Summary of the Environmental Impact Statement

Boat Harbour Remediation Project

Pictou Landing, Nova Scotia

Nova Scotia Lands Inc.

November 27, 2020

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1. Introduction and Environmental Impact Assessment Context

Boat Harbour, formerly known as A'se'k in Mi'kmaq, was originally a tidal estuary[1] connected to the Northumberland Strait in Nova Scotia. The Province of Nova Scotia (Province) constructed the Boat Harbour Effluent Treatment Facility (BHETF) in 1967 to treat effluent from industrial sources including a bleached Kraft Pulp Mill. Its construction included reconstructing the natural tidal estuary into a closed effluent stabilization basin. The Kraft Pulp Mill was responsible for operating the BHETF under a lease agreement with the Province. In accordance with the *Boat Harbour Act* (BHA) 2015, the use of the Facility for the reception and treatment of effluent from the Mill ceased in January 2020. The Kraft Pulp Mill is undertaking a shutdown of its facility to an indefinite hibernation condition.

Following approvals, the Province will remediate Boat Harbour and lands associated with the BHETF, and restore Boat Harbour to a tidal estuary. The existing causeway along Highway 348 and the dam will be removed and replaced with a bridge to allow return to tidal conditions and to permit boat access to Boat Harbour. As part of the remediation work, hazardous and non-hazardous waste-bearing sediment from the BHETF will be removed and disposed of in the on-site containment cell located adjacent to the BHETF. The closure of the BHETF operations and remediation of BHETF will result in a significant reduction in emissions, discharges, and wastes.

The Boat Harbour Remediation Project (BHRP or Project) spans from the wastewater effluent pipeline from the first standpipe on the Kraft Pulp Mill property, below the East River, through the BHETF lands, Boat Harbour and its banks, extending to Northumberland Strait, and Pictou Landing First Nation (PLFN), located between Boat Harbour and Northumberland Strait. The total Study Area is approximately 546 hectares (ha), of which 141 ha is Boat Harbour. Figure 1.1 provides an overview of the Project and Site Study Area.

[1] Partially enclosed coastal body of water, having an open connection with the ocean, where freshwater from inland is mixed with saltwater from the sea.

Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus

0 200 400 600
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

GHD

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

11148275-31-03
Dec 2, 2020

STUDY AREA

FIGURE 1.1

GIS File: I:\GIS_DATA\Projects\8-chars\1114----\11148275 Boat Harbour\11148275-REPORTS\11148275-Rpt-29\11148275-31-03(029)GIS-HX0E1.1.mxd

Nova Scotia Lands Inc. (NSLI/the Proponent) submitted the Project Description for the BHRP to the Canadian Environmental Assessment Agency (now known as the Impact Assessment Agency of Canada [IAAC]) on December 21, 2018. In February 2019, the IAAC determined that an Environmental Impact Assessment (EIA) would be required under the *Canadian Environmental Assessment Act* (CEAA 2012) for the BHRP. The BHRP is regulated by IAAC under Section 16(d), according to Section 16(d) of the Regulations Designating Physical Activities that states the Project triggers CEAA 2012.

On April 10, 2019 NSLI received draft guidelines for the preparation of an Environmental Impact Statement (EIS) for an environmental impact assessment conducted pursuant to the CEAA 2012. The final EIS guidelines were issued on May 31, 2019. The EIS was prepared in accordance with the EIS guidelines. This summary of the EIS has been prepared for the BHRP in accordance with the final EIS guidelines for the Project.

2. Project Overview

2.1 Purpose

The purpose of the BHRP is to remediate Boat Harbour, and lands associated with the BHETF. The goal of the Project is to return Boat Harbour to a tidal estuary, which necessitates the remediation of contaminated sediments within the BHETF, including Boat Harbour. Through the proposed Project, it is PLFN's desire and vision that Boat Harbour, (known to PLFN as A'se'k) be returned to a tidal estuary and allow the community to re-establish its relationship with the water and land of A'se'k. In this regard, the Project's effects on health, socio-economic conditions, and physical and cultural heritage as a result of changes caused through remediation activities are net positive in relation to PLFN.

2.2 Location

The BHRP spans from the wastewater effluent pipeline from the first standpipe on the Kraft Pulp Mill property, below the East River, through existing and historic BHETF lands, Boat Harbour and its banks, extending to Northumberland Strait, and PLFN, located between Boat Harbour and Northumberland Strait (See Figure 1.1).

