POINT NO POINT ESTUARY RESTORATION PROJECT

FINAL FEASIBILITY REPORT FOR SRFB#17-1032

Prepared by:

Mid Sound Fisheries Enhancement Group and Blue Coast Engineering

June 25, 2021

INTRODUCTION

Point No Point is located at the northeastern tip of the Kitsap Peninsula, where the waters of central Puget Sound meet the waters of Admiralty Inlet. The project location was historically a barrier estuary that has been leveed over time and cut off from tidal exchange for pasture and residential development. It is now a freshwater marsh owned by Kitsap County Parks and utilized as a recreation area on both the beachfront and along the marsh edges.

This project seeks to restore tidal influence and fish access to 32 acres of freshwater wetlands that were historically salt marsh by removing a malfunctioning tide gate on the west edge of the marsh and restoring tidal connectivity. This project will restore the largest of the historic barrier embayments (pocket estuaries) on the eastern shore of the Kitsap Peninsula, which provide critical nearshore habitat, and which have been largely lost. Several ecosystem processes that directly benefit juvenile Chinook salmon habitat will be restored, including tidal flow, tidal channel formation, exchange of marine/freshwater nutrients and prey resources, detritus import and export, sediment transport, and sediment deposition.

The feasibility and conceptual design phase explored the feasibility and sustainability of a tidal marsh restoration, both from a technical and land management perspective. Blue Coast Engineering conducted research and analysis on the technical feasibility and Mid Sound worked with the landowner and management parties to assess project support.

Early partner outreach and project development began in 2018. In 2019, an initial concept was developed and feasibility studies were initiated. In late 2020 and the first half of 2021, this information and conceptual alternatives were shared in an outreach effort including project partners and the nearby community. This phase of development and grant funding concludes at the end of June 2021.

PROJECT GOALS AND OBJECTIVES

This phase of the project investigated both technical feasibility and project support among partners and the community. Note that at the time of contract, Mid Sound's consultant was Confluence Engineering. When lead staff Jessica Cote left Confluence to start her own firm, Blue Coast Engineering, it was agreed by all parties that she would take the Point No Point project and scope with her.

Technical Goals and Objectives for preliminary data collection and analysis were focused on determining if a saltwater connection would be sustainable over time due to the highly dynamic nature of the site. Work conducted included:

- Assessment of coastal processes and geomorphology to document existing conditions and provide baseline design criteria.
- inundation mapping of the site for a range of sea level rise projections in anticipation of possible future conditions at the site and surrounding area.
- Geomorphic mapping on site of key sediment transport indicators
- Analysis of long term water level data to calculate tidal datums and extremal water levels
- Wind-wave calculations based on existing wind data from long-term stations.
- Cross-shore beach profiles including delineation of key elevations.
- Development of a preliminary digital elevation model using existing LIDAR and supplemented with limited survey data collected to ground-truth selected locations.

The methods and results of these studies are detailed in Appendix A and C.

Project goals and objectives also included partner and community engagement. Mid Sound and Blue Coast conducted the following efforts:

- Identification of relevant project partners and affected parties
- A review of property ownership, public right-of-ways, and easements
- Outreach to share project goals, feasibility study results, and conceptual design alternatives
- Receiving feedback, ideas, and concerns from the above parties
- Identifying potential setbacks or design considerations for project development
- Creating communication channels and building trust and support for our project and design/outreach process from both partners and the community
- Conveying community and neighbor feedback to partners and vice versa.

Methods and results for these efforts are outlined in Appendix B and D.

SUMMARY OF FINDINGS

Based on the technical studies and modeling completed, the barrier estuary restoration with tidal outlet on the east side of the marsh is feasible and sustainable. For more detailed analysis and next steps, see Appendix A. The next stage of design development focuses on the interior details of the marsh restoration, which we have outlined in our Conceptual Alternatives (Appendix E).

Based on our research, outreach, and alternatives analysis, Mid Sound and Blue Coast support the primary Conceptual Plan, which allows for the fullest restoration potential in the marsh. We have heard broad support for this route from our partners and community as well. We will continue to research the questions and concerns raised by our team and during outreach to confirm that this plan can be developed. Potential constraints include hydrology of the marsh, private parcel and Hillview Lane considerations for design, and minimizing flooding impacts to Point No Point Road and properties north of the road. Our next phase of design will center these questions through data collection, analysis, modeling, partner involvement and community discussions.

FUNDING AND NEXT STEPS

Mid Sound has been awarded Estuary and Salmon Restoration Program funding for Preliminary Design, beginning summer 2021. We have applied for additional SRFB 2021 funding for Preliminary Design as well as National Estuary Program funding for Preliminary through Final Design. Both of these would be awarded in later 2021 if the project is selected.

Mid Sound has also been awarded a NOAA Fisheries grant to engage recreational anglers and other interest groups in conservation work in the project. This funding is expected in summer 2021 and we anticipate developing Citizen Science data projects and education and outreach efforts to support the project with help from groups such as North Kitsap Puget Sound Anglers, Trout Unlimited, and Kitsap Audubon. This grant may also include planning work for future stewardship and construction projects such as viewing platforms or educational signage with the above groups.

Our goals and objectives for the next phase of design include:

- Wetland mapping and habitat surveys.
- Marsh and surrounding area hydrology including creek, groundwater, surface water, and existing adjacent road/drainage ditch flooding.
- Assessing and designing around potential project impacts to homes and infrastructure north of the marsh.
- Assessing and designing around potential project impacts to Hillview Lane, including fish passage/stream connectivity assessment and potentially raising the road.
- Refinement of the levee design including size, setback, length, interactions with Hillview Lane and Point No Point Road, connections with surface water drainage, impacts to habitat and homeowners, and potential for pedestrian usage.
- Confirm historic preservation requirements at lighthouse parcel and factor into design.
- Continue to research Gamble parcel inheritors and encumbrances with Kitsap Parks.
- Continuing conversations with project partners around the above design development, improving larger land use concerns in the area, and long-term operations and maintenance following project completion.
- Continuing conversations with neighbors and community regarding design development, interests and concerns, and project potential.
- Continuing conversations with U.S. Coast Guard (lighthouse parcel owner), Parks, and WDFW around neighboring projects and property.
- Continuing discussions with tribes around natural resource and cultural resource interests and concerns, as well as project development opportunities.

The project is expected to be in design through 2024, with permitting and construction in 2024-2025 if funding can be secured for this timeline.

FINAL REPORT APPENDICES

This report contains several deliverables and studies related to grant requirements and work conducted under the Salmon Recovery Funding Board (SRFB) Grant #17-1032. Each component it outlined here and included in an Appendix to this report.

Appendix A. Final Feasibility Report

Blue Coast Engineering has prepared the Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report, providing a technical review of studies, modeling, and analysis conducted to explore feasibility and sustainability of an east-shore tidal outlet for the proposed barrier estuary at Point No Point. These studies confirmed that a barrier estuary with restored tidal connection to the east is feasible and sustainable given existing coastal processes and infrastructure constraints. Appendix A consists of the Feasibility Report and its own appendices. Our next stage of design will focus on the interior marsh conditions and hydrology to better understand project potential in that area.

Appendix B. Outreach Summary Report

Mid Sound staff have prepared a summary report of their partner and community outreach efforts completed in 2020 and 2021. The report outlines methods, identified parties, results, and next steps in Appendix B. This appendix also includes the partner responses to our Conceptual Design and Alternatives.
After meeting with 46 partner staff (county departments, agencies, and tribes) and 44 community members in the neighboring communities, the project is overwhelmingly supported. Those project questions, concerns and frustrations with existing land use expressed to Mid Sound during this preliminary outreach are summarized in the report and will be shared with relevant project partners and considered in design development. Future outreach is planned throughout design development.

Appendix C. Homeowner FEMA Review Memo

Blue Coast Engineering prepared a FEMA insurance map review for project impacts upon request of a homeowner on Hillview Lane, which is uphill from the project. Blue Coast found that the project impacts will not require adjustments to the FEMA flood maps for the area surrounding the project. The Hillview Lane properties are not considered in the flood risk zone, but homes north of Point No Point Road are already mapped as within flood risk areas per FEMA.

Appendix D. Title Review

Mid Sound and Blue Coast Engineering conducted preliminary parcel and title research during this phase. We identified the parcel ownership within the project footprint. The area is primarily owned by Kitsap County Parks. One parcel within the marsh is owned by a resident on Hillview Lane and we are in touch with her about project developments. We are also in touch with landowners connected to Hillview Lane, a private road that runs through the marsh. One parcel on the east edge of the park is under private ownership. The owners are presumed deceased from our research but we will continue to pursue information on this parcel in our next phase of design.

Appendix E. Conceptual Alternatives Analysis

Appendix E summarizes the technical information provided in Appendix A and the outreach feedback on alternatives provided in Appendix B, and then summarizes the alternatives analysis conducted by Mid Sound and Blue Coast Engineering in light of this information. We present pros, cons, and comparisons of the alternatives and our suggestion for a preferred alternative (full restoration concept), and further information needed (next steps for design development). Those conclusions are also outlined above in this summary report.

Point No Point Restoration Reconnection Feasibility Study

Site Characterization and Conceptual Alternatives Report

Submitted to:
Mid Sound Fisheries Enhancement Group

Blue Coast Engineering
18320 47th Pl NE
Lake Forest Park, WA 98155

March 30, 2021

Table of Contents

List of Figures

List of Tables

Appendices

1 Introduction

At the request of the Mid Sound Fisheries Enhancement Group (Mid Sound) and on the behalf of Kitsap County Parks, Blue Coast Engineering (Blue Coast) has completed a site characterization and developed a high-level set of conceptual alternatives for the Point No Point restoration reconnection feasibility study.

The project seeks to identify a feasible conceptual design for restoring tidal influence and fish access to 32 acres of freshwater wetlands that were historically salt marsh at Point No Point at the northeastern tip of Kitsap County (Figure 1-1). The site is located near Hansville, WA where the waters of central Puget Sound meet the waters of Admiralty Inlet. The marsh has been diked and a pipe installed that allows a limited tidal connection to the eastern shoreline of the marsh with a poorly functioning tide gate. The majority of the former salt marsh is now on land owned by Kitsap County Parks with a recreational trail around the edge of the wetland and beach access.

The restoration of tidal influence to this site has been identified as a high priority restoration project during multiple studies and assessments, most recently in the Kitsap County assessment of nearshore projects (Schlenger et al 2016). This feasibility analysis is focused on determining the potential for restoring natural processes as comprehensively as possible while balancing the other land uses of the site.

This technical report documents work completed by Blue Coast under a grant from the Salmon Recovery Funding Board through Recreation and Conservation Office (PRISM Project #17-1032) as well as capacity funding through MSFEG. This work was conducted as seven tasks:

- Task 1: Clarify property ownership in the project vicinity using available tax assessor parcel data
- Task 2: Conduct a preliminary analysis of the coastal processes and geomorphic assessment of the site to document existing conditions and provide baseline information to be used in conceptual design.
- Task 3: Stakeholder outreach through a series of conversations with partners and local community members to identify key concerns and to develop support for a potential restoration.
- Task 4: Technical report to document the outcome of the early feasibility study and to develop a conceptual design for the site.
- Task 5: Conduct a high-resolution drone survey to develop a topographic surface for the site.
- Task 6: Cultural resource planning and coordination/consultation meetings between proponent, funding agency, regulatory agencies, and Tribes
- Task 7: Review of existing information and site conditions to determine data gaps and needs for future work to understand surface water and ground water within the project site and surrounding areas.

Figure 1-1. Site overview map.

2 Historical and Existing Conditions

Point No Point is a low-lying sandy barrier beach located at the northeastern tip of the Kitsap Peninsula at the entrance to Puget Sound from Admiralty Inlet (Figure 1-1). Fresh water wetlands at Point No Point are located to the east and south of NE Point No Point Rd, but this was once the largest barrier embayment salt marsh complex along the northern shore of the Kitsap Peninsula. The freshwater wetlands are fed by an unnamed perennial stream.

Point No Point is currently owned and operated by Kitsap County Parks with a parking lot, restrooms, picnic area, and perimeter walking trail which leads to a set of stairs that ascend to a higher forested park area. The site and adjacent areas are protected from further development through the 2014 Kitsap County Shoreline Management Plan. Kitsap County's 2014 Shoreline Master Plan designates the northern portion of the site as a Natural Shoreline, the most protective designation possible, and the southern half of the site as a Rural Conservancy which is only slightly less protective.

The site also features a historic US Coast Guard (USCG) lighthouse and guest houses which are now owned and leased as vacation rentals by Kitsap County Parks, and which house the U.S Lighthouse Society headquarters. The site is surrounded by private landownership and residences to the south and north, and is a popular public recreation area for walking, hiking, birdwatching, and fishing.

2.1 Site History and Development

The marsh within the Kitsap County Park at Point No Point was historically a barrier embayment with salt marsh enclosed by sandy barrier spits and a channel allowing tidal exchange with Admiralty Inlet on the north side of the site (Figure 2-1). These features are documented in the t-sheet published in 1857. The Point No Point Treaty between Washington Governor Isaac Stevens and delegates of the villages of S'Klallams tribes to relinquish land to the United States was signed at the site on January 26, 1855. This area was referred as Hahd-skus, meaning 'long nose", by the local tribes.

Based on reports in a historical journal (Todd et al. 2006) and US Lighthouse Society Keeper's Log dikes and a tide gate were constructed in the wetland at the same time as the lighthouse (1879) to protect the dwelling and lighthouse from tidal inundation. At this time, there was only one dike which extended from the northwest shoreline to southeast shoreline across the wetland behind the lighthouse. The road along the north side of the marsh (NE Point No Point Road) was constructed in approximately 1920 and this is conjectured to be how and when the primary tidal channel and saltwater flow into the northern portion of the marsh was cut off.

Between 1920 and 1950, drainage channels were cut into the wetland to promote drainage so the site could be used as a pasture for livestock (Vanbianchi 1991). The main ditched channel was connected to the existing tide gate in the 1950s and the tide gate was replaced at that time. Additional channels were cut into the marsh between 1965 and 1985 redirecting the perennial stream into a ditched channel. Hillview Lane, a private road that bisects the marsh, was also constructed in this period (between 1970 and 1985). Kitsap County Public Works upgraded the tide gate and extended the outlet culvert pipe from the tide gate into Puget Sound in approximately 2000.

The historical Point No Point salt marsh was fed by a small unnamed stream to the south which still feeds the freshwater wetland at the site. The salt marsh was bounded by saltwater shoreline both to the north and the east of the marsh. This historical outlet and connection to the salt water was through the

northern shoreline. The marsh had a series of sinuous channels flowing through the salt marsh where the freshwater from the small stream would mix with the salt water (Figure 2-1).

Although the main channels in the existing marsh have been ditched, the secondary channels in the wetland remain a more natural sinuous pattern and are likely the original salt marsh channels. The wetland currently consists of an upper and lower wetland separated by Hillview Lane and connected by a 12" culvert.

2.2 Existing Site Conditions

This section describes the shoreline, including a coastal processes and geomorphic assessment of the site to document existing conditions and provide baseline information to be used in conceptual design. Included in this section is a summary of the following:

- Ownership of the project site and neighboring properties;
- Topographic survey data;
- Water levels;
- Wind and wind-wave conditions; and
- Geology and geomorphology;
- Historical aerial photographs;
- Hydraulic review (surface water);
- Groundwater.

2.2.1 Property Ownership

The Kitsap County GIS database (Kitsap County 2020) was used to identify parcel boundaries and ownership of properties adjacent to the project site. A detailed drawing based on the public land survey section for Point No Point is provided in Appendix A. In addition to boundaries and property ownership, the drawing identifies public rights-of-way and easements adjacent the project site.

A major portion of the former salt marsh is now on land owned by Kitsap County Parks with only a small portion privately owned, which includes Hillview Lane. Kitsap County Parks owns an easement along the west side of Hillview Lane which is likely for access by the residents and in a case of emergency. Outreach to the landowner of the parcel adjacent to Hillview Lane was initiated by MSFEG in February 2020, then delayed because of the COVID-19 pandemic until Fall 2020. Details on property owner outreach are discussed in Section 5.0 of this report. Additional clarification of the extent and purpose of the easement on Hillview Lane will be requested during outreach with residents in future phases of this project.

The proposed restoration area is also bordered by a low-elevation residential community to the north, which experiences regular flooding of the NE Point No Point Rd. Communication with the residents of this community and research into flooding sources will also be conducted during the next phase of this project.

There is a privately owned parcel within the park boundaries along the eastern shoreline which is not a taxed parcel and shows a perpetual easement (an easement without any time limits). The owners of this parcel are listed as Bonnie Lou and Leota Gamble. According to the 1940 census, Bonnie Lou Gamble was 35 and Leota Gamble was 24 in 1940, and they were sisters who lived in Seattle at that

time. Their sister Elsie Myrtle Gamble is buried in Hansville cemetery and the memorial at the cemetery says the following, “moved back to Seattle, Washington, about 1943 to be with her family, taking son John, and resumed her nursing career. While spending the summer at her sister's summer home in Hansville, she met Charles Fleetwood Walters, Officer in Charge of the U.S.C.G. Lighthouse, which was next door and married him in Shelton, Washington, about 1948. After his retirement, they built a home in Hansville.” We presume that the owners of this parcel, Bonnie Lou and Leota Gamble are deceased.

There is a Shoreline Substantial Development Permit recorded on the Gamble parcel for the extension of the tide gate outlet culvert in 2012 which implies the perpetual easement has been granted to Kitsap County. Kitsap County public records did not have any additional information on this parcel and recommended a title search be conducted.

2.2.2 Topography

Topographic survey data was needed to identify existing gradients and bank slopes, toe and crest elevations, structure locations and elevations for the feasibility study and design phases. A digital elevation model (DEM) was created based using input from three sources (Figure 2-2). The three data sources are:

- A 1-foot resolution aerial drone survey of the site was completed by Blue Coast and Environmental Science Associates (ESA) in June 2019. The drone survey was flown for the above water portions of the site and ground-truthed using a real-time kinematic global positioning (RTK-GPS) survey.
- The RTK-GPS survey was also used to obtain beach profile cross-sections at low-tide to analyze beach slope (Figure 2-3) and fill gaps in the drone data.
- The drone topographic survey dataset was combined with the most recent available Light Detection and Ranging (LiDAR) topographic dataset for Kitsap County provided by the United States Geological Survey (USGS). The LiDAR dataset, flown in December 2017, has a 3-foot resolution with an absolute accuracy of about 0.3 feet and provides coverage in the areas to the north and west of the road leading to the project site where the drone was not flown.

Additional figures documented the development of the final DEM are provided in Appendix B.

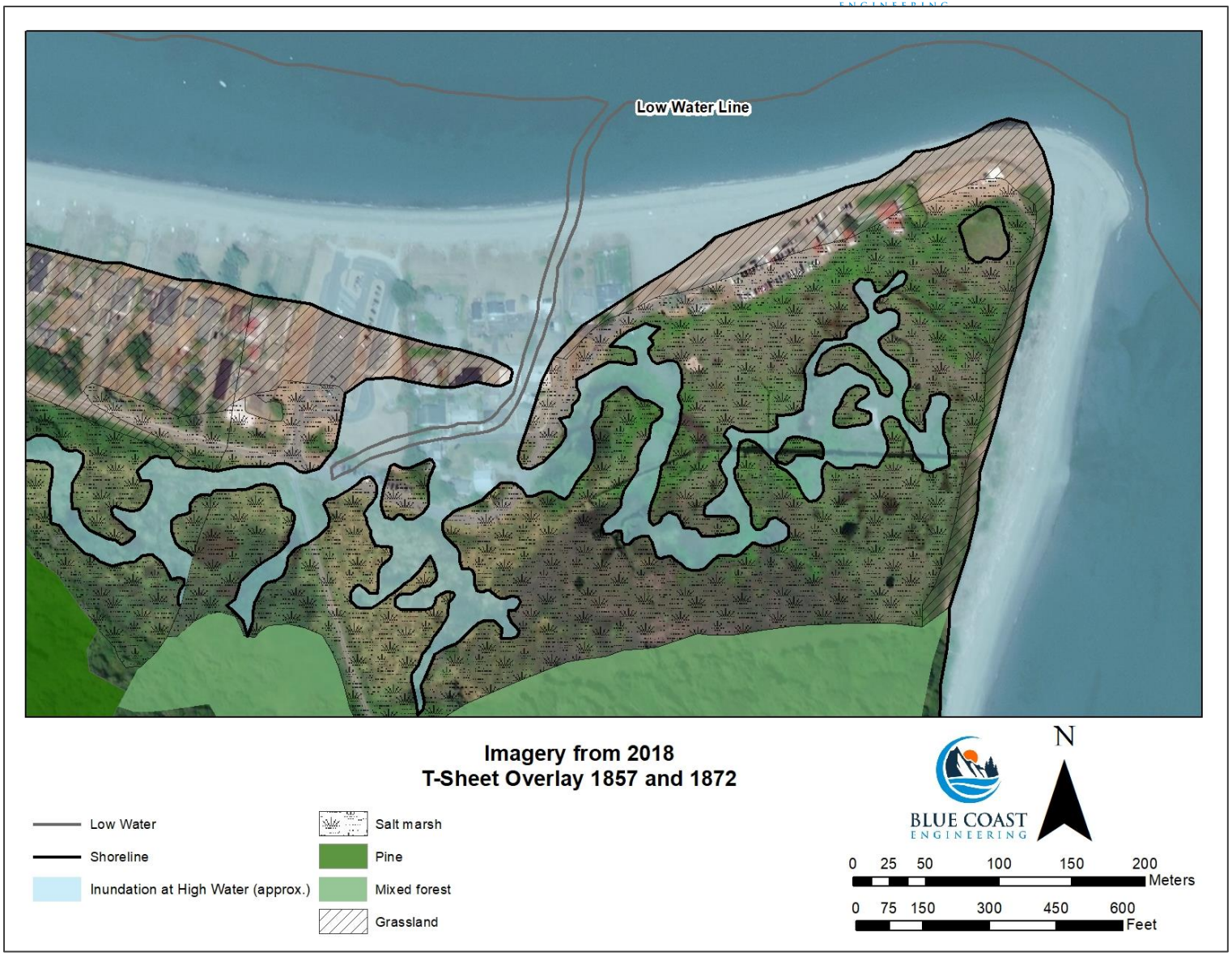


Figure 2-1. Features of historic barrier embayment and tidal wetland in 1857.

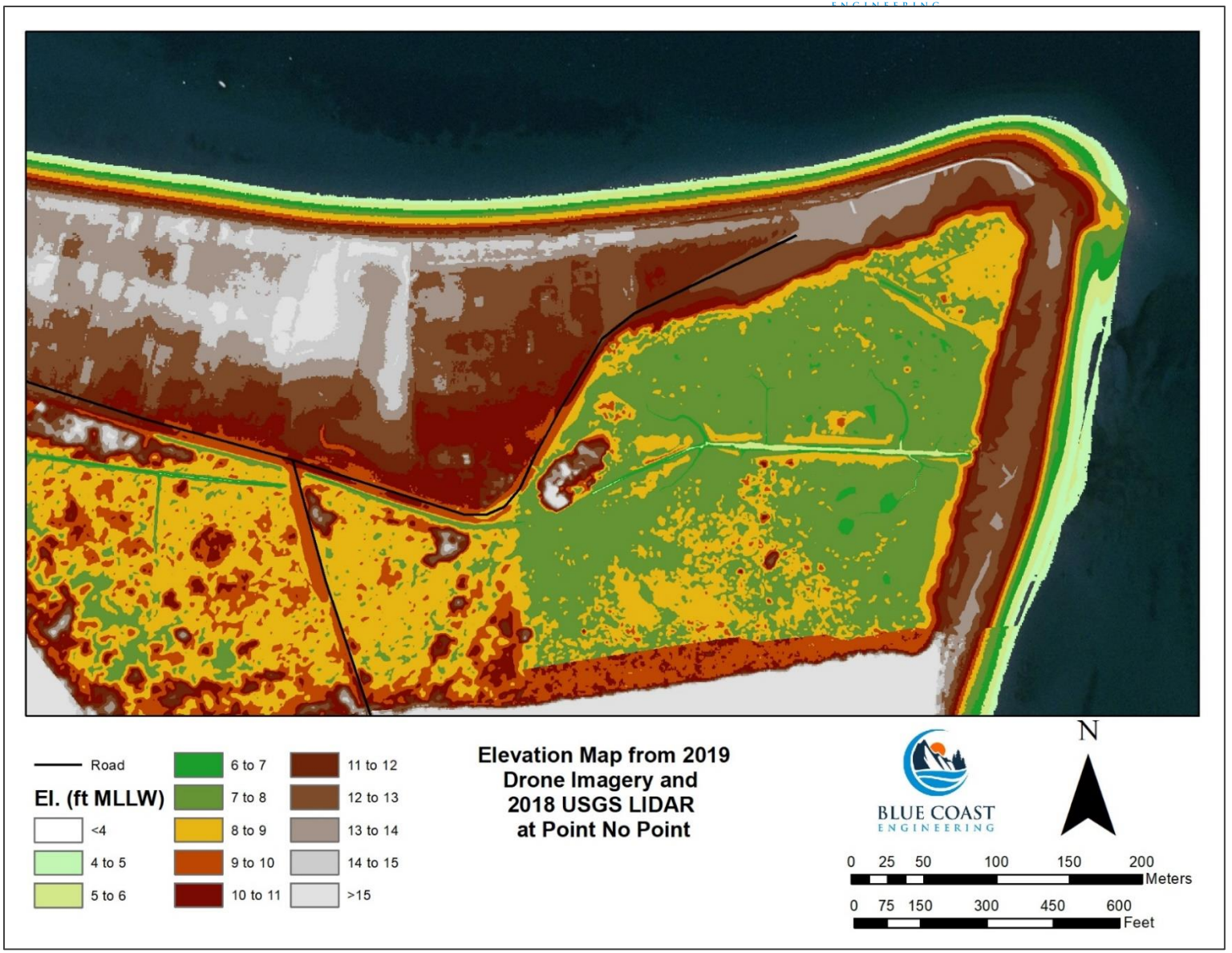


Figure 2-2. Digital elevation model of Point No Point site.

Figure 2-3. RTK-GPS survey points collected in June 2019.

3.0 Hydrology and Hydrodynamics

The project site is located within the Puget Sound estuary where fluctuations in water level occur from several forcing mechanisms:

- Astronomical tidal influence (mixed semi-diurnal tide resulting in two highs and two lows per day).
- Localized, short-term fluctuations occur over several hours and days due to meteorological conditions (storm surge resulting from winds and differences in barometric pressure, wind set-up, wave set-up); and
- Long-term changes in mean sea level due to climatic variation and vertical land motion.

The tidal datum elevations and extreme water levels and projections for sea level rise are provided in this section to understand the frequency and level of inundation along the shoreline at the project site.

3.1 Tidal Datums and Extreme Water Levels

No site-specific water levels are available for the project site, however characteristic tidal datum elevations are available from the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) water level station #9447130, in Seattle, WA approximately 22 miles southeast of the project site. A near continuous record of hourly water levels is available for the station from 1899 to 2019 (NOAA-NOS 2020). The tidal datum elevations are reproduced in Table 2-1 for the 1983 to 2001 tidal epoch at the Seattle station along with tidal datum elevations calculated for Point No Point using the NOAA Vdatum online tool. Water levels are provided in Table 2-1 relative to MLLW and the North American Vertical Datum of 1988 (NAVD88) based on the offset calculated using the NOAA Vdatum online tool. A frequency of occurrence and exceedance curve is provided in Figure 3-1 for the available hourly water level record the Seattle station. The most frequently occurring water levels are between 7 and 9 feet MLLW.

A NOAA-NOS analysis of the water level record provides extreme water levels at the Seattle station relative to the 1983 to 2001 epoch with projections to 2018 based on the linear historic trend in mean sea level. The extreme water levels (1-year, 2-year, 50-year, and 100-year return interval) based on the analysis are provided in Table 2-1 for Seattle and Point No Point (extrapolated from Seattle). The extreme water levels range from 11.9 feet MLLW for the 1-year return interval to 13.4 feet for the 100-year return interval. The water levels from the station record at Seattle (and estimates for the project site) include fluctuations due to astronomical tide, storm surge, wind and wave setup, but do not include wave runup. Water levels at the project site will be incorporated into the conceptual alternatives for restoration at the project site.

Table 3-1. Summary of water level elevations at the NOAA-NOS Seattle, WA tide station (#9447130) and at Point No Point.

	Seattle, WA (station #9447130)		Point No Point[1]	
	Elevation (feet MLLW)	**Elevation (feet NAVD88)**	**Elevation (feet MLLW)**	**Elevation (feet NAVD88)**
Highest Observed Water Level (Date: 10 Dec 1993)	14.5	12.1	N/A	N/A
Mean Higher High Water (MHHW)	11.4	9.0	10.5	8.7
Mean High Water (MHW)	10.5	8.2	9.6	7.8
Mean Tide Level (MTL)	6.7	4.3	6.2	4.4
Mean Sea Level (MSL)	6.6	4.3	6.1	4.3
Mean Low Water (MLW)	2.8	0.5	2.8	1
Mean Lower Low Water (MLLW)	0.0	-2.3	0	-1.8
Lowest Observed Water Level (Date 12 Dec 1985)	-5.0	-7.4	N/A	N/A
Extreme water level elevations				
100-year water level (1% AEP)	14.7	12.4	13.4	11.6
10-year water level (10% AEP)	14.3	12.0	13.1	11.3
2-year water level (50% AEP)	13.8	11.5	12.6	10.8
1-year water level (99% AEP)	13.0	10.7	11.9	10.1

Notes: AEP = annual exceedance probability; N/A = not available

[1] Datums for project site are calculated based on NOAA Vdatum online tool; extreme water levels at Point No Point are an approximation based on an extrapolation of the Seattle values.

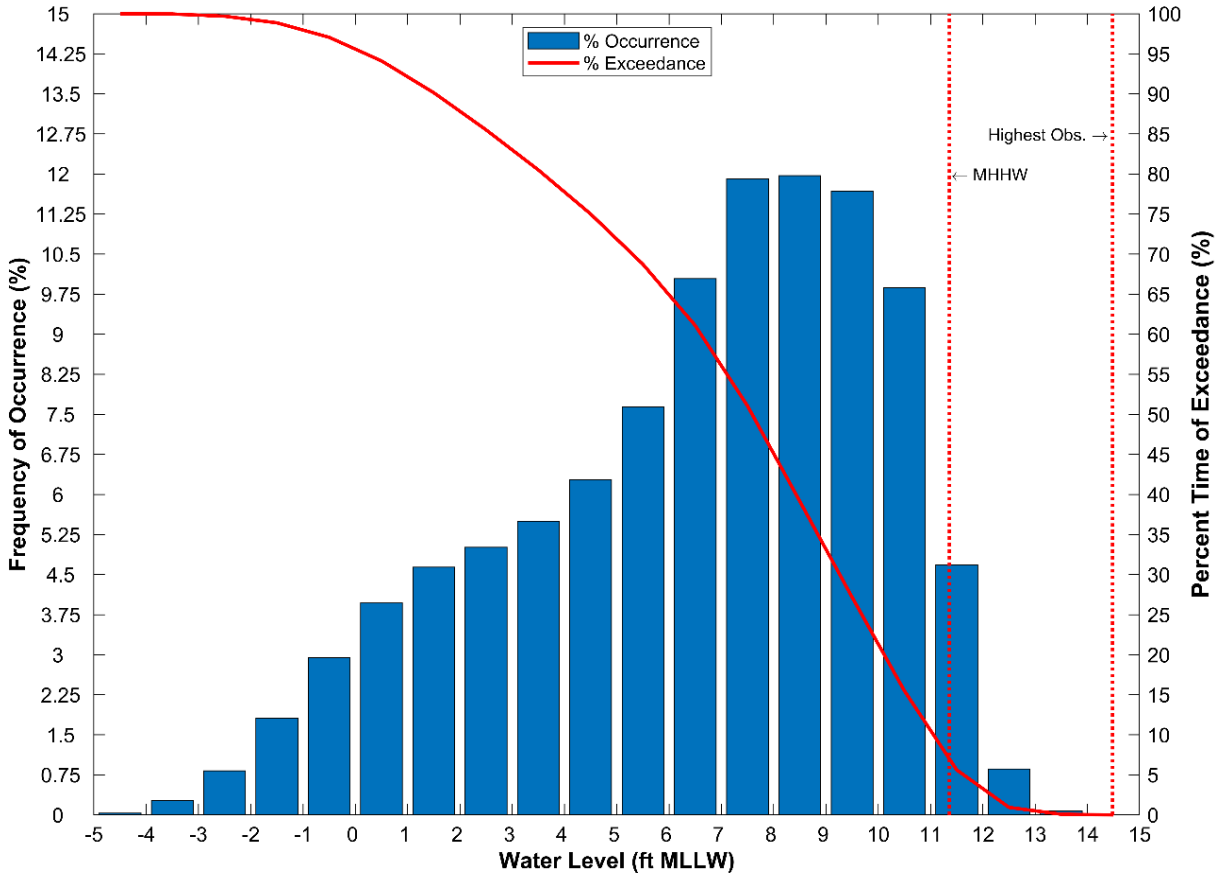


Figure 3-1. Frequency of occurrence and exceedance for hourly water levels measured at the Seattle (#9447130) tide station from 1899 to 2019. Mean Higher High Water (MHHW) and the highest observed water level on record are shown by red dashed lines.

The Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) have prepared Flood Insurance Rate Maps (FIRM) (2017a) and a Kitsap County Flood Insurance Study (FIS) (2017b) that provide flood elevation return intervals for the eastern Kitsap Peninsula. The Base Flood Elevation (BFE) (subject to inundation by the 1% annual chance flood) along Point No Point is mapped as elevation 13 feet NAVD88 (14.8 feet MLLW), presented on the FIRM (Appendix C, Figure C-4). The coastal BFE is calculated as the total still water elevation for a 1% annual chance flood plus the additional flood hazard from overland wave effects (storm-induced erosion, wave runup, and overtopping).

3.1.1 Sea Level Rise

The historical mean sea level trend based on a NOAA-NOS analysis of the Seattle station is an increase in mean sea level of 2.06 millimeters per year (0.08 inches/year) with a 95% confidence interval of 0.03 inches/year. This is equivalent to an increase in water level of 0.7 feet (8 inches) over the last 100 years.

Long-term mean sea level in Puget Sound is predicted to increase versus historical rates of sea level rise (SLR) because of climate change related impacts. Miller et al. (2018) provides projections of local SLR at coastal locations in Puget Sound and Washington for various planning horizons. The projections incorporate the latest assessments of global sea level rise due to different greenhouse gas scenarios and local estimates of vertical land motion. Table 3-2 provides projections for year 2050, 2070, and 2100 planning horizons for the coastal location nearest Point No Point. These estimates should be incorporated into design water levels in the design phase.

Table 3-2. Projected average sea level rise for different time periods and greenhouse gas scenarios for the coastal area near Point No Point.

Year	Greenhouse Gas Scenario	Sea level rise magnitude (feet) Central estimate (50% probability exceedance)
2050	Low (RCP 4.5)	0.8
2050	High (RCP 8.5)	0.8
2070	Low (RCP 4.5)	1.2
2070	High (RCP 8.5)	1.4
2100	Low (RCP 4.5)	1.9
2100	High (RCP 8.5)	2.4

3.1.2 Water Level Mapping

Topographic maps were created using the drone and LIDAR DEM to show the possible inundation of the existing site under various water level scenarios based on the water level analysis in Section 3.1. Figure 3-2 shows the land areas which would be inundated at Mean Tide Level (MTL), Mean Higher High Water (MHHW), and the 2-year and 100-year return interval extreme water levels if there was unrestricted tidal flow (open tidal channel) into the site and no flood protection measures were implemented. These maps are developed as a tool to understand areas where tidal inundation would develop immediately after restoration and to identify areas where flood protection measures need to be incorporated as part of restoration. Areas that are not flooded or outside the DEM surface are shown as transparent on map. The maps do not consider projections for SLR and should be incorporated in future planning.

At MTL portions of the beach and the main channel of the wetland above the tide gate are inundated. At MHHW level most of the wetland area would be inundated as well as portions of NE Point No Point Rd and adjacent properties to the north. Chronic minor flooding has been documented along this area of the road for more than 40 years (Entranco 1998). The flooding is believed to be the result of a combination of extreme high tide events and surface water. This is discussed in more detail in section 3.3.

Under the 2-year and 100-year extreme water level scenarios, a significant portion of the land area north of the NE Point No Point Rd is flooded. At the 2-year return interval extreme water level, the outer barrier beach on the east side of the point is overtopped, while the north shoreline is not. At the 100-year return interval extreme water level overtopping of the barrier beach occurs along portions of the north shoreline and the entire east shoreline.

Detailed maps of water depth during inundation for three water level scenarios (MHHW, 2-year, and 100-year extreme water levels) are provided in Appendix C.

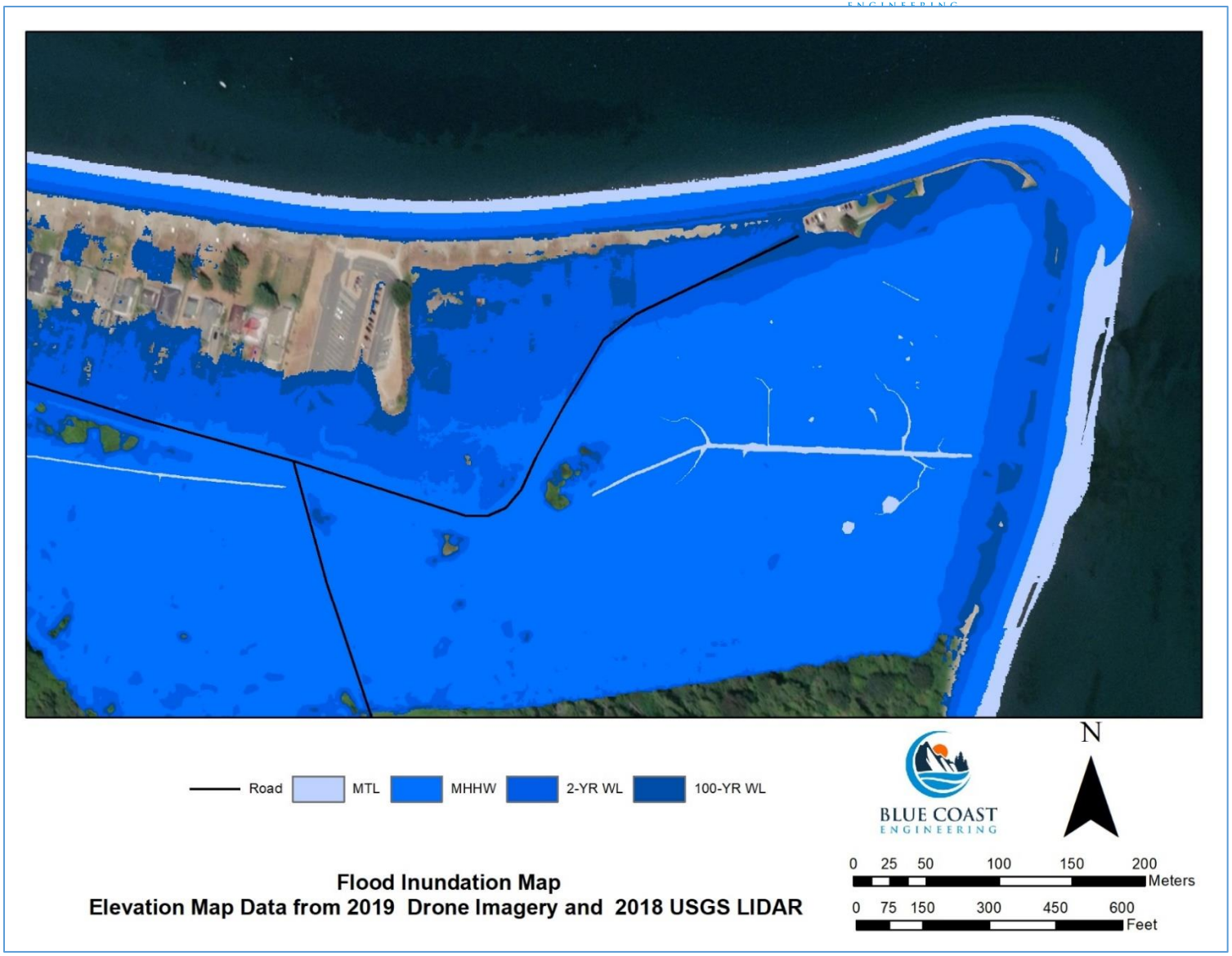


Figure 3-2. Point No Point inundation map for four water level scenarios if an open channel allowed unrestricted tidal inundation and no flood protection measures were implemented.

3.2 Wind and Wind-Waves

Wind-waves are formed in response to the force of the wind acting over the water surface. The height and period of wind-generated waves depends on both wind duration (i.e., time period of the windstorm) and fetch (i.e., distance over which wind is acting). Generally, the longer the windstorm lasts and the larger the fetch distance, the larger the height and period of the wave generated.

In areas with little topographic influence, wave direction is generally aligned with the wind direction unless the waves are in shallow water and refract to align with localized bathymetric contours (underwater topography). In areas where topographic effects are significant, such as Puget Sound and surrounding area, the wind, and therefore the wave direction becomes aligned with the maximum fetch length.

3.2.1 Wind Climate

The prevailing wind direction over the eastern Kitsap Peninsula is from the south and southwest in the winter and west and northwest during the summer (Overland and Walter 1983). The strongest winds are typically from the south during winter storm events.

Hourly wind records are available from the Point No Point US Coast Guard Lighthouse station from 2005 to 2017 and the West Point long-term meteorological station from 1975 to 2019, 18 miles to the southeast of the project site in Seattle. Wind roses for the wind records at the two stations are shown in Figure 3-3 superimposed on a topographic map of the region. The wind record at the West Point station was chosen as representative of the site and for further analysis of wind-waves at Point No Point due to its location over the water and the longer record (45) years versus 13 years at Point No Point. Additionally, the direction measurements at the Point No Point station are poor resolution (45 degrees).

The wind roses show the bimodal wind distribution at each station, aligning with the local topography along Admiralty Inlet (northwest) and Puget Sound (south) at Point No Point and along the axis (north to south) of Puget Sound at West Point. The strongest winds measured at both stations are between 50 and 60 miles per hour (mph).

Fetch is the open water distance over which wind can blow unimpeded and form waves. Waves in Puget Sound are usually fetch-limited, meaning even during the strongest windstorms the wave heights are limited in growth by the fetch distance. Point No Point is exposed to fetches of several miles to both the northwest and southeast.

A joint probability plot for wind direction and wind speed is shown in Figure 3-4 for the West Point wind data after filtering for suspect records (based on the quality code indicator for suspect or erroneous values) and 0 value wind speeds. The joint probability plot shows the frequency of occurrence of a combined wind speed and wind direction. The data are binned in 5 mph speed bins and 10° directional bins and shown as a heat map with warmer colors indicating a higher frequency of occurrence. The heat map shows that the most frequently occurring wind directions at the West Point station are southeasterly (160° to 170°; 12.5 mph bin center) and northeasterly (30° to 40°; 7.5 mph bin center). The strongest winds measured are from the south (160° to 240°), consistent with the broader regional wind patterns in western Washington.

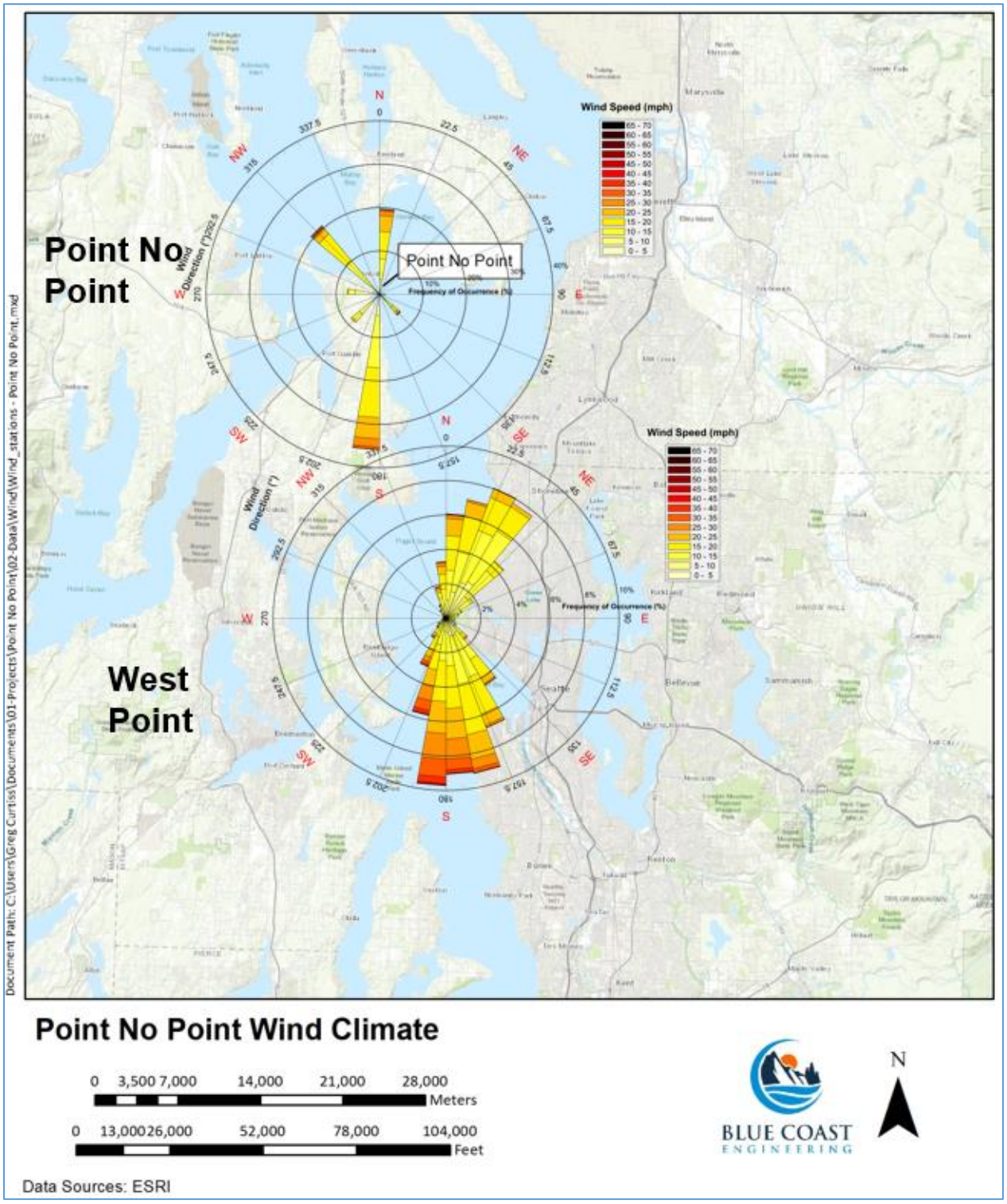


Figure 3-3. Wind rose for the Point No Point (top) and West Point (bottom) meteorological stations overlain on a regional map. Direction is the direction from which wind is blowing.

An extreme value analysis of the wind record from the westerly sector was completed following the methods of Goda (1988) and Leenknecht et al. (1992). The analysis was completed for the southerly (90^{o} to 270^{o}) sector and northerly sector (270^{o} to 90^{o}) for the West Point wind record. Independent storm events were identified using a peaks over threshold (POT) analysis to identify a minimum of at least one storm per year (Goda 1988). Criteria were set to identify storms with consecutive wind records exceeding a given threshold for at least an hour.

The peak storm speeds were then fit to two extreme value probability distribution functions (pdfs), the Fisher Tippett Type 1 (FT-1) and Weibull distributions. Based on the best fit extreme value pdf, return value wind speeds were estimated for return intervals ranging from 1 year to 100 years. The return value wind speeds from the extreme value analysis are summarized in Table 3-3 along with the 95% confidence interval wind speeds for the northerly and southerly sectors. The 100-year return interval wind speed is 58 mph for the southerly sector and 43 mph for the northerly sector. These extreme wind speeds are used to estimate extreme wind-wave heights and will be used as design criteria for shoreline elements and flood protection during future design phases of the project.

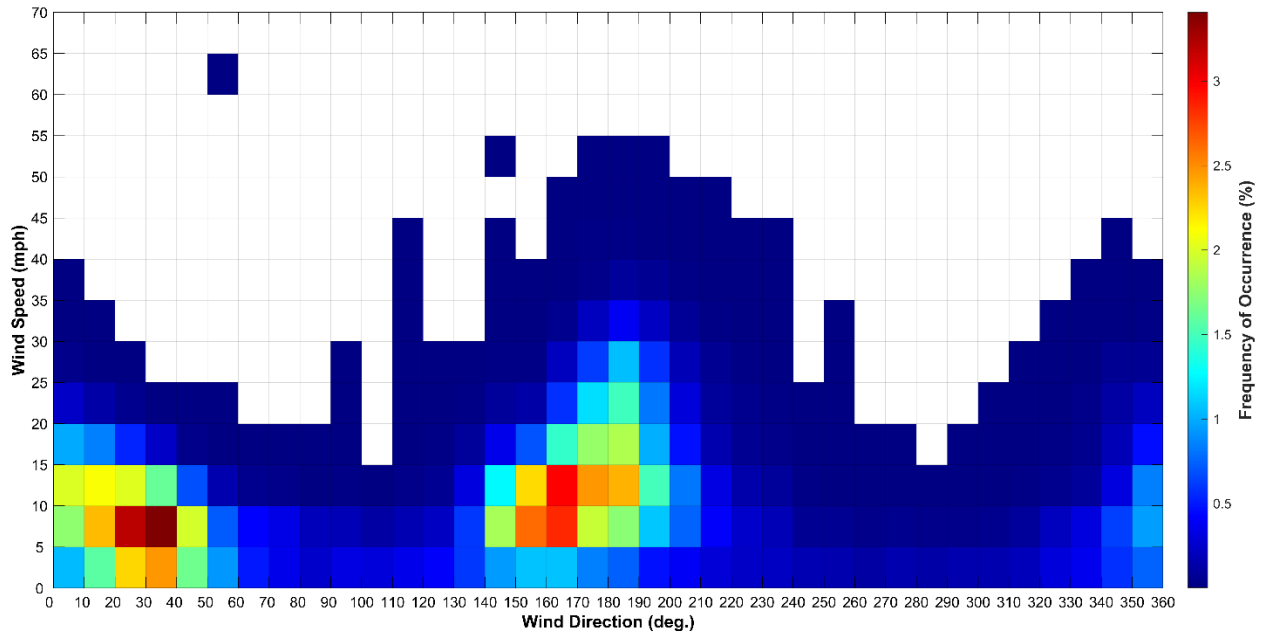


Figure 3-4. Joint probability plot of wind speed versus wind direction for the West Point meteorological station from 1975 to 2019.

Table 3-3. Extremal wind speeds at the West Point meteorological station.

	West Point (northerly)				West Point (southerly)		
Return Period (years	Wind Speed (mph)	95% confidence interval, lower (mph)	95% confidence interval, upper (mph)	Return Period (years	Wind Speed (mph)	95% confidence interval, lower (mph)	95% confidence interval, upper (mph)
1	30	29	30	1	43	42	44
2	32	31	33	2	46	44	47
5	35	33	37	5	49	47	51
10	37	35	39	10	51	50	53
25	40	37	42	25	54	52	57
50	41	39	45	50	56	53	59
100	43	40	47	100	58	55	61

3.2.2 Wind-waves

A wind-wave hindcast was completed to estimate typical and extreme wave conditions at Point No Point to characterize the wave climate. Wind-wave parameters were calculated using the Automated Coastal Engineering System (ACES) software (Leenknecht et al. 1992) developed by the United States Army Corps of Engineers (USACE) to estimate wind-wave growth over a restricted fetch in deep water. The following assumptions were made in the calculations:

- 2-minute average wind speeds were input as 1-hour average wind speeds (a conservative assumption);
- Measurement height of 42 feet based on site elevation and anemometer height at the West Point meteorological station;
- Waves growth occurs in deep water relative to the wavelength (water depth / wavelength > 0.5);
- The wind was applied along the direction of the maximum fetch to the north and south;

The direction of the longest fetch is to the southeast at 160° with a length of 15 miles and to the northwest at 330° at 14 miles (Figure 3-5). Water depths along both fetches are greater than 60 feet and exceed 100 feet in places.

Wave heights and wave periods calculated from the wind-wave hindcast were used in a wave run-up analysis to determine the elevation above the still water level (SWL) which will be inundated by wind-waves. Wave run-up (R) is the landward extent of wave uprush measured vertically from the SWL and consists of two parts: wave setup (mean water surface averaged over time) and swash (variation of the water –land interface about the mean) (Melby 2012). The run-up is provided as an R2% value which is

the run-up exceeded by 2 percent of run-up crests (R2%). Wave run-up was calculated using the method of Stockdon (2006) as reported in Melby et al. (2013) and assuming an 8% beach slope.

The wind-wave hindcast and run-up results are presented in Table 3-4. The outcome of the analysis is the estimated wave parameters, significant wave height (H_s) and peak wave period (T_p) for each wind-wave scenario. Upper and lower 95% confidence interval values are provided based on those calculated for the wind speeds (see Table 2-2). Significant wave height refers to a theoretical wave magnitude equal to the average of the highest one third of the waves in the sea.

The largest estimated wind-wave parameters are from the south due to both higher wind speeds and a longer fetch. The 100-year significant wave height is estimated to be 5.7 feet with a peak wave period of 4.6 seconds and the typical (most frequently occurring) significant wave height is estimated to be 0.5 feet and a peak wave period of 1.9 seconds. The predicted wave run-up ranges between 0.2 and 2.0 feet. Wave run-up will be combined with extremal water surface elevations to provide total design water levels for the shoreline components of the project such as barrier spits, placement of wood, and salt tolerant vegetation.

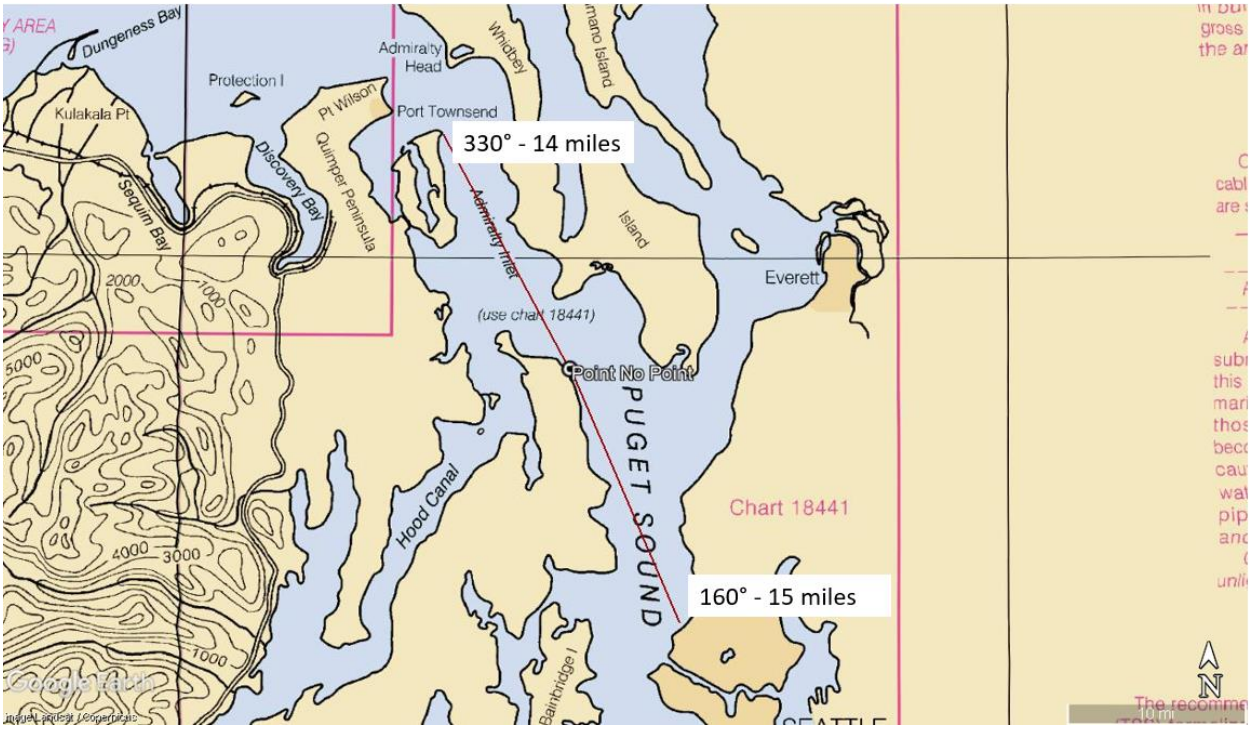


Figure 3-5. NOAA nautical chart #18440 in the vicinity of the project site. Fetch measurements for 160° and 330° are shown by the red lines.

Table 3-4. Wind-wave hindcast results for four wind and fetch cases.

Wind Scenario	Fetch Direction	Wind Speed (mph)	Fetch (miles)	Significant Wave Height, Hs (feet)	Peak Wave period, Tp (seconds)	Wave Runup, R2%, feet
Typical, southerly (most frequently occurring)	160°	12.5	15	0.5	1.5	0.2
Typical, northerly (most frequently occurring)	330°	7.5	14	0.2	1.1	0.1
100-year return interval, southerly	160°	58	15	5.7	4.6	2.0
100-year return interval, northerly	330°	43	14	3.4	3.7	1.2

3.3 Hydraulic Review (Surface Water)

Existing hydraulic studies of the site were reviewed as part of this study to understand surface water conditions and extent of known flooding at the project site. This information was also used to scope data collection and modeling which would need to be completed during future design phases of this project.

An alternatives analysis was completed by Skillings Connolly (2019a) under contract with Kitsap County Public Works as part of the initial evaluation and design potential for replacing the tide gate and outfall which drains the marsh at Point No Point. The existing outfall is an 18" concrete culvert extending from the east side of the Point No Point wetland under the beach berm and discharging into Puget Sound. A Checkmate Ultraflex Inline Check Valve serves as the tide gate in a vault located in the barrier beach east of the wetland.

The tide gate and outfall serve as a barrier to fish passage, require frequent maintenance due to clogging by debris, and access to the vault is difficult. Minor chronic flooding is also an issue along the NE Point No Point Rd adjacent to the marsh. Several alternatives were presented by Skillings Connolly (2019a) to alleviate flooding from upland runoff and for replacement of the tide gate based on modeling and analysis of the existing system:

- Improve the outfall: Upsize the outfall to a 48" culvert. Consideration should also be given to reducing the outfall pipe length to 100 feet and grading it out to daylight with a headwall and wingwalls. Skillings Connolly (2019a) suggested this improvement would increase the system drainage capacity and the length of pipe might be fish passable although no velocities were calculated.
- Improve the inlet system: Upgrade the inlet screening system to a bar screen-type system to provide better debris exclusion, easier debris removal, and fish passage. A larger platform structure with railings would also improve maintenance access.

- Improve conveyance under Hillview Lane: Upgrade the 12" culvert to a 30" culvert pipe or 18" tall by 50" wide rectangular precast concrete box culvert to improve drainage of the upper wetland area.
- Address flooding along NE Point No Point Rd: Flooding along NE Point No Point Rd appears to be caused by the inability of existing ditches and drainage structures to drain effectively via gravity and inadequate storage to attenuate runoff during storm events, based on low-slope gradients, sediment accumulation, and vegetation growth. Mitigation options include:
    - Increased maintenance intervals for removing sediment and vegetation buildup in ditches.
    - Detach the roadway drainage system from the lower wetland via a secondary tide gate and check valve.

Four alternatives were identified for replacing the tide gate to address the issue of local flooding (Skillings Connolly 2019a). The conclusions and recommendations presented in Skillings and Connolly (2019a) are summarized below. Of the four alternatives examined, two were presented as fully addressing fish passage compliance requirements, but the criteria for fish passage used in the evaluation were not well defined and did not follow the Water Crossing Design Guidelines by Washington Department of Fish and Wildlife (WDFW). The alternatives are summarized below:

- Replace the existing tide gate in-kind: This would replace the existing tide gate with same model. It is the most affordable of the alternatives and would be completed with upsizing and improvements suggested earlier. This option does not reconnect the marsh and allow tidal flushing or fish passage.
- Replace the existing tide gate with a self-regulating tide gate (SRT): This option would replace existing tide gate with an SRT, or buoyant tide gate. Skillings Connolly states the SRT allows for fish passage and tidal flushing of the wetland (2019a). Counter-floats on the gate close the gate during high tide or storm surges to prevent upland flooding. The SRT has potentially higher maintenance costs and risk of failure due to several moving parts.
- Replace the existing tide gate with a muted-tide-regulator (MTR): This option would replace the existing tide gate with an MTR tide gate. The MTR design is self-regulating and can be set to prevent tidal flushing only if upstream conditions have met a pre-set flood stage elevation, otherwise the gate remains open and allows flushing and fish passage. The MTR gate is a relatively new design and the anticipated lifespan is yet unknown.
- Removal of the existing tide gate and restore as an estuary: This alternative consists of returning the wetland to estuary conditions by removing the tide gate and adding a pedestrian bridge at the current location of the outfall in the barrier berm to allow saltwater flushing underneath. Without adding flood mitigation methods, simply removing the tide gate would regularly flood the lower stretch of Hillview Lane, NE Point No Point Rd, and properties on the north side of the road at high tide. Skillings Connolly suggested that flooding of the properties and road could be prevented by either redesigning the road and rebuilding it as a higher levee or implementing a managed retreat for the affected properties.

Of the four identified alternatives, Skillings and Connolly recommended the MTR tide gate alternative as the best option to achieve fish passage and still provide flood control according to their analysis (2019a). However, tidal muting structures are still barriers to passage by juvenile fish and reduce passage opportunities for adult fish (Greene et al 2017) and would only provide minor improvements to fish passage above the existing conditions. This feasibility study was initiated to further investigate the fourth option, restoring an embayment estuary with an open tidal channel at the site.

A supplementary technical memorandum (Skillings Connolly 2019b) evaluated additional alternatives for improving the storm drainage system along NE Point No Point Rd. The options included: improving the existing ditch system, replacement of the ditch system with a central trunk-line system, raising the road profile, and/or the addition of a stormwater pump station. Surface water modeling of the upland runoff has been conducted to evaluate these alternatives. The report states that the flooding along NE Point No Point Rd appears to be caused by the inability of the existing ditches and drainage structures to drain via gravity (2019b). In addition, the build-up of sediment and vegetation in the ditches further impedes surface water flow.

Skillings Connolly reported that the drainage system for NE Point No Point Rd becomes unable to drain during events when the downstream tide-gate closes (2019b). However, the water surface elevation or tidal stage during the events where the tide gate closes is unclear.

Skillings Connolly (2019b) recommends a central trunk-line to collect and convey stormwater runoff including downstream improvements to the Hillview Lane culvert with an outfall pipe designed to alleviate flooding. The central trunk-line scenario would replace the existing roadside ditches and could be upgraded in the future to accommodate raising the road profile or the addition of stormwater pump stations.

