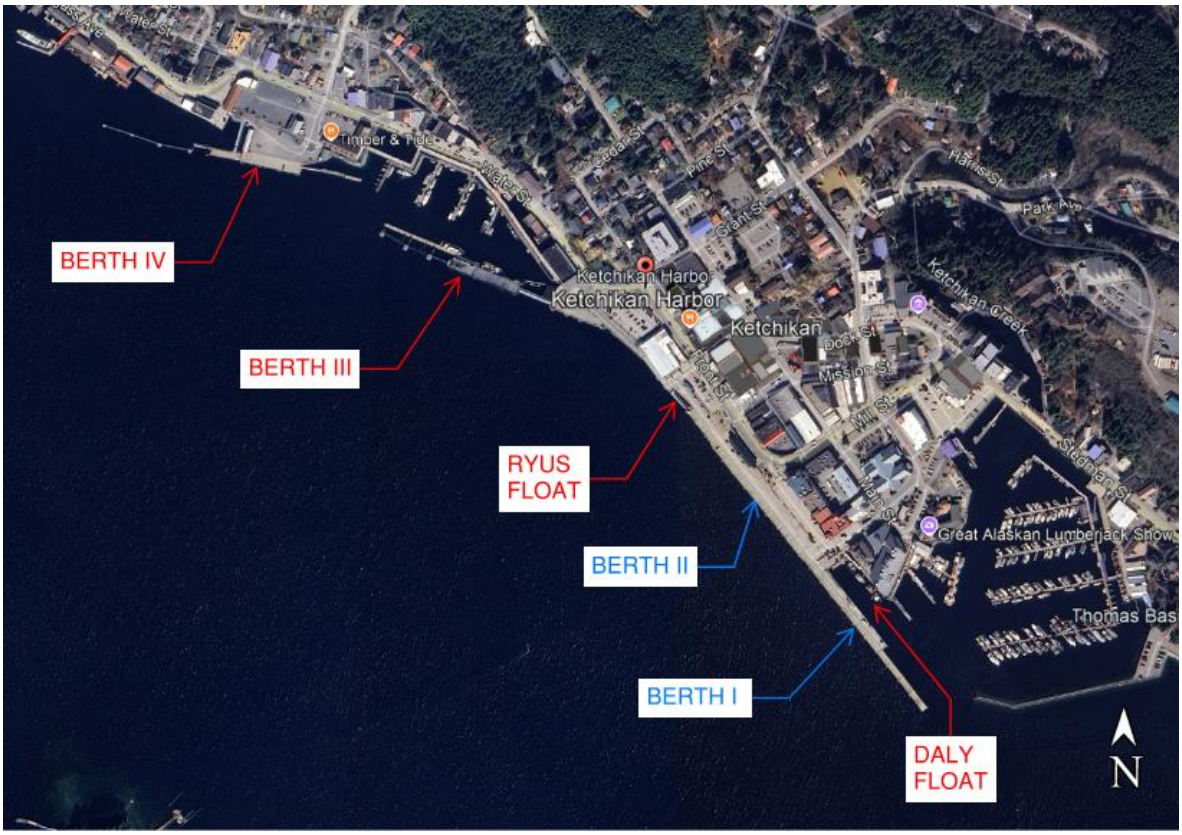

Figure 5: Port of Ketchikan Aerial Image.

At this stage, no existing drawings have been located for the cruise vessel berths at the Port of Ketchikan. However, additional research will be conducted to obtain any publicly available data.

South Tongass Ferry Terminal at Saxman Seaport is a new facility that is planned for development to support ferry operations between Metlakatla and Ketchikan. Figure 6 shows an aerial image of the site with existing facility that is planned to be demolished. The new terminal is scheduled for completion in 2030.

