Limited Assessment of Shoreline Erosion and Industrial Contamination at GAC Chemical Corporation

34 Kidder Point Road
Searsport, ME

August 1, 2025

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Attachments

Executive Summary

The Home Place Team was engaged to conduct a limited assessment of coastal resource conditions along the coastline of GAC Chemical Corporation's (GAC) shore, bluff, and intertidal land located at 34 Kidder Point, Searsport, Maine (the "site"). This site has hosted industrial chemical manufacturing facilities for the last century, and there is a documented history of releases of hazardous materials and permit compliance issues since at least the 1960s. Significant coastal erosion is evident on the GAC shoreline, despite attempts to stabilize using traditional shoreline engineering methods (i.e., installing riprap). Coastal erosion here is resulting in not only loss of bluff, but in exposing the Bay and its sediment to industrial waste within these bluffs. These issues will continue to be exacerbated by rising sea levels and storm events, with Maine and its coast already experiencing an increase in hazards and challenges associated with climate change.

This assessment's purpose was to examine the existing natural and man-made features, impacts of current and historic infrastructure and industrial waste in and adjacent to coastal resources, and to provide recommendations for further assessment and remediation. The intent of this report is to provide the Maine Department of Environmental Protection (DEP), and its Commissioner with information to take action to address existing issues at the site, and prevent further contamination of the intertidal land, Bay and its sediment while building resiliency against climate impacts. Recommendations include the potential use of Nature-based Solutions (NbS) to address erosion and contamination issues.

During site assessments conducted in April and June 2025, there was visual evidence of significant erosion, ineffective riprap, and industrial debris present, and sampling demonstrated ongoing releases of industrial contamination into Penobscot Bay and intertidal sediment from highly acidic fill containing sulfur and aluminum, and building materials containing lead, asbestos, and PCBs.

The shoreland zone of this property is in need of comprehensive assessment to determine the full extent of contamination. Once there has been a thorough assessment to provide a complete understanding of site conditions, a remediation plan should be developed. Our hope is that the remediation plan will acknowledge that this is not simply an unstable bluff, it is an unstable bluff that is composed of contaminated material that is threatened by climate change. We encourage the incorporation of Nature-based Solutions to prevent further erosion, additional release of harmful contaminants, build resiliency in the face of climate impacts and restore the area to a stable, native vegetated state.

Purpose, Scope of Work and Limitations

The Home Place Team was engaged to conduct a limited assessment of coastal resource conditions along the coastline of GAC's shore, bluff, and intertidal land located at 34 Kidder Point, Searsport, Maine. This assessment's purpose was to examine the existing natural and man-made features, impacts of current and historic infrastructure and industrial waste in and adjacent to the freshwater and coastal resources, and provide recommendations for further assessment and remediation. This project was funded by Ron Huber, Belfast resident and longtime advocate for Penobscot Bay.

The assessment area extends from the Sears Island causeway to the Stockton Springs/Searsport line. The Home Place Team examined the feasibility of nature-based restoration and stabilization solutions to the eroding Highest Astronomical Tide (HAT) Line proximal to industrial waste/historic bluff shoreline/ railroad-rail yard. Our investigations and sampling efforts were fairly limited in scope given that access to the site was restricted to the intertidal land below the HAT line. The intent of this report is to provide DEP and its Commissioner with information to take action to address existing issues at the site, and offer potential NbS to address the continued contamination of the beach, Bay and its sediment, and build resiliency in the face of climate impacts.

The assessment included two site visits to the shoreline/intertidal property during April and May 2025 to document existing conditions, capture aerial video and photographic drone footage, and collect water, building materials, and soil/sediment samples. This assessment also included a review of historical operations at the site, permit compliance history, and state and federal agency actions taken against the site owner and operator, as well as historical site occupants. Based on our understanding of the site, we have identified ongoing erosion and pollution issues, and have proposed NbS restoration and stabilization designs to mitigate impacts of sea level rise and storm events for consideration.

This assessment was not done in coordination with GAC or state agencies, therefore access to the site was limited to the shoreline/intertidal land below the HAT line. Despite the limited access and sampling conducted, it is clear that there are significant erosion and pollution issues that merit much broader investigations. While we recognize the intertidal land is owned by GAC and our investigations could be characterized as trespassing given the use of intertidal land only extends for "fishing, fowling, and navigation" purposes, the site owner and operator has long been unlawfully discharging into waters of the United States and there has been regulatory failure in addressing issues at the site in more than a "piecemeal" way. It is our hope that this assessment and report will provide information that the State of Maine will use to engage in a comprehensive site assessment and plan for remediation to permanently protect the waters, fisheries, and sediment of Stockton Harbor and Penobscot Bay from ongoing pollution from this site that will only be exacerbated by climate impacts.

Qualifications

The Home Place Team involved in this assessment included Paul Bernacki, Ruby Treyball, and Jillian Howell.

Paul Bernacki is coordinator for the Home Place Team, and leads a team of Living Shoreline Stabilization Specialists in private practice for Maine coastal stabilization projects from Harpswell through Mount Desert Island. Paul has led assessments, designs, licensing documentation, and project development for all aspects of Living Shoreline Stabilizations and Ecological Restorations of Freshwater and Coastal wetlands in Maine for two decades.

