



# Nonpoint Source Pollution Assessment Report for The Port Gamble Reservation

SEPTEMBER 2023



NONPOINT SOURCE POLLUTION ASSESSMENT REPORT  
FOR THE PORT GAMBLE RESERVATION

*Kingston, Washington*

Prepared for  
The Port Gamble S'Klallam Tribe

Prepared by  
RIDOLFI Inc.

September 2022  
Updated September 2023

## TABLE OF CONTENTS

1.0	OVERVIEW .....	1
2.0	INTRODUCTION.....	3
3.0	METHODOLOGY .....	6
4.0	LAND USE SUMMARY .....	8
5.0	SURFACE AND GROUNDWATER QUALITY SUMMARY .....	11
5.1	Streams .....	12
5.1.1	Shipbuilders Creek.....	13
5.1.2	Little Boston Creek.....	13
5.1.3	Middle Creek.....	14
5.1.4	Martha John Creek .....	14
5.2	Wetlands.....	15
5.3	Groundwater .....	16
6.0	RESULTS.....	17
6.1	Waterbodies.....	17
6.1.1	Shipbuilders Creek.....	17
6.1.2	Little Boston Creek.....	18
6.1.3	Middle Creek.....	19
6.1.4	Martha John Creek .....	19
6.2	Water Quality Parameters.....	20
6.2.1	Temperature.....	20
6.2.2	Dissolved Oxygen.....	21
6.2.3	pH.....	22
6.2.4	Turbidity.....	22
6.3	Shoreline Surveys.....	23
6.4	Groundwater Quality .....	23
7.0	DISCUSSION.....	24
7.1	Temperature.....	24
7.2	Dissolved Oxygen.....	25
7.3	pH.....	25
7.4	Turbidity.....	25
8.0	SELECTION OF BEST MANAGEMENT PRACTICES.....	26
8.1	Core Participants.....	26
8.2	Public Participation and Governmental Coordination .....	26
8.3	Existing Best Management Practices.....	27



8.3.1	Forest Management.....	27
8.3.2	Land Development .....	28
8.3.3	Road Building and Maintenance.....	28
9.0	EXISTING NONPOINT SOURCE CONTROL PROGRAMS.....	29
9.1	Forest Management Plan.....	29
9.2	Tribal Environmental Standards.....	29
9.3	Wetlands Conservation Program Plan .....	29
9.4	Pollution Identification and Correction Program.....	29
9.5	Wastewater Treatment.....	30
10.0	CONCLUSIONS.....	32
11.0	REFERENCES.....	34

## LIST OF FIGURES

Figure 1.	Vicinity Map
Figure 2.	Port Gamble S’Klallam Tribal Lands
Figure 3.	Tribal Housing and Commercial Developments
Figure 4.	Stream Monitoring Locations
Figure 5.	Land Use
Figure 6.	Watersheds

## LIST OF TABLES

Table 2-1.	Summary of Tribal Lands
Table 3-1.	Water Quality Sampling Locations and Parameters
Table 4-1.	Reservation Land Use
Table 4-2.	Watershed Acreage
Table 4-3.	Land Use by Watershed
Table 6-1.	Summary of Water Temperature Data
Table 6-2.	Summary of Dissolved Oxygen Data
Table 6-3.	Summary of pH Data

## LIST OF EXHIBITS

Exhibit 1.	Stream and Wetland Inventory
Exhibit 2.	Tribal Protection Area
Exhibit 3.	Wastewater System

## LIST OF ABBREVIATIONS AND ACRONYMS

BIA	United States Bureau of Indian Affairs
BMP	Best Management Practice
C	Degrees Celsius
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
CWA	Clean Water Act
Department	Port Gamble S’Klallam Tribe Natural Resources Department
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management System
FEATS	Financial and Ecosystem Tracking System
FMP	Forest Management Plan
ft	feet
GIS	Geographic Information System
HCCC	Hood Canal Coordinating Council
HCRPIC	Hood Canal Regional Pollution, Identification, and Control Program
HUD	United States Department of Housing and Urban Development
IHS	Indian Health Service
KPHD	Kitsap Public Health District
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
NEP	National Estuary Program
NEPA	National Environmental Policy Act
NPS	Nonpoint Source
NRD	Natural Resources Department
NTU	Nephelometric Turbidity Units
PGST	Port Gamble S’Klallam Tribe
PIC	Pollution, Identification, and Control
PUD	Public Utility District
RGF	Recirculating Gravel Filter
STORET	STorage and RETrieval
TAS	Treatment in a similar manner as a State
Tribe	Port Gamble S’Klallam Tribe
USEPA	United States Environmental Protection Agency
USHHS	United States Department of Health and Human Services
WDOH	Washington State Department of Health
WRIA	Water Resource Inventory Area

## 1.0 OVERVIEW

This non-point source (NPS) pollution assessment report was developed by the Port Gamble S’Klallam Tribe (PGST) to summarize available information on the condition of water resources on and adjacent to the Port Gamble Reservation. This report provides the foundation for the scope and direction of the Tribe’s NPS pollution management program.

The Port Gamble Reservation is situated on the northern end of the Kitsap Peninsula in Western Washington, approximately 27 miles northwest of the City of Seattle and 6 miles northwest of the Town of Kingston, on unincorporated lands within Kitsap County. The lands of the Port Gamble S’Klallam Tribe include 1,707 acres of Reservation lands held in Trust by the federal government for benefit of the Tribe, 60 acres of off-Reservation Trust lands, and 949 acres of off-Reservation fee lands owned by the Tribe.

The Port Gamble S’Kallam Tribe conducts periodic monitoring of surface water quality in all major watersheds on the Port Gamble Reservation. Based on the results of water quality monitoring from 2019 through 2021, water quality is considered good in all watersheds, and impacts related to nonpoint source pollution are minor and localized. Two locations exhibited water quality impacts related to NPS pollution, resulting from flow restrictions caused by partially blocked culverts and surface runoff from adjacent roadways. Other than at these two locations, nonpoint sources of pollution do not appear to be adversely impacting surface water quality on the Reservation.

While current NPS impacts are minor and localized, future development, particularly for Tribal housing and associated support services, has the greatest potential to result in NPS impacts to Tribal waters. Since 2003, the Tribe has acquired nearly 1,400 acres of new lands. In 2016, 410 acres were proclaimed as new Reservation lands, effectively increasing the size of the Reservation by more than 30 percent. In 2019, the Tribe acquired in fee 925 acres of forestlands north of and contiguous with the Reservation.

To meet the high demand for on-Reservation housing, it is likely that areas of these newly acquired lands will be developed for Tribal housing, with associated roadbuilding and infrastructure development. Management of these new lands will pose challenges for the Tribe in effectively addressing potential nonpoint sources of pollution and protecting Tribal water resources.

Currently, more than 80 percent of Reservation lands are undeveloped forestlands. Because of this, Tribal land management policy has focused primarily on forest management activities and has resulted in the development of a Forest Management Plan, which is periodically updated. However, there is a lack of specific guidance and BMPs for other types of land development. To address this gap, the Tribe is in the process of developing environmental standards to be included as a new chapter in the Tribe's Law and Order Code. These new standards are anticipated to address the design of stormwater treatment systems and to include enforcement mechanisms for implementation of BMPs to address NPS pollution. Development of a well-defined process for identifying and implementing land development BMPs is a critical need for the protection of Tribal water quality and water resources.



## 2.0 INTRODUCTION

Section 319 of the federal Clean Water Act provides authority to states, territories, and Tribes to address problems associated with nonpoint sources of pollution. Furthermore, the U.S. Environmental Protection Agency (USEPA) uses Section 319 as the primary source of funding to address nonpoint source problems. To qualify for Section 319 grants, the Tribe must complete a nonpoint source assessment report and a nonpoint source management plan that are approved by USEPA.

The goal of this non-point source (NPS) pollution assessment report is to develop a summary of available information on the condition of water resources on and adjacent to the Port Gamble Reservation. This report provides the foundation for the scope and direction of the Port Gamble S’Klallam Tribe’s (PGSTs) NPS pollution management program.

The objectives of this assessment report include:

- Provide a description of the present status of Reservation waters.
- Describe processes and land uses that may result in NPS impacts to Reservation waters.
- Identify existing Tribal, State, federal, and other programs that might be used for controlling NPS pollution.

The Port Gamble Reservation is situated on the northern end of the Kitsap Peninsula in Western Washington, approximately 27 miles northwest of the City of Seattle and 6 miles northwest of the Town of Kingston, on unincorporated lands within Kitsap County (See Figure 1). The lands of the Port Gamble S’Klallam Tribe include 1,707 acres<sup>1</sup> of Reservation lands held in Trust by the federal government for benefit of the Tribe, 60 acres of off-Reservation Trust lands, and 949 acres of off-Reservation fee lands owned by the Tribe (See Table 2-1 and Figure 2).

As of 2020, the Reservation has a population of 783 (Census Reporter, 2020). The Reservation population is concentrated along the shoreline of Port Gamble Bay and clustered along the southeastern and northwestern portions of the Reservation. A commercial area is located along the eastern edge of the Reservation adjacent to Hansville Road Northeast and includes the Gliding Eagle gas station and convenience store and the Point Hotel and Casino (See Figure 3). Most of the Reservation is managed as forestland, with the remaining areas in residential, commercial, and governmental and administrative uses.

---

<sup>1</sup> Estimates of total acreages differ slightly due to different sources of information.

**Table 2-1. Summary of Tribal Lands**

<b>Land Area</b>	<b>Acreage</b>	<b>Acquired by Tribe</b>	<b>Converted to Trust Land</b>	<b>Proclaimed as Reservation</b>
<b>Reservation</b>				
Uplands (1938 Boundary)	1,229.75	3/12/1936	6/16/1938	6/16/1938
Tidelands (1938 Boundary)	67.20	3/12/1936	6/16/1938	6/16/1938
Warrior Ridge	390.28	1/6/2005	2/29/2012	6/22/2016
Pope 20 - Trust	20.24	9/26/1989	7/31/2014	6/22/2016
<b>TOTAL RESERVATION</b>	<b>1,707.47</b>			
<b>Off-Reservation Trust Lands</b>				
Heronwood	14.97	7/12/2012	7/15/2014	N/A
Blue House	35.63	5/7/2003	10/12/2016	N/A
Foxglove	9.20	11/21/2016	1/3/2018	N/A
<b>TOTAL OFF-RESERVATION TRUST</b>	<b>59.80</b>			
<b>Off-Reservation Fee Lands</b>				
Pope 20 – Fee	20.08	9/26/1989	N/A	N/A
Simonsen Property	1.07	12/23/2011	N/A	N/A
Hansville Block	924.91	12/16/2019	N/A	N/A
Kountry Korner	1.11	7/31/2017	N/A	N/A
South Kountry Korner	1.34	3/6/2020	N/A	N/A
<b>TOTAL OFF-RESERVATION FEE</b>	<b>948.51</b>			
<b>TOTAL ACREAGE TRIBAL LANDS</b>	<b>2,715.78</b>			

Source: PGST Planning Department

The Port Gamble S’Klallam Tribe, originally known as the Nux Sklai Yem, or Strong People, are descendants of the Salish people who have been well-established in the Puget Sound basin and surrounding areas since 2400 B.C. (PGST, 2014)

In 1855 the S’Klallam, Chemakum, and Twana Tribes signed the Treaty of Point No Point with the United States government relinquishing title to their traditional lands, but preserving their rights for hunting, gathering and fishing in their usual and accustomed areas. The Tribe was assigned to the distant Skokomish Reservation on the south portion of the Hood Canal, but the Port Gamble S’Klallams remained on Port Gamble Bay at a S’Klallam settlement on Point Julia. In 1938, the Port Gamble S’Klallam Reservation was established on 1,231 acres of land (Tormod Hellwig, 2014)

The Tribe is governed by a constitution and by-laws adopted on August 5, 1939, as well a comprehensive law and order code. The Tribe’s six-member Tribal Council is delegated with

legislative authority by the PGST General Council, which consists of tribal members aged 18 and older (PGST, 2014).

The Port Gamble S’Klallam have lived, fished, and harvested in and around Port Gamble Bay (Noo Kayet) since time immemorial. The Reservation sits on the eastern shore of Port Gamble Bay, with Point Julia as a key access point for the many Tribal members who continue to practice their treaty rights for cultural, subsistence, and commercial purposes.

Port Gamble Bay and its watershed sustains culturally significant species, including many salmon varieties, geoducks, clams, oysters, red-cedar, huckleberry, and many more. It is also home to one of the largest remaining herring stocks in the Puget Sound. However, Port Gamble Bay faces many environmental challenges. Pollution from historical activities as well as disturbances from development and climate change all threaten the bay.

The Tribe established its own water quality standards in 2002 to protect public welfare, enhance the quality of waters of the Reservation and serve the purposes of the Clean Water Act. The standards are designed to establish uses for the waters of the Reservation which are to be protected. These uses include aquatic life uses, such as salmon spawning and rearing and shellfish harvesting, and recreational and cultural uses (PGST, 2002).