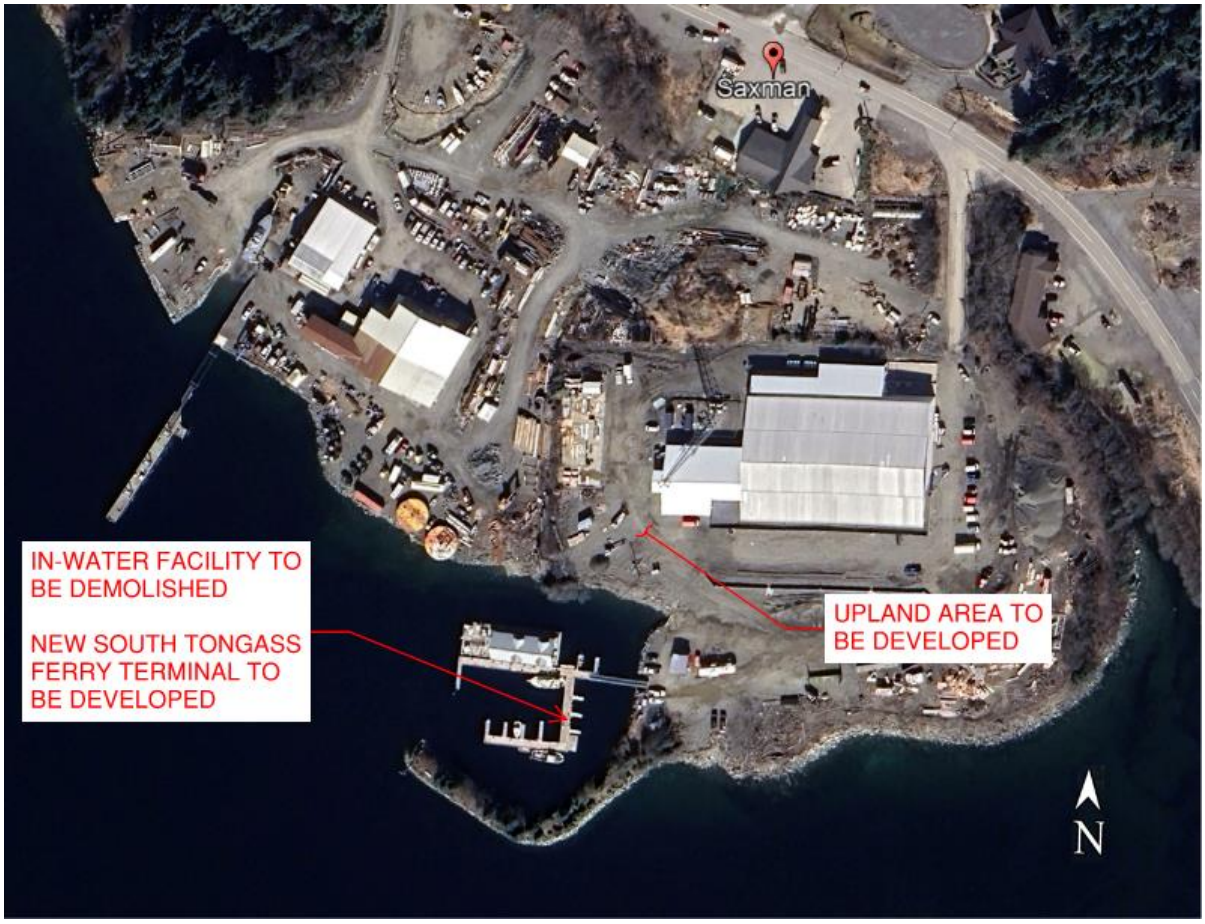

Figure 6: Saxman Seaport Aerial Image.

Concept scoping report for the proposed terminal is available. The report includes conceptual drawings for both the upland and in-water terminal development. The report and conceptual drawings can be referenced to understand the general configuration of the proposed terminal.

3.2 Metlakatla

The Annette Bay Ferry Terminal at Metlakatla is an existing ferry terminal owned by the State of Alaska that was built in 2013. Figure 6 shows an aerial image of the terminal site. The terminal features a side-berth loading configuration, with the vehicle transfer bridge and breasting fender panels supported by a series of Flexifloats. The upland area is paved and marked to accommodate parking and vehicle staging and is equipped with overhead lighting for visibility and safety. On-site amenities include an open-air passenger shelter, public pit toilets, and a generator building. The facility does not have a staffed terminal building or on-site personnel.