Ruby Treyball has worked in landscape management for 15 years. She has owned Natural Rhythms Landscaping for seven years and has been a project manager for The Home Place Team for three years.

She has experience in developing assessments, permits, native plant designs, and leading installation of planting projects for living shoreline stabilization sites.

Jillian Howell has Masters of Environmental Management and more than a decade of experience in the environmental sector, both in environmental consulting and environmental non-profit advocacy. Her experience includes Phase I environmental site assessments, and developing and conducting a broad range of environmental sampling programs including water, soil, and building materials. Jillian has been a part of the Home Place Team since April 2025.

Resumes are included in Attachment G.

Coastal Impacts of Climate Change in Maine

The state of Maine is experiencing an increase in challenges associated with climate change. Coastal communities and ecosystems are facing accelerated sea level rise, increasing water temperatures, and escalating storm intensity. In response, the state of Maine has addressed the impacts of climate change on the coastline through education, monitoring, and regulatory reform.

"A large majority of Maine's coast, approximately 40%, is made up of unconsolidated, erodible bluffs. (MGS, n.d.)," making it an important area to focus efforts. Sea levels have "climbed almost eight inches from a century ago and are accelerating, now twice as fast… with sea level rise driving the January 2024 storms to break records (Maine Climate Counsel, 2024)." The storms of January 9–13, 2024, were significant in intensity, scale of flooding and damage, and highlighted the impact climate change is already having on Mainers. There has been a 50% increase, largely related to shoreline stabilization, in permit applications submitted to the Department of Environmental Protection since these storms (MDEP, 2024).

The Maine Climate Council states that "these events have demonstrated the urgent need to help Maine communities prepare for and recover from climate-change impacts (2024)." In response, the Maine Board of Environmental Protection (BEP) enacted legislative changes to Chapters 305 and 310 to support the advancement of nature-based shoreline stabilization solutions. These changes aim to:

> encourage the use of vegetation and biodegradable materials in shoreline stabilization; place appropriate limits on hardened structures such as riprap and seawalls to ensure project impacts are reasonable; and simplify and accelerate the permitting process for applicants and the Department. (MDEP, 2024)

Programs across the state, such as *Maine Won't Wait,* are increasingly advocating for evidence-based solutions and proactive development planning to better prepare for climate change. This plan not only acknowledges the challenges Mainers have overcome and are currently facing, but also provides communities with the resources they need to confront climate change with solutions tailored to their unique circumstances and needs (Maine Climate Counsel, 2024). DEP and the University of Maine are collaborating to create the *OUR SHORE* guidebook, which offers tools for assessment, design, and implementation of NbS for municipalities, industries, contractors, and homeowners seeking sustainable shoreline stabilization.

Maine's coastal communities are on the frontlines of navigating the impacts of climate change. Our hope is that the coordinated efforts to protect the state's coastal resources will be integrated and applied to addressing coastal erosion and ongoing pollution concerns at GAC Chemical Corporation in Searsport.

Site Background and History

The site investigated is located at 34 Kidder Point Road, Searsport, Maine, a 152 acre parcel (44.46478° N, 68.88077° W). The field investigations were specifically focused on the shoreline, bluff, and intertidal land between the Sears Island causeway, and former Kidder Point Outfall building.

Prior to 1900, Kidder Point was utilized as farmland; the glacial till soils were well drained, mildly sloping and were suitable for crops and pasture. In 1906, a passenger terminal and steamship dock were constructed at Kidder Point. In the early 1900s, a railroad was built along the shore from up river to Mack Point in Searsport, that transported passengers and freight, mainly potatoes and lumber, to and from ports at Kidder Point, Mack Point and a wharf on the Stockton side of the harbor. In the 1910s, cargo ships transported phosphates from Boca Grande, Florida to Searsport for superphosphate fertiliser production. Following the shuttering of the freight terminal and passenger service to Kidder Point in the 1920s, the site was developed and utilized for industrial manufacturing of chemicals and fertilizers, including to bolster chemical production for the World War II war effort. Post-war, Kidder Point continued producing fertilizer and chemicals utilized by paper mills. A history of operations is outlined is below (EPA/Superfunds Records Center):

- 1920: Summers Fertilizer Company is incorporated; the company developed the site into the 1930s with the original plant facilities as an agricultural fertilizer manufacturing plant.
- 1943: Northern Chemical, Inc. (NCI), a division of Summers Fertilizer, assumed operation of the site and expanded the manufacturing operation to include production of super-phosphates, sulfuric acid, alum, and ammonium sulfate.
- 1953: An aluminum sulfate process is added.
- 1955: An additional section was constructed for the manufacture of ammonia and related products in a joint venture of NCI and Chemetron Corp.
- 1956: An ammonia plant, an ammonia nitrate plant, and a nitric acid plant were constructed at the site.
- 1966: W.R. Grace & Company leases the manufacturing facility. Ammonia production was discontinued this same year.
- 1970: W.R. Grace discontinued the production of superphosphates, ammonium nitrate, and nitric acid. Delta Chemicals, Inc. succeeded W.R. Grace & Company in 1970.
- 1993: Delta Chemicals, Inc. manufactures and sells aluminum sulfate (liquid alum), ammonium sulfate, sodium aluminate, and polyacrylamide based water soluble polymers. Delta also receives in bulk and resells sulfuric acid.
- 1994: General Alum purchases the assets of Delta Chemical, Inc. of Searsport, Maine.