The Port Gamble S’Klallam Tribe Natural Resources Department (NRD) has worked to protect the streams and wetlands on the reservation with funding provided under Section 106 of the Clean Water Act. The NRD has worked to identify several streams on the Reservation that are of critical importance for the Tribe. The NRD includes a Water Resources Program to support sustainably managing, preserving, enhancing, and protecting Tribal water resources.

Because most of the Reservation and other Tribal lands are managed forestlands, the primary sources of nonpoint source pollution that may impact Tribal waters are related to forest management activities, including timber harvest, road construction and use, and mechanical preparation for replanting. Other potential sources of nonpoint source pollution may include land development for residential use and associated residential uses including yard maintenance, potential impacts from improper sewage disposal, and stormwater runoff from roads and other impervious surfaces, and hydrologic modifications. Historical sources that have been or are being addressed through actions taken by the Tribe or by the State of Washington include contaminated leachate from the former Hansville Landfill and failing septic systems along the shoreline of Port Gamble Bay.

### 3.0 METHODOLOGY

The Port Gamble S’Klallam Tribe’s Natural Resource Department has been the recipient of a USEPA water quality grant for many years. The Department has worked to identify several streams on the Reservation that are of critical importance for the Tribe. The Tribe’s water quality monitoring strategy involves sampling these streams monthly (See Figure 4).

The water quality data reviewed for this report include data collected during calendar years 2019, 2020, and 2021. Data collected during all three years includes water temperature, dissolved oxygen (DO), specific conductance, conductivity, salinity, and pH. Additionally, nutrient data, including ammonia and nitrate/nitrite, was collected during 2020 and 2021, and turbidity data was collected in 2021. Data from all locations and all events were compared to numeric criteria included in the Tribe’s water quality standards.

During most events, water quality monitoring equipment performed reliably. However, during the late spring and early summer of 2020, because of an issue with the water quality probe, water temperature readings were recorded using the pH meter and appeared to be influenced by the ambient air temperature. Exceedances of water temperature criteria during May, June, and July of 2020 do not appear to accurately reflect water quality conditions and are not considered reliable.

**Table 3-1. Water Quality Sampling Locations and Parameters**

Waterbody Name	Location Name	Station ID	Parameters Monitored	Monitoring Frequency
Shipbuilders Creek	The Bars	SHC1	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Salmonberries	SHC2	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
Little Boston Creek	Hatchery	LBC1	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Ball Field	LBC2	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
Middle Creek	Middle Creek 1	MC1	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Middle Creek 2	MC2	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
Martha John Creek	Martha John East	MJ1E	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Martha John West	MJ2W	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Martha John Tributary	MJT	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly
	Miller Lake Creek and Martha John	MLC_MJ	Temp, DO, % Sat, Sp. Cond, Salinity, Flow, pH	Monthly

Temp = temperature; DO = dissolved oxygen, % Sat = percent saturation, Sp. Cond = specific conductivity

While the Tribe does not actively monitor groundwater on the Reservation, groundwater in the central portion of the Reservation is monitored quarterly as part of the post-closure monitoring required for the Hansville landfill cleanup site. Quarterly monitoring data are available on the Washington Department of Ecology's website (Ecology, 2022a).

## 4.0 LAND USE SUMMARY

The Port Gamble Reservation is located within the Puget Trough ecoregion. Due to the Reservation's proximity to Puget Sound and the Pacific Ocean, the Reservation experiences a maritime climate typical of the Pacific Northwest. The maritime climate of the Pacific Northwest is characterized by mild and wet winters with cool and dry summers. The mean July high temperature is 75 degrees, and the mean January high temperature is 45 degrees. Average low temperatures range from 35 degrees in the winter to 54 degrees in the summer months. The high temperature on record is 101 degrees and low was 7 degrees (PGST DNR, 2014).

Rainfall in the Puget Sound trough averages 38 inches a year, the majority of which falls during the winter months. High winds are typical during winter storm events with gusts over 50 miles per hour not uncommon due to the westerly exposure along Port Gamble Bay.

The topography and geology of the Reservation is the result of glaciation and subsequent deposition followed by erosional processes. Glacial deposits range from very porous gravels and sands to hard unconsolidated glacial tills.

The Puget Trough is characterized by north to south oriented parallel ridges separated by water bodies or poorly drained depressions. The northern Kitsap Peninsula, where the Reservation is located, exhibits the same ridge and swale topography that is characterized throughout the Puget Sound basin. The Reservation lies on the west side of a long ridge and has two long benches cut by steep narrow drainages and a few small valleys. The elevation ranges from sea level to 300 feet.

Soils on the Reservation are typical of those found in the Puget Sound Region where the parent material is glacial till. Reservation soils have relatively low surface runoff and generally a low erosion potential hazard (International Forestry Consultants, 2020).

Land uses on the Reservation generally fall into one of four categories: residential (single family and multi-family), commercial, governmental and administrative, and forestland. The Reservation is populated at rural densities typical of Western Washington, with the majority of the population concentrated along the shoreline of Port Gamble Bay and clustered along the southeastern and northwestern portions of the Reservation. A commercial area is located along the eastern edge of the Reservation adjacent to Hansville Road Northeast and includes the Gliding Eagle gas station and convenience store and the Point Hotel and Casino. The majority of

Reservation lands (over 80 percent) are actively managed as forestland (International Forestry Consultants, 2020) (See Figure 5).

**Table 4-1. Reservation Land Use**

<b>Current Land Use</b>	<b>Approximate Acreage</b>
Commercial	22
Single Family Residential	165
Multi-Family Residential	23
Governmental and Administrative	16
Forestland	1395
<b>Total</b>	<b>1696</b>

SOURCE: Gray and Osborne, 2013

The primary watersheds evaluated for this assessment include the following watersheds located on or adjacent to the Port Gamble Reservation:

**Table 4-2. Watershed Acreage**

<b>Watershed</b>	<b>Approximate Acreage</b>
Shipbuilders Creek	910
Little Boston Creek	510
Middle Creek	360
Martha John Creek	1,800

SOURCE: Ridolfi GIS Mapping

In addition to these watersheds, there are two small watersheds drained by short, intermittent creeks between the Little Boston Creek and Middle Creek watersheds. Lands within these smaller watersheds, as well as most of the lands within the Shipbuilders Creek, Little Boston Creek, and Middle Creek watersheds are on Reservation lands or adjacent Tribally owned lands. Most of the Martha John Creek watershed, including the mainstem of Martha John Creek, is located on non-Tribal lands; however, all the Warrior Ridge section of the Reservation is drained by unnamed tributaries to Martha John Creek. (See Figure 6)

Land Uses within the primary watersheds are identified in Table 4-3.

**Table 4-3. Land Use by Watershed**

Watershed	Percent Land Use			
	Forested and Undeveloped	Residential	Commercial	Governmental and Administrative
Shipbuilders Creek	94	6	-	-
Little Boston Creek	91	2.5	6	0.5
Middle Creek	84	4	12	-
Martha John Creek	84	12	3	1

Source: Ridolfi GIS mapping

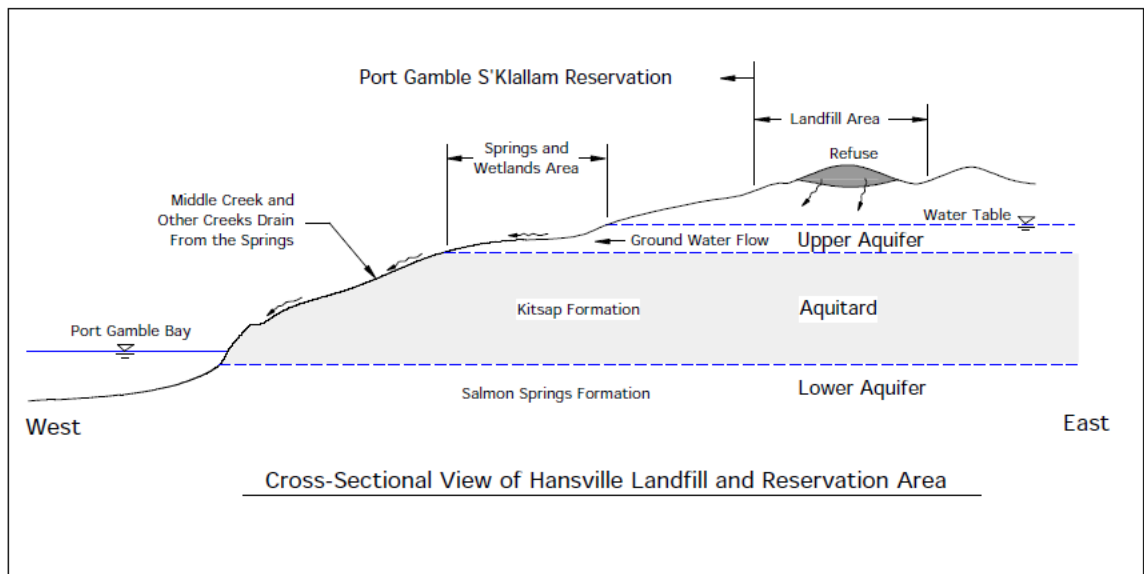
Since 2003, the Tribe has acquired nearly 1,400 acres of new lands. In 2016, 410 acres were proclaimed as new Reservation lands, effectively increasing the size of the Reservation by more than 30 percent. In 2019, the Tribe acquired in fee 925 acres of forestlands north of and contiguous with the Reservation. Both the lands recently proclaimed as Reservation lands and the lands acquired by the Tribe in 2019 were previously managed as commercial forestlands subject to Washington State Forest Practice Rules administered by the Washington State Department of Natural Resources.



## 5.0 SURFACE AND GROUNDWATER QUALITY SUMMARY

The Port Gamble Reservation is located on the western side of a long ridge that bisects the northern Kitsap Peninsula. The surface waters and groundwater on the Reservation reflect the underlying geologic materials deposited during the two most recent glaciations and the intervening interglacial period that affected the Puget Sound region. The deposits related to the older of the two glaciations have been correlated with the Salmon Springs Drift (lower aquifer). The younger glacial deposits have been named the Vashon Drift (upper aquifer). The non-glacially derived materials deposited between the two glacial drifts comprise the interglacial Kitsap Formation. The silt and clay of the Kitsap Formation separates the upper and lower aquifers.

The Kitsap Formation has a relatively low hydraulic conductivity and acts to impede the vertical movement of groundwater between the upper and lower aquifers. Several small creeks originate as springs and seeps from the upper aquifer, where the Vashon Drift formation outcrops at its contact with the underlying Kitsap Formation. These include Shipbuilders Creek, Little Boston Creek, and Middle Creek. The headwaters of these creeks are formed between approximately 160 and 225 feet above sea level. These headwater areas remain wet all year and support a variety of wetland vegetation. The geologic features that influence surface waters are illustrated in the cross-section diagram below, taken from the Remedial Investigation report for the Hansville Landfill, a closed landfill immediately to the east of the Reservation (Parametrix, 2006).



The creek bottoms in the headwater areas are dominated by sand- and silt-sized particles with fine particulate organic matter (e.g., decomposing leaves). In the middle and lower reaches the creeks flow in well-defined channels with primarily sand and gravel substrate. Shipbuilders Creek, Little Boston Creek, and the lower reaches of Middle Creek are larger streams with predominantly gravel and sand substrate.

Because the creeks are primarily fed by groundwater rather than surface runoff, flows appear to be relatively constant and infrequently subject to high peak flows during extreme storm events. Typical of other streams in the Puget Sound area, base flows are lowest in late summer and early fall with seasonal high flows occurring in the winter and spring. (Parametrix, 2006)

The streams located on the Reservation drain into or immediately to the north of Port Gamble Bay. Port Gamble Bay is located on the eastern shoreline of the Hood Canal, approximately five miles south of the entrance to Hood Canal. Port Gamble Bay is approximately two-and-one-half miles long, three-quarters of a mile wide at its widest point and occupies an area of approximately 1,210 acres. Since the mid-1990's the Tribe has been involved, along with the Washington Department of Ecology, in overseeing the investigation and cleanup of the former Pope and Talbot Mill located in the town of Port Gamble on the western shoreline near the mouth of Port Gamble Bay. The site was used to manufacture forest products from 1853 to 1995. Historical operations on this property resulted in the release of pollutants from wood product manufacturing and treatment activities, including the use of pentachlorophenol, incineration of salt-laden wood (and aerial deposition of resulting ash) and landfilling of used contaminated materials. These pollutants included metals, petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and dioxins/furans. Some of these contaminants have been found in soil surrounding the mill and in sediments and shellfish tissue in Port Gamble Bay. In addition to releasing toxic substances, wood waste has affected the marine sediments and benthic organisms in Port Gamble Bay (Ecology 2022b).

