HAINES
BOROUGH

HAINES WATER MASTER PLAN HAINES, ALASKA

June 2023

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OVERVIEW: HOW TO USE THIS PLAN

The *2023 Haines Water Master Plan* contains 11 sections.

Executive Summary: Overviews this plan's proposed public water system (PWS) improvements and recommendations for the Haines Townsite.

Section 1 – Introduction: Explains this plan's purpose and scope, and provides a recap of previous community water system improvements in the Haines Townsite.

Section 2 – Project Planning Area: Provides a synopsis of the natural environment of this northern SE Alaska community, including a brief history of how the town of Haines started. Climate change projections for temperature and precipitation are included.

Section 3 – Socioeconomics: Overviews basics about the Townsite population, transportation, land use, and the local government.

Section 4 – Existing Water System: Describes the current Townsite PWS, specifically sources, treatment, storage, distribution as well as annual capacity and water quality testing. Fourteen tables summarize details.

Section 5 – Capacity Evaluation: Examines annual water demand and production, and reviews the adequacy of the overall public water system as well as the four components: sources, treatment, storage and distribution.

Section 6 – PWS Project Development: 2023 – 2032: Contains the 14 proposed Capital Improvement Projects (CIPs), starting with highest priority. Proposed project summaries include estimated budgets.

Section 7 – Recommendations: 2023 – 2042: Explains six recommendations for the next 20 years.

Section 8 – Funding, Permits & Other Approvals: Outlines possible financial options for supporting the implementation of the proposed CIP list, and overviews usual steps for permitting construction.

Section 9 – References: Lists resources reviewed to develop this plan.

Section 10 – Appendices: Contains supporting materials referenced in the above sections. See ***Appendix A*** for information about the project area and the proposed improvements. Consult ***Appendix B*** to learn more about the PWS. Review ***Appendix C*** to see maps relating to area flood risk.

Cover photo from 2022 Haines Borough PWS Sanitary Survey

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ACRONYMNS & ABBREVIATIONS

AAC	Alaska Administrative Code
AC	Asbestos Cement
ACIS	Applied Climate Information System
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOLWD	Alaska Department of Labor and Workforce Development
ADOT&PF	Alaska Department of Transportation and Public Facilities
AL	Action Level
AMHS	Alaska Marine Highway System
AP&T	Alaska Power and Telephone
AWWA	American Water Works Association
BR	Beach Road
BWST	Barnett Drive Water Storage Tank
CBJ	City and Borough of Juneau
CCR	Consumer Confidence Report
CC/WST	Chlorine Contact / Water Storage Tank
CCWTP	Crystal Cathedral Water Treatment Plant
CDI	Carson and Dorn, Inc.
CDP	Census Designated Place
CIP	Capital Improvement Projects
CREAT	Climate Resilience Evaluation and Awareness Tool for Water Utilities
CWS	Community Waste Solutions
DBP2	Disinfection Byproducts Rule Stage 2
DHS	Department of Homeland Security
DI	Ductile Iron
DPW	Department of Public Works
EPA	Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FAA	Federal Aviation Administration
FT	Feet
G	Gallon(s)
GIS	Geographic Information System
GPCD	Gallons Per Capita-Day
GPD	Gallons Per Day
GPM	Gallons Per Month
GPY	Gallon Per Year
GWUDI	Ground Water Under the Direct Influence
HAA5	Group of 5 Haloacetic Acids
HB	Haines Borough or House Bill

HB W&S GIS	**Haines Borough Water and Sewer Geographic Information System**
HDPE	**High Density Polyethylene**
HWMP	**Haines Borough Water Master Plan**
IN	**Inches**
INC	**Incorporated**
ID#	**Identification Number**
ISO	**Insurance Services Office**
L	**Liter**
LF	**Linear Feet**
LLC	**Limited Liability Company**
LLWTP	**Lily Lake Water Treatment Plant**
LT2	**Long-Term 2 Enhanced Surface Water Treatment Rule**
MBR	**Mud Bay Road**
MCL	**Maximum Contaminant Level**
MCLG	**Maximum Contaminant Level Goal**
MFL	**Million Fibers > 10 µm in Length**
MG	**Million Gallons**
MOA	**Memorandum of Agreement**
MLLW	**Mean Lower Low Water**
MNR	**Monitored Not Regulated**
MGD	**Million Gallons per Day**
MGM	**Million Gallons per Month**
MGY	**Million Gallons per Year**
MRDL	**Maximum Residual Disinfectant Level**
MRDLG	**Maximum Residual Disinfectant Level Goal**
MRR	**Mount Riley Road**
NA	**Not Applicable**
ND	**Not Detected**
NR	**Not Required yet Recommended**
NOAA	**National Oceanic and Atmospheric Administration**
O&M	**Operation and Maintenance**
PEX	**Cross-Linked Polyethylene**
PCi	**Picocuries**
PPB	**Parts Per Billion**
PPM	**Parts Per Million**
PRV	**Pressure Reducing Valve**
PSAs	**Public Service Announcements**
PSI	**Pounds Per Square Inch**
PSV	**Pressure Sustaining Valve**
PVC	**Polyvinyl Chloride**
PWS	**Public Water System**
PWSID	**Public Water System Identification Number**
PWTP	**Piedad Water Treatment Plant**
PZ	**Pressure Zone**
RCPs	**Representative Concentrations Pathways**

ROW	Right of Way
RPZA	Reduced Pressure Zone Assembly
RUS	Rural Utility Service
SCADA	Supervisory Control and Data Acquisition
SE	Southeast
SHPO	State Historic Preservation Office
SNAP	Scenarios Network for Alaska and Arctic Planning
SOC	Synthetic Organic Compounds
SSS	Sanitary Sewer System
STR	Small Tracts Road
STS	Small Tracts Spur
SW AK DPS	Southwest Alaska Distinct Population Segment
SWTP	Skyline Drive Water Storage Tank
TCR	Total Coliform Rule
TT	Treatment Technique
TTHM	Total Trihalomethanes
TWST	Tower Road Storage Tank
UAF	University of Alaska - Fairbanks
URS	United Research Services
US	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VFD	Variable Frequency Drive
VOC	Volatile Organic Compounds
WELTS	Well Log Tracking System
WMP	Water Master Plan
WST	Water Storage Tank
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
YWST	Young Road Water Storage Tank

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EXECUTIVE SUMMARY

This *2023 Haines Water Master Plan* (*HWMP*) was prepared for the Haines Borough to provide guidance for future improvements and expansion to the community's public water system (PWS) in the Townsite area. This document provides an estimate of the construction costs for 14 prioritized water system improvements, ranked by the Department of Public Works (DPW) Staff. ***Table ES-1*** lists these improvements along with the estimated costs. (***Section 6*** contains additional details.) The total cost estimate is $24,556,205. A conceptual layout of the proposed water improvements is presented in ***Figure ES-2***: ***Map of Proposed Water Improvements***.

The *2023 HWMP* covers a 20-year planning period, 2023 through 2042, with a 10-year capital improvement focus, 2023 through 2032. Six recommendations without cost estimates are also included for 2023 – 2042. Refer to ***Table ES-2*** and ***Section 7*** for specifics.

This plan includes background information about the community (***Section 2***) and previous water system improvements (***Section 4***), a review of population projections and an analysis of future water capacity (***Section 3***), as well as PWS capacity and needs for the Townsite area (***Section 5***).

It is recommended that the Haines Borough Staff review the *2023 HWMP* every five years and continue updating the document every 10 years, assuming the population growth rate remains consistent with the estimate used in determining PWS capacity. Major population or economic changes within the Townsite area and Haines Borough may warrant an earlier update.

HAINES PUBLIC WATER SYSTEM – 2022

- **Annual Water Production: 110.1 Million Gallons**
- **Average Daily Water Production: 301,405 Gallons**
- **Connections: 664 Customers**
- **Cost to Treat 1,000 Gallons of Water: $4.09**
- **Gallons per Capita-Day: 163 Gallons per Person**
- **Distribution System: 24.3 Miles of Pipe**
- **Bulk Water Haulers: 100,000 Gallons per Year**
- **Fire Hydrants: 270**

Recommended Water Improvements

Costs for recommended water system improvements over the next ten years are shown in ***Table ES-1: Haines PWS Cost Estimates for Proposed Improvements***. See ***Section 6*** for additional information.

Table ES-1: Haines PWS Cost Estimates for Proposed Improvements, 2023 – 2032

Improvement		Design & Construction Costs
W1	BOROUGH CODE UPDATE	19,630
W2	ASSET MANAGEMENT SYSTEM IMPLEMENTATION & LIFECYCLE PLANNING	26,000
W3	LILY LAKE WTP IMPROVEMENTS	2,077,500
W4	PIEDAD WTP IMPROVEMENTS	1,253,400
W5	AUXILARY POWER FOR WATER SYSTEM	412,500
W6	SKYLINE WATER TANK IMPROVEMENTS	52,500
W7	SCADA MONITORING: WTPs & DISTRIBUTION SYSTEM	75,000
W8	HYDRAULIC MODELING & AUDITING PROGRAM	74,750
W9	CRYSTAL CATHEDRAL SOURCE IMPROVEMENTS	45,000
W10	TOWNSITE WATER MAIN EXTENSTIONS – GROUP A	2,362,500
W11	TOWNSITE WATER MAIN EXTENSTIONS – GROUP B	15,390,000
W12	TOWNSITE WATER MAIN EXTENSTIONS – GROUP C	2,295,000
W13	ASBESTOS CEMENT PIPE REPLACEMENT	277,425
W14	LILY LAKE WTP FLOC TANK ADDITION	195,000
	TOTAL:	24,556,205

Figure ES-1: Piedad Springs: Lower Spring Box, *2022 Sanitary Survey*

Figure ES-2: Map of Proposed Water Improvements, 2023 – 2032

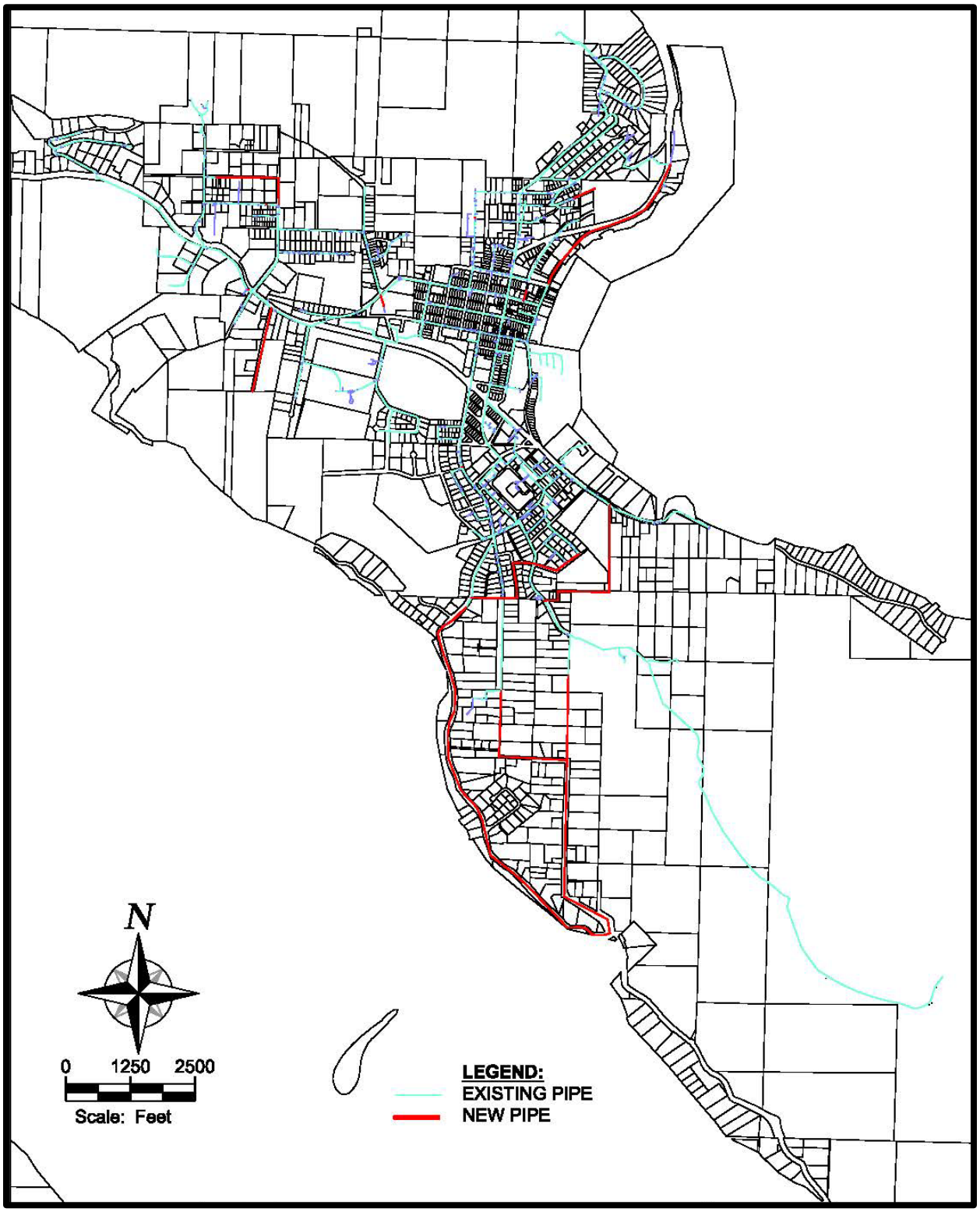


Table ES-2: Haines PWS Recommendations, 2023 – 2042

Recommendation	
WR1	FUTURE SOURCE DEVELOPMENT
WR2	REPLACE TOWER ROAD WATER STORAGE TANK
WR3	LEAK DETECTION & ABATEMENT
WR4	PWS UPGRADES FOR CLIMATE CHANGE IMPACTS
WR5	PUBLIC AWARENESS TO MAINTAIN WATER QUALITY
WR6	IMPROVING EFFICIENCIES WITH SCADA & STAFFING

Figure ES-3: Community Signs Reminding Public about Water Quality, *2022 Sanitary Survey* & *2021 – 2022 CCRs*.

1.0 INTRODUCTION

During the course of preparing the *2023 Haines Water Master Plan* (*HWMP*), improvements and recommendations were developed with the assistance of the Department of Public Works Staff, and presented and discussed at three meetings of the Haines Borough Planning Commission. The final prioritized improvements are described in ***Section 6 – PWS Project Development***.

This plan is intended to conform to applicable ADEC and local guidelines and requirements. It is an update to the water portion of the *2014 Haines Water and Sewer Master Plan* prepared by Carson and Dorn, Inc. (CDI). Information from the *Haines Borough 2025 Comprehensive Plan,* developed in 2012, has been incorporated into ***Section 2 – Project Planning Area*** and ***Section 3 – Socioeconomics***. (Sheinberg Associates, 2012)

1.1 PURPOSE

The purpose of this plan is to create a roadmap for the next two decades with prioritized improvements for the Haines Public Water System (PWS). In the past decade, Haines has experienced growth and changes impacting the community water system. The selected improvements and recommendations in the *2023 HWMP* provide guidance for future water facilities to serve the Townsite area and beyond. The Capital Improvement Program (CIP) list and details are provided in ***Section 6***.

1.2 SCOPE

The Scope of Work for preparing the *2023 Haines Water Master Plan* includes:

- Define and review the existing water infrastructure.
- Obtain updated land use information for the Townsite.
- Prepare population and community growth estimates and calculate water demands.
- Preparing a water system master plan and associated CIP list to implement the plan's improvements.
- Identify deficiencies as well as needed replacement and upgrade projects for the existing water system, including source, water treatment plants (WTPs), pipe replacements, pump stations, pressure reducing valves (PRVs) and water storage tanks (WSTs).
- Provide recommendations for improvements to the existing water system to continue serving the customer base and to accommodate growth.
- Provide a basis for funding and implementation by developing preliminary cost estimates for the proposed improvements. This includes detailed CIP items with expenses, including design, permitting and construction costs for the 2023 to 2032 improvements. For the period from 2023 to 2042, also include some general recommendations.
- Provide draft 35 percent, 65 percent, 95 percent and final copies of the *2023 HWMP*. Involve the Public Works Department Staff, other Borough Staff, the Haines Borough Planning Commission as

well as interested community members in the development of the final improvements, priorities and recommendations for the Townsite PWS.

Key planning issues include:

- Completion of the next *Haines Comprehensive Plan* update with implications for the Haines PWS, and needed upgrades and expansion.
- Water demands in Haines will continue to grow even though estimates from the Alaska Department of Labor and Workforce Development (ADOLWD) show a declining population in the Townsite and the Haines Borough. It is anticipated that seasonal workers and summer-only residents will continue the trend of annual upswings in water connections for new homes.
- Growth in the Townsite, including areas not currently served by the PWS.
- A mature water system with some pipes approaching over 50 years age. Repair, rehabilitation and replacement of these pipes will become a higher priority as additional years pass and more efforts to reduce wastage with leak detection are implemented.
- Fire water capacity needs improvements to meet national standards. The Haines PWS is used for firefighting response.
- Impacts of climate change on the PWS. Considerations include warmer temperatures with increased precipitation. Modeling changes to understand potential water quality impacts, such as algal blooms and saltwater instruction for community water sources, will help maintain source integrity.

1.3 AUTHORIZATION

The Haines Borough authorized Joiner Engineering LLC to prepare the *2023 HWMP*. Plan preparation was authorized by a contract between these two entities.

Important public meetings for the Haines Borough Planning Commission, were held on February 9, 2023, March 9, 2023 and June 8, 2023. The Haines Borough Manager, Mayor and the public had the opportunity to participate in relevant discussions at these meetings. The improvements and expansions to the PWS recommended in the *HWMP* reflect the consensus and direction by the Haines Borough Planning Commission. The final HWMP will be presented to the Haines Borough Assembly.

1.4 PLANNING PERIOD

A 20-year planning period is used for estimating future water demands. Future per capita water flows were predicted based on historical flow measurements taken by Haines Borough DPW Staff.

1.5 LIMITATIONS

The intent of this plan is to provide guidance to the Haines Borough and involved public agencies in the development of future water improvements and management of a sustainable utility infrastructure. The *2023 HWMP* cannot anticipate future changes to laws and regulations, and it cannot anticipate unforeseen changes to the Townsite's population and/or land uses. The Borough should periodically

review this plan relative to important changes to state and federal laws, and significant changes in the community's infrastructure and growth patterns.

1.6 NEED FOR IMPROVEMENTS

Without the improvements proposed in this plan, the basic sanitation needs of the Townsite could be compromised with an inadequate supply of potable water, and the ability to provide basic water service to unserved areas would be limited. Capacity problems will increase as the current infrastructure ages and the number of residential and commercial dwellings in the Townsite increases. These improvements will ensure an adequate, safe and reliable drinking water supply as well as Insurance Services Office (ISO) recommended fire flows for the community. With the implementation of the proposed sanitation improvements, potential community health problems can be prevented, appreciably reduced or eliminated.

1.7 IMPROVEMENTS RECAP

The following list summarizes major water improvements completed within the Haines Townsite:

- 1973: Lily Lake WTP Completed
- 1983: Preliminary Water System Hydraulic Analysis by URS
- 1986: Tower Road WST Constructed (320,000 Gallons)
- 1991: Flocculation Tank Added to Lily Lake WTP
- 1993: Downtown Waterline Replacement Project completed (10,000 LF)
- 1997: Crystal Cathedral Fire Hydrants Installed
- 1998: Skyline Drive WST Constructed (48,000 Gallons)
- 1999: FAA Chlorine Contact / WST Constructed (630,000 Gallons)
- 2001: Replaced Barnett Drive WST & Pump Station Constructed (125,000 Gallons)
- 2008: Replaced AC Pipe on Muncaster Road
- 2008: Replaced Wood-Stave Pipe on Young Road
- 2008: Replaced Young Road WST & Pump Station Constructed (285,000 Gallons)
- 2010: Lily Lake Water Transmission Line Replacement (10,000 LF)
- 2010: Replaced AC Piping in Piedad Road Area
- 2011: Replaced AC Pipe on Ocean View Drive
- 2011: Replaced AC Pipe on View Street, Fourth Avenue & Lynnvue Drive
- 2012: Crystal Cathedral Water System Acquired
- 2015: Piedad WTP Upgraded to Comply with GWUDI Determination
- 2015: Allen Road AC Water Line Replacement
- 2016: Crystal Cathedral Water System Integrated into Haines PWS
- 2016: Tower Road Water Storage Tank Roof Replacement
- 2017: Bear Trails Lane Water Extension
- 2019: Front Street AC Waterline Replacement
- 2020: Asbestos Cement Waterlines Replaced (8,600 LF)
- 2020: Mud Bay Road AC Waterline Replacement
- 2020: Piedad Spring Expansion

- 2021: Alaska Rural Water Acoustical Study
- 2021: Replaced AC Pipe on Mud Bay Road
- 2021: Bulk-Fill Water Station Installation
- 2022: Young Road Waterline Realignment & Replacement (8,000 LF)

Figure 1.1: FAA Road Chlorine Contact / Water Storage Tank, *2022 Sanitary Survey*

2.0 PROJECT PLANNING AREA

The Townsite encompasses the boundaries of the area for this project. The area includes locations currently served by the Haines PWS as well as adjoining subdivisions within the Townsite served with private wells and haul systems. The Townsite consists of 20.4 square miles or approximately 13,056 acres. Some outlying, adjacent watershed protection areas expand the planning area beyond the Townsite. Refer to the following sheets in ***Appendix A:***

- ***Sheet A-1: Location of Haines PWS***
- ***Sheet A-2: Proposed Water Improvements***
- ***Sheet A-3: Watershed Protection Areas***
- ***Sheet A-4: Townsite & Zoning Designations***
- ***Sheet A-5: PWS Pressure Zones***

2.1 HISTORY

The Haines area was originally settled by Native Alaskans of the Tlingit culture who traveled along the Northwest coast as glaciers receded or ventured down mountain valleys from the Interior. This area was valued for its mild climate and abundant food. The original Native name for Haines was *Deishu*, meaning the *beginning* or the *end of the trail*. Local archeological evidence shows fish traps in the Chilkoot River 2,100 years ago and house remnants at the Chilkoot Village site dating back over 800 years.

The community of Haines was named for Mrs. F. E. Haines, secretary of the Presbyterian National Committee of Home Missions. This organization raised funds for a new mission school, to educate local Native children at Deishu Village, which opened in the 1880s. A post office followed as the community grew around the school. The location made the emerging community an important outlet for the Porcupine Mining District. Haines also marked the start of the Dalton Trail, which crossed the Chilkat Pass to the Yukon during the 1896-1899 Klondike Gold Rush.

Construction south of Haines began in the early 1900s and included the first permanent US military installation in Alaska, Fort Seward. Four canneries were also constructed in the area by the turn of the 20th century. The last of these canneries closed in 1972. The Haines Highway, built in 1943, opened up additional transportation options.

2.2 LOCATION

The Haines Borough encompasses approximately 2,350 square miles of land, or almost 1.5 million acres, and another 382 square miles of water within its borders, stretching nearly 120 miles in length and 80 miles at the widest point. The region is typified by snow-capped mountains, some over 6,000 feet, glaciated and forested valleys, and numerous salmon-rich streams and rivers descending to salt water fjords.

Chart 2.1: Haines Precipitation & Temperature Data by Month, 2020 – 2021

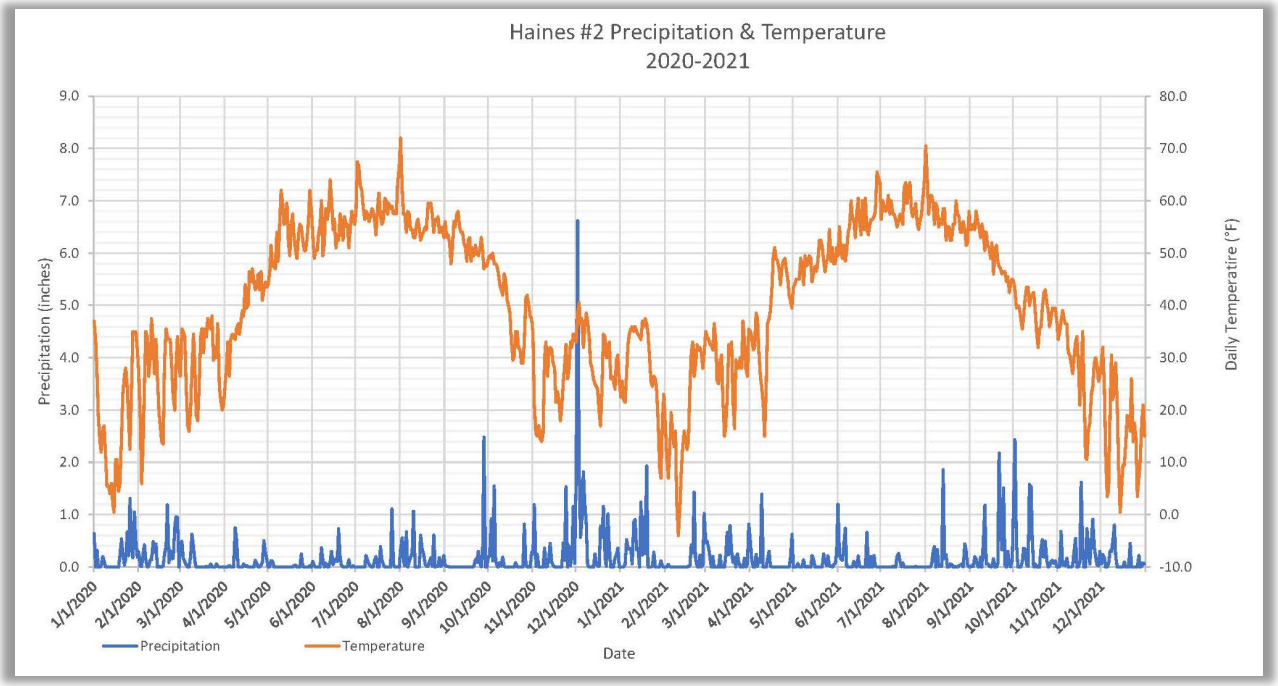


Chart 2.2: Haines Precipitation Data by Year, 2000 – 2022

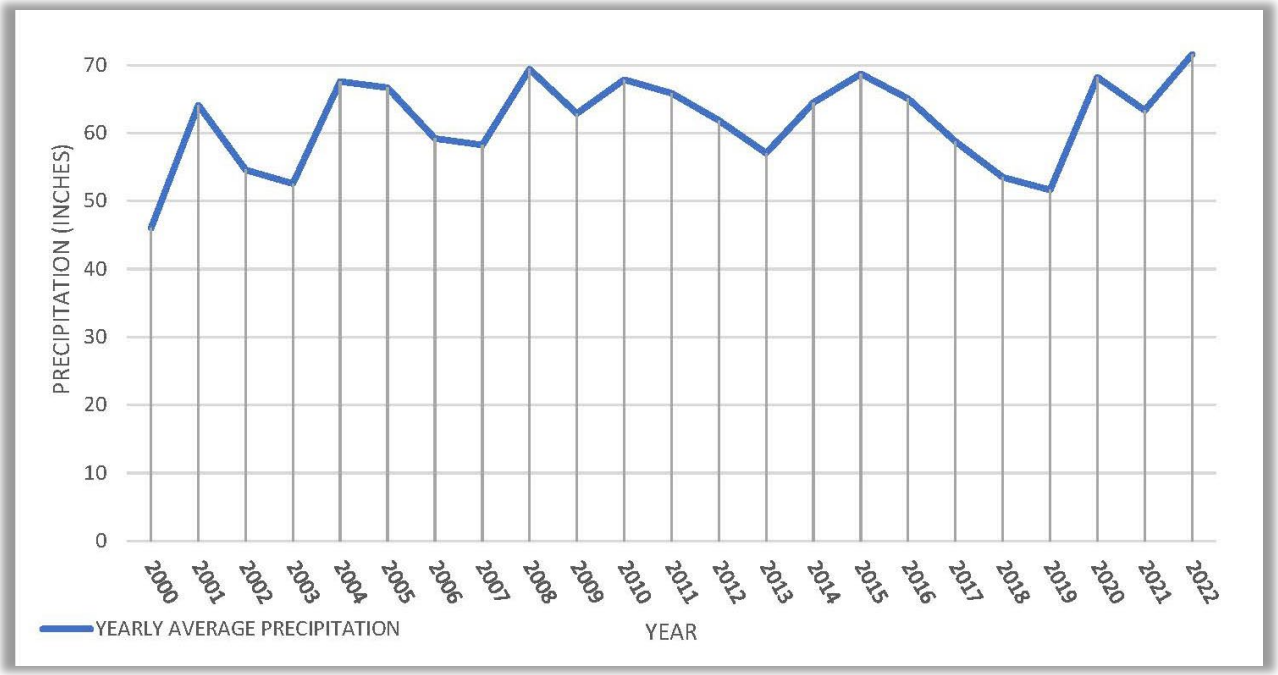
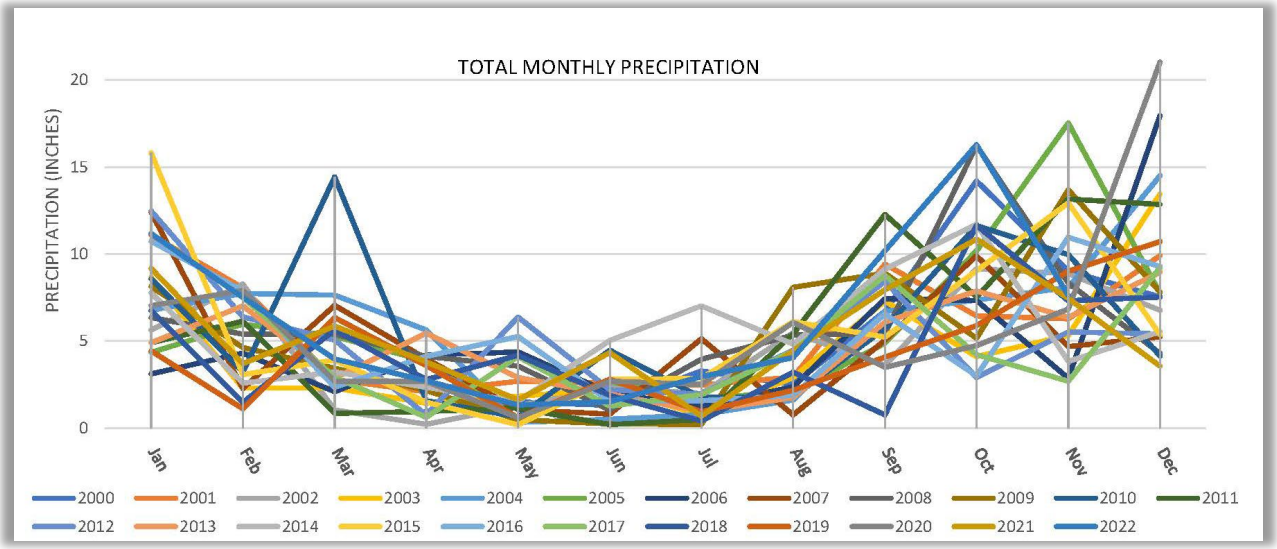


Chart 2.3: Haines Monthly Precipitation Data by Year, 2000 – 2022



SNAP

Scenarios Network for Alaska & Arctic Planning

The University of Alaska – Fairbanks SNAP tool uses Representative Concentration Pathways (RCPs) to display climate scenarios for over 3,800 northern communities in Alaska and Canada. RCPs represent possible future climate scenarios to the year 2100 and provide a basis for comparison. The three RCP scenarios include:

- **RCP 4.5 – Low Scenario: Assumes new technologies and socioeconomic strategies cause emissions to peak in 2-4- and radiative forcing to stabilize after 2100.**
- **RCP 6.0 – Medium Scenario: Assumes emissions peak in 2080 and radiative forcing stabilizes after 2100.**
- **RCP 8.8 – High Scenario: Emissions increase through the 21st century.**

2.3 CLIMATE

The Haines Borough climate is dominated by maritime influences. The area is characteristically drier than other Southeast Alaska areas because of its distance from the exposed coast, more northerly latitude, and proximity to Interior regions and local mountains. ***Chart 2.1*** provides a precipitation and temperature summary for the Haines Townsite. ***Chart 2.2*** and ***Chart 2.3*** show specifics of the annual precipitation for 23 years, 2000 through 2022. (Data for these charts were recorded at the NOAA, Fourth & Union Weather Station in Haines, Alaska.)

SNAP Community Climate Charts, based on three future scenarios, indicate the Haines area will likely become warmer and wetter. ***Chart 2.4*** and ***Chart 2.5*** show *Representative Concentration Pathways* (RCPs) for the Haines / Deishu area for precipitation and temperature respectively, describing paths to future climates based on greenhouse gas concentrations. For more information see: Climate Tools — SNAP (uaf-snap.org)

Chart 2.4: Future Climate Scenarios: Average Monthly Precipitation for Haines (Deishu), 2030 – 2099

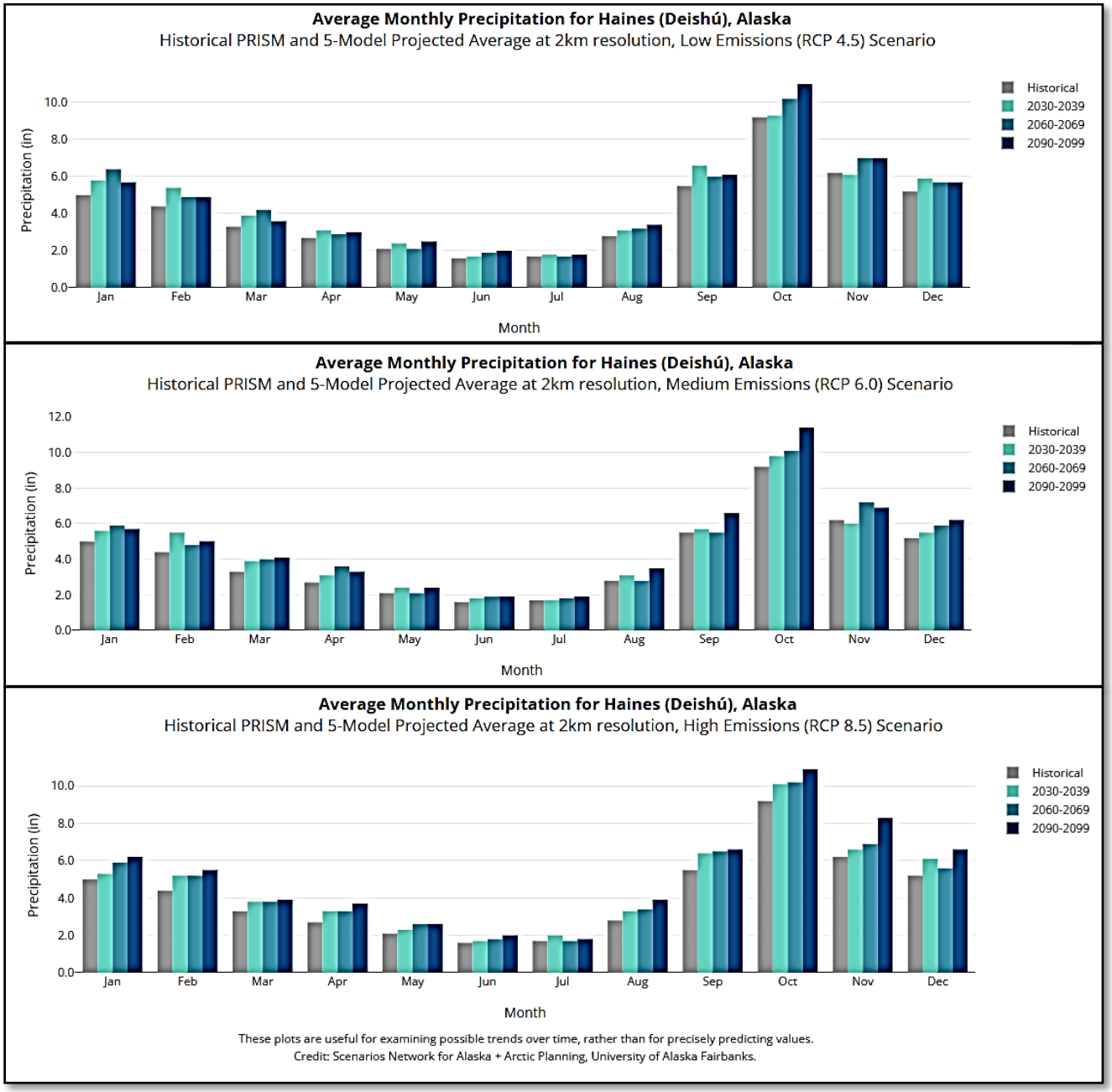
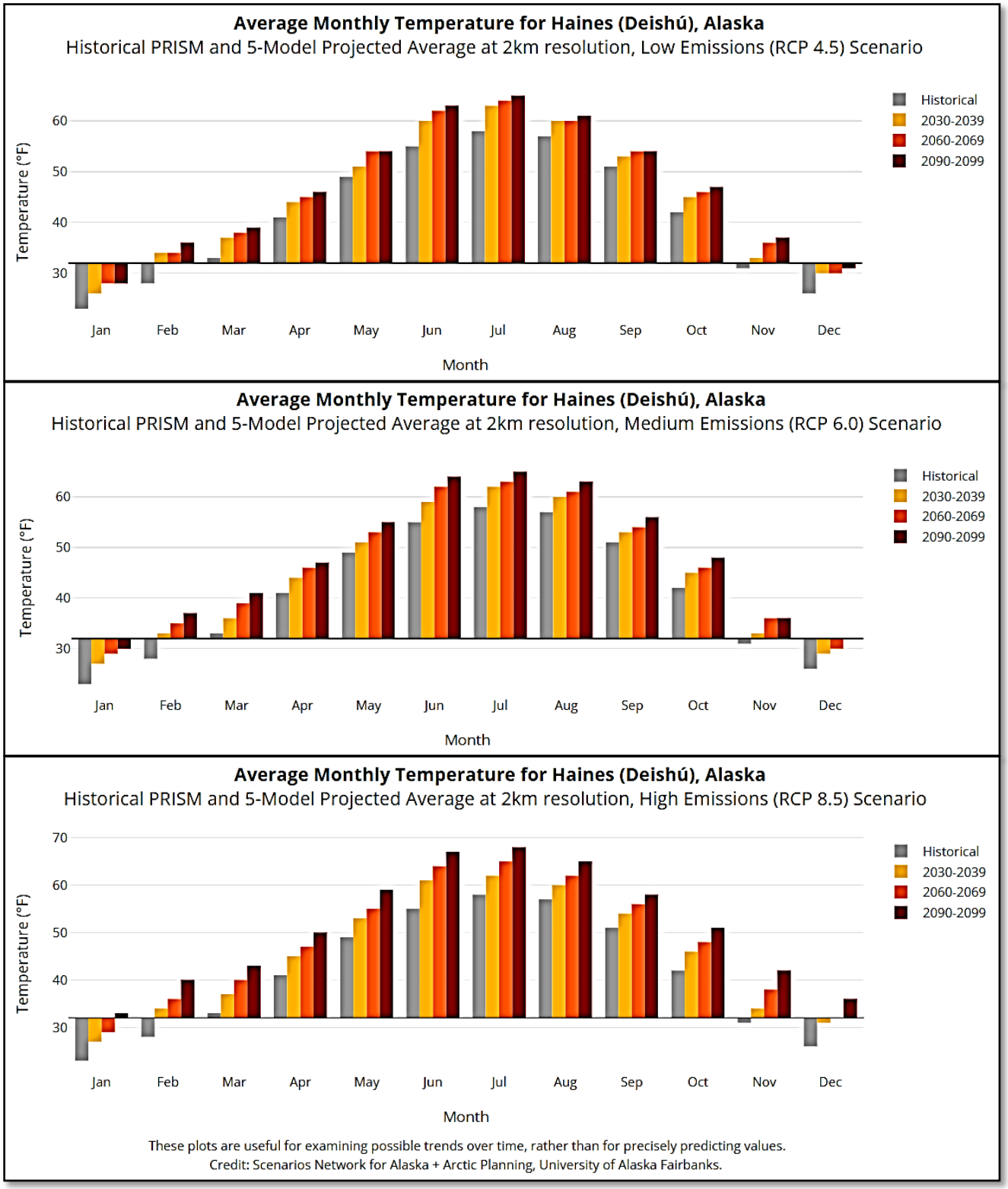


Chart 2.5: Future Climate Scenarios: Average Monthly Temperatures for Haines (Deishu), 2030 - 2099



2.4 TOPOGRAPHY

The Haines Townsite is bounded by the Takshunuk Mountains to the north, the Chilkat Peninsula to the south, Lynn Canal to the east and the Chilkat River to the west. Elevations range from sea level to Mount Ripinski, at the southern terminus of the Takshunuk Mountains, reaching 3,612 feet. Steep, rocky slopes are common in the area, and the adjacent fjord, named Lynn Canal, hits depths of over 2,000 feet. Lynn Canal is the deepest fjord in North America, and one of the deepest and longest in the world. The northern end of the Alexander Archipelago, a group of 1,100 islands lying off the coast of southeastern Alaska, extends to the Haines Borough with Eldred Rock, Sullivan Island and others.