The current owner and occupant of the site is GAC Chemical Corporation. GAC manufactures and distributes industrial, specialty, and fine inorganic and organic chemicals, including ammonium sulfate, liquid alum, sodium aluminate, aqua ammonia, liquid urea, polyvinyl alcohol, and hollow sphere plastic pigment and coatings. The chemicals are sold to the pulp and paper industries, power plants, agriculture industry, municipal water and wastewater facilities, and other industrial entities.

The site is of significance in its location; the property is bounded on the southwest and southeast by Stockton Harbor/Penobscot Bay, and Stockton Harbor is bounded to the west by the Sears Island Causeway. Penobscot Bay and Stockton Harbor are home to a diverse array of marine life and coastal habitat. The Sears Island Causeway has significantly restricted water flow, reducing currents to primarily tidal influence within the semi-enclosed embayment west of Sears Island.

Regulatory and Compliance History

Industrial operations at the site have a long history of spills and violating permit conditions. This includes both the current site operator, GAC, as well as former site owner and operators. A selection of regulatory issues are included below:

- Between 1983 and 2020, 77 spills are documented in Maine DEP's Bureau of Remediation and Waste Management Hazardous and Oil Spill System database. 20 spills are documented to have occurred since GAC Chemical took ownership of the property.
- According to the Environmental Compliance Online History (ECHO) database, violations related to the pH of effluent were identified during four of the last 12 fiscal quarters.
- In February 11, 2002, Conservation Law Foundation filed a complaint against GAC in the United States District Court for the District of Maine in a matter entitled Conservation Law Foundation v. GAC Chemical New England Corn., Civil Docket No. 00-CV02-24-B-5, alleging that GAC Chemical violated certain terms of its NPDES Permit, the Multi-Sector General Permits and the Clean Water Act. The parties reached a settlement agreement without any finding that GAC Chemical had or had not violated the Clean Water Act.
- On September 29, 2021, EPA Region 1 entered into a Consent Agreement with GAC Chemical Corp. and General Alum New England Corp. resolving violations of the Clean Air Act (CAA) at the facility. The administrative penalty case included two counts alleging violations of the CAA Section 112(r)(1)'s General Duty Clause (GDC) and five counts alleging violations of the Risk Management Plan (RMP) regulations that implement CAA Section 112(r)(7) relating to its handling of large amounts of anhydrous ammonia and sulfuric acid, among other chemicals. (ECHO)

Field Observations

Assessment Site Information:

Address / Location: 34 Kidder Point Road Searsport, ME (44.46478° N, 68.88077° W)
Date of Visit: 04/21/2025
Time of Arrival / Departure: 9:30am - 11:45am
Weather Conditions: Clear skies with full sun and no precipitation, 50°F, wind 10mph
Tide: Low at 11:42 am
Observers: Paul Bernacki, Ruby Treyball, Jillian Howell

Photograph: View of Kidder Point, facing northwest.

Assessment Site Observations:
On the morning of April 21, 2025, our team assessed a portion of the GAC Chemical Corporation property, accessing the site below the HAT Line via the Sears Island Causeway. This scope of this project is limited and examines a portion of shoreline within lot 83 on map 07. The property is approximately one mile long and this assessment addresses 2050 linear feet. We observed two young individuals walking along GAC's intertidal land collecting rocks and shells during our assessment.

The shoreline was divided into 18 different sections. The assessment began at the westernmost point of the property and proceeded eastward through the intertidal area. Sections were delineated in approximately 100-foot increments; however, some sections, particularly around the midpoint, were longer to accommodate areas with uniform characteristics. Photographs of each section are included in Attachment B.

The shoreline is primarily composed of unstable bluffs. According to the Maine Geological Survey's *Coastal Bluffs and Landslide Hazard* data (Figure A3, Attachment A)—and consistent with our observations—Sections 1–8 and 10–18 are classified as highly unstable (MGS, n.d.). Section 9, where the upland elevation is less than three feet, is not considered bluff. Overall, we observed visible signs of bluff erosion, toe erosion, and slumping throughout the site. Around the eastern point the bluff appears to be mostly vegetated with consistent toe erosion. There are pockets of marsh along the beach.

There are four sections of armored shoreline on the site. One is recent and appears stable; however, it shows significant plastic liner exposure, suggesting boulder movement and potential instability of the underlying soils. The three other areas of armored shoreline on site appear to be older, all of them have been overtopped by wave action and have indicators of downward movement and collapse (Photo #1, Attachment B). Two of the riprap structures are composed primarily of concrete pilings.

Visual evidence of industrial waste is present along much of the shoreline. This includes two broad categories: sediment contamination and industrial debris. We identified three primary areas of sediment contamination:

1. A layer of pink-colored sediment/fill, visible in Photo #4 (Attachment B).
2. A reddish layer on intertidal sediments and rocks near an old discharge pipe along the western side of Kidder Point (Photo #6, Attachment B).
3. Multiple locations within Sections 4–6 where a grey, powdery substance is present (Photo #10, Attachment B).