The Skillings Connolly report (2019a) and Vanbianchi (1991) both report saltwater entering the marsh through overtopping of the eastern beach berm during extreme high tides and storm events. This overtopping adds to the backwater when the tide gate is closed and not operating correctly. The water level analysis presented in Section 3.2 of this report indicates overtopping can occur during a 2-year return period event.

Vanbianchi's report is discussed further below, but also notes the stream channel entering the Point No Point wetland is degraded from livestock access and potentially from ditching (1991). This should be further investigated as part of future studies to understand the connectivity between the stream and the wetland.

Work conducted by Skilling Connolly under contract with Kitsap County Public Works to evaluate tide gate alternatives and flood mitigation measures is summarized as:

- The tide gate and outfall serve as a barrier to fish passage, and an MTR tide gate has been recommended as a replacement for the existing system to provide some improvement in passage for adult fish. However, Blue Coast has identified references which indicates an MTR tide gate reduces opportunities for passage by adult fish and do not provide passage for juvenile fish (Greene et al 2017).
- Surface water modeling showed flooding occurs along the NE Point No Point Rd during 25-year and 100-year return period interval rainfall events. A new central trunk line system to replace

the existing roadside ditches is recommended and future upgrades to raise the road profile or the addition of stormwater pump stations should be considered.

- The drainage report (Skillings Connolly 2019b) states that the drainage system is largely influenced by tidal conditions, but the incorporation of tides into the model is ambiguous and the report further states the chosen model cannot incorporate coastal flooding. Blue Coast has identified the influence of tides and coastal flooding coupled with rainfall events as a gap in the understanding of overall flooding and drainage of the site.
- Both reports (Skilling Connolly 2019a; 2019b) recommend the 12-inch culvert under Hillview Lane be replaced with a culvert or bridge with an opening of at least 30 inches to provide conveyance of water from the upper wetland to the lower wetland.

3.4 Groundwater

A reconnaissance-level geotechnical and hydrogeologic review of the Point No Point site by Aspect Consulting, LLC (Aspect) to collect background information to begin to develop an understanding of freshwater and groundwater flow through the wetland (Appendix D). The review established an understanding of the site layout, geology, and historical influences.

Vanbianchi (1991) installed two piezometers at the site and noted groundwater levels were within 6 inches below ground surface (bgs) in the spring, but no water was present as of July. This report also noted standing water in the wetland during the wet season, but drier conditions in the summer. Blue Coast and Aspect noted standing water in the ditches along the roadside as well as within the marsh during the spring and the summer months indicating there has been a change in the hydrology at the site since 1991.

It is important to understand groundwater flow at the site to determine the potential for changes to flooding of adjacent properties and park facilities due to backwatering during high tides if tidal influence is restored. In addition, saltwater intrusion into the shallow aquifer can have an effect on below grade utilities such as septic systems as well as the surrounding vegetation.

The Blue Coast team recommends installation of eight drive-point piezometer up to a depth of 10 feet below ground surface to understand the shallow groundwater flow at the site. Pressure transducers installed in the piezometers would collect hourly groundwater levels and be downloaded during monitoring visits.

4.0 Geomorphology and Geology

Point No Point is a sandy cuspate spit extending seaward at the entrance to Puget Sound from Admiralty Inlet (Figure 4-1). The deposits along the immediate shoreline are mapped as beach deposits backed by salt marsh deposits (Polenz et al 2015). Sediment grain size distributions on the beach are medium to coarse sand with small amounts of gravel and cobble on the upper beach. The eastern side of the spit has a wide vegetated riparian zone and an abundance of wood. The vegetation and wood recruitment along the northern shoreline of the park has been reduced by the heavy recreational use of the shoreline and the placement of angular riprap along the northern shoreline near the lighthouse.

4.1 Sediment Transport

The spit is located within a moderate wave energy environment with exposure to wind-waves from the north, south, and west and the strongest winds and wind-waves from the south. Two miles of mapped feeder bluffs along the shoreline to the south discharge sediment into the littoral system which is transported alongshore to the north along the eastern barrier beach (CGS 2017). On the north side of the point sediment is transported alongshore to the east and transport from both directions converge at the point. However, the drift cell along the northern shoreline has been altered by private residential development and shore protection structures that have somewhat reduced the sediment supply. The southern drift cell is largely undisturbed and sediment supply is intact. The point is mapped as an accretion shoreform, which is confirmed by the wide low tide terrace and complex bedforms particularly on the eastern shoreline.

Wind-waves are the primary mechanism of sediment transport in the nearshore zone. Wind-waves predominantly transport material alongshore (parallel to the shoreline) and generally in the direction in which the wind is blowing. Dominant transport on the east side of the point is from the south to the north due to the dominant fetch direction to the south. A wide low-tide terrace is located along this portion of shoreline with extensive sand flats. A surveyed beach profile from this portion of the shoreline shows the beach exhibits a composite slope typical of Puget Sound mixed sand and gravel beaches where there is a change in slope at approximately 0 ft MLLW. The average beach slope between MHHW and MLLW is about 8% (1V:12H), while below MLLW the low tide terrace extends over 500 feet at a slope of less than 1% (1:100 [Figure 4-2]).

The low-sloping terrace and varied tidal water levels should refract waves and cause breaking of waves to occur across a wide beach area. This would act to distribute wave energy and sediment across the foreshore and low-tide terrace and limit the alongshore transport of sediment across the mouth of a new open tidal channel into the marsh; making it sustainable to construct a tidal channel into the marsh on the east side of the point.

Figure 4-1. Washington State Department of Ecology oblique aerial photograph of the project site, taken on July 24, 2016. North is to the right in the photograph.

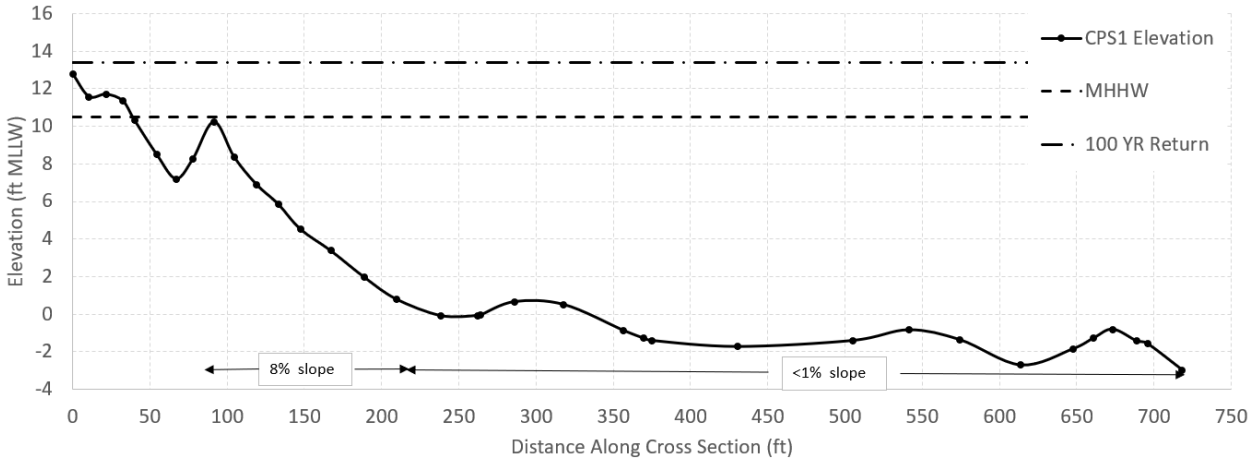


Figure 4-2. Beach profile CPS1 started at landward side of dune (x= 0 ft). Note vertical exaggeration.

4.2 Barrier Embayment Geomorphology

Point No Point's shorelines were historically the barrier beaches to an estuary with a tidal channel on the northern side of the point. Barrier embayments in Puget Sound accumulate sediment in the barrier

spits and the orientation and length of the barrier spits are an indication of the local volume of available sediment, transport rates, and transport direction (Shipman 2008; Beamer et al 2019; Côté et al 2018). Tidal channels along easterly facing shorelines which have not been modified with structures tend to flow alongshore to the north in the direction of sediment transport. These types of barrier spit configuration are observed at several sites on Whidbey Island, just north of Point No Point, including North Bluff Lagoon and Race Lagoon (Figure 4-3).

Race Lagoon has nearly 1 mile of feeder bluffs directly up drift of the barrier spit, the site is exposed to a 6-mile fetch to the south and nearly a 12-mile fetch to southeast. Large volumes of sediment are transported alongshore by wind-waves which hit the shoreline at an oblique angle and therefore the site has developed a barrier spit that extends for 0.3 miles alongshore from the northern end of the lagoon to where the tidal flow exits into Puget Sound. North Bluff Creek Lagoon has a shorter section of feeder bluffs immediately up drift (approximately 0.2 miles in length), a shorter fetch in the dominant wind direction (8 miles at 162 degrees) and a shorter barrier spit that extends approximately 350 feet (0.07 miles) from the northern end of the lagoon.

In addition, intact barrier embayments have wide low tide terrace with complex bedforms offshore of the tidal channel. This morphology is also observed at Race Lagoon and North Bluff Lagoon (Figure 4-3). The historical Point No Point estuary had a tidal channel on the north side, but the coastal processes and existing nearshore morphology are similar to sites with a tidal channel on the eastern shoreline.

The wind-wave climate and length of updrift feeder bluffs at Point No Point are similar to Race Lagoon. Prior to development, the embayment had a 100-foot wide tidal channel and Race Lagoon has a 130-foot wide tidal channel. The opening of the tidal channel of barrier embayments is maintained by current velocity produced by the rising and falling of water levels from tides combined with surface water inflow. These flows produce the force on the bottom and sides of the channel (shear stress) to mobilize and transport sediment which has been deposited within the channel as a result of longshore drift from wind-waves.

While there are many region-specific controls on the stability of tidal channels, some generalizations about the hydrodynamics of stable inlet systems based on existing literature can be made (Bruun 1978; Gao and Collins 1992; Hughes 2002; and Hume and Herendorf 1993):

- The force exerted by the current velocity through the inlet must exceed the threshold required to mobilize the average sediment grain size (D_{50}) within the system on a regular basis to keep the channel open.
- Natural tidal channels tend to move laterally over time (and not always in the same direction) either in response to longshore drift or simply to a path of lower resistance to avoid deposited sediment and debris.
- The surface water input to the estuary (a function of watershed area and precipitation) influences the areal extent of marsh within a system.
- The wind-wave energy and sediment supply have a significant effect on the growth of the barrier spit.
- Stable inlets typically have cross-sectional depth averaged velocities of at least 3 feet per second (fps).

Blue Coast has been working on developing design guidelines for barrier embayment restoration in Puget Sound being funded by WDFW under an Estuary and Salmon Recovery Program (ESRP) learning grant (Côté et al 2018) hereafter referred to as the ESRP Barrier Embayment Project. In addition, Skagit River Systems Cooperative has conducted extensive studies of pocket estuaries in the Whidbey Basin which are being incorporated into the ESRP Barrier Embayment Project (Beamer 2019).

Findings from the ESRP Tidal Channel Study specific to Puget Sound indicate:

- Intertidal volume of the estuary is the best predictor of sustainable tidal inlet cross-sectional area and cross-sectional width.
- The tidal channel outlet depth is also correlated to intertidal volume, but not as strongly as the cross-sectional area or width as the depth appears to be influenced by other factors such as dominant habitat type (Marsh, Mud flat, or Lagoon).
- Sediment availability and habitat type (lagoon, marsh, or mud flat) are significant factors in the determination of tidal channel geometry but need more refined parameters to include in regression models.

4.3 Open Tidal Channel Design

Natural barrier embayments in Puget Sound have sufficient space for the tidal channel to be able to move and adjust to dynamic coastal processes and variability in sediment transport under extreme weather events. The primary risk of closure of tidal channels is from alongshore sediment transport generated by wind-waves filling in the channel and insufficient velocities through the tidal channel to flush these sediments.

Sediment transport on mixed sand and gravel beaches is classified as bed load transport, such that material is moved along the bed (not in suspension) primarily because of the larger mean grain size distribution. Therefore, transport occurs in locations where water depths are shallow enough for the hydrodynamic forcing to act on the sediment. At Point No Point waves will break on the wide shallow low tide terrace which limits the sediment transport on the eastern barrier beach where a tidal channel could be located and provides additional sheltering to the tidal channel.

Natural tidal channels exposed to wind-wave energy have barrier spits oriented parallel to shore. The barrier spit serves two functions which are a morphological feedback mechanism. The barrier spit accretes sediment and grows alongshore and protects the tidal channel from wind-waves which would otherwise transport material directly into the embayment. In addition, natural tidal channels measured in the ESRP project have a channel slope of approximately 1%, which is the same as the slope of the low tide terrace at Point No Point.

The existing coastal conditions including wind-wave energy, sediment availability and low-sloping low tide terrace suggest a constructed tidal channel into the marsh would be sustainable on the east side of the Point. Blue Coast recommends a two-dimensional hydrodynamic model of the barrier embayment restoration design be constructed to predict water surface elevations and current velocities within the marsh and through the open tidal channel. This model can be used to develop design alternatives and to optimize design elements such as channel slope and barrier spit configuration.

Figure 4-3. North Bluff Lagoon and Race Lagoon provide examples of barrier embayments along the eastern shoreline of Whidbey Island with tidal channels which flow alongshore to the north in the direction of sediment transport.

5 Feasibility of Restoration

Cereghino et. al. (2012) states that coastal embayments provide unique services to migrating fish and birds and that the continuity of embayments along the shoreline provides services to migratory and mobile species. Beamer (2019) has shown that distance to the nearest river mouth is an important factor in terms of salmonid use of pocket estuaries for the Whidbey Basin. This research indicates that many fish, in particular endangered Chinook from the Skagit, Snohomish, and Stillaguamish Rivers prefer to use non-natal embayments for rearing prior to outmigration. Juvenile Chinook salmon have been found in pocket estuaries up to 34 miles away from natal rivers. Point No Point is approximately 18 miles from the Snohomish River mouth and 29 miles from the Stillaguamish River mouth.

Beamer (2019) has found that the use of pocket estuaries by salmonids is influenced by the proximity of these estuaries to other pocket estuaries. There are several pocket estuaries along the shorelines of Whidbey Island heading towards the Kitsap Peninsula and Point No Point would provide connectivity between the natal rivers to the north and other pocket estuaries (Figure 5-1) in South Central Basin such as Doe Kag Watts. Restoring the Point No Point barrier embayment will contribute to an increased density of available embayments for migrating juvenile Chinook which will contribute to an increased carrying capacity.

Restoring tidal connection and exchange in the wetlands at Point No Point at the northeastern tip of Kitsap County presents the most significant opportunity to restore nearshore and estuarine processes along the Kitsap County Puget Sound shoreline, as reported in a comprehensive analysis of 420 potential projects to protect or restore nearshore habitat. This analysis reviewed each project's potential to protect or restore tidal flow, sediment supply, sediment transport, cross shore connectivity, and fish passage. The potential restoration of estuary at Point No Point scored the highest by far compared to any other project evaluated (Confluence et. al. 2016). On a scale of 1 to 200, the restoration of 32 acres of salt marsh at Point No Point scored 197. The primary processes that would be restored and that contributed the most points to its overall score were restoring tidal flow and restoring fish passage to the marsh area, although the analysis also noted that the project contributed to restoring sediment transport and cross shore connectivity.

5.1 Constraints

The Point No Point salt marsh complex, interior tide flats of the barrier embayment, and former tidal channel have been heavily altered starting as early as 1870. These alterations as well as site history, significance, and diversity of uses place some constraints on the restoration opportunities at the site. These constraints include:

1. There are known archaeological sites at Point No Point and therefore excavation of particular areas is not advised. The sensitive locations are predominantly around the former historic tidal channel location; however, the entire area is culturally significant to area tribes and would need to be designed with their input and approval.
2. The historic channel location to the north is now occupied by private residents and two historic buildings (lighthouse station and quarters) which must be maintained, including access, and flood protection to current levels.

3. Point No Point Road, which provides access to the park, runs through the location of the historic channel and vehicle access to the park must be maintained.
4. Park facilities included the parking lot, restrooms, and utilities on the northern side of the park must remain in place.
5. The trail from the lighthouse to the south end of the park connects an upland trail network via a staircase to Point No Point park and access from the upland trail network to the park must be maintained.

Based on these constraints, a new tidal channel cannot be opened in the historic channel location (northern shoreline) based on cultural and historic consultation as well as consultation with Parks.

5.2 Opportunities

The compromised existing conditions within and around the park provide motivations and opportunities for restoration, including:

1. The existing freshwater wetland and perennial stream are degraded from livestock access and ditching and would benefit from habitat enhancement.
2. The site is already receiving saltwater through the leaking tide gate during water levels exceeding MTL and overwash of the barrier spit and flooding during 2-year extreme water levels. These overwash and inundation events will become more frequent with a changing climate.
3. The tide gate is a fish passage barrier, it is not functioning as designed and is not sufficient to provide drainage of the site during rainfall events or after saltwater inundation. The tide gate also requires regular maintenance. A new tide gate would likely be difficult to permit.
4. Under the 2-year and 100-year extreme water level scenarios, a significant portion of the land area north of Point No Point road is flooded. The existing drainage ditch system requires significant maintenance or modification to mitigate the flooding.
5. Under sea level rise scenarios, the historic buildings and park infrastructure will experience regular flooding from the north and future planning needs to occur to limit these effects.
6. The significant sediment supply, littoral drift, and extensive low tide terrace on the eastern shoreline provide the correct geomorphic conditions to support an open tidal channel fronted by a barrier spit.
7. A tribal archaeologist recognized that this site could support the harvesting of culturally important salt tolerant plants which are currently scarce but could be restored at this site.
8. Due to its large size, the wetland has high potential for surface water storage, which could be leveraged in design development to potentially alleviate area groundwater and surface water flood concerns.
9. Endangered Chinook are known to travel along this route and require estuary embayment habitat such as the project proposed here. Few Puget Sound embayments remain although they are critical to migration and rearing of salmonid species.

10. Other fisheries which could benefit from this project include resident cutthroat and coho particularly if fish passage between the perennial stream and Puget Sound is provided through this project.

Point No Point does not currently provide any habitat for fish and prevents fish access to the perennial stream. There is an opportunity to create habitat with a low gradient channel into a tidal embayment with extensive surrounding overhanging vegetation. Restoration of a barrier embayment at Point No Point would provide habitat for juvenile salmonids in a location where no other habitat of a similar nature exists. However, juvenile salmonids require an open tidal channel for access and therefore an MTR tide gate solution would not provide this benefit.

5.3 Stakeholder Outreach

Point No Point is heavily used by diverse user groups and surrounded by multiple agency and landowner interests. Project partner and community engagement is critical to successful development of the project and will be conducted throughout the design process. Several stakeholder meetings were held during the feasibility study. These meetings are described in the following sections.

5.3.1 Kitsap County Departments

MSFEG and Blue Coast held multiple meetings with the owner of the park, Kitsap County Parks Department (Parks), and the agency responsible for the tide gate, Kitsap County Department of Public Works Stormwater Division throughout this study. A meeting with Parks, Stormwater, Kitsap County Community Development and Planning, and Commissioner Rob Gelder was held on February 26, 2020. During this meeting, all county agencies agreed MSFEG should proceed with design alternatives for restoration of a barrier embayment at Point No Point. In addition, MSFEG was given permission to begin outreach to private property owners including the owner of the parcel along Hillview Lane.

Information provided through the meetings with the Kitsap County agencies which is relevant to design and consideration moving forward includes:

- Point No Point Park grounds including parking lot, restroom facility, and other amenities are maintained by the Parks Department.
- Kitsap County Public Works Stormwater Division is responsible for maintaining the tide gate and the catch basins for the drainage system along NE Point No Point road.
- The ditches along NE Point No Point road which are part of drainage system are maintained by the Kitsap County Roads Department.
- The primary maintenance issue at the site is drainage of surface water from NE Point No Point Road which floods in the winter. The responsibility for complete drainage is shared as mentioned above.
- All park functions and amenities must be preserved and maintained including all structures, current parking, and trail around site connecting to upland trail.
- The ownership of the lighthouse is in the process of being transferred from US Coast Guard to Kitsap County, but the current functions and usage of space will not change.

The primary goals for restoration of the site from the County departments' perspectives would be to:

- Reduce or eliminate flooding of NE Point No Point Rd through improved drainage of surface water.
- No change to existing conditions for private properties north of NE Point No Point Rd (i.e., prevent saltwater intrusion from marsh into those properties and park infrastructure which could be negatively impacted such as septic systems)
- Eliminate maintenance of tide gate and satisfy fish passage requirements.
- Enhance park user experience, recreation opportunities, and education opportunities.

5.3.2 Regulatory Consultation

While there are several regulatory agencies which will be involved in permitting any restoration project at Point No Point Park, compliance with National Historic Preservation Act, Section 106 was identified as the primary consideration for feasibility because of the historic structures and cultural significance of the property.

On June 25, 2019, a cultural pre-project meeting was held and attended by representatives from Suquamish Tribe, Port Gamble S'Klallam, Washington State Recreation and Conservation Organization (RCO) and Chris Lockwood, Archaeologist from ESA as a sub-consultant to Blue Coast. In general, tribal cultural representatives expressed support for the project and interest in using the project as an opportunity for education and native plant restoration. A work plan for cultural resource monitoring will be developed prior to any ground disturbing activities taking place at the site during future design phases as well as construction.

A pre-project regulatory meeting will be held with the following agencies during design development: Washington Department of Fish and Wildlife, US Army Corps of Engineers, US Fish and Wildlife Service, National Marine Fisheries Service. In addition, a meeting with the natural resources staff from the effected tribes will be held including Suquamish Tribe and Port Gamble S'Klallam Tribe at a minimum as other Tribes will be invited to participate as appropriate.

5.3.3 Property Owner Outreach

MSFEG and Blue Coast reached out to property owners along Hillview Lane as a starting point for the project. The first conversations were held with the owner of the private parcel within the marsh who lives in a home just above the marsh on Hillview Lane. This owner facilitated the meeting with other owners along Hillview Lane which was conducted virtually on September 11, 2020. The purpose of the meeting was to introduce the concept of saltmarsh restoration at Point No Point and identify the constraints and concerns around Hillview Lane. The following key information gathered is relevant to the design of restoration work at Point No Point:

- Hillview Lane must be maintained as a road and there is no interest in it being removed.
- There has not been flooding across Hillview Lane in the last couple of years and there did not seem to be eminent concerns of flooding of Hillview Lane.
- Property owners were concerned about changes to Federal Emergency Management Agency (FEMA) flood zone and potential effect on insurance because of the project.

- One property owner on the west side of Hillview Lane adjacent to creek expressed concerns about drainage of their property currently being an issue (reported as very wet) and wanted to understand if project would make their property wetter.
- Private road is often used an extension of the upland trail which is undesirable; mapped as loop trail on some websites from the park through forested upland trail and then down Hillview Lane to NE Point No Point Rd.

In response to these comments and concerns, Blue Coast expanded the previous review of the FEMA FIRM (Section 3.1 of this report) in relationship to the private parcels. The FEMA FIRM (flood map) shows a coastal flooding scenario where saltwater could flood the entire Point No Point marsh, which is not accurate to the existing conditions. The FEMA FIRM for this area does not recognize the effect of the tide gate on prohibiting saltwater from getting into the marsh and assumes all the properties north of NE Point No Point Rd and the road itself can be flooded by coastal inundation. The proposed project would provide a path for saltwater to flood the Point No Point Marsh similar to or to a slightly lesser degree than the FEMA flood maps. As such, the proposed project would not change the FEMA flood zone mapping for any property along Hillview Lane. The findings of this analysis are document in a technical memorandum as standalone report which will be provided to the property owners and is appended to a summary report on outreach efforts developed by MSFEG.

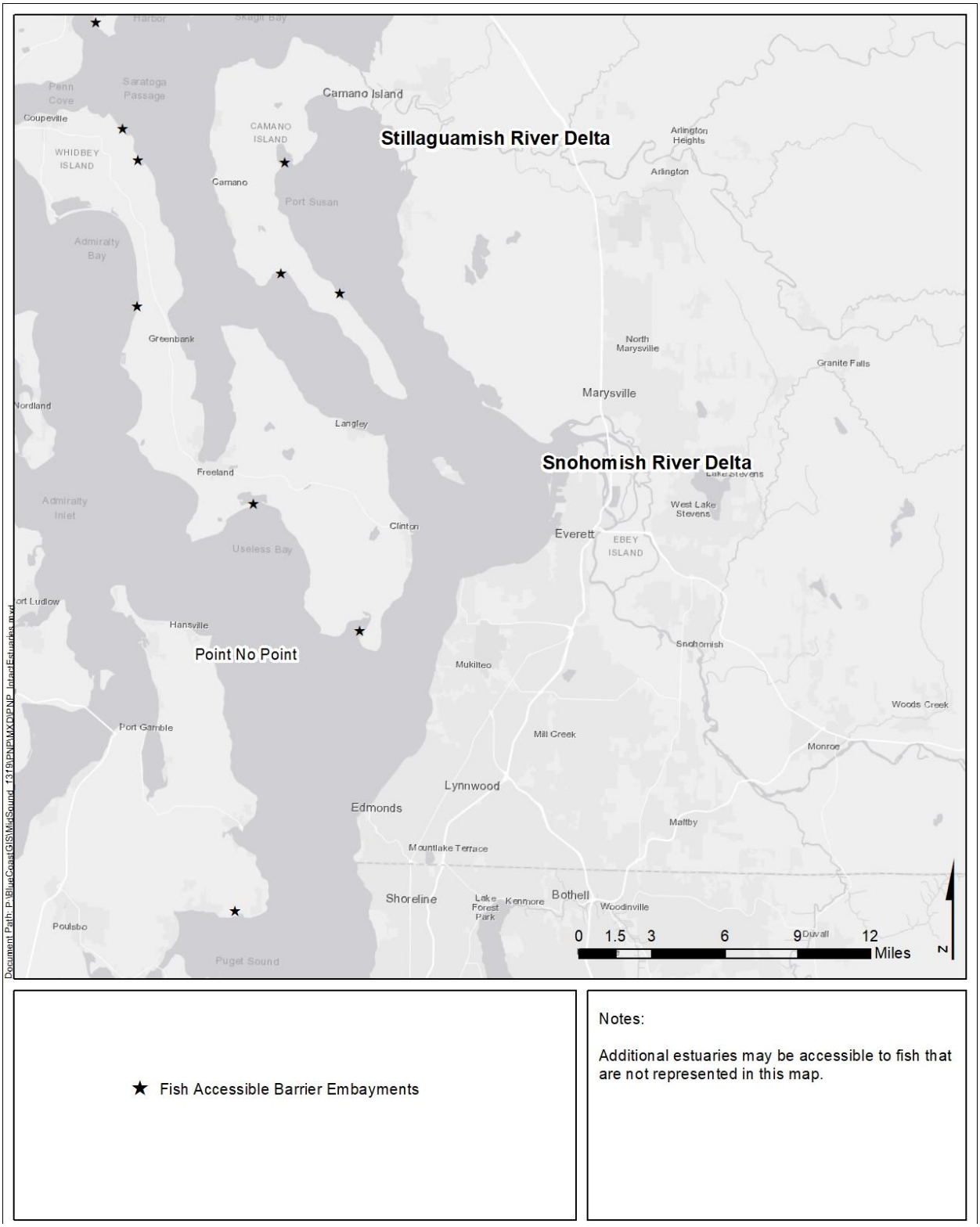


Figure 5-1. Map of Point No Point showing proximity to Chinook salmon natal rivers to the north and existing barrier embayments which can be accessed as they migrate out to the ocean.

6 Conceptual Restoration Alternatives

As part of the preliminary feasibility study, we have developed three conceptual design alternatives for an open tidal channel on the eastern shoreline to replace the existing tide gate at Point No Point (Figures 6-1 through 6-3). Restoration alternative A presents restoration of the entire 32 acres of freshwater marsh to salt marsh habitat. However, there are still several gaps in information which adds uncertainty for restoration of the upper 10 acres freshwater marsh on the west side of Hillview Lane. These data gaps include the existing condition of the perennial stream and 10-acre marsh habitat, property owner permission to modify Hillview Lane to provide hydraulic connectivity and prevent flooding of the Hillview Lane, and secured written permission to restore saltwater across the privately owned parcel on the east side of Hillview Lane. Restoration alternatives B and C were developed to have varying degree of modification to the upper marsh and Hillview Lane.

We did not develop a conceptual design alternative for replacing the tide gate with an MTR as recommended in the Skillings Connolly 2019a report, as an MTR would not provide restoration to the site for juvenile Chinook salmon, one of the primary goals of this feasibility study.

6.1 Primary Restoration Alternative

The conceptual design presented in Figure 6-1 shows the largest area of restoration of freshwater marsh to salt marsh habitat, including the private parcel within the lower marsh (east of Hillview Lane) and the upper marsh to the west of Hillview Lane. Flooding of Point No Point Road and Hillview Lane would be fully addressed under this scenario. Restoration concept A has the following features:

- Open tidal channel through the barrier in the eastern shoreline (south of the existing outfall pipe location) with a width of at least 100 feet.
- Barrier spit fronting the tidal channel on the south side and interior spit in the north side of channel.
- An increase in interior marsh channel complexity to increase storage of surface water and provide sinuosity to provide habitat complexity and capacity.
- Varying elevations of marsh to allow for complex marsh habitat.
- Restoration of the perennial stream channel into the marsh to provide freshwater flow.
- Hillview Lane modifications to connect upper marsh to lower marsh and prevent flooding using one to two larger culverts under raised gravel road.
- Utilizing a levee on the north edge of the marsh to prevent flooding from the marsh onto NE Point No Point road. The levee would also provide a safe pedestrian route to the park and provide flood protection to the County park facilities and historic structures.
- Pedestrian bridge across tidal channel to maintain required access between park and upland trails.
- Total salt marsh restoration is approximately 32 acres.

6.1 Restoration Alternative A

The conceptual design presented in Figure 6-2 (Alternative A) includes a slightly smaller restoration area across the private parcel in the lower marsh and up to the east side of Hillview Lane, and would prevent exchange of saltwater into the upper marsh west of Hillview Lane. This option would be used if there could not be agreement on restoration of upper marsh to salt marsh or if there was desire to maintain additional freshwater wetlands at the site for habitat reasons. Flooding of Point No Point Road and Hillview Lane would be reduced under this scenario, but not fully addressed. Restoration Alternative B has the following features:

- Open tidal channel through the barrier in the eastern shoreline (south of the existing outfall pipe location) with a width of at least 100 feet.
- Barrier spit fronting the tidal channel on the south side and interior spit in the north side of channel.
- An increase in interior salt marsh channel complexity to increase storage of surface water and provide sinuosity to provide habitat complexity and capacity in lower marsh only.
- Varying elevations of marsh to allow for complex marsh habitat.
- Perennial stream channel discharge into western freshwater marsh maintained or improved and western marsh remains freshwater. Freshwater could be allowed to flow eastward through tide gate or other flood control structure.
- Hillview Lane modifications to prevent saltwater intrusion, allow drainage of upper marsh, and prevent flooding will include raising road and flood control structures such as tide gate.
- Levee along Point No Point Road to prevent flooding or raising Point No Point Road; shorter in length than the primary restoration concept, stopping east of Hillview Lane.
- Levee to provide flood protection to parking and historic structures.
- Reduced pedestrian access to levee for safe entrance to park.
- Pedestrian bridge across tidal channel to maintain required access to upland trails.
- Total restored salt marsh area is approximately 23 acres (9 acres less than primary concept).