Figure 6: Annette Bay Ferry Terminal Aerial Image.

According to the 2022 condition assessment, the bridge, float, apron, and mooring structures at the site were all reported to be in good condition, with only minor issues identified. Further investigation is required to evaluate the nature of these issues and to assess the facility's suitability for meeting the requirements of the new terminal design.

Table 2 presents the terminal projects identified in the condition assessment for which record drawings were available through the AKDOT&PF online portals. Record drawings for all past terminal projects listed in the AMHS condition assessment were obtained from the public portal.

Table 2: Annette Bay Ferry Terminal Past Projects from the AMHS Report with Available Record Drawings in DOT Portal.

Year	Project Name	Description
2013	Annette Bay Ferry Terminal	Construction of new marine & uplands facilities at the end of Walden Point Road.
2015	Annette Bay FT Improvements	Installation of a 4-pile mooring dolphin to the east of the existing marine structures, boarding ladder mounted on steel bridge float, envelope improvements to the existing storage room.

4.0 Skagway and Haines

4.1 Skagway

Along the Skagway waterfront, several existing key facilities support ferry and cruise ship operations as part of the Port of Skagway. The primary existing sites include:

1. Skagway Ferry Terminal is owned and operated by both the State of Alaska and Municipality of Skagway. The State of Alaska leases the uplands from the Municipality of Skagway.
2. Skagway Cruise Terminal, owned partially by the Municipality of Skagway and White Pass and Yukon Route Railroad (WP&YR.)

Figure 7 presents an aerial image illustrating the locations of both facilities.

Figure 7: Skagway Ferry Terminal Aerial Image.

The Skagway Ferry Terminal includes a floating side berth, terminal building, staging and parking areas, three mooring dolphins, a concrete mooring float, and separate vehicle and passenger transfer bridges.

According to the 2022 condition assessment, the deck and superstructure are rated in fair condition, indicating that the primary structural elements remain intact but exhibit minor corrosion, cracking, and chipping. The substructure, however, is in poor condition and its structural elements show advanced corrosion, deterioration, and cracking.

Table 3 summarizes past terminal projects identified in the condition assessment for which record drawings were available through the online portal. While not all projects from the assessment were found in the portal, additional research will be undertaken to locate the remaining records if deemed relevant to the project.

Table 3: Skagway Ferry Terminal Past Projects from the AMHS Report with Available Record Drawings in DOT Portal.

Year	Project Name	Description
1963	Skagway Ferry Terminal	Original construction of terminal facility consists of uplands fill, timber transfer & mooring/fendering structures.
1980	Skagway FT Facility	Removed original timber structures and replaced with steel transfer and mooring/fendering structures. Extended uplands fill for future staging and terminal building.
1981	Skagway FT Pedestrian Transfer Bridge	Constructed the steel pedestrian bridge.
1993	Skagway FT Slope Stabilization	Added riprap armory rock to the seaward slopes beneath the terminal building.
1995	Skagway FT Reconstruction	Repaired and corrosion proofed existing transfer and mooring structures that were damaged from a slope failure across the Inlet.
1999	Skagway FT Improvements	Installed new fender panels and hawse rails on dolphin S3.
2014	AMHS Skagway Dock Emergency Repairs	The work consists of salvaging the sunken concrete float off the ocean bottom, structural analysis of the float's condition, raising and placement of the vehicle & pedestrian bridges, salvaging/repairing the timber vehicle ramp, repairing the intermediate ramp hydraulic system, replacing utility (fuel/water) services to the dock face.

Skagway Cruise Terminal consists of four main docks at the Port of Skagway which are Ore Dock, Broadway Dock, and Railroad Docks Aft & Forward. All record drawings of the cruise terminals are available and obtained from past projects done by KPFF.

4.2 Haines

Along the Haines waterfront, several existing key facilities support ferry and cruise ship operations. Two primary existing sites include:

1. Haines Ferry Terminal, owned and operated by the State of Alaska.
2. Port Chilkoot Cruise Ship Dock is a publicly owned dock that is owned and operated by the Haines Borough.