The industrial debris on site includes concrete fragments, several hundred feet of inactive pipeline (Sections 10-14), rebar, bricks, discarded wood, plastic materials, demolished facility components, and an abandoned building. This debris is visible in the intertidal area in every section that we have assessed. In Sections 12-14 the industrial debris fills the foundational layer of bluff that appears to be topped with soil and vegetation. The layer of soil and vegetation has become unstable over time, exposing the industrial waste and in some areas has washed approximately 50 feet into the intertidal area of Stockton Harbor. We were only able to assess what was visible from within the intertidal area, the extent of industrial fill is unknown.

There are two primary areas of concern regarding upland drainage. One area is at the beginning of Section 1 where there is industrial railroad infrastructure on the upland immediately adjacent to the HAT line. There is severe bluff erosion beneath the railroad tracks that transport industrial chemicals. There appears to be a freshwater wetland on the upland and there do not appear to be culverts to allow fresh water drainage. The other area is in Section 9 at the point where it appears to be a source of sloped upland

runoff. The land at the top of the slope has distinct channels from rain events over the beach/intertidal zone. There appears to be one active outfall pipe in Section 16.

The overall condition of this ½ mile of shore and coastal resource is highly unstable bluffs with industrial contamination subject to erosion from the upland into Stockton Harbor. Visually, the adjacent coast and adjacent resource is polluted, and biologically compromised due to exposed industrial waste, and hydrological migration of upland contaminants.

Sampling Plan and Procedures

Sampling Assessment Site Information:

Address / Location: 34 Kidder Point Road Searsport, ME (44.46478° N, 68.88077° W)
Date of Visit: 05/16/2025
Time of Arrival / Departure: 6:30am - 12:00pm
Weather Conditions: 100% cloud cover, 55°F, wind 6 mph from the S/SE
Tide: Low at 8:02 am
Observer/Sample Collector: Jillian Howell

A limited field sampling program was conducted on May 16, 2025, along the shoreline. Grab samples of sediment/fill material eroding from the bluff, as well as intertidal sediment were collected in order to assess the extent of contamination within fill materials and in the intertidal sediment. Grab water samples were collected from the culvert (Section 16) in order to assess potential contaminants in surface runoff from the site. Grab building materials samples found along the shoreline and within the bluff were collected in order to assess their composition, as they are found along the beach area, or in areas highly susceptible to erosion or impacts from future storms.

Ten grab sediment samples were collected and analyzed for total aluminum, total mercury, total sulfur, and pH. Nine of the grab sediment samples were also analyzed for volatile organic compounds (VOCs).

Two water samples were collected and analyzed for total aluminum, total mercury, total sulfur, pH, and VOCs. The water samples were collected from the culvert at the eastern end of the assessment area (Section 16).

Four building materials samples were collected and analyzed for PCBs, lead, and asbestos.

Field sampling photographs are included as Attachment C, a Site Map depicting sampling locations is included in Attachment A, Figure A1, and laboratory reports are included in Attachment F.

Samples were submitted to Maine Environmental Laboratory (MEL) in Yarmouth, Maine. Eurofins Concord, a laboratory within Eurofins Environment Testing Eastern Analytical, Inc. (EAI), was subcontracted by MEL to perform analysis of VOCs, asbestos, and PCBs. Maine Environmental Laboratory is accredited by the States of Maine (Cert. #ME00028) and New Hampshire (NH ELAP) (Cert. #2031) and is TNI/NELAP accredited. EAI holds primary NELAC accreditation from the State of New Hampshire (NH ELAP #1012), and is certified throughout New England, including in Maine (Cert. #ME2010028).

Sample Results and Discussion

Water Samples

Low levels of aluminum (0.1 mg/L), sulfur (10 mg/L), and trichloroethene (3.1 ug/L) were identified in both water samples, with a pH between 7.3 and 7.5.

Sediment Samples

Five sediment/fill samples were extremely acidic, with pH levels ranging between 2.67 and 5.09. Five samples were within normal pH range between 6.22 and 7.55. All 10 sediment samples contained aluminum, ranging from 190 to 100,000 mg/kg. Eight of the 10 samples contained sulfur, ranging from 120 to 120,000 mg/kg. Three samples contained low levels of mercury, ranging from 0.12 to 0.39 mg/kg.

Building Materials

Lead was detected at elevated levels in two building materials samples. A black, brittle coating located within the banks of a bluff contained 9.6 mg/kg of lead, and green paint found on pipeline scaffolding contained 5,700 mg/kg of lead. This green paint also contained 3,300 ppm of PCBs. Black pipe wrap on the pipeline contained asbestos.

Tables with tabulated data results are included in Appendix D.

Discussion

While the scope of field sampling was very limited, there is sufficient evidence from sampling to demonstrate that the bluffs containing contaminated materials are actively eroding, resulting in the release of acidic fill containing aluminum and sulfur into the environment, and that building materials within the fill, and on infrastructure that is no longer in use contain PCBs, asbestos, and lead paint.

There is a failing pipeline structure that is no longer in use present to the north of Kidder Point that follows the bluff. Without removal, future storms and erosion will likely cause the pipeline and its structural components to fall into the Bay. The paint on the metal components contains lead and PCBs, and the wrap around the pipe itself contains asbestos. All of these materials should be properly removed and disposed of.