6.2 Restoration Alternative B

The conceptual design presented in Figure 6-3 only restores salt marsh habitat up to the private parcel property line in the freshwater marsh, preventing the exchange of saltwater into the private parcel or the marsh east of Hillview Lane. This design reduces inundation of the lower marsh adjacent to the bend in Point No Point Rd where most of the flooding is concentrated. This option eliminates the need for any work to be conducted on privately owned property or Hillview Lane. Alternative B would not reduce flooding of Point No Point Road or Hillview Lane. Restoration Alternative B has the following features:

- Open tidal channel through the barrier in the eastern shoreline (south of the existing outfall pipe location) with a width of at least 100 feet.

- Barrier spit fronting the tidal channel on the south side and interior spit in the north side of channel.
- An increase in interior marsh channel complexity in lower marsh to increase storage of surface water and provide sinuosity to provide habitat complexity and capacity, but reduced from Alternatives A and B.
- Varying elevations of marsh to allow for complex marsh habitat but in reduced area as compared to Alternatives A and B.
- Perennial stream channel into freshwater marsh and upper marsh remains freshwater and no changes are made to this portion of system.
- No Hillview Lane modifications.
- Setback dike within the marsh to prevent free exchange of saltwater between private parcel and flooding of Hillview Lane.
- Much shorter levee along Point No Point Road to prevent flooding of small section of road. Flooding of most of Point No Point Road and Hillview Lane would still occur unless drainage improvements are implemented by the County.
- Levee to provide flood protection to parking and historic structures.
- Significantly reduced pedestrian access to levee for safe entrance to park.
- Pedestrian bridge across tidal channel to maintain required access to upland trails.

A summary of the key differences in these conceptual design alternatives is provided in Table 6-1. A rough estimated cost for construction of each of the alternatives is also provided in Table 6-1.

These conceptual designs will be further developed during the next phase of the project. Additional technical studies and data collection which were beyond the scope and budget of this study are required to develop alternatives beyond these concepts. The additional technical studies required for an alternatives analysis are discussed in the next section.

Table 6-1. Comparison of restoration conceptual alternatives

Concept	Upper Marsh Conversion to Salt Marsh	Lower Marsh Conversion to Salt Marsh	Perennial Stream connected to Lower Marsh	Changes to Hillview Lane	Point No Point Road Levee Requirements	Rough Construction Cost
Primary Concept	Nearly 100%	100%	Through one to two Culverts	Raise road and new culverts	Full extent of restored marsh (upper and lower)	$4M
Alternative A	0%	Approximately 85%	No connection	Potentially raise road and tide gate	Adjacent to lower marsh only	$3M
Alternative B	0%	Approximately 65%	No connection	None	Adjacent to section of lower marsh only	$2.5M

Figure 6-1. Primary conceptual plan for full restoration of a barrier embayment at Point No Point.

Figure 6-2. Conceptual plan for partial restoration Alternative A of a barrier embayment at Point No Point.

Figure 6-3. Conceptual plan for partial restoration Alternative B of a barrier embayment at Point No Point.

7 Summary & Recommendations

This report documents an initial feasibility study conducted to determine if the coastal processes and conditions at Point No Point Park could support an open tidal channel to restore the historic barrier estuary and salt marsh. Restoration has been determined to be feasible based on physical processes and surrounding conditions. In addition, the restoration conceptual plan is supported by the key project partners including the landowner, Kitsap County Parks Department.

Although restoration is possible and sustainable, the development of design requires additional technical studies to fill data gaps and explore design alternatives for restoration. The following studies and tasks are recommended to more fully develop the preliminary design alternatives and evaluate the alternatives for ecological benefits, recreational benefits, cultural benefits, construction costs, and maintenance:

- Groundwater and Geotechnical – The preliminary review of groundwater flow on the site has emphasized the importance of developing a strong understand of the soil properties, the depth of the aquifers, and the flow of groundwater at the site. Test pits and/or geotechnical borings will be necessary to characterize the soils and sediments. Measurement and modelling of ground water flow to determine the direction of ground water flow at the site and the design elements required to prevent unwanted flooding and saltwater intrusion onto private property is recommended. In addition, geotechnical studies to develop design criteria for required flood protection for the historic lighthouse and park infrastructure is necessary.
- Wetland and Habitat Survey– These surveys are required to determine critical habitats and species use, to evaluate potential impacts of the project on these habitats and species, and develop reports required for permit applications.
- Hydraulic Assessment –The tidal volumetric flow, flow velocities, potential shear stress, and coastal flooding generated by changes in water elevation will be estimated through a combination of 2-D numerical modelling (HEC-RAS) and GIS mapping.
- Cultural Resources Assessment – We have conducted a reconnaissance level assessment of cultural resources at the site as well as initial tribal consultation. All ground disturbing investigations will require work plans, archaeological permits, and onsite archaeologic oversight.
- Project Partner and Public Involvement – Blue Coast recommends working collectively with project partners, stakeholders, and property owners to develop a range of preliminary restoration alternatives. Design should be conducted collaboratively with a technical advisory group of key stakeholders convened to define restoration goals, site use concerns, constraints, and opportunities. In addition, private landowners should be engaged early in the process to discuss design alternatives and build consensus around the preferred alternative.
- Preliminary Design & Alternatives Analysis – At least three preliminary design alternatives should be developed based on the information provided in the technical studies and using the hydraulic assessment to provide design which have varying degrees of benefits and costs. The benefits and costs should be evaluated using a scoring matrix for ecological benefits, recreational benefits, cultural benefits, construction costs, and maintenance to assist in selecting the preferred alternative.

- Permitting Strategy– A pre-application meeting onsite prior to selecting a preferred alternative is recommended such that regulatory authorities have the ability to provide input on the design alternatives and selection of preferred alternative. Once all planning level studies are completed, a permit level design can be developed and used to acquire the required permits and approvals for the project.

Once preliminary design and permitting strategy are completed, the project can either move to a 60% design phase or final design depending on feedback from regulatory agencies, requirements of the landowner (Kitsap County), and permits required. MSFEG has submitted applications for additional grant funding and if awarded would be made available in July 2021 to complete the above studies and preliminary design.

8 References

Aspect Consulting, LLC (Aspect). 2019. Point No Point Restoration Feasibility Study – Geotechnical Considerations. Technical Memorandum submitted to Blue Coast Engineering July 1, 2019.

Beamer, 2019 in preparation, Channel and Habitat Characteristics of Pocket Estuaries in the Whidbey Basin and West Whidbey Shoreline. Skagit River System Cooperative, La Conner, WA.

Bruun, P. 1978. Stability of Tidal Inlets: Theory and Engineering, Elsevier Scientific Publishing Co., Amsterdam, Netherlands.

Cereghino, P., Toft, J., Simenstad, C., Iverson, E., Campbell, S., Behrens, C. and J. Burke. 2012. Strategies for Nearshore Protection and Restoration in Puget Sound. Puget Sound Nearshore Report 2012-01 published by WDFW, Olympia, WA and US Army Corps of Engineers.

Côté, J.M., T. Sanderson and P. Schlenger, 2018. Puget Sound Channel Guidelines for Barrier Embayment Restoration, Phase 1 Report: Data Collection Methods and Analysis for 2017. Prepared for Washington Department of Fish and Wildlife Estuary and Salmon Restoration Program.

Coastal Geologic Services (CGS). 2017. Beach Strategies Phase 1 Summary Report: Identifying Target Beaches to Restore and Protect. Estuary and Salmon Restoration Program Learning Project #14-2308. October 25, 2017.

Confluence Environmental and Coastal Geologic Services. 2016. West Sound Nearshore Integration and Synthesis of Chinook Salmon Recovery Priorities prepared for West Sound Watershed Council.

Entranco. 1998. Hansville Flooding Alternatives Analysis. Technical Memorandum prepared for Kitsap County Public Works. March 1998.

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM). 2017a. Kitsap County, Washington and Incorporated Areas, Panel 50 of 525, Map Number 53035C0050F, Effective Date February 3, 2017.

Federal Emergency Management Agency (FEMA), Flood Insurance Study (FIS). 2017b. Kitsap County, Washington and Incorporated Areas, Washington, D.C., February 3.

Finlayson, D. 2006. The geomorphology of Puget Sound beaches. Puget Sound Nearshore Partnership Report No. 2006-02. Published by Washington Sea Grant Program, University of Washington, Seattle, Washington.

Gao, S and M. Collins, 1992. Tidal Inlet Equilibrium, in Relation to Cross-sectional Area and Sediment Transport Patterns. Estuarine and Coastal Shelf Science 38, pp157-172.

Goda, Y. 1988. "On the Methodology of Selecting Design Wave Height," Proceedings, Twenty-first Coastal Engineering Conference, American Society of Civil Engineers, Costa del Sol-Malaga, Spain, pp. 899-913.

Google Earth Pro Software (Google) 2020. Aerial imagery reviewed for 1990 to 2019. Accessed January 26, 2020.

Greene, C., Hall, J., Small, D., and Smith, P. 2017. Effects of intertidal water crossing structures on estuarine fish and their habitat: a literature review and synthesis. White paper produced for Washington Department of Fish and Wildlife and Northwest Fisheries Science Center.

Leenknecht, D.A., Szuwalski, A. and Sherlock, A.R. 1992. "Automated Coastal Engineering System (ACES): Technical Reference," U.S. Army Corps of Engineers, Coastal Engineering Research Center, Waterways Experiment Station, CPD-66, Vicksburg, MS. Volume II.

Kitsap County. 2020. https://www.kitsapgov.com/dis/Pages/GIS.aspx. GIS database.

Melby, J.A. 2012. Wave Runup Prediction for Flood Hazard Assessment. ERDC/CHL Technical Report TR-12-24: October 2012, US Army Engineer R&D Center, Vicksburg, MS.

Melby, J.A. Nadal, N. and Kobayashi, N. 2013. “Wave Runup Prediction for Flood Mapping,” Proceedings of 33rd Coastal Engineering Conference (ICCE2012), 141.

Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E. 2018. Projected Sea Level Rise for Washington State – A 2018 Assessment. A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, Oregon State University, University of Washington, and US Geological Survey. Prepared for the Washington Coastal Resilience Project. *updated 07/2019*

National Oceanic and Atmospheric Administration National Ocean Service (NOAA-NOS). 2020. Water level station data. Accessed September January 22, 2020: https://tidesandcurrents.noaa.gov/stationhome.html?id=9447130

Polenz, M. Favia, J.G., Huber, I.J., Legorreta Paulin, G., Cakir, R. 2015. Geologic Map of the Port Ludlow and Southern Half of the Hansville 7.5-minute Quadrangles, Kitsap and Jefferson Counties, Washington. WA Division of Geology and Earth Resources Map Series, 2015-02.

Skillings Connolly. 2019a. Hydraulic Analysis Summary & Tide Gate Alternatives. Technical Memorandum submitted to Kitsap County Department of Public Works. February 1, 2019.

Skillings Connolly. 2019b. Alternative Analysis Summary Point No Point Road Flood Mitigation. Draft Technical Memorandum submitted to Kitsap County Department of Public Works. December 19, 2019.

Stockdon, H. F., Holman, R.A., Howd, P.A., and Sallenger, A.H. 2006. Empirical parameterization of setup, swash, and runup. *Coastal Engineering*. 53:573–588. Elsevier.

Todd, S., Fitzpatrick, N., Carter-Mortimor, A, and Weller, C. 2006. Historical Changes to Estuaries, Spits, and Associated Tidal Wetland Habitats in the Hood Canal and Strait of Juan de Fuca Regions of Washington State. Technical Report submitted to Interagency Committee for Outdoor Recreation, Salmon Recovery Funding Board and Bureau of Indian Affairs.

U.S. Army Corps of Engineers. 2006. Coastal Engineering Manual. Engineer Manual 1110-2-1100, U.S. Army Corps of Engineers, Washington, D.C. (in 6 volumes).

Vanbianchi, R. 1991. Wetland Identification and Assessment: Hansville and Point No Point Wetlands. Hansville. Washington. Technical Report prepared for Hansville Chamber of Commerce.

39 pp. plus appendices.

Washington Department of Ecology (Ecology). 2020. Coastal Atlas. Accessed on January 24, 2020. https://fortress.wa.gov/ecy/shorephotoviewer/Map/ShorelinePhotoViewer

9 Closure

DISCLAIMER

This document has been prepared by Blue Coast Engineering in accordance with generally accepted engineering practices and is intended for the exclusive use and benefit of Mid Sound Fisheries Enhancement Group and Kitsap County and their authorized representatives for specific application to the Point No Point restoration project. The contents of this document are not to be relied upon or used, in whole or in part, by or for the benefit of others without specific written authorization from Blue Coast Engineering. No other warranty, expressed or implied, is made. Blue Coast Engineering and its officers, directors, employees, and agents assume no responsibility for the reliance upon this document or any of its contents by any parties other than Mid Sound Fisheries Enhancement Group and Kitsap County.

Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report

APPENDIX A

PROPERTY OWNERSHIP MAPS

POINT NO POINT RECONNECTION RESTORATION FEASIBILITY STUDY

0 200' 400'

SITE MAP

Scale: 1:200

LEGEND

- LITTORAL DRIFT BOUNDARY
- TAX LOT BOUNDARY
- MEANDER LINE
- SHORELINE
- EASEMENT

Notes:

1. PARCEL INFORMATION OBTAINED FROM KITSAP COUNTY DATABSE OF PUBLIC LAND SURVEY SECTIONS (JANUARY 2020).
2.. MARCH 2016 BING MAPS BACKGROUND AERIAL IMAGERY

REV:	DESCRIPTION:	BY:	DATE:

STATUS:

BLUE COAST ENGINEERING

CLIENT: MID SOUND
7400 SAND PT WA
SEATTLE, WA
98115

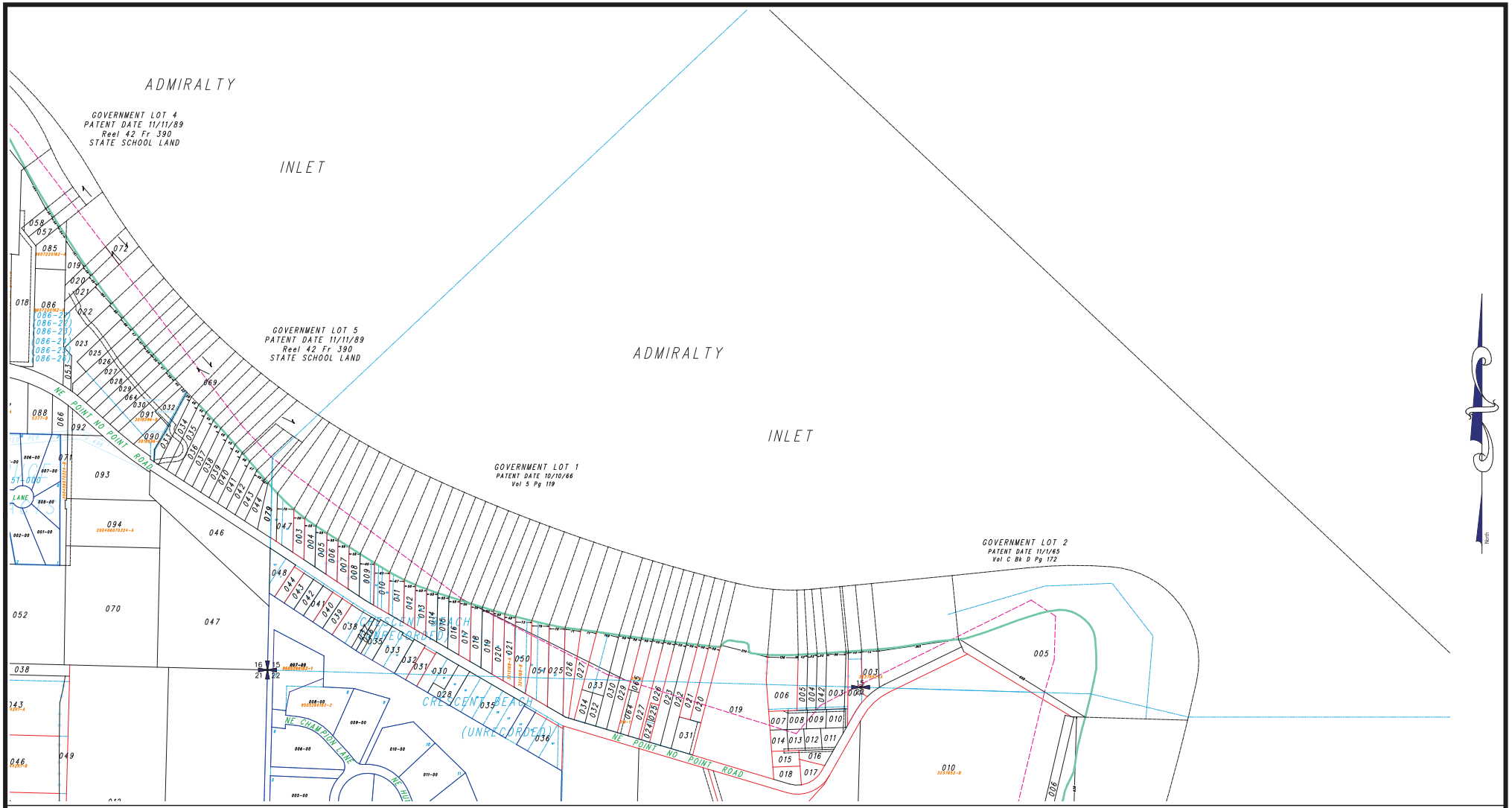
ENGINEER: BLUE COAST ENGINEERING
18320 47TH PL NE
LAKE FOREST PARK. WA
98155

SITE: KITSAP COUNTY
POINT NO POINT

TITLE: PROPERTY OWNERSHIP

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:200	06/16/21	GC	

PROJECT NO:	SHEET NO:	REVISION:
1319-18-01	01	0



KITSAP COUNTY
18 57
WASHINGTON

LEGEND

UNPLATTED TAX LOT BOUNDARY
PLATTED TAX LOT BOUNDARY
SURVEYED TAX LOT BOUNDARY
PLAT LOT BOUNDARY
SUPPRESSED PLAT LOT BOUNDARY
EASEMENT BOUNDARY
LITTORAL LOT BOUNDARIES
PLAT BOUNDARY
SHORELINE
CREEK
WETLAND

006 UNPLATTED TAX LOT NUMBER
(006-21) AUXILIARY UNPLATTED LOT NUMBER
012-00 PLATTED TAX LOT NUMBER
(012-00) AUXILIARY PLATTED TAX LOT NUMBER
4042-001 PLAT & BLOCK NUMBER
12 PLAT LOT NUMBER

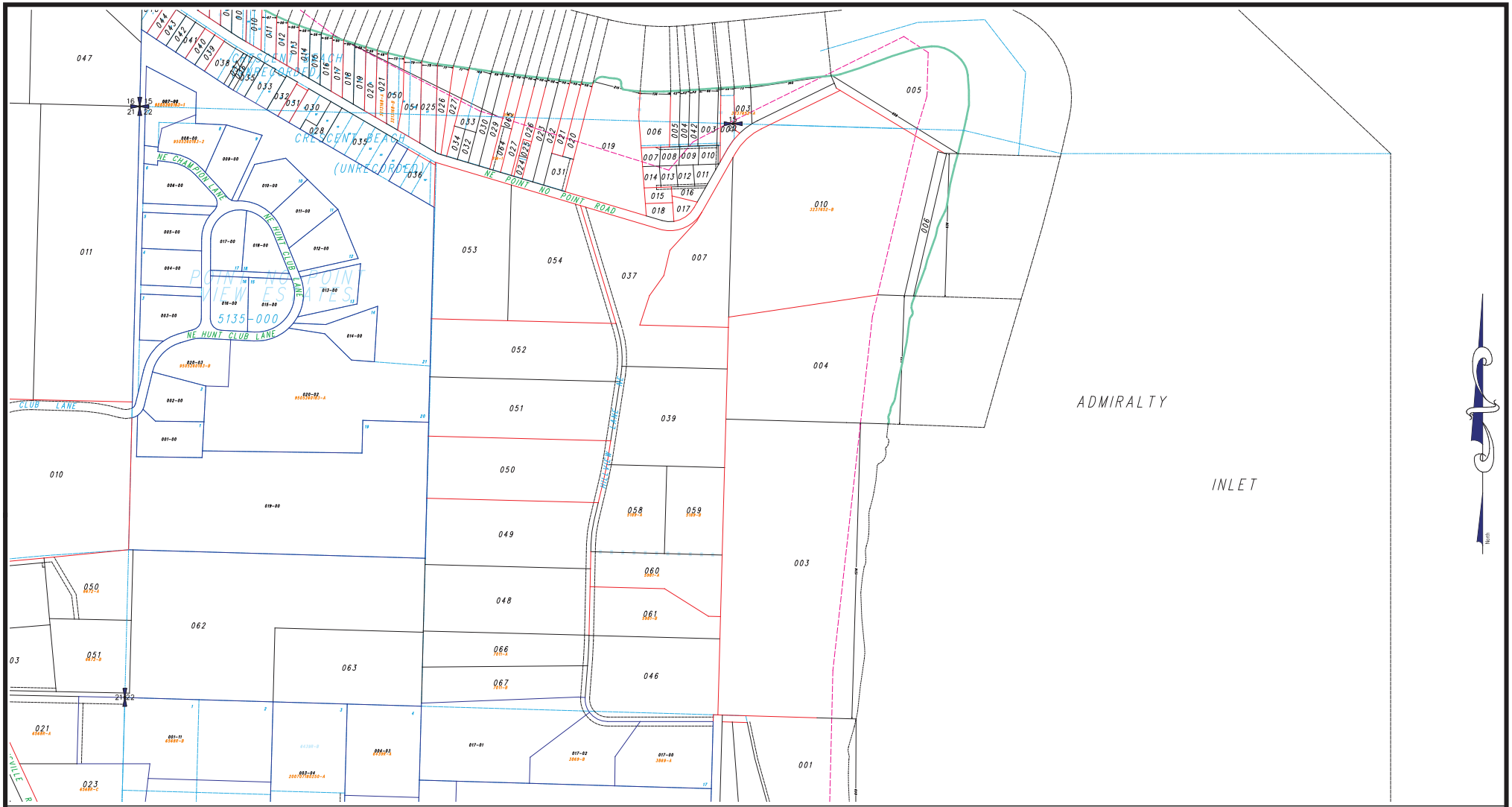
This map was compiled for the Kitsap County Assessor as a record of existing tax lots, for tax assessment purposes only. It is not a survey map.

South 1/2
Section 15-28-2E

Scale: 1 = 200'

February 05, 2018

Map Number **B15S**



KITSAP COUNTY
18 57
WASHINGTON

LEGEND

UNPLATTED TAX LOT BOUNDARY
PLATTED TAX LOT BOUNDARY
SURVEYED TAX LOT BOUNDARY
PLAT LOT BOUNDARY
SUPERSEDED PLAT LOT BOUNDARY
EASEMENT BOUNDARY
LITTORAL LOT BOUNDARIES
PLAT BOUNDARY
SHORELINE
CREEK
WETLANDS

006 UNPLATTED TAX LOT NUMBER
(006-21) AUXILIARY UNPLATTED LOT NUMBER
012-00 PLATTED TAX LOT NUMBER
(012-00) AUXILIARY PLATTED TAX LOT NUMBER
4042-001 PLAT & BLOCK NUMBER
10 PLAT LOT NUMBER

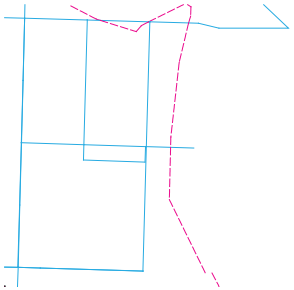
This map was compiled for the Kitsap County Assessor as a record of existing tax lots, for tax assessment purposes only. It is not a survey map.

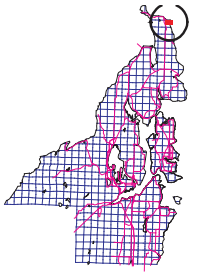
North 1/2
Section 22-28-2E

Scale: 1 = 200'