2.5 GEOLOGY & SOIL CONDITIONS

The geologic processes that formed the Haines area are recorded in the landforms, fossils, debris and plant life. Faulting and folding of the earth's crust began forming the rugged and relatively young mountains of the area, and the Alexander terrain that predominates in Southeast Alaska emerged.

Glaciations had a major effect on the shape of land in the Haines area. At least eight major glacial cycles have occurred, carving out valleys, grinding down rock and depositing moraines and layers of glacial till. A warming of the climate caused a general retreat of late Pleistocene ice that ended approximately six to seven thousand years ago. At that time, Alaska's glaciers were reduced to near their current size. Post-glacial rebound, the uplift of terrain after the weight of glaciation is removed, causes measurable elevation increases, especially along shorelines, mud flats and riverine basins. The rate of isostatic rebound has been constant in the last two centuries with recordings as high as 1.6 inches per year in the region and 0.9 inches in the Townsite area.

The Chilkat Peninsula forms an important geological boundary in Lynn Canal. It is composed of Mesozoic greenstones, volcanic sandstones, mudstone, chert, and limestone that closely resemble the rocks of the Gravina belt. These Gravina-belt-type rocks lie on top of much older, lower to middle Paleozoic carbonates of the Alexander terrain.

Near the delta of the Tsirku and Chilkat Rivers, 750 feet of river sands and gravel fill this deep glacially scoured valley. Along the Chilkat River Valley, Mesozoic Gravina-like rocks, and Alexander-terrain rocks are separated by the Chatham Strait fault, tracing from Berner's Bay north of Juneau, along Lynn Canal and northwestward through the Chilkat River Valley. On the Chatham Strait fault, fjord-filling sediments indicate no slippage has occurred. Some gravel areas are underlaid by blue clay and surface bedrock is common.

Area soils are rich from years of river deposition loaded by nutrients that abundant salmon and eagles create in this temperate rainforest. Areas of best agricultural potential are located on stream terraces. Small vegetable gardens have been successful in the Haines Borough for decades, and a number of farms produce commercial sales.

2.6 GEOHAZARDS

The three geophysical hazards most common in Southeast Alaska are earthquakes, flooding (coastal and stream), and mass wasting (rock and/or mud slides). Due to the physical location of Haines, the community is relatively free of flooding and avalanche danger, although local drainage characteristics and construction activity on the slopes beyond the Townsite area have caused runoff and ground slumping problems.

Landslides occur frequently in Haines on or adjacent to steep slopes. Unconsolidated soils, talus deposits and overburden, and overlay bedrock or impermeable soils are contributing factors. Avalanches also occur on these slopes. Most are small, and occur away from developed and inhabited areas. Landslides and mixed mud and snow debris avalanches occur during or after periods of extreme precipitation.

The past twelve years brought two memorable landslides in the Haines area. In January 2011, a ground slump above Lutak Road and Oceanview Drive fractured and moved toward Portage Cove, displacing the road and ground. The Haines Borough Assembly declared a state of emergency.

In December 2020, an atmospheric river impacted the Haines area with a catastrophic landslide on Beach Road. The extreme weather event brought above-freezing temperatures and delivered record-breaking rainfall. The existing snowpack melted, increasing the runoff volume and resulted in flooding and landslides, washing out roads, damaging utilities and impacting homes. Dozens of landslides occurred during or after the two days of intense precipitation. The Beach Road Landslide, which demolished two houses and resulted in the loss of two residents in these structures, occurred in an area considered safe by community planners. This destruction swath was 600 feet wide and resulted in 1-to-16 feet of landslide debris covering the area. The Haines Borough Assembly declared a state of emergency, followed by the State of Alaska. This event overloaded the Townsite's Wastewater Treatment Plant and Storm Water System, resulting in localized flooding in low-lying areas and damage to various roads, such as Young Road which turned into a drainage conduit.

The Haines area is in a seismically active region in Alaska, part of the highly active Circum-Pacific Seismic Belt where earthquakes of magnitude 8 and greater on the Richter scale have occurred. In historic times, five earthquakes of this intensity have occurred in Southeast Alaska near the tectonically-active Queen Charlotte-Fairweather fault system and the Chugach-Saint Elias fault.

The United States Army Corps of Engineers (USACE) designates the Haines area in Seismic Zone 3, where the largest expected earthquakes could have magnitudes greater than 6.0 on the Richter scale with major damage to human-made structures. The strongest ground vibration as a result of an earthquake is expected to occur on filled areas, such as the Haines Airport, the Alaska Department of Transportation and Public Facilities (ADOT&PF) Shop, the Alaska Marine Highway System (AMHS) Ferry Terminal area and the Lutak Dry Cargo Dock area, also known as the Lutak Industrial Dock. (Only the ADOT&PF Shop is located in the Haines Townsite.) Settlement of the ground surface due to shaking could cause damage to buried and above-ground utilities, road beds, buildings, and other facilities with foundations on filled land.

A distant, intense earthquake from the Queen Charlotte-Fairweather fault could cause damage to the Haines area. Local subsidiary faults to the Chatham Strait fault are the Chilkat River, Chilkoot and Takhin faults, as well as faults in the Townsite saddle area. For the most part, these faults are concealed by water or valley floor deposits, and their exact location can only be estimated.

In 1987 an earthquake registering 5.3 on the Richter scale epi-centered near Haines. Seismic records indicate that over 100 significant earthquakes have been recorded in the Haines area since 1899. Earthquakes of moderate size, between 6.0 and 7.0 on the Richter scale, can be expected to occur on the order of once or twice per century.

Flood hazard areas exist throughout the flood plains of all riverine systems. Sudden changes in main channel alignment and course are common, as has recently occurred at Klukwan and the Tsirku River Fan. Sloughs, riverine islands, river deltas and tributary channels are all subject to sudden flood immersion and scouring, with a resultant uncertainty as to the permanence of existing lowland physical features.

Flood hazard areas and other geophysical hazard areas in the Townsite are identified in the *1989 Flood Plain and Flood Hazards Map*. Development in hazard areas is considered by the Haines Borough Planning Commission and the Haines Borough Assembly. It is estimated for emergency preparedness purposes, that a 1,000-year cycle of seiches, sea waves caused by ground movement or landslides, could have impacts up to 100 feet elevation above Mean Lower Low water (MLLW) shoreward. Effects at a higher elevation are possible. The *Flood Hazard Map*, located in ***Appendix C***, was developed over three decades ago and needs updating.

Major tsunami effects from earthquakes near or outside the region are less likely. The energy of distant tsunami shock waves tends to dissipate before they reach Haines due to the community's location 100 miles up Lynn Canal as well as the shelter provided by the Chilkat Islands and Peninsula. See ***Appendix C*** for 2018 *Tsunami Impact Maps* created by researchers at the Alaska Earthquake Center, Geophysical Institute, University of Alaska – Fairbanks (UAF).

2.7 WATER RESOURCES

There are three available sources of water: springs, surface and groundwater wells. The only significant surface water source for the Haines Townsite is Lily Lake on the Chilkat Peninsula, at an elevation of 663 feet. There are no other major surface water sources in the near vicinity of Haines that can be used as a significant source of drinking water. While the Chilkat River has significant volume, rock flour and salt water intrusion would require significant capital costs for the construction of an appropriate water treatment plant. Historically, the US Army ran a wood-stave pipeline from Pyramid Harbor to Fort Seward, tapping into a surface water source on the west side of the Chilkat River.

The AMHS Ferry Terminal uses a surface water source from a small, dammed reservoir on an unnamed stream east of this facility. The surface water source is filtered and disinfected for usage as potable water for staff and travelers.

Current groundwater sources in the Crystal Cathedral Well Field aquifer meet ADEC minimum standards yet the public prefers consuming less mineralized water. A nearby artesian well, located at 1 Mile Haines Highway and referred to as Sloan's well in the Department of Natural

Resources (ADNR) Well Log Tracking System (WELTS) database under the Crystal Cathedral Wells, could be a future groundwater source if it was economically and technologically viable.

The current spring source consists of three springs – the Main Spring, Meyers Tunnel and the Lower Spring. Collectively, these are referred to as the Piedad Springs. Other springs on the same mountainside, Mount Ripinski, are known, and more may be viable, additional sources. There are additional springs in the area below Lily Lake, south of the Townsite on Mud Bay Road. One of these springs, the Mud Bay Spring, is an untreated and unregulated community water source popular with local residents. (See Public Radio Station KHNS's article about this orphan spring for additional information.)

The Haines PWS currently uses Lily Lake and the Piedad Springs as the primary water sources. The Crystal Cathedral Wells function primarily as a backup source.

Haines' Mud Bay spring water tests positive for E. coli

August 22, 2017 by Abbey Collins, KHNS-Haines

A Haines resident fills up buckets of water at the Mud Bay spring to use for drinking and cleaning. (Photo by Abbey Collins/KHNS)

A popular but unregulated and untreated drinking water source in Haines has tested positive for E. coli.

KHNS had a sample of the Mud Bay spring water tested as part of a series focused on answering listener questions.

Juneau-based water testing company Admiralty Environmental said preliminary results show E. coli is present in the water.

E. coli is a type of fecal coliform bacteria associated with human or animal waste.

The bacteria is not always harmful, but certain strains can cause health problems.

Admiralty's test does not include what level or strain of the bacteria is present.

2.8 ENDANGERED SPECIES & CRITICIAL HABITAT

The purpose of the federal Endangered Species Act (ESA) is to conserve threatened and endangered species and their ecosystems. A species is considered **endangered i**f it is in danger of extinction throughout all or a significant portion of its range. Species shown in bold are found in the Haines area. (ADF&G, 2022)

Endangered species in Alaska include: Aleutian Shield Fern, Blue Whale, Bowhead Whale, Cook Inlet Beluga Whale, Eskimo Curlew, Fin Whale, **Humpback Whale** (Western North Pacific DPS), Leatherback Sea Turtle, North Pacific Right Whale, Sei Whale, Short-tailed Albatross, Sperm Whale, **Stellar Sea Lion**

Threatened species encompass: Green Sea Turtle, Loggerhead Sea Turtle, Northern Sea Otter (SW AK DPS), Olive Ridley Sea Turtle, Polar Bear, Spectacled Eider, Steller's Eider, Wood Bison

Alaska **species under review** for consideration include: **Alexander Archipelago Wolf**, Pacific Walrus, **Kittlitz's Murrelet**, Pinto Abalone, **Lynn Canal Herring.**

Stellar Sea Lion **critical habitat** (haul out) is located in the Haines vicinity. The Chilkoot River, the Chilkat River and some of its tributaries are considered anadromous fish streams.

2.9 HISTORICAL & ARCHAEOLOGICAL SITE CONDITIONS

All future water projects will be coordinated with the Alaska Office of History and Archaeology in order to identify any potential impacts to historical and/or archeological sites. The State Historic Preservation Office (SHPO) must give an archaeological clearance for any state or federally funded project, which usually occurs when a project is proceeding into final design and permitting. SHPO reviews projects under Section 106 of the National Historic Preservation Act (*36 CFR 800*) and the *Alaska Historic Preservation Act* (*AS 41.35.070*). *Section 106* requires federal agencies to take into account the effects of proposed activities on historic properties. The *Alaska Historic Preservation Act* requires a review of state public construction projects to determine if historic, prehistoric, or archaeological sites may be adversely affected.

Figure 2.1: December 2020 Beach Road Slide, May 2021

Figure 3.1: Piedad Springs: Meyers Tunnel, *2022 Sanitary Survey*

3.0 SOCIOECONOMIC

Since the Native mission school was established in the 1880s, the Haines population and economy has continued to grow.

3.1 POPULATION PROJECTIONS & WATER USERS

The number of Townsite households served with the Haines Public Water System appears to be expanding. However, federal census data and population projections from the Alaska Department of Labor and Workforce Development (ADOLWD) indicate the Haines Townsite population is decreasing, and this trend will continue. The federal census counts year-round residents only.

The annual growth rate per decade for the past 80 years based on census data varies from minus 4 percent to plus 4 percent. (See ***Table 3.1: Haines Townsite Population & Growth Rates***.) ***Table 3.2: Haines CDP Estimated Population Projections*** presents a summary of ADOLWD estimates for the Haines Townsite from 2025 through 2050.

For the purposes of this plan, an annual population growth rate of 2 percent is assumed for 2023 to 2032, and from 2033 to 2042. Growth appears to be tied to new, part-time residents. The increase in the annual number of residential hookups is at least a decade-long trend. According to the *2020 US Census,* a Townsite household constitutes 2.2 people (1,657 residents in 759 occupied dwellings of 921 total). (See ***Table 3.3: Haines Townsite Dwelling Units, Occupancy & Growth Rates***.) The State Demographer stated that the *2020 Census* appears to have undercounted residencies, suggesting the 2021 and 2022 State of Alaska estimates are a better assessment of the actual situation. (Sandberg, 2022)

The *2025 Haines Comprehensive Plan*, focusing on 2012 to 2030, projects a high-average annual growth rate and a low-average annual growth rate for the Haines Borough of 0.85 percent and 0.47 percent respectively. This projection estimates that, by 2030, the Haines Borough will have gained an additional 248 to 463 people and need an additional 92 to 210 dwelling units. (Sheinberg Associates, 2012)

The population figure used for the capacity analysis in ***Section 5***, 1,850 Townsite residents, is from the *2022 Haines Borough Sanitary Survey*. This number, provided by DPW Staff, includes 1,500 residents and 350 non-transient workers, which is more than the 1,657 residents recorded in the *2020 Census*.

The Haines population is expected to remain stable with continued, steady growth of part-time residents. Growth is expected to occur throughout the Townsite. More construction is expected to occur in planned and newer subdivisions. The Haines Borough Planner indicates areas of expansion may include:

- Hilltop – 64 lots
- LynnVista Estates – 10 lots
- Well Field Road – 6 lots

- North Sawmill Road – 13 lots
- Bear Trail Lane / Small Tracts Spur – 18 lots
- Small Tracts Road – 79 lots
- Mount Riley Road – 13 lots
- Mount Riley Subdivision – 60 to 70 lots

The majority of future growth will be single and multi-family homes, with the accompanying commercial, light industrial and public facilities.

Figure 3.2: Piedad Springs: Main Box, *2022 Sanitary Survey*

3.2 ECONOMY / FINANCIAL PROFILE

Haines' economy is based primarily on government, tourism, construction, mining, timber and fishing. Every summer numerous seasonal workers arrive to work in the Borough, including the Townsite. Seasonal residents also return for summer weather and activities. The *2025 Haines Comprehensive Plan*, currently under revision, addresses the future development of the local economy including mine exploration. Tourist-related industries also include a brewery, a distillery and a meadery.

Table 3.1: Haines Townsite Population & Growth Rates, 1940 – 2020

YEAR	POPULATION			PERIOD	ANNUAL GROWTH RATE
1940	Haines Townsite Chilkoot Barracks	357 337	694	1941-1950	-4.0%
1950	Haines Townsite Port Chilkoot Village	338 125	463	1951-1960	1.0%
1960	Haines Townsite Port Chilkoot Village	392 120	512	1961- 1970	2.6%
1970	Haines City Port Chilkoot	463 220	663	1971-1980	4.1%
1980	Haines City (Port Chilkoot merged)	993		1981-1990	2.2%
1990	Haines City	1,238		1991-2000	3.9%
2000	Haines City	1,811		2001-2010	-0.6%
2010	Haines CDP	1,713		2010-2020	-0.3%
2020	Haines CDP	1,657			
Average Growth Rate: 1941 - 2020					1.1%
Average Growth Rate: 1980 - 2020					1.3%
Average Growth Rate: 2000 - 2020					-0.4%
Maximum Growth Rate Per Decade: 1941 - 2020					4.1%
Assumed Annual Growth: 2023 - 2032					2%
Assumed Annual Growth: 2033 - 2042					2%

Table 3.2: Haines CDP Estimated Population Projections, 2025 - 2050

YEAR	ESTIMATED POPULATION	ANNUAL GROWTH RATE
2025	2,613	-0.2%
2030	2,600	-0.5%
2035	2,575	-0.8%
2040	2,536	-1.1%
2045	2,483	-1.1%
2050	2,427	

Table 3.3: Haines Townsite Dwelling Units, Occupancy & Growth Rates, 1980 to 2020

YEAR	POPULATION	DWELLING UNITS	ANNUAL GROWTH RATE	OCCUPANCY
1980	993	399	2.2%	84%
1990	1,238	527	3.3%	90%
2000	1,713	895	0.6%	84%
2010	1,811	902	-0.9%	87%
2020	1,657	921		82%

3.3 TRANSPORTATION

Haines can be reach by sea, air and ground transportation. The Haines Airport, operated and maintained by the Alaska Department of Transportation and Public Facilities (ADOT&PF), is located north of the Townsite Area and consists of a 4,000-ft by 100-ft asphalt runway. Regular flights are available from Juneau. Haines is on the Alaska Marine Highway System (AMHS) route, with a Ferry Terminal located at Mile 3 Lutak Road, and can be reached via the Haines Highway from Haines Junction in the Yukon Territory. Government port and harbor facilities include:

- the Lutak Industrial Dock;
- two boat harbors: the Small Boat Harbor and a seasonal one at Letnikof Cove;
- the Port Chilkoot Dock used by cruise ships, day ferries and other vessels;
- a seaplane base at Portage Cove;
- the Alaska Marine Highway System Ferry Terminal, northeast of the community.

Other privately-owned facilities in and near the Townsite include: the Chilkoot Lumber Dock (north of the Lutak Dock), and the Chilkat Cruises Dock in Portage Cove.

3.4 LAND USE

Lands impacted by the recommendations in this *2023 Haines Water Master Plan* are primarily owned or controlled by the Haines Borough, the State of Alaska or public agencies. In some instances, future easements through private or public-owned property will be required for the recommended improvements.

When the former City of Haines and the Haines Borough each incorporated, neither was eligible to select much land as part of its municipal entitlement compared to other parts of Alaska because there is little State land in Southeast Alaska. In 2010, the State Legislature helped remedy this situation when *House Bill 273* passed, transferring an additional 3,167 acres.

The developed land in Haines is classified as being used for commercial, industrial, or residential purposes. Industrial facilities include fish processing, marine support, construction, shipping, timber processing and small-scale, alcohol beverage production. The Haines Borough Planning Department developed a zoning map, which is included in ***Appendix A***.

The Townsite is compact, with residential neighborhoods surrounding the commercial center. About 64 percent of Borough residents live in this area. Land in town is primarily privately owned. The Borough owns parcels where public facilities have been constructed, such as the Water and Wastewater Treatment Plants, as well as some undeveloped land.

The parts of town with water and sewer lines are developed with relatively dense residential, commercial or mixed-use buildings. From the early town core, residential neighborhoods have followed road and subdivision development to the north off Young Road, Allen Road, Piedad Road, and to the south off Small Tracts and FAA Roads. The Small Tracts Road / FAA Road / Carrs Cove area was annexed into the former City of Haines in 1999. The majority of area residents south of Mount Riley Road provide their water and wastewater systems.

3.5 COMMUNITY DEVELOPMENT PROJECTS

Future development is expected in the main part of the Haines Townsite, where much of the existing commercial development has already occurred. Future expansion for the water system is expected to derive primarily from residential construction.

Road rehabilitation or construction projects currently planned with the Haines Townsite include:

- **Portage Cove Trail Development**: proximity to proposed water and sewer line extension on Front Street
- **FEMA Young Road Repairs – December 2020 Storm**: scheduled for completion summer 2023
- **New Subdivision Development**: Hilltop and LynnVista Estates

3.6 UTILITIES

The Haines Borough operates two utilities in the Townsite area: the Haines PWS and the Haines Sanitary Sewer System (SSS). Private companies provide solid waste, electrical and telephone services, Community Waste Solutions (CWS) and Alaska Power and Telephone (AP&T) respectively.

Figure 3.3: Bulk Fill Station, *2022 Sanitary Survey*

3.7 LOCAL GOVERNMENT

Haines currently functions as a Home Rule Borough. After statehood in 1959, the Alaska Legislature urged occupied areas of the state to become more organized. In 1968, the Haines Borough became the only Third Class Borough in Alaska, and its only mandated power was taxation for education. The original boundaries encompassed approximately 2,200 square miles. In 1975, the Borough annexed an additional 420 square miles with the inclusion of the commercial fish processing facility at Excursion Inlet.

In 2002, Haines citizens voted to consolidate the City of Haines and Haines Borough to form the current Home Rule Haines Borough. A charter written by residents sets the basic municipal rules. The Haines Borough currently possesses all powers and privileges of a Home Rule Borough under the laws of the State of Alaska and the Haines Borough Charter.

Table 3.4: Haines Local Government Changes, 1956 – 2002

YEAR	LOCAL GOVERNMENT
1956	City of Port Chilkoot
1968	Third Class Haines Borough
1970	City of Haines
2002	Home Rule Haines Borough (Consolidation)

4.0 EXISTING WATER SYSTEM

Drinking water from the Haines PWS consists of three types derived from the following sources:

- Lily Lake: a surface water source
- Piedad Springs: groundwater under the direct influence of surface water (GWUDI)
- Crystal Cathedral Well Field: groundwater

HAINES PUBLIC WATER SYSTEM – 2022

- **Annual Water Production:** 110.1 Million Gallons
- **Average Daily Water Production:** 301,405 Gallons
- **Connections:** 664 Customers
- **Cost to Treat 1,000 Gallons of Water:** $4.09
- **Gallons per Capita-Day:** 163 Gallons per Person
- **Distribution System:** 24.3 Miles of Pipe
- **Bulk Water Haulers:** 100,000 Gallons per Year
- **Fire Hydrants:** 270

Water is treated, stored in tanks (1.4 million gallons with five tanks full) and distributed. It is estimated that about 80 percent of the occupied homes in the Townsite are served by the Haines PWS. (Using *2020 Census* data for occupied and unoccupied dwellings in the Townsite, and the number of water service connections for the same year, an estimated range of 71 to 88 percent of dwellings are connected to the PWS.) The residents of the remaining dwellings haul water, use rain catchment or have private wells.

4.1 HISTORY

The current public water system (PWS) likely began with infrastructure from the Fort Seward water system built by the United States (US) Army. A wood-stave pipeline ran from an unnamed stream near Pyramid Harbor, crossed the Chilkat River and filled an open reservoir near the current location of the Tower Road Water Storage Tank (WST). Lily Lake was later used as a water source and remnants of wood-stave pipe are visible along the current access road. Underground pipes for the Haines Townsite water system were first installed in the 1950s. The US Army Corp of Engineers expanded the system further in the 1970s.

A water feasibility report was completed in 1970. James McConaghy's *Reconnaissance of Water Resources in the Haines-Port Chilkoot Area, Alaska,* discusses potential sources of additional water for the community. The Lily Lake Water Treatment Plant was completed in 1973. Detailed water supply records have been kept by the Water Treatment Plant (WTP) Operators since 1991. The first *Haines Water System Master Plan* was completed in 2004 by Juneau-based Carson and Dorn, Inc. (CDI). CDI completed an updated version in 2014.

4.2 SOURCES

The Haines Borough water system is classified as a non-transient, community system identified as **PWSID #: AK2111566**. The primary drinking water source is Lily Lake. This lake is approximately 663 feet above Mean Lower Low Water (MLLW). A review of the Haines Borough

Chart 4.1: Haines PWS Usage by Month, 2022

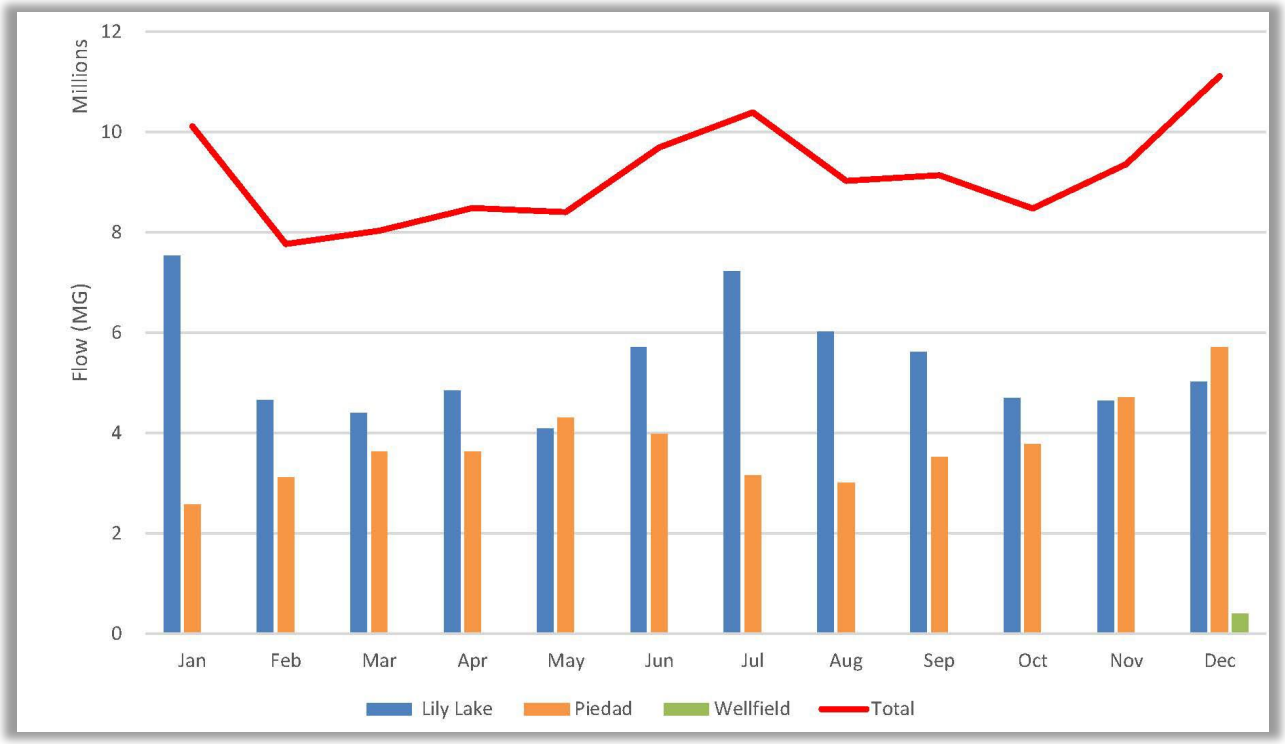
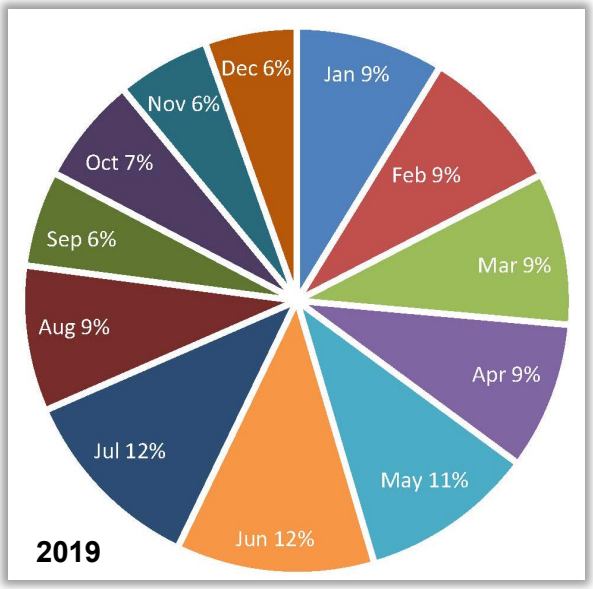
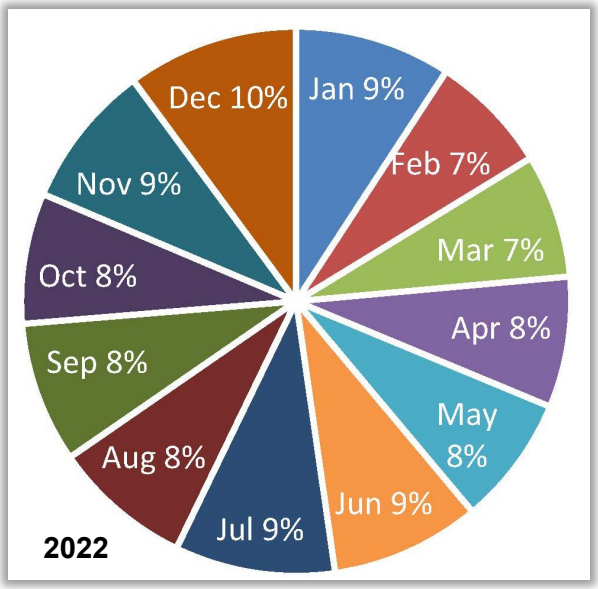


Chart 4.2: Haines PWS Percentage of Annual Usage by Month, 2019 & 2022





Water and Sewer Geographic Information System Database (HB W&S GIS), shows the lake covers about 27 acres. The lake is estimated to have an approximate depth of 14 feet, with a maximum storage capacity of approximately 8.8 MG per foot of depth, or about 123 MG. The remote location limits accessibility, as vehicle access is via a service road with a locked gate; yet the unfenced, watershed area contains various hiking trails.

An earlier report by Joseph Mulligan and Associates, cited in the *2004 Haines Water and Sewer Master Plan*, estimated the lake area at approximately 32 acres with a storage volume of 10 MG per foot of depth. (CDI, 2004) This mass balance analysis compared typical water demand with lake storage and recharge from storm and rainfall events. These results estimate an average sustainable rate of 550 GPM or about 790,000 GPD.

A screened intake, located approximately 8 feet below the lake surface, feeds a gravity-flow waterline to the Lily Lake Water Treatment Plant (LLWTP). Raw water flows from the lake through a 10-inch, HDPE pipe with five air-relief valves before reaching the LLWTP.

In 2019, due to a low snowpack and summer drought conditions, the capacity of the LLWTP was reduced to 130 GPM, significantly lower than the typical summer rate of 350 GPM. The community experienced a water shortage. The low lake level, the lowest any of the DPW Staff had noted, created an issue with the gravity-fed waterline. This situation necessitated aligning the lake-to-plant pipeline elevation closer to the original design by removing part of a bedrock hump.

The Piedad Springs source augments the Lily Lake supply. This source currently consists of three springs that connect into a 6-inch, HDPE waterline before entering the Piedad Water Treatment Plant (PWTP). The Lower Spring and Meyer Tunnel Spring were added to this source in 2020. The maximum flow rate from this WTP is 150 GPM, with 120 GPM a more sustainable output. This remote, unfenced watershed area contains some hiking trails. The main spring can be reached by a steep road with a tracked vehicle.

The Crystal Cathedral Well Field consists of two wells near sea level and adjacent to the Chilkat River. One well is currently operable as a back-up water source. During the summer of 1999, the West Well was heavily pumped, yielding salty water. This source is the most expensive to operate of the three sources as electricity usage for pumping replaces the gravity flows of Lily Lake and the Piedad Springs.

Chart 4.1 through ***Chart 4.5*** provide PWS usage and production information from 2015 to 2022. ***Chart 4.2*** and ***Chart 4.3*** compare 2019 and 2022, a pre-pandemic year and a post-pandemic one. Note that 2019 also experienced drought conditions.

These three water sources are potentially susceptible to some contamination from human activity. Lily Lake and the Piedad Springs are located in elevated, remote areas, and impacts are most likely from hikers. The Crystal Cathedral Wells are also adjacent to commercial activities, including a golf course, a non-profit club house and a carpenter's shop. This area is served by the Haines Sanitary Sewer System.

The City retains the Alaska Department of Natural Resources (ADNR) Water Rights for 58,000 GPD from Lily Lake, 500,000 GPD from Piedad Springs and 500,000 from Crystal Cathedral Well Field. The Haines Borough needs to update the Water Rights for Lily Lake as the 58,000 GPD has been exceeded for many years. Refer to ***Appendix B*** for more information.

4.3 WATER USAGE

Community water consumption is characterized by several types of demand, including residential, public, commercial and industrial uses. Residential uses include both indoor and outdoor connections. Public demand includes water for fire protection, street cleaning, and use in schools and other public facilities. Commercial and industrial demands include water for stores, offices, hotels, apartment buildings, laundromats, restaurants, and most manufacturing plants.

Water service in the Haines Townsite is classified into four categories by billing type: Residential, Commercial, Bulk Water and Cruise Ships. Industrial activity presently includes three small facilities: a brewery, a distillery and a meadery.

The majority of the usage is for residential and commercial purposes. Residential customers are not metered while approximately 90 percent of commercial customers have remotely read meters. A Bulk Fill Station for self-haul customers, adjacent to the Small Boat Harbor parking area, started service in November 2021. Water service for boats is provided at the Small Boat Harbor as part of the moorage fee. Cruise ships take on water at the Cruise Ship Dock and pay a fee. (See ***Appendix B*** for a *Haines Borough Water-Sewer Rate Schedule*.)

Chart 4.3: Haines PWS Percentage of Annual Usage by Source, 2019 & 2022

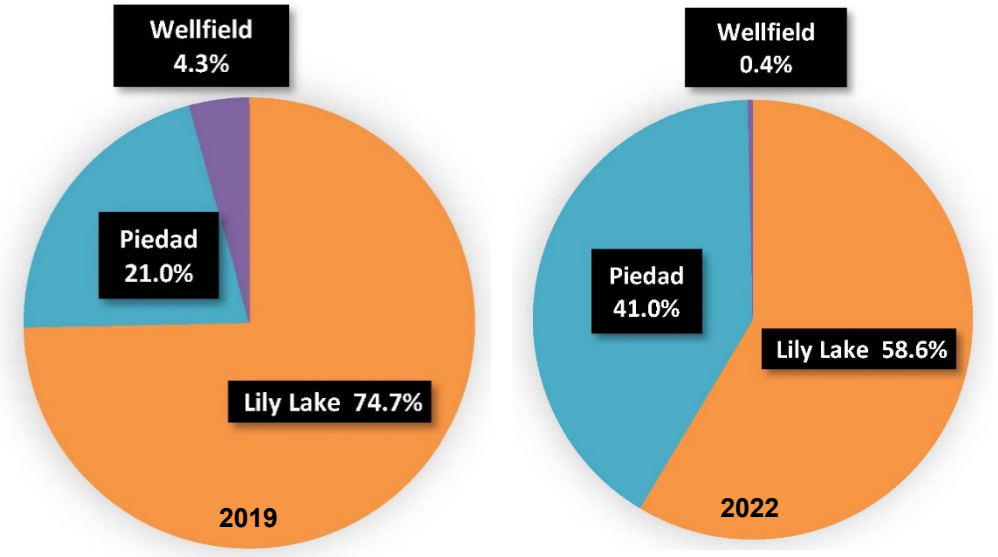
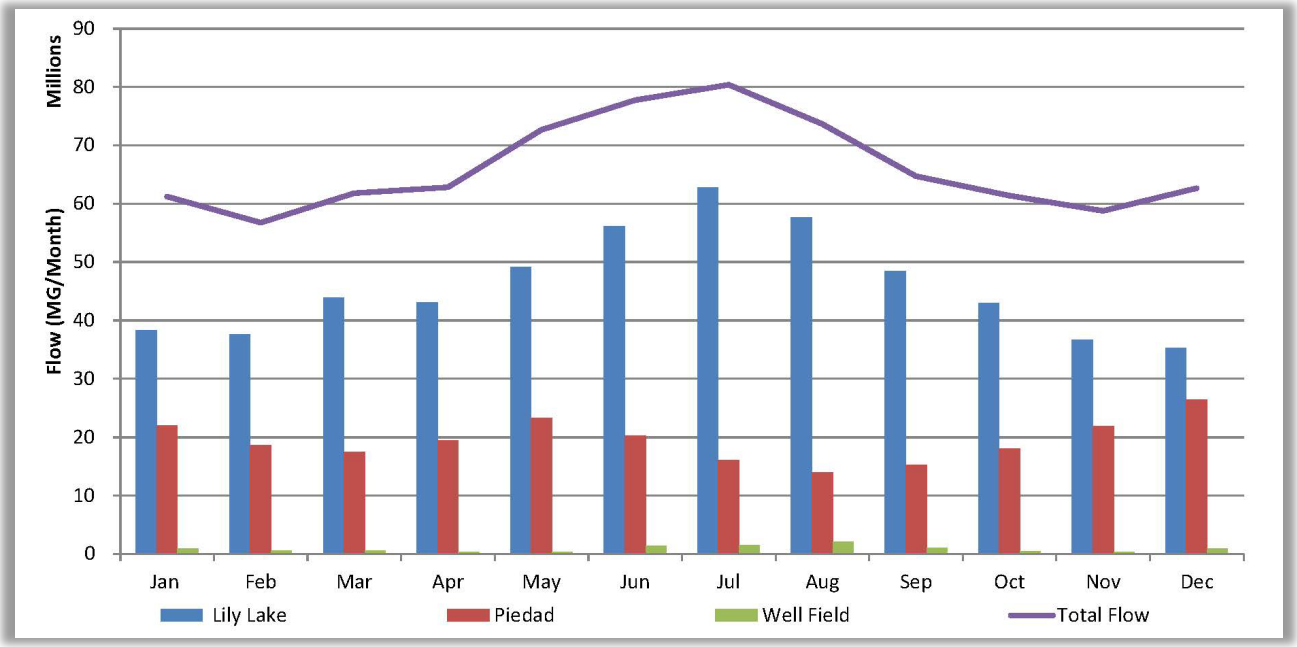


Chart 4.4: Haines PWS Production by Month, 2015 – 2022



Approximately 1,850 residents are currently served by the water distribution system. The per capita usage rate for the Haines Townsite is estimated to be 163 gallons per capita-day (GPCD), derived with the 2022 annual usage of 110.1 MG. Typical municipal water systems have usage rates ranging from 115 to 143 GPCD for indoor and outdoor residential usage, according to the United States Geological Survey (USGS). (The USGS estimates a range of 80 to 100 GPCD for indoor use; indoor usage composes 70 percent of the total indoor-outdoor sum.)

Table 4.1 shows GPCD rates for a sampling of Alaska communities. Other communities appear to use substantially less potable water than Haines. Working camps at Prudhoe Bay, with hauled and measured systems for both water and wastewater, use 55 GPCD. Yet Juneau and Petersburg appear to use even less, significantly less than the Haines PWS, while Sitka exceeds all communities shown.

In the Haines Townsite, residential usage includes indoor and outdoor demand at single-family dwellings. Indoor uses include drinking water, food preparation, flushing toilets, washing clothes and dishes, showering and bathing. Outdoor uses include hose bibs for washing vehicles and pavement, watering lawns and gardens, and other recreational activities associated with fishing and boating.

The per capita flowrate contribution to the Townsite's Sanitary Sewer System does not mirror the water system GPCD demand as there are more residents on the PWS than the Haines SSS. Further, leaks and wasting in the distribution system account for additional water demand.

The average production of the three combined WTPs for 2022 ranged from 7.8 MG to 11.1 MG per month, and less than one percent came from the Well Field WTP. In 2022, the average annual production was 301,405 GPD, yielding 110.1 MG for the year.