Sediment samples collected from the Kidder Point bluff face, specifically the southwestern facing bluff, contain concerning levels of aluminum and sulfur, and have an extremely low pH, indicating high acidity of materials. The two sediment samples collected from within the intertidal area both also contain aluminum and sulfur, indicating that material from the bluff is contaminating intertidal sediment.

Water samples collected from the culvert contained low levels of aluminum, sulfur, and trichloroethene with a normal pH value.

While standard exposure to industrial contaminants is often limited on an industrial site to workers, the nature of this location and use of the intertidal land by the public presents an ongoing hazard to public health. Due to the proximity of Sears Island and the causeway, the public accesses the intertidal land in front of GAC and is potentially exposed to contaminants in the sediment without being aware of the dangers. During sampling on May 16, 2025, a woman and her two dogs were observed walking along the intertidal land in front of GAC Chemical, and two young individuals were also observed during the April 2025 site visit walking along GAC's intertidal land. Additionally, there was an effort to seed clams with elementary and middle school students in June along the Sears Island causeway intertidal land and intertidal land towards GAC shores. With the exception of Posted, No Trespassing signs on the bluffs of GAC's property, there is not signage indicating any potential harms or hazards.

Recommendations

We recommend a comprehensive sampling effort to delineate the extent of contamination within the eroding bluffs, as well as installation of soil borings to determine the depth of contamination both on the

property's uplands, as well as the intertidal land. We also recommend the installation of signage, visible to the public recreating on GAC's intertidal land, to inform them of potential exposure to industrial contaminants.

Remediation Proposal

We present below an approach to remediation with the acknowledgement that we have limited information. The end result of a remediation effort would ideally incorporate the removal of all loose industrial debris; this includes the waste that is along the beach, the removal of as much contaminated material as possible, and the capping and re-vegetating of the bluff in order to stabalize it. Delineating the extent of contamination at the site is beyond the scope of this report and requires further assessment by GAC and DEP to determine.

Kidder Point currently has industrial waste actively eroding into Stockton Harbor. In response, our team strongly advocates for the implementation of a nature-based remediation plan. The shoreline at Kidder Point—as well as the adjacent east–west facing stretches along Stockton Harbor—constitutes a sheltered coastline. The specific portion of shoreline assessed in this report faces a limited fetch from the south-southeast and southwest, measuring less than 1.5 miles.

A Living Shoreline Stabilization (LSS) approach for the GAC property aligns with current state and federal regulatory priorities, which increasingly favor nature-based shoreline solutions. According to the Maine Geological Survey's Living Shorelines Decision Support Tool (2023), the majority of this site is classified as "highly suitable" to "moderately suitable" for Living Shoreline methods (see Attachment A, Figure A4). To date, the strategy to address erosion of the bluff has been piecemeal, and primarily has consisted of adding additional rip-rap. Based on the continued erosion and failing condition of new and old riprap, our team is recommending a different, comprehensive approach incorporating LSS moving forward. Included in Appendix E are Sample Remediation Illustrations.

We recommend a comprehensive professional assessment of the entire coastline to guide next steps. This further investigation should include, but not be limited to:

- Soil borings in the upland area
- Soil testing in the bluff and within the intertidal area
- Additional water quality testing
- Department of Marine Resources (DMR) shellfish sampling
- Marine geologist site inspection
- Erosion control assessment of vulnerable areas, including near the railroad tracks
- EPA phytoremediation specialist consultation & plan development
- Assessment by DEP leadership
- Ongoing monitoring and adaptive shoreline management
- Public safety & exposure assessment (e.g., installation of warning signage)

We strongly recommend the complete removal of loose industrial debris from the intertidal zone, including abandoned pipelines and collapsing structural supports. Where deemed safe and feasible, we also support the removal of contaminated soils, derelict buildings, and construction debris from the adjacent shoreland zone (defined as 75 feet inland from the highest annual tide line). The scope of our assessment was not comprehensive enough to determine the extent to which removal of materials within the bluff is safe and feasible. Whatever cannot be physically removed from the site needs to be capped in place to prevent further erosion and release of materials.

Additionally, we recommend establishing a minimum 10-foot planted buffer zone above the most recently constructed riprap. This buffer should be vegetated with native species and supported by supplemental stabilization strategies to reduce the risk of edge effects and minimize erosional impacts. In addition, there are multiple forms of phytoremediation recommended for industrial waste sites recommended by the U.S. Environmental Protection Agency (EPA): “vegetated caps, buffer strips, and riparian corridors are applications that combine a variety of these methods for contaminant containment, removal, and/or destruction (EPA, 2001).”

We recommend regrading the decontaminated beach and bluff to establish a stable profile that supports the development of a fringe marsh, vegetated bluff, and forested upland. This LSS approach will include beach nourishment to restore elevation levels that align with natural erosion and stabilization processes, free from the interference of existing industrial waste and deteriorating riprap structures.

At the base of the bluff, a toe structure should be constructed using cobbles, boulders, and coir-encased gravel that mimics glacial deposits, chosen for their optimal consistency to absorb storm wave energy and surges. This structure should be vegetated with native fringe shrubs and salt-tolerant grasses. Above the toe, the bluff should be reconstructed with soil strategically deposited in alignment with natural stratification, stabilized with coir fabric, and planted with a diverse array of native bluff and upland vegetation.