March 05, 2018

Map Number **B22N**





Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report

APPENDIX B

TOPOGRAPHIC DATA COMPILATION

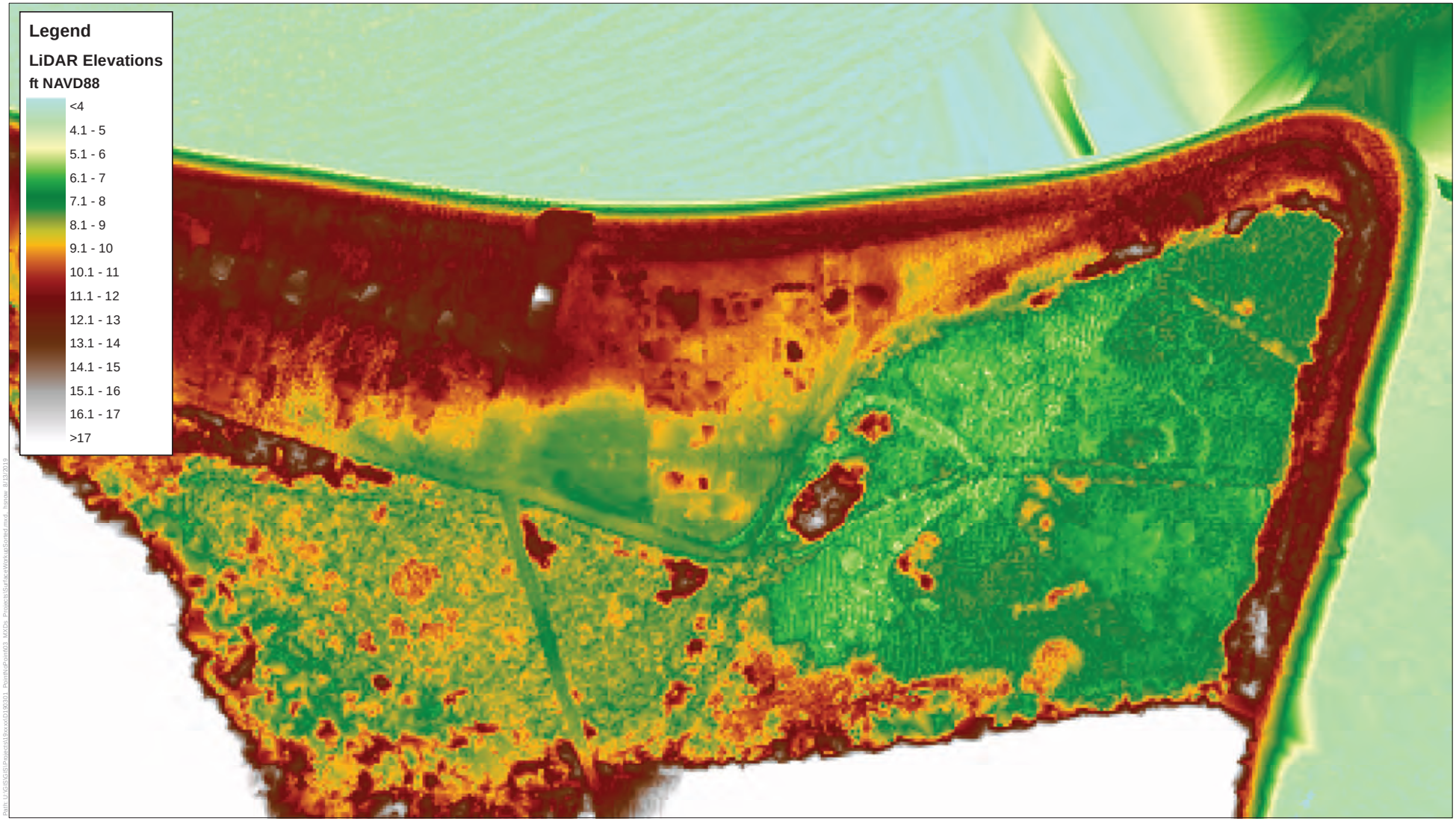
N

100 50 0 100 Feet

ESA

Point No Point Restoration

Figure 1
Points Only



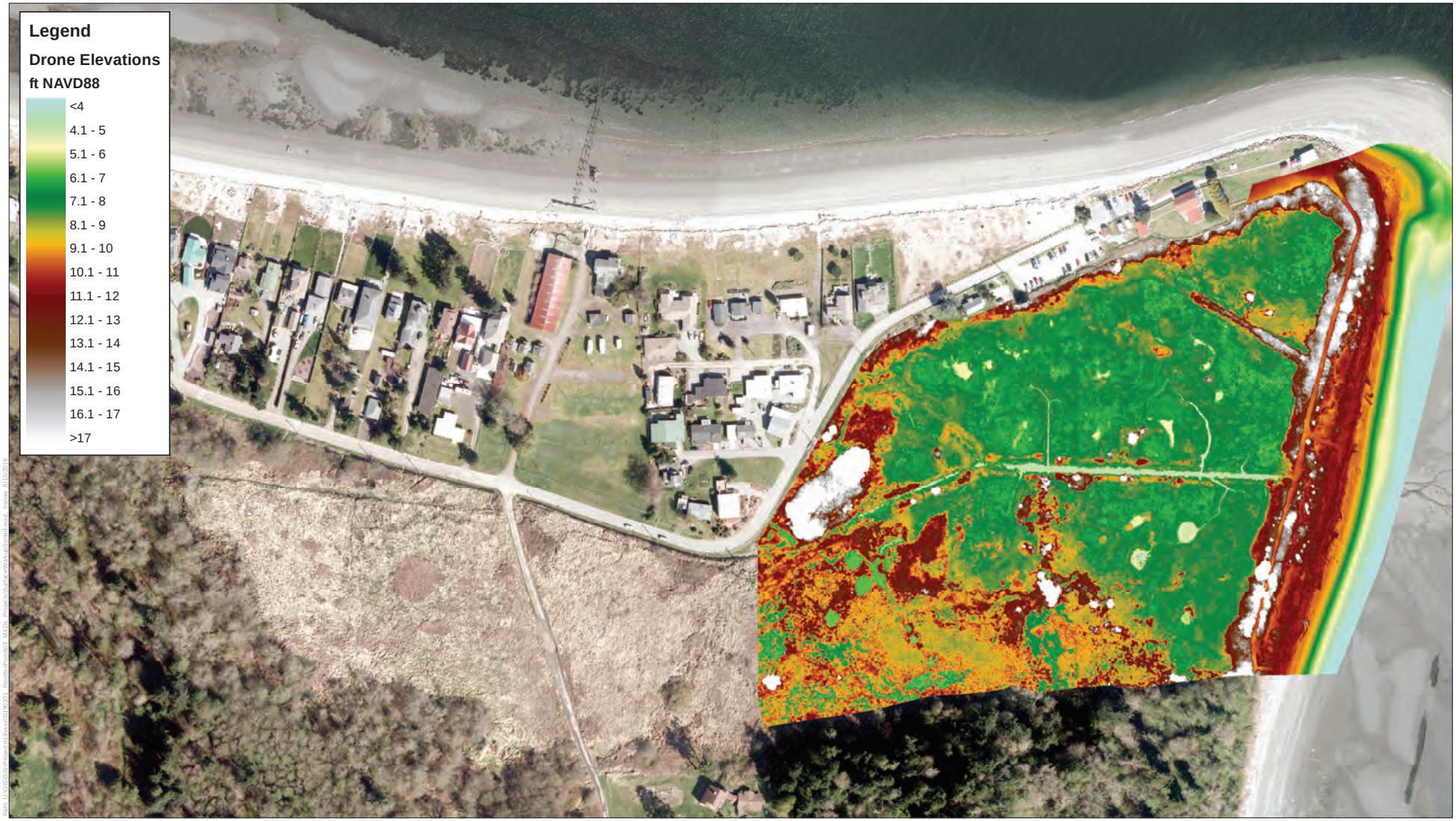
N

100 50 0 100 Feet

Point No Point Restoration

Figure 2
LiDAR Only

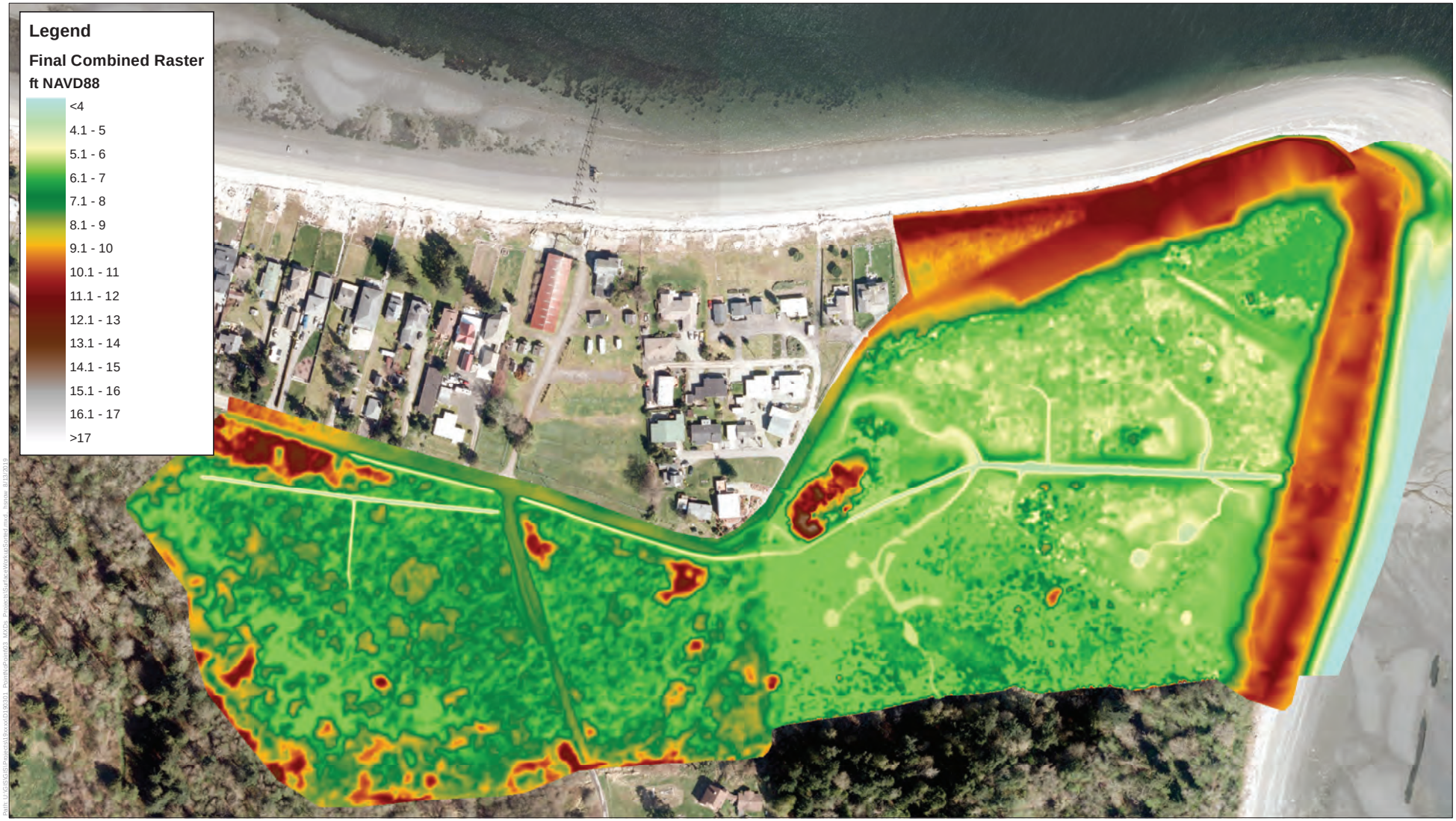
ESA



Point No Point Restoration

Figure 3
Drone Only

ESA



Point No Point Restoration

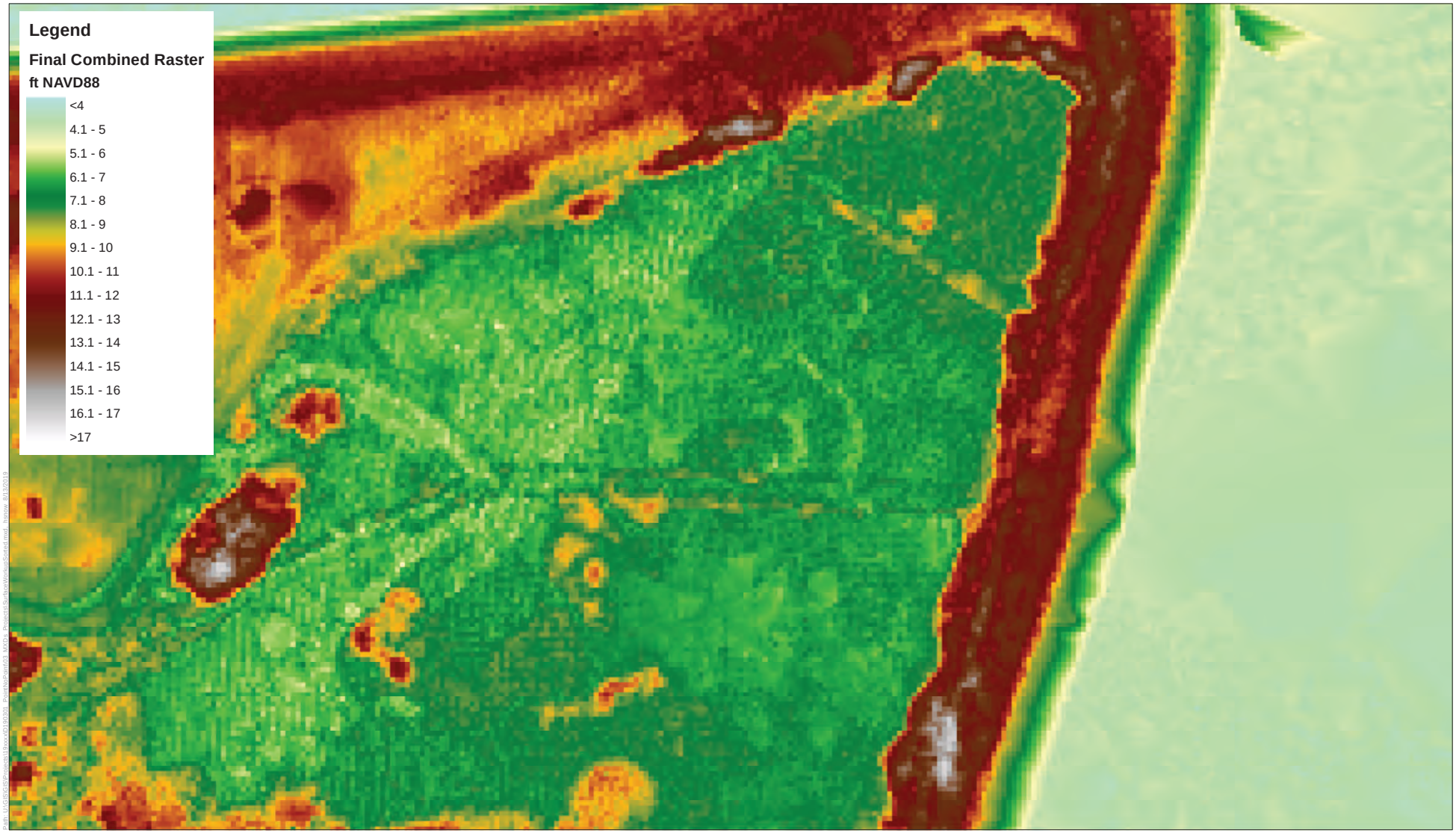
Figure 4
Compiled Surface

ESA

Point No Point Restoration

Figure 5
Points Only

ESA

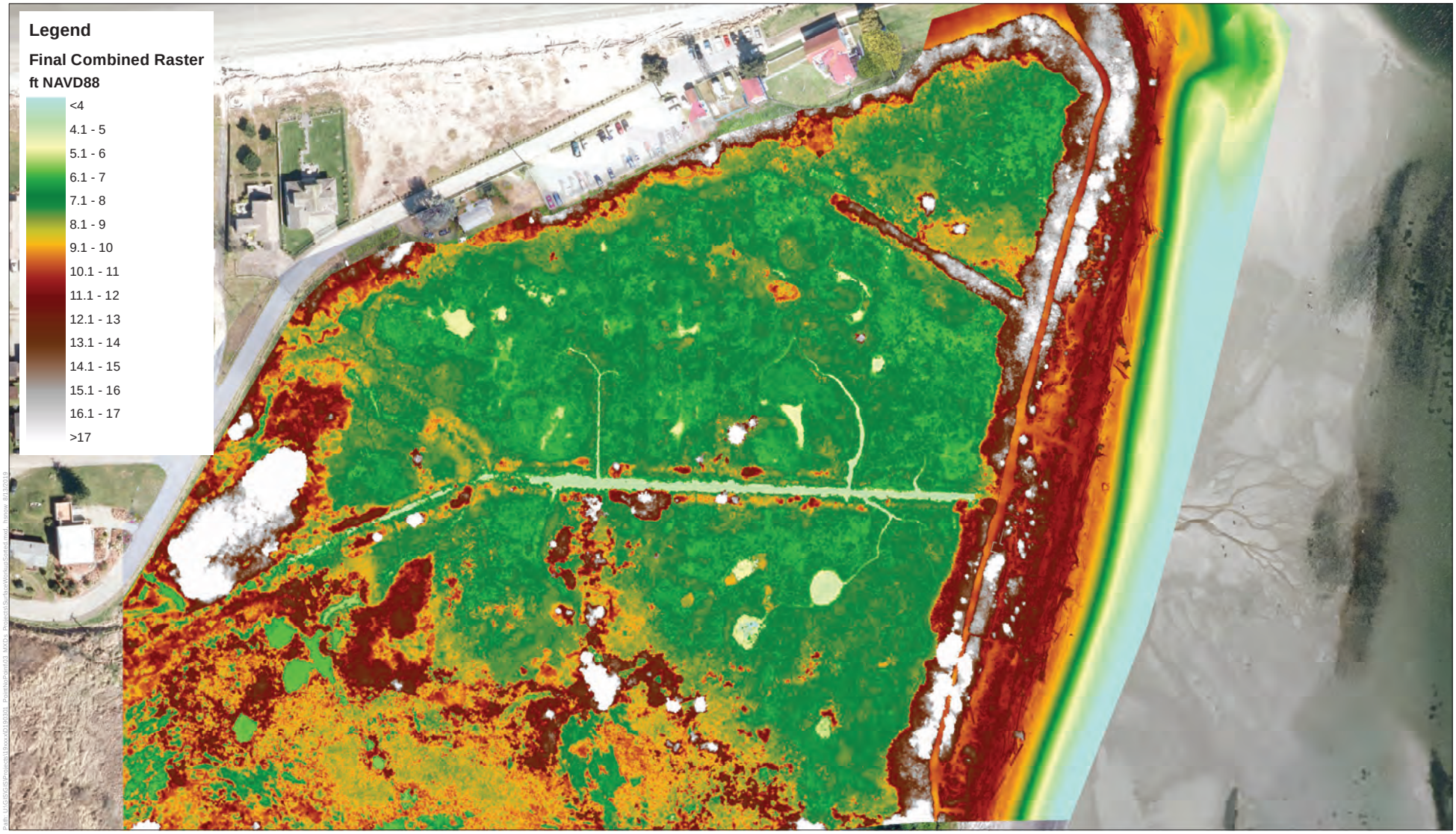


SOURCE: ESA

Point No Point Restoration

Figure 6
LiDAR Only

ESA

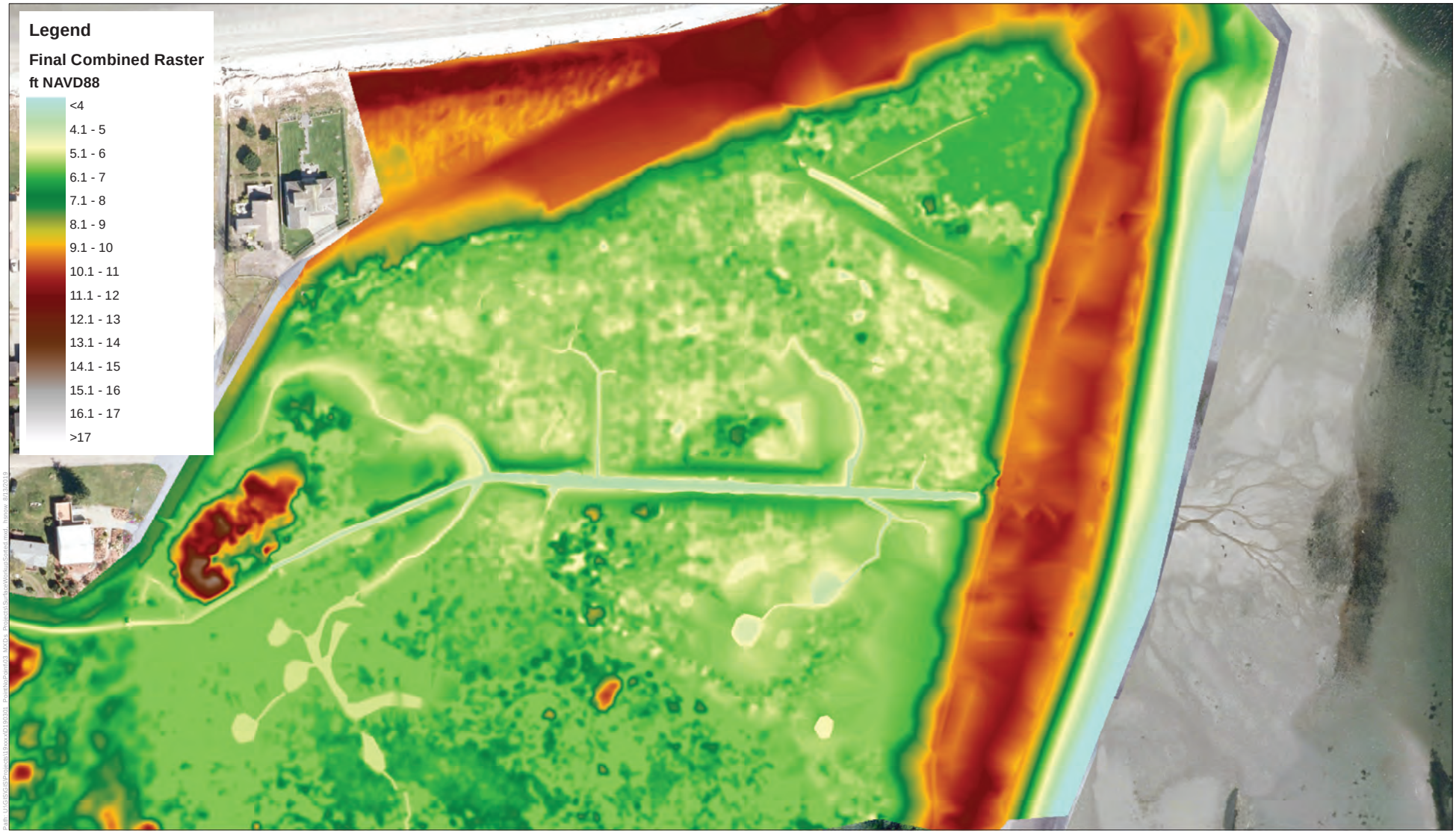


SOURCE: ESA

Point No Point Restoration

Figure 7
Drone Only

ESA

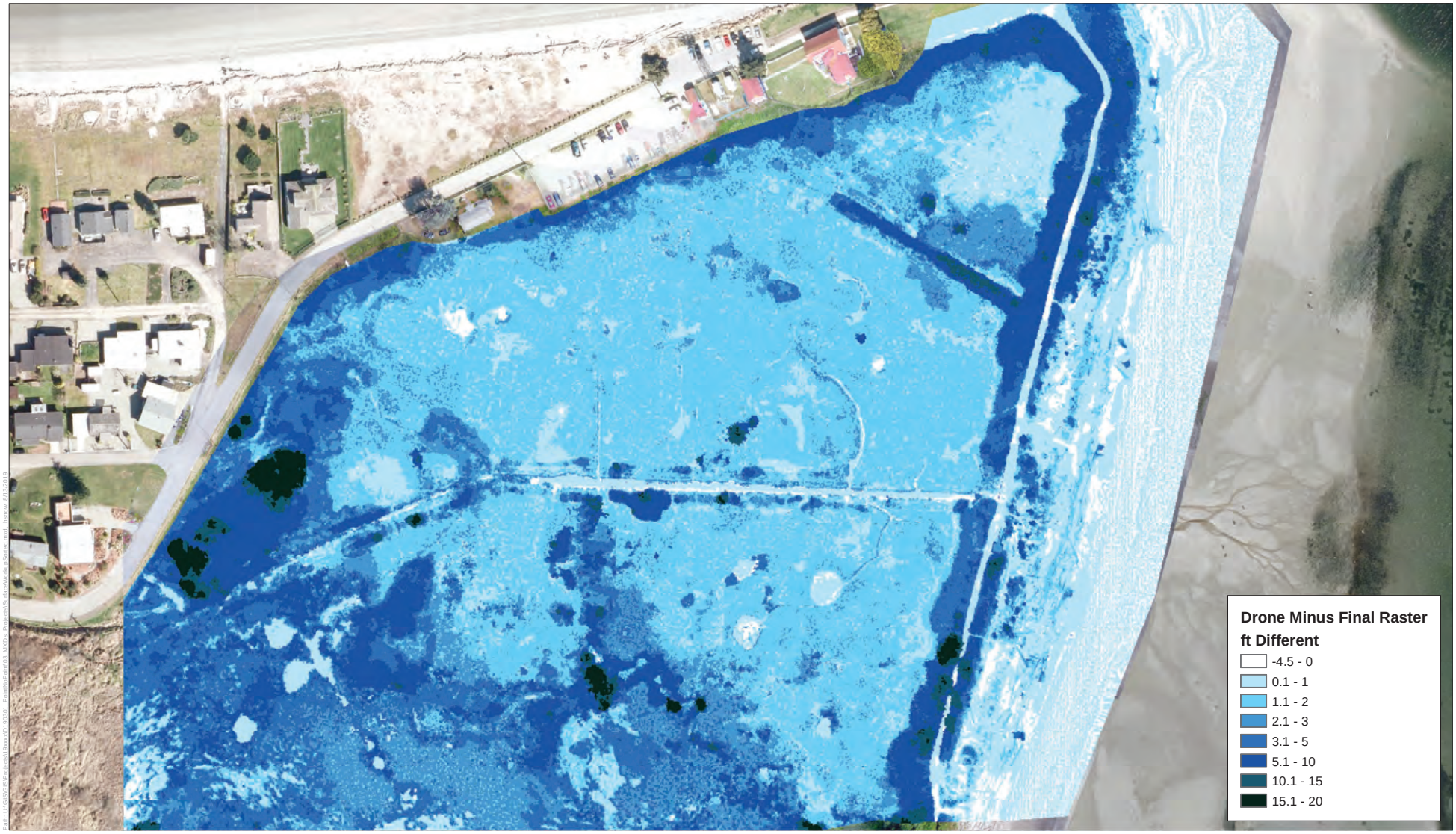


SOURCE: ESA

Point No Point Restoration

Figure 8
Final Combined Raster Elevations

ESA



SOURCE: ESA

N

0 200

Feet

ESA

Point No Point Restoration

Figure 9
Drone Elevations Minus Final Combined Raster Elevations

SOURCE: ESA

Point No Point Restoration

Figure 10
RTK Points vs Final Combined Raster Elevations

Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report

APPENDIX C

FLOOD INUNDATION MAPS

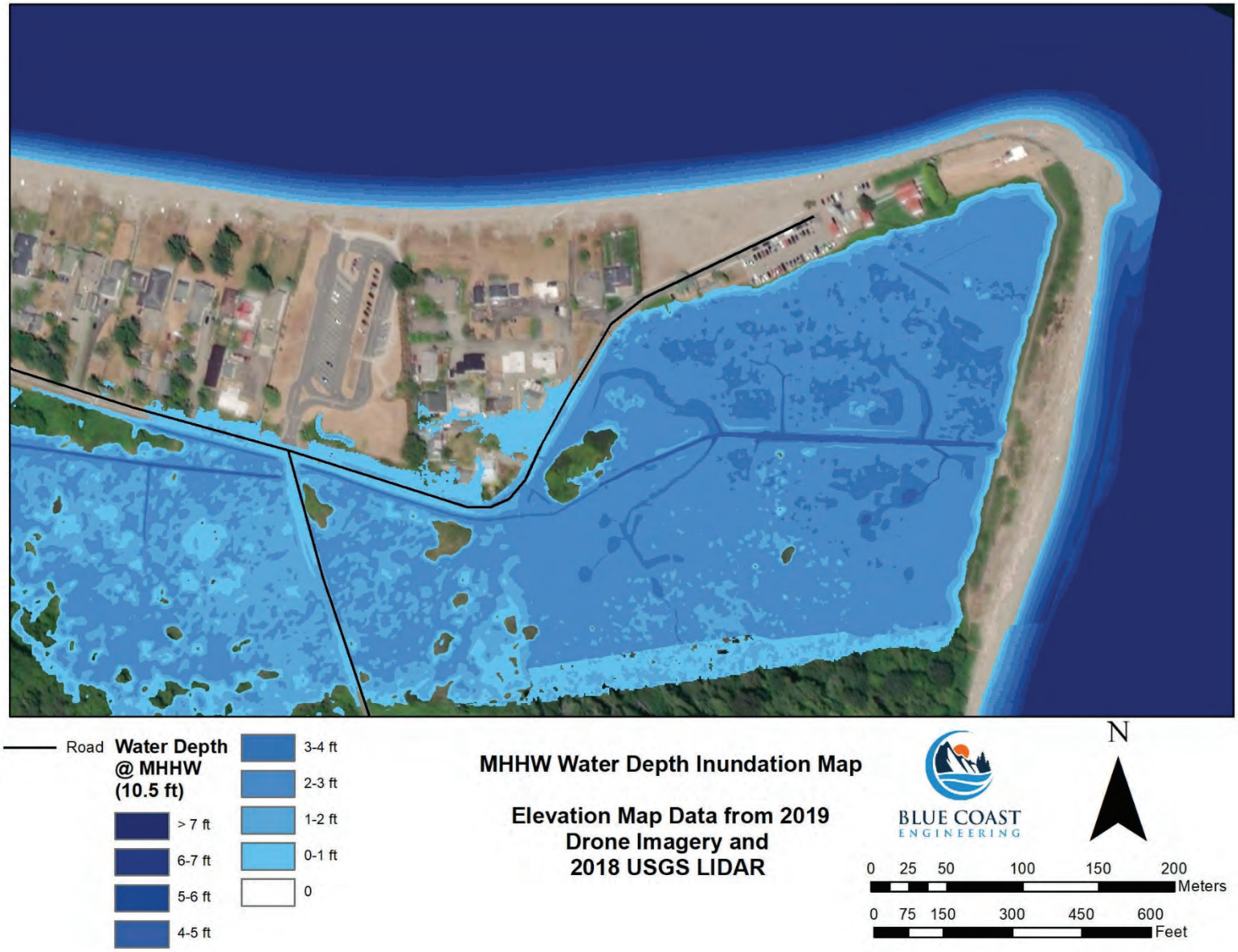


Figure C-1. Point No Point flood inundation water depth map for a MHHW water level.

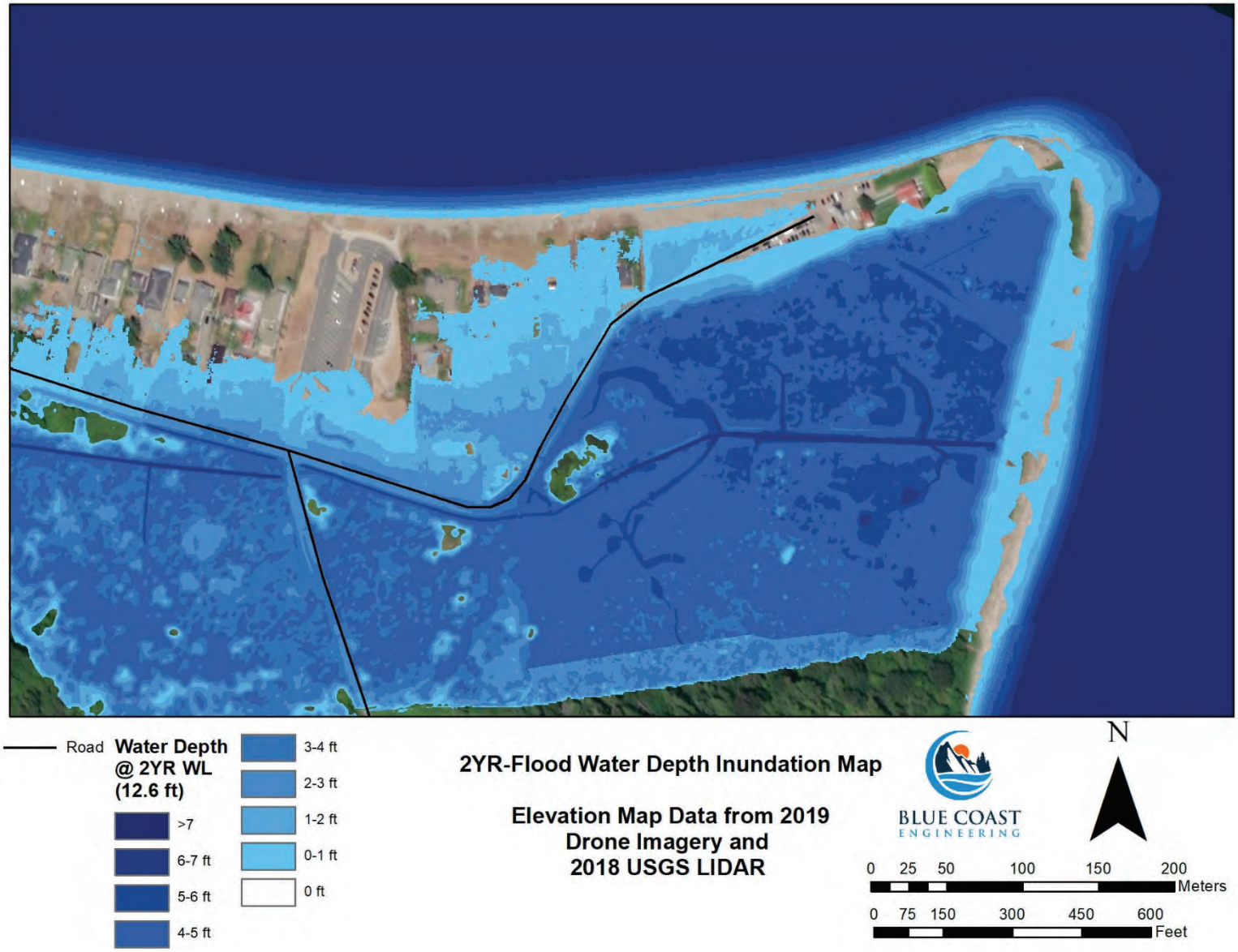


Figure C-2. Point No Point flood inundation water depth map for a 2-year return interval extreme water level.

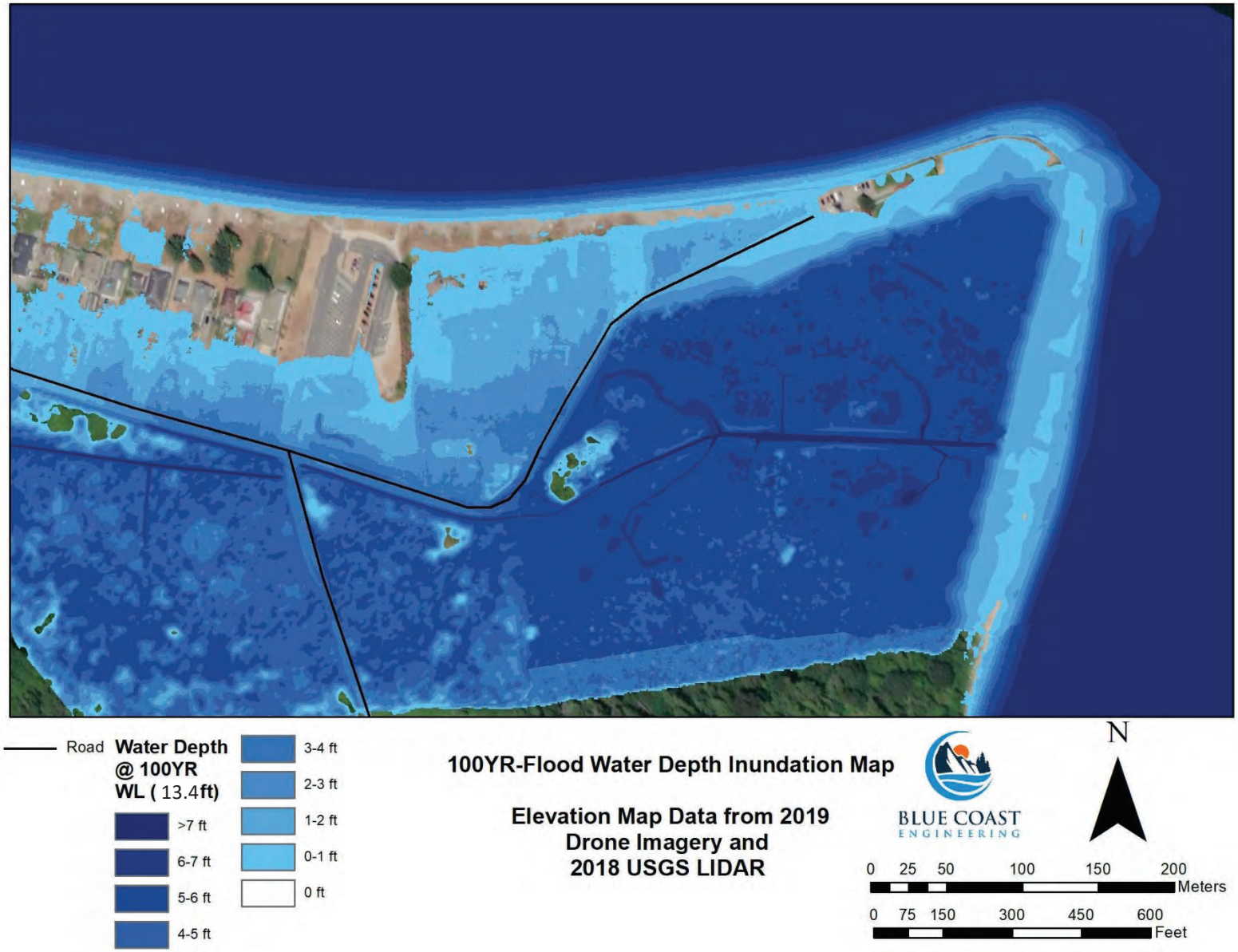


Figure C-3. Point No Point flood inundation water depth map for a 100-year return interval extreme water level.

Property Parcels

Elevation Contours (5ft NAVD88)

FEMA FloodZone with Base Flood Elevation (BFE)

Notes:

Elevation Contours - Kitsap LiDAR 2018
Property Parcels - Ecology 2019

FEMA Flood Mapping Effective 2/3/2017
BFE (ft NAVD88)
https://msc.fema.gov/portal/home

Figure C-4.