Table 4.1: Select Southeast Alaska PWS Usage, 2016 – 2022

Public Water System	2016 GPCD	2019 GPCD	2022 GPCD
Haines	175	175	163
Juneau	51 (for 2022)		
Petersburg	44 (for 2021)		
Prudhoe Bay	55 (for 2022)		
Sitka	294 (for 2022)		

The average summer production (May through October) for the same period was 302,728 GPD, and winter production was 299,788 GPD. Generally, demand is highest from June through September, with July being the month with the highest use. However, the range of monthly production is less than it was a decade ago as the summer peak is lower.

4.4 WATER TREATMENT

The Haines Borough operates three water treatment plants: Lily Lake WTP, Piedad Springs WTP and Crystal Cathedral WTP. The current maximum capacity of these three is 900 GPM.

Lily Lake WTP is a pressure filtration plant treating surface water from Lily Lake with 350 GPM maximum production, only sustainable during the months when the water temperature is more than 40 degrees F. During the cooler winter months, sustainable capacity is about 120 GPM.

A screened outlet from the lake feeds the 10,000-feet of 10-inch, HDPE waterline, carrying raw water via gravity to the WTP. At the plant, raw water is dosed with alum and receives static mixing prior to the flocculation tank. Flocculation reaction time is temperature dependent.

Polymer is then added, and the effluent feeds three, pressure-filter vessels. Filtrate is chlorinated and soda ash is added for corrosion control. Contact time is provided in 500 feet of 24-inch, ductile iron waterline from the WTP to the FAA Chlorine Contact / Water Storage Tank (CC/WST), where additional contact time is achieved. Seasonal turnover, storms and algal blooms can impact lake water quality.

Piedad WTP, with a theoretical yield of 150 GPM, is gravity fed from three spring-box intake works. Waterlines from the springs converge before entering this plant. At the WTP, raw water is filtered then disinfected with ultraviolet light and chlorine. Contact time is provided with 120 feet of 24-inch, ductile iron pipe buried in an area adjacent to the WTP. Treated water then enters the distribution system.

The Crystal Cathedral WTP treats ground water from two wells. The current well pumps each have a maximum capacity of 400 GPM. The West Well is currently un-operable, and there are plans to install a new variable frequency drive (VFD) pump along with other upgrades to both

Well Houses. The East Well currently has a VFD pump to bring raw groundwater into the WTP. A 3,154-G, hydropneumatic tank, built in 1998 with no diaphragm, pressurizes the system. Chlorination is the only treatment. Treated water then enters the distribution system. This source is primarily a backup supply.

Treatment expenses for the three sources vary. Refer to ***Table 4.3: Haines PWS Treatment Cost by Source***. Piedad is the least expensive source. While all three sources require disinfection, Lily Lake and Piedad Springs require additional treatment as they are subject to the Surface Water Treatment Rule. Both undergo filtration and disinfection. Lily Lake water also receives coagulation and flocculation prior to filtration. (Costs include chemicals, filters and electricity only, averaged over a three-year period, 2020 through 2022.) Water service to residents in the Highlands Estates and Skyline Estates subdivisions also require pumping to Young Road Water Storage Tank and the Skyline Drive Water Storage Tank. See ***Appendix B*** for additional information about these WTPs: plant schematics as well as summary information from the *2022 Haines Borough Public Water System Sanitary Survey*.

Table 4.2: Haines PWS Maximum Capacity by Source, 2022

WTP	Daily Run Time (hours)	2022
Lily Lake WTP – Summer 6 Months @ 350 GPM	22	84.3 MG
Lily Lake WTP – Winter 6 Months @ 120 GPM	22	28.9 MG
Piedad Springs WTP @ 120 GPM	24	60.4 MG
Annual Water Capacity with 2023 System – 2 Sources		173.6 MG

Table 4.3: Haines PWS Treatment Cost by Source, 2020 - 2022

Water Treatment Plant	Cost (per 1,000 gallons)
Lily Lake	$0.86
Piedad	$0.13
Crystal Cathedral	$1.60

4.5 WATER STORAGE

The Townsite has 1.418 MG of water storage available in five water storage tanks (WSTs). ***Table 4.4: Haines PWS Storage Tanks*** shows specifics for each tank.

The FAA CC/WST is located near the Lily Lake WTP and serves nearby neighborhoods at higher elevation than Tower Road WST. The wood-stave Tower Road Tank, located near the top of Cemetery Hill, was constructed in 1986 and is one of the original Townsite storage tanks. Two tanks, Skyline Drive and Young Road, supply the upper elevations north of downtown. Barnett Drive WST, coupled with Tower Road WST, serve the downtown area.

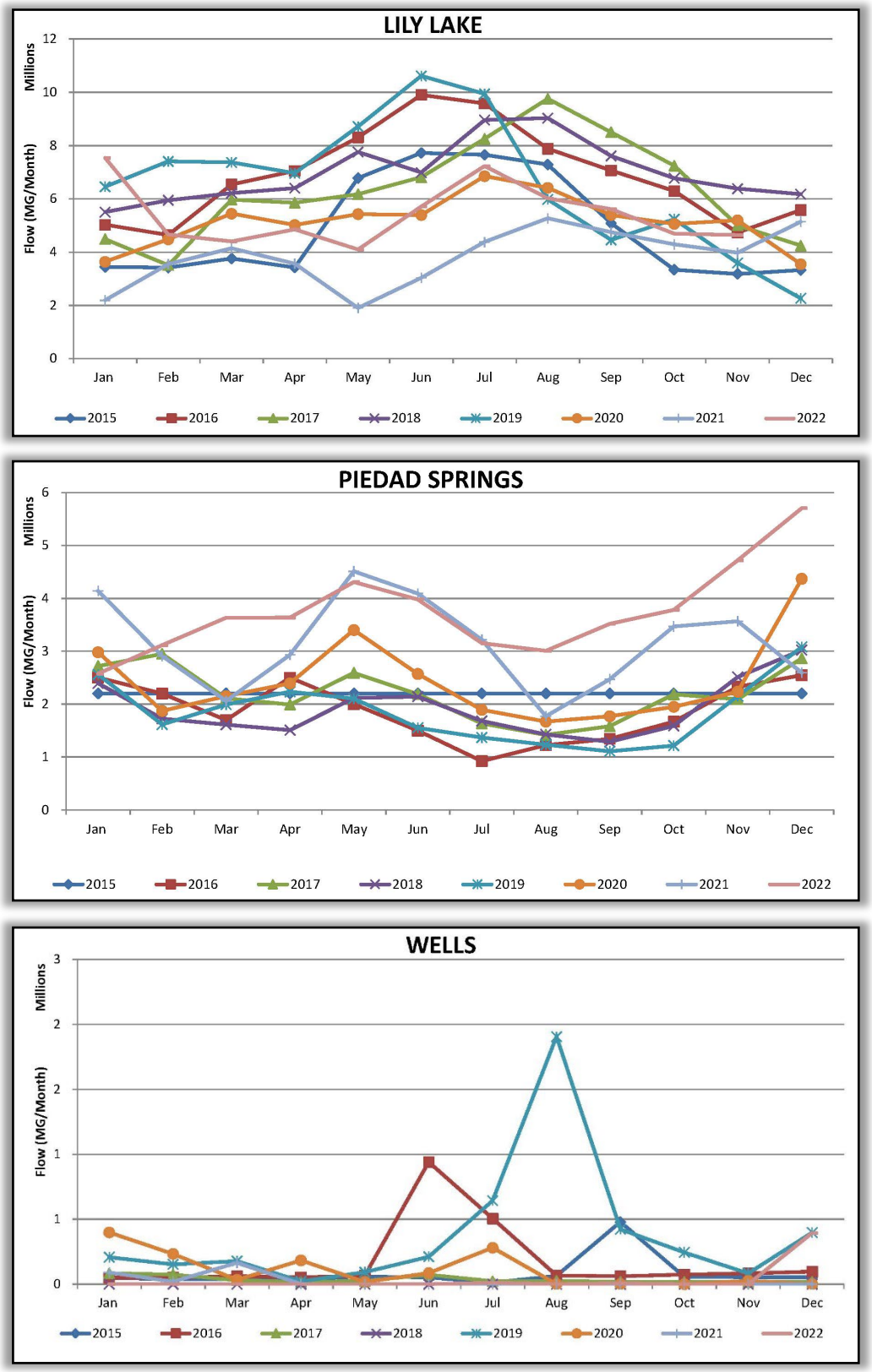
The WSTs serve as reservoirs for water demands and fire emergencies. Winter freezing has been a problem in some of the tanks. First-generation, floor-mounted *PAX* mixers were installed in some WSTs and worked for a number of years. Borough DPW Staff recently installed a new type of *PAX* mixer, one that hangs from the ceiling, in Young Road and Tower Road WSTs. An additional *PAX* mixer will be installed at Barnett Drive WST in 2023 when the previous model is removed.

The DPW Staff tries to operate the Townsite area with the WSTs continuously full; however, water demands can drop capacities below maximum storage limits. Fires, cruise ship water sales and other large demands can affect the water levels in the WSTs.

The WSTs are visually inspected annually by the DPW Staff and cleaned on an as-needed basis. The filtration systems at the LLWTP and PWTP remove sediment that would typically accumulate in the tanks. The Young Road WST was emptied, cleaned, chlorinated, flushed and coliform sampled / tested when a new *PAX* mixer was installed in November 2022. The interior integrity of the other four WSTs is unknown.

Figure 4.1: Locked Access to Young Road Water Storage Tank, *2022 Sanitary Survey*

Chart 4.5: Haines PWS Production by Source & Month, 2015-2022



It is recommended that all the water storage tanks undergo comprehensive cleanings and inspections at least once every five years. This includes draining, cleaning and inspecting each tank, followed by disinfecting before re-filling. These inspections should include assessments of coating and corrosion issues, structural deficiencies, integrity of anodes, tank mixing devices (if used), and any noted water quality problems. Any coating failures due to ice formation should also be noted and corrected. Inspections should be performed by a qualified engineer or a National Association of Corrosion Engineers-qualified Coatings Inspector. If problems with the paint coatings are noted in future inspections, the interior of the WST should be recoated with an American Water Works Association (AWWA)-approved potable water coating system. The functionality of any cathodic protection systems in the WSTs should also be tested and verified, and the systems replaced if necessary.

Two of the tanks, Barnett Drive and Young Road WSTs, have booster pumps. The Barnett Drive booster pump feeds the Young Road WST. The Young Road booster pump feeds the Skyline Drive WST. Neither of these Pump Stations have back-up power on-site. In the event of a shutdown of all WTPs, sufficient storage is available to supply the Townsite for about five days of average demands, assuming all WSTs are full at the onset.

4.6 WATER DISTRIBUTION

There are approximately 25 miles of pipe in the water distribution system, not including service piping and abandoned mains. Water distribution lines in the Townsite consist primarily of ductile iron (DI), polyvinyl chloride (PVC) and high-density polyethylene (HDPE) pipe, with main sizes ranging from 1.5-inch to 24-inch inner diameter. Most of the known asbestos-cement (AC) pipe was removed by 2019. Approximately 411 feet of AC pipe remain in two areas: the main 199-ft serving the ADOT&PF Shop between Main Street and Union Street, and a 212-foot length along First and Union Streets. An inventory of the known, active-water-distribution mains in the Townsite is shown in ***Table 4.5: Haines PWS Active Water Main by Pipe Diameter***.

Table 4.6: ***Piping Material Life Expectancies*** provides an estimated typical lifespan of water and sewer piping materials. (Mays, 2000; Foundations for Water Research, 1988) Although numerous studies have been conducted to determine pipe life expectancies, the actual lifespan will vary depending on soil conditions, installation methods, seismic conditions, etc.

Waterlines in the Haines area are buried a minimum of 6 feet below grade or insulation equivalent. Piping is typically installed using bedding material in conformance with the *City and Borough of Juneau Standard Details.* (CBJ, 2011) Dead-end lines are typically flushed through hydrants on an annual basis to remove sediment.

Existing water distribution lines are depicted on ***Sheet A-2*** in ***Appendix A.***

4.7 PRESSURE REDUCING VALVES

The Haines Townsite has a total of four operating pressure-reducing valves (PRVs) and one pressure-sustaining valve (PSV) within the water distribution system. Details regarding these devices are shown in ***Table 4.7: Haines PWS Pressure Control Valves***. Locations for these valves are shown in in ***Appendix A, Sheet A-5***.

4.8 SERVICE PRESSURES / FLOWRATES

There are six pressure zones within the current Haines Townsite water distribution system. Exit pressures from individual PRVs can fluctuate by as much as 5 to 10 pounds per square inch (psi) depending on the flow rate through the PRV. Two tables provide pressure-related information. ***Table 4.8: Haines PWS Pressure Zones*** and ***Table 4.9: Haines PWS Meter & Backflow Preventer Vaults***. The pressure zones for the Townsite PWS are shown in ***Figure 4.3*** and in ***Appendix A, Sheet A-5.***

Table 4.4: Haines PWS Storage Tanks, 2023

TANK	LOCATION	NOMINAL VOLUME (gallons)	ESTIMATED AVAILABLE VOLUME (gallons)	TYPE	FLOOR ELEVATION (feet)	STORED WATER HEIGHT (feet)	DIAMETER (feet)	YEAR BUILT
SF001 Tower Road	Tower Road	320,000	290,000	Wood Stave - Redwood	234	17	54	1986
SF002 FAA Road Contact	FAA Road	630,000	630,000	Welded Steel	270	35.5	52.5	1999
SF003 Skyline Drive	Skyline Drive	48,000	48,000	Bolted Steel	561	23	18	1998
SF004 Young Road	Young Road	280,000	280,000	Bolted Steel	435	27	52	2008
SF005 Barnett Drive	Barnett Drive	140,000	140,000	Bolted Steel	235	16	36	2011
TOTAL NOMINAL VOLUME: 1,418,000 Gallons								

Table 4.5: Haines PWS Active Water Main by Pipe Diameter, 2023

Pipe Material	Pipe Diameter (inches)										TOTAL (feet)
	1.5	2	3	4	6	8	10	12	15	24	
Asbestos Cement				212	199						411
Copper	47	238									285
Ductile Iron				142	23,962	15,791		5,282	412	433	46,022
Galvanized Iron			4								4
HDPE		1,055		1,633	1,045	1,935	14,296				19,964
PVC				4,801	9,766	38,992	3,830	4,107			61,496
TOTAL (feet)	47	1,293	4	6,788	34,973	56,717	18,126	9,390	412	433	128,182
TOTAL PIPES IN GROUND: 128,181 feet or 24.3 miles											

Table 4.6: Piping Material Life Expectancies

Piping Material	Estimated Installation Date (mains)	Estimated Life Expectancy (years)
Asbestos Cement	1950s – 1970s	20-30
Ductile Iron	1970s – 1990s	50+
Polyvinyl Chloride	1990s – 2019	50-70+
High-density Polyethylene	2010 - current	50-100

Table 4.7: Haines PWS Pressure Control Valves, 2023

Name	Location	Elevation (feet)	Valve Sizes (inches)	Inlet Setting (psi)	Outlet Settings (psi)
Pressure Reducing Valve Stations					
Piedad WTP	Piedad WTP	363	1.5	55	40
Haven Court	Haven Court	166	4	105	25
Haven Court	Haven Court	166	1.5	105	30
Battle Road	Battle Road	108	6	95	55
Pressure Sustaining Valve Station					
South Sawmill Road	South Sawmill Road	59	3	115	95

4.9 FIRE PROTECTION

A primary criterion for the sizing and placement of water distribution system is fire protection. The Haines Borough Volunteer Fire Department currently has a 4,500-gallon tanker truck used for response. Responders anticipate 300 GPM from available fire hydrants to augment the tanker supply. Water storage volumes could decrease substantially after a fire, and cause an emergency shortage if a very large, abnormal fire emergency occurred.

One of the goals of the Borough is to conform to the National Fire Protection Agency minimum recommended fire-flow requirements. There are currently 270 hydrants connected to the Haines Townsite water distribution system. All hydrants have a 5.25-inch main value, with a pumper port and two hose outlets. Hydrants are standard AWWA 502, dry-barrel units as manufactured by Mueller. The preferred unit is a *Model Centurion 200* or *25*0, or equal. Hydrants are labelled with a unique identification number permanently attached to each. All hydrants are currently in service, and there are no known operational or maintenance issues. To check flow rates and pressures, DPW Staff flushes hydrants annually to remove sediments from hydrants and dead-end lines. A stock of repair parts is maintained.

The recommended spacing between hydrants, from the *2012 Edition Ten State Standards* is 350 to 600 feet with a maximum distance (hose length) between hydrants and service points of 250 feet. For larger public buildings, such as the school and clinic, four hydrants are recommended with a maximum spacing of no more than 350 feet. For harbors, hydrants should have a minimum space of no more than 450 feet.

Table 4.8: Haines PWS Pressure Zones, 2023

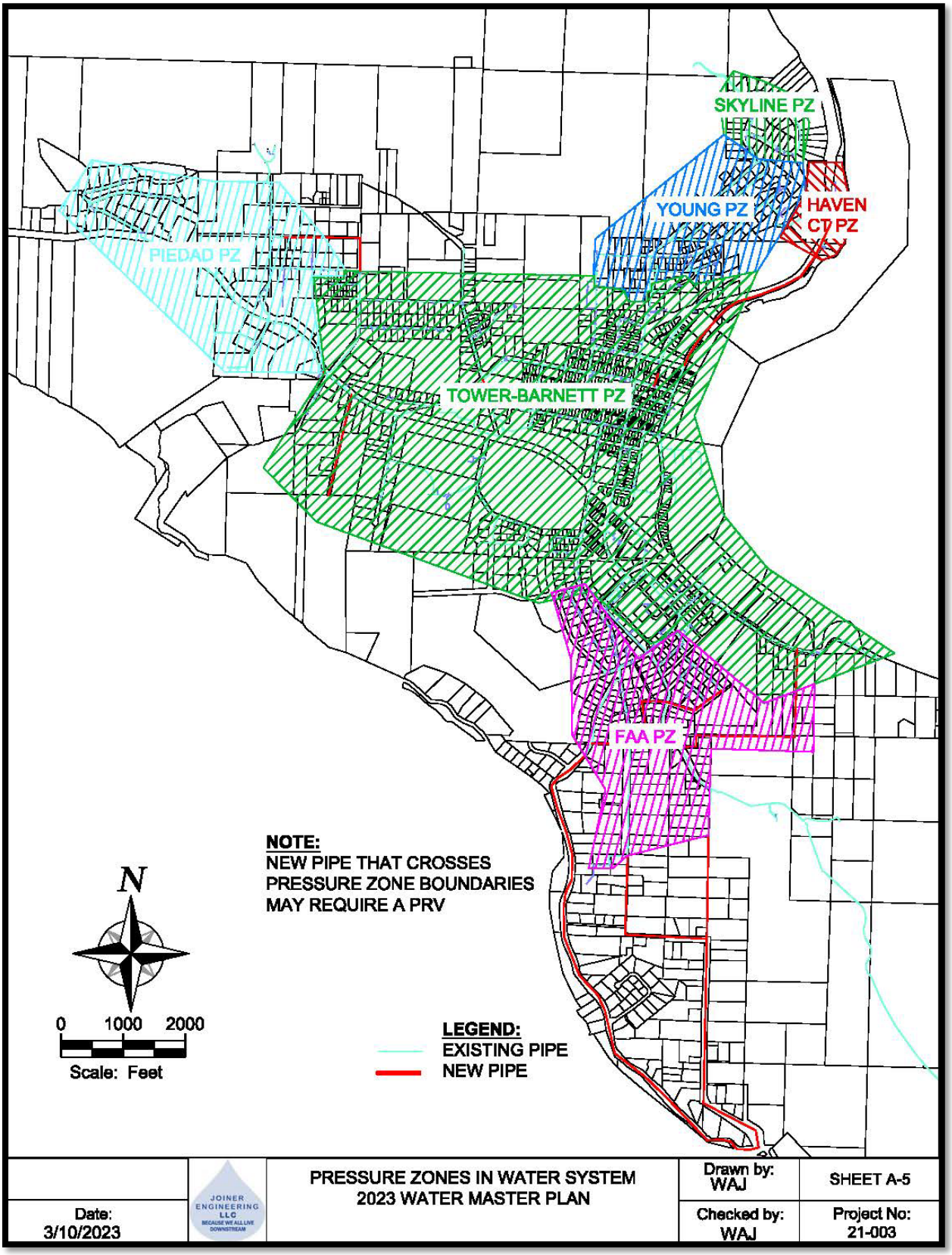
Pressure Zone	Upstream Pressure / Water Surface Elevation (feet or psi)	Downstream PRV Station(s) Facility	Approximate Minimum Static Pressure (psi)	Approximate Maximum Static Pressure (psi)
FAA	305.5 FT		45	90
Tower Road	251 FT		35	90
Young Road	462 FT		22	110
Skyline Drive	584 FT		53	62
Piedad	402 FT	South Sawmill PSV	90	105
Haven Court	110 PSI	Haven Court PRV	35	85

Table 4.9: Haines PWS Meter & Backflow Preventer Vaults, 2023

Vault Name	Location	Station Type
Old Small Boat Harbor	Old Small Boat Harbor	RPZA, Meter
New Small Boat Harbor	New Small Boat Harbor	RPZA, Meter
Cruise Ship Dock	Cruise Ship Dock	RPZA, Meter

Figure 4.2: New Harbor Improvements — RPZ Assembly, *2022 Sanitary Survey*

Figure 4.3: Map of Haines PWS Pressure Zones, 2023



4.10 SCADA SYSTEM

The Townsite water system uses a telephone-based Supervisory Control and Data Acquisition (SCADA) telemetry system. *Sensaphone* monitor operations at the Lily Lake WTP, the FAA CC/WST and the Piedad WTP. The Haines Borough plans to continue expanding their SCADA system with upgrades.

4.11 ISOLATION VALVES

DPW Staff regularly exercises valves to check for proper operation. Approximately eight main line isolation valves are located throughout the water distribution system. The valves are typically gate valves for smaller diameter mains (12-inch or smaller), and butterfly valves for larger diameter (16-inch or larger) mains. Other valve counts include:

- Mains service values: 566
- Control valves (including air release): 47
- Curb stop valves (known): 826

4.12 SERVICE CONNECTIONS

There are approximately 664 service connections in the Haines Townsite PWS: a total of 515 residential connections and 149 commercial ones. Ninety percent of commercial connections are metered remotely. Residential customers pay a monthly fee. Fees for the various categories of service connections are shown in ***Appendix B***.

The increase in customers, as noted during the last decade of sanitary surveys, is shown in ***Table 4.10: Haines PWS Service Connection***. This annual rate for the prior decade is 1.2 percent.

Existing service connections are PEX (cross-linked polyethylene) or HDPE. Freeze-ups are generally not a problem at water services between the mains and curb box. DPW Staff installs service connections from the water main to the property line. Water services from the dwelling to the curb stop are the responsibility of the property owner. Tracer wires are required for new service connections. If service lines do not have a minimum of 6-feet burial depth, they are installed with insulation in the trench. For services with pressure exceeding 80 psi, the property owner needs to discuss individual PRV options with DPW Staff.

LynnVista Subdivision, within the Townsite and under development by a private citizen, will be assumed by the Haines Borough once ADEC provides final approval to operate. It is anticipated that this development, which will provide up to ten additional residential lots, will be completed in 2023.

Table 4.10: Haines PWS Service Connections, 2004 – 2022

Sanitary Survey Year	Service Connections	Annual Growth Rate	Average Growth Rate
2004	534	1.4	1.2
2013	605	3.3	
2016	625	3.7	
2019	648	2.5	
2022	664		

4.13 CROSS CONTAMINATION

Facilities with the potential to contaminate water supplies through backflow are required under *18 Alaska Administrative Code, Part 80.025* to install reduced-pressure, backflow prevention devices on their water service. Such devices should be evaluated and installed in a manner that would not cause a contamination issue due to a loss of pressure from the backflow device. Backflow devices should be installed in all commercial service connections. There are no known cross-contamination problems for the Haines Townsite. Regular, annual inspections of backflow prevention devices at commercial services should be required.

4.14 METERS

The Borough uses monthly meter readings to bill commercial users. There are currently 149 metered, commercial accounts. Ninety percent of these metered accounts are read remotely. Metering all residential customers is under consideration. Meter readings are also taken at each WTP. All three have a master meter.

Meters are not calibrated unless they are suspected of being inaccurate. It is recommended that major system meters be checked and calibrated periodically to ensure accurate information. Such data will be essential for future water expansions and WTP/WST upgrades.

Table 4.11: Haines PWS Water Quality: System Wide

Parameter	Testing Frequency	Recent Result	
		Value	Date
Bacteriological			
Coliform (TCR)	2 samples per month	0 colonies / 100 ml sample	1/9/23
Disinfection By-Product			
TTHMs	1 sample quarterly	32.4 ppb	12/19/22
HAA5		32.4 ppb	12/19/22
Inorganics			
Copper – consumer taps	10 samples every 3 years	11.5 to 330 ppb	12/6/22
Lead – consumer taps		<0.2 to 0.53 ppb	12/6/22
Asbestos			
Million Fibers > 10 µm in Length	1 sample every 9 years	0 MFL	4/5/21

4.15 MAINTENANCE / OPERATIONAL RECORDS

The Borough has one Licensed Water / Wastewater Level 2 Operator and one Provisional Wastewater Operator Level 1. Although Operators generally work a Monday-through-Friday work week, with 8 hours-per-day shift, the ADEC requires a certified Operator to be available 24 hours-per day, 7 days-a-week. An on-call Operator also works over weekends to make the typical rounds as well as troubleshoot any urgent situation.

The Operators are specifically assigned to monitor and maintain the WTPs, WSTs, pump stations, WWTP, lift stations and piping systems. One Operator is required to be on-call, 24 hours-a-day by radio or telephone, to respond to emergencies related to the water and sewer systems. Other Borough employees and contractors assist in the maintenance and repair of the water system as needed.

Meter readings for potable water exiting the three WTPs are taken on a continuous basis and data logged on-site. Lily Lake WTP also meters incoming raw water. Meter readings are also recorded for the water exiting the FAA CC/WST.

Operational information for water in the system as well as chlorine concentrations are recorded on a daily basis. Residual chlorine is measured at designated locations throughout the distribution system as specified in the federal *Revised Total Coliform Rule* that ADEC has primacy for. Total coliform tests are taken on a regular basis and reported to ADEC. See ***Table 4.11*** through ***Table 4.14*** for specific tests and schedules for the overall Haines PWS as well as individual sources. These tables contain information from a *January 27, 2023 Monitoring Data Dump* and a *January 25, 2022 Monitoring Summary* for the Haines Borough from ADEC, and

the *2021 – 2022 Consumer Confidence Report*. (See ***Appendix B*** for the *Monitoring Summary* and the *CCRs*.) DPW Staff also conducts jar testing for measuring the effect of coagulation, flocculation, and sedimentation on turbidity whenever there is a noticeable change.

The Haines Borough is up-to-date with testing. The consolidation of Crystal Cathedral Public Water System into the Haines Borough Public Water System created what may appear to be irregularities as the two testing schedules for separate systems combined.

Table 4.12: Haines PWS Water Quality: Lily Lake Source

Parameter	Testing Frequency	Recent Result	
		Value	Date
Nitrate			
Nitrate-Nitrite	1 sample annually	0 ppm	6/13/22
Organic Compounds			
SOC	1 sample quarterly	Not Required	2020 -2022 Waiver
VOC	1 sample annually	0 ppm	6/13/22
Inorganics			
Barium	1 sample every 9 years	0.016 ppm	2013
Chromium		0 ppb	2013
Fluoride		0 ppm	2013
Selenium		0 ppb	2013
Beryllium		0 ppb	2013
Arsenic		0 ppb	2017
Radiation			
Alpha Emitters	1 sample every 9 years	0 PCI/L	2017
Radium 226		0.12 PCI/L	2017
Radium 228		0.18 PCI/L	2017

The WSTs are cleaned on an as-needed basis. Other regularly scheduled maintenance procedures are performed according to operations and maintenance (O&M) manuals and the Borough annual maintenance program.

Detailed water production records are kept by DPW Staff. These are also complied through the Alaska Water Use Data System, managed by the Alaska Hydrologic Survey with ADNR. Monthly data sheets are forwarded to ADNR for inclusion in the statewide data network. Water use data is available dating back to at least 1990. ADNR also bills the Haines Borough for the amount of water used each year.

The Borough keeps an inventory of critical replacement pumps, valves, and equipment available for the water supply facilities in the event of equipment failure. Replacement equipment is also

Table 4.13: Haines PWS Water Quality: Piedad Springs

Parameter	Testing Frequency	Recent Result	
		Value	Date
Bacteriological			
LT2 E. Coli	1 sample every 2 weeks	colonies / 100 ml sample	
Nitrates			
Nitrate - Nitrite	1 sample annually	0 ppm	6/13/22
Organic Compounds			
SOC	1 sample quarterly	Not Required	2020 - 2022 Waiver
VOC	1 sample annually	0 ppm	6/13/22
Inorganics			
Barium	1 sample every 9 years	0.016 ppm	2013
Chromium		0 ppb	2013
Fluoride		0 ppm	2013
Selenium		0 ppb	2013
Beryllium		0 ppb	2013
Arsenic		0 ppb	2017
Radiation			
Alpha Emitters	1 sample every 9 years	0 PCI/L	2017
Radium 226		0.048 PCI/L	2017
Radium 228		0 PCI/L	2017

stocked for PRVs. (*Cityworks*, an asset management software program being implemented into Haines Borough activities, includes inventories for extra equipment and parts.)

With the assistance of various contractors, the Borough developed a GIS-based inventory of PWS, SSS and Storm Water Sewer System appurtenances. Data entry work for the parcel viewers began over two decades ago. The system is used to keep track of installation dates, equipment manufacturers, construction materials, maintenance dates and other information. This information allows the Borough to perform routine repairs and maintenance more easily as well as provide engineers with detailed information about the existing water system to accommodate design and construction of updates or expansions. Limited utility information is available to the public at: Haines Borough Parcel Viewer | Haines Alaska

Table 4.14: Haines PWS Water Quality: Crystal Cathedral Well Field

Parameter	Testing Frequency	Recent Result	
		Value	Date
Volatile Organic Compounds			
SOC	1 sample quarterly	Not Required	2020 - 2022 Waiver
VOC	1 sample every 3 years	0 ppm	6/13/22
Inorganics			
Barium	1 sample every 9 years	0.04 ppm	2013
Chromium		1.24 ppb	2013
Fluoride		0.17 ppm	2013
Selenium		0.90 ppb	2013
Beryllium		0.27 ppb	2009
Arsenic		0 ppb	2017
Radiation			
Alpha Emitters	1 sample every 9 years	2.0 PCI/L	2017
Radium 226		0.11 PCI/L	2017
Radium 228		0.69 PCI/L	2017

4.16 DEACTIVATED SYSTEMS

Historical water systems, including the Fort Seward, Piedad Springs, Downtown Haines systems, were incorporated into the current Haines Townsite Public Water System by the 1970s. The Crystal Cathedral Water System was purchased by the Haines Borough in 2012 and integrated into the Townsite system in 2016.

4.17 PRIVATE WELLS / WATER HAUL

Haines homes and businesses not served by the Townsite PWS typically maintain their own wells, use roof catchment or haul potable water from town to a holding tank. About 22 customers have bulk water accounts with the Haines Borough, mostly those outside of the Townsite. Bulk water haulers account for approximately 100,000 GPY. Some areas outside of the Townsite are unsuitable for residential and commercial water wells. Problems with wells include: shallow groundwater, low yields, contamination concerns and saltwater intrusion. Wells frequently have poor water quality, typically with high levels of iron, manganese and arsenic.

4.18 CRUISE SHIP WATER USAGE

In the last few decades, some cruise ships purchased potable water from the Haines Borough. This resulted in higher summer water usage for the Townsite system. In 2010, water sales to cruise ships totaled over 3 MGY and generated $12,260 in revenue for the Borough.

In 2022, cruise ships purchased limited water even though the community experienced the highest number of ship visits ever due to rerouting with Skagway dock issues. Only 600,000 GPY of potable water were purchased by cruise ships in 2022. How full of passengers these arriving, post-pandemic cruise ships were may have some bearing on this water volume.

Cruise ships typically have flash evaporation and reverse osmosis systems for making potable water. These systems require seawater free of silt and other contaminants. Cruise ships spend significant time in Southeast Alaska ports and may not have enough stored potable water for their needs.

HAINES
ALASKA

2023 CRUISE SHIP CALENDAR

CAPACITY AND CALLS DATA

Ship	Brand	Length (ft)	Passenger Capacity	Crew Capacity	# of Calls	Total Passengers
American Constellation	American Cruise Lines	267	175	25	15	2,625
Carnival Luminosa	Carnival Cruise Lines	965	2,260	1,050	1	2,260
Queen Elizabeth	Cuanrd Lines	965	2,081	980	2	4,162
Roald Amundsen	Hurtigruten Cruies Lines	459	530	150	4	2,120
Sea Bird	Lindblad Expeditions	164	62	24	12	744
Sea Lion	Lindblad Expeditions	164	62	24	12	744
Norwegian Sun	Norwegian Cruise Lines	848	1,976	906	3	5,928
Regatta	Oceania Cruises	594	684	386	1	684
Crown Princess	Princess Cruise Lines	951	3,090	1,201	1	3,090
Ruby Princess	Princess Cruise Lines	951	3,080	1,200	2	6,160
Brilliance of the Seas	Royal Caribbean	958	2,543	848	11	27,973
Radiance of the Seas	Royal Caribbean	962	2,466	894	5	12,330
Seabourn Odyssey	Seabourn Cruies Lines	650	458	335	8	3,664
Silver Whisper	Silversea Cruises	610	392	302	8	3,136
Wilderness Explorer	UnCruise Adventures	164	62	24	8	496
Viking Orion	Viking Cruises	745	930	465	5	4,650
Star Breeze	Windstar Cruises	439	208	150	5	1,040

2023 Totals	
Calls	103
Passengers	81,806
Crew	33,427

Last Updated:6/13/2023

Source: Cruise Ship Schedule (visithaines.com)

4.19 OTHER SYSTEMS

There is one other public water systems in the Haines Townsite area at the Haines Ferry Terminal at Mile 3 Lutak Road.

There are five other public water system on the Haines Borough road system. These include:

- Chilkat Indian Village (Klukwan)
- Chilkat River Adventures (Mile 25 Haines Highway)
- 33 Mile Road House (Haines Highway)
- Dalton Cache Border Station (Mile 41 Haines Highway)
- Echo Ranch Bible Camp – Haines (Mile 6 Mud Bay Road)

Other public water systems in the Haines Borough only accessible by boat or plane include:

- OBI (Excursion Inlet)
- Doc Warner's Alaska Adventures (Excursion Inlet)

5.0 CAPACITY EVALUATION

The projections for future water needs developed in this section are based upon information discussed earlier. ***Table 5.1: Haines PWS Capacity*** summarizes the numbers used for determining the future Townsite water needs. ***Chart 5.1*** shows past water use trends and projects community demand for the next two decades.

Figures used to determine demand and production in this capacity analysis include:

- **Townsite Population for the PWS**: **1,850** (see ***Section 3.1***)
- **Townsite Annual Growth Rate: 2 percent population** (see ***Section 3.2***)
- **Individual Resident Water Usage: 163 gallons Per Capita-Day** (see ***Section 4.3***)
- **Annual WTPs Volume – 2022: 110.1 MG** (see ***Section 4.2*** and ***Section 4.3***)
- **Maximum WTPs Annual Production – 2022: 173.6 MG** (see ***Section 4.4***)

Section 5.2 through ***Section 5.6*** discuss the **STATUS** and **NEEDS** of the overall PWS and its four separate components.

5.1 PROJECTED WATER USAGE

Currently, the maximum annual production of the WTPs is 173.6 MG. If all the proposed water main extensions listed in ***Section 6.0: Water System Project Development*** are built, there will be approximately 150 additional lots adjacent to the new water lines that would have the option to connect to the Haines PWS. Some of these lots have dwelling units that may have existing wells or roof catchment systems, or the occupants may haul water. These residents and the owners of the vacant lots may or may not be interested in connecting to the Townsite PWS.

To estimate future demand, two scenarios are shown in ***Table 5.1.*** The first uses an additional 150 residents connecting to this PWS in the next decade as new water main improvements are constructed by 2032. The second uses an additional 300 residents tapping into the new water mains by 2042. See the **green rows** in ***Table 5.1*** for the required capacity for these two scenarios.

Assuming 2.5 residents per dwelling unit and 163 GPCD water use, these increases would add an additional 8.9 MG for 2032 and another 17.8 MG by 2042 to the annual demand to the Haines PWS. (This is in addition to the projected 2 percent growth rate in the area currently served by the Townsite.)

As shown in ***Table 5.1*** and summarized in ***Table 5.2***, the projected water demand in 2042 surpasses the 2022 maximum annual production. This potential outcome means that additional sources or increased production from the three current WTPs will be needed to supply future demand.

Table 5.1: Haines PWS Capacity, 2022 – 2042

Parameter		2022	2032	2042
Townsite Population Projection with 2% Growth		1,850	2,255	2,755
2022 USAGE INTO THE FUTURE	Annual Water Demand	110.1 MG	134.2 MG	163.9 MG
	Maximum Annual Production	173.6 MG	unknown	unknown
2022 USAGE INTO THE FUTURE WITH MAIN EXTENSIONS	Additional Population with 150 More Residents per Decade	NA	2,405	NA
	Additional Population with 300 More Residents per Decade	NA	NA	3,055
	Projected Water Demand	NA	143.1 MG	181.8 MG
	Maximum Annual Production	173.6 MG	unknown	unknown

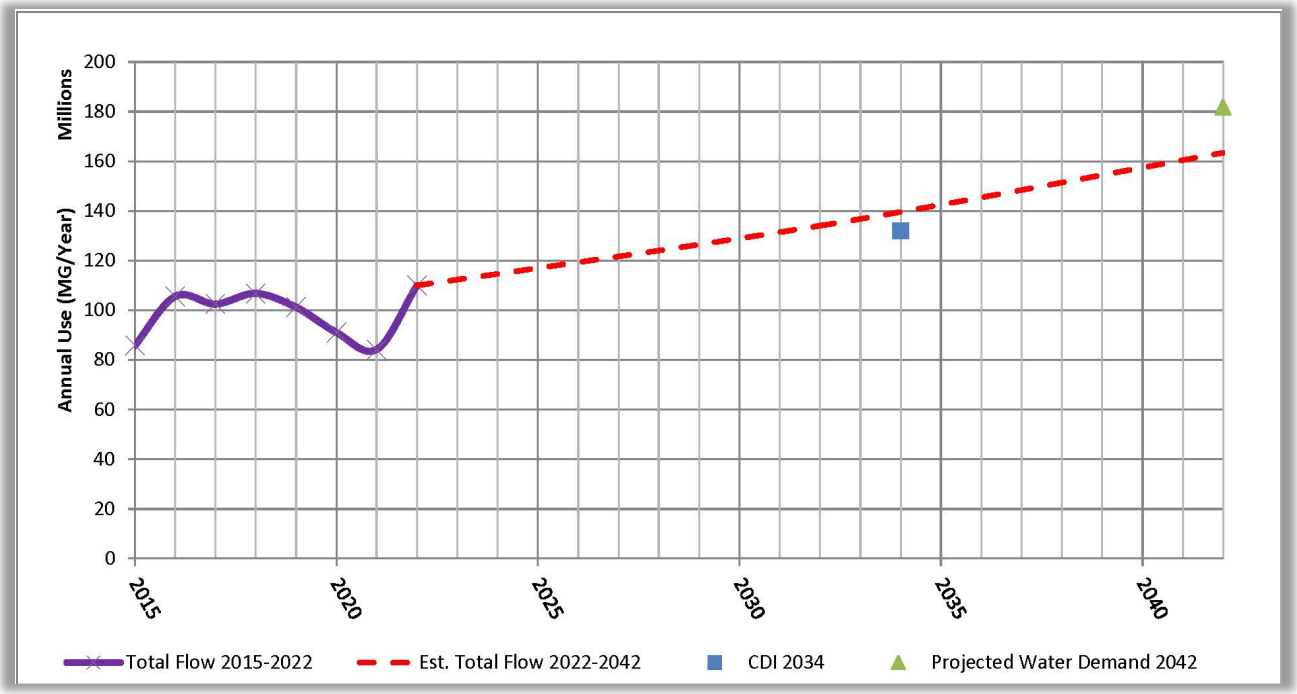
TABLE KEY

- displays two percent population growth
- shows no new water mains added to the current PWS
- displays scenario of 150 new residents per decade on new water mains plus the two percent population growth

Table 5.2: Haines PWS Projected Shortage, 2022 – 2042

Parameter	2022	2042
Maximum Annual Production	173.6 MG	
Projected Water Demand		181.8 MG
Difference: -8.2 MG		

Chart 5.1: Haines PWS Consumption & Projections by Year, 2015 – 2042



5.2 ADEQUACY OF OVERALL WATER SYSTEM

STATUS

- The Haines Borough PWS presently has adequate water supply with some extra capacity.
- Recognized standards for water utility improvements need to be followed by building contractors to ensure the anticipated lifecycle for construction projects.
- Aging utility infrastructure needs planned refurbishing or replacement as assets reach the end of functional lifecycles.
- Limited SCADA monitoring currently exists for the WTPs and the Water Distribution System. Only Lily Lake WTP, FAA Road CC/WST and Piedad WTP have *Sensaphone* monitoring.
- A preliminary *Water System Hydraulic Analysis* for the Haines Borough was completed by URS forty years ago in 1983 when the water system was substantially smaller. An update of a more complex system is warranted.
- Water usage in the Townsite appears to be within the range of GPCD usage for municipalities throughout the US, albeit on the high end for other Southeast Alaska.
- The two primary water sources are remote and require access via steep trails. One access road requires a tracked vehicle. The other features a locked gate with access controlled by DPW Staff. Hikers have unfettered access to both sources. Some drinking water source protection signs are posted.
- Warmer temperatures and increased annual precipitation associated with climate change may impact surface water quality and quantity with potential impacts for Lily Lake and Piedad Springs, the main Haines PWS sources. During the summer months when Lily Lake water temperature can reach over 55 degrees Fahrenheit, green algae grows and impacts water quality odor and taste.
- Complexity of water system continues to increase with additional regulations requiring more testing and staff time.