While the Tribe has been, and continues to be, involved in monitoring cleanup actions in Port Gamble Bay, the focus of this NPS assessment report is on the streams located on the Reservation and potential NPS impacts within the watersheds of those streams, and not on other sources of impact to Port Gamble Bay.

## **5.1 Streams**

---

Each of the major streams on or adjacent to Reservation lands are described in the following sections (See Figure 6). All streams on the Reservation are located within Washington State Water Resource Inventory Area (WRIA) 15. As mentioned above, there are two small,

intermittent unnamed creeks that are located between Little Boston Creek and Middle Creek. These creeks have small watersheds and are not described in further detail in this section. However, the headwater areas of these smaller intermittent streams are located in an area potentially impacted by contaminated leachate from the former Hansville Landfill, which is undergoing cleanup under the Washington State Model Toxics Control Act (MTCA) under the jurisdiction of the Washington Department of Ecology.

### **5.1.1 Shipbuilders Creek**

---

Waterbody ID: WA 15.0349

Shipbuilders Creek is the northernmost drainage on the Reservation. The headwaters of Shipbuilders Creek are located on Tribally owned lands north of the Reservation and the creek drains southwesterly before discharging into Hood Canal just north of Point Julia at the entrance to Port Gamble Bay. The mainstem is approximately 9,000 feet long, and the watershed includes a few smaller tributaries arising on Reservation lands. The Shipbuilders Creek watershed encompasses just over 900 acres, 94 percent of which are managed forestlands. The remaining 6 percent of the watershed has been developed for residential use, primarily in the lower portion of the watershed.

Potential sources on nonpoint source pollution in the watershed include timber harvest, roadbuilding, and other forest management activities; road runoff; residential construction; and residential uses.

Shipbuilders Creek supports both coho and chum salmon, as well as resident fish species (May and Peterson, 2003).

### **5.1.2 Little Boston Creek**

---

Waterbody ID: WA 15.0350

Little Boston Creek is located on Reservation lands south of the Shipbuilders Creek watershed. Groundwater discharge from the upper aquifer forms the headwaters of Little Boston Creek, and the creek flows west, from an elevation of about 225 feet above sea level, and discharges into Port Gamble Bay at the southern end of Point Julia. The Little Boston Creek watershed encompasses just over 500 acres, more than 90 percent of which are managed forestlands. Other land uses in the watershed include residential and governmental and administrative uses in the lower portion of the watershed, and some commercial uses in the upper portion of the

watershed. The mainstem of Little Boston Creek is approximately 7,500 feet long, and the watershed includes several small tributaries.

Potential sources on nonpoint source pollution in the watershed include timber harvest, roadbuilding, and other forest management activities; road runoff; residential construction; residential uses; and hydrologic modifications. The upper watershed may be impacted by leachate from the closed Hansville Landfill, which has undergone cleanup actions overseen by the Washington State Department of Ecology. Compliance monitoring for cleanup actions at this site includes quarterly surface water and groundwater monitoring (Ecology, 2022a).

Little Boston Creek supports both coho and chum salmon, as well as resident fish species (May and Peterson, 2003).

### **5.1.3 Middle Creek**

---

Waterbody ID: WA 15.0352

The Middle Creek watershed is located south of the Little Boston watershed. Middle Creek arises from seeps and springs downgradient from the former Hansville Landfill. It is composed of five small tributaries that meet about 2,000 feet east of Port Gamble Bay. The total stream length is 1.1 miles. Middle Creek discharges into Port Gamble Bay.

The Middle Creek watershed encompasses about 360 acres, about 300 (84 percent) of which are forested. In addition to limited residential development, the upper portion of the watershed also includes the former Hansville Landfill, a Kitsap County Transfer Station, a small industrial park, and the Point Casino and Hotel. While this commercial development is within the Middle Creek watershed, there are no surface waters in the vicinity of these developments.

Potential sources of nonpoint source pollution that may impact Middle Creek include timber harvest, roadbuilding, and other forest management activities, leachate from the former Hansville Landfill, and leachate from a septic drain field serving the Point Casino and Hotel.

Like Shipbuilders and Little Boston Creeks, Middle Creek also supports both coho and chum salmon, as well as resident fish species, but salmon habitat is limited to the lower reaches of the creek due to lack of water depth in the upper reaches (May and Peterson, 2003).

### **5.1.4 Martha John Creek**

---

Waterbody ID: WA 15.0353

The Martha John Creek watershed is the southernmost watershed on or adjacent to Reservation lands. Martha John Creek drains Miller Lake and flows northerly before turning south and discharging into southern Port Gamble Bay at Cedar Cove. The entire Warrior Ridge section of the Reservation is drained by tributaries of Martha John Creek. The mainstem of Martha John Creek is approximately 2.4 miles in length and includes several fish-bearing tributaries (Kuttel, 2003).

The Martha John Creek watershed encompasses just over 1,800 acres, more than 75 percent of which are forested. The watershed also contains rural residential lands, some commercial development in the extreme upper reaches, as well as some agricultural lands.

Martha John Creek and some of its larger tributaries support both coho and chum salmon, as well as resident fish species (May and Peterson, 2003; Kuttel, 2003).

The Washington Department of Ecology identified Martha John Creek as an impaired waterbody due to exceedances of state water quality standards for fecal coliform bacteria and for dissolved oxygen. A watershed improvement project was implemented to address fecal coliform exceedances in Martha John Creek related to failing septic systems in the lower reaches and along the shoreline of the creek near its mouth. Based on recent monitoring data from Kitsap County, the Department of Ecology has determined that Martha John Creek now meets state water quality standards for fecal coliform bacteria. (Ecology, 2022c)

## **5.2 Wetlands**

---

In addition to freshwater streams on the Reservation, the Tribe has also mapped numerous wetlands (See Exhibit 1) and has developed a Wetlands Conservation Program Plan (PGST DNR, 2014). Wetlands occur in each of primary watersheds on the Reservation at an elevation between approximately 160 and 225 ft above sea level where the contact between the upper aquifer and the underlying Kitsap formation outcrops. Above this elevation surface soils are generally sandy and porous, and precipitation infiltrates and moves rapidly through these soils until it encounters the Kitsap formation which impedes further downward migration. Groundwater then moves laterally to the west and discharges in a series of springs and seeps.

A portion of this groundwater discharge zone, primarily within the Middle Creek watershed, has been impacted by leachate from the Hansville Landfill. Institutional controls related to cleanup of the Landfill prohibit the use of groundwater and surface waters within this zone (referred to as the "Tribal Protection Area") for water supplies (See Exhibit 2). This prohibition was put in

place in 2011, and the contamination related to the landfill is projected to decay to below applicable standards by 2034 (Aspect, 2022).

### **5.3 Groundwater**

---

Currently, the Tribal drinking water system relies predominantly on two on-Reservation groundwater wells. Water is fed from the wells into three water storage tanks, which in turn provide water to all buildings on the Reservation except the business park, which receives its water from nearby wells through the Kitsap Public Utility District (Kitsap PUD). The Tribe's system is connected via an intertie to the Kitsap PUD #1 water system in case of emergency water shortages (PGST NRD, 2016).

Groundwater within and adjacent to the zone affected by contaminated leachate from the former Hansville Landfill is monitored quarterly (See Exhibit 2). Quarterly monitoring results can be found on the Washington Department of Ecology's website (Ecology, 2022a).

## 6.0 RESULTS

Based on the monitoring data evaluated for this assessment report, the quality of Reservation surface waters is good, and current impacts from nonpoint-source pollution appear to be minor and localized. The most significant non-point sources currently affecting water quality are related to road runoff and hydrologic modifications resulting from the partial blockage of culverts on Martha John Creek and Shipbuilders Creek. However, because of the large percentage of Tribal lands available for commercial forestry and for residential development, the most significant potential sources of nonpoint-source pollution are from future forest management activities and residential land development, and may include timber harvest, road construction and use, and mechanical preparation for replanting; and land clearing, roadbuilding, and development for residential use and associated residential uses including yard maintenance, and stormwater runoff.

The results of water quality monitoring in each of the major watersheds on the Port Gamble Reservation are discussed in the following sections.

### 6.1 Waterbodies

---

#### 6.1.1 Shipbuilders Creek

Shipbuilders Creek drains a 900-acre watershed at the northern end of the Reservation, 94 percent of which is managed as forestlands. Surface water monitoring stations are located on the mainstem of Shipbuilders Creek near its mouth (SHC1) and upstream on a small tributary adjacent to where Shipbuilders Creek crosses beneath Little Boston Road (SHC2). Water quality data is periodically collected for parameters including temperature, dissolved oxygen, specific conductance, conductivity, salinity, turbidity, and pH. Of these parameters, the Tribe's water quality standards include numeric criteria for temperature, dissolved oxygen, turbidity, and pH. In 2020 and 2021, these monitoring stations were also monitored for nutrients including ammonia and nitrate/nitrite.

Because the vast majority of lands within the Shipbuilders Creek watershed are managed forestlands, the most likely potential sources of nonpoint source pollution are from forest management activities, including removal of streamside vegetation, road construction and use, timber harvesting, mechanical preparation for the planting of trees, and the application of fertilizers or pesticides. Other potential nonpoint sources may include surface runoff from roads and other developed surfaces, construction for residential development, and residential uses including the application of lawn chemicals.

Based on a comparison of available monitoring data from 2019 through 2021 to the applicable water quality standards, overall water quality in the Shipbuilders Creek watershed is good. However, there have been occasional exceedances of dissolved oxygen, temperature, and turbidity criteria at the upstream monitoring location. This monitoring station is located on a small tributary to Shipbuilders Creek just upstream of a partially blocked culvert where the Creek flows beneath Little Boston Road. At Little Boston Road, the creek enters a 24-inch diameter reinforced concrete culvert.. This culvert may be failing, as there is a minor sinkhole at the edge of the road shoulder on the upstream margin. This culvert is a fish barrier at the downstream outlet, where there is a scour pool and a vertical drop from the culvert to the stream channel.

### **6.1.2 Little Boston Creek**

The Little Boston Creek watershed encompasses just over 500 acres, more than 90 percent of which is managed forestlands. Other land uses in the watershed include residential and governmental and administrative uses in the lower portion of the watershed, and some commercial uses in the upper portion of the watershed. The mainstem of Little Boston Creek is approximately 7,500 feet long, and the watershed includes a number of small tributaries.

The Tribe has two water quality monitoring stations, both located on the lower mainstem of Little Boston Creek approximately 1,200 feet apart (LBC1 and LBC2). Water quality data is periodically collected for parameters including temperature, dissolved oxygen, specific conductance, conductivity, salinity, turbidity, and pH. Of these parameters, the Tribe's water quality standards include numeric criteria for temperature, dissolved oxygen, turbidity, and pH. In 2020 and 2021, these monitoring stations were also monitored for nutrients including ammonia and nitrate/nitrite.

Similar to other watersheds on the Reservation, most lands within the Little Boston Creek watershed are managed forestlands, the most likely potential sources of nonpoint source pollution are from forest management activities, including removal of streamside vegetation, road construction and use, timber harvesting, mechanical preparation for the planting of trees, and the application of fertilizers or pesticides.

Other potential nonpoint sources may include surface runoff from roads and other developed surfaces, construction for residential development, and residential uses including the application of lawn chemicals. Additionally, a retention pond located in the lower Little Boston watershed is used seasonally for the Tribe's hatchery at the mouth of Little Boston Creek and may be resulting in streambank erosion and associated water quality impacts.



Based on a comparison of available monitoring data from 2019 through 2021 to the applicable water quality standards there are no known water quality impairments related to nonpoint source pollution. Overall water quality in the Little Boston Creek watershed is good.

### **6.1.3 Middle Creek**

---

The Middle Creek watershed encompasses about 360 acres, about 300 (84 percent) of which are forested. It is composed of five small tributaries that meet about 2,000 feet east of Port Gamble Bay. The total stream length is 1.1 miles. There are two Tribal monitoring stations located on Middle Creek - one near the mouth (MC1) and one in the headwaters (MC2). Water quality data is periodically collected for parameters including temperature, dissolved oxygen, specific conductance, conductivity, salinity, turbidity, and pH. Of these parameters, the Tribe's water quality standards include numeric criteria for temperature, dissolved oxygen, turbidity, and pH. In 2020 and 2021, these monitoring stations were also monitored for nutrients including ammonia and nitrate/nitrite.

Additionally, there are two monitoring stations near the headwaters of Middle Creek that are monitored quarterly as part of the compliance monitoring program for the Hansville Landfill cleanup overseen by the Washington Department of Ecology. Those stations (SW1 and SW4) are monitored for contaminants related to landfill leachate, including arsenic and vinyl chloride. Potential sources of nonpoint source pollution that may impact Middle Creek include timber harvest, roadbuilding, and other forest management activities, leachate from the former Hansville Landfill, and leachate from a large on-site septic system serving the Point Casino and Hotel.