PLFN is located on the banks of Boat Harbour, within the Study Area, and has been granted Indian Reserve (IR) Lands which are federal crown lands. As illustrated in Figure 1.1, the PLFN community is located on IR24, additional federal lands include IR37 and IR24G, both of which are also within the Project Study Area.

The coordinates of the centre of Boat Harbour are: NAD 83/20 N/527179E/5056702N.

2.3 Project Components and Activities

As illustrated in Figure 1.1, the main components of the BHETF, includes the wastewater effluent pipeline (over 3 kilometres [km] in length) that runs from the Kraft Pulp Mill and extends eastward, below the East River of Pictou (East River), to the BHETF property; settling basins and an aeration stabilization basin (ASB) west-southwest of Boat Harbour; and the Boat Harbour stabilization lagoon

(Boat Harbour or BHSL). Effluent from the BHSL discharged through a dam (northeast of Boat Harbour) into an estuary before being released to the Northumberland Strait. Prior to the construction of the settling basins and ASB, effluent was routed by open ditch from the pipeline on the east side of Highway 348 to natural wetland areas (Former Ponds 1, 2, and 3) before being discharged into the BHSL.

The BHRP is comprised of the following components:

- Wastewater effluent pipeline
- Effluent ditches (current and historical)
- Existing settling basins
- Existing ASB
- Existing BHSL
- Boat Harbour estuary and adjacent marine environment in the Northumberland Strait
- Wetlands
- Existing containment cell (including overflow pond, spillways, and catch basin)
- Existing liner and leachate collection system
- Geotubes® or equivalent technology for sludge dewatering and containment
- New containment cell gas management system
- Residual mill effluent
- Existing causeway along Highway 348
- Existing dam
- New replacement bridge
- Pilot study berm and cove
- Dredging
- Wastewater management system
- Site clearing, earthmoving, leveling, and drilling activities
- New and upgraded access roads
- Transportation corridor construction or improvement
- Storage of petroleum products and reagents
- Water supply (industrial and drinking)
- Power supply
- Infrastructure decommissioning
- Existing administrative, maintenance, support, treatment, and storage buildings

Project activities associated with each Project component will be completed in three phases; site preparation and construction, operation, and decommissioning and abandonment (or post-closure in reference to the containment cell) as outlined in the final EIS guidelines. Activities for each phase specific to each Project component are discussed below. However, not all phases apply to each Project component.

The Project components have been grouped in categories and are described further in the subsections below along with the activities that will be completed in each phase of the Project.

2.3.1 Waste Management

Solid waste generated during remediation would be disposed of in the existing 6.7 hectare (ha) containment cell (Figure 1.1). Vertical expansion of the containment cell would be required to accommodate the waste; and the containment cell would be further modified to enhance the base liner system and leachate collection system and facilitate placement and dewatering of the sludge/sediment in a one-step operation.

Site Preparation and Construction

Prior to modifications of the existing containment cell, the current waste in the containment cell would be temporarily relocated either by pumping or hauling to existing Site infrastructure (i.e., settling basins, ASB) or constructed staging areas.

The containment cell improvements would include removal of the existing overlying leachate collection infrastructure and exposure of the clay liner to install an engineered single composite liner system. A new geosynthetic clay liner (GCL) would be installed over the existing clay liner to replace the portion of removed clay and provide the liner system up the extended perimeter berms. A new Flexible Membrane Liner (FML) and a protective cover system consisting of a sand layer and geotextile would be installed over the GCL, followed by a leachate collection system consisting of leachate collection piping and a granular drainage layer overlaid with a geotextile over the cell composite liner system.

A below grade leachate storage tank would be constructed for the management of leachate during the operational phase of the Project and would form part of the long-term leachate management system post-closure. The stormwater management pond would also be constructed for use during the operational phase as an equalization basin and would form part of the long-term stormwater management system post-closure.

Operation

The majority of the sludge would be pumped into Geotubes® or equivalent technology located in the containment cell and dewatered by gravity over time. Other wastes generated through the Project such as impacted soil would be used to fill the voids between the Geotubes® or equivalent technology and shape the cell, as available. Mechanically excavated sludge (e.g., sludge from the edges of BHSL, settling basins and ditches) would be managed through a combination of slurrying and pumping or loading in a dump truck and end dumping into the containment cell.

Leachate Management

Dewatering effluent from Geotubes® or equivalent technology would be collected and conveyed to Boat Harbour, where it would undergo natural attenuation processes before being discharged to the estuary. The effluent discharge criteria are currently being developed using a risk based approach. Final discharge criteria would be adopted through the Provincial IA process required for the remediation.