NEEDS

- Codify recognized standards for Borough water utility improvements.
- Implement an Asset Management System for the PWS assets. Maintenance procedures for assets, such as WST cleanings and annual maintenance of backflow prevention devices, need to be documented (photos taken inside WSTs), recorded and tracked in the Asset Management System.
- Incorporate climate change risk assessment information results, using a tool such as the EPA *Climate Resilience Evaluation and Awareness Tool for Water Utilities* (*CREAT*), into best management practices and capital investment decisions.
- Expand the SCADA system to cover more PWS components and to provide information in addition to monitoring alarms.
- Update the PWS hydraulic modeling with the implementation of a Hydraulic Modeling Program, such as EPANET software or other programs.
- Develop a PWS security plan consistent with EPA and DHS guidelines. (Review *2014 Haines Borough PWS Vulnerability Assessment & Gap Analysis*.)
- Perform an acoustical survey of suspected areas of the water system to identify and correct undetected leaks.

- Additional staff is needed to adequately and safely run the Haines PWS as there is only one Operator with the required credentials. When this individual leaves town, there is no backup.

5.3 ADEQUACY OF SOURCES

STATUS

- Portion of Lily Lake watershed and access road are located on non-Borough property.
- Low winter snowfall and summer drought conditions can impact the water level of Lily Lake and the LLWTP production rate as demonstrated in August 2019.
- More recreationists at Lily Lake may decrease the quality of the water source.
- Crystal Cathedral Wells supply water as a backup source. Only the East Well currently functions. Current pumps have 400 GPM capacity. Further treatment of this source could improve consumer satisfaction.
- Water rights for Lily Lake do not concur with current usage.
- Three current sources produce 900 GPM maximum. The two preferred sources produce a maximum of 500 GPM during summer months. Future improvements to the Well Field source and/ or additional sources may be needed to satisfy increased water consumption within the growing Townsite.
- Piedad WTP captures and treats only 120 GPM or about 172,000 GPD. Excess water is being wasted at the WTP or blows off in the collection system.

NEEDS

- Obtain ownership of watershed areas or else develop a Memorandum of Agreement (MOA) with the State of Alaska and any other property owners.
- Replace well pump and control panel for West Well source.
- Implement a public education program stressing the importance of uncontaminated watersheds for the three water sources.
- Secure adequate water rights for Lily Lake: 58,000 GPD is lower than current usage.
- Increase treatment capacity of the Piedad WTP and add a WST for fire flows and fuller utilization of this source.
- Investigate other potential water resources including additional springs on Mount Ripinski and a private artesian well near the Crystal Cathedral Well Field.
- Investigate additional treatment options for the Well Field water source to improve consumer satisfaction.

5.4 ADEQUACY OF WATER TREATMENT PLANTS

STATUS

- Lily Lake WTP, a 50-year old facility, needs upgrades and modernization to maintain water quality and capacity. Current Lily Lake WTP maximum capacity is 350 GPM for summer and 120 GPM for winter months. The design capacity of this plant is theoretically at 400 GPM or over 500,000 GPD, yet sustainable summer yield is lower, with 462,000 GPD with the 350 GPM rate. The maximum capacity at the Lily Lake WTP is restricted when water temperatures are 40 degrees F due to issues with flocculation. In the summer months, low winter snowfall and summer drought conditions can impact the typical 350 GPM production.
- The Lily Lake WTP backwash pond is unsecured and potentially a safety hazard due to the muddy water.
- Piedad WTP lacks capacity to treat all of the water being captured. To maintain adequate pressure at the Piedad WTP, a PSV and on-site backup generator are needed.
- Well Field WTP has a 3,154-G, hydropneumatic pressure tank that is oversized and the interior condition is unknown.

NEEDS

- Modernize Lily Lake WTP with piping and valve replacements, and SCADA improvements.
- Plan upgrades for the Lily Lake WTP to increase the plant production capacity as wintertime demand surpasses the production capacity of this WTP. Regularly monitor the level at Lily Lake during the summer months.
- Fence the Lily Lake WTP backwash pond to keep out animals and people, especially children.
- Build a new Piedad WST, sized with a hydraulic network analysis of the PWS. Upgrade piping and vault for Piedad PSV. Obtain and install a backup generator enclosed in a building.
- Build a separate chlorine storage room to maintain the integrity of the equipment in the Piedad WTP.
- Replace the hydropneumatic tank at the Well Field WTP with a properly sized one. After inspection, the current 3,154-G, hydropneumatic tank could be re-purposed, perhaps as an additional flocculation tank at the LLWTP.

5.5 ADEQUACY OF WATER STORAGE TANKS

STATUS

- Total nominal storage in five WSTs is 1.418 MG.
- Wood-staved Tower Road Water Storage Tank has a finite lifecycle. It was installed 36 years ago and has some leakage.
- Backup power for two Pump Stations is lacking.
- New generation *PAX* Mixers to prevent freezing installed in Young Road and Tower Road WSTs.
- The Tower Road WST maximum fill is 19 feet. This tank is currently filled to 17 feet to prevent over topping of Barnett Drive WST.

NEEDS

- For fuller utilization of this source, increase treatment capacity of the Piedad WTP to provide additional flow for firefighting and peak-demand days during summer months.
- Plan for the replacement of Tower Road WST with a steel tank, sized with a hydraulic network analysis of this PWS.
- Secure a mobile generator for as-needed usage as backup power for the Barnett Drive and Young Road WST Pump Stations.
- Install additional PAX Mixer in Barnett Drive WST.
- Consider installing an altitude valve on Barnett Drive WST so additional two feet of storage in Tower Road WST can be used. This would add approximately 32,000 gallons of capacity.

Figure 5.1: Skyline Drive WST, *2022 Sanitary Survey*

5.6 ADEQUACY OF THE DISTRIBUTION SYSTEM

STATUS

- Several established residential areas in the Townsite lack water service.
- Young Road Pump Station lacks VFD pumps, and current piping hampers the cleaning of the Skyline Tank that this Pump Station feeds. No SCADA connections exist.
- South Sawmill Road PSV vault has leaks and tends to fill with water, making access and maintenance difficult.
- Beach Road PRV was replaced by Battle Road PRV and is no longer functional.
- Some AC pipe remains in the Townsite PWS: 199 feet at the ADOT&PF yard between Main Street and Union Street, and 212 feet on First Street.
- Carson and Dorn's *2004* and *2014 Water and Sewer Master Plans* suggest water and sewer expansion into Small Tracts Road and Mud Bay Road.
- Pressure reducing and pressure sustaining valves require annual inspections. No one in the Borough is currently certified to provide these inspections, and scheduling a certified inspector is difficult and expensive.
- The Barnett Drive Pump Station and the Young Road Pump Station lack security. Alaska Power and Telephone (AP&T) requires shut-offs to be outside and accessible to anyone to turn off the power. This is an unacceptable condition for the US Department of Homeland Security.
- The Haines Borough Volunteer Fire Department currently has a 4,500-gallon tanker truck used for response. The responders anticipate 300 GPM from available fire hydrants to augment the tanker supply. Knowing what pressure system each hydrant is fed by, may help increase fire flows during major responses. There is some historical flow and pressure data.

NEEDS

- Extend water mains into multiple residential areas, adding about 150 lots into the PWS.
- Upgrade Young Road Pump Station with piping improvements and VFD pumps.
- Upgrade the south Sawmill PSV vault to an above-ground heated building and upgrade valves.
- Remove Beach Road PRV.
- Consider installing individual residential water meters, ones that can detect leaks between the curb stop and the customer's home, such as the *Kamstrup flowIQ® 2200*.
- Replace remaining AC pipe.
- Review extension of PWS to Small Tracts Road and Mud Bay Road with hydraulic modeling.
- Train and certify a DPW Staff member to conduct the required annual inspections for pressure reducing and pressure sustaining valves.
- Fence the Barnett Drive and Young Road Pump Stations to provide adequate security.
- Code fire hydrants to indicate what pressure zone each is supplied by.
- Flow test each fire hydrant at least every five years and record results in HB W&S GIS.

6.0 WATER SYSTEM PROJECT DEVELOPMENT

This section provides a discussion of the priority improvements selected for the Haines PWS and is the basis for proposed Capital Improvement Projects (CIPs). The prioritized sanitation improvements are listed below by priority, with ***W1*** ranked highest and ***W14*** lowest. A description and cost estimate for each improvement follows. The estimated cost for these 14 items runs $24,566,205.

Table 6.1: Haines PWS Cost Estimates for Proposed Improvements, 2023 – 2032

Improvement		Design & Construction Costs
W1	BOROUGH CODE UPDATE	19,630
W2	ASSET MANAGEMENT SYSTEM IMPLEMENTATION & LIFECYCLE PLANNING	26,000
W3	LILY LAKE WTP IMPROVEMENTS	2,077,500
W4	PIEDAD WTP IMPROVEMENTS	1,253,400
W5	AUXILARY POWER FOR WATER SYSTEM	412,500
W6	SKYLINE WATER TANK IMPROVEMENTS	52,500
W7	SCADA MONITORING: WTPs & DISTRIBUTION SYSTEM	75,000
W8	HYDRAULIC MODELING & AUDITING PROGRAM	74,750
W9	CRYSTAL CATHEDRAL SOURCE IMPROVEMENTS	45,000
W10	TOWNSITE WATER MAIN EXTENSTIONS – GROUP A	2,362,500
W11	TOWNSITE WATER MAIN EXTENSTIONS – GROUP B	15,390,000
W12	TOWNSITE WATER MAIN EXTENSTIONS – GROUP C	2,295,000
W13	ASBESTOS CEMENT PIPE REPLACEMENT	277,425
W14	LILY LAKE WTP FLOC TANK ADDITION	195,000
	TOTAL:	24,566,205

W1 BOROUGH CODE UPDATE

ESTIMATED COST

$19,630

PROJECT DESCRIPTION

Update sections of the Haines Borough Code relevant to the Townsite Public Water System including: *Title 13 Utilities, Chapter 13.04 Water System*

This will include references to ADEC and USEPA regulations and accepted design standards, such as *Ten States Standards*, *American Water Works Association Standards*, *National Sanitation Foundation Guidelines*, *Uniform Building Code*, *Uniform Plumbing Code* and other relevant standards. This update will ensure that new waterworks will be compliant with required regulations and codes, preserve public health and relieve the Borough of the necessity to repair substandard work. Revisions also will address water conservation by encouraging usage of low-flow toilets and shower nozzles for new construction with financial incentives.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Lawyer	10	hour	$400	$4,000
Engineer	60	hour	$175	$10,500
HB Planner	10	hour	$60	$600
Estimated Cost				$15,100
Administration (5%), Contingency (25%)				$4,530
				$19,630

W2 ASSET MANAGEMENT SYSTEM IMPLEMENTATION

ESTIMATED COST

$26,000

PROJECT DESCRIPTION

Include the community water system infrastructure into the Borough Asset Management System, *Cityworks*. Establish lifecycle and replacement planning for key facilities.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Software	1	lump sum	$10,000	$10,000
Data Input	100	hour	$100	$10,000
Estimated Cost				$20,000
Administration (5%), Contingency (25%)				$6,000
				$26,000

W3 LILY LAKE WTP IMPROVEMENTS

ESTIMATED COST

$2,077,500

PROJECT DESCRIPTION

Replace all piping and valves at Lily Lake WTP (in design phase):

- SCADA added into design
- Replace 24-inch line from LLWTP to FAA Tank (24-inch versus 12-inch re: chlorine contact issues)
- Add pump for backwash upgrades due to cold water, flocculation issues

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Replace Piping	1	lump sum		$1,200,000
SCADA Addition	1	lump sum		$5,000
24"Ø Pipe	400	LF	$450	$180,000
Estimated Construction Cost				$1,385,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$692,500
				$2,077,500

W4 PIEDAD WTP IMPROVEMENTS

ESTIMATED COST

$1,253,400

PROJECT DESCRIPTION

Upgrade the Piedad Pressure Sustaining Valve to 4-inch diameter in South Sawmill Vault, construct a small utility building over vault, and move PSV above grade to allow better access and eliminate confined space in vault that is often full of water.

Build WST near Piedad WTP to increase chlorine contact time, fire suppression and water supply volume.

Add Chlorine Room to isolate chlorine from other WTP equipment.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Chlorine Room Addition	64	square foot	$400	$25,600
SCADA Addition	1	lump sum		$5,000
PSV Building	100	square foot	$400	$40,000
PSV Plumbing	1	lump sum	$10,000	$10,000
SCADA Addition	1	lump sum		$5,000
PD Water Storage Tank	150,000	gallon	$5	$750,000
Estimated Construction Cost				$835,600
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$417,800
				$1,253,400

W5 AUXILARY POWER FOR WATER SYSTEM

ESTIMATED COST

$412,500

PROJECT DESCRIPTION

Install Stationary Generators for Piedad WTP and Well Field WTP.

Purchase Mobile Unit for Barnett Drive Pump Station, Young Road Pump Station, and others. (Barnett Drive Pump Station serves the Young Road WST. The Young Road Pump Station serves the Skyline Drive WST.)

RESPEC estimate for preliminary design and design and bid documents (1/18/2023)

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Portable Standby Generator	1	Each	$87,000	$87,000
Skyline Drive WST Modifications	1	Each	$26,000	$26,000
Young Road WST Modifications	1	Each	$26,000	$26,000
Piedad WTP Generator	1	Each	$50,000	$50,000
Well Field Generator	1	Each	$86,000	$86,000
Estimated Construction Cost				$275,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$137,500
				$412,500

W6 SKYLINE WATER TANK IMPROVEMENTS

ESTIMATED COST

$52,500

PROJECT DESCRIPTION

Replace pump and upgrade piping in Young Road Water Pump Station. Add VFD pumps to allow Skyline Drive WST cleaning.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Booster Pumps	2	lump sum	$5,000	$10,000
VFD Panels	2	lump sum	$5,000	$10,000
SCADA Addition	1	lump sum		$5,000
Plumbing	1	lump sum	$10,000	$10,000
Estimated Construction Cost				$35,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$17,500
				$52,500

W7 SCADA MONITORING: WTPs & DISTRIBUTION SYSTEM

ESTIMATED COST

$75,000

PROJECT DESCRIPTION

Increase SCADA monitoring of WTPs and Water Distribution System.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
SCADA System	1	lump sum	$50,000	$50,000
Estimated Construction Cost				$50,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$25,000
				$75,000

W8 HYDRAULIC MODELING & AUDITING PROGRAM

ESTIMATED COST

$74,750

PROJECT DESCRIPTION

Conduct water distribution hydraulic modeling to:

- Simulate the water distribution system
- Calculate flows and pressures in pipe network under various scenarios and fire flow conditions
- Aid in sizing various pumps, pipes, pressure zones and water storage tanks

Examine UAF SNAP community climate charts and EPA *CREAT* program to look at possible impacts of climate change on future flow volumes.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Model Program	1	lump sum	$5,000	$5,000
Engineer	250	hour	$175	$43,750
GIS Specialist	50	hour	$175	$8,750
Estimated Cost				$57,500
Administration (5%), Contingency (25%)				$17,250
				$74,750

W9 CRYSTAL CATHEDRAL SOURCE IMPROVEMENTS

ESTIMATED COST

$45,000

PROJECT DESCRIPTION

Add second well pump, VFD and control panel at Well Field.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Booster Pumps	1	lump sum	$10,000	$10,000
VFD Panels	1	lump sum	$5,000	$5,000
SCADA Addition	1	lump sum		$5,000
Plumbing	1	lump sum	$10,000	$10,000
Estimated Construction Cost				$30,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$15,000
				$45,000

W10 TOWNSITE WATER MAIN EXTENSTIONS – GROUP A

ESTIMATED COST

$2,362,500

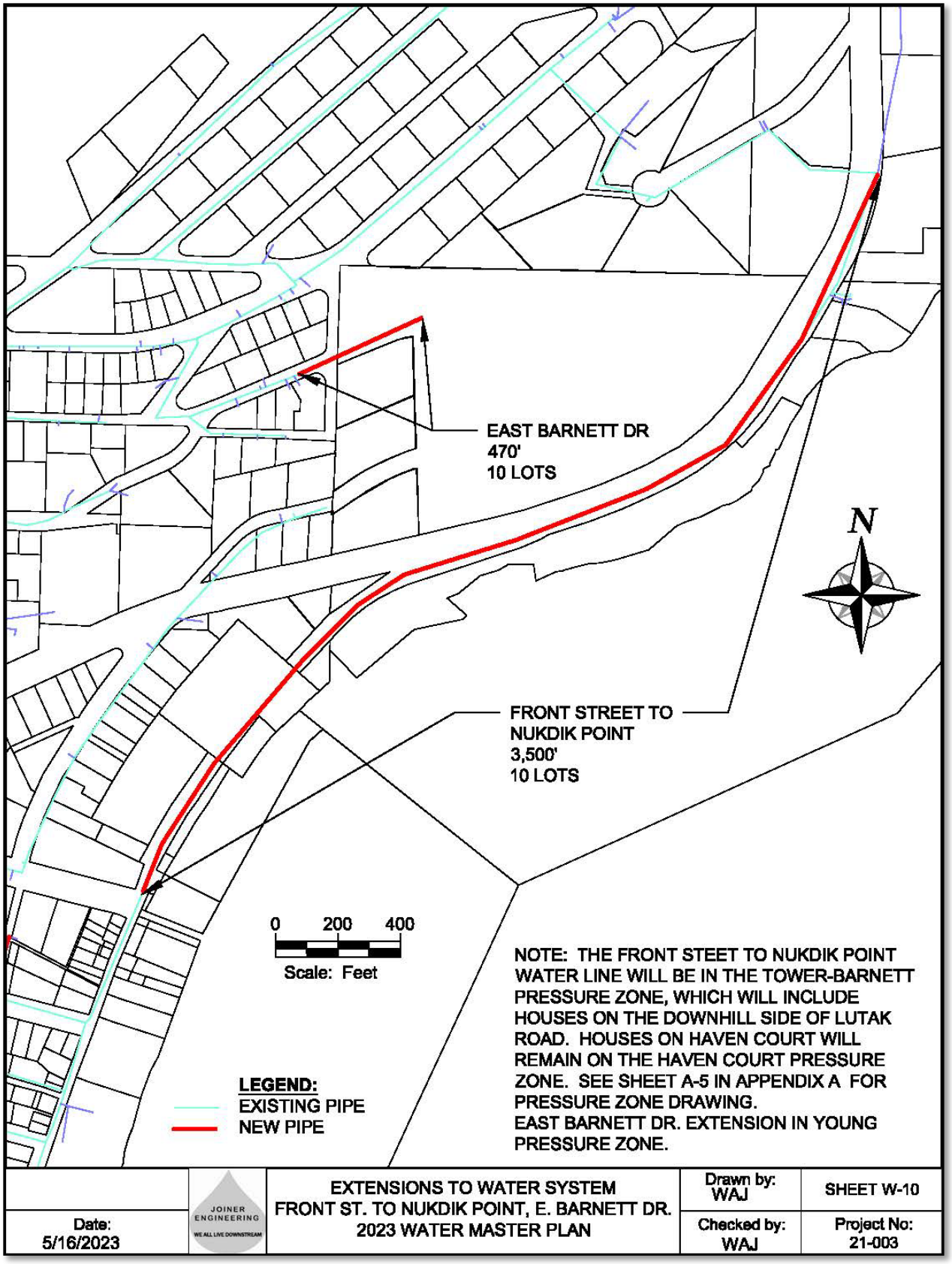
PROJECT DESCRIPTION

Extend water main from Front Street to Nukdik Point.

Remove Beach Road PRV and connect Tower Road to Beach Road Main (in design phase). (East Barnett Drive waterline extension to be developed by a private developer.)

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost	Lots Added
Front St - Nukdik Point	3500	LF	$450	$1,575,000	10
Estimated Construction Cost				$1,575,000	**10**
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$787,500	
				$2,362,500	


EAST BARNETT DR
470'
10 LOTS
FRONT STREET TO
NUKDIK POINT
3,500'
10 LOTS
N
0 200 400
Scale: Feet
LEGEND:
EXISTING PIPE
NEW PIPE
NOTE: THE FRONT STEET TO NUKDIK POINT WATER LINE WILL BE IN THE TOWER-BARNETT PRESSURE ZONE, WHICH WILL INCLUDE HOUSES ON THE DOWNHILL SIDE OF LUTAK ROAD. HOUSES ON HAVEN COURT WILL REMAIN ON THE HAVEN COURT PRESSURE ZONE. SEE SHEET A-5 IN APPENDIX A FOR PRESSURE ZONE DRAWING.
EAST BARNETT DR. EXTENSION IN YOUNG PRESSURE ZONE.
Date: 5/16/2023
JOINER ENGINEERING
WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
FRONT ST. TO NUKDIK POINT, E. BARNETT DR.
2023 WATER MASTER PLAN
Drawn by: WAJ
Checked by: WAJ
SHEET W-10
Project No: 21-003

W11 TOWNSITE WATER MAIN EXTENSTIONS – GROUP B

ESTIMATED COST

$15,390,000

PROJECT DESCRIPTION

Extend Bear Trails Lane 8-inch water main to Small Tracts Spur (STS) and to existing water main in Small Tracts Road (STR). Extent loop from Small Tracks Spur / Small Tracts Road intersection south to Mud Bay Road intersection and north to the existing water main in Mud Bay Road (MBR) on Cemetery Hill.

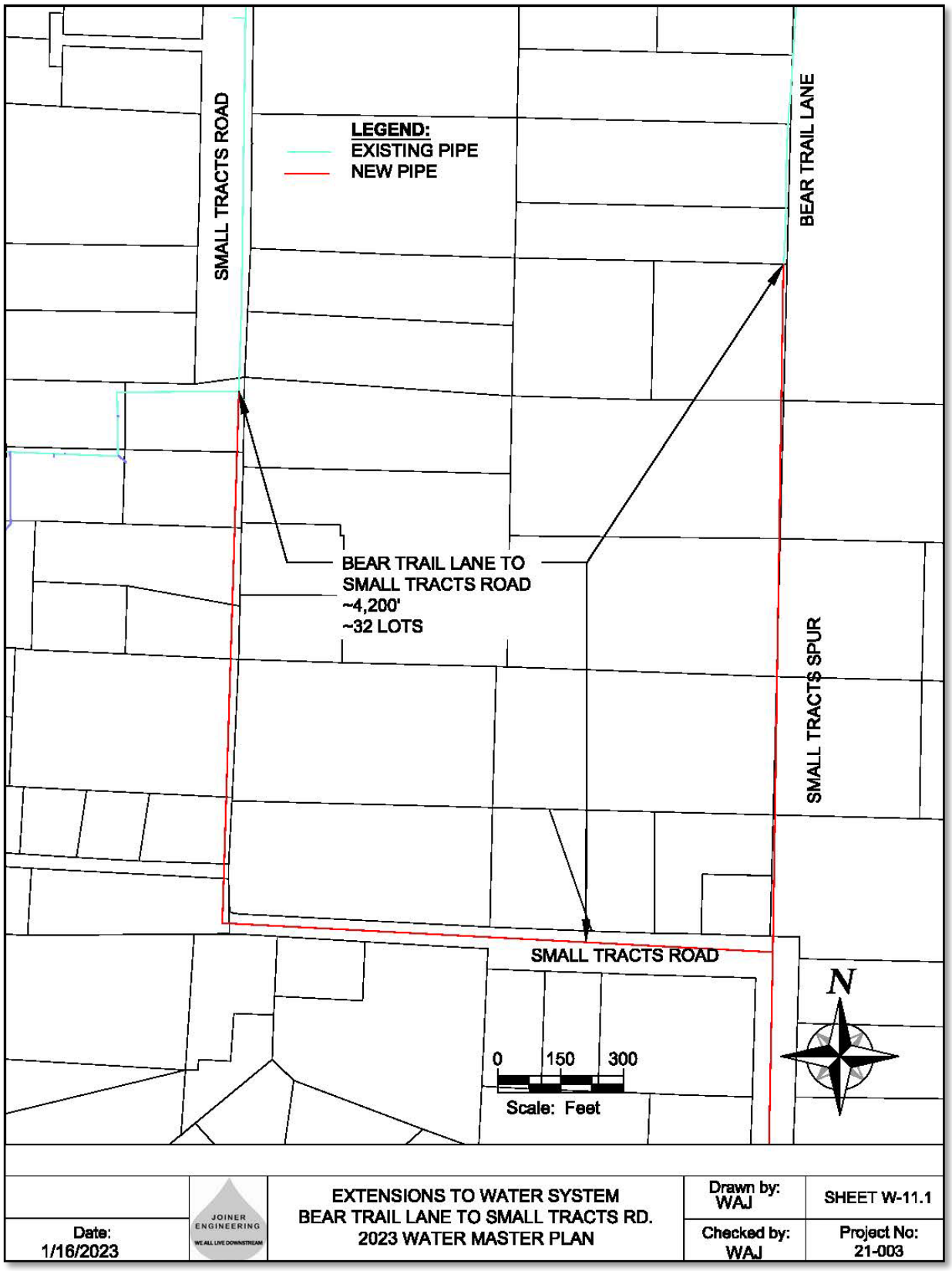
Connect water main from FAA Road down right-of-way to Newhart and Matrix Drive (creates a loop and adds volume for fire protection).

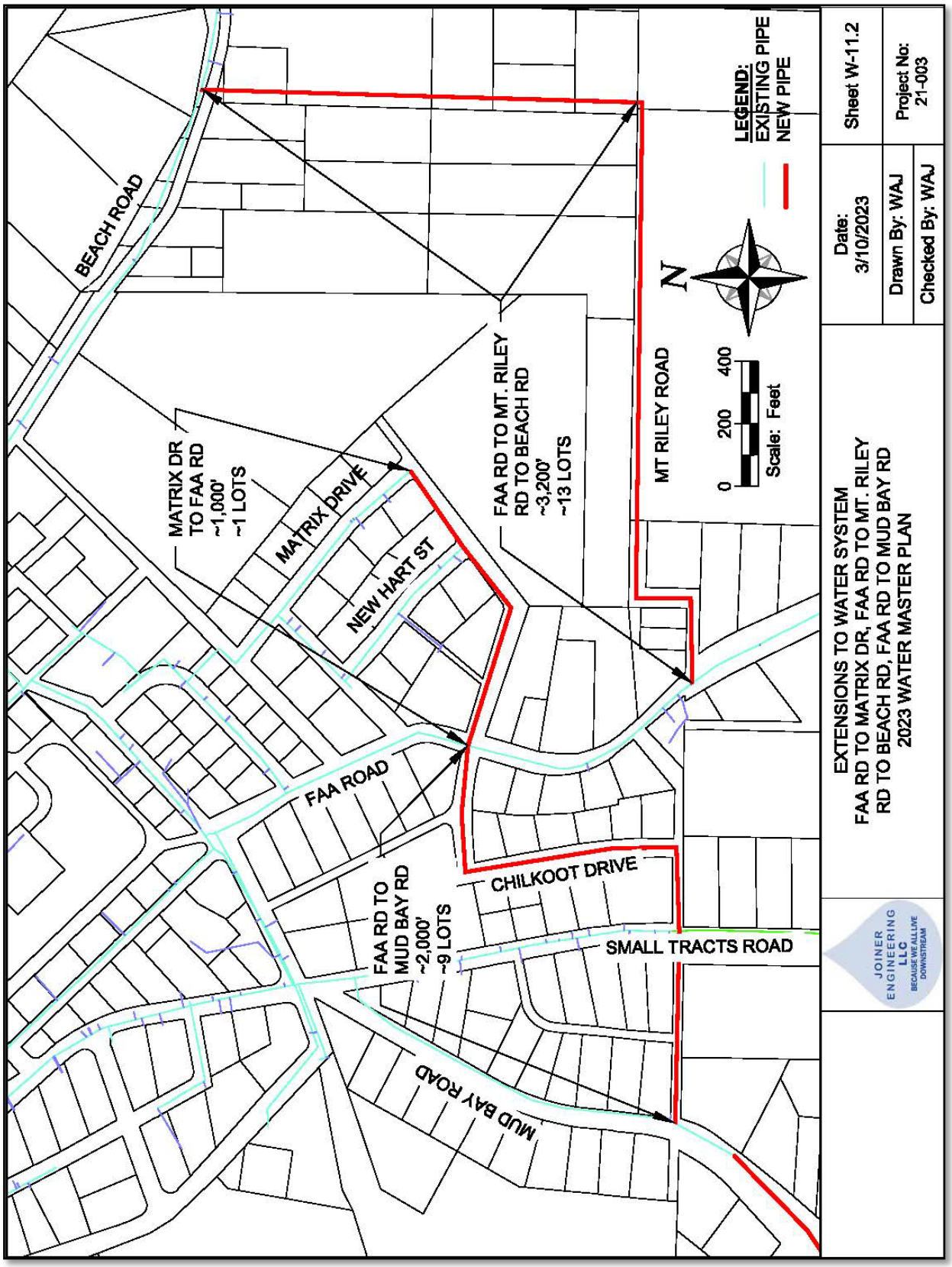
Extend water main from FAA Road down to Myra Lane, down Chilkoot Drive, down right-of-way to Small Tracts, to right-of-way on Mud Bay Road (creates a loop and adds volume for fire protection).

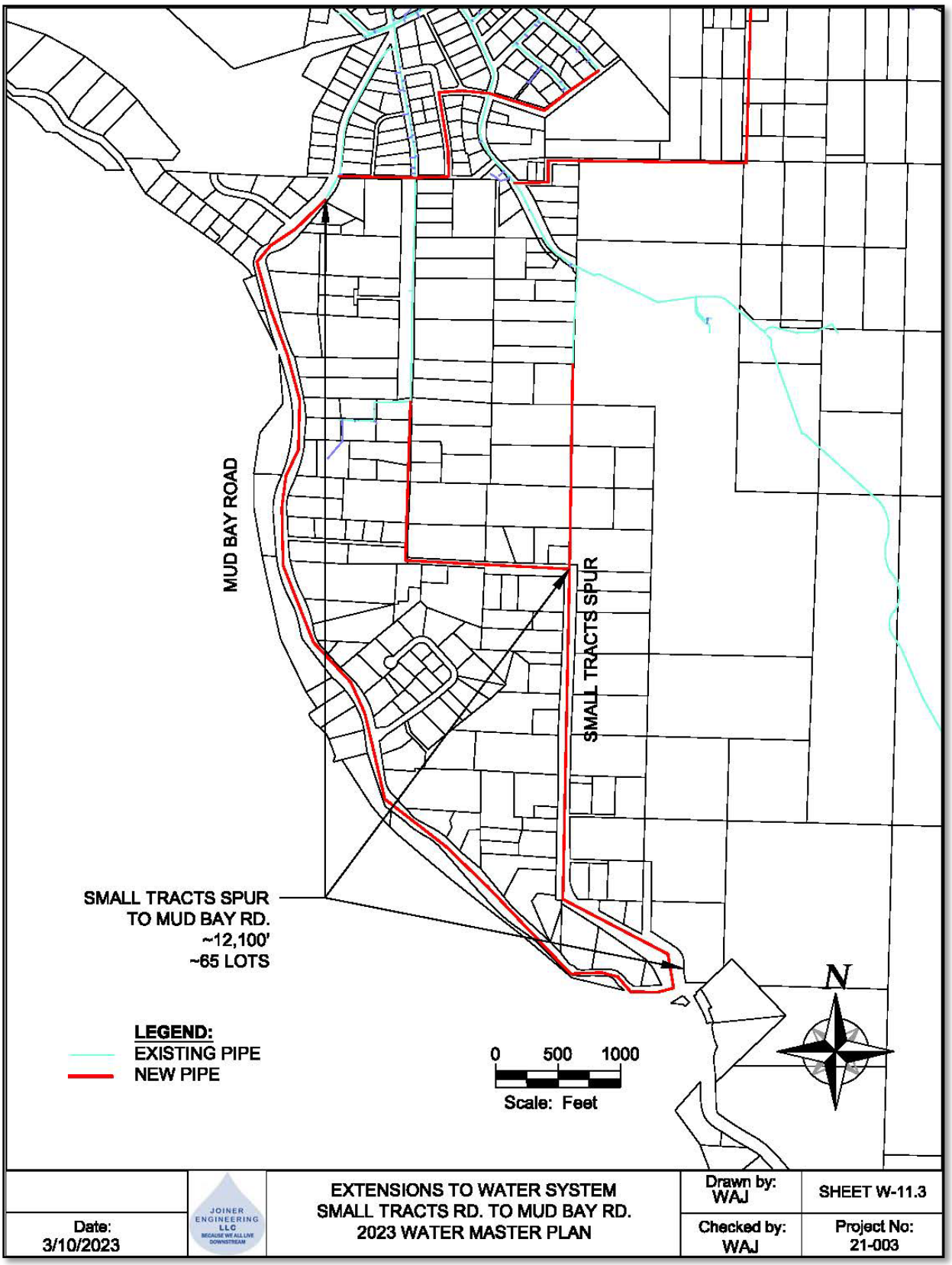
Extend water main to Mount Riley Road (MRR) and down section line easement to Kathleen Drive and Beach Road (BR).

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost	Lots Added
Bear Trail Lane-STRS	4,200	LF	$450	$1,890,000	32
FAA-Matrix	1,000	LF	$450	$450,000	1
FAA-Chilkoot-STR-MBR	2,000	LF	$450	$900,000	9
FAA-MRR-BR	3,500	LF	$450	$1,575,000	13
STRS-MBR	12,100	LF	$450	$5,445,000	65
Estimated Construction Cost				$10,260,000	**120**
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$5,130,000	
				$15,390,000	


SMALL TRACTS ROAD
LEGEND:
EXISTING PIPE
NEW PIPE
BEAR TRAIL LANE
BEAR TRAIL LANE TO
SMALL TRACTS ROAD
~4,200'
~32 LOTS
SMALL TRACTS SPUR
SMALL TRACTS ROAD
N
0 150 300
Scale: Feet
Date:
1/16/2023
JOINER ENGINEERING
WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
BEAR TRAIL LANE TO SMALL TRACTS RD.
2023 WATER MASTER PLAN
Drawn by:
WAJ
SHEET W-11.1
Checked by:
WAJ
Project No:
21-003


BEACH ROAD
MATRIX DR TO FAA RD ~1,000' ~1 LOTS
MATRIX DRIVE
NEW HART ST
FAA RD TO MT. RILEY RD TO BEACH RD ~3,200' ~13 LOTS
MT RILEY ROAD
FAA ROAD
FAA RD TO MUD BAY RD ~2,000' ~9 LOTS
CHILKOOT DRIVE
SMALL TRACTS ROAD
MUD BAY ROAD
LEGEND:
EXISTING PIPE
NEW PIPE
N
0 200 400
Scale: Feet
Date: 3/10/2023
Drawn By: WAJ
Checked By: WAJ
Sheet W-11.2
Project No: 21-003
EXTENSIONS TO WATER SYSTEM
FAA RD TO MATRIX DR, FAA RD TO MT. RILEY
RD TO BEACH RD, FAA RD TO MUD BAY RD
2023 WATER MASTER PLAN
JOINER ENGINEERING LLC
BECAUSE WE ALL LIVE DOWNSTREAM


MUD BAY ROAD
SMALL TRACTS SPUR
SMALL TRACTS SPUR
TO MUD BAY RD.
~12,100'
~65 LOTS
LEGEND:
EXISTING PIPE
NEW PIPE
0 500 1000
Scale: Feet
N
Date:
3/10/2023
JOINER ENGINEERING LLC
BECAUSE WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
SMALL TRACTS RD. TO MUD BAY RD.
2023 WATER MASTER PLAN
Drawn by:
WAJ
SHEET W-11.3
Checked by:
WAJ
Project No:
21-003

W12 TOWNSITE WATER MAIN EXTENSTIONS – GROUP C

ESTIMATED COST

$2,295,000

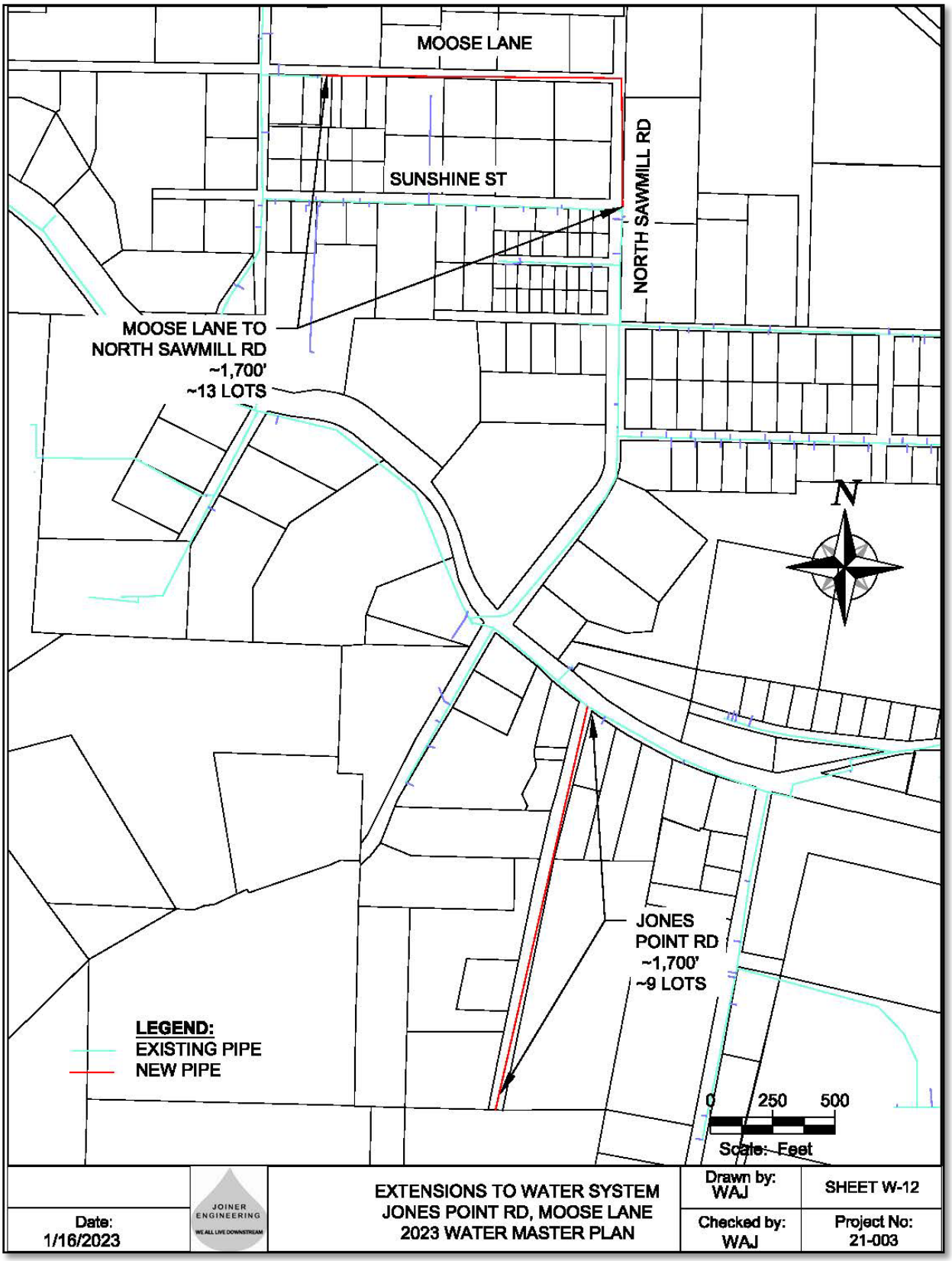
PROJECT DESCRIPTION

Extend water main down Jones Point Road.