Point No Point FEMA Flood Mapping

Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report

APPENDIX D

GEOTECHNICAL TECHNICAL MEMORANDUM

MEMORANDUM

Project No. 190275

July 1, 2019

To: Jessica M. Côté, PE, Blue Coast Engineering PS, Inc

From:

Alison J. Dennison, LEG
Senior Engineering Geologist
adennison@aspectconsulting.com

Erik O. Andersen, PE
Principal Geotechnical Engineer
eandersen@aspectconsulting.com

Re: **Point No Point Restoration Feasibility Study – Geotechnical Considerations**
Contract PNP18-2
Task 7 – Surface Water and Ground Water

This memorandum presents the results of a limited reconnaissance-level geotechnical and hydrogeologic review completed by Aspect Consulting, LLC (Aspect). The intent of our study was to collect background information to begin to develop an understanding of freshwater and groundwater flow at the Point No Point wetland (Site) as it relates to the proposed conversion of the wetland to salt marsh (Project).

We performed our services in accordance with our agreed upon scope of work dated and authorized by you on June 4, 2019.

Project Understanding

The Site is located at the northeast corner of Kitsap County in Hansville, Washington (Figure 1). The Site covers a total of about 45 acres with about 32 acres of freshwater wetlands. Historically, the Site was a salt marsh fed by a small stream from the south with an outlet to Puget Sound to the north and bounded by a saltwater shoreline to the north and east. The construction of a dike in the 1880s and a roadway along the north side of the Site in the 1990s turned the area into a freshwater wetland. The Project seeks to return the freshwater wetland to salt marsh with tidal influence to allow fish access, improve sediment transport processes, and improve cross-shore connectivity and tidal flow.

Our scope of services included a Site reconnaissance, a desktop review of publicly available geologic, hydrogeologic, and geotechnical data, and preparation of this memorandum. Our recommendations for groundwater monitoring are also presented.

Observations

Site Conditions

The Site consists of six Kitsap County parcel numbers: 222802-2-053-2008, 222802-2-054-2007, 222802-1-007-2007, 222802-1-005-2009, 22802-1-010-2002, and 222802-1-004-2000, as shown on Figure 1. For ease in describing the parcels we have named them Parcel A through Parcel E as indicated below in Table 1 and illustrated on Figure 2.

Table 1. Site Parcel Information

Kitsap County Parcel Number	Parcel Name	Approximate Parcel Size	Site Address
222802-2-053-2008	Parcel A	5.08	No Site Address
222802-2-054-2007	Parcel B	5.03	No Site Address
222802-1-007-2007	Parcel C	3.69	No Site Address
222802-1-010-2002	Parcel D	17.59	8997 NE Point No Point Road
222802-1-005-2009	Parcel E	4.05	9003 NE Point No Point Road
222802-1-004-2000	Parcel F	9.31	No Site Address

Notes: (County, 2019)

The two western-adjoining parcels, Parcels A and B, are separated by a privately-owned, single-family residential parcel from the four eastern-adjoining parcels, Parcels C through F. A two-lane, asphalt paved, public roadway, NE Point No Point Road, boarders the north side of Parcels A B and C, and crosses through Parcel D. Parcel B is bordered by a gravel, private road, Hillview lane NE, to the east. Parcel A is bordered to the west by an open-space designated area owned by Point No Point Homeowners to the west. Parcel E is bordered by parks open space to the south. A gravel, recreational trail cuts north-to-south through the eastern portion of Parcel D. The Puget Sound boarders Parcel D to the north and east, Parcel E to the north and east, and Parcel F to the east. Single-family residential parcels boarder Parcel A and Parcel B to the south, Parcel C to the west and south, Parcel E to the west, and Parcel D west of the northwest portion of the parcel.

Parcels A B, C, and F are undeveloped. Parcel D is developed with an asphalt-paved parking area that is about 12,760 square-feet near the northeast corner of the parcel. Just to the east, Parcel D is developed with a one-story, 776 square-foot dwelling that was built in 1935 (County, 2019). Parcel E is developed with a lighthouse built in 1879, two adjoining 3,600 square-foot apartments built in 1882, and a 448 square-foot light-utility storage shed built in 1879 (County, 2019). We also observed a fenced area with a tower and a smaller building with public restrooms. A recreational, gravel trail provides access north-to-south along the east side of Parcels D, E, and F, about 100 feet west of the beach. The tide gate that connects the wetland to the Puget Sound is located on the west side of this gravel trail within Parcel D.

The shoreline along the northern edge of Parcel D is a sandy beach currently covered by scattered, natural driftwood. The shoreline along the northern edge of Parcel E is protected by 2- to 4-man,

angular rip rap. The shoreline along the east edge of Parcels D, E, and F is a sandy beach currently covered by abundant, natural driftwood.

Topography

The central area of the Site is the lowest topographically, below elevation 10 feet (County, 2019). There is a slight rise of a few feet from the interior wetland to the shoreline to the north and east of the Site, including the residential area between the Site and the northern shoreline north of Parcels A, B, and C. The area south of the Site slopes up to a high elevation of 110 feet and slopes steeply down to the east along the shoreline. The recent topographic map indicates that the Site is a wetland (USGS, 2017).

We reviewed aerial photographs (Google, 2019 and NETR, 2018) of the Site area from 1951 through 2018. We also reviewed recent Washington State Department of Natural Resources (DNR) LiDAR maps and hillshades (DNR, 2005). The drainage patterns do not appear distinctly on the images. We did not observe much change in the shoreline, surface-water flow patterns, areas of standing water, or evidence of recent landslides (loss of vegetation) or movement on or directly adjacent to the Site.

Drainage

A freshwater stream flows down from the uplands and enters the Site from the south, near the southwest corner of Parcel B. The stream turns to the east and crosses the central area of Parcel D and outfalls to Puget Sound through a tide gate along the eastern shoreline. We observed a ditch along the south side of NE Point No Point Road. The ditch was full of standing water and we were unable to tell flow direction. We also observed stormwater catch basins on the north side of NE Point No Point Road with standing water. The catch basins indicated flow towards the wetland and noted that they discharged into fish-bearing streams.

Vegetation

The central area of the Site, in the low wetland area, is vegetated with grasses, reeds, and scattered deciduous trees, shrubs, and vines. The uplands and sloped area to the south-southeast is vegetated with young to mature evergreens and deciduous trees with an established understory of ferns, ivy, woody shrubs, and herbaceous ground cover. The large second-growth evergreens typically exhibited no trunk curvature, indicating little to no ongoing slope creep was occurring.

Geology

The small-scale geologic map (DNR, 2005) indicates that the Site is underlain by Holocene-aged, alluvium (Qa) while the large-scale map (Polenz et al., 2015) indicates that the Site is underlain by Holocene-aged, nonglacial, salt marsh deposits (Qm). Alluvium refers to the organic and mineral sediments deposited by a fluvial process. Salt marsh deposits refer to the organic sediment and loose clay, silt, and sand deposited in a saltwater to brackish coastal wetland. In both geologic maps, the northern and eastern shorelines are mapped as beach deposits which are described as loose, sand, pebbles, pebbly sand, cobbles, silt, clay, shells, and isolated boulders.

The large-scale geologic map (Polenz et al., 2015) indicates that the area south of the Site is underlain by Pleistocene-age, Everson glaciomarine drift ($Qgdm_e$) overlying Vashon Stade

lodgment till (Qgt). This indicates that the area has been inundated by seawater. Up to four former shorelines have been identified.

The geomorphic map (Haugerud, 2009) indicates that the Site is a flat backshore area created by a modern beach accretion with an elevation near mean high water.

A search for nearby geotechnical explorations was completed by reviewing the DNR subsurface exploration database (DNR, 2019). One geotechnical well was referenced at the lighthouse, a hollow-stem auger boring advanced 13.5 feet below the ground surface (bgs) for installation of a 2-inch-diameter polyvinyl chloride (PVC) well. Groundwater was not noted in the geotechnical log. No other records were found within 1,000 feet of the Site.

Geologic Hazards

The Coastal Zone Atlas of Washington (Ecology, 1979) maps the Site area as "Stable," which is defined as an area with less than 15 percent slopes. The east-facing slope along the Puget Sound shoreline on Parcel F and further south is mapped as "Intermediate," which includes slopes greater than 15 percent or areas of weak material and/or abundant groundwater exist. This slope is a known landslide estimated to be 169,000 square meters (approximately 42 acres) (McKenna et al., 2008; Polenz et al., 2015; Haugerud, 2009). We also reviewed coastal aerial photographs (Ecology, 2019a) and aerial photographs (Google, 2019 and NETR, 2018) of the Site area from 1951 through 2018 with no appreciable geotechnical differences of the Site or adjacent properties noted.

Groundwater

A total of 14 nearby water well records were reviewed within the township, range, section, and quarter-quarter sections of the Site (Ecology, 2019b). Of these, we were unable to determine the locations of three of the records. However, those records did not include mention of groundwater data.

On June 27, 2018, four direct push geotechnical soil borings were advanced on Parcel E, at the lighthouse, and indicated no groundwater within 15 feet of the ground surface. No well casings were installed in these borings.

Between May 1988 and August 2008, six domestic water wells were installed on the residential properties to the south of the Site, on Hillview Lane NE. The wells were drilled between 86 and 133 feet bgs. Three of the wells had a recorded static groundwater depth between 70 to 78 feet bgs, one well at 54 feet bgs, and two wells between 20 and 25 feet bgs.

On February 2, 1984, one domestic water well was installed at one of the adjacent residential properties north of Parcel B. This well was installed 86 feet bgs and recorded a static water level at 51 feet bgs.

Conclusions and Recommendations

We now have a basic understanding of the Site layout, the geology, and the historic influences on the area. The next step is to begin to understand the surface water and shallow groundwater flow conditions at the Site to design an effective conversion of the area to salt marsh. It will also be important to understand that if the existing wetland area became inundated by tidal influence,

whether the perimeter will protect the adjacent residential properties, especially those to the north of Parcels A and B.

To better understand flow of shallow groundwater at the Site, we recommend the installation of approximately eight drive-point piezometers up to a depth of 10 feet bgs and 1 year of bimonthly monitoring. The proposed locations of these piezometers are shown on Figure 2. We recommend installing pressure transducers in the piezometers to collect hour-by-hour groundwater levels. This data will be downloaded during our monitoring visits.

To better understand surface water flow, we recommend additional visual observation of the ditchline and catch basins along NE Point No Point Road. This scope will be accomplished while conducting the groundwater scope discussed above.

At the conclusion of this monitoring, we will present the data in a memorandum. A breakdown of our estimated costs for these services is presented in Table 2 below.

Table 2. Proposed Budget for Groundwater Monitoring

Task Title	Labor	Other Direct Costs	Subtotal
Project Kickoff and Management	$3,200		$3,200
Drive Point Piezometer Installation	$7,550	$10,550	$18,100
Groundwater Data Collection (4 site visits)	$2,800	$1,050	$3,850
Groundwater Monitoring Memorandum	$5,150		$5,150
		Total:	$30,300

Notes: Pressure transducers included in Groundwater Data Collection task will be purchased for the project and will be effective in salt water conditions.

References

Haugerud, R.A., 2009, Preliminary geomorphic map of the Kitsap Peninsula, Washington, USGS, Open-File Report 2009-1033, Version 1.0, Scale 1:36,000.

Kitsap County (County), 2019, Parcel Map, https://psearch.kitsapgov.com/psearch/index.html, accessed June 13, 2019.

Google, 2019, Google Earth Pro Program, Years reviewed: 1990, 2004, 2006, 2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018, accessed June 13, 2019.

McKenna, J.P., Lidke, D.J., Coe, J.A., 2008, Landslides mapped from LiDAR imagery, Kitsap County, Washington: U.S. Department of the Interior, U.S. Geological Survey, Reston, Virginia, Open-File Report 2008-1292, Version 1.0, 81 p.

Nationwide Environmental Title Research, LLC (NETR), 2019, Historical Aerials, Years reviewed: 1951 and 1969, https://www.historicaerials.com/, accessed June 13, 2019.

Polenz, M., J.G. Favia, I.J. Hubert, G. Legorreta Paulin, and R. Cakir, 2015, Geologic map of the Port Ludlow and southern half of the Hansville 7.5-minute quadrangle, Kitsap and Jefferson Counties, Washington: Washington Division of Geology and Earth Resources, Map Series 2015-02, Scale 1:24,000.

U.S. Geological Survey (USGS), 2017, Hansville Quadrangle, Washington, U.S. Department of the Interior, 7.5-minute series, Contour Interval 20 feet, North American Vertical Datum of 1988, Scale 1:24,000.

Washington State Department of Ecology (Ecology), 1979, Coastal Zone Atlas of Washington, https://fortress.wa.gov/ecy/coastalatlas/, accessed June 13, 2019.

Ecology, 2019a, Coastal Zone Atlas of Washington, Shoreline Photos from 1977, 1992, September 24, 2000, April 26, 2001, and July 24, 2016, available at: https://fortress.wa.gov/ecy/coastalatlas/, accessed June 13, 2019.

Ecology, 2019b, Washington State Well Report Viewer – Map Search, https://fortress.wa.gov/ecy/wellconstruction/map/WCLSWebMap/WellConstructionMapSearch.aspx, accessed June 26, 2019.

Washington State Department of Natural Resources (DNR), 2005, Washington Lidar Portal, lidarportal.dnr.wa.gov, accessed June 13, 2019.

Washington State Department of Natural Resources (DNR), 2019, Subsurface Geology Information System, https://fortress.wa.gov/dnr/protectiongis/geology/?Theme=subsurf, accessed June 13, 2019.

Limitations

Work for this project was performed for Blue Coast Engineering PS, Inc (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

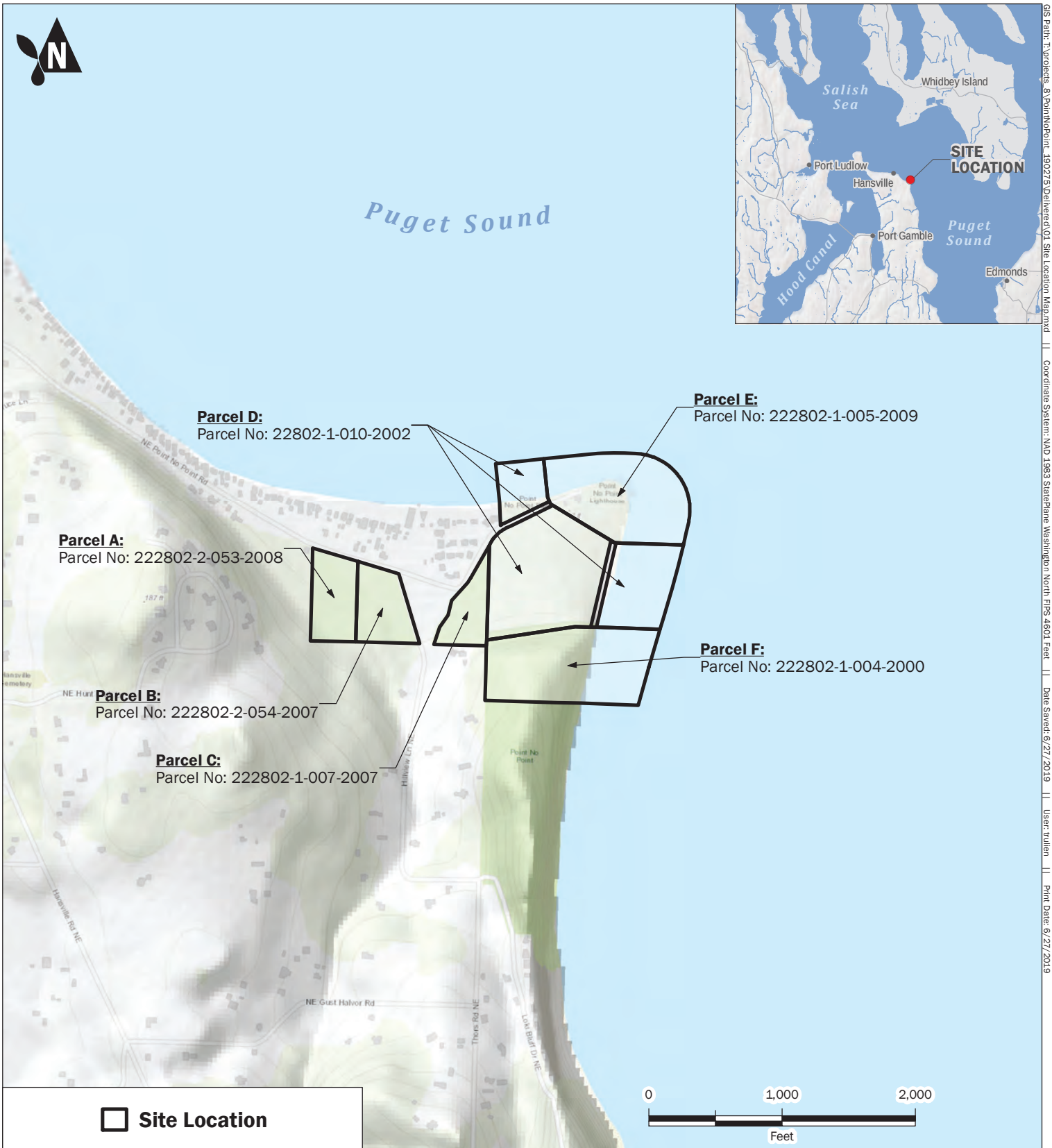
All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix A titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Alison J. Dennison, Senior Engineering Geologist, at 206-780-7717 or Erik O. Andersen, Principal Geotechnical Engineer, at 360-746-8964.

Attachments: Figure 1 – Site Location Map
Figure 2 – Site Map
Appendix A – Report Limitations and Guidelines for Use

FIGURES



Site Location Map

Point No Point Restoration Feasibility Study
Geotechnical Considerations
Hansville, Washington

Aspect Consulting	JUN-2019	BY: AJD / TDR	FIGURE NO. 1
	PROJECT NO. 190275	REVISED BY: ---	

GIS Path: T:\projects_8\PointNoPoint_190275\Delivered\01 Site Location Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 6/27/2019 || User: trullen || Print Date: 6/27/2019

Basemap Layer Credits || Copyright (C) 2015 - Kitsap County, Puget Sound Aerial Mapping Project

Site Map

Point N o Point Re storation Fe asibility Stud y –
Ge ote c hnic al Consid e rations
Hansville , Washington

Aspect Consulting	JUN-2019	BY: AJD / TDR	FIGURE NO. 2
	PROJECT NO. 190275	REVISED BY: ---	

APPENDIX A

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

Geoscience is Not Exact

The geoscience practices (geotechnical engineering, geology, and environmental science) are far less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or property, you should contact Aspect Consulting, LLC (Aspect).

This Report and Project-Specific Factors

Aspect's services are designed to meet the specific needs of our clients. Aspect has performed the services in general accordance with our agreement (the Agreement) with the Client (defined under the Limitations section of this project's work product). This report has been prepared for the exclusive use of the Client. This report should not be applied for any purpose or project except the purpose described in the Agreement.

Aspect considered many unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you;
- Not prepared for the specific purpose identified in the Agreement;
- Not prepared for the specific subject property assessed; or
- Completed before important changes occurred concerning the subject property, project, or governmental regulatory actions.

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance

of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical, Geologic, and Environmental Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

Appendix B. Point No Point Feasibility Phase Outreach Summary

Background

Point No Point is a popular public park and locally-valued community resource, with many parties interested in the land and resource management of the area, including agencies; conservation, historical, and recreation groups; landowners; and visitors. Including partners and interest groups in the habitat restoration design development process is a critical component of project success.

Mid Sound Fisheries Enhancement Group, with input by Blue Coast Engineering and Kitsap County Public Works, identified several project partners and interest groups shown below in Table 1 to include in our initial outreach phase.

Outreach Strategy

Initial outreach was intended to develop communication and project input pathways for the most central project partners and community members, including:

- The Park property owners and managers (Kitsap County Parks and Public Works)
- Tribes (Suquamish, Jamestown S'Klallam, Port Gamble S'Klallam, Skokomish and Point No Point Treaty Council)
- Adjacent landowners (Hillview Lane neighborhood and Point No Point Road neighborhood)

Conversations with these project partners built consensus for project development and provided key insights into land use and other concerns that would need to be addressed. These partners also provided additional interested party contacts.

Additional project partners and interest groups in the area were identified such as:

- The neighboring Hansville community
- Recreation and Interest Groups (North Kitsap Puget Sound Anglers, Audubon Kitsap chapter, US Lighthouse Society)
- Washington Department of Fish and Wildlife (WDFW), both area habitat biologists for biological input and regional office staff for parking lot/boat ramp updates

After primary partner and interested party identification was complete, identified groups were mapped by relationship (Known, Identified or To Be Found) and organized by level of engagement and input for each stage of the project (Engage, Involve, or Inform). This sorting allowed Mid Sound to identify which partners needed to be updated regularly with detailed information, to be consulted for key design components, or to simply be kept informed and have questions answered. Some groups would be very invested in early design concepts, others would want to weigh in throughout design development, and others would want or need more design detail that would be provided later in the process. Some would simply want to kept informed as the project developed, or around a specific concern. Several groups were identified as partners who would help connect to other interest groups, build support, or volunteer on the project.

Engagement Levels have been identified as:

- **Involve (Inv)–** Key partners will be included in design development and project updates, and their input will be critical in developing project solutions and support.
- **Consult (C)–** a formal, legal consulting relationship exists for the project, through a specific legal pathway. Parties may have other informal interest and input in addition to formal consultation.
- **Engage (E)–** Mid Sound should include these groups in project outreach and input opportunities to seek input, but expects varying degrees of interest and participation. Some parties may be engaged for specific phases or milestones, and kept informed for others.
- **Inform (Inf)–** At key points in project development, these groups should be provided information relevant to their interests in the project.

Key Milestones for Partner Communications by Phase:

FEASIBILITY

- Partner Identification – partners and interested parties were identified during the Feasibility phase. These partners were encouraged to share other parties for Mid Sound to connect with.
- Feasibility Findings – Feasibility studies conducted for this report include early data gathering and project partner consultation.
- Alternatives Identification – preliminary alternatives developed as part of this Feasibility Report.

DESIGN DEVELOPMENT - PRELIMINARY DESIGN

- Data Gathering – additional data is needed to develop alternatives including groundwater and surface water around the park area.
- 30% Design – as the identified alternative is developed, continued input and support will be sought from key partners.
- Alternatives Analysis – with additional data and input gathered from partners, project alternatives will be developed further.
- Alternative Selection – input will be sought on developed alternatives as part of selection to advance the most successful design option.

DESIGN DEVELOPMENT - 60% DESIGN, PERMITS, AND FINAL DESIGN

- 60% Design/Permitting – in addition to keeping partners informed, the 60% design milestone also triggers formal consultations with permitting agencies, and is one of the key milestones for tribal consultations.
- Final Project Design – input and support will be solicited prior to the finalization of design and preparing the project for construction.
- Additional input needs will be addressed as design progresses.

Based on the sorting and prioritization of groups by their relationships and interests in the projects, Mid Sound conducted outreach efforts as summarized in Tables 1 and 2 below.

Outreach Process

Beginning in 2017, Mid Sound reached out to Kitsap County to discuss the potential for a restoration project at Point No Point. The County requested that technical studies be conducted first to confirm the feasibility of an eastern outlet for the marsh to replace the tide gate and any potential for flooding to adjacent properties. While funding was not available for full conceptual design development given the intensive data collection required for the project, Mid Sound was able to work with Blue Coast Engineering to develop an early conceptual plan to confirm the east outlet option was viable from a coastal processes point of view, and develop the levee concept to address flooding concerns. The County requested that we conduct preliminary data and assessment prior to meeting.

In June 2019, Mid Sound's consultant, ESA, engaged cultural resources staff from the Suquamish Tribe, Port Gamble S'Klallam Tribe, and RCO to understand cultural resource and tribal interests for the project. These staff were supportive and provided history and potential project considerations.

Toward the end of 2019 we used additional PSAR funds we received to collect additional data and develop very basic conceptual designs, after which the county agreed to meet with us to discuss our findings. In meetings in early 2020 we were able to present our findings to the County departments connected to the project: Parks, Public Works, and Community Development, as well as Commissioner Gelder.

Mid Sound then got the green light from the department heads and the County Commissioner to continue to explore the idea of completely removing the tide gate and restoring the estuary, including approval from the Commissioner to begin community outreach. However this was approved just prior to the COVID-19 related quarantine order. Plans to hold community outreach meetings at the local community center were paused and re-strategized. In the spring and summer of 2020 Mid Sound established communication and met virtually with homeowners living near the Park.

Beginning in early 2021 once Mid Sound's staffing transition was complete, we began implementation of our full outreach strategy, which included outreach to local tribes, neighbors in the community, and conservation and interest groups interested in the area and the Park. Due to the history of land use conflict in the area and the complexity of the project, Mid Sound focused on developing confidence in the project with partners and being sure to understand their concerns and needs for potential impacts, constraints, and long-term viability of the project.

In Fall 2020, Mid Sound engaged the Kitsap County departments, Commissioner Gelder's office, local tribes, and interested landowners on Hillview Lane. The County departments, Commissioner's office, and tribes are strongly in support of the project and provided their interests and areas of concern for consideration during design development. These are included in the outreach summary below.

The Hillview Lane owners who attended provided site history and background on the area. Cecilia Runkle, who owns the parcel extending into the marsh, is supportive of restoration efforts but requested more information on the potential FEMA mapping changes due to the project. Blue Coast Engineering conducted that analysis and Mid Sound provided a summary memo to Ms. Runkle and other

landowners, which can be found in Appendix C. The report found that the project will not increase the FEMA mapped area beyond the existing map definitions.

Discussion of these concerns as well as data gathering conducted by Blue Coast Engineering identified the need for more research into the existing conditions of the site, particularly around groundwater and surface water flows, potential impacts to septic systems on properties north of the marsh, and a stream survey of the creek entering the marsh to determine fish use and condition.

In 2021, Mid Sound provided early conceptual alternatives as identified in this report to, and solicited feedback from, project partners and interested parties listed in Table 1. We invited neighboring community members to virtual outreach meetings (due to COVID-19 gathering restrictions) via postcards and email invites using the County address database and constituent list-serve. The community outreach was focused first on the two neighborhoods adjacent to the Park: north of Point No Point Road and homes along Hillview Lane and connecting roads (Fig 1). We then expanded our outreach to the greater Hansville community (Fig 2).

Mid Sound held 34 partner and community meetings plus additional one on one conversations with interested parties. We connected with 46 project partner staff and organization members, and 44 neighbors and community members. In June 2021, we will hold an outreach summary meeting for the County staff involved in the project to share this information and outline next steps. We will continue community outreach after data collection and analysis for Preliminary Design.

Feedback Summary

Project partners are strongly supportive of the project and interested in our analysis and outreach. Many conveyed that while they support the project, they know we will face logistical hurdles and resistance from others. These concerns and interests are outlined below, and overlapped greatly across interest groups, partners, and landowners.

- Surface water and groundwater management around Point No Point Road and septic systems north of the marsh portion of the park.
- Safety and trespassing concerns around park visitors using the WDFW parking lot and adjacent shorefront homes as access routes to the park.
- Road safety along Point No Point Road: illegal parking, pedestrian safety, speeding, blind corners.
- Park visitors using Hillview Lane as a pass-through by foot and car.
- Negative experiences related to increased park visitation, including noise, litter, trespassing and night-time activities in and around the park.
- Long term maintenance responsibilities and accountability.
- The tribes are interested in cultivation of indigenous medicinal foods as used historically on site, as well as continued protection and respect for cultural values, land use, and artifacts on site. The historic Treaty of Point No Point was signed here in 1855, and the site continues to hold cultural significance. There is interest in increasing signage and other acknowledgements of the historic and present-day importance of the site.

Neighboring landowners are deeply engaged in and care greatly for the Park and the wildlife in the area. Most we spoke with are supportive of the restoration goals, and many are excited and want to help the project. Some, particularly in the area north of Point No Point Road, support the habitat work but have strong concerns about other impacts due to park development and want to know how these can be addressed as well.

Residents in the area north of Point No Point Road are frustrated by the rapid and diverse changes to land use in the area in the past decade. The park upgrades by the County, while appreciated for cleanliness, are believed to have attracted more users and associated stressors including overflow parking, speeding on the undersized Point No Point Road, trespassing, and litter. The WDFW parking lot also raises several of these concerns including late-night visitors who create noise and leave litter and daytime visitors who access private properties along the beach.

Landowners are also concerned about the existing road and drainage ditch flooding and the potential for the marsh restoration to increase this problem. Similarly, septic system impacts north of Point No Point Road are a common concern. Residents feel that their concerns are not being heard or addressed, and some wonder why the restoration project is proceeding ahead of addressing these issues.

Residents of Hillview Lane and connecting roads above the marsh (Thor Road, Loki Bluff Drive, Gust Halvor Road, and Hunt Club Lane) are supportive and interested in project. Concerns in this community center around Hillview Lane maintenance and function, which will be addressed in the project design. If there are ways to reduce visitor pass-through on the private road, this would be appreciated.

Habitat questions raised include whether salmon will utilize the reconnected habitat, impacts to existing birds and other wildlife using the marsh, and aesthetics of the restored area. Landowners also wondered if the tidal outlet will remain open with sediment and log movement along the shoreline, and whether beach access would be maintained for visitors.

Preliminary discussion of a boardwalk drew mixed results: some residents are strongly in favor of the boardwalk as an access and educational improvement. Others are concerned it will increase human impacts on the marsh, such as litter and dogs scaring wildlife. Those who feel the park is already overused are concerned than any enhancements to the park will bring more visitors and more of the associated impacts. While a bridge of some kind will be needed across the tidal inlet to maintain access on the east side of the marsh, a larger boardwalk or trail system will need to be evaluated for potential improvements and impacts during design.

Table 3 outlines the feedback provided across consulted groups and how future design phases may be able to address these concerns. While the project cannot address all of the existing concerns in the area due to multiple land management jurisdictions, Mid Sound is seeking to identify the known and potential issues so that the project can be sure to not increase any problems and potentially can address some of them. Mid Sound is also relaying the feedback received to the appropriate agencies and County department staff.

Design Concept and Alternatives Feedback

The primary design concept was overwhelmingly preferred by both partners and the residents and community we met with. The alternatives, which reduced the project footprint in anticipation of potential land use conflicts (e.g. private road) or hydraulic concerns (e.g. flooding along Point No Point Road) were seen as too much compromise of the project goals. The repeated feedback was to restore as large an area as possible for maximum benefit and return investment.

The few (quantity 2) who disagreed were concerned that the project was too large a change for the area and would prefer as little change as possible or no change at all. Additional concerns raised were consistent with those listed above and are included below.

In addition to feedback provided during outreach meetings, we invited the neighborhood members to participate in the online project survey. The results below reflect participant responses and are consistent with feedback we received during meetings and from project partners.

Below is a conceptual drawing [primary concept design] of what the project could look like. What interests or concerns would you have about a project like this?

- I don't see an urgent need to destroy the marsh.
- Would like to make sure that beach access isn't affected by saltwater egress point. Would like to see additional hiking trails in the restoration area.
- Roadway and parking lot runoff impact to fish.
- My concerns are not understanding what if anything is being done to improve the drainage of the existing Point No Point road drainage system. Where will the water accumulation during the rainy seasons go? I believe Kitsap County Public Works Dept will not improve the clogged storm drain system without a solution for where the water can flow to.
- I like it. I assume there is a bridge over the stream outlet.
- Flooding in the fall and winter, septic failures, beach access limited. This looks like what the wetlands would look like in low water summer months not in the fall and winter when it is completely filled and resembles a lake. Road flooding is also an issue that needs to be addressed as well as dangerous walking on the road esp at the blind corner.
- discharge channel staying open with large sediment and driftwood movement, beach walkers ability to cross discharge channel without having to use levee trail and bridge, longterm management
- Improving pedestrian access is key. Most of this area is already grassed, but changing the water flow will improve it for wildlife.
- The water outlet from the marsh to the beach
- The scope of this project looks very achievable
- West side is private property [note: this is not accurate, the west parcels are owned by Kitsap County Parks]
- interested in the water flow in and out, especially at king tides

This Alternative Concept A for our project. The red areas would not be part of this smaller project. Tell us below what you think of this plan. Do you like it more or less than the first plan? Why?