Surface Water Management

During remediation, clean surface water runoff in the vicinity of the containment cell would continue to be diverted away from the cell and controlled by infiltration and overland flow. Water that comes in contact with the waste would be managed as leachate and conveyed with the dewatering effluent to Boat Harbour.

The proposed location of the stormwater management pond is in the location of the existing overflow pond area. The upgraded stormwater management pond outlet structure would include a discharge control valve operated in the normally open position. This valve can be closed to prevent discharge in the event of a spill and during the operational phase as well as post-closure.

Decommissioning and Abandonment

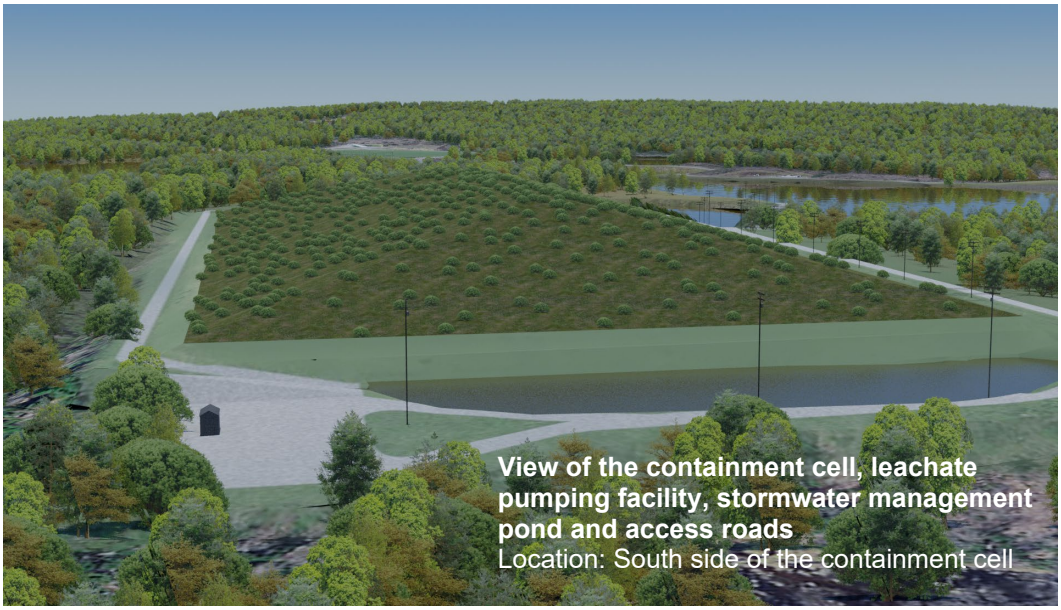
Containment Cell Closure and Post-Closure

The decommissioning and abandonment phase for the containment cell is referred to as 'closure and post-closure' as it is more appropriate for describing the end of operation life for containment cells. The containment cell will not be decommissioned (i.e., withdrawn from service), it will be capped and waste will be continued to be stored within it. After the containment cell is capped and closed, on-going monitoring and maintenance (long-term) will occur.

Post-closure leachate would be managed though off-site disposal as described in Section 2.3.4 Water Management. Once active remediation is complete, a Temporary Leachate Treatment Facility (TLTF) would treat leachate from the containment cell until the leachate storage and loading station is fully commissioned, the containment cell is completed with final cover, and dewatering has stabilized such that leachate hauling is feasible. Leachate management long-term would involve off site disposal. Details on TLTF and long-term leachate management are described in Section 2.3.4 Water Management.

Final cover would be placed once the waste within the containment cell has stabilized. The final cover would consist of a sand/grading layer, FML, sand drainage layer, and vegetated topsoil constructed to minimize infiltration and reduce leachate generation. The final cover material would be designed to accommodate intended plantings such as short shrubs that would tie the containment cell visually into the surrounding tree line. As part of final cover construction, leachate monitoring wells and passive gas vents would be installed. A digital rendering of the proposed final containment cell (with the stormwater pond and leachate loading station in the foreground) is shown in Figure 2.1.

Figure 2.1 Digital Rendering of the Proposed Final Containment Cell



Long-term Monitoring

As part of containment cell closure, infrastructure for long-term monitoring and maintenance of the containment cell would be constructed. This would include groundwater monitoring wells, gas monitoring probes, surface water monitoring stations, perimeter fencing, and signage. Routine post-closure maintenance would include cleaning of the leachate collection system, repair to infrastructure including access roads, fencing, final cover, stormwater ditches and ponds, and monitoring stations.

Landfill Gas Management

LFG is produced by the biological decomposition of waste placed in a landfill. LFG would be managed using a passive venting system (constructed as part of the final cover system) which allows the release of pressure build up within the closed cell.