Figure 8 presents an aerial image illustrating the locations of both facilities.

Figure 8: Haines Ferry Terminal and Port Chilkoot Cruise Ship Dock Aerial Image.

The Haines Ferry Terminal is an existing ferry terminal owned by the State of Alaska. An aerial image of the site is provided in Figure 9. The terminal is a side-loading facility featuring a transfer bridge, a twin lift tower syncrolift system, three steel pile dolphins, two timber dolphins, sheet pile cell structure equipped with timber fenders, in addition to catwalks and gangways providing access for line handling.

Figure 9: Haines Ferry Terminal Aerial Image.

Based on the 2022 AMHS condition assessment, the marine structures are all in good condition with minor problems, the superstructure received the lowest rating of a fair condition noting that primary structural elements are in good condition but may have minor corrosion, cracking, or chipping.

Table 4 summarizes past terminal projects identified in the condition assessment for which record drawings were available through the online portal. While not all projects from the assessment were found in the portal, additional research will be undertaken to locate the remaining records if deemed relevant to the project.

Table 4: Haines Ferry Terminal Past Projects from the AMHS Report with Available Record Drawings in DOT Portal.

Year	Project Name	Description
1962	Southeast Alaska Ferry Terminal	Placement of fill, guardrail, septic tank, oil tank, lighting, and hypochlorinator.
1992	Haines Ferry Terminal Upland Improvements	Expand uplands parking & staging areas.
2007	Haines Mooring Improvements	Replaced a Duncan Type timber dolphin (E3) and a concrete timber pile cluster (E4) with new steel mooring/breasting dolphins. A new dolphin, W2, was also installed west of the transfer bridge. Additional work included replacing a timber catwalk between E3 and E4 with a steel catwalk, installing a new gangway between W2 and the sheet pile dock, removing an existing timber fender module on the dock, and shoring for an existing concrete retaining wall above partially fail sheet pile cell #4.

Year	Project Name	Description
2008	Haines - Ferry Dock Hoist Upgrade	Replaced the existing relay-based control panel for the transfer bridge lift system with a PLC-based control panel.
2015	Haines FT Improvements	Removed the cellular sheet pile bulkhead, installed a retaining wall seaward of the terminal building, constructed three new mooring dolphins, four catwalks, two pedestrian walkways, new generator & storage buildings, reconfigured the uplands parking and staging areas, placed excavated fill from bulkhead along tidelands to construct new staging area west of the terminal building.

The Port Chilkoot Cruise Ship Dock has a single cruise ship dock. Figure 10 presents an aerial image of the cruise ship dock. At this stage, no existing drawings have been obtained for the cruise vessel berths at the Port of Haines. Additional research needs to be conducted to obtain any publicly available data.

Figure 10: Port Chilkoot Cruise Ship Dock Aerial Image.

5.0 Conclusion

This preliminary assessment focuses on identifying and presenting available data for existing ferry terminals and marine facilities that may support the implementation of the two proposed HE ferry vessel routes. Table 5 summarizes the data collected for each site condition assessment. The AMHS condition assessment (Attachment 1) served as a valuable reference for evaluating the

condition of existing AMHS sites; however, additional investigation is necessary to assess current facility conditions and determine their suitability for supporting the new HE ferry routes.

Supplementary research identified existing cruise dock terminals at the sites under consideration, but further efforts are required to obtain record drawings and detailed condition assessments. Table 6 provides a summary of record drawings obtained from the AKDOT&PF public portal, referencing past projects at existing AMHS terminals as listed in the 2022 AMHS condition assessment.

Table 5: Summary of Condition Assessment Data Gathering Status for Each Site.