Based on a comparison of available monitoring data from 2019 through 2021 to the applicable water quality standards there are no known water quality impairments related to nonpoint source pollution. Overall water quality in the Middle Creek watershed is good.

### **6.1.4 Martha John Creek**

---

The mainstem of Martha John Creek is approximately 2.4 miles in length and the watershed includes several fish-bearing tributaries (Kuttel, 2003). The Martha John Creek watershed encompasses just over 1,800 acres, more than 75 percent of which are forested. The watershed also contains rural residential lands, some commercial development in the extreme upper reaches, as well as some agricultural lands.

There are four Tribal monitoring stations located on Martha John Creek and its tributaries. The most upstream station is just below Miller Lake and just upstream of the Reservation boundary (MLC\_MJ) and the other three (MJT, MJ1E and MJ2W) are located on tributaries draining the Warrior Ridge section of the Reservation. Water quality data is periodically collected for parameters including temperature, dissolved oxygen, specific conductance, conductivity, salinity, turbidity, and pH. Of these parameters, the Tribe's water quality standards include numeric criteria for temperature, dissolved oxygen, turbidity, and pH. In 2020 and 2021, these monitoring stations were also monitored for nutrients including ammonia and nitrate/nitrite.

Additionally, water quality data on Marth John Creek has been collected by Kitsap County and is available online through the Washington Department of Ecology's Environmental Information Management (EIM) system. These data include fecal coliform, dissolved oxygen, pH, temperature, and salinity.

The Washington Department of Ecology identified Martha John Creek as an impaired waterbody due to exceedances of state water quality standards for fecal coliform bacteria based on data collected between 2003 and 2006. The Department of Ecology also listed Martha John Creek as an impaired waterbody due to exceedances of state water quality standards for the dissolved oxygen criteria based on data collected between 2004 and 2006. A water quality improvement project was implemented to address fecal coliform exceedances resulting from failing septic systems, and the Department of Ecology has determined that Martha John Creek is no longer exceeding fecal coliform criteria (Ecology, 2022c).

Overall water quality in the Martha John Creek watershed is good. However, exceedances of Tribal water quality criteria were recorded at the upstream sampling location (MLC\_MJ) for temperature, dissolved oxygen, and pH. These exceedances have been attributed to road runoff and hydrologic modifications related to blockage of a culvert as the result of a beaver dam.

## **6.2 Water Quality Parameters**

---

The following sections present a summary of available data for monitored water quality parameters for which the Tribe has applicable water quality standards, including temperature, dissolved, oxygen, pH, and turbidity.

### **6.2.1 Temperature**

---

The Tribal temperature water quality criteria for the protection of cold-water biota, including salmon rearing, is not to exceed 16 degrees Celsius (C) as a 7-day average of maximum temperatures, and not to exceed 15 C as a 7-day average of mean temperatures.

Table 6-1 displays the mean, minimum and maximum temperatures for each station in degrees Celsius (C). Note that these values are single readings, and not 7-day averaged values. However, values exceeding the 7-day average maximum value are **bolded** for comparison.

**Table 6-1. Summary of Water Temperature Data (in degrees Celsius)**

Watershed	Station	2019			2020 <sup>A</sup>			2021		
		Max	Mean	Min	Max	Mean	Min	Max	Mean	Min
Shipbuilders Creek	SHC1	13	9	2	13.1	11.6	5	14.2	8.9	3.9
	SHC2	13	1.6	8.4	9.1	11	5.9	13.3	8.2	4.4
Little Boston Creek	LBC1	13	9.25	3.4	13.3	12.3	6.4	13.8	9.2	5.2
	LBC2	12.7	9.5	3.5	13.6	12.25	6.4	11.1	8.2	5.2
Middle Creek	MC1	12.6	9.9	4.9	14.4	12.8	6.9	13.5	9.8	6.1
	MC2	12.7	10.3	5.5	13	12.3	6.9	11.3	8.9	5.7
Martha John Creek	MCL_MJ	<b>16.1</b>	10.9	4.2	<b>17.1</b>	15.6	8.3	<b>21</b>	11.3	2.2
	MJE	12.2	9.8	6.1	14.8	12.7	7.8	11	8.6	5.1
	MJW	13.5	9.7	3.8	14.9	13.7	7.2	11.8	8.7	4.8
	MJT	12.8	10	6.7	15.1	12.7	7.2	11.6	9.2	6.5

<sup>A</sup> Data do not include the period between May and July of 2020 due to equipment failure.

It should be noted that the maximum temperature exceedances recorded at all monitoring locations during 2020 were recorded during the period between May and July of 2020 and are not considered reliable due to problems encountered with the monitoring equipment.

### 6.2.2 Dissolved Oxygen

The Tribal dissolved oxygen water quality criterion for the protection of cold-water biota states that dissolved oxygen shall exceed 8.0 milligrams per liter (mg/L) at all times. Table 6.2 displays mean, minimum and maximum dissolved oxygen concentrations for each station in mg/L. Values not meeting the minimum criterion are **bolded**.

**Table 6-2. Summary of Dissolved Oxygen Data (in mg/L)**

Watershed	Station	2019			2020			2021		
		Max	Mean	Min	Max	Mean	Min	Max	Mean	Min
Shipbuilders Creek	SHC1	13.7	10.8	<b>7.43</b>	12	11.3	10.5	13.1	10.5	<b>7.4</b>
	SHC2	14	11.6	8	10.7	10.3	9.9	12.5	8.9	<b>5</b>
Little Boston Creek	LBC1	13.2	11.4	10.2	11.8	11.7	11.7	12.9	11.4	9.8
	LBC2	13.1	12.2	11.8	11.9	11.8	11.7	12.7	11.6	10.5

Middle Creek	MC1	13.2	11.4	9.8	11.7	11.6	11.4	12.7	11.4	10
	MC2	11.4	10.3	9.6	11.3	10.8	10.2	11.8	10.8	9.7
Martha John Creek	MCL_MJ	9.8	8.8	<b>7.2</b>	8.9	8.8	8.7	9.2	<b>5.2</b>	<b>1.7</b>
	MJE	12	11.2	10.2	9.8	9.6	9.4	11.2	9.8	8.6
	MJW	13	11.4	10.1	11.8	10.8	9.8	12.4	11.3	10.2
	MJT	9.9	9.85	9.8	11	10.8	10.5	12.4	11.5	10.6

### 6.2.3 pH

Tribal monitoring data for pH was evaluated for the years 2019, 2020, and 2021. For the protection of all designated uses the Tribal water quality criterion for pH states that “pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period.”

Table 6-3 displays maximum, mean, and minimum pH values for each station. Values outside of the criteria range are **bolded**.

**Table 6-3. Summary of pH Data**

Watershed	Station	2019			2020			2021		
		Max	Mean	Min	Max	Mean	Min	Max	Mean	Min
Shipbuilders Creek	SHC1	7.65	7.44	7.25	7.27	7.16	6.97	7.77	7.33	6.97
	SHC2	6.56	<b>6.4</b>	<b>6.27</b>	6.53	<b>6.43</b>	<b>6.33</b>	6.9	6.55	<b>6.21</b>
Little Boston Creek	LBC1	8.06	7.8	7.5	7.62	7.45	7.22	8.06	7.57	7.16
	LBC2	7.99	7.74	7.48	7.65	7.4	7.25	8.11	7.6	7.22
Middle Creek	MC1	8.15	7.8	7.5	7.91	7.51	6.89	8.15	7.58	7.33
	MC2	8.01	7.8	7.45	7.88	7.53	7.19	8.0	7.56	7.27
Martha John Creek	MLC_MJ	7.84	6.68	<b>5.74</b>	6.59	<b>6.28</b>	<b>6.05</b>	7.24	6.69	<b>5.54</b>
	MJE	7.84	7.38	6.897	7.62	7.29	7.02	7.94	7.33	6.89
	MJW	7.84	7.26	6.94	7.44	7.18	6.82	7.88	7.29	6.84
	MJT	7.57	7.22	6.85	7.45	7.11	6.73	7.57	6.98	6.57

Only two locations had recorded pH values outside of this range, including the upstream locations on Martha John Creek (MLC\_MJ) and Shipbuilders Creek (SHC2). Both sampling locations are located adjacent to partially blocked culverts.

### 6.2.4 Turbidity

Monitoring for turbidity was conducted at all sampling locations in 2021 and is reported in Nephelometric Turbidity Units (NTU). For the protection of aquatic life designated uses, Tribal water quality criteria for turbidity state that “Turbidity shall not exceed 5 NTU over natural

background levels when the natural background turbidity is 50 NTU or less or have more than a 10 percent increase in turbidity when the natural background level is more than 50 NTU. Natural background turbidity for implementing this criterion is to represent the 90th percentile value of the annual average turbidity.”

Because natural background has not been established for Reservation surface waters, the available monitoring data cannot be directly compared to Tribal criteria. However, elevated turbidity values were consistently recorded at the upstream Shipbuilders Creek sampling location (SHC2). These elevated values appear to result from hydrologic modifications related to a partially blocked culvert, including impeded flow and surface runoff from the adjacent roadway (Little Boston Road).

### **6.3 Shoreline Surveys**

---

The PGST Pollution Identification and Correction (PIC) Program conducted wet and dry season shoreline surveys on the PGST Reservation in 2015.

The wet season shoreline survey results led to the identification of one fecal bacteria “hotspot”. PGST coordinated with Kitsap County Public Health District (KPHD) in responding to this hot spot and KPHD and PGST staff led a home visit and dye test in April 2015. The results of this dye test were negative, meaning the source of pollution remained unconfirmed, and subsequent monitoring results showed that water quality improved. Dry season shoreline survey bacteria results yielded no hotspot confirmation and required no investigation.

### **6.4 Groundwater Quality**

---

Groundwater quality on the Reservation is monitored quarterly in the area downgradient from the former Hansville Landfill cleanup site. As a requirement of the remedial actions taken at the Hansville Landfill site, the use of shallow groundwater within the area affected by landfill releases is prohibited until cleanup levels are met (See Exhibit 2). Currently, three monitoring wells immediately west of the former landfill exceed groundwater standards for vinyl chloride, and dissolved arsenic and manganese. It is anticipated that all areas affected by landfill releases will achieve cleanup levels by 2030 (Aspect Consulting, 2022).

## 7.0 DISCUSSION

The data evaluated for this report indicate that the quality of surface waters of the Port Gamble Reservation is generally good, and there are not significant or widespread water quality impacts because of nonpoint sources of pollution. Localized impacts from nonpoint sources were identified at upstream sampling locations on Shipbuilders Creek and Martha John Creek, and in both cases, impacts were attributable to road runoff and diminished flow related to partially blocked culverts.

While impacts from nonpoint sources of pollution are currently minor, because of the large percentage of Tribal lands being managed as forestlands, and because of the potential for increased development on newly acquired lands, nonpoint sources of pollution still require close attention.

Water quality parameters at least periodically exceeding Tribal water quality criteria include temperature, dissolved oxygen, pH, and turbidity. A discussion of each of these parameters is discussed in the following sections.

### 7.1 Temperature

---

The Tribal water quality criteria for temperature are based on a 7-day average of daily maximum temperatures (16 C) and a 7-day average of daily mean temperatures (15 C). Because the Tribal dataset only includes instantaneous temperature readings collected monthly, it is not possible to directly compare the data to the water quality criteria. However, to evaluate water quality, temperature data were compared to the 7-day average daily maximum temperature criterion of 16 degrees C.

Stream temperatures exceeding the average daily maximum criterion were recorded at all monitoring locations during period between May and July of 2020. However, these results were not considered reliable due to problems encountered with the monitoring equipment. Outside of this period the only maximum temperature exceedances occurred at the upstream sampling location on Martha John Creek (MCL\_MJ) and have been attributed to impacts caused by a beaver dam and culvert blockage in the vicinity of the sampling location. Other than at this location, non-point sources of pollution are not causing water quality impairment based on water temperature.

## **7.2 Dissolved Oxygen**

---

The Tribal dissolved oxygen water quality criterion for the protection of cold-water biota states that dissolved oxygen shall exceed 8.0 milligrams per liter (mg/L) at all times.

Dissolved oxygen concentrations not meeting Tribal water quality criteria were recorded at three locations during the monitoring period, including at the upstream location on Martha John Creek (MLC\_MJ), and at both locations in the Shipbuilders Creek watershed. The low dissolved oxygen concentrations recorded on Martha John Creek have been attributed to conditions resulting from a blocked culvert. The low dissolved oxygen concentrations recorded at the downstream sampling location on Shipbuilders Creek (SHC1) appear to be related to tidal saltwater influence and are correlated with elevated salinity and specific conductance measurements. The low dissolved oxygen concentrations recorded at the upstream sampling location on Shipbuilders Creek (SHC2) has been attributed to conditions resulting from a partially blocked culvert. This sampling location is on a small tributary to the mainstem of Shipbuilders Creek.