2.3.2 Dredging

Remediation of the BHETF would include dredging of the ASB, BHSL, wetlands, and estuary (Figure 2.2). Dredging would be completed in the wet, predominantly via hydraulic dredge. The shorelines of the ASB, BHSL, wetlands and estuary, and the settling basins, and effluent ditches (current and historical) would be mechanically excavated. Dredged sludge slurry would be pumped through discharge lines to the Geotubes® or equivalent technology located in the containment cell, where it would dewater by gravity.

Site Preparation and Construction

Site preparation and construction would include installation of silt curtains, dredging anchor points, Geotubes® or equivalent technology, and the slurry dosing system. Construction would include the water level control structure at the causeway, which would be used to adjust the BHSL water level as needed for dredging and to prevent discharge of water that is not in compliance with the

discharge criteria. For sludge removal within the impacted wetlands and potentially areas of BHSL, temporary access points would be constructed off of the existing Site access roads.

Operation

Ditches and Initial Settling Basin Remediation

During this initial remediation stage, the pipeline would have been cleaned and/or decommissioned but the containment cell improvements would not yet be completed. As such, one of the settling basins and/or the ASB would be used as a temporary containment cell at this time. These initial remedial works consist of the following:

- Dewatering of the settling basins through existing decant structures.
- Disconnecting/blocking flow from settling basins to the ASB.
- Excavation of sludge/contaminated sediment in the effluent ditches.
- Backfilling ditches to match adjacent grades with clean fill, followed by placement of topsoil and seeding and erosion control measures as needed.
- Excavation of residual impacted soil/sludge within one of the settling basins.

ASB Remediation

All equipment located within the ASB would be decommissioned and removed prior to remediation of the ASB. Impacted sludge/sediments from the ASB would be hydraulically dredged and conveyed to the Geotubes® or equivalent technology located within the containment cell for dewatering and disposal.

Boat Harbour Stabilization Lagoon Remediation

Impacted sediment/sludge in BHSL would primarily be hydraulically dredged and conveyed to the Geotubes® or equivalent technology located within the containment cell for dewatering and disposal. Mechanical dredging may be employed as needed in shallower areas at the edges of BHSL. BHSL would be dredged in sub-areas divided by silt curtains.

During dredging, the active area or downstream areas of BHSL would receive the pre-treated dewatering effluent from the containment cell. Once returned to BHSL, the effluent would undergo additional treatment through natural attenuation processes. The water level control structure at the causeway will provide the ability to hold water in BHSL should the water quality exceed discharge criteria.

Settling Basins Final Remediation

Prior to final remediation of the settling basins, any residual sludge and contaminated soil would be hauled to the containment cell for bulk disposal. The settling basins would be filled with clean fill and graded to maintain positive drainage, followed by placement of topsoil and seed, and erosion controls.

QA/QC Program for Dredging

Site quality control will take place during dredging by the contractor. Sludge/sediment samples will be taken from the bottom of the area undergoing active dredging. The samples will allow for

identification of the extent of dredging remediation via qualitative comparison of sludge samples versus known characteristics of impacted sludge/sediment and native marine sediment.

Following dredging to the target elevation, a sediment sampling program would be implemented to confirm that the bottom surface meets the proposed criteria/site specific target levels (SSTLs) for the contaminants of concern (COC).. In areas that do not meet the remediation criteria a second dredging pass would be conducted followed by confirmatory sampling. This process would be repeated until the remediation criteria has been met in all areas.

Decommissioning and Abandonment

There is no decommissioning and abandonment phase associated with dredging.

Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus

0 150 300 450
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

AREAS TO BE DREDGED AND ACCESS POINTS

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FIGURE 2.2

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2.3.3 Wetlands Management

Through completion of the Human Health and Ecological Risk Assessment (HHERA), areas of the wetlands and the estuary that require remedial action through a mix of hydraulic and mechanical dredging have been determined. Areas for remediation and access points are shown in Figure 2.3.

Site Preparation and Construction

Construction of access roads would be required to facilitate dewatering and removal activities prior to remediation.