- Neither plan
- Do it right or not. Can this alternative ultimately deliver any of the stated goals?
- Less. It is important to reduce the impact of flooding.
- Flooding and maintenance really needs to be addressed
- stormwater management, largest road flooding area is in the red area so how will this water be managed if the project area is leveed.
- Less. It doesn't have as much connectivity for the wildlife.
- Why have a scaled back plan?
- Preferred over A. Not encroaching on private property [note: comment not made by the private parcel owner]
- I think the more you can do, the better the restoration.

This Alternative Concept B for our project. The red areas would not be part of this smallest project. Tell us below what you think of this plan. Do you like it more or less than the other plans? Why?

- Neither plan
- Don't prefer this alternative (easy for me as our property is not adjacent). If you're going to go through the process to restore this tidal wetland, you should use the whole area, not just part of it.
- Do it right or not. Can this alternative ultimately deliver any of the stated goals?
- Less. I want to go big. Our climate is changing and the ecosystem deserves a chance.
- How would any of the scenarios address the on going flooding
- same as concept A but even larger flood prone area
- No. It's smaller, so not as appealing
- Silly to engage on a wonderful project like this. Why waste time and effort?
- What is the point - is it big enough to be worth the effort?
- like it less; the larger project will result in better restoration

Further analysis of the conceptual alternatives is discussed in Appendix E of this report.

Feedback Incorporation

Much of the feedback we received confirmed our anticipated project hurdles and considerations. The next phase of design is oriented specifically around the marsh questions: hydrology, potential impacts to Hillview Lane, understanding the road and drainage ditch flooding at Point No Point Road, and assessing potential impacts to property and infrastructure north of the Park. We will be deploying piezometers around the park to monitor sub-surface groundwater behavior, mapping the wetlands and marsh

habitat, surveying the hydraulic conditions in and around the marsh in more detail, and talking with County staff about the existing surface and groundwater conditions and flooding problems in the area.

While this project cannot address all of the existing land use and management concerns in the area, such as the speeding and parking concerns, we will continue to talk with WDFW and County staff about opportunities to contribute in a positive way to these conditions through the project. We will continue to relay the feedback and concerns of landowners back to land managers and seek to support consensus and problem-solving opportunities through the project.

We will also be consulting with agency and conservation groups for habitat considerations including invasive plant management strategies, habitat and species impacts and opportunities, and best practices for public spaces and wildlife habitat overlap. We will continue to consult with tribal staff on natural resource and cultural concerns and interests.

Future Outreach Planning

All phases of design include outreach and feedback solicitation for the project development. The partners included thus far will be kept apprised of project development via periodic email updates and website update information. In future phases outreach meetings will be planned for design milestones. Homeowners and the public are able to register for email updates on the project and future outreach invitations.

Additional interested groups will be approached in future design phases to build interest and support in the project and to support additional data gathering, particularly around habitat and the concerns in septic, road, and surface water management around the park. These groups include:

- Friends of Point No Point Park
- Trout Unlimited
- Stillwaters Environmental Center
- Permitting agencies as relevant to data gathering and design development
- Local groups such as the Hansville Greenway Association and Hansville Community Center
- Others as identified through the design process

All of the above identified groups will be given the opportunity to hear updates on data collection and design development (estimated late Fall 2021 or early 2022, pending funding) and, and will be invited to provide input on alternatives analysis once the alternatives are further developed.

Mid Sound has received funding from NOAA to engage recreational anglers in conservation work on this project. We will begin strategizing this effort in Summer 2021, and anticipate a combination of Citizen Science data collection and education and outreach events within this community. We also hope to develop ways for fishers to support the project through education and outreach at the Park, to other angling groups, and through long-term stewardship of the site.

In addition, general public outreach and education is planned throughout design development. Because of the diverse and dispersed nature of public use at Point No Point, talking with other project partners will be a useful tool in identifying when, how, and where to connect with the public about the project development.

Table 1. Project Partner/Interested Parties Identification

Name	Role/ Relationship	Land Manag.	Natural Resources	Roads	Surface Water	Mainten -ance	Septic	Cultural	Public Use	Other Specific Concern(s)
Kitsap County Parks Department	Property owner	X	X	X	X	X	X	X	X	Other party interests
Kitsap County Public Works	Manage utilities around park	X		X	X	X	X		X	
Kitsap County Community Development	Permits and impact assessment	X	X	X	X	X	X	X	X	
Commissioner Gelder's Office	Constituent representation	X	X	X				X	X	Community Impacts
West Sound Partners for Ecosystem Recovery (WSPER)	Local Integrating Organization	X	X						X	
Recreation and Conservation Office (RCO)	Grant administration	X	X					X	X	
State Historic Preservation Office (SHPO)	Lighthouse parcel, tribal interests	X				X		X	X	
U.S. Coast Guard	Owns lighthouse parcel, transferring to Parks Dept.	X		X		X			X	Remediation work at lighthouse parcel Fall 2021
Representative Kilmer's Office	Constituent representation, liaison for Coast Guard transfer	X	X					X	X	
WA Department of Fish and Wildlife	Biological permitting, adjacent parking lot	X	X	X	X	X	X		X	Pedestrian Access/Routes

Name	Role/ Relationship	Land Manag.	Natural Resources	Roads	Surface Water	Mainten -ance	Septic	Cultural	Public Use	Other Specific Concern(s)
Suquamish Tribe Cultural and Natural Resources Staff	Historic and current site significance, natural resources	X	X					X	X	Indigenous Foods/ Medicinal Plants
Port Gamble S'Klallam Tribe Cultural and Natural Resources Staff	Historic and current site significance, natural resources	X	X					X	X	Indigenous Foods/ Medicinal Plants
Jamestown S'Klallam Tribe Cultural and Natural Resources Staff	Historic and current site significance, natural resources	X	X					X	X	
Skokomish Tribe Cultural and Natural Resources Staff	Historic and current site significance, natural resources	X	X					X	X	
Point No Point Treaty Council	Historic and current site significance, natural resources	X	X					X	X	
Hillview Lane Landowners	Property impacted by project	X	X	X	X	X		X	X	Privacy/ Trail Use, Visitor Impacts
Point No Point Road Landowners	Property impacted by project	X	X	X	X	X	X	X	X	Privacy/ Beach Use, Visitor Impacts
Hansville Community	Community impacted by project	X	X	X	X	X			X	Visitor Impacts
Permitting Agencies	Federal, State, and Local Permits	X	X	X	X	X	X	X	X	Multiple
U.S. Lighthouse Society	Headquarters in park	X		X	X	X		X	X	Lighthouse Impacts

Name	Role/ Relationship	Land Manag.	Natural Resources	Roads	Surface Water	Mainten -ance	Septic	Cultural	Public Use	Other Specific Concern(s)
Puget Sound Anglers – North Kitsap Chapter	Recreational/ Natural Resources		X						X	Fish habitat and impacts
Audubon Society Kitsap Chapter	Recreational/ Natural Resources	X	X						X	Bird habitat and impacts
Public Users	Park visitors	X	X	X				X	X	

Figure 1. County mailing address map used for neighborhoods adjacent to Park for focused outreach meetings in Spring 2021.

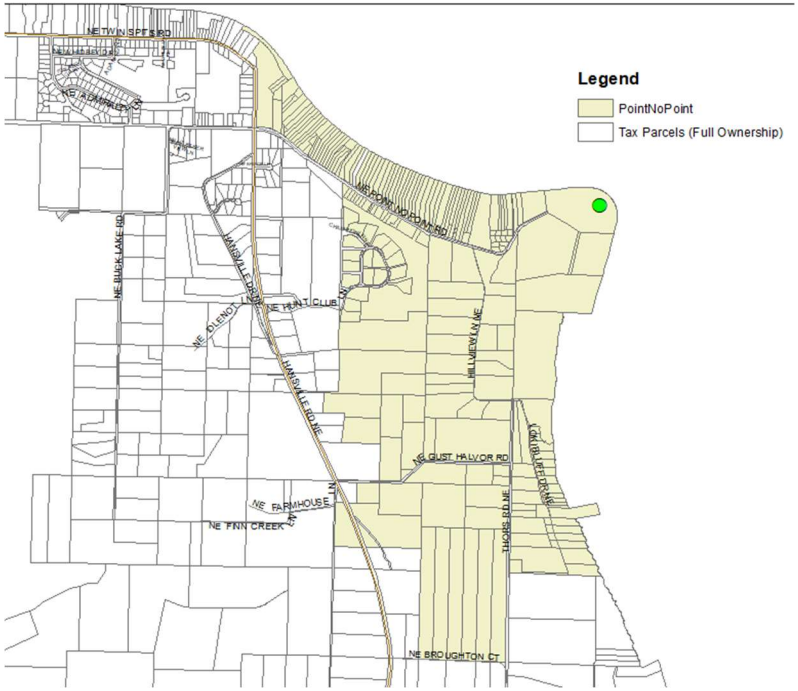


Figure 2. County mailing address map used for the Hansville area outreach meetings in Spring 2021.

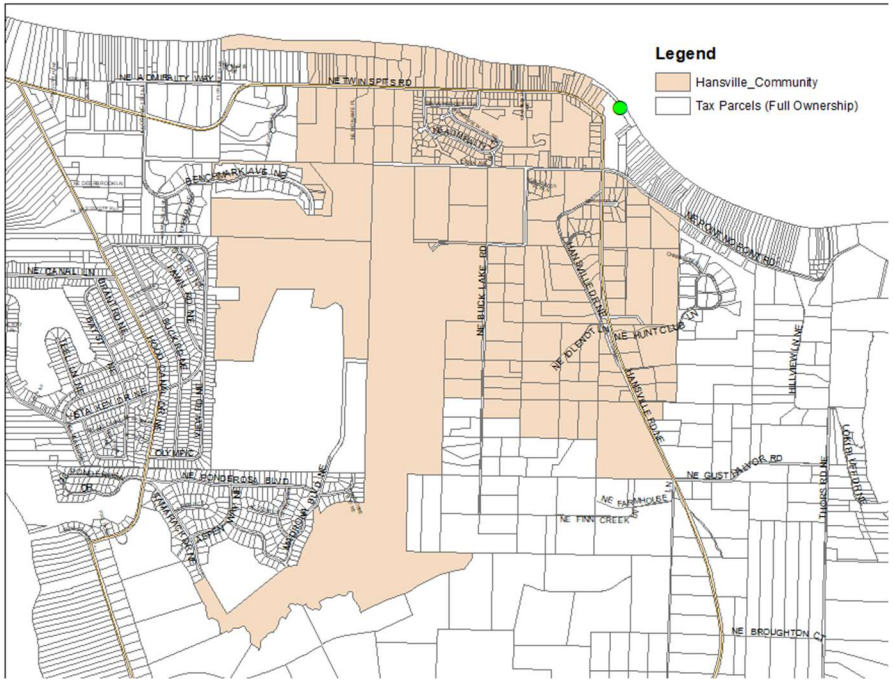


Table 2. Outreach and Feedback Summary

FEEDBACK RECEIVED	FREQUENCY	RESPONSE/DESIGN INPUT
Roads and Public Access		
Surface water and groundwater management and flooding	Very common	Discussions with partners in Phase 1. Data collection and analysis in Phase 2. Levee and marsh restoration design to manage.
Potential septic system impacts	Common	Discussions with partners in Phase 1 Data collection and analysis in Phase 2. Project may not be able to address existing conditions but can shed light on concerns.
Park visitors using Hillview Lane as a pass-through by foot and car.	Specific interest group	Project cannot entirely stop trespassing but the setback levee can provide other pedestrian pathways that may reduce occurrence.
General road conditions and usage due to increased park visitation, including dangerous driving and overflow parking.	Common	The project cannot entirely resolve this but the proposed levee can provide an alternate pathway for pedestrians to access the park to reduce trespassing. Mid Sound will relay concerns to the County.
WDFW parking lot frustrations (nighttime use, litter, park visitors trespassing)	Common	The project cannot entirely resolve this but the proposed levee can provide an alternate pathway for pedestrians to access the park to reduce trespassing. Mid Sound will relay concerns to the County and WDFW.
Long term maintenance responsibilities and accountability.	Common	Mid Sound is discussing the project development and long-term operations and maintenance planning with multiple County departments.
Point No Point Road is too narrow, blind corners, no shoulders or sidewalks, speeding	Common	While the project does not include the existing Point No Point Road, Mid Sound will talk with Kitsap County about opportunities to improve park access and road conditions during design development.
There is not enough parking. Park improvements will encourage more visitation and make this worse.	Very Common	While the project does not include parking in its scope, Mid Sound will talk with Kitsap County about opportunities to improve park access and parking during design development. Park use has increased for multiple reasons. This project hopes to align that use to more sustainable pathways through the levee design.
Keeping or removing of Hillview Lane. Raising of Hillview Lane.	Somewhat common	Hillview Lane owners are not interested in removal of the road. Project design will explore hydrologic, and fish passage improvements for the road in future

		phases. Raising of the road is likely a part of the project and will be developed further in the next phase of design.
Project will be blamed for or rejected due to larger land use issues in the area	Common	Based on feedback around frustrations with prior projects and land use changes in the area, Mid Sound is engaging project partners and interested parties widely and throughout the design process.
Will the private parcel and/or road easement for Hillview Lane and/or Parks ownership interfere with project goals?	Somewhat common	Mid Sound is talking with the parcel owner and residents of Hillview Lane about project designs and how best to incorporate the road and parcel into the project. Mid Sound is working with Kitsap Parks as well as Public Works and Community Development staff in developing the project and long-term sustainability of the site.
Cultural Priorities		
Are the tribes involved? Are they supportive?	Somewhat common	Yes, Mid Sound has met with and will continue to involve natural resources and cultural staff from the Suquamish, Port Gamble S'Klallam, Jamestown S'Klallam, and Skokomish tribes, and the Point No Point Treaty Council. The tribes are supportive and enthusiastic about the project, and we have plans to discuss not only impacts and protection but opportunities as outlined below with tribal staff throughout the project.
Cultivation of indigenous medicinal foods as used historically on site	Specific interest group	Mid Sound will coordinate with tribal staff in our marsh restoration design for opportunities to improve food harvesting and potentially education around this topic.
Continued protection and respect for cultural values, land use, and artifacts on site.	Specific interest group	Mid Sound will coordinate with tribal staff through formal surveys and monitoring, and regular communications around cultural importance, sensitivities, and protection plans throughout the project.
Increasing signage and other acknowledgements of the Point No Point Treaty and site significance.	Specific interest group	Mid Sound will coordinate with tribal and County Park staff to explore opportunities to increase education and storytelling at the site in our project design.
Habitat and Hydrology		
Salt marsh conversion habitat changes for birds	Somewhat common	There will be changes to bird use of the marsh, but most species will be able to adapt and the salt marsh is a net habitat improvement over the non-native invasive species currently present. Mid Sound will be reviewing species usage for the site and considering impacts as part of the design process. The salt marsh

		restores the traditional habitat in the area and replaces invasive non-native plants with native habitat. In addition, the marsh flushing will increase productivity in the nearshore environment, supporting forage fish and the many wildlife species (fish, birds, marine wildlife) which depend on them.
Viability of embayment shore form: logs or sediment blocking the tidal outlet, changes to the beach.	Common	Blue Coast Engineering has modeled and will continue to analyze the coastal processes and tidal prism required to ensure adequate tidal flushing and sustainability of the embayment shore form. Beach access will not be removed. At highest tides, visitors may need to use the walkway adjacent to the marsh to cross the tidal outlets.
Salt-tolerant invasive plants could migrate via tidal influence if not removed before project.	Somewhat common	Mid Sound will survey existing plants and develop an invasive plant management strategy during future design phases.
Low flow, low energy systems will not create channel complexity very quickly, could lead to subsidence and difficulty establishing vegetation.	Somewhat common	Conceptual plan includes regrading channels for sinuosity and diverse habitat types an inundation levels. This will be explored further in future phases of design development.
The existing marsh is important to amphibian and bat populations and other wildlife.	Somewhat common	Species impacts will be assessed and minimized during the design and permitting process. Most species on site will adapt to the traditional habitat we are restoring. Freshwater habitat is less rare than coastal salt marsh and the restoration is considered beneficial to wildlife.
Will the trees/plants die?	Somewhat common	Vegetation impacts will be assessed during design and permit consultation, including invasive plant strategies, impacts to existing plants and habitat, and native plant planting plans. We will not know specifics until later in design.
How deep will the marsh be? Will there be digging as part of the project?	Once	The water depth in the marsh will vary by location and time of day, due to the tidal influence. There will be higher and lower elevation points, including hummocks above the water line, deeper channels, and points in between. There will be digging and reshaping of the marsh interior as well as building the tidal connection and barrier spit.
How will seal level rise affect the project and the neighborhood north of the road?	Somewhat common	Sea level rise and high water events are being modeled and evaluated in our design. Tidal flushing will help with marsh drainage, compared to the current situation with collapsed ditches and inconsistent tide gate functionality.

		The levee will be designed to prevent the marsh from flooding the north neighborhood. Existing drainage concerns along Point No Point Road and the drainage ditches will be studied an evaluated in our project research, including the potential for increased flooding due to climate change. Other projected area sea level rise impacts to the neighboring development are not part of the project and will likely not be addressed by the project.
Will the sandy beach change? Will the marsh become barren mudflat?	Once	While the beach will become a more dynamic area with the embayment shore form, the sandy nature will not change. The marsh will have diverse habitat, with hummocks and islands, and a variety of vegetation. At low tide, there will be exposed areas, but we expect this to be a marsh-dominated site, not a mud flat dominated site.
Will salmon really use this site if they aren't here now? Will stormwater pollution enter the marsh that will kill the fish?	Somewhat common	There is strong evidence that juvenile Chinook depend on and utilize estuaries as rest stops once they leave their natal stream. In addition, the nutrient flow from the marsh to the nearshore will support forage fish for adult salmonids to feed on in the nearshore environment. The hydraulic analysis of the project design will consider stream flows, water quality, and water temperature. Surface water will not enter the marsh without passing through filtering vegetation. This project has been evaluated and ranked as the number one priority in West Sound restoration for Chinook salmon, and will benefit other salmonids and provide native habitat for plants and wildlife. The project design includes extensive consultation and review by engineering and scientific experts, consulting agencies, and tribes.
Other Project Design Feedback and Questions		
The levee will give public views into private properties north of the park.	Once	Mid Sound will consider privacy concerns in designing the levee path.
The levee will change or reduce birdwatching visibility for homes north of Point No Point Road.	Once	The levee may move bird habitat deeper into the marsh, but will also provide more access along the levee trail for birdwatching.

The conceptual alternatives are not as good as the full conceptual design. Do it all and get the most habitat restoration possible for the effort	Common	Mid Sound hopes we can develop the full conceptual project. However, there may be funding, access, habitat or water management considerations that constrain the project footprint. Even if we end up with a smaller restoration as shown in the conceptual alternatives, we would be providing great additional salmon habitat and marsh improvements, and making important tradeoff decisions in doing so.
The boardwalk idea will be great for the project – education, access, and a safe way to see the marsh. Can we also have more trails in the marsh or the park?	Common	Mid Sound will consider the boardwalk concept further after the technical research and hydraulic modeling is complete. The boardwalk concept will consider positive and potential negative impacts to the park, habitat, and neighbors. Trails are less likely due to the nature of the habitat restoration. Mid Sound will continue to consider user improvements and impacts to the park.
The boardwalk is a terrible idea – it will attract more people to an already busy place. It will bring dogs into the marsh to scare away birds. It will increase littering and reduce the habitat value.	Common	Mid Sound will consider the boardwalk concept further after the technical research and hydraulic modeling is complete. The boardwalk concept will consider positive and potential negative impacts to the park, habitat, and neighbors and will consult widely on this option.
I love the restoration project idea. But I know others will have different feelings and impacts.	Common	Mid Sound is meeting with as many project partners, neighbors, and conservation/interest groups as possible. We are listening and developing relationships now and will incorporate this feedback into the questions we ask moving forward. We are aware of the land use stresses in the area, and are looking for ways to help as best as a habitat project can. We are also doing extensive research and engineering work to not ensure the restoration will not contribute to the flooding concerns around the park – and can hopefully help them.
Will the project flood my property?	Common	Our next stage of design is to evaluate the groundwater and surface water flows in the project area, particularly in the west end of the marsh. We know that there is standing water in the drainage canals all year and that Point No Point Road has flooding issues. We will be exploring how to not add to these problems with the project, and hopefully to also help if we can. We are exploring how to design a setback levee to address the flooding concerns by bringing tidal connection back to the marsh. The exact size, extent, and

		placement of the levee will be developed as we explore several factors in project design, and we will share design updates back to the community and partners.
What are your funding sources for the project?	Somewhat common	We are currently supported by a 2017 Salmon Recovery Funding Board grant. In summer 2021 we expect to receive an Estuary and Salmon Recovery Program grant to continue our research and modeling in the marsh. We have applied for a 2021 Salmon Recovery Funding Board grant and will be notified this fall. We have also been awarded a National Oceanic and Atmospheric Administration grant to engage recreational fishers in data collection, education, and outreach opportunities on the project. This will grant will be available around July 2021. This project has received broad support, both from input and partners, and financially. We are optimistic that our thoughtful approach, thorough research and design, and extensive partner and community engagement will help us continue to leverage that support for future phases of the project.
What is the timeline of the project? Will we not be able to access Hillview Lane/the beach/the park?	Somewhat common	We will continue in research and design through 2023. Pending funding and permitting, we could be in construction 2024 or 2025, but given the short window that we can work in the marsh to minimize wildlife impacts, and the uncertainty of funding cycles, we may not start until later than that. During construction, there will be a short window where Hillview Lane will not be accessible – we will be in communication with those residents well before that. Parts of the beach, marsh, and park will be closed to visitors for the construction window as well. Details will not be available until much further into design but will be shared widely. While the design phases are long, the actual construction is quite short, just a few months.

Appendix C. Homeowner FEMA Review Memo

Memorandum

To:	Cecilia Runkle
From:	Juliana Tadano, Mid Sound Fisheries Enhancement Group and Jessica Côté, Blue Coast Engineering
CC:	Robin Lancaster
Date:	April 21, 2021
Re:	**Hillview Lane FEMA Flood Mapping Analysis/Review**

1. Introduction

At the request of the Mid Sound Fisheries Enhancement Group (Mid Sound) and on the behalf of Kitsap County Parks, Blue Coast Engineering (Blue Coast) has completed a site characterization and developed a high-level set of conceptual alternatives for the Point No Point restoration reconnection feasibility study. The project seeks to identify a feasible conceptual design for restoring tidal influence and fish access to 32 acres of freshwater wetlands that were historically salt marsh at Point No Point at the northeastern tip of Kitsap County (Figure 1). A detailed description of the history of the site, hydrology and geomorphology, and feasibility are documented in the Point no Point Restoration Reconnection Feasibility Study Report (Blue Coast 2021).

Mid Sound and Blue Coast presented the preliminary results of the feasibility study to property owners along Hillview Lane during a virtual meeting on September 11, 2020. The purpose of the meeting was to introduce the concept of saltmarsh restoration at Point No Point and identify the constraints and concerns around Hillview Lane. The following key points were gathered during this meeting:

- Hillview Lane must be maintained as a road and there is no interest in it being removed.
- There has not been flooding across Hillview Lane in the last couple of years and there did not seem to be eminent concerns of flooding of Hillview Lane.
- Property owners were concerned about changes to Federal Emergency Management Agency (FEMA) flood zone and potential effect on insurance because of the project.
- One property owner on the west side of Hillview Lane adjacent to creek expressed concerns about drainage of their property currently being an issue (reported as very wet) and wanted to understand if project would make their property wetter.
- Private road is often used an extension of the upland trail which is undesirable; mapped as loop trail on some websites from the park through forested upland trail and then down Hillview Lane to NE Point No Point Rd.

In response to these comments and concerns, Blue Coast expanded the previous review of the FEMA FIRM (Blue Coast 2021) in relationship to the private parcels. This memorandum documents the predicted change in water levels in the marsh that upland property owners may see if tidal inundation is restored. Exact extent changes to water levels will not be known until further data analysis is conducted

and a final design is adopted which may include levees or other water control structures within the marsh to protect infrastructure and waterfront homes from flooding.

2. Tidal Datums and Coastal Flood Levels

Tides at the project site are semi-diurnal, with two high tides and two low tides each day. Water levels are provided in Table 1 relative to mean lower low water (MLLW) and the North American Vertical Datum of 1988 (NAVD88) based on the offset calculated from the Seattle tidal station #9447130 using the NOAA Vdatum online tool. A frequency of occurrence and exceedance curve is provided in Figure 2 for the available hourly water level record the Seattle station. The most frequently occurring water levels are between 7 and 9 feet MLLW. The water levels from the station record at Seattle and estimates for the project site include fluctuations due to astronomical tide, storm surge, wind and wave setup, but do not include wave runup. Wave runup would not impact upland properties identified as wave energy during high water events would be dissipated across the shallow areas of the marsh. Figure 3 indicates the extent of Mean Higher High Water (MHHW), which is the average of the higher high water height of each tidal day. This would be the typical extent of daily coastal water inundation that would be expected if the tide gate was removed and no additional flood control structures such as a dike or levee were installed as part of the project.

Figure 4 shows the predicted 2-year water level at the site, with tide gate removed and no use of additional flood control structures and based solely on existing topography. This water level is predicted to occur every 2 years based on statistics but may occur more or less frequently and shows that in both of these cases (MHHW and 2-year water level), salt water would inundate the marsh up to the edge of the current fresh water marsh (11 ft NAVD88), but the water levels would be well below the northern most homes on Hillview Lane (16 ft NAVD88).

2.1 FEMA Flood Maps

The Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) have prepared Flood Insurance Rate Maps (FIRM) (2017a) and a Kitsap County Flood Insurance Study (FIS) (2017b) that provide flood elevation return intervals for the eastern Kitsap Peninsula. The Base Flood Elevation (BFE) (subject to inundation by the 1% annual chance flood) along Point No Point is mapped as elevation 13 feet NAVD88 (14.8 feet MLLW), presented on the FIRM. If a property falls within the BFE then they are required to pay into NFIP. None of the structures on the properties along Hillview Lane currently fall within the FEMA BFE.

The coastal BFE is calculated as the total still water elevation for a 1% annual chance flood plus the additional flood hazard from overland wave effects (storm-induced erosion, wave runup, and overtopping). FEMA flood levels at the project site are shown in Figure 5. The predicted flooding for the FEMA BFE extends significantly further inland than the predicted extent of the 2-year or 100-year return period water level if the tide gate was removed and salt water inundation was restored at the site.

The BFE elevation is approximately 1.5 ft higher than the 100-year extreme water levels calculated based on the Seattle tide gage because it also includes wave run-up. However, it is important to note that FEMA FIRM maps are developed based on the average elevation of the land over a fairly large area and can over predict the actual flooding that can occur at a site. In this case, there are some areas of land on the north side of Point No Point Road which are higher than the FIRM BFE and would prevent

some of the predicted FEMA flooding. In addition, wave run-up would not penetrate into the marsh as far as Hillview Lane. While the BFE is important for understanding NFIP requirements, it is not the most accurate elevation for design of restoration and understanding the future salt water intrusion at the site.

2.2 Sea Level Rise

The historical mean sea level trend based on a NOAA-NOS analysis of the Seattle station is an increase in mean sea level of 2.06 millimeters per year (0.08 inches/year) with a 95% confidence interval of 0.03 inches/year. This is equivalent to an increase in water level of 0.7 feet (8 inches) over the last 100 years. Long-term mean sea level in Puget Sound is predicted to increase versus historical rates of sea level rise (SLR) because of climate change related impacts. Miller et al. (2018) provides projections of local SLR at coastal locations in Puget Sound and Washington for various planning horizons. The projections incorporate the latest assessments of global sea level rise due to different greenhouse gas scenarios and local estimates of vertical land motion. Table 2 provides projections for year 2050, 2070, and 2100 planning horizons for the coastal location nearest Point No Point. These estimates will be incorporated into design water levels during the design phase of the project resulting in design water levels which are higher than current water levels to account for the predicted sea level rise. Under the most extreme sea level rise scenario and in almost 80 years (2100), water levels after restoration in the marsh might reach the edge of the upland parcels at 15 feet NAVD88, but will not reach the homes (16 feet NAVD88).

3. Surface and Ground Water

In addition to coastal water that would be allowed to exchange with the Point No Point wetland complex more freely as part of this project, surface and ground water in the area will also be evaluated in more detail as part of the design process. Currently, flooding is an issue along Hillview Lane and NE Point No Point Rd. Design development for this project include identifying the drivers of this flooding and identify options for addressing that while improving habitat and restoring tidal inundation. Limited data on surface and ground water have been collected by other consultants and additional data collection during futures phases of the project is planned to fill this data gap. Blue Coast is proposing to install piezometers to measure groundwater levels and may also propose to collect water level data on the freshwater stream flowing into the marsh from the west side of Hillview Lane (Figure 6). This information will be coupled with elevation and coastal water level data to model different design alternatives in many different coastal water level and surface water level events to select the best design alternative to minimize increases in or provide reduction (if possible) to existing surface and ground water issues.

4. Discussion and Summary

The homes along Hillview Lane are not currently required to pay flood insurance to NFIP and therefore the restoration project concept was evaluated to determine if this designation might change as a result of the project.

The FEMA FIRM (flood map) shows a coastal flooding scenario where saltwater can flood the entire Point No Point marsh up to an elevation of 13 ft NAVD88. This elevation is approximately 1.5 ft higher than the extreme water levels calculated based on the Seattle tide gage because it also includes wave run-up. FEMA flood maps are developed based on very coarse data and topography. This FEMA FIRM does not recognize on the slightly higher land on the north side of NE Point No Point Rd (14 to 15 ft NAVD88) prohibiting some of the potential coastal flooding getting into the marsh. NAVD88. the proposed project would provide a path for saltwater to flood the Point No Point Marsh, but to a lesser

extent than the FEMA flood maps show. As shown in the referenced figures, all estimates of flooding and sea level rise do not exceed the capacity of the marsh, thus the proposed project would not change the FEMA flood zone mapping for any property along Hillview Lane.

Closure

This document has been prepared by Blue Coast Engineering LLC. in accordance with generally accepted engineering practices and is intended for the exclusive use and benefit of Mid-Sound Fisheries Enhancement Group and their authorized representatives for specific application to Point No Point Restoration Feasibility Project in Hansville, Washington. The contents of this document are not to be relied upon or used, in whole or in part, by or for the benefit of others without specific written authorization from Blue Coast Engineering LLC. No other warranty, expressed or implied, is made. Blue Coast Engineering LLC. and its officers, directors, employees, and agents assume no responsibility for the reliance upon this document or any of its contents by any parties other than Mid-Sound Fisheries Enhancement Group.

References

Blue Coast Engineering. 2021. Point no Point Restoration Reconnection Feasibility Study: Site Characterization and Conceptual Alternatives Report.

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM). 2017a. Kitsap County, Washington and Incorporated Areas, Panel 50 of 525, Map Number 53035C0050F, Effective Date February 3, 2017.

Federal Emergency Management Agency (FEMA), Flood Insurance Study (FIS). 2017b. Kitsap County, Washington and Incorporated Areas, Washington, D.C., February 3.

Miller, I.M., Morgan, H., Mauger, G., Newton, T., Weldon, R., Schmidt, D., Welch, M., Grossman, E. 2018. Projected Sea Level Rise for Washington State – A 2018 Assessment. A collaboration of Washington Sea Grant, University of Washington Climate Impacts Group, Oregon State University, University of Washington, and US Geological Survey. Prepared for the Washington Coastal Resilience Project. *updated 07/2019*

Table 1. Summary of water level elevations at the NOAA-NOS Seattle, WA tide station (#9447130) and at Point No Point.