	Location	Site	Existing Structures Condition Data Gathering Status
Ketchikan / Metlakatla Route	**Ketchikan**	Ketchikan Ferry Terminal	According to AMHS condition assessment, overall, the three berths are in satisfactory condition showing minor deterioration. Further investigation is required to evaluate the facilities condition.
		Port of Ketchikan	No record of condition assessment of the existing structures has been obtained yet.
	Saxman	South Tongass Ferry Terminal	Given that this is a new project scheduled for completion in 2030, with planned development of terminal facilities both upland (parking and buildings) and in-water, the site can be considered to be in good condition.
	Metlakatla	Annette Bay Ferry Terminal	The bridge, float, apron, and mooring structures at the site were all reported to be in good condition, with only minor issues identified. Further investigation is required to evaluate the nature of these issues and to assess the facility's suitability for meeting the requirements of the new HE vessel route.
	Skagway	Skagway Ferry Terminal	According to AMHS condition assessment, overall, the deck and superstructure are rated in fair condition, indicating that the primary structural elements remain intact but exhibit minor corrosion, cracking, and chipping. The substructure, however, is in poor condition and its structural elements show advanced corrosion, deterioration, and cracking. Further investigation is required to evaluate the terminal condition.

	Location	Site	Existing Structures Condition Data Gathering Status
Ketchikan / Metlakatla Route	**Ketchikan**	Ketchikan Ferry Terminal	According to AMHS condition assessment, overall, the three berths are in satisfactory condition showing minor deterioration. Further investigation is required to evaluate the facilities condition.
		Port of Ketchikan	No record of condition assessment of the existing structures has been obtained yet.
	Saxman	South Tongass Ferry Terminal	Given that this is a new project scheduled for completion in 2030, with planned development of terminal facilities both upland (parking and buildings) and in-water, the site can be considered to be in good condition.
	Metlakatla	Annette Bay Ferry Terminal	The bridge, float, apron, and mooring structures at the site were all reported to be in good condition, with only minor issues identified. Further investigation is required to evaluate the nature of these issues and to assess the facility's suitability for meeting the requirements of the new HE vessel route.
Skagway / Haines Route		Skagway Cruise Terminal	There has been recent development at Ore Dock, indicating Ore dock is in good condition. No record of condition assessment for Broadway Dock, and Railroad Docks are obtained yet.
	Haines	Haines Ferry Terminal	According to AMHS condition assessment, overall, the marine structures are all in good condition with minor problems, the superstructure received the lowest rating of a fair condition noting that primary structural elements are in good condition but may have minor corrosion, cracking, or chipping.
		Port Chilkoot Cruise Ship Dock	No record of condition assessment of the existing structures has been obtained yet. Further investigation is required to evaluate the terminal condition.

Table 6: Summary of Record Drawings Data Gathering Status for Each Site.

	Location	Site	Drawings Data Gathering Status Summary
Ketchikan / Metlakatla Route	**Ketchikan**	Ketchikan Ferry Terminal	Majority of record drawings of past terminal projects were obtained and provide sufficient information regarding current conditions. However, due to the sheer number of past projects that AMHS has undertaken at this terminal, the available drawings were not exhaustive of all projects, with some drawings for older past projects listed in the AMHS condition assessment not found in the AKDOT&PF public portal.
		Port of Ketchikan	No record drawings have been obtained yet; additional research needs to be conducted to obtain any publicly available data.
	Saxman	South Tongass Ferry Terminal	Considering this is a new project scheduled to be completed in 2030, only conceptual drawings for the proposed ferry terminal at Saxman Seaport are available.
	Metlakatla	Annette Bay Ferry Terminal	All record drawings for all past terminal projects listed in the AMHS condition assessment were obtained from the AKDOT&PF public portal.
Skagway / Haines Route	**Skagway**	Skagway Ferry Terminal	Majority of record drawings of past terminal projects were obtained, but some of the past projects listed in the AMHS condition assessment were not found in the AKDOT&PF public portal.
		Skagway Cruise Terminal	Record drawings of the cruise terminals are available from past projects done by KPFF.
	Haines	Haines Ferry Terminal	Majority of record drawings of past terminal projects were obtained, but some of the past projects listed in the AMHS condition assessment were not found in the AKDOT&PF public portal.
		Port Chilkoot Cruise Ship Dock	No record drawings have been obtained yet; additional research needs to be conducted to obtain any publicly available data.