Extend water main down Moose Lane (creates a loop and adds volume for fire protection).

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost	Lots Added
Jones Point Road	1700	LF	$450	$765,000	9
Moose Lane	1700	LF	$450	$765,000	13
Estimated Construction Cost				$1,530,000	**22**
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$765,000	
				$2,295,000	


MOOSE LANE
SUNSHINE ST
NORTH SAWMILL RD
MOOSE LANE TO
NORTH SAWMILL RD
~1,700'
~13 LOTS
N
JONES
POINT RD
~1,700'
~9 LOTS
LEGEND:
EXISTING PIPE
NEW PIPE
0 250 500
Scale: Feet
Date:
1/16/2023
JOINER ENGINEERING
WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
JONES POINT RD, MOOSE LANE
2023 WATER MASTER PLAN
Drawn by:
WAJ
SHEET W-12
Checked by:
WAJ
Project No:
21-003

W13 ASBESTOS CEMENT PIPE REPLACEMENT

ESTIMATED COST

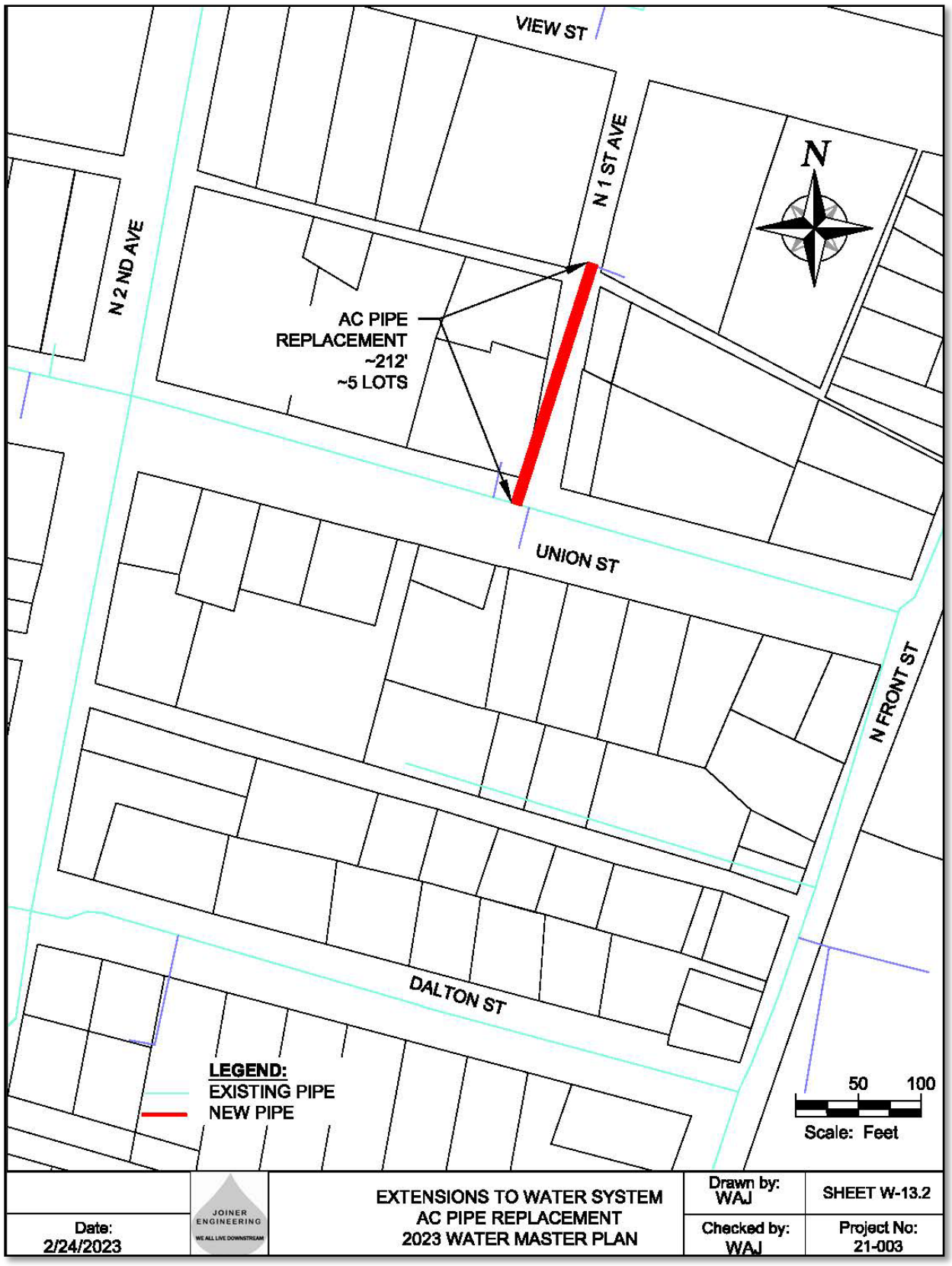
$139,725

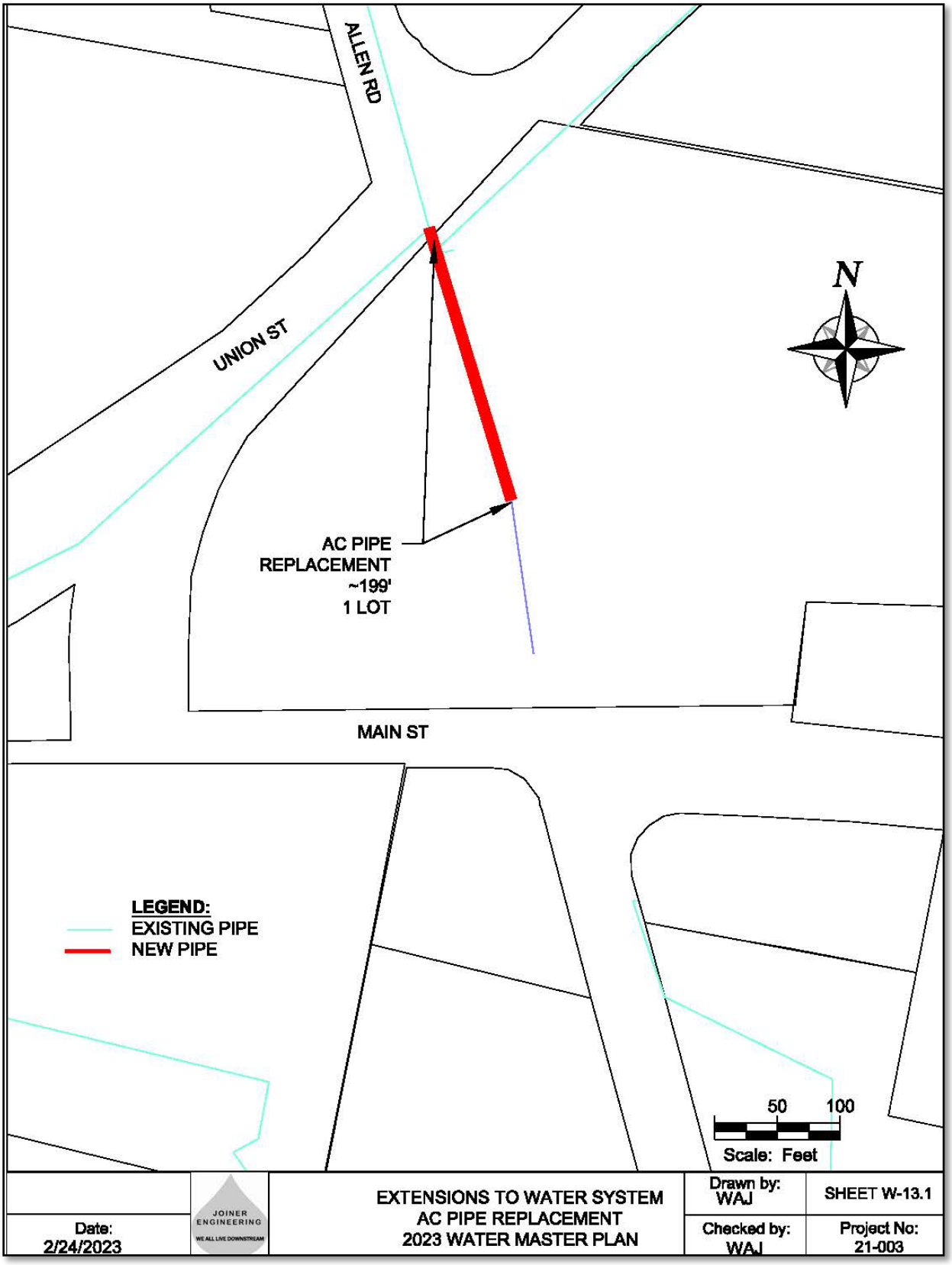
PROJECT DESCRIPTION

Replaces asbestos cement water mains feeding the ADOT&PF yard between Union Street and Main Street and North 1st Avenue.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
AC Water Main -- DOT/FP Yard	199	LF	$450	$89,550
AC Water Main -- North 1st Ave	212	LF	$450	$95,400
Estimated Construction Cost				$184,950
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$92,475
				$277,425


VIEW ST
N 1 ST AVE
N 2 ND AVE
N
AC PIPE
REPLACEMENT
~212'
~5 LOTS
UNION ST
N FRONT ST
DALTON ST
LEGEND:
EXISTING PIPE
NEW PIPE
50
100
Scale: Feet
Date:
2/24/2023
JOINER ENGINEERING
WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
AC PIPE REPLACEMENT
2023 WATER MASTER PLAN
Drawn by:
WAJ
SHEET W-13.2
Checked by:
WAJ
Project No:
21-003


ALLEN RD
UNION ST
N
AC PIPE
REPLACEMENT
~199'
1 LOT
MAIN ST
LEGEND:
EXISTING PIPE
NEW PIPE
50 100
Scale: Feet
Date:
2/24/2023
JOINER ENGINEERING
WE ALL LIVE DOWNSTREAM
EXTENSIONS TO WATER SYSTEM
AC PIPE REPLACEMENT
2023 WATER MASTER PLAN
Drawn by:
WAJ
SHEET W-13.1
Checked by:
WAJ
Project No:
21-003

W14 LILY LAKE WTP FLOC TANK ADDITION

ESTIMATED COST

$195,000

PROJECT DESCRIPTION

Remove the existing 3,154-gallon hydropneumatics tank from Crystal Cathedral WTP and replace with a smaller tank. The upgraded VFD pumps require significantly less volume to pressurize the distribution system. Repurpose the old tank as an additional floc tank at the Lily Lake WTP. This additional holding tank will increase the reaction time by approximately 40% and the cold-water flow rate from approximately 120 to 165 GPM. Pump upgrades at the Well Field are covered in ***W9 – Crystal Cathedral Source Improvements***.

COST DETAIL

Description	Quantity	Unit	Cost/Unit	Cost
Floc Tank Room Addition @LLWTP	250	square foot	$400	$100,000
Tank Inspection & Moving	1	lump sum	$10,000	$10,000
Floc Tank Plumbing @ LL WTP	1	lump sum	$10,000	$10,000
New Pressure Tanks @CCWF	1	lump sum	$5,000	$5,000
Pressure Tank Plumbing @ CCWF	1	lump sum	$5,000	$5,000
Estimated Construction Cost				$130,000
Design (10%), Inspection (10%), Administration & Permitting (5%), Contingency (25%)				$65,000
				$195,000

7.0 WATER SYSTEM RECOMMENDATIONS

This section highlights recommendations for the Haines PWS. These sanitation suggestions are potential future projects beyond the scope of the ten-year Capital Improvement Project list shown in ***Section 6***. These recommendations focus on the next twenty years, 2023 through 2042. A summary of each follows.

WR1 FUTURE SOURCE DEVELOPMEMT

PROJECT DESCRIPTION

Examine possible new sources and/or enhancements of current sources to augment the community water supply. Beyond 2032, additional sources may be required to adequately supply a growing community with enough potable water. A hydrology study could be conducted to better define the extent of other spring sources on Mount Ripinski.

Providing additional filtration equipment at LLWTP to increase the summer capacity of 350 GPM to 500 GPM, a rate less than the 550-GPM, sustainable yield for the lake, determined by Joseph Mulligan and Associates on an unknown date. (Carson and Dorn, 2014) Since the acreage of Lily Lake cited in the Mulligan study appears to be five acres larger than current lake aerial photos suggest, a reevaluation of the watershed and the lake's potential yield should be considered.

The LLWTP has a finite lifecycle and is nearly fifty years old. Although upgrades are planned for the next few years, a long-term replacement needs to be considered as well.

Exploring the use of more water from the Crystal Cathedral Wellfield is another option. Advanced filtration, such as membrane and/or nano filtration, would improve water quality, taste and consumer satisfaction.

Desalination is a potential option although an expensive one in terms of cost and energy.

WR2 REPLACE TOWER ROAD WATER STORAGE TANK

PROJECT DESCRIPTION

When a wood-stave tank is full, the material stays saturated and seals better to prevent leaks. Having two feet of freeboard at the top of the Tower Road WST to compensate for the Barnett Drive WST's height may impact this tank's longevity. (Due to a surveyor error, the Barnett Drive WST was built two plus feet lower than designed.)

Wood-stave water storage tanks are estimated to have a lifecycle of 25 to 90 years. The tank on Tower Road was constructed in 1986. The asphalt shingle roof was replaced with a membrane one in 2016. Replacing this wood-stave tank with a steel one will reduce system leakage and provide a long lifecycle with regular maintenance.

In the Carson and Dorn *2014 Haines Water and Sewer Master Plan*, there is a recommendation to replace Tower Road WST to provide in excess of 1,500 GPM to the entire Mud Bay Road area as well as fire protection in the excess of 500 GPM.

An updated hydraulic analysis is needed to ascertain size and elevation of a replacement tank as well as how this improvement will fit into the current pressure zones.

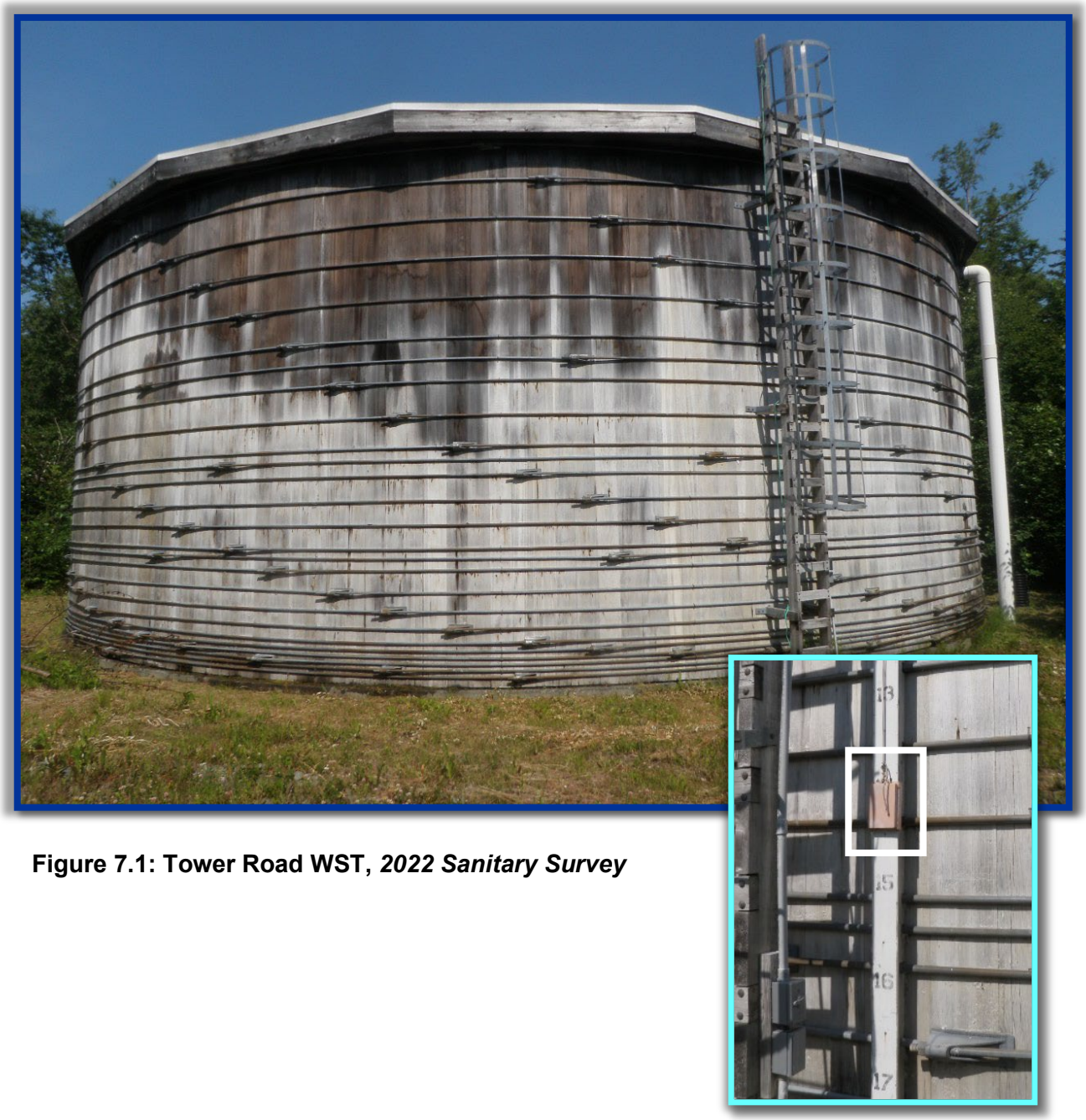


Figure 7.1: Tower Road WST, *2022 Sanitary Survey*

Gage reads 14 feet.

WR3 LEAK DETECTION & ABATEMENT

PROJECT DESCRIPTION

Reducing water system leaks will lower the annual GPCD rate for the Townsite PWS, an important step in conserving the supply. There are two concurrent parts for this project.

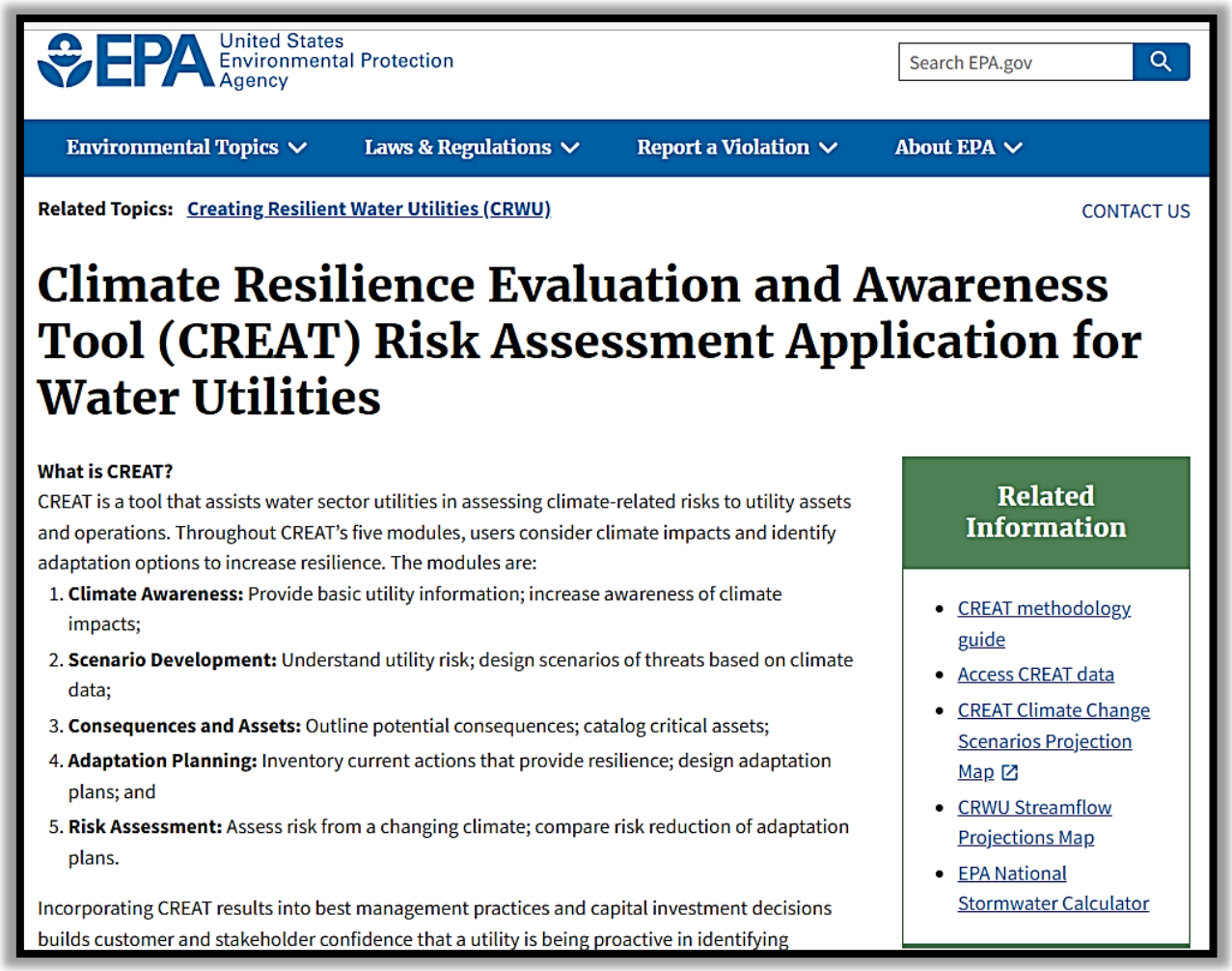
The first is aging pipe replacement. Inventory entire PWS for pipe material type, diameter, age and condition. Replace as need, preferably in conjunction with other road and utility improvements. Prepare a multi-year upgrade schedule and review annually.

The second activity is locating leaks from curb stops to customers. Install residential meters with leak detection capabilities, such as the *Kamstrup flowIQ® 2200* model. (Brown, 2023)

WR4 PWS UPGRADES FOR CLIMATE CHANGE IMPACTS

PROJECT DESCRIPTION

Assess the Haines PWS with available software tools, such as EPA *CREAT*. Develop strategies for coping with anticipated temperature and precipitation changes for the watersheds for the three sources, and the Townsite area. Develop short-term and long-term mitigation plans.



EPA United States Environmental Protection Agency

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Related Topics: Creating Resilient Water Utilities (CRWU) CONTACT US

Climate Resilience Evaluation and Awareness Tool (CREAT) Risk Assessment Application for Water Utilities

What is CREAT?

CREAT is a tool that assists water sector utilities in assessing climate-related risks to utility assets and operations. Throughout CREAT's five modules, users consider climate impacts and identify adaptation options to increase resilience. The modules are:

1. **Climate Awareness:** Provide basic utility information; increase awareness of climate impacts;
2. **Scenario Development:** Understand utility risk; design scenarios of threats based on climate data;
3. **Consequences and Assets:** Outline potential consequences; catalog critical assets;
4. **Adaptation Planning:** Inventory current actions that provide resilience; design adaptation plans; and
5. **Risk Assessment:** Assess risk from a changing climate; compare risk reduction of adaptation plans.

Incorporating CREAT results into best management practices and capital investment decisions builds customer and stakeholder confidence that a utility is being proactive in identifying

Related Information

- CREAT methodology guide
- Access CREAT data
- CREAT Climate Change Scenarios Projection Map
- CRWU Streamflow Projections Map
- EPA National Stormwater Calculator

WR5 INCREASE PUBLIC AWARENESS TO MAINTAIN WATER QUALITY

PROJECT DESCRIPTION

Source protection and user conservation will become more important as the population increases and community water demand approaches the annual capacity for the Haines PWS. Increased recreational activities in watershed areas also impact water quality. In conjunction with the release of the annual *Consumer Confidence Report* (CCR), review current water quality issues to spotlight in an annual public awareness campaign with PSAs to raise awareness and community stewardship. (***Appendix B*** contains the *2021-2022 Haines Borough CCR*.)

Haines Borough
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2021 — 2022

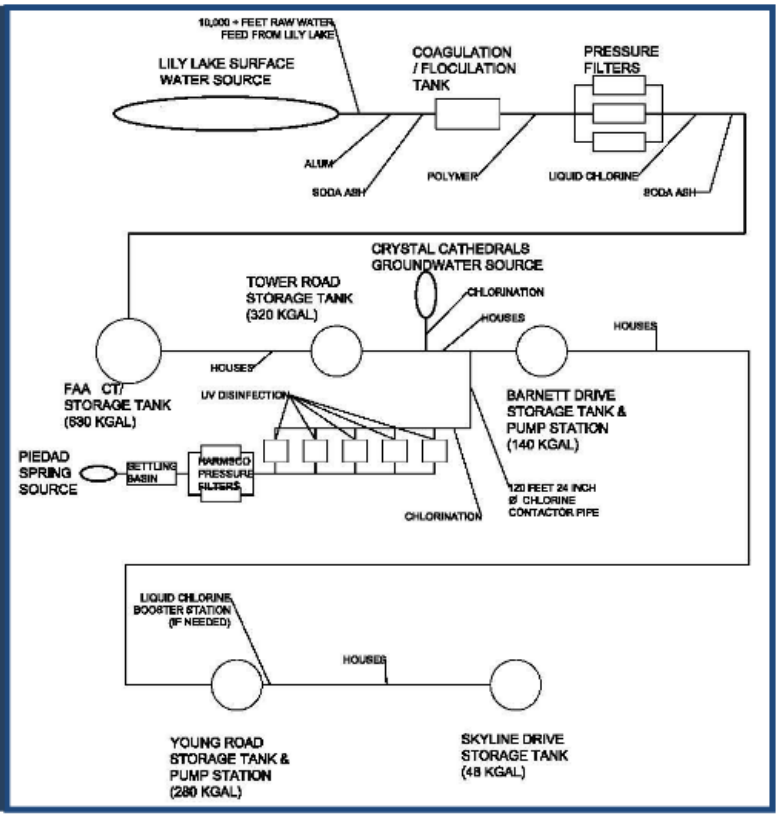
HAINES BOROUGH

DRINKING WATER QUALITY

REPORT

Postal Customer

Schematic of Haines Borough Water System



Pledge to Protect Community Water Sources

Additional Information

If you have questions about this report or need more information, contact:

Dennis Durr
WTP Operator
P0 Box 1209
Haines, AK 99827
907-766-2200 or
907-766-2716
ddurr@haines.ak.us

WATER DATA

16

WR6 IMPROVING EFFICIENCIES WITH SCADA & STAFFING

PROJECT DESCRIPTION

Complexities of this PWS require improved efficiencies to run and maintain the utility adequately.

Proposed SCADA Upgrades will help Operators with data collection and equipment malfunctions. Even so, Additional staffing is warranted to ensure current DPW Staff have time to perform all required tasks to comply with current water quality regulations. When staff are on personal leave, there should be enough certified Operators to adequately run the system. This means more than one certified Operator.

One option is to consider cross-training. Perhaps other DPW employees could be trained to fill in on an as-needed basis to ensure adequate staffing patterns for the PWS operation.

8.0 FUNDING, PERMITS & OTHER APPROVALS

8.1 FUNDING SOURCES

Potential funding for future public water and sewer projects in the State of Alaska include, but may not be limited to:

- ADEC grants and/or revolving loan funds
- ADOT&PF
- Alaska Legislative Direct Appropriation Grant(s)
- Municipal Bond Issues (includes the Alaska Municipal Bond Bank and Private Sector Bonding)
- Rural Utility Service (RUS) Water and Environmental Programs (administered by the US Department of Agriculture). These include federal grant/loan programs, including Farmer's Home Administration programs available to communities with fewer than 10,000 residents. Low interest loans are made available for water and wastewater disposal systems. Public bodies and not-for-profit corporations are eligible. Funds may also be used for solid waste disposal and storm drainage systems, as well as training. Some applicants may qualify for grant funds to supplement a loan. US Department of Agriculture Rural Development Staff in Alaska can be contacted at (907) 761-7705.
- The USEPA and RUS provide funding to organizations that provide training and technical assistance to small water systems. These organizations include the National Rural Water Association, the Rural Community Assistance Program and the National Drinking Water Clearinghouse.

8.2 PERMITS & APPROVALS

There are several permits and approvals that would be required prior to the construction of the proposed improvements. These permits and approvals include, but may not be limited to:

- ADEC plan review, approval to construct and operate water improvements
- ADNR approval for construction activities that cross streams and other water bodies
- ADOT&PF approval for work in state rights-of-way (ROWs) and road crossings
- Federal Aviation Administration (FAA) approval for work in the boundaries of the airport and its vicinity
- USACE permits for work in shorelines or wetlands
- Section 401 Water Quality Certification (federal Clean Water Act)
- Easement from individual property owners and public agencies
- Archeological clearance from SHPO
- Water Rights from ADNR

9.0 REFERENCES

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10.0 APPENDICES

APPENDIX A: DRAWINGS

- Sheet A-1: Location of Haines PWS
- Sheet A-2: Proposed Water Improvements
- Sheet A-3: Watershed Protection Areas
- Sheet A-4: Townsite & Zoning Designations
- Sheet A-5: PWS Pressure Zones

APPENDIX B: WATER SYSTEM INFORMATION

- Haines Borough
  - Water Treatment Plant Schematics
  - 2021 – 2022 CCRs
  - 2023 Water Fee Schedule
- ADEC
  - 2022 Sanitary Survey Summary
  - 2022 Monitoring Summary for Haines Borough
  - 2023 Monitoring Summary for Haines Borough
  - Master Plan Review Communication
- ADNR
  - Water Rights
  - Well Logs

APPENDIX C: MAPS

- Flood Risk
- Tsunami Inundation Risk

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APPENDIX A: DRAWINGS

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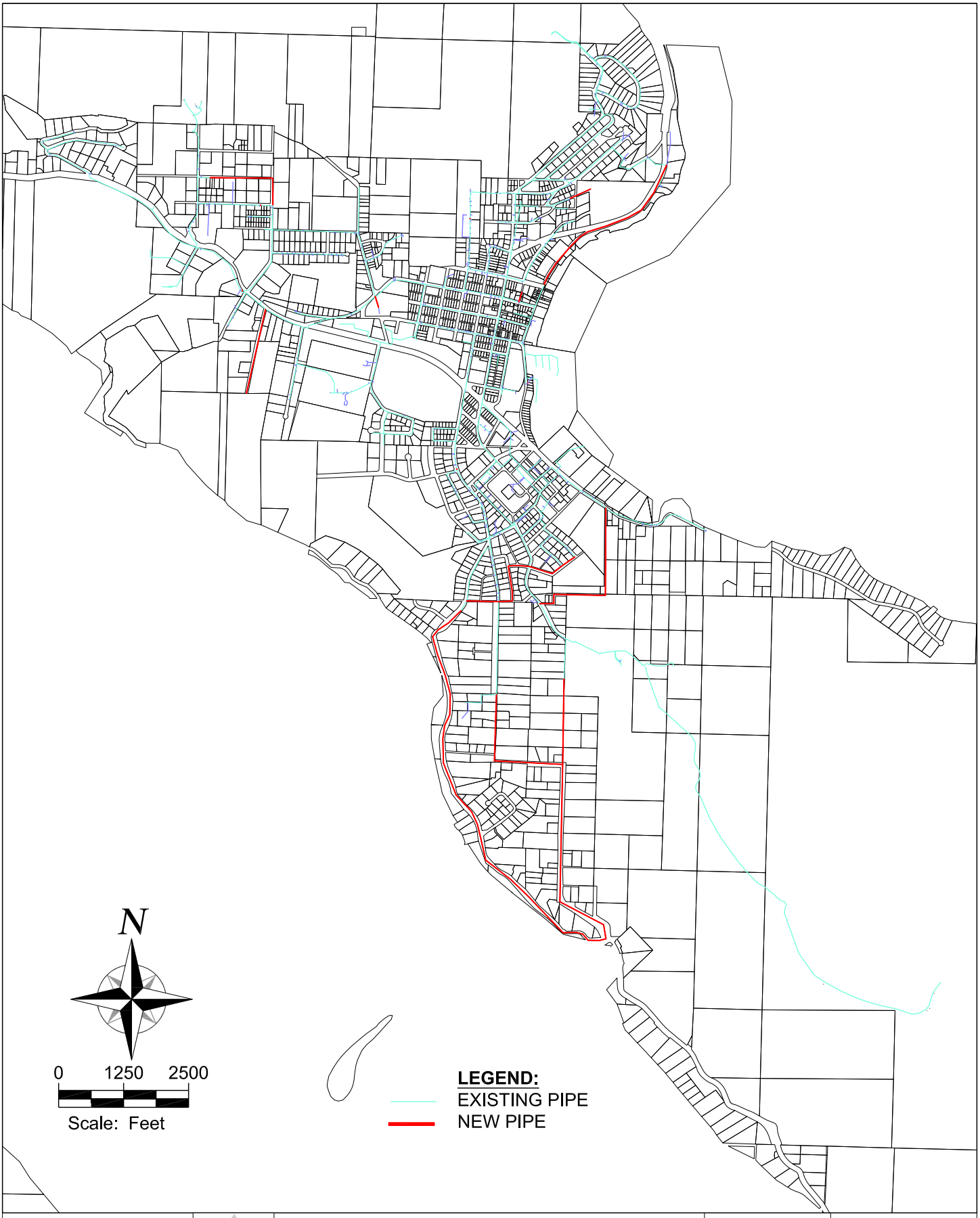
Date: 1/12/2023	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	TOPOGRAPHIC MAP OF HAINES BOROUGH WATER SYSTEM 2023 WATER SYSTEM MASTER PLAN	Drawn by: WAJ	Sheet A-1
			Checked by: WAJ	Project No: 21-003



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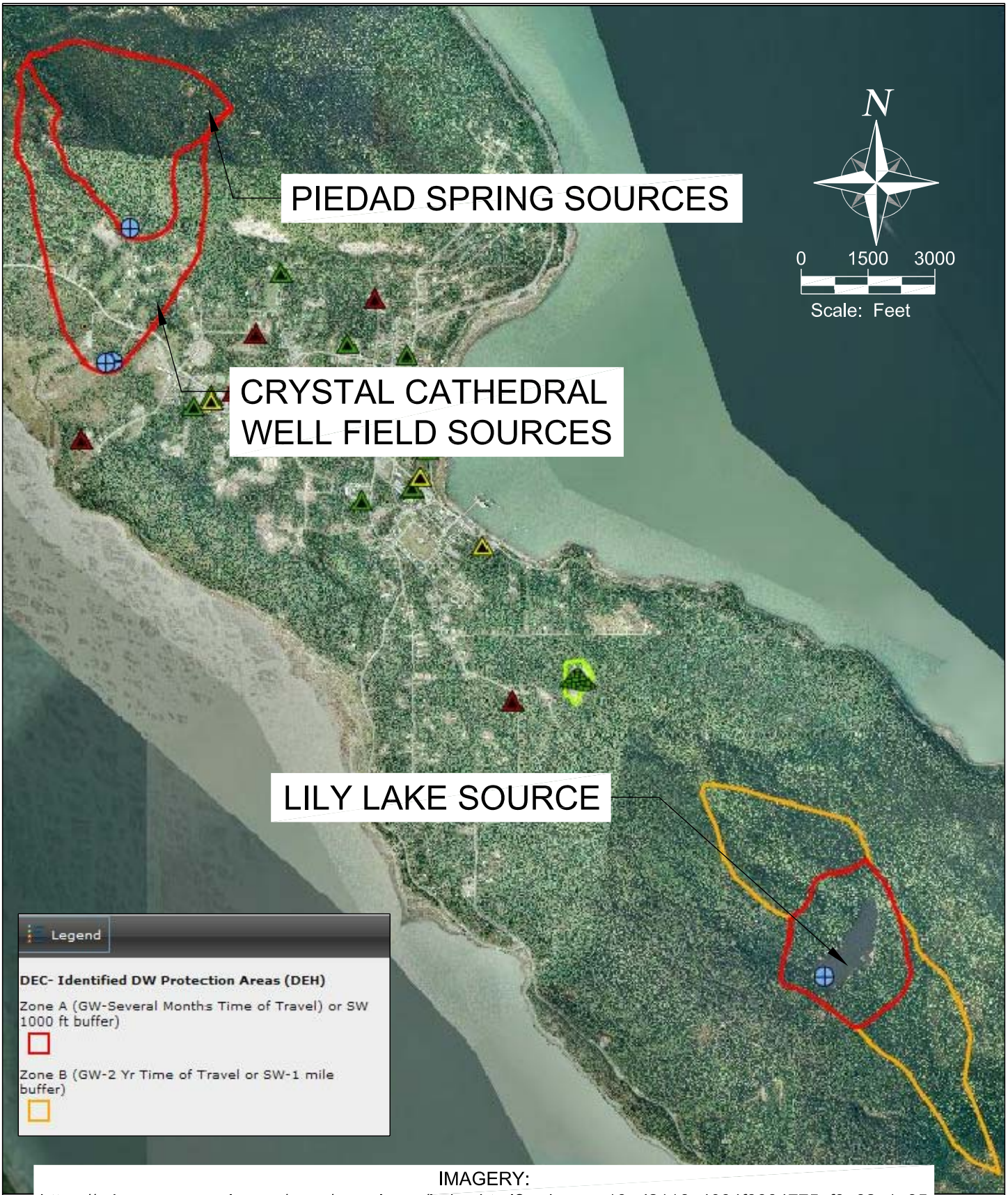
Date: 5/16/2023			Checked by: WAJ	Project No: 21-003