	Seattle, WA (station #9447130)		Point No Point[1]	
	Elevation (feet MLLW)	Elevation (feet NAVD88)	Elevation (feet MLLW)	Elevation (feet NAVD88)
Highest Observed Water Level (Date: 10 Dec 1993)	14.5	12.1	N/A	N/A
Mean Higher High Water (MHHW)	11.4	9.0	10.5	8.7
Mean High Water (MHW)	10.5	8.2	9.6	7.8
Mean Tide Level (MTL)	6.7	4.3	6.2	4.4
Mean Sea Level (MSL)	6.6	4.3	6.1	4.3
Mean Low Water (MLW)	2.8	0.5	2.8	1
Mean Lower Low Water (MLLW)	0.0	-2.3	0	-1.8
Lowest Observed Water Level (Date 12 Dec 1985)	-5.0	-7.4	N/A	N/A
Extreme water level elevations				
100-year water level (1% AEP)	14.7	12.4	13.4	11.6
10-year water level (10% AEP)	14.3	12.0	13.1	11.3
2-year water level (50% AEP)	13.8	11.5	12.6	10.8
1-year water level (99% AEP)	13.0	10.7	11.9	10.1
FEMA BFE	N/A	N/A	14.8	13.0

Notes: AEP = annual exceedance probability; N/A = not available

[1] Datums for project site are calculated based on NOAA Vdatum online tool; extreme water levels at Point No Point are an approximation based on an extrapolation of the Seattle values.

Table 2. Projected average sea level rise for different time periods and greenhouse gas scenarios for the coastal area near Point No Point.

Year	Greenhouse Gas Scenario	Sea level rise magnitude (feet) Central estimate (50% probability exceedance)
2050	Low (RCP 4.5)	0.8
2050	High (RCP 8.5)	0.8
2070	Low (RCP 4.5)	1.2
2070	High (RCP 8.5)	1.4
2100	Low (RCP 4.5)	1.9
2100	High (RCP 8.5)	2.4

Figure 1. Site overview map

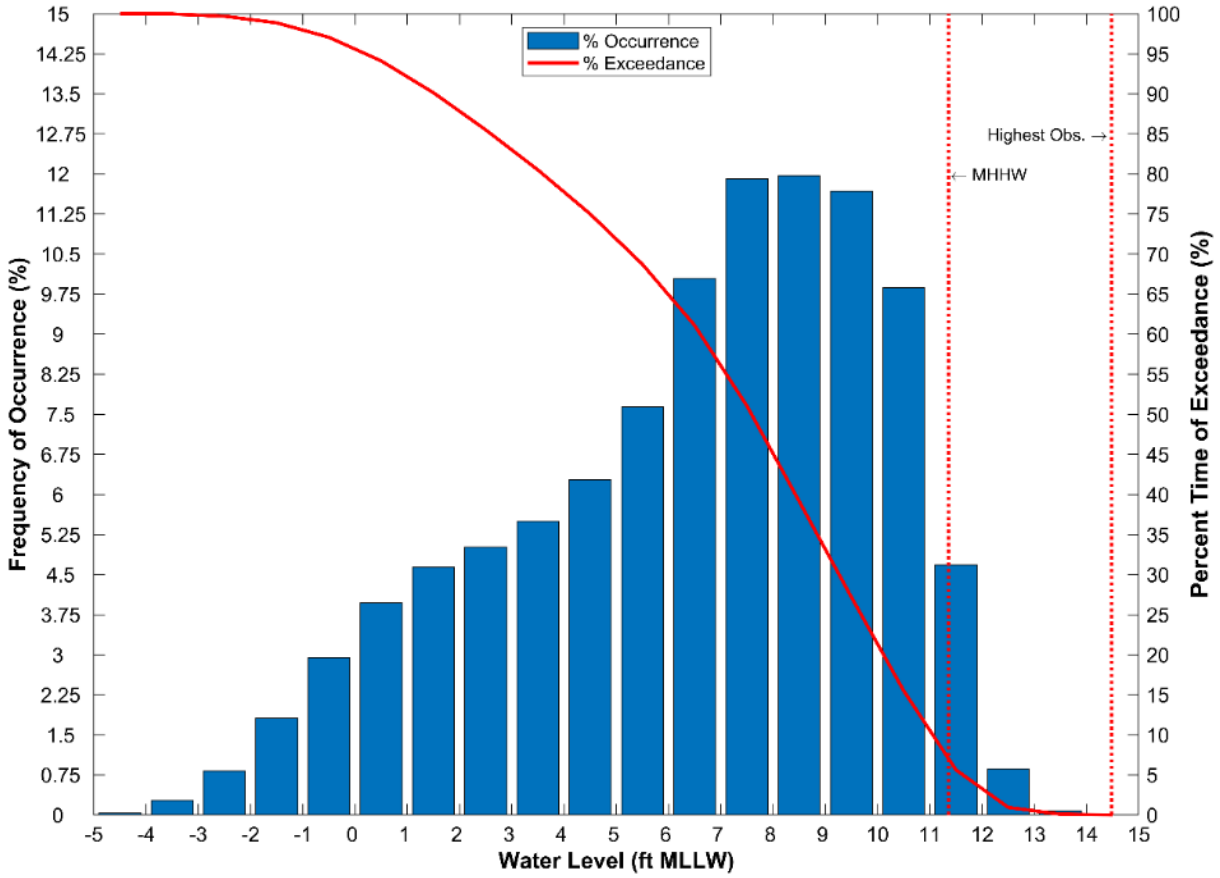


Figure 2. Frequency of occurrence and exceedance for hourly water levels measured at the Seattle (#9447130) tide station from 1899 to 2019. Mean Higher High Water (MHHW) and the highest observed water level on record are shown by red dashed lines.

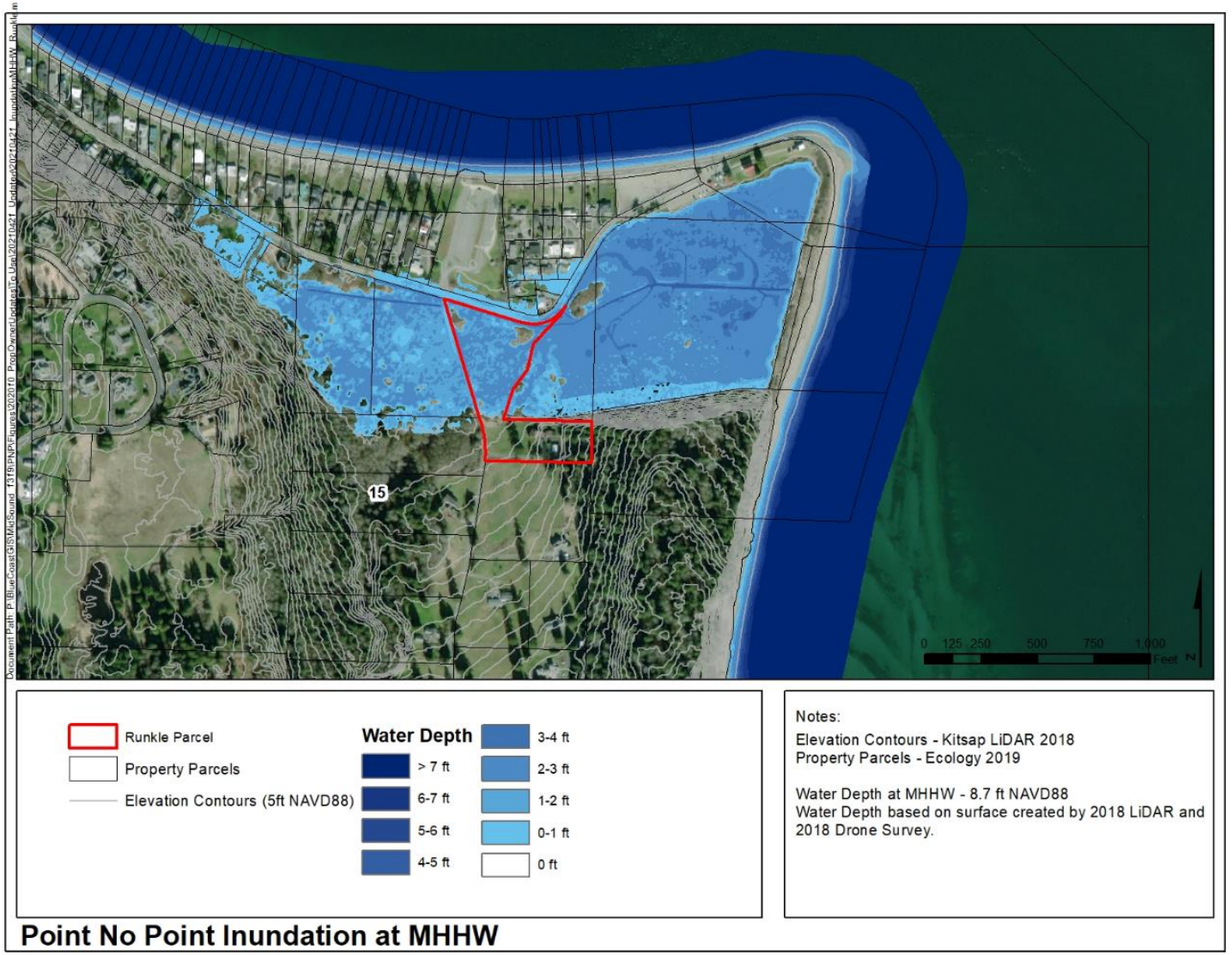


Figure 3. Inundation of the site at Mean Higher High Water based on topography with tide gate removed and no additional flood control structures.

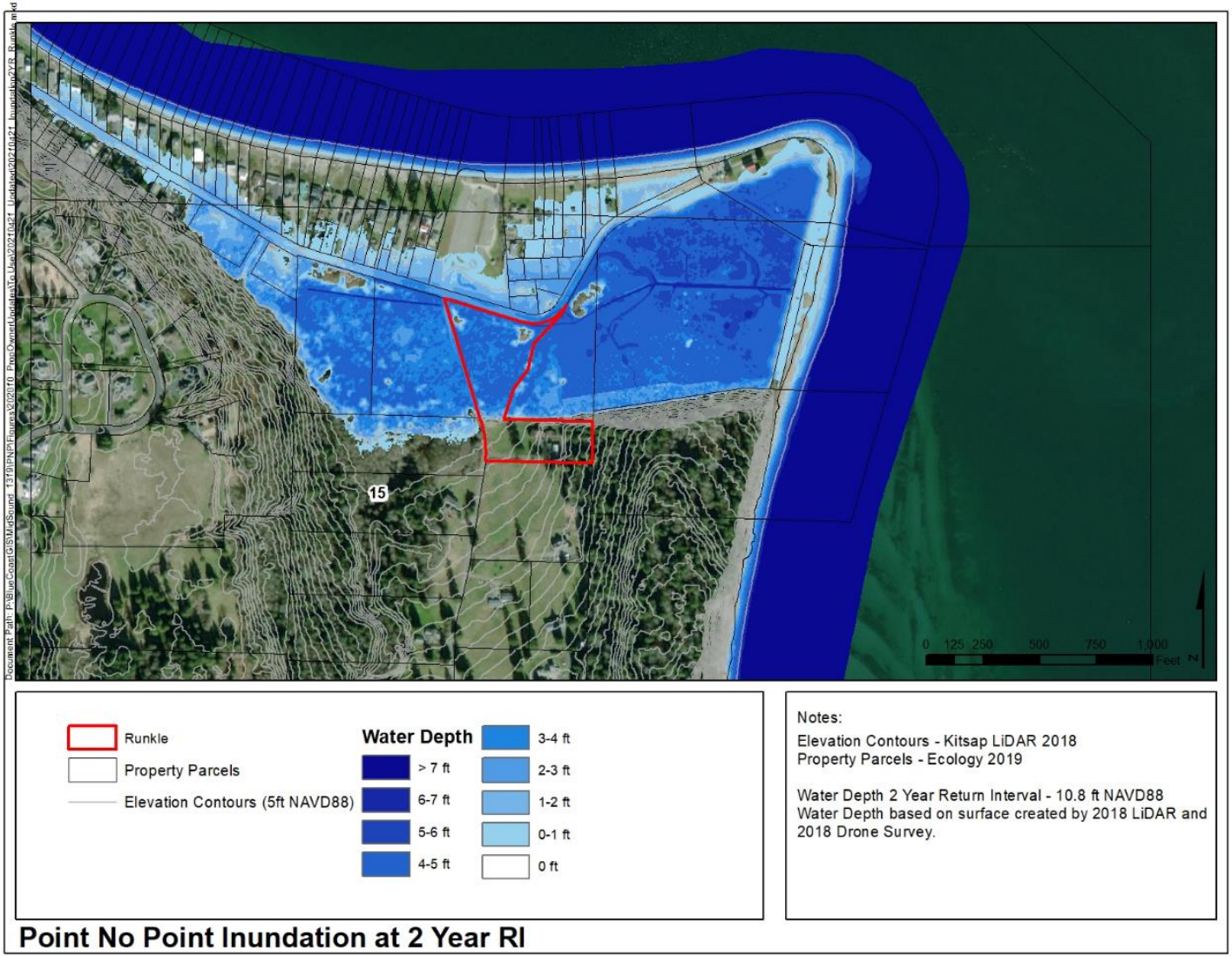


Figure 4. Inundation of the site at a two return interval based on topography with tide gate removed and no additional water control structures.

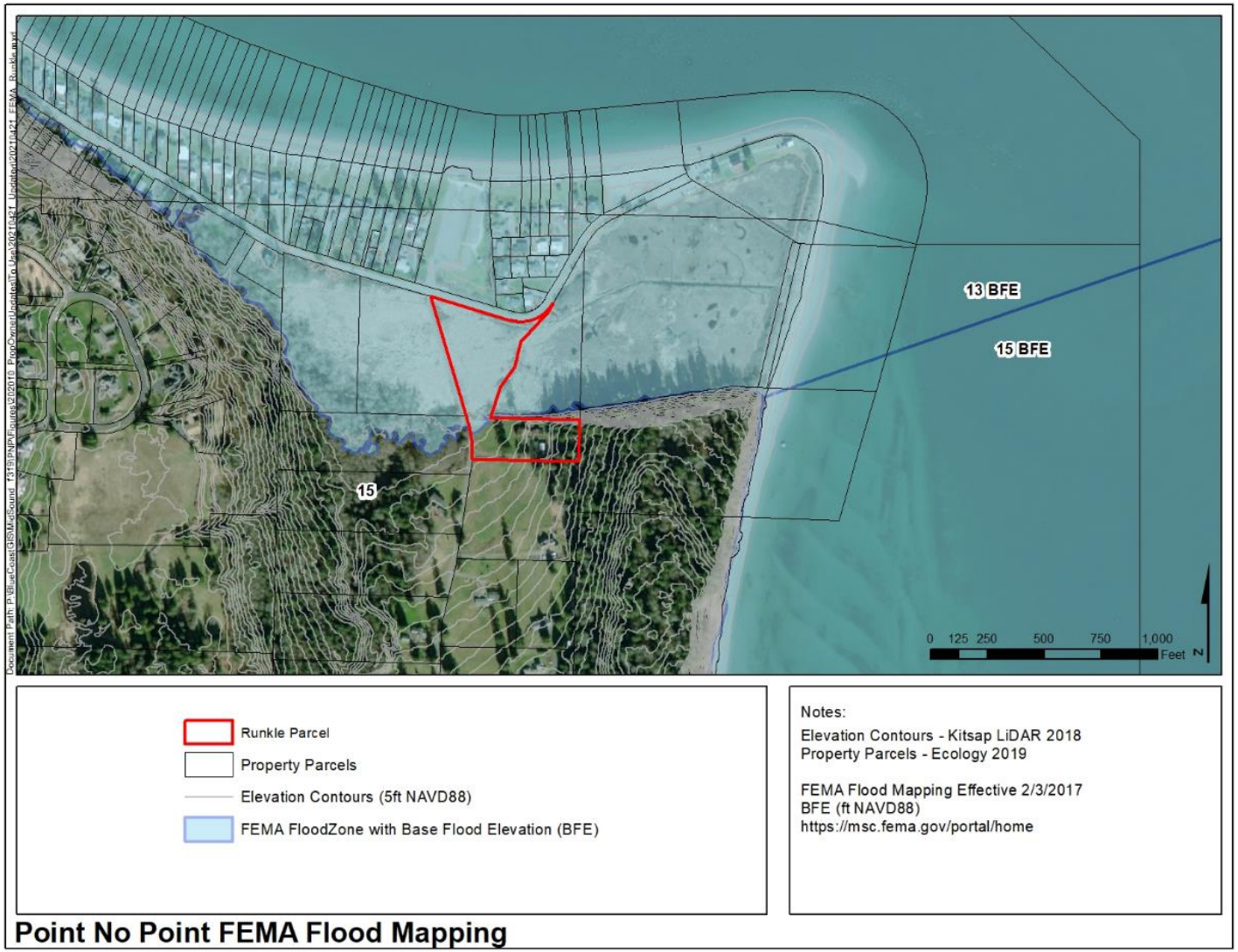


Figure 5. Mapped FEMA flood zone including coastal Base Flood Elevation (BFE) at the project site.

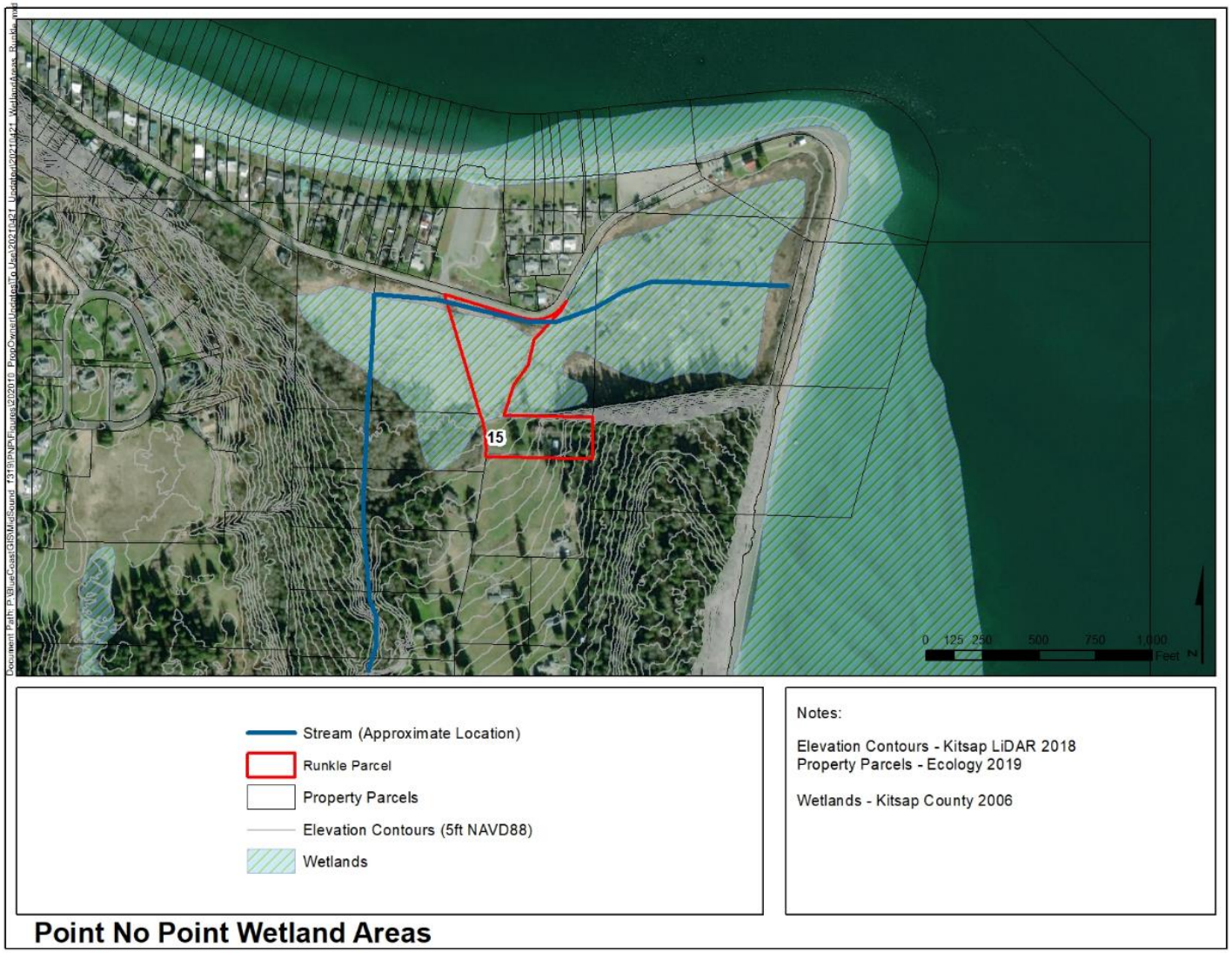


Figure 6. Approximate location of existing coastal wetlands, freshwater wetlands, and streams in the project area.

Appendix D. Point No Point Title Review Summary Report

Due to the sensitive nature of the Point No Point estuary restoration project, Mid Sound Fisheries Enhancement Group wrote into the project that we would conduct an early title review to identify parcel ownership and parties we would need to engage on the project. This document summarizes those efforts and results.

Blue Coast Engineering researched the parcel ownership for the Park itself and adjacent properties, as well as public right of way and easements in the project area. The Kitsap County GIS database (Kitsap County 2020) was used to identify parcel boundaries and ownership of properties adjacent to the project site.

The results of their search are outlined in the attached map (Figure 1) and in the Point No Point Restoration Reconnection Feasibility Study Site Characterization and Conceptual Alternatives Report (Blue Coast Engineering 2021) available on PRISM.

Findings of that report as summarized below.

- The majority of parcels within the project affected area are owned by Kitsap County Parks and maintained by Kitsap County Parks and/or Public Works.
- There is one parcel privately owned within the project area. Cecilia Runkle owns the property at 38104 Hillview Lane (APN# 222802-2-037-2009), which includes her homestead uphill of the project area and a wedge-shaped portion within the marsh, adjacent to Hillview Lane.
- Hillview Lane is a private road with an easement extending north-south through the marsh from Point No Point Road NE. Kitsap County Parks has an easement on the west side of this gravel road, presumably for maintenance access for the marsh. Cecilia Runkle's parcel includes the east side of the road through the marsh.
- There is a small linear parcel on the east shore of the park which is labeled as privately owned and holds an easement registered to Bonnie Lou and Leota Gamble, who are presumed deceased based on records review. The County records do not record any deeds or easements from 1987 forward. Mid Sound will work with the County to continue to research descendants of the Gambles in the next phase of design.
- The lighthouse site is currently owned by the U.S. Coast Guard and leased to Kitsap County, who then subleases the buildings to the U.S. Lighthouse Society. There is a process underway to transfer ownership fully to the Kitsap County which is expected to be complete by the end of 2021. Mid Sound is in touch with both the County and the Coast Guard during this process.

Mid Sound is in regular communication with Kitsap County Parks as the landowner and Public Works staff as well, as they manage the roads and drainage ditches adjacent to the park and the tide gate which outlets from the marsh.

Mid Sound and Blue Coast Engineering are in touch with Cecilia Runkle, the owner of the single private parcel extending into the project area. There is not a homeowner's association for management of Hillview Lane but Mid Sound is in touch with the homeowner who coordinates the funding for its upkeep.

Mid Sound is also conducting outreach to landowners adjacent to the park, including Hillview Lane and Point No Point Road NE. Blue Coast Engineering prepared a FEMA analysis for this neighborhood which demonstrates that the proposed project will not require changes to the current FEMA FIRM for the area. This report is included in the Feasibility report referenced above as an appendix.

Figure 1. Point No Point Parcel Map, prepared by Blue Coast Engineering (not to scale).

Appendix E. Point No Point Conceptual Alternatives Analysis

INTRODUCTION

This report focuses on alternatives analysis from technical, cost, partner input, and community feedback perspectives. As such only summary descriptions are provided here for each alternative. The full process for feasibility and alternatives development is described in Appendix B.

The project landowner, Kitsap County, required preliminary technical studies prior to conceptual design development and landowner/community outreach. The project also called for extensive early outreach due to historic land use conflicts in the area. Due to limited funding and the need to engage deeply with our project partners and community members early on, Mid Sound developed the conceptual plans around scope-level alternatives and potential constraints identification rather than design-detail alternatives. This approach allowed us to gather input from a number of partners, community groups, and neighbors to inform our planning for appropriate data collection and analysis when more funding becomes available. We have found that this early engagement has supported and clarified the project development and will inform the next stages of design and planning around potential project constraints and opportunities.

Input was collected through a series of one-on-one meetings, partner meetings (County departments, agencies, tribes), conservation and interest group meetings, and neighbor/community outreach meetings. In addition, a project survey that included questions about the alternatives was made available to neighbors and the nearby community. Due to COVID-19 and related quarantine restrictions, we did not host site visits or in-person meetings. All feedback is summarized here and in Appendix B.

CONCEPTUAL ALTERNATIVES

MTR Alternative

Blue Coast Engineering did not develop a conceptual design alternative for replacing the tide gate with an MTR as recommended in the Skillings Connolly 2019a report. An MTR would not provide adequate access to the site or habitat restoration opportunity to benefit juvenile Chinook salmon. Improving nearshore habitat conditions for juvenile Chinook salmon is one of the primary goals of restoration at Point No Point, therefore this alternative was not developed further.

Primary Conceptual Design

This conceptual design shows the largest area of restoration of tidal inundation and salt marsh habitat, including the private parcel within the lower marsh (east of Hillview Lane) and the upper marsh to the west of Hillview Lane (owned by Kitsap County Parks). Flooding of Point No Point Road and Hillview Lane would be fully addressed under this scenario. 33 acres restored.

Pros:

- Largest footprint and most area for diversity of habitat types restored.
- Most opportunity to restore hydraulic connectivity and function in marsh, supporting unrestricted passage into and out of the marsh for juvenile Chinook salmon and coastal cutthroat trout.
- Pedestrian pathway on levee could reduce safety concerns for park access.

Cons:

- Highest expense.
- Design considerations for Hillview Lane and Point No Point Road and associated drainage required.
- Impacts to properties and infrastructure must be mitigated.
- Support by private parcel owner required (this is not anticipated to be a roadblock).

Cost: Estimated construction costs at $4 million, pending further design refinement and scoping.

Conceptual Alternative A

This conceptual design includes a smaller restoration area across the private parcel in the lower marsh and up to the east side of Hillview Lane, and would prevent exchange of saltwater into the upper marsh west of Hillview Lane. This option would be used if there could not be agreement on restoration of upper marsh to salt marsh or if there was desire to maintain additional freshwater wetlands at the site for habitat reasons. Flooding of Point No Point Road and Hillview Lane would be reduced under this scenario, but not fully addressed. The levee length would not support as much pedestrian access. Approximately 22 acres restored.

Pros

- Hillview Lane and Point No Point Road considerations reduced.
- Smaller footprint could reduce costs (although additional setback levee and tide gates at the western edge of the salt marsh must be factored into cost).
- Opportunity to retain freshwater marsh habitat if this is a wildlife priority.
- Could provide a model for phased construction.

Cons

- Reduced habitat restoration acreage.
- Cost of tide gates and setback levee, hydraulic disconnection of stream to Sound.
- Eliminates habitat connectivity between fresh and salt marsh areas for cutthroat and juvenile Chinook salmon.
- Reduces pedestrian access improvements to the park.

Cost: Estimated construction costs at $3 million, pending further design refinement and scoping.

Conceptual Alternative B

This conceptual design only restores salt marsh habitat up to the private parcel property line in the freshwater marsh, preventing the exchange of saltwater into the private parcel or the marsh east of Hillview Lane. This design reduces inundation of the lower marsh adjacent to the bend in Point No Point Rd where most of the flooding is concentrated. This option eliminates the need for any work to be conducted on privately owned property or Hillview Lane. Alternative C would not reduce flooding of Point No Point Road or Hillview Lane or provide pedestrian pathways from the western parking areas. Approximately 18 acres restored.

Pros

- Hillview Lane and Point No Point Road considerations reduced.
- Private parcel engagement not required (unless freshwater marsh restoration was in scope).
- Smaller footprint could reduce costs (although additional setback levee and tide gates at the western edge of the salt marsh must be factored into cost).
- Opportunity to retain freshwater marsh habitat if this is a wildlife priority.
- Could provide a model for phased construction.

Cons

- Further reduced habitat restoration acreage.
- Cost of tide gates and setback levee, hydraulic disconnection of stream to Sound.
- Eliminates habitat connectivity between fresh and salt marsh areas for cutthroat and juvenile Chinook salmon.
- Reduces pedestrian access improvements to the park.

Cost: Estimated construction costs at $2.5 million, pending further design refinement and scoping.

Alternatives Analysis

Technical tradeoffs across conceptual alternatives are noted above in the descriptions of each design, and summarized in the table below.

Comparison of restoration conceptual alternatives

Concept	Upper Marsh Conversion to Salt Marsh	Lower Marsh Conversion to Salt Marsh	Perennial Stream connected to Lower Marsh	Changes to Hillview Lane	Point No Point Road Levee Requirements	Rough Construction Cost
Alternative A	Nearly 100%	100%	Through one to two Culverts	Raise road and new culverts	Full extent of restored marsh (upper and lower)	$4M
Alternative B	0%	Approximately 85%	No connection	Potentially raise road and tide gate	Adjacent to lower marsh only	$3M
Alternative C	0%	Approximately 65%	No connection	None	Adjacent to section of lower marsh only	$2.5M

Conversations with partners emphasized maximizing the habitat as much as possible as shown in the primary concept. All partners acknowledged that concessions may need to be made similar to the other alternatives based on future data collection and analysis. We will continue to explore other project tradeoffs such as road and parking changes with partners once we have confirmed the hydrology and project footprint in the west marsh area.

Conversations with landowners centered on concerns specific to each neighborhood. With a few exceptions, landowners supported the restoration project goals and agreed that the primary concept provided the most benefit for the effort and should be pursued. A few homeowners in the north neighborhood felt any improvements at all would further existing stressors by attracting more public use of the park – but in their case they felt any project would result in these problems and did not feel one alternative would be more effective than another for these issues. They also did say they opposed the project based on their frustrations and concerns, but rather emphasized that they wanted to know that the project design would address their concerns and that we would work with the County to look at their concerns. These are outlined more fully in Appendix B.

Lastly, we had two survey results that indicated they preferred the small project footprints and more strongly preferred no project at all. However, these responses came from landowners who did not participate in outreach meetings and had misunderstood the project design. Mid Sound will reach out to these owners to more completely share the project goals and perspectives (these survey results arrived just recently) and listen to their concerns.

Recommendation

Based on technical review and outreach, Mid Sound is confident that the project should continue and that we have grounds to continue pursuing design development for the primary concept shown above, with the largest restoration footprint.

We know that we will need to work with the State Historic Preservation Office, the U.S. Coast Guard, and Kitsap County Parks to determine the exact footprint of marsh restoration in the northeast corner of the design, pending historic landmark status there.

We will need more data on the marsh hydraulics, potential for impacts to Point No Point Road and properties north of the road, and better understanding of the causes of existing flooding along the road to prepare more complete designs around the levee and restoration footprint.

Our next phase of design is focused on these questions and we will continue partner and community outreach as we incorporate our findings and develop the design further. It is still possible that the above data gaps may drive a smaller, modified footprint as demonstrated in Alternatives A and B, but we recommend continuing to develop our primary concept until we have more data indicating what, if any, constraints we cannot address with our design.