## **7.3 pH**

---

The Tribal water quality criteria for pH state that the pH shall be within the range of 6.5 to 8.5, with a human caused variation within this range of less than 0.5 units over any 24-hour period. Only two locations had recorded pH values outside of this range, including the upstream locations on Martha John Creek (MLC\_MJ) and Shipbuilders Creek (SHC2). Both sampling locations are located adjacent to partially blocked culverts which appear to be impacting multiple water quality parameters at these locations.

## **7.4 Turbidity**

---

The Tribal water quality criterion for turbidity states that turbidity shall not exceed 5 nephelometric turbidity units (NTU) over natural background levels when the natural background turbidity is 50 NTU or less or have more than a 10 percent increase in turbidity when the natural background level is more than 50 NTU. Since natural background concentrations have not been established it is not possible to directly determine exceedances of this criterion. However, the highest turbidity values were consistently seen at the upstream location on Shipbuilders Creek (SHC2). This station is located on a small tributary to the mainstem of Shipbuilders Creek immediately upstream of a partially blocked culvert under Little Boston Road and appears to be influenced by both a restriction of flow and stormwater runoff from the adjacent roadway.

## 8.0 SELECTION OF BEST MANAGEMENT PRACTICES

### 8.1 Core Participants.

---

Best management practices (BMPs) for the control of nonpoint sources of pollution will be selected based on the type of activity planned. The activities most likely to involve nonpoint sources of pollution on Port Gamble S'Klallam lands include forest management, residential and commercial development, and roadbuilding and maintenance.

For forest management activities on Reservation and trust lands, the identification and selection of BMPs will involve the Tribal departments including Natural Resources, Planning, Cultural Resources, and Tribal Council, as well as the United States Bureau of Indian Affairs (BIA). For forest management activities on Tribally owned fee lands, the selection of BMPs will involve the Washington State Department of Natural Resources and the Tribal Departments of Natural Resources and Cultural Resources.

For residential development on Reservation and trust lands, the identification and selection of BMPs will involve the Tribal departments including Planning, Housing, Natural Resources, Utilities, and Cultural Resources, as well as federal agencies including the United States Department of Housing and Urban Development (HUD) and BIA.

For commercial development, in addition to the department and agencies mentioned above for residential development, the selection of BMPs will also involve the Tribe's Noo-Kayet Development Corporation.

At the locations identified as being adversely impacted by road runoff and culvert maintenance, in the Shipbuilders Creek and Martha John Creek watersheds, Tribal programs are currently working with Kitsap County to address nonpoint source pollution issues.

Although septic systems have historically impacted Reservation surface waters, they do not appear to be a current source of nonpoint source pollution. Tribal water and wastewater systems are operated and maintained by the Tribal Utilities Department.

### 8.2 Public Participation and Governmental Coordination

---

Title 24 of the PGST Law and Order Code (Environmental Protection) provides for public review and a public hearing for all activities that require and Environmental Site Analysis. The Tribal Planning Director shall provide notice of public hearings and the notice shall state the date, time, and place of the hearing, as well as the subject matter. The notice shall be posted in at



least two prominent locations on the Reservation. The notice shall be delivered or mailed to the address provided by the applicant at least ten (10) calendar days before the hearing. The Planning Director shall verify that the notices have been made as required.

For development projects that are wholly or partly federally funded, public participation will be conducted consistent with the requirements of NEPA, and the Tribe will coordinate with the funding agency and the BIA to ensure NEPA compliance.

### **8.3 Existing Best Management Practices**

---

The Tribe does not currently have a nonpoint source control program in place. This Assessment Report and the associated Management Program Plan are the first steps in implementing nonpoint source prevention and controls. The goal is to facilitate coordination among the various Tribal Departments, and between the Tribe and other entities that may be involved in activities on or near the Reservation that could result in nonpoint sources of pollution, and to identify best management practices to minimize or eliminate nonpoint source impacts to Tribal waters.

#### **8.3.1 Forest Management**

---

The Tribe has a Forest Management Plan (FMP), updated in 2020, and approved by the Port Gamble S’Klallam Tribal Council and the Bureau of Indian Affairs. The purpose of this Plan is to provide the Tribe with policy guidance in developing operational plans and silvicultural prescriptions for the forest resources of the Port Gamble S’Klallam Reservation. While the Plan does not include formalized best management practices (BMPs), it does require the protection of water resources using riparian buffers and riparian reserves. Specific operating plans for timber harvest are developed through a review and decision process among the managers who report to the Director of Natural Resources and with the Tribal Council and the BIA.

The FMP requires that forest roads are designed and constructed to the specifications used by the BIA for roads on timber sales. Further, the FMP states that roads will be constructed using BMPs as outlined in the Washington State Forest Practice Board Manual Section 3 pertaining to roads. These referenced BMPs should be used when designing road construction and maintenance for forest management roads in conjunction with timber harvesting (International Forestry Consultants, 2020).

Forest management activities on Tribally owned fee lands are subject to State Forest Practice Rules & Regulations that are administered by Washington State Department of Natural Resources.

### **8.3.2 Land Development**

---

Environmental standards for development on Tribal lands are included in Title 24, Environmental Protection, of the Tribal Law and Order Code. While there are not specific BMPs, there are environmental protection and permitting requirements for many types of land development. Most Tribal development projects are also, at least partly, federally funded and are required to comply with the National Environmental Policy Act (NEPA). NEPA does not contain specific BMPs, but measures to mitigate potential adverse impacts, including nonpoint source pollution, are developed and reviewed on a project-specific basis.

The Tribe has developed planning documents, including *Comprehensive Economic Development Strategies* (PGST, 2014) and *Administrative Campus Facilities Assessment and Master Plan* (Tormod Hellwig, 2014) that identify development needs and strategies, but do not include BMPs or other specific measures to address NPS pollution.

To address potential NPS pollution resulting from wastewater treatment and disposal, the Tribe has developed and is implementing a *General Sewer/Wastewater Facility Plan* (Gray & Osborne, 2013).

### **8.3.3 Road Building and Maintenance**

---

For roads other than forest roads, the Tribe does not have specific BMPs. Impacts from road building and maintenance are typically evaluated through the Tribal or federal review process, either pursuant to Tribal Environmental Standards included in Title 24 of the Tribe's Law and Order Code (Environmental Protection) or through the NEPA process. For roads on or near the Reservation constructed or maintained by Kitsap County, BMPs are included in the Kitsap County Road Standards (Kitsap County, 2020) and in the Kitsap County Stormwater Design Manual (Kitsap County, 2021).

## 9.0 EXISTING NONPOINT SOURCE CONTROL PROGRAMS

Although the Tribe does not currently have a nonpoint source pollution control program, it has developed management plans and environmental standards that provide general requirements for environmental protection. BMPs are currently developed on a project-specific basis.

### 9.1 Forest Management Plan

---

Potential nonpoint sources of pollution resulting from forest management activities are addressed in the Forest Management Plan (FMP) for the Port Gamble Reservation (International Forestry Consultants, 2020). In addition to general requirements for the protection of surface waters, the FMP states that roads will be constructed using BMPs as outlined in the Washington State Forest Practice Board Manual.

### 9.2 Tribal Environmental Standards

---

Title 24 of the Port Gamble S'Klallam Tribe's Law and Order Code (Environmental Protection) provides a process for the review and approval of development projects. Chapter 24.08 (Environmental Standards) requires that projects are implemented in a manner that is protective of water quality and water resources.

### 9.3 Wetlands Conservation Program Plan

---

The Tribe's Wetlands Conservation Program Plan (PGST DNR, 2014) identifies priorities, actions and activities the Port Gamble S'Klallam Tribe intends on undertaking to monitor, protect, restore, and manage wetlands on the Tribe's reservation and within their usual and accustomed harvest area.

### 9.4 Pollution Identification and Correction Program

---

The PGST Pollution Identification and Correction (PIC) Program was made possible through funding from the Washington State Department of Health (WDOH) and the United States Environmental Protection Agency (USEPA) National Estuary Program (NEP), with significant coordination with Washington State Department of Ecology (Ecology).

PGST Natural Resources staff was primarily responsible for managing and implementing the PGST PIC program. PGST prepared and submitted necessary documentation for planning and reporting, submitted semi-annual reports to the USEPA Puget Sound Financial and Ecosystem Tracking System (FEATS), and facilitated data reporting to USEPA's STorage and RETrieval (STORET) website through the tribe's network node.

PGST has administered the PIC Program on the Reservation and worked closely with Kitsap County Public Health District (KPHD) to plan and conduct Shoreline Surveys in the wet and dry seasons, as well as respond to elevated bacteria levels.

## **9.5 Wastewater Treatment**

---

In 1996, in response to concerns about the effluent from the septic tanks and the associated potential water quality impacts to Port Gamble Bay, the Indian Health Service (IHS) constructed a recirculating gravity filter and a large portion of the lower Reservation sewer collection system. The individual septic tanks were retained and connected to the sewer collection system. Septic tank pumps were installed to pump the septic tank effluent from the tanks that are at lower elevation than the sewer mains into the new sewer system. Septic tanks at higher elevation than the sewer lines were connected to the main by gravity lines. The HUD Pump Station was constructed to pump the septic tank effluent from the Salmonberries neighborhood to the RGF. The former Salmonberries drain field was incorporated into the new RGF drain field. The S'Klallam Hill neighborhood was not connected to the residential collection and sewage currently continues to be treated and disposed in its community septic tank and drain field. Since the original construction of the sewer collection system in 1996, the system has been extended to serve the Bud Purser, Kloomachin, Teekalet, and Bear Ridge neighborhoods (See Exhibit 3). The lower Reservation sewer system currently serves approximately 183 acres, which includes the Tribal Administration campus (Gray & Osborne, 2013).

## **9.6 Funding and Assistance Programs**

---

### **9.6.1 Clean Water Act (CWA) Section 106**

---

Section 106 of the CWA authorizes federal grants to assist state and interstate agencies in administering water pollution control programs. funding allows tribes to address water quality issues by developing monitoring programs, water quality assessment, standards development, planning, and other activities designed to manage reservation water resources. Section 106 funds can also be used for inventorying nonpoint sources, attending NPS meetings and training, and forming partnerships to address NPS issues.

### **9.6.2 The CWA section 104(b)(3) Wetland Program Development Grants**

---

The CWA section 104(b)(3) Wetland Program Development Grants provide applicants an opportunity to improve wetland programs by conducting projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.

### **9.6.3 Clean Water State Revolving Funds**

---

The Clean Water State Revolving Fund program funds water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management.

### **9.6.4 General Assistance Program (GAP)**

---

The primary purpose of the GAP is to support the development of a core tribal environmental protection program. Although GAP funds may be used to develop program capacity, they may not be used for program implementation. Specific activities could include defining and developing administrative and legal infrastructures; conducting assessments, monitoring, planning, and other actions.

## 10.0 CONCLUSIONS

The Port Gamble S’Klallam Tribe conducts periodic monitoring of surface water quality in all major watersheds on the Port Gamble Reservation. Based on the results of water quality monitoring from 2019 through 2021, water quality is generally good in all watersheds, and impacts related to nonpoint source pollution are minor and localized.

Two sampling locations, including the upstream locations on Shipbuilders Creek (SHC2) and Martha John Creek (MLC\_MJ) exhibited periodic water quality impacts for temperature, dissolved oxygen, pH, and turbidity. Exceedances appear to be the result of hydrologic modifications associated with roadbuilding and blocked culverts, as well as surface runoff from adjacent roadways. Other than at these two locations, nonpoint sources of pollution do not appear to be adversely impacting surface water quality on the Reservation.

Nonpoint source pollution related to releases from the former Hansville Landfill, immediately east of the Reservation, has resulted in restrictions prohibiting the use of surface water and shallow groundwater within a “Tribal protection area” in the upper Middle Creek watershed, and in two small watersheds between Middle Creek and Little Boston Creek (See Exhibit 2). While the use of surface waters within this protection area is restricted, surface water quality does not currently appear to be adversely impacted. However, groundwater quality within this area is not expected to meet drinking water standards until 2030 (Aspect Consulting, 2022).

While current NPS impacts are minor and localized, future development, particularly for Tribal housing and associated support services, has the greatest potential to result in NPS impacts to Tribal waters. Since 2003, the Tribe has acquired nearly 1,400 acres of new lands. In 2016, 410 acres were proclaimed as new Reservation lands, effectively increasing the size of the Reservation by more than 30 percent. In 2019, the Tribe acquired in fee 925 acres of forestlands north of and contiguous with the Reservation. To meet the high demand for on-Reservation housing, it is likely that areas of these newly acquired lands will be developed for Tribal housing, with associated roadbuilding and infrastructure development. Management of these new lands will pose challenges for the Tribe in effectively addressing potential nonpoint sources of pollution and protecting Tribal water resources.