Operation

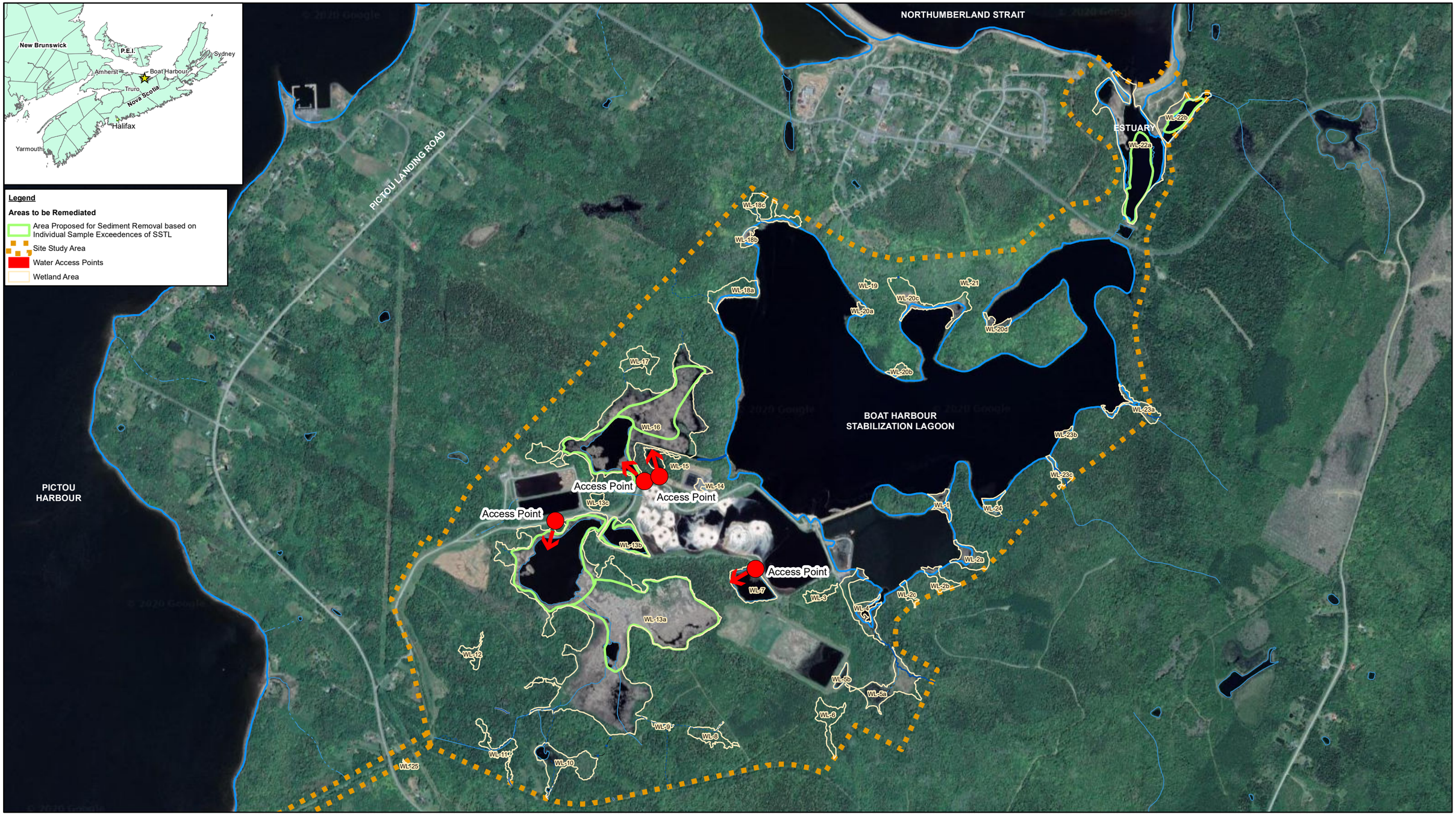
Cattails and other organic material will be removed from the wetlands through clearing and grubbing activities. The material will be mechanically processed through chipping and grinding and stockpiled for future use as mulch/soil amendment. The impacted sediment in the wetlands would be hydraulically and/or mechanically dredged and conveyed to the Geotubes® or equivalent technology located within the containment cell for dewatering and disposal.

In areas where sludge is to be completely removed, remaining sediments would meet risk-based sediment criteria that is protective of ecological and human health.

Following dredging to the target elevation, a sediment sampling program would be implemented to confirm that the bottom surface is in compliance with the remediation criteria. In areas that do not meet the remediation criteria a second dredging pass would be conducted followed by confirmatory sampling. This process would be repeated until the remediation criteria has been met in all areas.

Decommissioning and Abandonment

Once the wetlands are remediated, the impediments for restoration would be removed allowing for future reestablishment of vegetation and wetland function to start to occur before Boat Harbour is returned to tidal conditions. The remediation phase would include, in addition to the infilling and regrading of wetlands, planting or seeding of native aquatic and terrestrial vegetation in the construction areas only.



Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus

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Coordinate System:
NAD 1983 CSRS UTM Zone 20N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

WETLANDS AND ESTURAYS TO BE REMEDIATED AND ACCESS POINTS

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Dec 2, 2020

FIGURE 2.3

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2.3.4 Water Management

Bulk Water Management

The term bulk water management refers to impacted surface water and groundwater that would need to be managed prior to, during, or post sludge/sediment removal, and excludes leachate from sludge/sediment treatment processes (i.e., discharges from the containment cell following cessation of dredging operations). The proposed approach for the management of bulk water during active remediation of the BHETF is natural attenuation with no physical or chemical treatment beyond that achieved through the use of the Geotube® or equivalent technology dewatering process for dredged sludge/sediments.

Dewatering Effluent Management

Dewatering effluent is water generated from dewatering sludge/sediment using Geotube® or equivalent technology and effluent from the containment cell which has come in contact with waste. Geotube® or equivalent technology dewatering operations would occur within the containment cell. Geotube® or equivalent technology effluent would be collected and directed by discharge piping back to the BHSL in the areas being dredged, or into an area that has not been remediated. Through Geotube® or equivalent technology dewatering, the effluent is pre-treated through chemical dosing and Geotube® or equivalent technology filtration. The dewatering effluent then mixes with the bulk water and is managed through natural attenuation.

Leachate Management

All water that comes in contact with the waste material that is dredged would be managed as leachate. During the interim period, leachate would be directed from the containment cell to the stormwater management pond (which will be operated as a retention pond), prior to being conveyed to a TLTF configured in the area immediately east of the containment cell. Treated effluent from the TLTF that meets the appropriate discharge criteria would be conveyed to the discharge point of the BHSL to the estuary. It is expected that the TLTF would be required for approximately 1-2 years following cessation of dredging operations and for a few months following placement of final cover and closure of the containment cell.

Under post-closure conditions, the anticipated leachate generation rate from the containment cell is expected to be less than 2,500 cubic metres (m^3) per year (≤7.0 m^3/day), decreasing over time. In this post closure period, the TLTF would no longer be employed and would be removed. Leachate collected within the containment cell would be directed (pumped) to a 40 m^3 buried holding tank. Stored leachate would be pumped from the holding tank to tanker trucks and taken off-site.

2.3.5 Bridge at Highway 348

Currently a causeway along Highway 348 crosses the downstream end of Boat Harbour (Figure 1.1). The causeway would be demolished/decommissioned using mechanical means and replaced with a concrete girder bridge along the same alignment to return Boat Harbour to tidal conditions and to allow for boat access to the harbour.

The new bridge structure would be approximately 34 metres (m) long, single-span structure, maximizing the flow beneath the span through elimination of a center pier. The bridge would have a sidewalk on both sides and a decorative concrete and metal rail barrier to meet the necessary

requirements for pedestrians and architectural enhancements. Digital renderings of the proposed bridge are shown in Figure 2.4 and 2.5.

Figure 2.4 Digital Rendering of the Proposed Bridge (South View)

Figure 2.5 Digital Rendering of the Proposed Bridge (East View)

Site Preparation and Construction

The bridge would be constructed prior to dam decommissioning to allow sediment to be managed within Boat Harbour and prevent its migration downstream to the estuary or Northumberland Strait.

A water main is constructed within the existing Highway 348 causeway embankment and provides water supply from the nearby well field to PLFN. Prior to construction, a temporary single lane by-pass (causeway) would be constructed on the north side of the existing causeway (between the dam and the causeway) to facilitate traffic flow during bridge construction and a temporary water main and would be overland along the edge of the temporary by-pass. The design of the new bridge would incorporate a new support system for the water main.

Operation

It is anticipated that the bridge would have a service life of approximately 75 years.

Decommissioning and Abandonment

As the end of design life approaches, the bridge would most probably be refurbished, if community and traffic requirements do not require a significant change (either increase or removal) to the functionality of the bridge. Should the bridge no longer be required at end of design life, selective deconstruction and demolition would permit much of the bridge material to be removed and recycled or repurposed.

2.3.6 Infrastructure Decommissioning

2.3.6.1 Decommissioning Pipeline

The pipeline consists of approximately 2,305 m of 0.915 m diameter fiberglass reinforced plastic pipe buried on land (starting at a standpipe adjacent to the Kraft Pulp Mill property and running to the East River and emerging at Indian Cross Point then running under Highway 348 to the first BHETF open draining ditch) and approximately 1,220 m of 1.1 m diameter high density polyethylene pipe buried below the East River.