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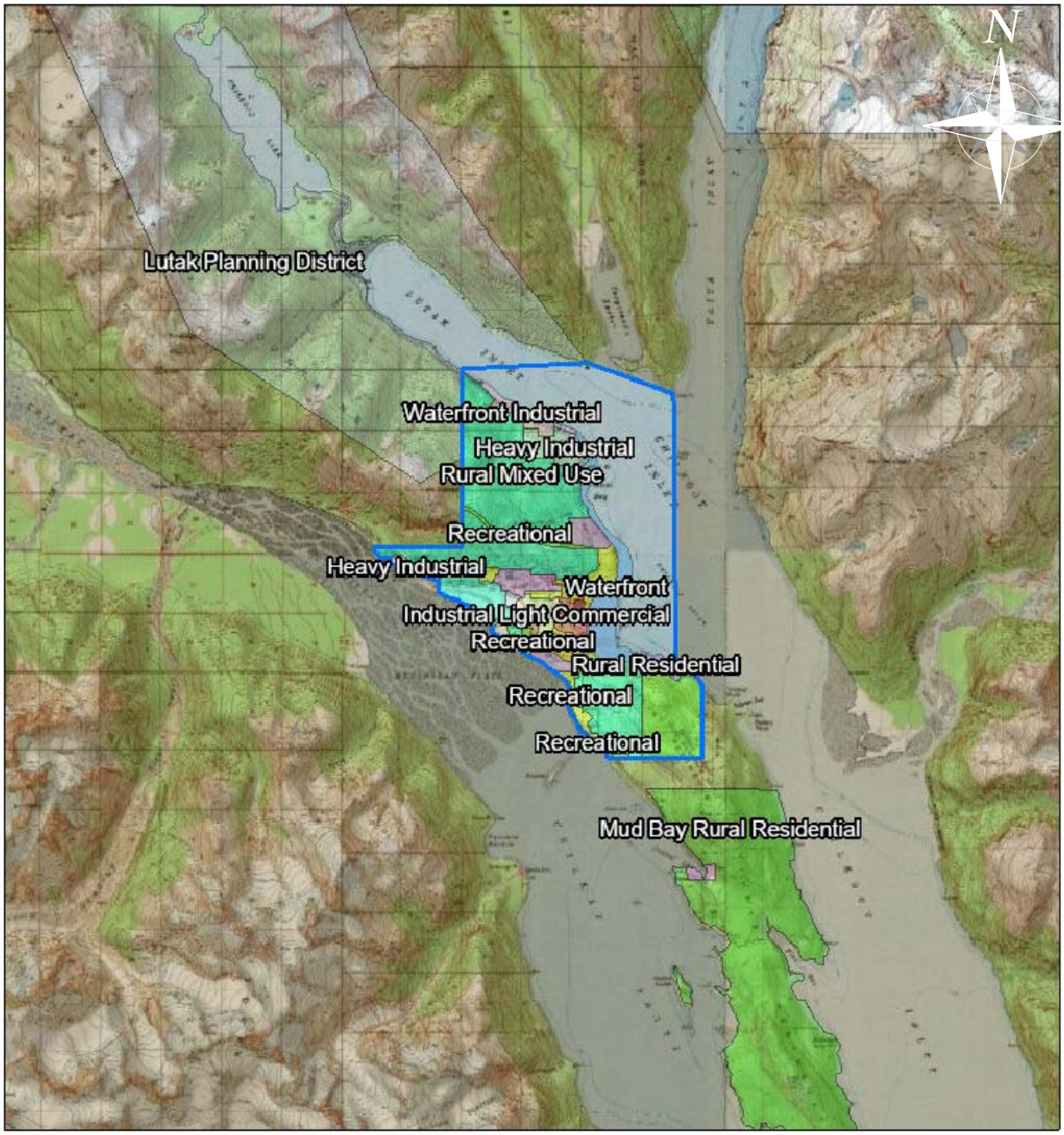
Date: 1/12/2023	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	DEC DRINKING WATER PROTECTION AREAS HAINES BOROUGH WATER SYSTEM 2023 WATER SYSTEM MASTER PLAN	Drawn by: WAJ Checked by: WAJ	Sheet A-3 Project No: 21-003

Townsite and Zone Boundaries



1/16/2023, 12:54:58 PM

1:288,895

0 1.25 2.5 5 mi

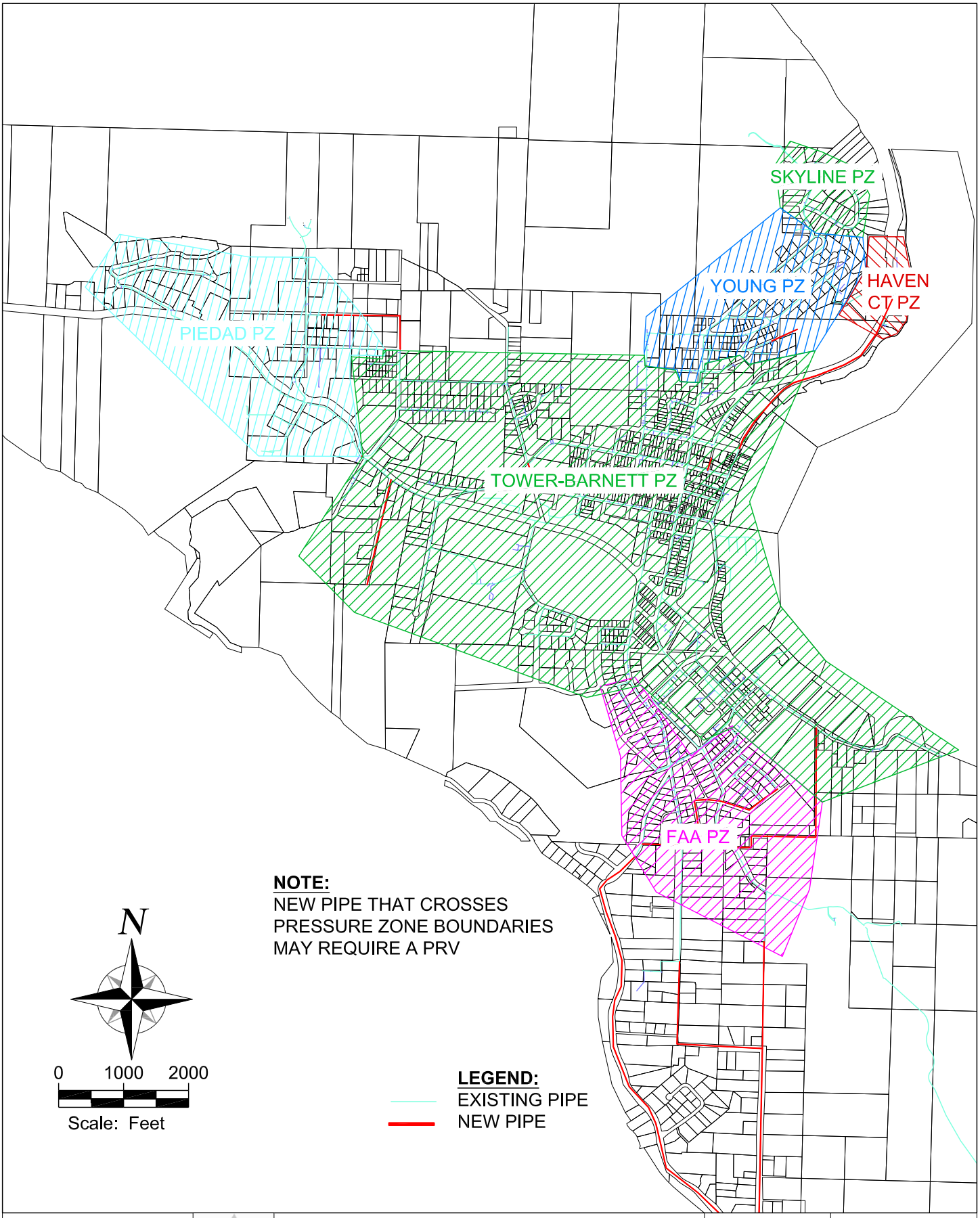
0 2 4 8 km

- Townsite Service Area Boundary

Zoning

- Recreational
- Heavy Industrial
- Rural Residential
- Single Residential
- Mud Bay Rural Residential
- Rural Mixed Use
- Commercial
- Multiple Residential
- General Use
- Industrial Light Commercial

	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	TOWNSITE & ZONING BOUNDARIES HAINES BOROUGH WATER SYSTEM 2023 WATER SYSTEM MASTER PLAN	Drawn by: WAJ	Sheet A-4
Date: 1/18/2023			Checked by: WAJ	Project No: 21-003



Date: 5/16/2023	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	PRESSURE ZONES IN WATER SYSTEM 2023 WATER MASTER PLAN	Drawn by: WAJ	SHEET A-5
			Checked by: WAJ	Project No: 21-003

10.0 APPENDICES

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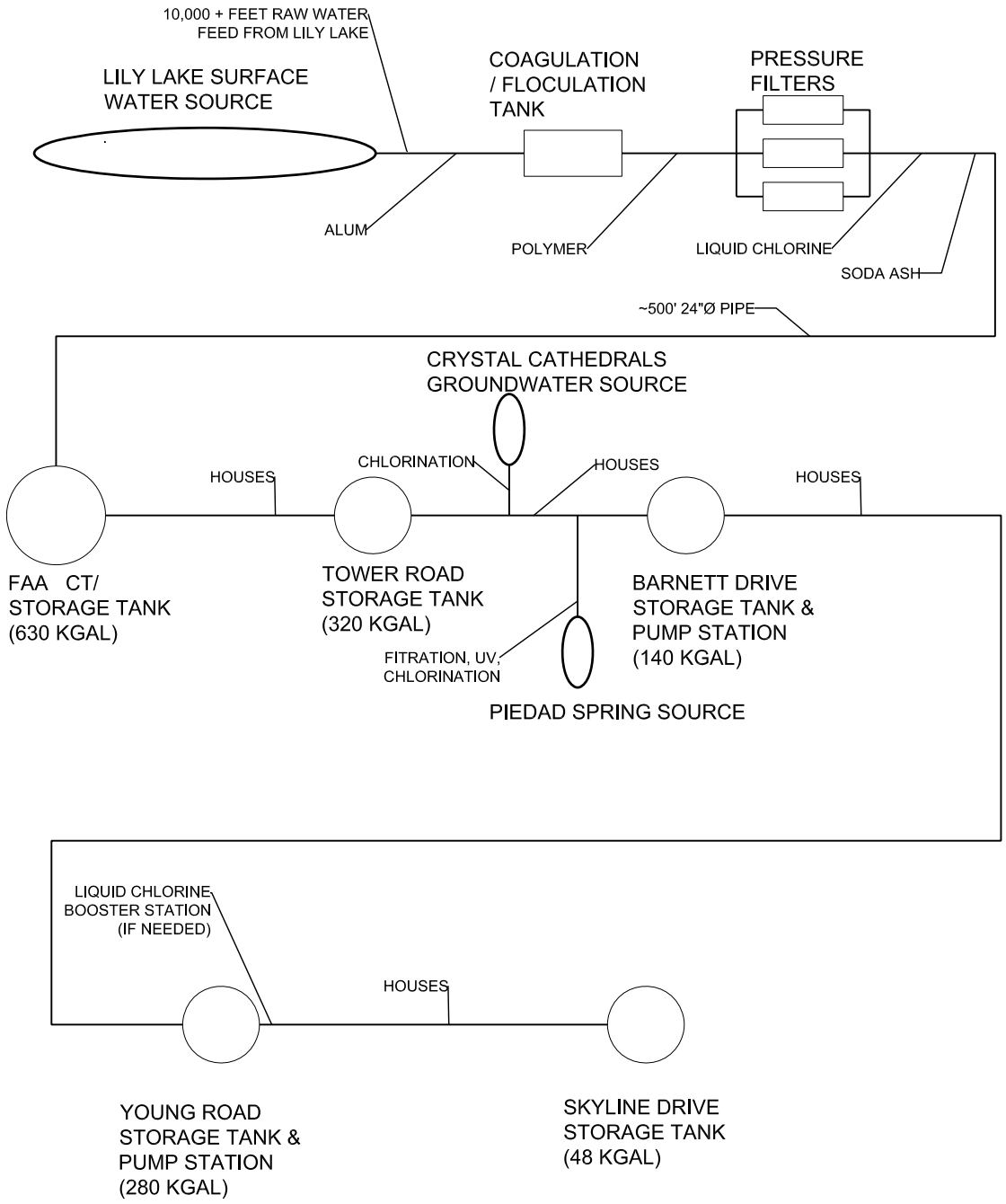
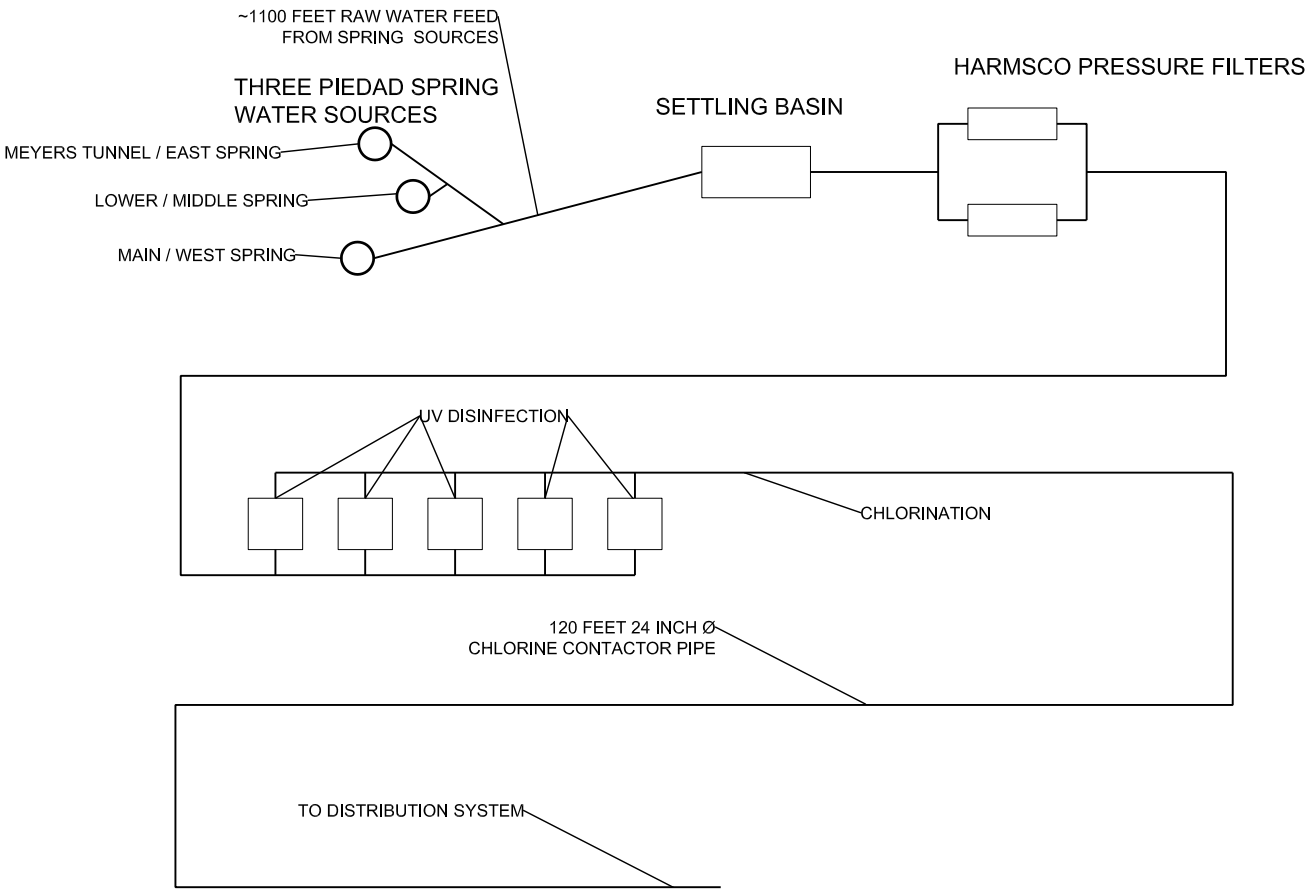
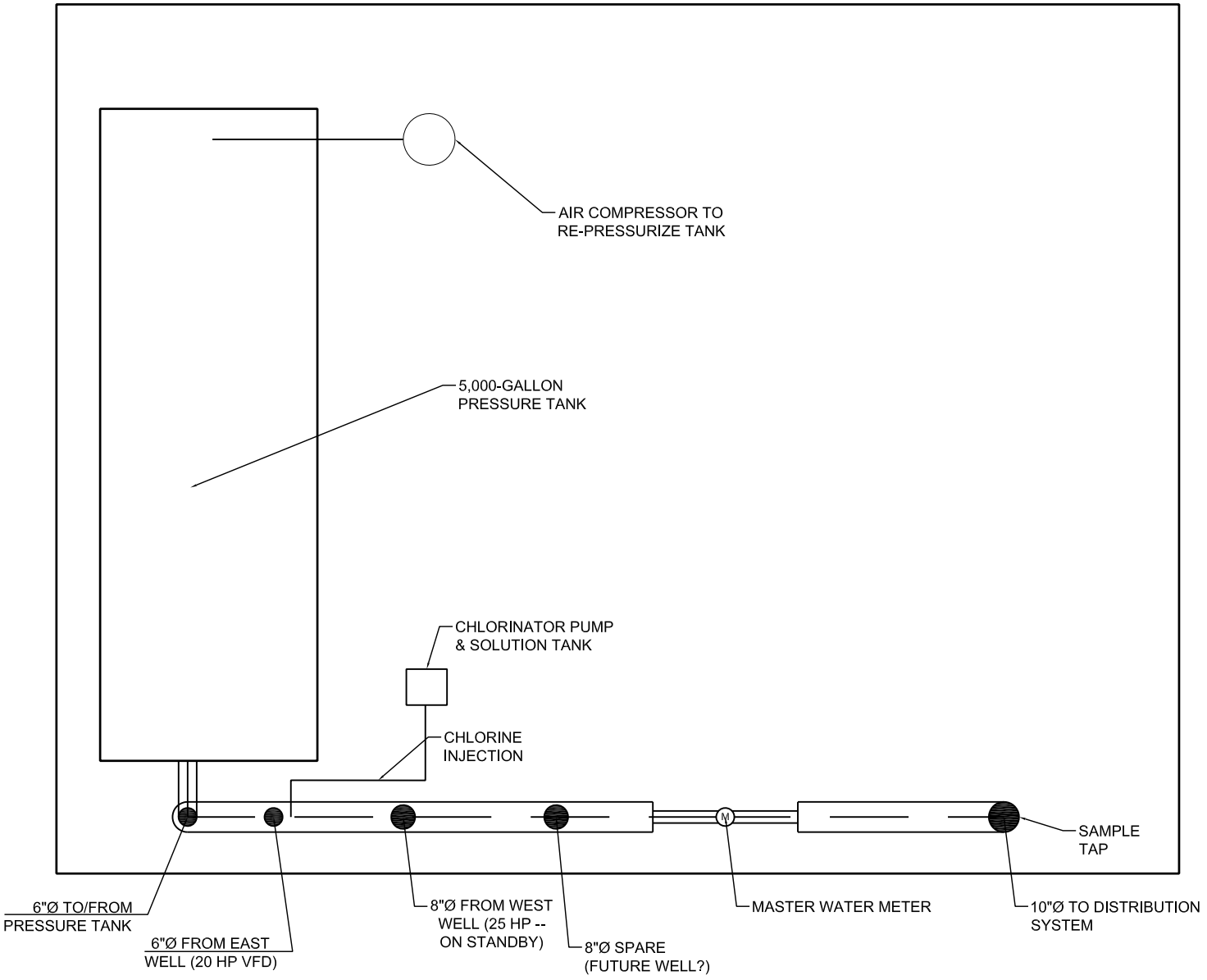


NOT TO SCALE	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	SCHEMATIC OF HAINES BOROUGH WATER SYSTEM 2023 WATER MASTER PLAN	Drawn by: WAJ	SHEET B-1
Date: 1/18/2023			Checked by: WAJ	Project No: 21-003



NOT TO SCALE	JOINER ENGINEERING WE ALL LIVE DOWNSTREAM	SCHEMATIC OF PIEDAD SPRING WATER SOURCE 2023 WATER MASTER PLAN	Drawn by: WAJ	SHEET B-2
Date: 1/18/2023			Checked by: WAJ	Project No: 21-003



NOT TO SCALE

JOINER ENGINEERING LLC
BECAUSE WE ALL LIVE DOWNSTREAM

CRYSTAL CATHEDRALS WATER SYSTEM
TREATMENT BUILDING
2023 WATER MASTER PLAN

Date: 1/18/2023

Drawn By: WAJ

Checked By: WAJ

Sheet B-3

Project No: 22-004

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2021 — 2022

HAINES BOROUGH

DRINKING WATER QUALITY REPORT

Postal Customer

Haines Borough

How Safe Is Your Water?

We are pleased to present this year's *Annual Water Quality Report* (Consumer Confidence Report or CCR) as required by the Safe Drinking Water Act (SDWA).

This report provides details about where your water comes from, what it contains, and how it compares to standards set byregulatory agencies. This report is a snapshot of water quality for calendar year 2021.

We are committed to providing you with information because informed customers are our best allies. We routinely test for over 80 contaminants as scheduled. Test results showed no levels higher than what the US Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC) allow.

What Precautions Do You Need to Take?

Some people may be more vulnerable to contaminants in water than the general population. Immuno-compromised persons, such as those undergoing cancer chemotherapy, persons who have organ transplants, people with HIV /AIDS and other immune system disorders, some elderly, and infants can be particularly at-risk from infections. These people and/or their caregivers should seek advice about drinking water from their health care providers.

EPA and the Centers for Disease Control & Prevention (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Water Drinking Hotline at:

800-426-4791

2021 — 2022 Water Report

Where Are the Sources for Your Public Water System?

The primary source of Haines drinking water is Lily Lake, located 2.5 miles southeast of the Haines Townsite on the Chilkat Peninsula. In 2021, 45 percent of the Haines drinking water was supplied from the Piedad Spring System, a groundwater source located 1.5 miles northwest of the Haines Townsite. The Crystal Cathedral wells provided limited supplies, only 0.3 percent of the 84 million gallons of community water consumed (see page 11 for more detail).

Learn More About Local Water Quality

Three Source Water Assessments

Very High, Medium & Low Susceptibility Ratings

The public water system for the Haines Townsite is a Community Water System consisting of three sources. The *Source Water Assessment* for each of these sources is available at the Haines Borough Administration Offices. These assessments are used by the by Haines Borough staff to assess water quality risks and can be used as a foundation for local volunteer protection efforts.

Lily Lake Source Water Assessment (LLSWA) - Surface Water Source

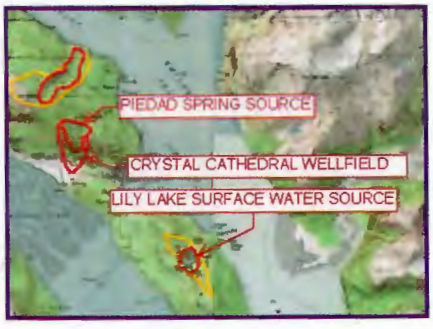
- The overall protection area received *Susceptibility Rating of Very High*.
- The overall protection area received a *Vulnerability Rating of Medium* for metals, other organic chemical and synthetic chemicals.

Piedad Spring Source Water Assessment (PSSWA) - Ground Water Source under Direct Influence of Surface Water

- The combined score for the Wellhead and Aquifer has a natural *Susceptibility Rating of Medium* (the Wellhead and Aquifer each received an individual *Susceptibility Rating of Medium*).
- The combined score for the Wellhead and Aquifer received a *Susceptibility Rating of Low* for:
  * Bacteria/ Viruses
  * Nitrites/ Nitrates
  * Volatile Organic Chemicals
  * Heavy Metals
  * Synthetic Organic Chemicals
  * Other Chemicals

Crystal Cathedral Source Water Assessment (CCSWA) - Ground Water

- The combined score for the Wellhead and Aquifer has a natural *Susceptibility Rating of Medium* (the Wellhead and Aquifer each received an individual *Susceptibility Rating of Medium*).
- The combined score for the Wellhead and Aquifer received a *Susceptibility Rating of Medium* for:
  * Bacteria/ Viruses
  * Nitrites/ Nitrates
- The combined score for the Wellhead and Aquifer received a *Susceptibility Rating of Low* for:
  * Volatile Organic Chemicals
  * Heavy Metals
  * Synthetic Organic Chemicals
  * Other Chemicals



What Contaminants Are Found in Your Drinking Water?

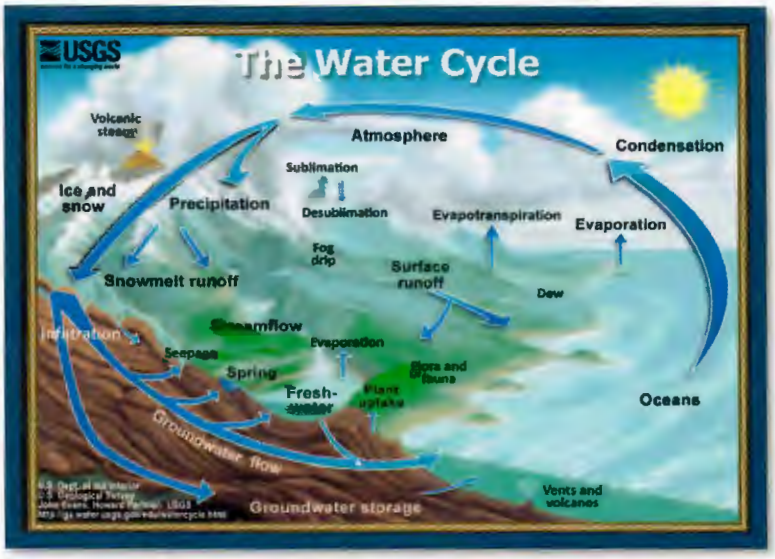
Drinking water, including bottled water, may be reasonably expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency (EPA) Safe Drinking Water Hotline at:

800-426-4791

The sources of drinking water, both tap water and bottled water, include:

rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the grounds, it dissolves other substances, including:

- Naturally occurring minerals
- Substances resulting from the presence of animals or from human activity
- Microbial contaminants, such as viruses and bacteria (that may come from sewage treatment plants, residential / commercial wastewater systems, livestock operations, wildlife and pets
- Inorganic contaminants, such as salts and metals (which can occur naturally or result from urban storm -water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming)
- Pesticides and herbicides (which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses)
- Organic chemical contaminants, including synthetic and volatile organic chemicals (which are byproducts of industrial process and petroleum production and can also come from gas stations, urban stormwater runoff, and residential / commercial wastewater systems)
- Radioactive contaminants (which can be naturally occurring or be the result of oil and gas production and mining activities)



Citizen Involvement: Public Meetings & Protective Actions

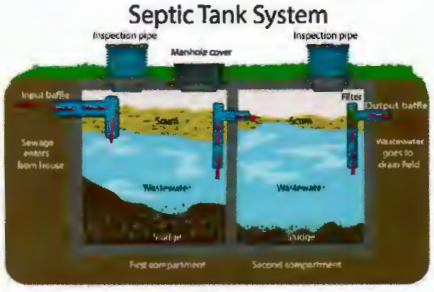
Citizens may get involved by attending the Haines Borough Assembly meetings. The dates and agenda are posted online at: **www.hainesborough.us**

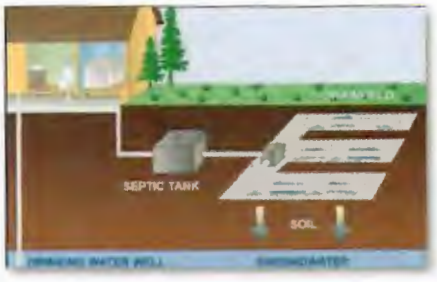
Meeting dates and agenda are also posted at the Borough Offices, Library and Post Office.

Source Water Protection Tips

Protection of drinking water is everyone's responsibility. You can help protect community drinking water source in several ways:

- Pick up after your pets.
- Eliminate excess use of lawn and garden fertilizers and pesticides; they contain hazardous chemicals that can reach drinking water sources.
- If you have a residential wastewater system, properly maintain your system with regular septic tank pumping or ATU servicing to reduce leaching to water sources.
- Dispose of chemicals properly; take used motor oil to a recycling center.



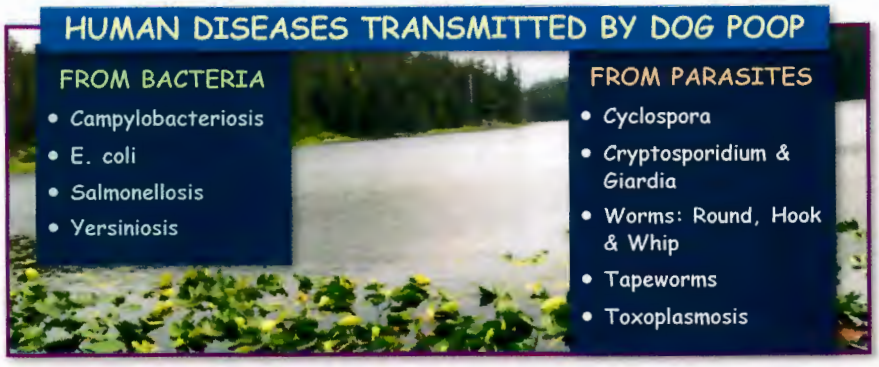


Water Conservation Tips

Do you know that the average U.S. household uses approximately 300 gallons of water per day or 75 gallons per person per day? Luckily there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference. For more information on water conservation visit:

www.epa.gov/watersense

* Take short showers: a five-minute shower uses four to five gallons of water compared to up to 50 gallons for a bath.
* Shut off water while brushing your teeth, washing your hair and shaving to save up to 500 gallons a month.
* Use a water-efficient showerhead; these are inexpensive, easy to install, and can save up to 750 gallons a month.
* Run your clothes washer and dishwasher only when they are full to save up to 1,000 gallons a month.
* Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait; if it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
* Adjust sprinklers to water only your lawn. Apply water as fast as the soil absorbs it and during the cooler part of the day to reduce evaporation.
* Teach your kids about conserving water to ensure future generation uses this resource wisely. Make conservation a family effort.



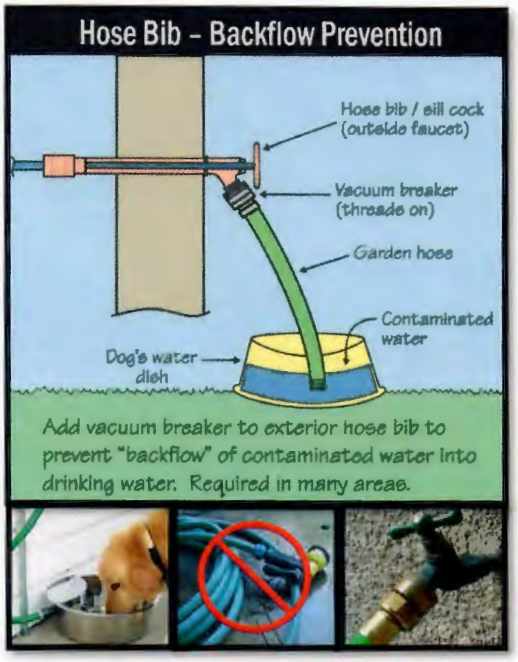
More Source Water Protection Tips

* Contact Takskanuk Watershed Council and volunteer to help at:

  www.takshanuk.org or **907-766-3542**

* Organize a storm-drain stenciling project with the local government. Stencil a message next to the street drain reminding people: *Dump No Waste - Protect Our Water.*
* Produce and distribute a flyer for households to remind residents that storm drains dump directly into local water bodies.

Cross Connection Control



It is important to determine whether a cross-connection may exist at your home or business. A cross connection is an unprotected or improper connection to a public water distribution system that may cause contamination or pollution to enter the system. The Haines Borough is responsible for enforcing cross-connection control regulations and insuring that no contaminants, under any flow conditions, can enter the distribution system. A vacuum breaker, available from a local hardware store, installed on a hose bib prevents back siphoning. Do not leave a hose in a puddle on the ground or in a bucket full of water as back siphoning could occur. If you have any of the devices listed below, please contact us to discuss the issue, and, if needed, to survey your connection and assist you in isolating it if that is necessary.

* Boiler / radiant heater (water heaters not included)
* Underground lawn sprinkler system
* Pool or hot tub (whirlpool tubs not included)
* Additional source(s) of water on the property
* Decorative pond
* Watering trough

More Information about Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Haines Borough is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you can have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at:

www.epa.gov/safewater/lead

2021 Water Quality Data

Water Quality Regulations

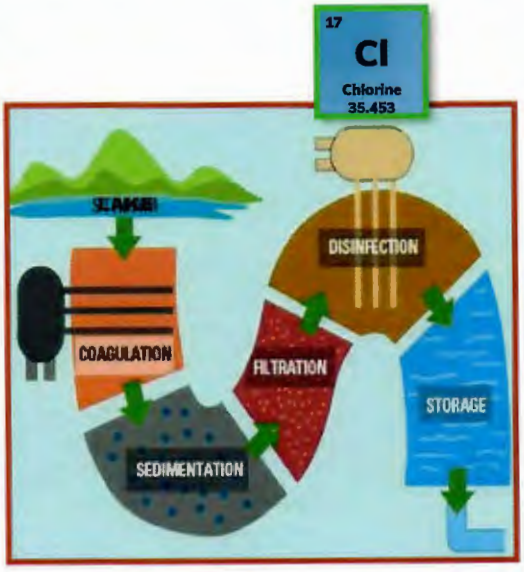
In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally unharmful in drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels.

In 2016, the two Public Water Systems — Haines Borough and Crystal Cathedral — were combined into a single water system. The following data tables show information for the combined system as well as some data for the original PWSIDs. Testing is done in the calendar year of the report (2021).

The EPA or ADEC requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of these data, though representative, may be more than one year old. (Data for 2021 is highlighted blue.) In these tables you will find terms and abbreviations that might be unfamiliar. A table of terms and definitions follows (see page 14).

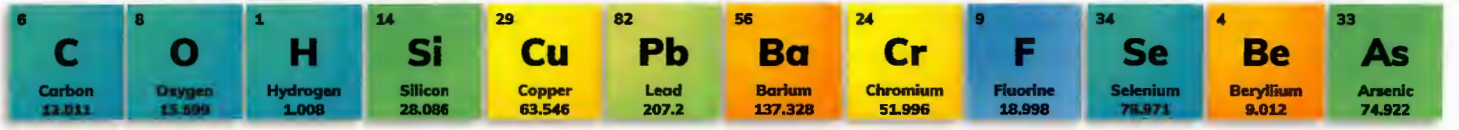
Water Treatment Process

Our water is treated by disinfection. Disinfection involves the addition of chlorine or other disinfectant to kill dangerous bacteria and other microorganisms that may be present. Disinfection is considered one of the major public health advances of the 20th Century. However, disinfection creates disinfection by-products that are monitored to ensure they remain at a safe level. Lily Lake and the Piedad Spring are also filtered prior to disinfection.



2021 Water Quality Data

CONTAMINANTS	MCLG or MRDLG	MCL, TT or MRDL	YOUR WATER	RANGE LOW	RANGE HIGH	SAMPLE DATE	VIOLATION	TYPICAL SOURCE
Disinfectants & Disinfectant By-Products There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.								
TTHMs - ppb	NA	80	50.1	29.2	65.6	2021	No	By-product of drinking water disinfection
HAA5 - ppb	NA	60	27.9	23.3	30.0	2021	No	By-product of drinking water disinfection
Nitrates There is **health concern** with nitrates in drinking water, especially for infants under 6 months of age, as exposure can result in methemoglobinemia. One of the Haines Borough public water system sources, Piedad, had a detectable limit of nitrates.								
Nitrate – ppm	10	10	0.03	0	0.09	2021	No	Agriculture run-off and septic tanks
Volatile Organic Compounds Haines Borough staff sample for a variety of volatile organic compounds quarterly. Of the 21 chemicals regularly tested, none were above detection limits. All three Haines Borough public water system sources had no detectable amount.								
Xylenes, Total - ppm	10	10	0	0	0	2021	No	Discharge from petroleum and chemical factories



POTABLE WATER USAGE: TREND DATA

LEAK DETECTIONS CONSERVES WATER

CONTAMINANTS	MCLG	AL	YOUR WATER	SAMPLE DATE	# OF SAMPLES EXCEEDING AL	EXCEEDS AL	TYPICAL SOURCE
Inorganic Contaminants							
Lily Lake							
Asbestos - MFL	7	7	0	2021	0	No	Decay of asbestos cement in water mains; Erosion of natural deposits
System Wide							
Copper – ppm Consumer taps	1.3	1.3	0.29	2019	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead – ppb Consumer taps	0	15	1.03	2019	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

ANNUAL VOLUME BY SOURCE, 2016 - 2021

MILLIONS OF GALLONS

YEAR	LILY LAKE	PIEDAD	WELLFIELD	TOTAL
2016	82.574	22.434	2.106	105.613
2017	75.795	26.329	0.415	102.539
2018	83.723	23.020	0.000	106.743
2019	78.986	22.222	4.556	101.208
2020	61.851	29.251	1.260	91.102
2021	46.205	37.737	0.276	83.942
TOTAL	429.134	160.993	8.613	591.147

ANNUAL VOLUME BY SOURCE, 2016 - 2021

PERCENTAGE OF TOTAL VOLUME

YEAR	LILY LAKE	PIEDAD	WELLFIELD	TOTAL
2016	78.2	21.2	2.0	100.0
2017	73.9	25.7	0.4	100.0
2018	78.4	21.6	0.0	100.0
2019	78.0	22.0	4.5	100.0
2020	67.9	32.1	1.4	100.0
2021	55.0	45.0	0.3	100.0
AVERAGE	71.9	27.9	1.4	100.0

2021 Water Quality Data

2021 System Milestones

- Water Conservation with Leak Detection Program

Data tables on page 11 show the community usage reduction for 2020 and 2021. Leak Detection Program implemented in 2020.

CONTAMINANTS	MCLG or MRDLG	MCL, TT or MRDL	YOUR WATER	RANGE LOW	RANGE HIGH	SAMPLE DATE	VIOLATION	TYPICAL SOURCE
Inorganic Contaminants								
LILY LAKE & PIEDAD SPRING								
Barium - ppm	2	2	0.016	NA	NA	2013	No	Erosion of natural deposits; Discharge of drilling wastes & metal refineries
Chromium - ppb	100	100	0	NA	NA	2013	No	Erosion of natural deposits; Discharge from steel & pulp mills
Fluoride – ppm	4	4	0	NA	NA	2013	No	Erosion of natural deposits; Water additive; Discharge from fertilizer & aluminum factories
Selenium - ppb	50	50	0	NA	NA	2013	No	Erosion of natural deposits; Discharge from mines, petroleum & metal refineries
Beryllium - ppb	4	4	0	NA	NA	2013	No	Discharge from metal refineries & coal-burning factories, electrical, aerospace & defense industries
Arsenic - ppb	10	10	0	NA	NA	2017	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass & electronics wastes

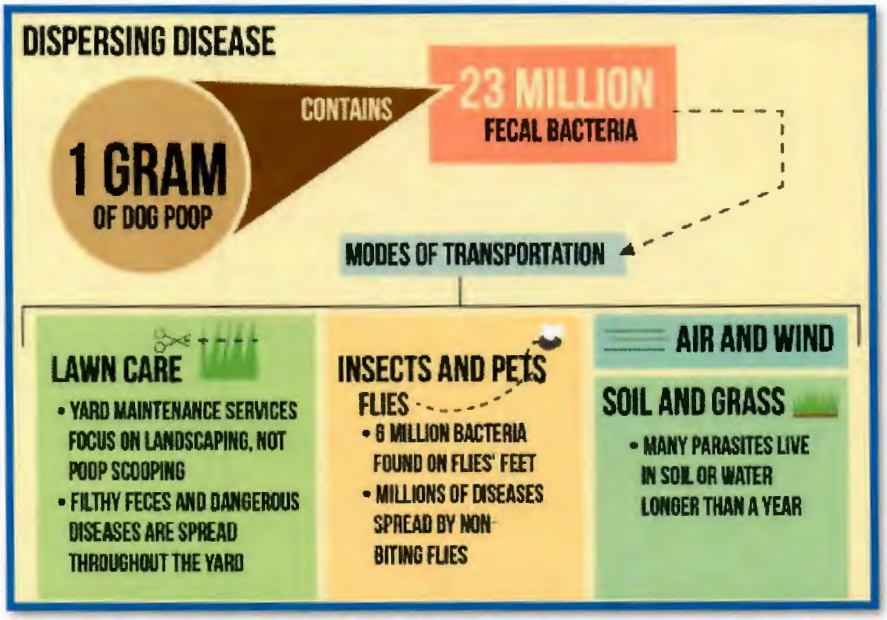
CONTAMINANTS	MCLG or MRDLG	MCL, TT or MRDL	YOUR WATER	RANGE		SAMPLE DATE	VIOLATION	TYPICAL SOURCE
				LOW	HIGH			
Inorganic Contaminants								
CRYSTAL CATHEDRAL								
Barium – ppm	2	2	0.04	NA	NA	2013	No	Erosion of natural deposits; Discharge of drilling wastes & metal refineries
Chromium - ppb	100	100	1.24	NA	NA	2013	No	Erosion of natural deposits; Discharge from steel & pulp mills
Fluoride – ppm	4	4	0.17	NA	NA	2013	No	Erosion of natural deposits; Water additive; Discharge from fertilizer & aluminum factories
Selenium - ppb	50	50	0.90	NA	NA	2013	No	Erosion of natural deposits; Discharge from mines, petroleum & metal refineries
Beryllium - ppb	4	4	0.27	NA	NA	2009	No	Discharge from metal refineries & coal-burning factories, electrical, aerospace & defense industries
Arsenic - ppb	10	10	0	NA	NA	2017	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass & electronics wastes

- **Piedad Spring Expansion**
  Additional sources to be added to original spring
- **December 2021 Severe Weather Recovery**
  Repairs and improvements continue to maintain water and wastewater systems assets

More Water Quality Data & Definitions

CONTAMINANTS	MCLG or MRDLG	MCL, TT or MRDL	YOUR WATER	RANGE LOW	RANGE HIGH	SAMPLE DATE	VIOLATION	TYPICAL SOURCE
Radioactive Contaminants								
LILY LAKE								
Alpha Emitters PCI/L	NA	15	0	NA	NA	2017	No	Erosion of natural deposits
Radium 226/228 PCI/L	NA	5	0.12 0.18	NA	NA	2017	No	Erosion of natural deposits
CRYSTAL CATHEDRAL								
Alpha Emitters PCI/L	NA	15	2.0	NA	NA	2017	No	Erosion of natural deposits
Radium 226/228 PCI/L	NA	5	0.11 0.69	NA	NA	2017	No	Erosion of natural deposits
PIEDAD SPRING								
Alpha Emitters PCI/L	NA	15	0	NA	NA	2017	No	Erosion of natural deposits
Radium 226/228 PCI/L	NA	5	0.048 0	NA	NA	2017	No	Erosion of natural deposits

IMPORTANT DRINKING WATER DEFINITIONS	
Term	**Definition**
AL	**Action Level:** concentration of a contaminant that triggers treatment or other requirements for the water system
HAA5	**Haloacetic Acid:** a byproduct of drinking water chlorination
MCL	**Maximum Contaminant Level:** highest level of a contaminant allowed in drinking water; MCLs are set as close to the MCLGs as feasible using the best available treatment technology
MCLG	**Maximum Containment Level Goal:** level of a contaminant in drinking water below which there is no known or expected risk to health; MCLGs allow for a margin of safety
MFL	**Million Fibers per Liter** (fibers >10 micrometers)
MNR	**Monitored Not Regulated**
MRDL	**Maximum Residual Disinfectant Level:** highest level of a disinfectant allowed in drinking water; convincing evidence shows that the addition of a disinfectant is necessary for control of microbial contaminants
MRDLG	**Maximum Residual Disinfection Level Goal:** level of a drinking water disinfectant below which there is no known or expected risk to health; MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants
NA	**Not Applicable**
ND	**Not Detected**
NR	monitoring **Not Required** but recommended
PCi/L	**Picocuries per Liter** (a measure of radioactivity)
ppb	**parts per billion** or micrograms per liter (µg/L)
ppm	**parts per million** or milligrams per liter (mg/L)
TT	**Treatment Technique**
TTHM	**Total Trihalomethanes:** group of disinfection byproducts that form when chlorine compounds are used to disinfect water.