Currently, more than 80 percent of Reservation lands are undeveloped forestlands. Because of this, Tribal land management policy has focused primarily on forest management and has resulted in the development of a Forest Management Plan, which is periodically updated. However, there is a lack of specific guidance and BMPs for other types of land development. To

address this gap, the Tribe is in the process of developing environmental standards to be included as a new chapter in the Tribe's Law and Order Code. These new standards are anticipated to address the design of stormwater treatment systems and to include enforcement mechanisms for implementation of BMPs to address NPS pollution. Development of a well-defined process for identifying and implementing land development BMPs is a critical need for the protection of Tribal water quality and water resources.

## 11.0 REFERENCES

- Aspect Consulting. 2022. Remedial Action Status Report Hansville Landfill Site. Prepared for Kitsap County and Waste Management of Washington, Inc. June 28.
- Gray & Osborne, Inc. 2013. *Port Gamble S’Klallam Tribe General Sewer/Wastewater Facility Plan*. October.
- International Forestry Consultants, Inc. 2020. *Forest Management Plan for the Port Gamble S’Klallam Indian Reservation*. Updated April 21, 2020.
- Kitsap County. 2020. *Kitsap County Road Standards*. Kitsap County Department of Public Works. June 8.
- Kitsap County. 2021. *Kitsap County Stormwater Design Manual, Volumes I and II*. Kitsap County Department of Public Works and Department of Community Development. October 4.
- Kuttel, Michael, Jr. 2003. *Salmonid Habitat Limiting Factors Water Resources Inventory Areas 15 (West), Kitsap Basin and 14 (North) Kennedy-Goldsborough Basin*. Washington State Conservation Commission. June.
- May, C.W. and G. Peterson. 2003. *Kitsap Salmonid Refugia Report*. Prepared for Kitsap County. October 31.
- Parametrix. 2006. *Hansville Landfill Public Review Draft - Remedial Investigation/Feasibility Study, Remedial Investigation Report*. Prepared by Parametrix, Bellevue, Washington. September 22, 2006.
- Port Gamble S’Klallam Tribe. 2017. *Pollution Identification and Correction Program*. Final Report.
- Port Gamble S’Klallam Tribe. 2014. *Comprehensive Economic Development Strategies*. June.
- Port Gamble S’Klallam Tribe Natural Resources Department. 2016. *Climate Change Impact Assessment*. A collaboration of the Port Gamble S’Klallam Tribe, Cascadia Consulting Group, and the University of Washington Climate Impacts Group.



Port Gamble S’Klallam Tribe Natural Resources Department. 2014. *Wetlands Conservation Program Plan*. Revised August 2014.

Tormod Hellwig. 2014. *Port Gamble S’Klallam Tribe Administrative Campus Facilities Assessment and Master Plan*. December 31.

Washington State Department of Ecology (Ecology). 2022a. *Hansville Landfill*. Available: <https://apps.ecology.wa.gov/cleanupsearch/site/695>. Accessed: June 15, 2022.

Washington State Department of Ecology (Ecology). 2022b. *Port Gamble Bay and Mill Site*. Available: <https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Cleanup-sites/Puget-Sound/Port-Gamble-baywide>. Accessed: June 15, 2022.

Washington State Department of Ecology (Ecology). 2022c. *Supporting Information for 2018 Water Quality Assessment*. Water Quality Program. Publication 22-10-018. August.



**RIDOLFI**  
Environmental

# Figures





**Port Gamble  
S'Klallam  
Reservation**

**Port Gamble**



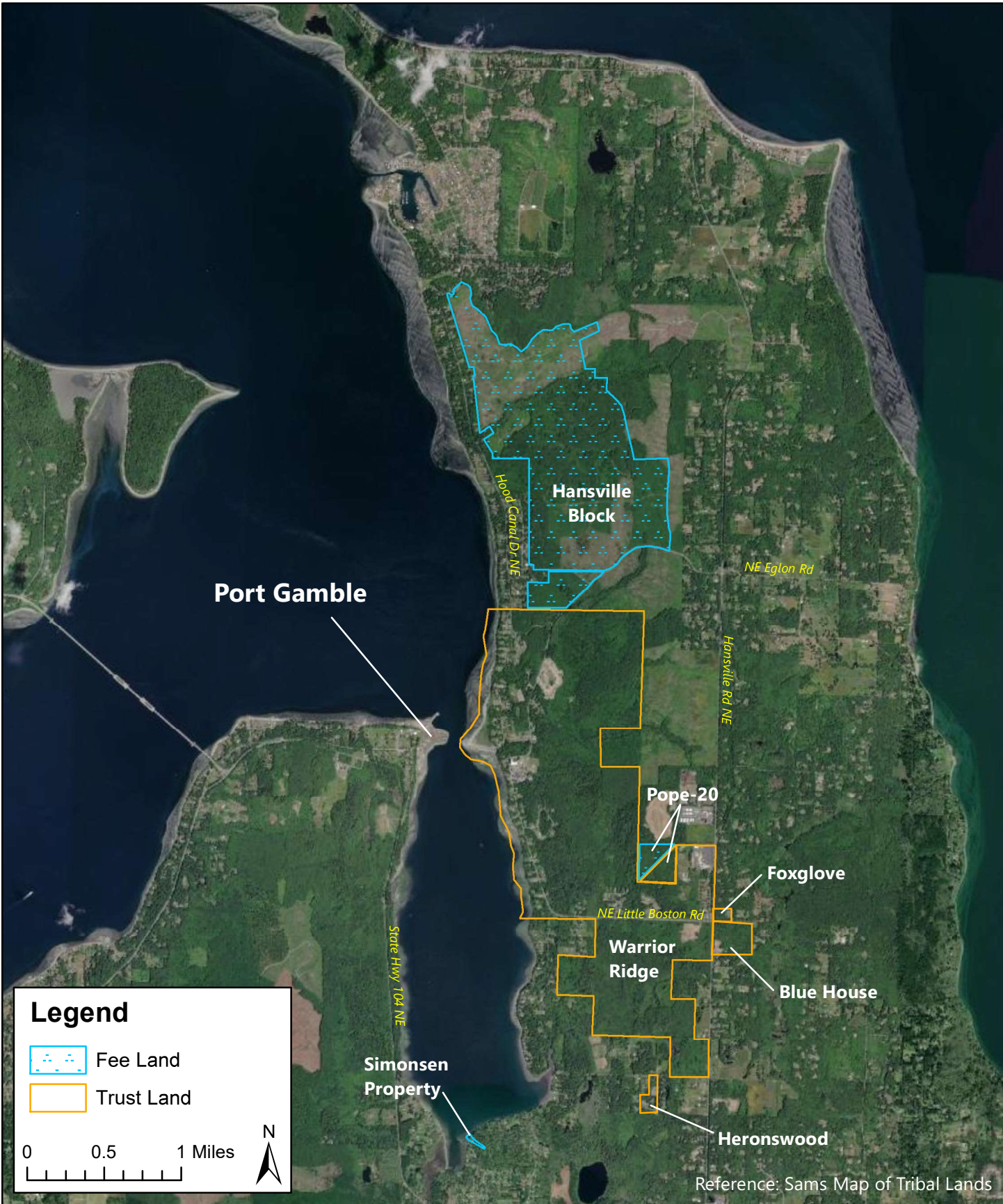
Nonpoint Source Pollution Assessment Report  
for the Port Gamble Reservation