At the direction of Nova Scotia Environment (NSE), the owners of the Kraft Pulp Mill have cleaned and inspected the pipeline and confirmed that no effluent remains, and only 10 percent gravel remains in low portions of the pipeline that will not be removed. Therefore, no activities as part of this Project are required for the decommissioning of the pipeline sections that will be abandoned in place (i.e., no further cleaning or inspection will be completed).

Site Preparation and Construction

The pipeline will be cleaned and inspected to remove any accumulated solid residue and other liquids that otherwise could pose an environmental risk/liability.

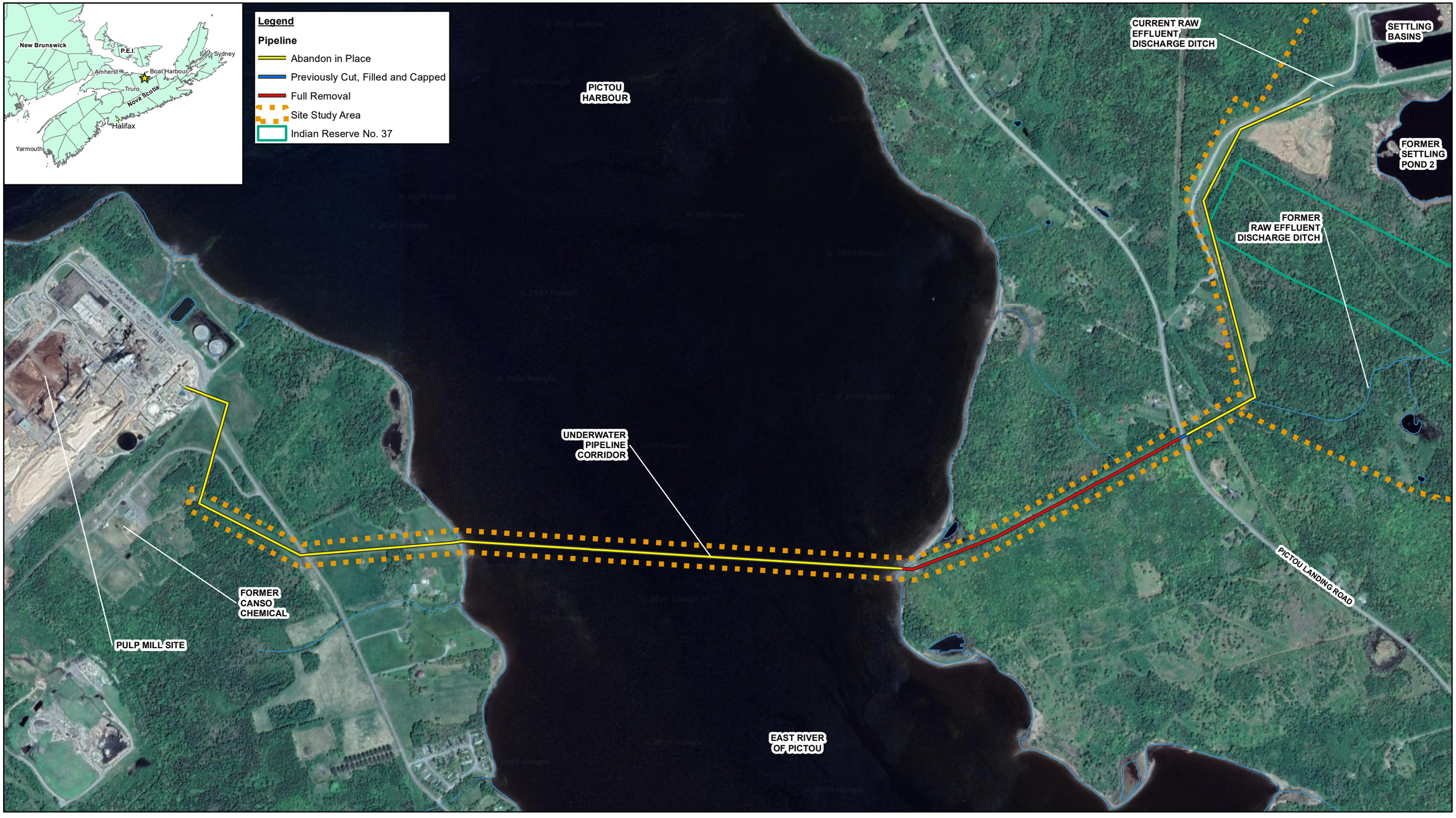
Operation

There is no operation phase associated with infrastructure decommissioning.