Monitoring & Reporting of Data Compliance Violations

Violations

- Regular monitoring produced four irregularities: last year's CCR was submitted to DEC late; a low chlorine level for a March 1 sample; a high turbidity reading for an April 1 sample; and a February 1 sample was delayed due to inclement weather.

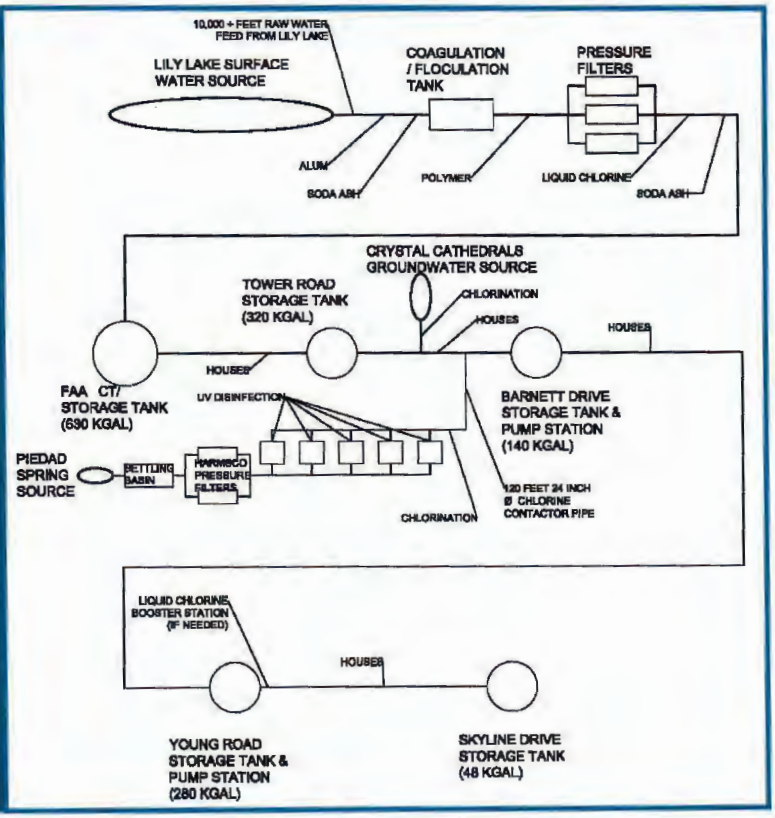
Copper Action Level Exceeded

- Copper (Cu) is a reddish metal that is commonly used in household plumbing. It is also an essential nutrient for humans in small amounts; however, too much copper can cause adverse health effects. Water that is corrosive can leach Cu from pipes into drinking water. Water Treatment Plant Operators use soda ash to adjust the pH and reduce corrosivity. The longer water has stood idle in copper pipes, the more likely Cu will be in your water.
- The EPA Action Level for copper was exceeded at two of the 10 testing sites in 2015 and 2016. Monitoring for copper and lead was increased from 10 samples per year to 40 samples (quarterly tests at 10 sample sites) in 2015 and 2016. 20 samples were taken in 2017; 10 samples in 2018; and three samples in 2019. All the sample results from consumer taps for these three years were below the Action Level.

How To Reduce Copper Exposure

- To reduce exposure to copper, run your household water used for cooking and drinking until the water is colder (30 to 60 seconds) anytime it has not been used for more than six hours to clear the pipes and bring in fresh water. Hot water dissolves copper more quickly than cold water; if you need hot water for cooking or drinking, take water from the cold tap and heat it.

Schematic of Haines Borough Water System



Pledge to Protect Community Water Sources

Additional Information

If you have questions about this report or need more information, contact:

Dennis Durr
WTP Operator
P0 Box 1209
Haines, AK 99827
907-766-2200 or
907-766-2716
ddurr@haines.ak.us

WATER DATA

Haines Borough – Water-Sewer Rate Schedule

(See HBC Title 13 for regulations and more information)

Effective Date	07/01/2022	07/01/2023	07/01/2024	07/01/2025
Flat Rate Residential Service				
Water	$41.00	$43.05	$45.20	$47.45
Sewer	$54.75	$56.45	$58.25	$60.20
Total Monthly Residential Flat Rate	**$95.75**	**$99.50**	**$103.45**	**$107.65**
Unmetered Commercial Service ¾" (existing non-conforming)				
Water	$41.00	$43.05	$45.20	$47.45
Sewer	$54.75	$56.45	$58.25	$60.20
Total Monthly Rate ¾" Unmetered Commercial:	**$95.75**	**$99.50**	**$103.45**	**$107.65**
¾" Metered Commercial Service*				
Water	$38.60	$40.50	$42.55	$44.70
Sewer	$52.70	$54.30	$56.00	$57.85
Total Monthly Rate ¾" Commercial Service:	**$91.30**	**$94.80**	**$98.55**	**$102.55**

*Includes the first 5,000 gallons of water used per month

Multi-dwelling Residential Flat Rate (apartments)

Multi-dwelling flat rate Per unit -**3 to 4 units**				
Water	$40.20	$42.20	$44.30	$46.50
Sewer	$53.65	$55.30	$57.05	$58.95
Total Monthly Rate Per Unit (3-4)	**$93.85**	**$97.50**	**$101.35**	**$105.45**
Multi-dwelling flat rate Per unit -**5 or more units**				
Water	$39.35	$41.35	$43.40	$45.55
Sewer	$52.55	$54.15	$55.85	$57.65
Total Monthly Rate Per Unit (5+)	**$91.90**	**$95.50**	**$99.25**	**$103.20**

Water Demand Charge (additional monthly charge for commercial service larger than ¾")

1" Service	$12.16	$12.77	$13.41	$14.08
1½" Service	$24.31	$25.52	$26.80	$28.14
2" Service	$36.47	$38.29	$40.20	$42.21
3" Service	$72.92	$76.57	$80.40	$84.42

Monthly Surcharge for Crystal Cathedrals Special Assessment District

	WATER	SEWER
Commercial / Residential Surcharge as of 07/01/2022	$7.75	$3.35
Total Combined Surcharge for Water-Sewer Service:	**$11.10**	

Extra Gallonage Charge Each 1,000 gals or fraction thereof used after the minimum usage charge

Water	$2.68	$2.81	$2.95	$3.10
Sewer	$7.00	$7.35	$7.72	$8.10

Note: If a commercial service includes residential dwellings, an additional 5,000 gals is allowed for each dwelling, covered by the residential flat rate charge as defined in HBC 13.04.240.

Hook-Up Fees

	WATER	SEWER
Minimum Hook-Up Fee (upon completion applicant will be billed for costs in excess of the minimum)	$750.00	$650.00
Water Hook-up Inspection Deposit	200.00	n/a
Inspection Fee per Hook-Up	$100.00	$100.00
Water Main Extension Inspection Fee - First 100 Feet ~Each Additional Foot	$100.00 $1.00	$100.00 $1.00

Expansion Charges

Size of Water Service Line	Capacity (GPM)	WATER	SEWER
¾" – 1" commercial	8 – 15	$450.00	$500.00
1-1/2" commercial	45	$1,030.00	$1,040.00
2" commercial	80	$1,830.00	$2,030.00
4" commercial	500	$7,300.00	$8,120.00

Other Water & Sewer Fees and Charges

Water and/or Sewer Service Application fee	$75.00
Subdivision application for five or more services	$150.00
Other Agency Permit Fee	Cost of the Permit plus $50
Meter Installation Fee	Actual cost of installation
Meter Inspection Fee	$40.00
Meter Testing Fee	Actual cost +15%
Frost Bottom Replacement	$50.00
Control Valve Shut-off or Turn-on ~Minimum service fee (if water is off for less than 3 months) ~Seasonal Turn-on/off (if water is off for 3 months or more) ~Excess fees, if necessary	 $40.00 $100.00 $50/hour
Bulk Water (PC Dock, Boat Harbor, Fill Station, & Hydrants,) ~Per 1,000 gallons ~Service Charge (does not apply to water fill station)	 $6.00 $75.00
After Hours Employee Call-Out	$150.00
Deposits and Credit Establishment	$100 for water and $100 for sewer
Unauthorized Water Turn On ~Charge to Shut Off Water at the Main or Remove Meter	Actual cost to the water department plus $250
Termination or Restoration of Sewer Service ~Minimum Service Charge (nonrefundable)	Actual cost +15%
Septic Waste Disposal (at sewage plant only) per load	$20.00 for each 100 gals or fraction thereof $100 minimum
RV Dump Stations	$60.00
RV Parks	Same as Metered Commercial

10.0 APPENDICES

APPENDIX B: WATER SYSTEM INFORMATION

- **ADEC**
  - **2022 Sanitary Survey Summary**
  - **2022 Monitoring Summary for Haines Borough**
  - **2023 Monitoring Summary for Haines Borough**
  - **Master Plan Review Communication**

THE STATE of ALASKA
GOVERNOR MICHAEL J. DUNLEAVY

Department of Environmental Conservation

DIVISION OF ENVIRONMENTAL HEALTH
Drinking Water Program

43335 Kalifornsky Beach Rd., Ste. 11
Soldotna, Alaska 99669
Main: 907.262.5210
Fax: 907.262.2294
dec.alaska.gov

September 14th, 2022

Haines Borough
Dennis Durr
P. O. Box 1209
Haines, AK 99827

RE: Haines Borough, Sanitary Survey Date 7/14/2022, PWSID#: 111566; Community Water System; Source(s): Surface Water; 2022 Sanitary Survey Response Letter and Report

Dear Mr. Durr:

This letter is the follow-up to the sanitary survey conducted by Bill Joiner on 7/14/2022, at Haines Borough Public Water System. The Drinking Water Program received the sanitary survey on 8/14/2022 & additional information from the surveyor on 8/29/2022. Based on the onsite inspection we have determined that your system has 2 significant deficiencies, 1 minor deficiency, and 6 recommendations. Deficiencies, reminder(s) and recommendation(s), along with required action deadlines, are included in the enclosed deficiency list. Documentation with written verification that the listed deficiencies have been corrected (including photo documentation where appropriate) is required to close out the deficiencies.

Please be advised that any modifications to the drinking water system other than routine repairs must first be approved by the Drinking Water Program. Please contact one of our engineers before making any changes, to determine if you need to submit engineered plans for approval.

Drinking Water Regulations under 18 AAC 80.430 establish that Haines Borough Public Water System must have a sanitary survey conducted at least every 3 years. Your next sanitary survey will be during the calendar year of 2025. If you have any questions about this survey or its findings, please contact me at (907) 262-3420 or via email at christina.harris@alaska.gov.

Sincerely,

C. Harris

Christina Harris
Environmental Program Specialist
Drinking Water Program, Soldotna Office

Enclosure(s): 2022 sanitary survey report

Cc'd via email: DEC Operator Certification

Amy Hill & Charity Bare, ADEC, Drinking Water Program
Bill Joiner, Joiner Engineering LLC, PE

Haines Borough
(AK111566)
Sanitary survey
7/14/2022

By 10/14/2022 contact DEC to discuss corrective actions or provide a corrective action plan with a timeline for each Significant deficiency listed below. Each Minor deficiency listed below must be corrected by 1/12/2023. If you are unable to meet this timeline, you will need to include this in the discussion with DEC or include them in the corrective action plan.

Significant Deficiency

- The surveyor noted that the RPZ backflow preventor assembly at the Small Boat Harbor is not tested annually. Failure to annually test backflow preventors is considered a significant deficiency.
    - Please have a certified professional test the indicated backflow preventor & submit photo documentation of the service receipt as proof of completion to the Department.

- The surveyor noted that the interior ladder of the Skyline Drive water storage tank was damaged by ice & is actively rusting. A water storage tank that is not clean and free from contamination is considered a significant deficiency.
    - Please remove & replace the interior tank ladder & submit photo documentation of the correction to the Department.

Minor Deficiency

- The surveyor noted that the FAA Road water storage tank was potentially unsafe & difficult to access due to the presence of a public radio antenna. This is considered a minor deficiency.
    - Due to the constrictions of the public radio antenna presence, the surveyor was unable to get photos of the inside of the water storage tank, which is required for a sanitary survey.
        - To complete the requirements of the sanitary survey, please submit supplementary photos of the interior of the FAA Road water storage tank to the Department.

Recommendations / Reminders

Items listed below are recommendations, reminders, and notifications; the Department encourages you to adopt these recommendations, when possible.

- The surveyor noted that the RPZ backflow preventor assembly at the Small Boat Harbor is installed in a pit.
    - This is typically considered a significant deficiency, however the surveyor provided additional documentation that the pit drains to daylight into an area free of obstructions, which satisfies the concern for flooding.
        - Should the pit flood or the drainpipe becomes permanently obstructed, the system will have to submit engineering plans to update the design to remove the assembly from the pit. For questions, please contact Charity Bare, ADEC Engineer, at 907-262-3400 or charity.bare@alaska.gov

- The surveyor noted that the Crystal Cathedrals wells (East & West) do not have spare pumps or critical pump parts readily available. Additionally, the West well pumps are not in good operating condition & the electrical wiring is not maintained properly.
    - These are typically considered deficiencies, however these wells serve as a backup source for the system & are not routinely utilized.
        - Please continue to maintain these wells in a sanitary condition should they need to be utilized in the event of an emergency.

- The surveyor noted that the Tower Road Storage Tank had some minor leaks at the time of inspection.
    - As per the surveyor's notes, it is common for wood stave tanks to have a small amount of seeping & is therefore not considered a deficiency at this time.

- The surveyor noted that the FAA Road, Skyline Drive, Young Road & Barnett Drive water storage tanks have not been cleaned in recent history.
    - Water storage tanks should be inspected annually & cleaned once every three years.

- The surveyor found no auto-switch for disinfection units to prevent a break in disinfection at the treatment plants at Piedad or Lily Lake locations. These were flagged as significant deficiencies.
    - The deficiency report noted any break in chlorination triggers an alarm which calls 911 & the dispatcher contacts system operator.
        - The Department considers the surveyors notes adequate to address these deficiencies. However, should the conditions change, please contact ADEC Engineer Charity Bare (charity.bare@alaska.gov; 907-262-3400) to discuss any future modifications to the system.

- The surveyor noted there is no HAZCOM signage on the Piedad Treatment Plant chlorination setup.
    - Proper HAZCOM labeling with the chemical contents clearly identified is strongly recommended for the chlorine mixing tank, pumps, chemical storage area, & door to plant.

Water Storage Tank Inspection/Cleaning – storage tanks should be inspected and cleaned in accordance with AWWA standard C652-92.

Additional Surveyor Recommendations – the surveyor also made additional recommendations in their survey cover letter. Please review them and address them when possible.

***Recommendation* - Best Management Practices (Disinfection)** - When conducting routine maintenance or emergency repair, public water systems should properly disinfect and verify the well and distribution system to be free of Coliform bacteria in accordance with applicable AWWA standards or methods approved by the department. Flushing the water system to move stagnant water is also recommended. Small drinking water systems that are properly maintained can prevent problems, enhance public health protection, improve the system's reliability, and help reduce the costs of maintaining the water system.

Reminder General Compliance - If required samples are not taken, compliance schedules (noted deficiencies) or reports are not completed within the appropriate timeframe, violations are issued. When violations are not addressed in a timely manner, this can lead to increased enforcement actions and your system listed on the EPA's national Enforcement Targeting Tool (ETT).

Emergency Notification - In May 2019 an addition to the Drinking Water Regulations in section *18 AAC 80.057* went into effect: Notifying the department of an emergency. This regulation requires the owner or operator of a public water system to report emergencies to the Drinking Water Program within 24 hours of the start of the emergency. An emergency is something that causes damage, disrupts normal operations and requires immediate action to protect public health. Systems are required to notify the Drinking Water Program by phone or email of an emergency. Drinking water staff will then document the emergency and any follow up activities to address the emergency.

Pressure Drop - Water system owners/operators must notify the department immediately after the distribution system's pressure drops below 20 psi. The Drinking Water Regulations section *18 AAC 80.200(5)* requires that at least 20 psi of service pressure at the highest elevation or pressure zone of a distribution main be maintained under peak design demand. Systems are required to notify the Drinking Water Program by phone or email of an emergency.

Record retention requirements - According to *40 CFR 141.33*, all PWSs are required to maintain records on site or at a convenient location near the premises for sample results, distribution system maintenance records and plans of the water system. Record retention requirements are outlined below.

Records to Keep	***Period of Time Years***
✓ Public Notices	3
✓ Actions to correction violations	3
✓ Bacteriological Analysis	5
✓ Chemical Analysis	10
✓ Sanitary Survey Reports	10
✓ Approval(s) to Operate	Recommended Indefinitely
✓ Maintenance/Repair Records	Recommended Indefinitely
✓ RTCR Sample Siting Plan	Until Superseded - Recommended Indefinitely

PWSID#: 111566 Haines Borough 2022 Sanitary Survey Corrective Action Plan

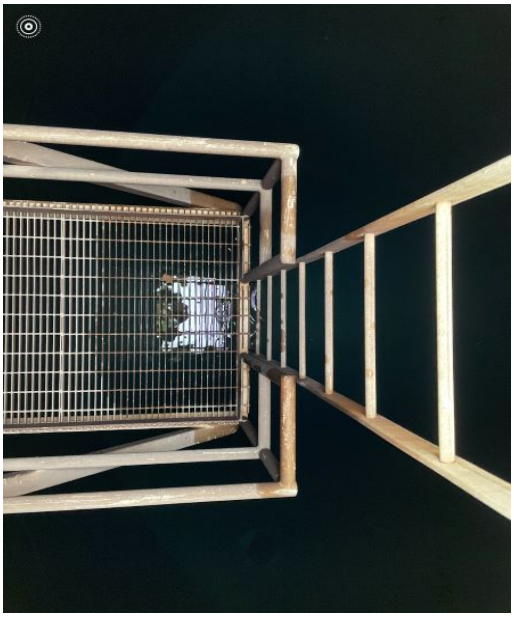
Significant Deficiencies

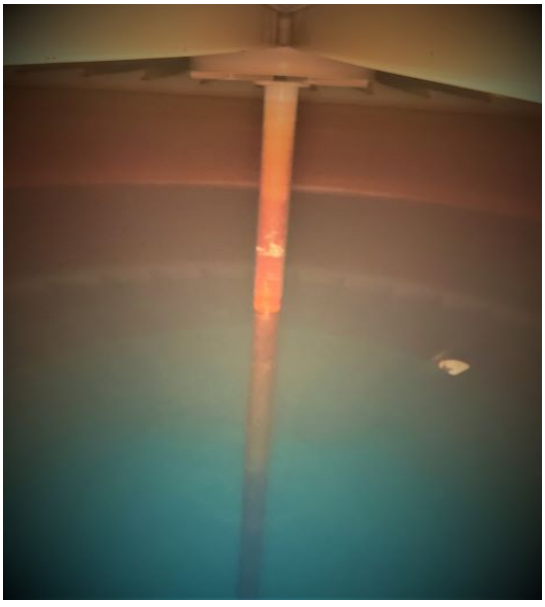
1. RPZ Backflow Preventer Small Boat Harbor corrective action: The Haines Small Boat Harbor water system is not currently active. (Seasonal from May-Sept) Our current corrective plan is to have the Alaska Rural Water Association test the backflow preventer on their next annual site visit. Our long term corrective action plan is to have at least one of our operators certified as a backflow preventer tester when a class is available.

2. Skyline water storage tank corrective action: On October 3, 2022 we removed the damaged ladder from the Skyline tank. Attached is a picture of the ladder removed.

Minor Deficiencies

1. FAA Road water storage tank corrective action: On October 11, 2022 we were cleared by the local radio station to safely inspect the FAA Road tank. The inside of the tank appears to be clean and in good condition. I have included pictures of the interior inspection.





Recommendation corrective actions:

Hazcom signage Piedad Water Treatment Plant: A hazcom sign has been hung in the Piedad Water Treatment Plant building at the calcium hypochlorate mixing tank.

Water Storage Tank Inspection/Cleaning:

1. Young Road water storage tank was emptied, inspected, cleaned, chlorinated, flushed and TC sampled/tested on September 25, 2022. A picture of operator Henry Pollan cleaning the inside of Young Road tank is attached below.

2. Barnett Tank We plan to replace a Pax mixer in Novemeber. The storage tank will need to be emptied for the installation. At that point we are planning to clean, inspect, disinfect and TC test the tank before we bring it back online.
3. Skyline Tank Currently we cannot drain and clean the tank without dozens of homes losing water service for at least 48hrs. Shut down will require tank draining, cleaning, filling and a negative TC Bacteria sample before it is brough back online. Our long term plan is to have VFD pumps designed/installed in the Skyline Tank water lift station. This change will allow maintenance on the tank and maintain pressure in the Skyline neighborhood at the same time .
4. FAA Road Storage Tank We are working on a plan that allows us to shut down FAA Tank for cleaning, and continue to meet the chlorine contact time requirments for drinking water leaving Lily Lake Water Treatment Plant. We hope to form a plan that allows cleaning of the FAA Tank and avoid a townsite boil water notice.

We will document all additional corrective actions. If you have questions or need additional documentation I will respond promptly.

Sincerely,

Dennis A Durr

HB Water and Sewer Department Supervisor

Monitoring Summary for HAINES BOROUGH

Public water system ID#AK2111566 **Population: 1748** **January 25, 2022**

Community Water System, Surface water

	Requirement	Sample Point ID	Required Sampling Frequency	Last Sample	Next Sample
	Sanitary Survey		Every 3 years	07/10/2019	2022
DS HAINES BOROUGH (Facility ID:DS001)					
	COLIFORM (TCR)	SPDS001TCR	2 sample(s) monthly	12/27/2021	Monthly, according to Sample Siting Plan
	TTHM & HAA5 (DBP2)	SPDS1DBP2-1	1 sample(s) quarterly	09/27/2021	See stage 2 sampling detail information below
	LEAD AND COPPER	SPDS001PC	10 sample(s) every 3 years	09/25/2019	2022
	ASBESTOS - SINGLE	SPDS001ASBS	1 sample(s) per 9 year cycle	04/05/2021	Between 2029 and 2037
SP PIEDAD SPRING (Facility ID:SP001)					
	LT2 E. COLI	SPSP001	1 sample every 2 weeks	09/25/2017	2024
TP LILY LAKE (Facility ID:TP001)					
	SOC	SPTP001	1 sample(s) quarterly		2020-2022 SOC Waiver Granted
	NITRATE	SPTP001	1 sample(s) annually	03/08/2021	2022
	VOC	SPTP001	1 sample(s) annually	06/21/2021	2022
	ARSENIC - SINGLE	SPTP001	1 sample(s) per 9 year cycle		Between 2020 and 2028
	INORGANICS	SPTP001	1 sample(s) per 9 year cycle		Between 2020 and 2028
	GROSS ALPHA	SPTP001	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
	RADIUM 226 AND 228	SPTP001	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
TP PIEDAD (Facility ID:TP002)					
	SOC	SPTP002	1 sample(s) quarterly		2020-2022 SOC Waiver Granted
	VOC	SPTP002	1 sample(s) annually	03/03/2020	2022
	NITRATE	SPTP002	1 sample(s) annually	06/21/2021	2022
	INORGANICS	SPTP002	1 sample(s) per 9 year cycle		Between 2020 and 2028
	ARSENIC - SINGLE	SPTP002	1 sample(s) per 9 year cycle	04/10/2017	Between 2020 and 2028
	GROSS ALPHA	SPTP002	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
	RADIUM 226 AND 228	SPTP002	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
TP CRYSTAL CATHEDRALS (Facility ID:TP003)					
	SOC	SPTP003	1 sample(s) quarterly		2020-2022 SOC Waiver Granted
	NITRATE	SPTP003	1 sample(s) annually	09/27/2021	2022
	VOC	SPTP003	1 sample(s) per 3 year period	08/12/2020	Between 2023 and 2025
	INORGANICS	SPTP003	1 sample(s) per 9 year cycle		Between 2020 and 2028
	ARSENIC - SINGLE	SPTP003	1 sample(s) per 9 year cycle	02/27/2017	Between 2020 and 2028
	GROSS ALPHA	SPTP003	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
	RADIUM 226 AND 228	SPTP003	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034

Stage 2 Sampling Detail Information - Sample frequency listed in requirements above				
Contaminant	Sample Pt. ID	Location	Sample Count	Sample Dates
DBP2	SPDS1DBP2-1	SKYLINE FH	1	March, June, September, and December

Operator Report				
Requirement	Location	Sampling Frequency	Last Report	
TURBIDITY - Lily Lake	After Filters	Daily - every 4 hours while treatment plant is operating	11/01/2021	Test and record daily. Send reports to ADEC on the last day of the month (before the 10th day of the following month).
TURBIDITY - Piedad	After Filters	Daily - every 4 hours while treatment plant is operating	11/01/2021	
CHLORINE	Distribution System	Same time/place as routine TCR sample	12/01/2021	
CHLORINE - Lily Lake	Entry Point	Daily - Minimum EP CL= 0.2 mg/L	11/01/2021	
CHLORINE	Entry Point	1 samples 20 days per month	11/01/2021	
CHLORINE - Piedad	Entry Point	Daily - Minimum EP CL= 0.4 mg/L	11/01/2021	
CHLORINE - Crystal Cathedrals	Entry Point	Daily - while operating	11/01/2021	

Compliance Schedules		
Schedule/Action	Due	Comments
Sanitary Survey Corrective Actions		
CORRECTIVE ACTION	12/31/2020	The surveyor noted that there is no overflow pipe at the Piedad spring source. The pictures provided with the survey indicate that the spring is a concrete structure covered with a piece of plywood held in place with a rock, and it is not clear if an overflow pipe is necessary. Please contact our engineer Charity Bare at charity.bare@alaska.gov or at 907-262-3400 to discuss: Spring box improvements at the Piedad Spring source and if engineer plan review is required for modifications. The unresolved plan review requirement for the fill station. A backflow prevention device was installed after being identified as a deficiency in the last survey report; however, we discovered that the addition of the fill station had not gone through engineer review. Update: info received 10/24/19 - pending SForgue review - deadline extended to end of year. 10/31/19 Review: plan submittal needed with request for FATO for fill station, overflow pipe to be added to deign by BJoiner in March 2020- added pictures showing secured HDPE spring box lid. Per emails, extended deadline. Deadline for plan submittal for fill site extended based on 8/5/20 emails. JForgue 6/8/2021- PWS representative indicated project to address deficiency was to be completed by July 2021. Please provide status update ASAP.
Consumer Confidence Report		
CCR - SUBMITTAL	06/30/2022	CCR due to customers and DEC by July 1, 2022
CCR - CERTIFICATION PAGE	09/30/2022	CCR Certification due to DEC by October 1, 2022

**NSF = No sample found

1) Periods are three years in length. The current period is 1/1/2020 - 12/31/2022 and the next period will be 1/1/2023 - 12/31/2025. Cycles are nine years in length. The current cycle is from 1/1/2020 - 12/31/2028 and the next cycle is 1/1/2029 - 12/31/2037.
2) Periods for radionuclides (gross alpha, radium 226/228, and uranium) are three or six years in length. The current 6 year period is 01/01/2020 - 12/31/2025, the next 6 year period will be 01/01/2026 - 12/31/2031. Cycles for radionuclides are nine years in length. The current cycle is from 01/01/2017 - 12/31/2025 and the next cycle is 01/01/2026 - 12/31/2034.
3) WL (well) or TP (treatment plant) is the entry point to the distribution system, except for raw water samples and WL (well) is the raw water tap. DS (distribution system) is the home and buildings that receive water from a piped water system.
4) Water quality parameters are tested in order to conduct a corrosion control study. Please contact your engineer, health corporation, or certified laboratories for assistance.
5) Lead/Copper samples on an annual or 3 year schedule should be collected in month of warmest water temperature.
6) Water systems with multiple water sources that do not combine before entering the distribution must take one sample from each entry point to the distribution and may do a composite sample according to 18AAC80.325(17), 18AAC80.315(4).
7) SOC waiver renewal forms are due every three year period. SOC waiver, new and renewal, forms can be found at http://dec.alaska.gov/eh/dw/soc/.
8) Each public water system is required to have a water operator (or operators) certified at or above the drinking water treatment and drinking water distribution level assigned to the system. To check on current level of certification for your water operator please see the Alaska Certified Water/Wastewater Operator Database maintained by the Division of Water: https://dec.alaska.gov/Applications/Water/OpCert/Home.aspx?p=OperatorSearch. If you have questions regarding the water system level or the operator certification level please contact Operator Certification at 907-465-1139 or at dec.water.fco.opcert@alaska.gov.

Monitoring Summaries reflect sample results the Drinking Water Program has record of at the time the summary is drafted (see date at top of summary). If information appears incorrect or is inconsistent with previous monitoring summaries please contact DW staff. Monitoring summaries are part of the DW Program's compliance assistance efforts to summarize requirements to help water systems stay in compliance. However, they do not cover all items that may be required of a Public Water System (PWS), nor does it supersede the regulation requirement as outlined in the Code of Federal Regulations or the Alaska Administrative Code. The PWS owner/operator is required to understand or seek assistance in understanding what regulations apply to their PWS.

Monitoring summary completed by Christina Harris, Environmental Program Specialist/ADEC. If you have any questions please contact ADEC at (907) 262-3420 or 1-866-956-7656 Email: christina.harris@alaska.gov Fax: (907) 262-2294.

Sincerely,

Christina Harris
Environmental Program Specialist

Monitoring Summary for HAINES BOROUGH

Public water system ID#AK2111566 **Population: 1748** **February 9, 2023**

Community Water System, Surface water

	Requirement	Sample Point ID	Required Sampling Frequency	Last Sample	Next Sample
	Sanitary Survey		Every 3 years	07/14/2022	2025
DS HAINES BOROUGH (Facility ID:DS001)					
	COLIFORM (TCR)	SPDS001TCR	2 sample(s) monthly	02/01/2023	Monthly, according to Sample Siting Plan
	TTHM & HAA5 (DBP2)	SPDS1DBP2-1	1 sample(s) quarterly	12/19/2022	See stage 2 sampling detail information below
	LEAD AND COPPER	SPDS001PC	10 sample(s) every 3 years	12/06/2022	2025
	ASBESTOS - SINGLE	SPDS001ASBS	1 sample(s) per 9 year cycle	04/05/2021	Between 2029 and 2037
SP PIEDAD SPRING (Facility ID:SP001)					
	LT2 E. coli	SPSP001	1 sample every 2 weeks	09/25/2017	2024
TP LILY LAKE (Facility ID:TP001)					
	SOC	SPTP001	1 sample(s) quarterly		Submit SOC waiver renewal application by Sept 30, 2024
	NITRATE	SPTP001	1 sample(s) annually	06/13/2022	2023
	VOC	SPTP001	1 sample(s) annually	06/13/2022	2023
	ARSENIC - SINGLE	SPTP001	1 sample(s) per 9 year cycle		Between 2020 and 2028
	INORGANICS	SPTP001	1 sample(s) per 9 year cycle		Between 2020 and 2028
	GROSS ALPHA	SPTP001	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
	RADIUM 226 AND 228	SPTP001	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
TP PIEDAD (Facility ID:TP002)					
	SOC	SPTP002	1 sample(s) quarterly		Submit SOC waiver renewal application by Sept 30, 2024
	NITRATE	SPTP002	1 sample(s) annually	06/13/2022	2023
	VOC	SPTP002	1 sample(s) annually	06/13/2022	2023
	INORGANICS	SPTP002	1 sample(s) per 9 year cycle		Between 2020 and 2028
	ARSENIC - SINGLE	SPTP002	1 sample(s) per 9 year cycle	04/10/2017	Between 2020 and 2028
	GROSS ALPHA	SPTP002	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
	RADIUM 226 AND 228	SPTP002	1 sample(s) per 9 year cycle	10/24/2017	Between 2026 and 2034
TP CRYSTAL CATHEDRALS (Facility ID:TP003)					
	SOC	SPTP003	1 sample(s) quarterly		Submit SOC waiver renewal application by Sept 30, 2024
	NITRATE	SPTP003	1 sample(s) annually	06/13/2022	2023
	VOC	SPTP003	1 sample(s) per 3 year period	08/12/2020	Between 2023 and 2025
	INORGANICS	SPTP003	1 sample(s) per 9 year cycle		Between 2020 and 2028
	ARSENIC - SINGLE	SPTP003	1 sample(s) per 9 year cycle	02/27/2017	Between 2020 and 2028
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Stage 2 Sampling Detail Information - Sample frequency listed in requirements above				
Contaminant	Sample Pt. ID	Location	Sample Count	Sample Dates
DBP2	SPDS1DBP2-1	SKYLINE FH	1	March, June, September, and December

Operator Report				
Requirement	Location	Sampling Frequency	Last Report	
TURBIDITY - Lily Lake	After Filters	Daily - Every 4 hours while treatment plant is operating	12/01/2022	Test and record daily. Send reports to ADEC on the last day of the month (before the 10th day of the following month).
TURBIDITY - Piedad	After Filters	Daily - Every 4 hours while treatment plant is operating	12/01/2022	
CHLORINE	Distribution System	Same time/place as routine TCR sample	02/01/2023	
CHLORINE - Lily Lake	Entry Point	Daily - Minimum EP CL = 0.2 mg/L	12/01/2022	
CHLORINE - Piedad	Entry Point	Daily - Mimimum EP CL = 0.4 mg/L	12/01/2022	
CHLORINE - Crystal Cathedrals	Entry Point	Daily - While operating	12/01/2022	

Compliance Schedules		
Schedule/Action	Due	Comments
LCRR		
SUBMIT DRAFT LSL INVENTORY	04/24/2024	Submit Draft of Lead Service Line Inventory to DEC by 4/24/2024. For more information visit DW LCRR website https://dec.alaska.gov/eh/dw/lcrr/
SUBMIT LEAD SERVICE LINE INVENTORY	10/16/2024	Please submit a completed Lead Service Line Inventory to DEC by 10/16/2024.
Sanitary Survey Corrective Actions		
CORRECTIVE ACTION	05/31/2023	The surveyor noted that the RPZ backflow preventor assembly at the Small Boat Harbor is not tested annually. Failure to annually test backflow preventors is considered a significant deficiency. -Please have a certified professional test the indicated backflow preventor & submit photo documentation of the service receipt as proof of completion to the Department. 10/12/2022: Received notification that BFP is in operation May - Sept annually. System plans to have ARWA test the RPZ assembly in May 2023. Deadline extended from 1/12/2023 to 5/31/2023. -CRH
Consumer Confidence Report		
CCR - SUBMITTAL	06/30/2023	CCR due to customers and DEC by July 1, 2023
CCR - CERTIFICATION PAGE	09/30/2023	CCR Certification due to DEC by October 1, 2023

**NSF = No sample found

1) Periods are three years in length. The current period is 1/1/2023 - 12/31/2025 and the next period will be 1/1/2026 - 12/31/2028. Cycles are nine years in length. The current cycle is from 1/1/2020 - 12/31/2028 and the next cycle is 1/1/2029 - 12/31/2037.
2) Periods for radionuclides (gross alpha, radium 226/228, and uranium) are three or six years in length. The current 6 year period is 01/01/2020 - 12/31/2025, the next 6 year period will be 01/01/2026 - 12/31/2031. Cycles for radionuclides are nine years in length. The current cycle is from 01/01/2017 - 12/31/2025 and the next cycle is 01/01/2026 - 12/31/2034.

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8) Each public water system is required to have a water operator (or operators) certified at or above the drinking water treatment and drinking water distribution level assigned to the system. To check on current level of certification for your water operator please see the Alaska Certified Water/Wastewater Operator Database maintained by the Division of Water: https://dec.alaska.gov/Applications/Water/OpCert/Home.aspx?p=OperatorSearch. If you have questions regarding the water system level or the operator certification level please contact Operator Certification at 907-465-1139 or at dec.water.fco.opcert@alaska.gov.

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Monitoring summary completed by Christina Harris, Environmental Program Specialist/ADEC. If you have any questions please contact ADEC at (907) 262-3420 or 1-866-956-7656 Email: christina.harris@alaska.gov Fax: (907) 262-2294.

Sincerely,

Christina Harris
Environmental Program Specialist

From:	bjoiner@gci.net
To:	Edward Coffland; Dennis Durr; "Carolann Wooton"
Cc:	"nphlvh@gmail.com"
Subject:	FW: Haines Water/Sewer master plan
Date:	Monday, January 30, 2023 5:39:00 PM

From: Bare, Charity M (DEC) <charity.bare@alaska.gov>
Sent: Monday, January 30, 2023 4:14 PM
To: Bill Joiner <bjoiner@gci.net>
Subject: Haines Water/Sewer master plan

Hi Mr. Joiner,
Thanks for the call the other day. We spoke about whether the Haines Water/Sewer master plan needed to be submitted. The master plan isn't needed as long as plans are submitted for each water main extension/replacement. If you want to send it in though, we wouldn't object to having it as a reference for other projects.
Thanks,

Charity Bare, PE
ADEC Drinking Water Program
43335 Kalifornsky Beach Rd. Ste. 11
Soldotna AK 99669
Office: 907 262-3400
Cell: 907 953-2536

10.0 APPENDICES

APPENDIX B: WATER SYSTEM INFORMATION

- **ADNR**
  - **Water Rights**
  - **Well Logs**

We are now accepting payments online for case agreements and mining claims bills! To make a payment by credit card or from your bank account, click here.

Results - Water Rights

ATTENTION!