Prepared for the Port Gamble S'Klallam Tribe

September 2023

Figure 1

Vicinity Map




**Legend**

- Fee Land
- Trust Land

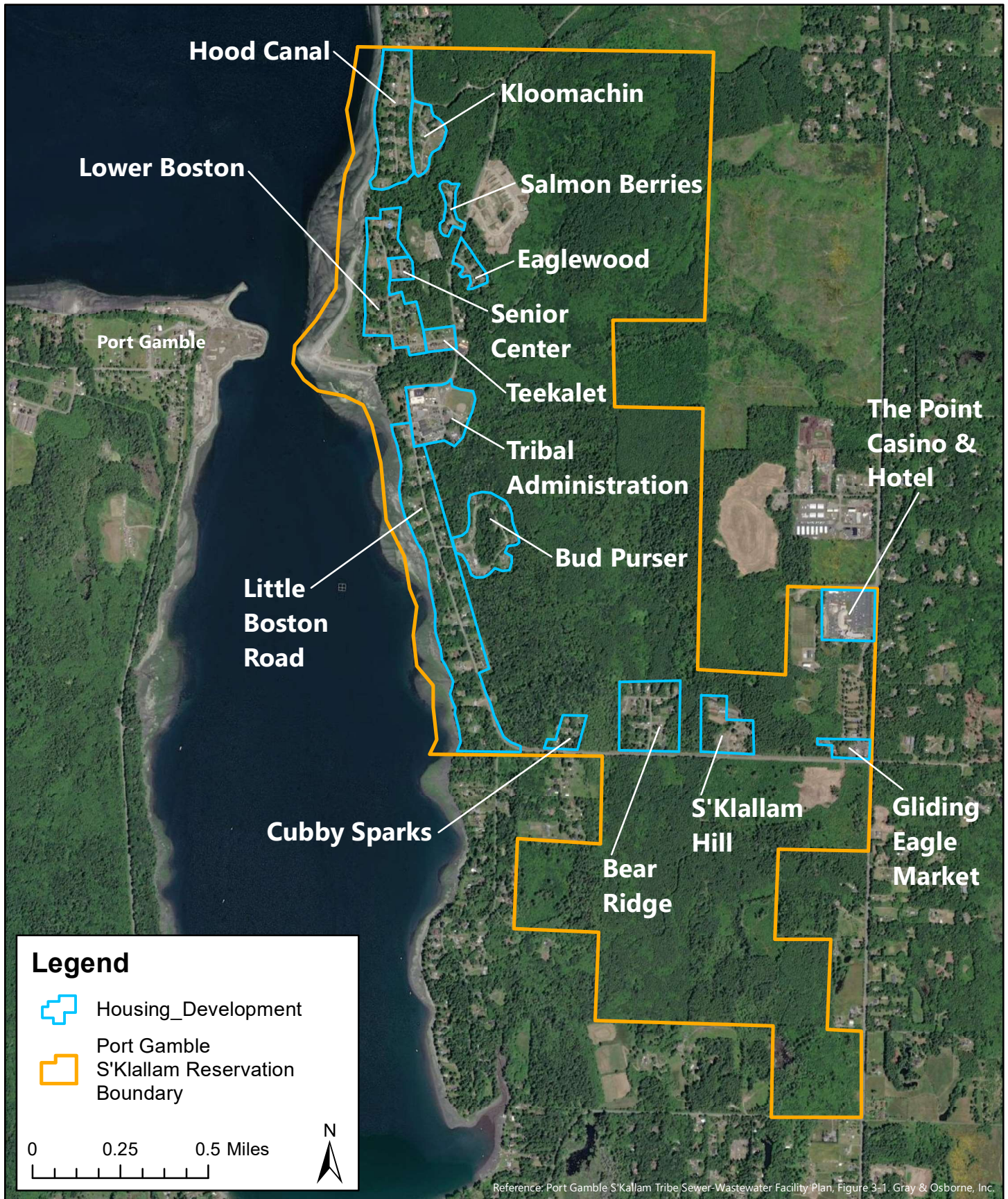
0    0.5    1 Miles


N

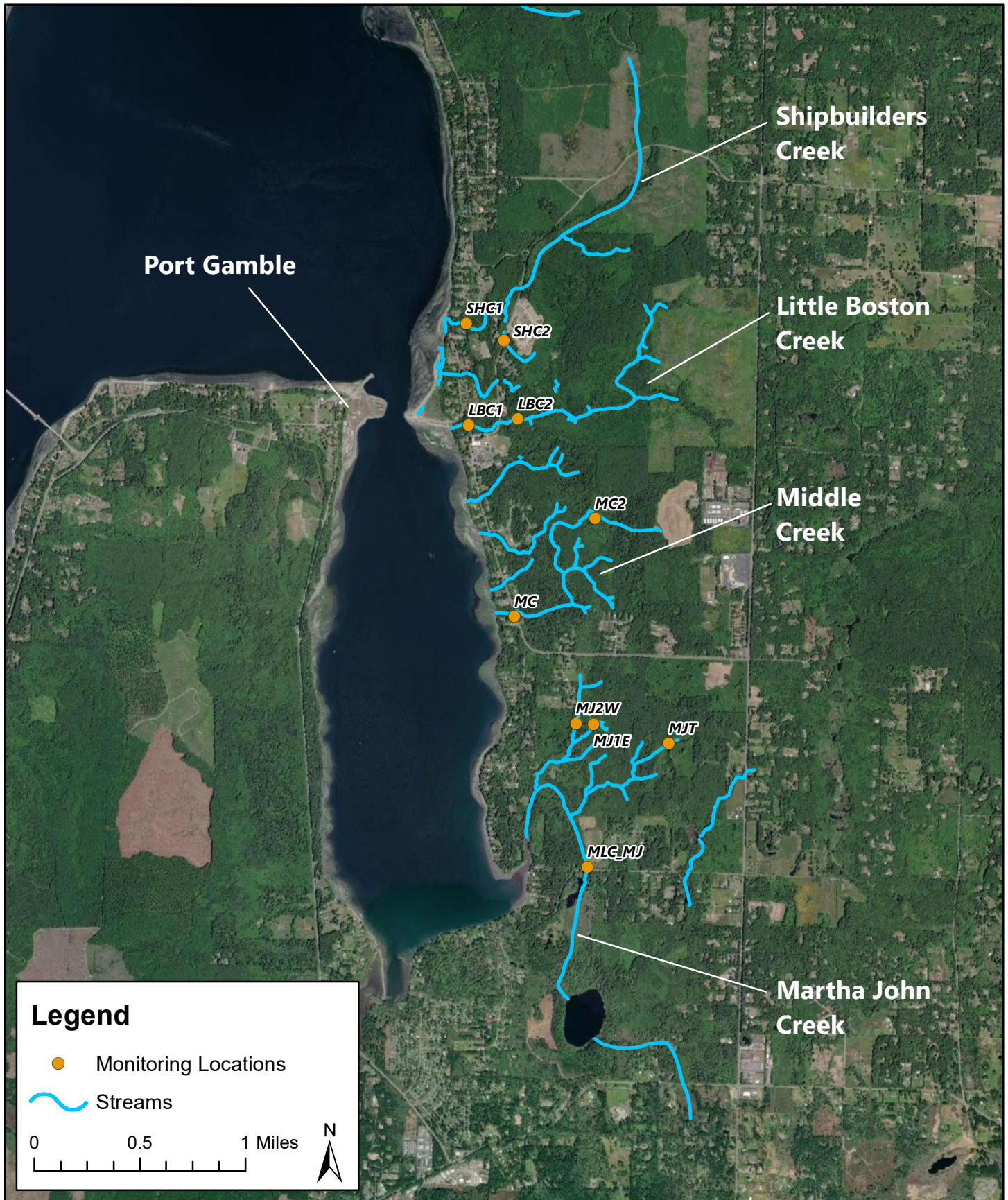
Reference: Sams Map of Tribal Lands

	Nonpoint Source Pollution Assessment Report for the Port Gamble Reservation	September 2023	Figure 2
	Prepared for the Port Gamble S'Klallam Tribe	Port Gamble S'Klallam Tribal Lands	

Path: M:\Projects\265\_PGST\265H\_CWA\_319\mapfiles\265H\_Fig03\_TribalLandStatus\_220808.mxd



	Nonpoint Source Pollution Assessment Report for the Port Gamble Reservation	September 2023	Figure 3
	Prepared for the Port Gamble S'Klallam Tribe	Tribal Housing and Commercial Developments	




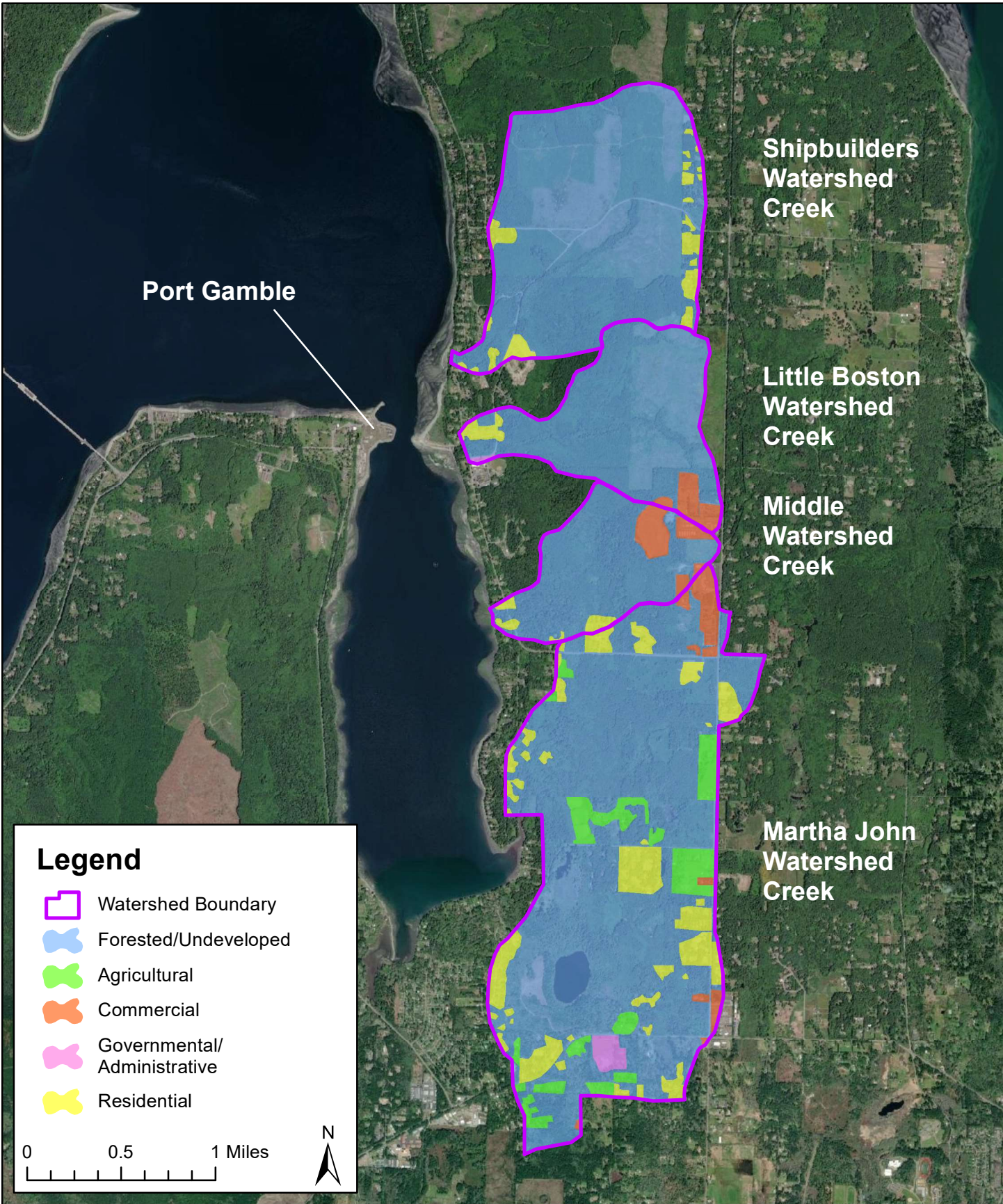
**Legend**

- Monitoring Locations
- ~ Streams

0      0.5      1 Miles

N

	Nonpoint Source Pollution Assessment Report for the Port Gamble Reservation	September 2023	Figure 4
	Prepared for the Port Gamble S'Klallam Tribe	Stream Monitoring Locations	



Nonpoint Source Pollution Assessment Report  
for the Port Gamble Reservation

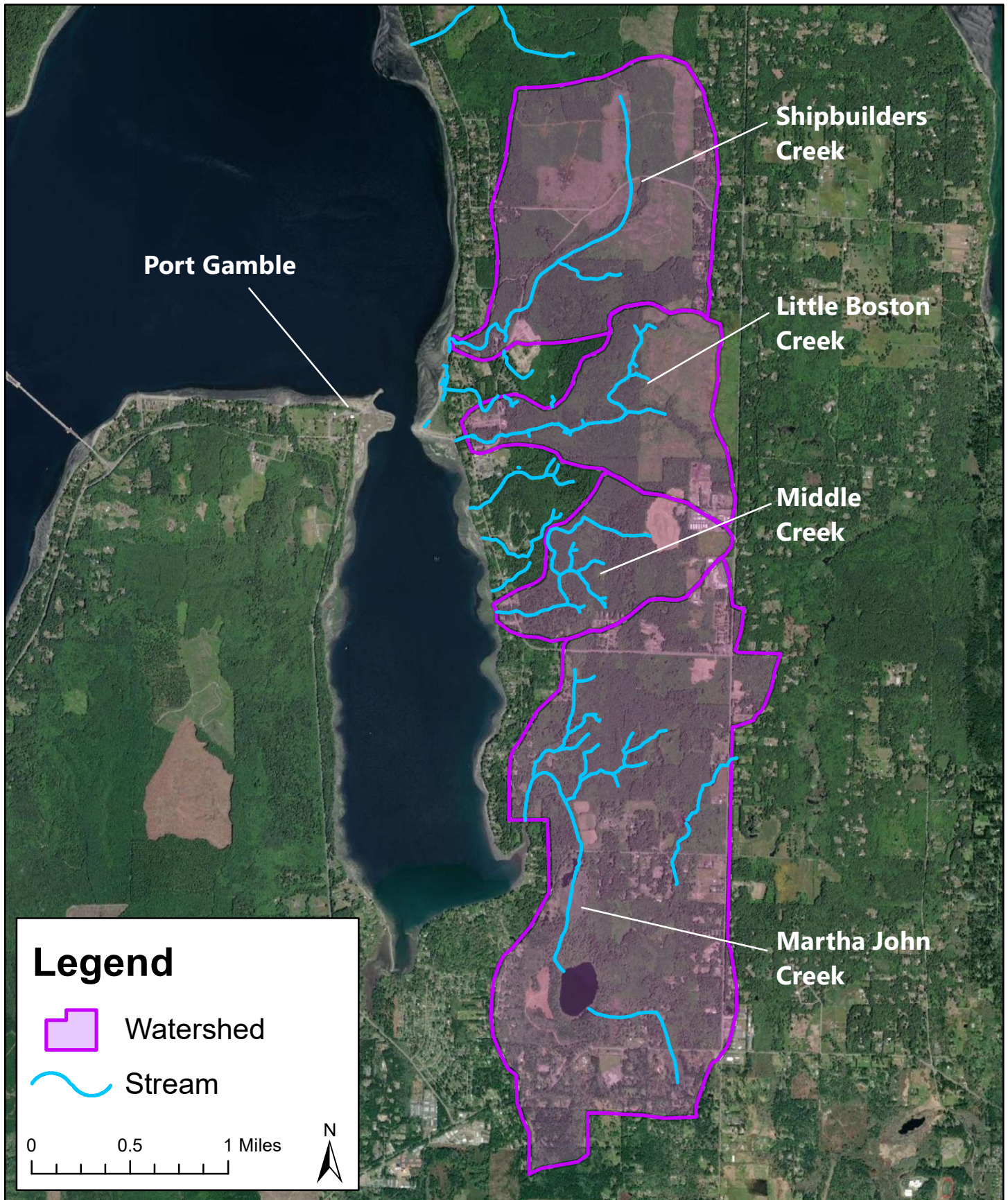
Prepared for the Port Gamble S'Klallam Tribe


September 2023

Figure 5

Land Use





	Nonpoint Source Pollution Assessment Report for the Port Gamble Reservation	September 2023	Figure 6
	Prepared for the Port Gamble S'Klallam Tribe	Watersheds	