The entire system, including the nourished beach, toe structures, and lower bluff, should be designed to accommodate projected sea level rise scenarios, with a design threshold of up to six feet over the next 100 years. This adaptive design would allow the living shoreline - composed of natural soils, boulders, cobbles, and plant communities - to migrate landward over time, preventing bluff scarping and avoiding re-exposure of previously remediated industrial waste materials.

References

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Attachment A
Site Maps

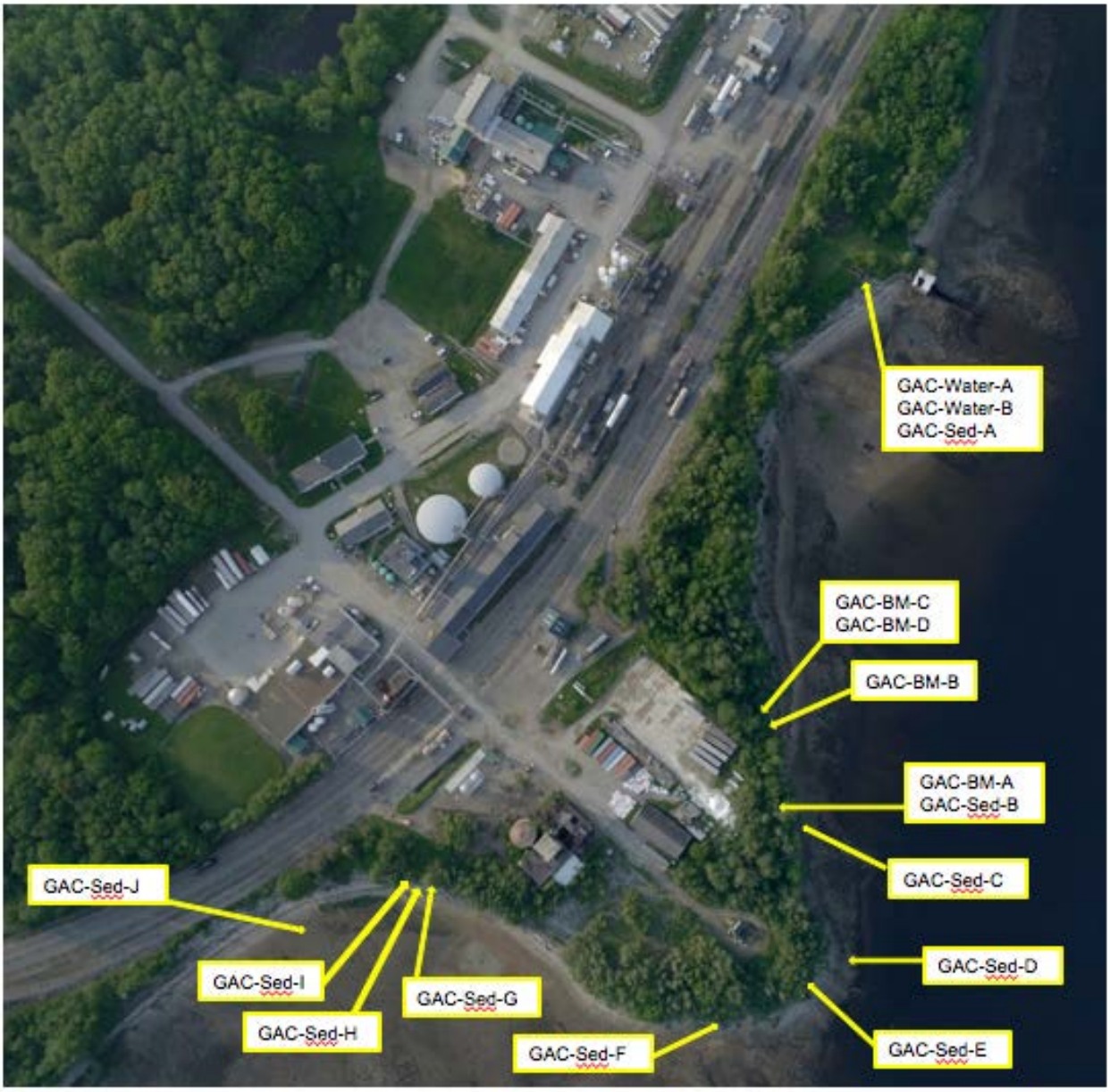

Figure A1: Site Plan and Sampling Locations

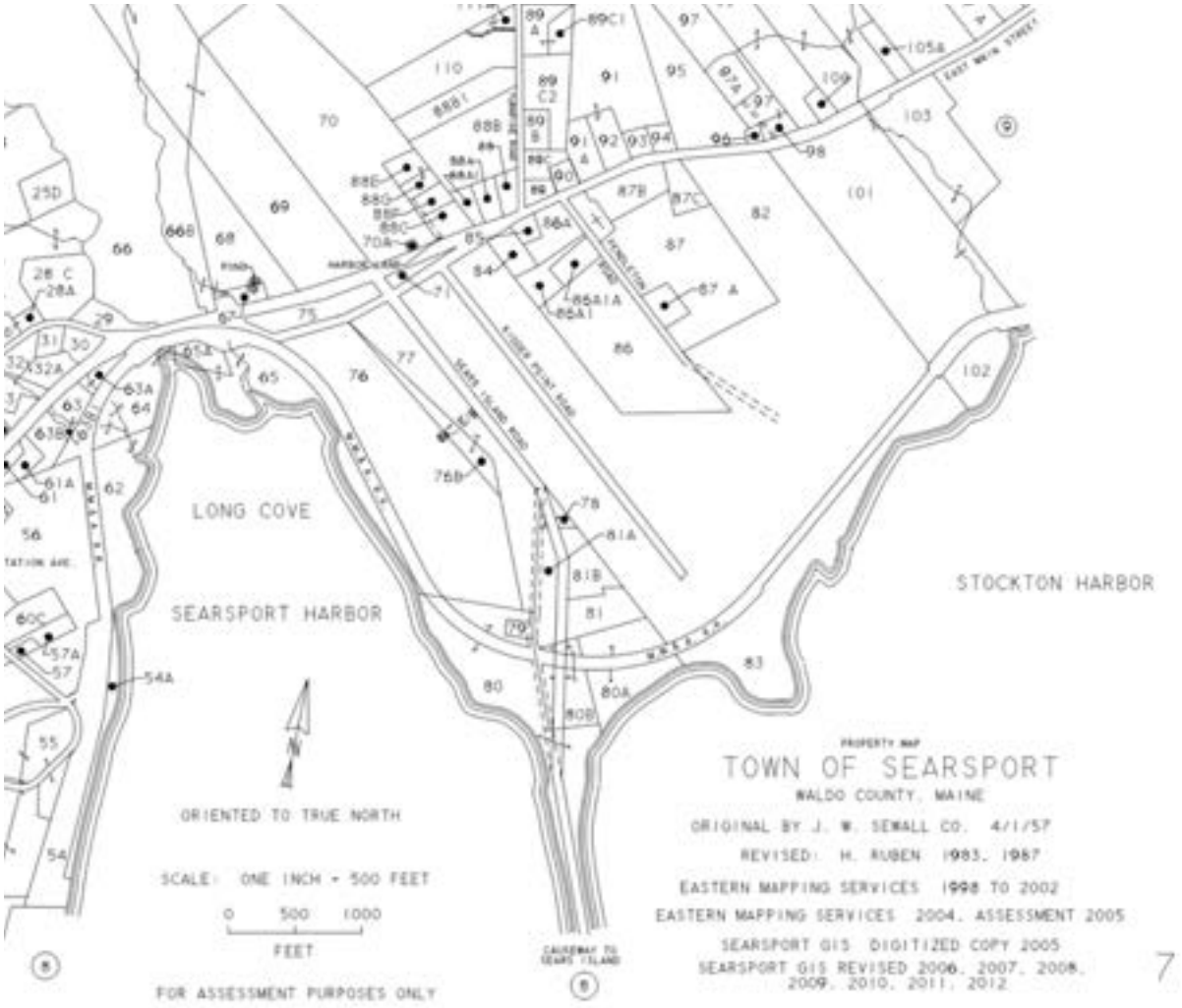

Figure A2: Town Tax Assessment Map 07 Lot 83

Figure A3: Maine Geological Survey (MGS) Coastal Bluffs & Landslide Hazards Map determines;
Sections 1-8: Yellow- Highly Unstable Bluff
Sections 10-18: Yellow- Highly Unstable Bluff
https://www.maine.gov/dacf/mgs/pubs/digital/bluffs.htm