The data fields displayed here were established before the beginning use date for the water right case file increased data field format utilized on and after February 18, 2014.

File: ADL 52025

Customer Name: HAINES BOR **Customer ID:** 000125925

Case Status: CERTIFICATE ISSUED **Status Date:** 05/04/1971

Other num: C0000744 **File Location:** WATER MGT-JUNEAU

Source: A **Source Type:** LAKE OR OUTLET **Priority Date:** 12/31/1956

Meridian: C **Township:** 031S **Range:** 059E **Section:** 12 **Quarter Section:** NE **Quarter of Quarter Section:** NE

Latitude: 591217.5 **Longitude:** 13523354W

Usage: A **Sic Code:** 4941 PUBLIC WATER SUPPLY

Quantity: 58000.0 Gallons / Day **Starting MM/DD:** 01/01 **Ending MM/DD:** 12/31

Subdivision: CM,T31S,R59E,SEC12,NENE

Creek, River, Lake: None

Additional Information:

LILY LK NE 1/4 SEC 12. USE: CITY OF HA
INES

We are now accepting payments online for case agreements and mining claims bills! To make a payment by credit card or from your bank account, click here.

Results - Water Rights

ATTENTION!

The data fields displayed here were established before the beginning use date for the water right case file increased data field format utilized on and after February 18, 2014.

File: ADL 53556

Customer Name: HAINES BOR **Customer ID:** 000125925

Case Status: CERTIFICATE ISSUED **Status Date:** 09/20/1972

Other num: C0000895 **File Location:** WATER MGT-JUNEAU

Source: A **Source Type:** SPRING **Priority Date:** 02/25/1971

Meridian: C **Township:** 030S **Range:** 059E **Section:** 28 **Quarter Section:** NE **Quarter of Quarter Section:** NW

Latitude: 591451.8 **Longitude:** 13528371W

Usage: A **Sic Code:** 4941 PUBLIC WATER SUPPLY

Quantity: 500000.0 Gallons / Day **Starting MM/DD:** 01/01 **Ending MM/DD:** 12/31

Subdivision: CM,T30S,R59E,SEC28,NWNE

Creek, River, Lake: None

Additional Information:

3 UNNAMED SRR'S W/I S1/2S1/2 SEC 21; N
1/2 NE 1/4 & NENE SEC 28 W/COLLECTION
DEVICE INSESWNENE SEC 28. USE: CORP LIMI
TS CITY.

We are now accepting payments online for case agreements and mining claims bills! To make a payment by credit card or from your bank account, click here.

Results - Water Rights

ATTENTION!

The data fields displayed here were established before the beginning use date for the water right case file increased data field format utilized on and after February 18, 2014.

File: LAS 20016

Customer Name: HAINES BOR	**Customer ID:** 000125925	
Case Status: PERMIT PEND. ACTION	**Status Date:** 05/19/2005	
Other num: None	**File Location:** WATER MGT-JUNEAU	
Source: A	**Source Type:** DRILLED WELL	**Priority Date:** 08/22/1995
Well depth: 0.00	**Date Completed:**	**Contractor:** NOT ON FILE
Meridian: C **Township:** 030S **Range:** 059E **Section:** 28 **Quarter Section:** SE **Quarter of Quarter Section:** SE		
Latitude: 591416.1	**Longitude:** 13528446W	

Usage: A	**Sic Code:** 4941 PUBLIC WATER SUPPLY	
Quantity: 500000.0 Gallons / Day	**Starting MM/DD:** 01/01	**Ending MM/DD:** 12/31
Usage: B	**Sic Code:** 4941 PUBLIC WATER SUPPLY	
Quantity: 200000.0 Gallons / Day	**Starting MM/DD:** 05/01	**Ending MM/DD:** 09/30

Subdivision: CM,T30S,R59E,SEC28,SESE

Creek, River, Lake: 2 DRILLED WELLS IN WELL FIELD OF 2 WELLS 100' APART.

Additional Information:

WELLS IN UNSUBDIVIDED PORTION OF TRACT A, USS 205.
USE A: PVT. PROPERTY & PROPOSED S.A., S. 28,29,33, T30S, R59E.
USE B: DELIVER TO CITY OF HAINES, SW1/4SW1/4 S. 27, T30S, R59E.

24081

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ___/___/_____ Completed: 7 / 2 / 1997 Pump Install: ___/___/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
Haines	USS 0205			J FLORESKE ,

Well location: Latitude _____ **Longitude** _____
Meridian C Township 030S Range 059E Section 28 , SE 1/4 of SE 1/4 of _____ 1/4 of _____ 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

Drilling method: ☐ Air rotary, ☐ Cable tool, ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking
☐ Commercial, ☐ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling,
☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage,
☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 383 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: 333 ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: CASED TO 333 FT

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☐ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): 0 ft on___/___/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at 2 gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: CHANNEL DRILLING .....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/___/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

24081

RECEIVED
NOV 20 1997

CHANNEL DRILLING CO.
FINAL WELL REPORT

Property Owner John Floreske - Crystal Cathedrals Water System **Date** 10/28/97 **Code** T-53

Location 1.5 Mile Haines Hwy HNS **Well No.** 1 test well 1of 4

Legal Descript A Well field in an unsubdivided portion of Tract A, USS 205 in SE¼, SE¼ Sec 28 TS 30 South, Range ~~50~~ 59 East **Contract No.** 97-01

Adress P.O Box 34117, Juneau, Ak 99803 **Drill Rig No.** 2

Driller Frank Ramsey RAR **Date Started** 6/6/97 **Date Finished** 7/2/97

WELL LOG

Well Diameter 6 inches

Total Depth 383 feet

Depth Cased 332-11 feet

Static Level Flowing feet

CASING LOG

Casing Stick Up 2 ft **Casing I.D.** 6 inches

Casing Shoe Yes X No **Casing O.D** 6 5/8 inches

Casing Welded Yes X No **Casing Wt.** 17.02 Lbs

Surface Seal Yes Not Yet No **Perforated** Yes No X

8 in casing still in place

From To From To

SCREEN LOG

Make Johnson **Dia.** 6 inch

Metal Stainless S **Slot Sz** 25

Lenght 10 ft **Exposed** 9 ft

Fittings K packer **Total Fill** 4 ft

Depth Set 188 - 179

Type Surge air **Hours** 1.5

TEST PUMPING LOG

Date 6/23/97 **Hours Pumped** 1.5 **GPM** 120

Pump Make IR T-4 **Type** Air

Size Drop Pipe 4.5 inches **Draw Down** 187 feet

Time Water Cleared .5 hr Hours

Flow Test 1.5 Hours **G.P.H.** 120

Water To Be Used For Water System test well

Remarks: Tried #15 screen to fine - Set #25 - then tested - then pulled to go deeper

Flowing at both 188 ft and 375 ft

SITE ID

LOCAL NO. CD 30-59-28 DD

FORMATION LOG

From	To	
0	3	Fill
3	6	Gray Silt
6	11	Clay - few small rocks
11	16	" " " "
16	21	" " " "
21	26	" " " "
26	31	" " " "

24081

CHANNEL DRILLING CO.

FINAL WELL REPORT

FORMATION LOG

From	31	To	36	Clay - few small rocks
From	36	To	41	" " " "
From	41	To	46	" " " "
From	46	To	51	" " " "
From	51	To	56	" " " "
From	56	To	61	" " " "
From	61	To	63	" " " "
From	63	To	68	Clay - bk
From	68	To	73	" "
From	73	To	78	" "
From	78	To	79	" "
From	79	To	84	Clay gray - few small rocks - shells
From	84	To	89	" " " " "
From	89	To	94	" " " " "
From	94	To	99	" " " " "
From	99	To	104	" " " " "
From	104	To	109	" " " " "
From	109	To	114	" " " " "
From	114	To	119	" " " " "
From	119	To	124	" " " " "
From	124	To	129	" " " " "
From	129	To	134	" " " " "
From	134	To	139	" " " " "
From	139	To	144	" " " " "
From	144	To	149	Fine sand / few small rocks / water
From	149	To	154	" " " " "
From	154	To	159	" " " " "

CO 30-59-28 DD

CHANNEL DRILLING CO.
FINAL WELL REPORT

FORMATION LOG

From 159 To 164 Clay
From 164 To 169 "
From 169 To 172 "
From 172 To 177 Sand - gravel - silt
From 177 To 182 " " "
From 182 To 187 " " "
From 187 To 192 " " "
From 192 To 197 Clay
From 197 To 202 "
From 202 To 207 "
From 207 To 212 "
From 212 To 217 "
From 217 To 222 "
From 222 To 227 "
From 227 To 232 "
From 232 To 237 "
From 237 To 242 "
From 242 To 247 "
From 247 To 252 "
From 252 To 257 "
From 257 To 262 "
From 262 To 267 "
From 267 To 272 "
From 272 To 277 "
From 277 To 282 "
From 282 To 287 "
From 287 To 292 "

CD 30-59-28 DD

CHANNEL DRILLING CO.

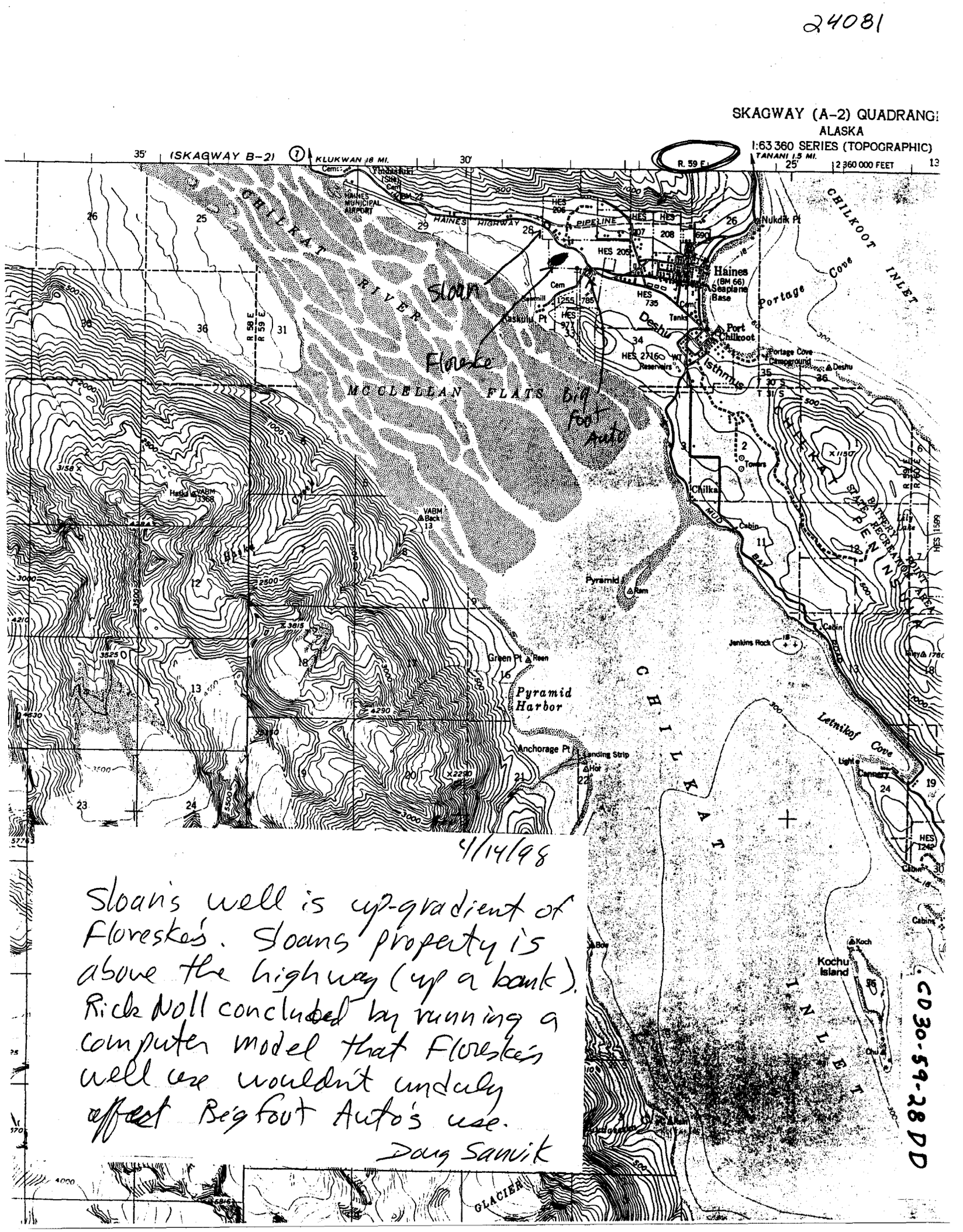
FINAL WELL REPORT

FORMATION LOG

From	292	To 293	Clay
From	293	To 297	Fine sand
From	297	To 302	Clay - silt - very fine sand
From	302	To 307	" " " " "
From	307	To 312	" " " " "
From	312	To 317	" " " " "
From	317	To 320	" " " " "
From	320	To 324	Very fine sand
From	324	To 326	Sand - pea rock
From	326	To 331	Clay
From	331	To 336	"
From	336	To 341	"
From	341	To 346	"
From	346	To 351	"
From	351	To 356	"
From	356	To 361	"
From	361	To 366	"
From	366	To 371	"
From	371	To 374	"
From	371	To 379	Gravel - sand - silt- water will not clear up
From	379	To 383	Bed rock
From		To	
From		To	
From		To	
From		To	
From		To	
From		To	

CD 30-59-28 DD

24081



4/14/98

Sloan's well is up-gradient of Floreske's. Sloans property is above the highway (up a bank). Rick Noll concluded by running a computer model that Floreske's well use wouldn't unduly affect Big Foot Auto's use.

Doug Samuit

CD30-59-28 DD

24089

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ___/___/_____ Completed: 9 / 11 / 1997 Pump Install: ___/___/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
Haines	USS 0205			J FLORESKE ,

Well location: Latitude _____ **Longitude** _____
Meridian C Township 030S Range 059E Section 28 , SE 1/4 of SE 1/4 of _____ 1/4 of _____ 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

Drilling method: ☐ Air rotary, ☐ Cable tool, ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking
☐ Commercial, ☐ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling,
☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage,
☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 191 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: _____ ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: _____

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☐ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): 0 ft on___/___/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at 500 gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: CHANNEL DRILLING .....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/___/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

24089

CHANNEL DRILLING CO.
FINAL WELL REPORT

LAS 20016

Property Owner John Floreske - Crystal Cathedrals Water System Date 10/28/97 Code T 62

Location 1.5 mile Haines Hwy HNS Well No. 2 Production 8 in

Legal Descript A well field in an unsubdivided portion of Tract A, USS 205 in SE ¼, SE ¼, Sec 28 TS 30 South, Range 59 East Contract No 97-10

Adress P.O. Box 34117, Juneau, Ak 99803 Drill Rig No. 2

Driller Frank Ramsey RAR Date Started 8/24/97 Date Finished 9/11/97

WELL LOG

Well Diameter 8 inches

Total Depth 191 feet

Depth Cased 177 feet

Static Level Flowing feet

CASING LOG

Casing Stick Up 2 ft

Casing Shoe Yes X No

Casing Welded Yes X No

Surface Seal Yes X No

From 0 To 19 ft

Casing I.D. 8 in inches

Casing O.D 8 5/8 inches

Casing Wt. 22.36 Lbs

Perforated Yes No X

From To

SCREEN LOG

Make Johnson Dia. 8 inch

Metal Stainless S Slot Sz 40

Lenght 15 ft Exposed 14 ft

Fittings K packer Total Fill 5 ft

Depth Set 191 - 177

Type Surge air Hours 2

TEST PUMPING LOG

Date 9/11/97 Hours Pumped 2 GPM 400-500 est

Pump Make IR T-4 Type air

Size Drop Pipe 4.5 inches Draw Down 190 feet

Time Water Cleared .5 Hours

Flow Test 2 Hours G.P.H. 24,000-30,000 est

Water To Be Used For Water system

Remarks:

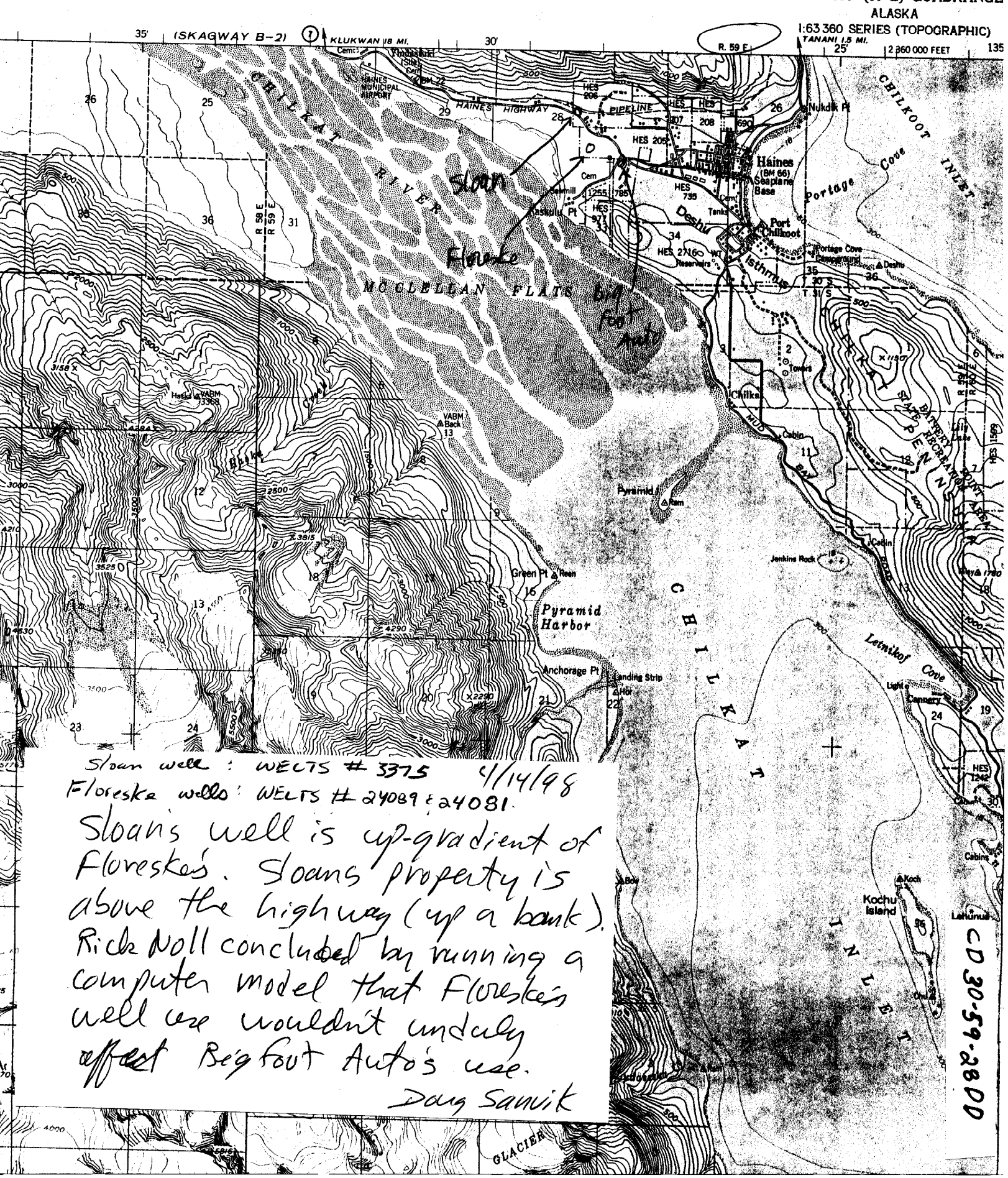
FORMATION LOG

From 0	To 3	Fill	From 170 to 192 Gravel - sand - water
From 3	To 21	Silt - Clay	
From 21	To 145	Clay	
From 145	To 155	Silt - sand - gravel	
From 155	To 160	Sand - gravel - water	
From 160	To 165	Gravel - Clay	
From 165	To 170	Clay - gravel	

SITE ID

LOCAL INFO CP 30-59-28 DD

24089



Sloan well: WELTS # 3375 4/14/98

Floreske wells: WELTS # 24089 & 24081.

Sloans well is up-gradient of Floreskes. Sloans property is above the highway (up a bank). Rick Noll concluded by running a computer model that Floreske's well use wouldnt unduly affect Bigfoot Auto's use.

Doug Sanvik

CD 30-59-2800

26014

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ____/____/_____ Completed: 5 / 29 / 1999 Pump Install: ____/____/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
Haines	USS 0205			J FLORESKE ,

Well location: Latitude _____ **Longitude** _____
Meridian C Township 030S Range 059E Section 34 , SE 1/4 of SE 1/4 of _____ 1/4 of _____ 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Drilling method: ☐ Air rotary, ☐ Cable tool, ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking ☐ Commercial, ☐ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling, ☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage, ☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 187 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: _____ ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: _____

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☐ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): _____ ft on____/____/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at _____ gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: CHANNEL DRILLING .....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/____/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

CHANNEL DRILLING CO.
FINAL WELL REPORT

Property Owner John Floreske - Crystal Cathedrals Water System Date 10/23/99 Code T-90

Location 1.5 mile haines Hwy Hns Well No. 3 6 in

Legal Descript A Well field in an unsubdivided portion of tract A, USS 205 in SE½, SE½ Sec 28 TS 30 S, Range 50E Contract No. 99-02

Adress P.O. box 34117, Juneau,Ak 99803 Drill Rig No. 2

Driller Frank Ramsey RAR Date Started 5/13/99 Date Finished 5/29/99

WELL LOG

Well Diameter 6 inches

Total Depth 187 feet

Depth Cased 187 feet

Static Level ------ feet

CASING INFORMATION

Casing Stick Up 1 Casing I.D. 6 inches

Casing Shoe Yes X No Casing O.D 6 5/8 inches

Casing Welded Yes X No Casing Wt. 17.02 Lbs

Surface Seal Yes X No Perforated Yes No X

From 18 To 8 From To

SCREEN LOG

Make NA Dia. inches

Metal Slot Sz

Lenght Exposed

Fittings Total Fill

Depth Set

Type Surge Hours

TEST PUMPING LOG

Date NA Hours Pumped GPM

Pump Make Type

Size Drop Pipe inches Draw Down feet

Time Water Cleared Hours

Flow Test Hours G.P.H.

Water To Be Used For

Remarks: not the same formation as other well,to fine (abandonded)

FORMATION LOG

From 0 To 2 Fill

From 2 To 150 Clay & silt

From 150 To 187 Silt and fine sand (no gravel)

From To

From To

From To

From To

26016

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
Alaska Hydrologic Survey

WATER WELL LOG Revised 08/18/2016

Drilling Started: ___/___/_____ Completed: 6 / 22 / 1999 Pump Install: ___/___/_____

City/Borough	Subdivision	Block	Lot	Property Owner Name & Address
Haines	USS 0205			J FLORESKE ,

Well location: Latitude _____ **Longitude** _____
Meridian C Township 030S Range 059E Section 34 , SE 1/4 of SE 1/4 of _____ 1/4 of _____ 1/4

BOREHOLE DATA: (from ground surface)
Suggest T.**M. Hanna's hydrogeologic classification system***
https://my.ngwa.org/NC__Product?id=a185000000BYub3AAD

	Depth From	Depth To

Include description or sketch of well location (include road names, buildings, etc.):

North

Drilling method: ☐ Air rotary, ☐ Cable tool, ☐ Other _____
Well use: ☐ Public supply, ☐ Domestic, ☐ Reinjection, ☐ Hydrofracking
☐ Commercial, ☐ Observation/Monitoring, ☐ Test/Exploratory, ☐ Cooling,
☐ Irrigation/Agriculture, ☐ Grounding, ☐ Recharge/Aquifer Storage,
☐ Heating, ☐ Geothermal Exploration, ☐ Other _____
Fluids used: _____

Depth of hole: 189 ft Casing stickup: _____ft
Casing type: _____ Casing thickness: _____ inches
Casing diameter: _____ inches Casing depth: 178 ft
Liner type: _____ Depth: _____ ft Diameter: _____inches
Note: CASE TO 178 FT, SCREEN TO 193 FT

Well intake opening type: ☐ Open end, ☐ Open hole, ☐ Other _____
Screen type: _____, Screen mesh size: _____
Screen start: _____ ft, Screen stop:_____ ft, Perforated ☐ Yes ☒ No
Perforation description:_____ Perf from: _____ ft, Perf to: _____ft, Perf from: _____ ft, Perf to: _____ ft
Gravel packed ☐ Yes ☐ No Gravel start: _____ ft , Gravel stop:_____ ft
Note: _____

Static water (from top of casing): _____ ft on___/___/_____ Artesian well ☐
Pumping level & yield: _____ feet after _____ hours at 400 gpm
Method of testing:_____
Development method:_____ Duration: _____
Recovery rate: _____ gpm

Grout type: _____ Volume _____
Depth: From _____ft, To _____ft

Final pump intake depth: _____ ft Model: _____
Pump size: _____ hp Brand name: _____

Was well disinfected upon completion? ☐ Yes ☐ No
Method of disinfection: _____
Was water quality tested? ☐ Yes ☐ No
Water quality parameters tested: _____

Well driller name: .....
Company name: CHANNEL DRILLING .....
Mailing address:.....
City: _____ State: AK Zip: _____
Phone number: (_____) _____- _____
Driller's signature: _____
Date: _____/_____/_____

AS 41.08.020(b)(4) and AAC 11 AAC 93.140(a) require that a copy of the well log be submitted to the Department of Natural Resources within **45 days of well completion**. Well logs may be submitted using the online well log reporting system available at:

https://dnr.alaska.gov/welts/

OR email electronic well logs to

dnr.water.reports@alaska.gov

Anchorage Municipal Code 15.55.060(I) and North Pole Ordinance 13.32.030(D) require that a copy of this well log be submitted to the Development Services Department/City within **30 days of well completion**.

City Permit Number: _____
Date of Issue: _____/___/_____

Parcel Identification Number: _____-_____-_____

*Guide for Using the Hydrogeologic Classification System for Logging Water Well Boreholes by Thomas M. Hanna NGWA Press

CHANNEL DRILLING CO.
FINAL WELL REPORT

Property Owner John Floreske - Crystal Cathedrals Water System **Date** 10/23/99 **Code** T-92

Location 1.5 Mile Haines Hwy Hns **Well No.** 4 8in

Legal Descript A well field in an unsubdivided portion of tract A, USS 205 in SE¼. Se¼, Sec30 TS 30 S, Range 50E **Contract No.** 99-04

Adress P.O. Box 34117, Juneau, Ak 99803 **Drill Rig No.** 2

Driller Frank Ramsey RAR **Date Started** 6/8/99 **Date Finished** 6/22/99

WELL LOG

Well Diameter 8 inches

Total Depth 189 feet

Depth Cased 178 feet

Static Level + 8.75 feet

CASING INFORMATION

Casing Stick Up 3 ft **Casing I.D.** 8 inches

Casing Shoe Yes X No **Casing O.D** 8 5/8 inches

Casing Welded Yes X No **Casing Wt.** 22.36 Lbs

Surface Seal Yes X No **From** 18 **To** 2

Perforated Yes No X **From** **To**

SCREEN LOG

Make Johnson **Dia.** 8 inches

Metal SS **Slot Sz** 60

Lenght 16 **Exposed** 15

Fittings k pack **Total Fill** 10 ft

Depth Set 178 - 193

Type Surge air **Hours** 2

TEST PUMPING LOG

Date 6/21/99 **Hours Pumped** 2 **GPM** 400

Pump Make IR T-$ **Type** air

Size Drop Pipe 4.5 inches **Draw Down** 190 feet

Time Water Cleared 1.5 Hours

Flow Test 2 **Hours** **G.P.H.** 24,000

Water To Be Used For Water system

Remarks:

after 1hr develop on #4 -- #2 SH +58 in./1.5hr SH +47in/ 2hr SH +42 in

after stop develope .75 hr SH +45in

FORMATION LOG

From	To	
0	2	Fill
2	150	Clay - silt
150	172	Sand/some fine gravel/silt/clay
172	198	Gravel - Sand

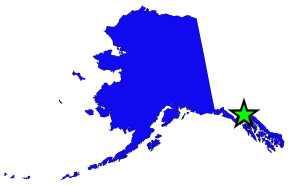
10.0 APPENDICES

APPENDIX C: MAPS

- **Flood Risk**
- **Tsunami Inundation Risk**

Haines

City Office: 907-766-2231
Revised: 29-Jun-2017



Alaska District

Status	First Class City	**Last Flood Event**	N/A
Population	2508	**Elevation**	N/A
River System	Multiple	**Flood of Record**	N/A
Coastal Area	Lynn Channel	**Baseline Erosion Report Year (Updated)**	2007 ()
NFIP Status	Community-Only	**Flood Insurance Rate Map**	N/A
Flood Gage		**Flood Insurance Study**	Yes

Gage Info: N/A

Profile Map: http://dcra.commerce.alaska.gov/profile Pdfs/Haines_1983.pdf

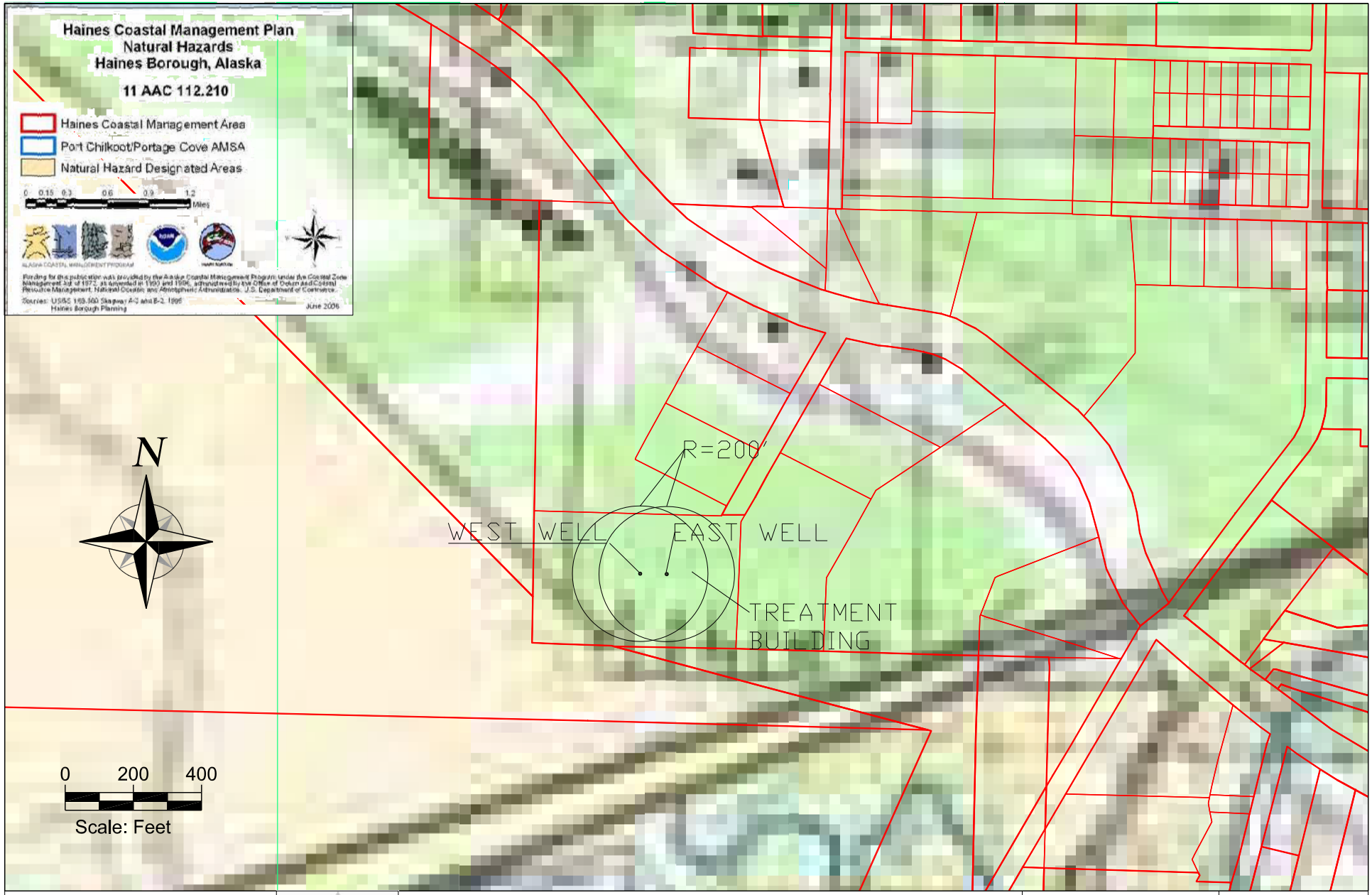
FEMA Map: N/A

High Water Mark: N/A

Floodplain Notes: No known flooding. The highway into Haines was severely damaged by flooding from the rivers and streams of the Chilkat River Valley. The airstrip came within inches of flooding in September, 1967. The design elevation of the airstrip is 22 ft Mean Lower Low Water. All of the low areas between the sawmill and the airstrip were inundated. This area is normally flooded by 20' spring tides once or twice a year.

Figure 2. HCMP Natural Hazards

Source: *HCMP, 2007*



JOINER ENGINEERING
Civil & Environmental Engineering

CRYSTAL CATHEDRALS WATER SYSTEM
HCMP NATURAL HAZARDS
HAINES, ALASKA

Date: 4/2/2014	Sheet 1 of 1
Drawn By: WAJ	Project No: 14-002
Checked By: WAJ	

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Explanatory text accompanies map

135°35'W 135°30'W 135°25'W

59°16'N 59°14'N 59°12'N 59°10'N

Chilkoot Inlet

McClellan Flats

Sheet 3

Chilkat Inlet

Letnikof Cove

Flow Depth

15 m (50 ft)
10 m (33 ft)
5 m (17 ft)
2.5 m (8 ft)
1.5 m (5 ft)
1.0 m (3 ft)
0.5 m (1.6 ft)
0.25 m (0.8 ft)

Maximum estimated inundation extent from all scenarios

Inundation from tectonic scenarios

Scenario 4
Scenario 1M

STATE OF ALASKA
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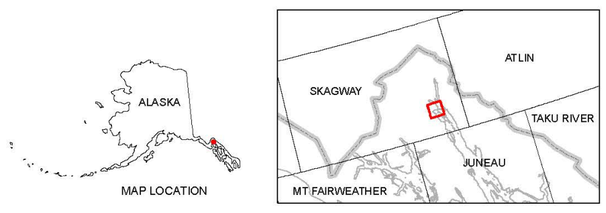
MAXIMUM ESTIMATED TSUNAMI INUNDATION FROM TECTONIC AND LANDSLIDE SOURCES, HAINES, ALASKA

by

D.J. Nicolsky[1], E.N. Suleimani[1], and J.B. Salisbury[2]

2018



Location of Map Area

SCALE 1:29000

0 0.25 0.5 1 1.5 2 2.5 3 3.5 MILES

0 0.5 1 2 3 4 5 KILOMETERS

0 700 1400 2800 4200 5600 7000 8400 9800 11200 12600 14000 FEET

N

Affiliations:

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University of Alaska Fairbanks, PO Box 757320, Fairbanks, AK 99775-7320
[2] Alaska Division of Geological & Geophysical Surveys, 3354 College Road,
Fairbanks, AK 99709-3707

Base map from:
UAF-GINA Best Data Layer
Projection:
Alaska State Plane Zone 1 (Feet)
Datum:
North American Datum of 1983
Cartography by:
L. Gardine[1] (2018)
Cartographic review by:
P.E. Gallagher[2] (2018)
Peer review by:
De Anne S.P. Stevens[2] (2018)

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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SHEET 3 OF 3
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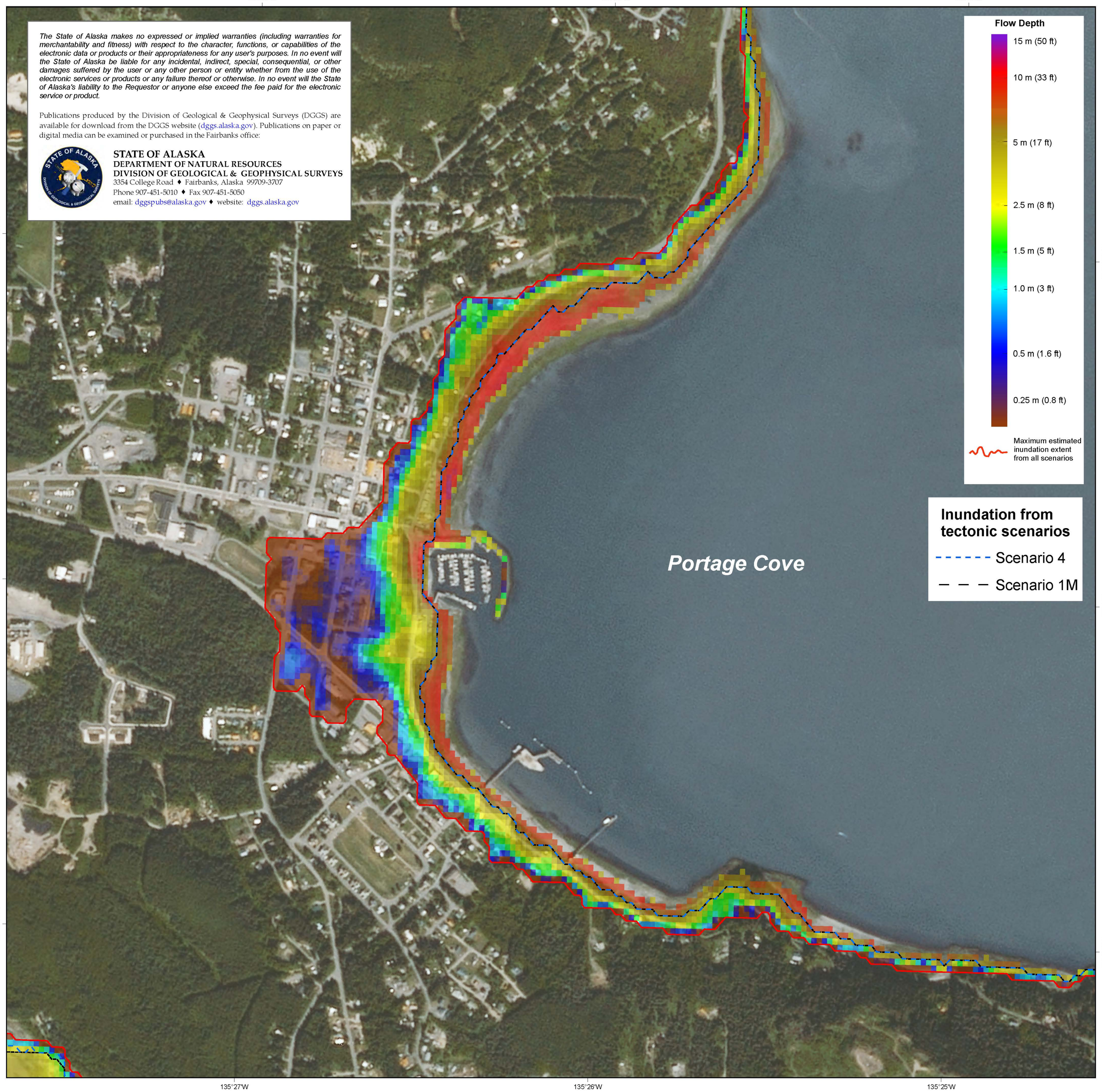
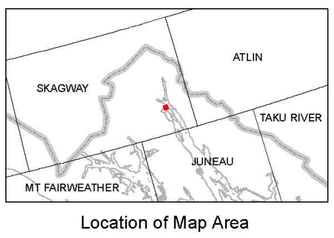


MAXIMUM ESTIMATED TSUNAMI INUNDATION FROM TECTONIC AND LANDSLIDE SOURCES, PORTAGE COVE, HAINES, ALASKA



Location of Map Area

by

D.J. Nicolsky[1], E.N. Suleimani[1], and J.B. Salisbury[2]

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2018

SCALE 1:6250

0 0.125 0.25 0.5 0.75 MILE

0 0.05 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 KILOMETER

0 150 300 600 900 1200 1500 1800 2100 2400 2700 3000 FEET

N

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