# Exhibits






Exhibit 1. Stream and Wetland Inventory

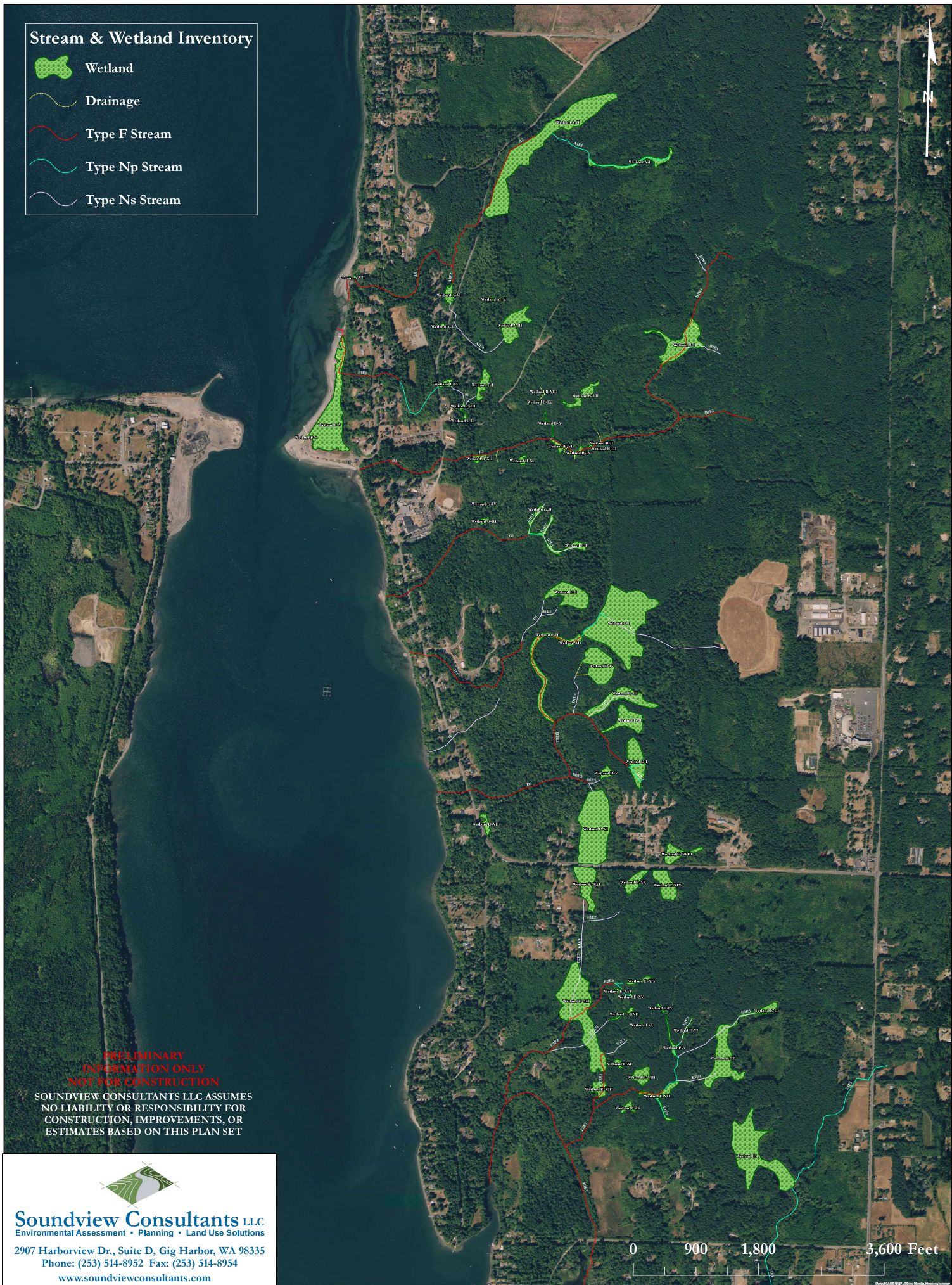
Exhibit 2. Tribal Protection Area

Exhibit 3. Wastewater System



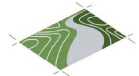
# Stream & Wetland Inventory

-  Wetland
-  Drainage
-  Type F Stream
-  Type Np Stream
-  Type Ns Stream



**PRELIMINARY  
INFORMATION ONLY  
NOT FOR CONSTRUCTION**

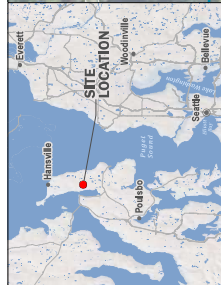
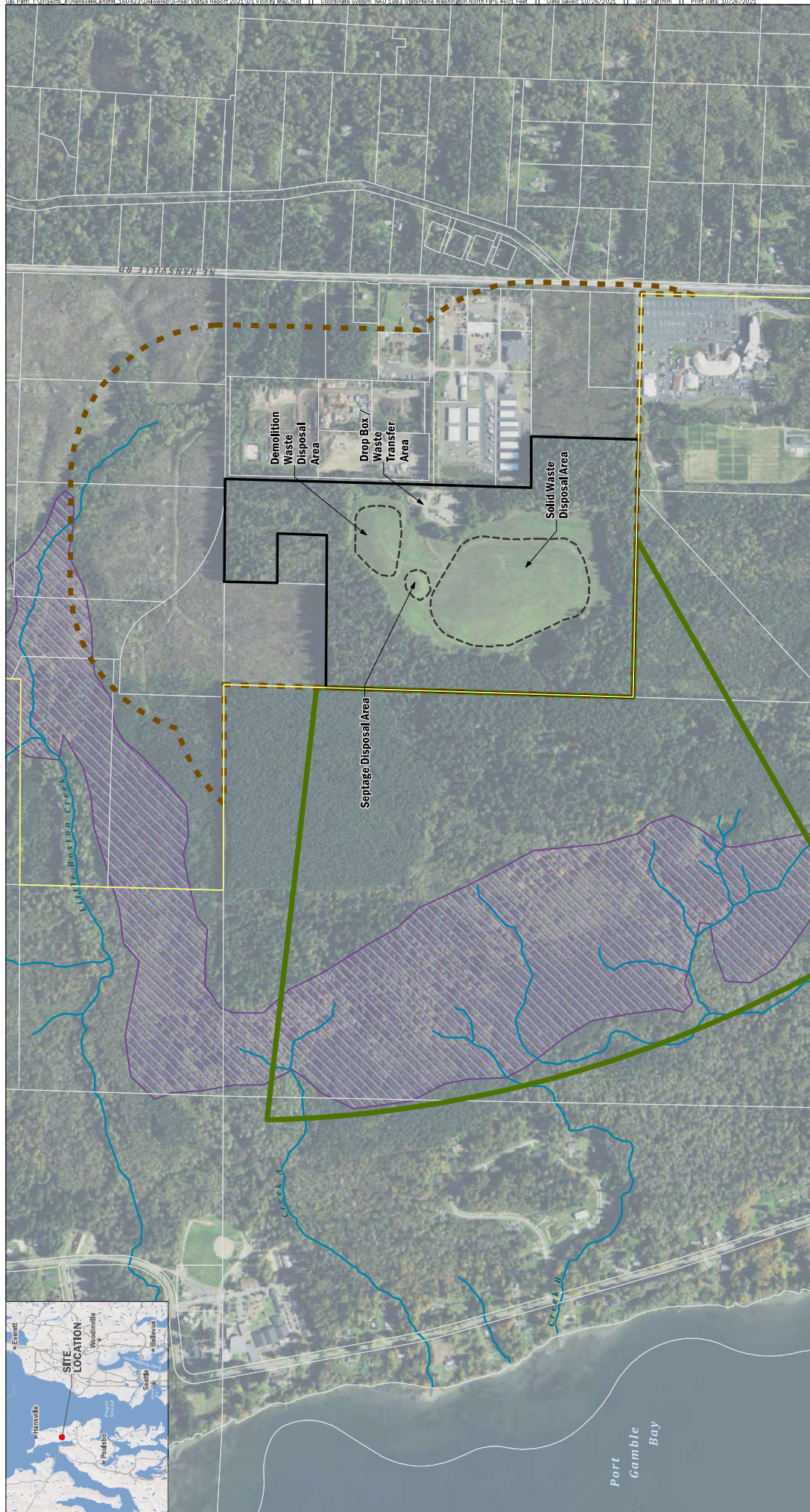
SOUNDVIEW CONSULTANTS LLC ASSUMES  
NO LIABILITY OR RESPONSIBILITY FOR  
CONSTRUCTION, IMPROVEMENTS, OR  
ESTIMATES BASED ON THIS PLAN SET



**Soundview Consultants LLC**  
Environmental Assessment • Planning • Land Use Solutions

2907 Harborview Dr., Suite D, Gig Harbor, WA 98335  
Phone: (253) 514-8952 Fax: (253) 514-8954  
www.soundviewconsultants.com

0 900 1,800 3,600 Feet



**Vicinity Map**  
 Five-Year Status Report  
 Hansville Landfill  
 Kitsap County, Washington

PROJECT NO: 2021-01  
 PREPARED BY: MLK / WEG  
 MLK / PSB / WEG

FIGURE NO. **1**

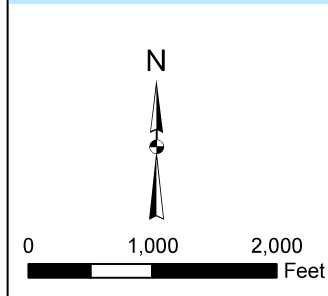
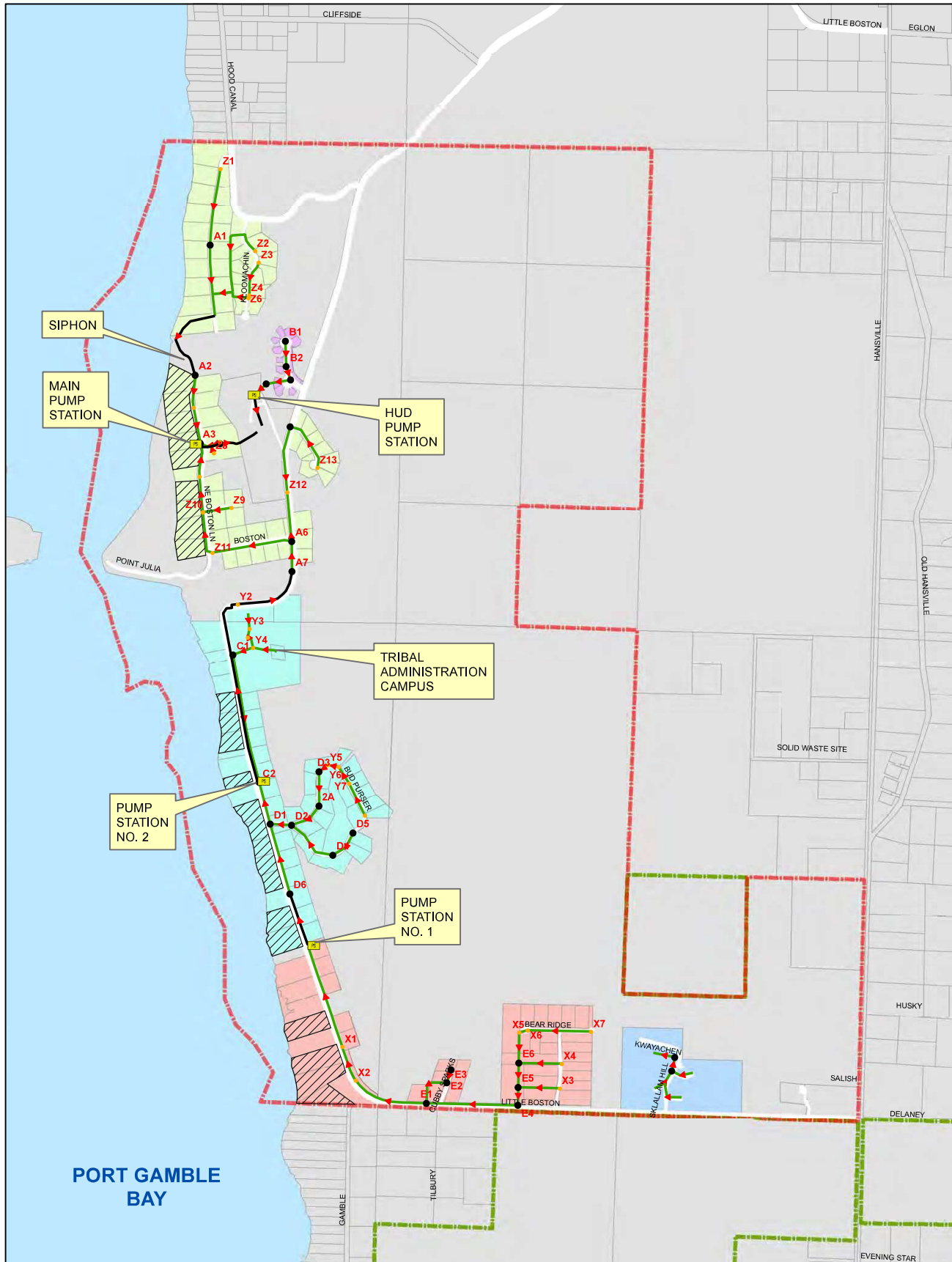
Aspect  
 Environmental

**Legend**

- Exterior Boundary of Port Gamble S'Klallam Tribal Land
- State Well Drilling Restriction Area
- Tribal Protection Area
- Approximate Area of Groundwater Discharge from Upper Aquifer
- Waste Disposal Area
- Landfill Property Boundary
- Stream
- Tax Parcel

Note: Site features are approximate.

Scale: 0, 500, 1,000 Feet



- LEGEND:**
- PUMP STATIONS
  - CLEANOUT
  - MANHOLE
  - FORCEMAIN
  - GRAVITY
  - PARCELS SERVED BY STEP SYSTEMS
  - PORT GAMBLE S'KLALLAM TRIBE RESERVATION BOUNDARY
  - BOUNDARY OF LAND PURCHASED BY TRIBE
  - PARCELS
- |  |              |
|--|--------------|
|  | SEWER BASINS |
|  | 1            |
|  | 2            |
|  | 3            |
|  | 4            |
|  | 5            |

**PORT GAMBLE S'KLALLAM TRIBE**

GENERAL SEWER / WASTEWATER FACILITY PLAN  
FIGURE 4-1  
RESIDENTIAL SEWER COLLECTION SYSTEM  
AND SEWER BASINS



Gray & Osborne, Inc.

**RIDOLFI**

500 Union Street  
Suite 1010  
Seattle WA 98101  
(206) 682-7294

[ridolfi.com](http://ridolfi.com)