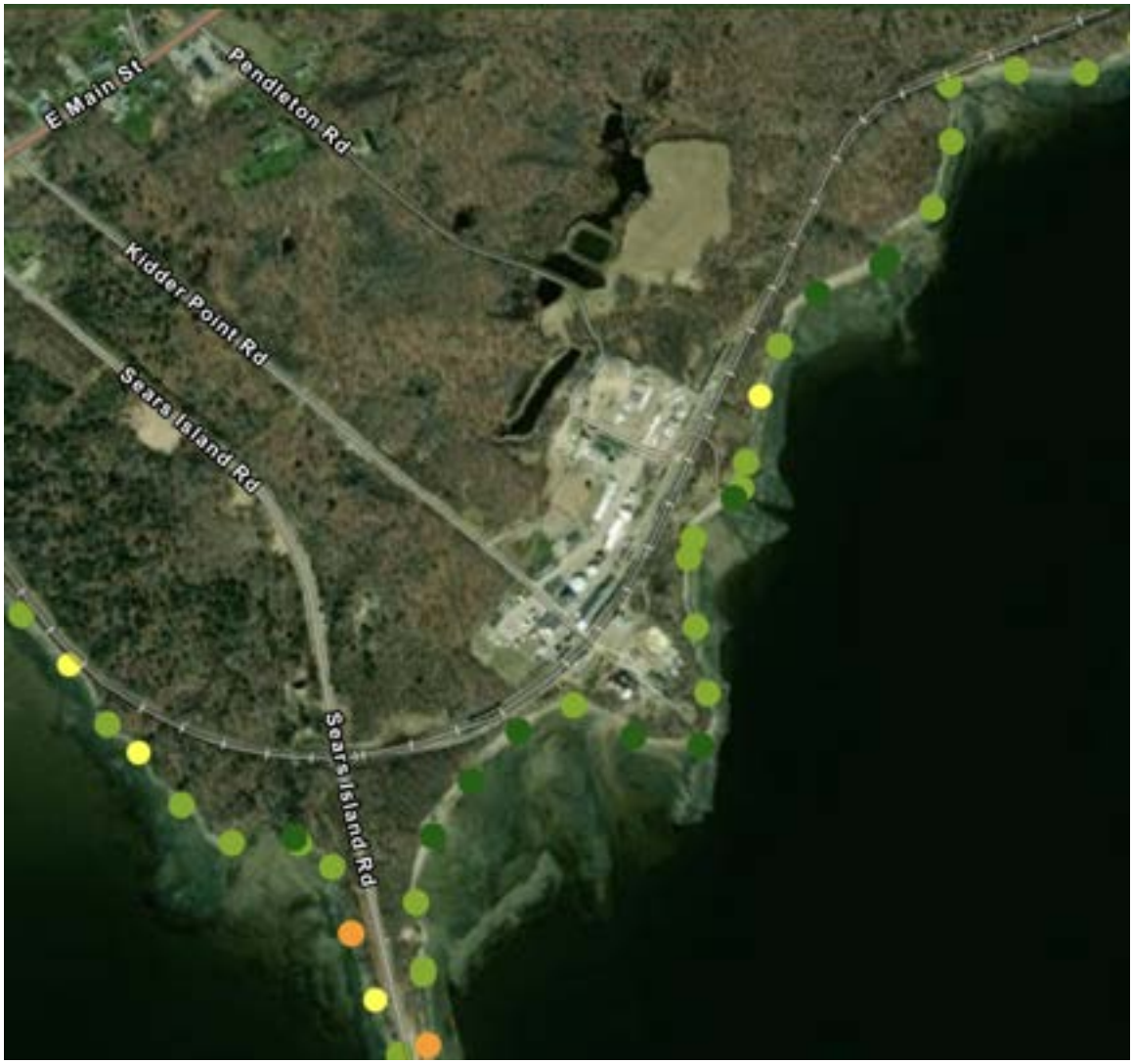

Figure A4: MGS Living Shorelines Decision Support Tool determines:
The Maine Geological Survey reports that this site ranges from “highly suitable” (dark green) to “moderately” suitable (light green) and includes one small area that is “possibly suitable” (yellow).
https://www.maine.gov/dacf/mgs/hazards/living_shoreline/

Figure A5: FEMA Flood Map Service Center- Zone VE (EL12)
"Zone VE EL 12" indicates a flood zone designation by the Federal Emergency Management Agency (FEMA), specifically a high-risk coastal area with a 1% annual chance of flooding and wave action. The "VE" part means it's a high-velocity, coastal flood zone, while "EL 12" signifies that the base flood elevation (the expected water level during a 1% annual chance flood) is 12 feet. This means that properties in this zone are at a higher risk of damage from both flooding and wave action.
https://msc.fema.gov/portal/search?AddressQuery=34%20kidder%20point%20rd%20searsport%2C%20ME

Figure A6: Maine Geological Survey (MGS) Projected Sea Level Rise Map
https://www.maine.gov/dacf/mgs/hazards/slr_ss/index.shtml

Attachment B
Site Photos

SECTION 1- 100’

Photo #1. Overtopped riprap, highly unstable bluff. 44.46478° N, 68.88077° W.

SECTION 2- 100’

Photo #2. Highly unstable bluff, metal and concrete waste. 44.46480° N, 68.88035° W

Photo #4. Discolored sediment layer, plastic waste. Direction of View****

SECTION 3- 100’

Photo #5. Discolored intertidal sediment, concrete, failed riprap, newly installed riprap
44.46468° N, 68.88003° W


Photo #6 discolored sediment. Photo #7 exposed plastic riprap lining

SECTION 4- 100’

Photo #8 newly installed riprap, exposed plastic, grey powdery sediment 44.46454° N, 68.87976° W

SECTION 5- 100’

Photo #9 vegetated unstable bluff, marsh, industrial debris on beach 44.46433° N, 68.87938° W

SECTION 6- 100’

Photo #10 vegetated unstable bluff, industrial debris on beach, grey powdery sediment pilings 44.46430° N, 68.87897° W

Photo #11 industrial debris

Photo #12 grey powdery sediment

SECTION 7: 100’

Photo #13 vegetated unstable bluff, industrial debris on beach. 44.46430° N, 68.87852° W

SECTION 8- 100’

Photo #14 vegetated unstable bluff, industrial debris on the beach. 44.46442° N, 68.87798° W

SECTION 9- 100’

Photo #15 concrete, industrial debris. 44.46485° N, 68.87779° W

Photo #16 concrete, industrial debris

SECTION 10- 100’

Photo #17 concrete, industrial debris. 44.46506° N, 68.87778° W

Photo #18 inactive & collapsing industrial pipe

SECTION 11- 100’

Photo #19 unstable bluff, inactive industrial pipe, unstable riprap 44.46528° N, 68.87786° W