Decommissioning and Abandonment

The section of pipeline on land from the shoreline of Indian Cross Point east up to the Highway 348 property line, adjacent to a historic Mi'kmaq burial ground will be removed completely, as requested by PLFN (Figure 2.6). This would require clearing and grubbing within the existing pipeline easement prior to excavation and removal. Archaeological monitoring would be conducted.

The portion of the on-land pipeline that goes under Highway 348 has been severed, filled and capped by Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) on the Indian Cross Point side of Highway 348. The rest of the on land pipeline would be decommissioned and abandoned in place. Abandonment of the rest of the portions of the on land pipeline and the underwater pipeline would consist of leaving the cleaned and inspected pipeline in place. The ends of the pipeline would be plugged with an appropriate cap (e.g., concrete or bentonite plug). Each manhole will be cut approximately 1 metre below ground surface (mbgs) and backfilled (both remaining void space and disturbed area). Disturbed areas will be graded to match existing hard surfaces and to achieve positive drainage.



Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus; WSP Canada Inc., Project No. 171-10478

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Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

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NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

PIPELINE

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FIGURE 2.6

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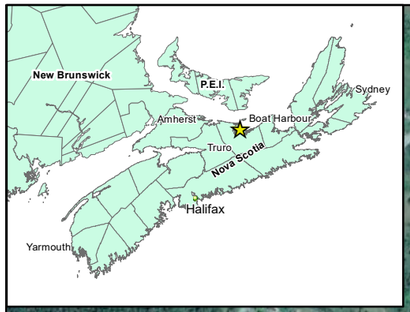
2.3.6.2 Treatment Buildings

Numerous treatment buildings, as well as small structures, (including Mobile Building Adjacent to Press Building; Storage Shed; Air Monitoring Shelter; Mobile Building belonging to CTS Electrical; Silo and Electrical Building; Point A Building; and Point C Building), were part of the BHETF (Figure 2.7). Treatment buildings and smaller infrastructure would undergo a chemical sweep, cleaning, designated substance removal (if any), followed by demolition using mechanical means. Footing and foundations would be cut and buried. Only above-grade structures would be removed.There may be an opportunity to re-purpose buildings where it may be beneficial to PLFN, which would require some modified approach to the decommissioning process. PLFN's potential use of buildings will be confirmed through further consultation with them. The demolition waste would be stockpiled and disposed of off-site at an appropriate landfill facility as per Nova Scotia's Management Guide for Construction and Demolition Debris[2].

[2] Nova Scotia. 2013. Management Guide for Construction and Demolition Debris. Available at: https://divertns.ca/assets/files/Guides/CandDManagementGuide.compressed.pdf



Legend

- Site Study Area
- Indian Reserve No. 24 (Pictou Landing First Nation)
- Indian Reserve No. 24G
- Indian Reserve No. 37
- Pipeline

DAM/DISCHARGE OF TREATED EFFLUENT
BOX CULVERTS
SETTLING BASINS
FORMER SETTLING POND 3
POINT A BLDG/ PRESS BUILDING
SILO/ ELECTRICAL BUILDING
BOAT HARBOUR STABILIZATION LAGOON
MOBILE BUILDING
ELECTRICAL BUILDING
DISCHARGE OF BIOLOGICALLY TREATED EFFLUENT
STORAGE SHED
AERATION STABILIZATION BASIN
CURRENT EFFLUENT DISCHARGE DITCH
PICTOU LANDING ROAD
FORMER SETTLING POND 2
CTS ELECTRICAL MOBILE BUILDING
POINT C BUILDINGS (ELECTRICAL & SAMPLING)
CONTAINMENT CELL
FORMER SETTLING POND 1
FORMER EFFLUENT DISCHARGE AREA (1967 - 1972)

Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus; WSP Canada Inc., Project No. 171-10478

0 100 200 300
Meters

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NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
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TREATMENT BUILDINGS

FIGURE 2.7

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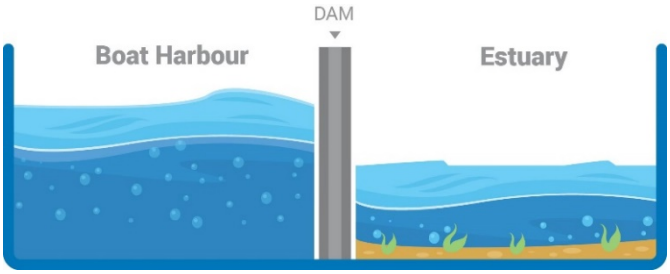
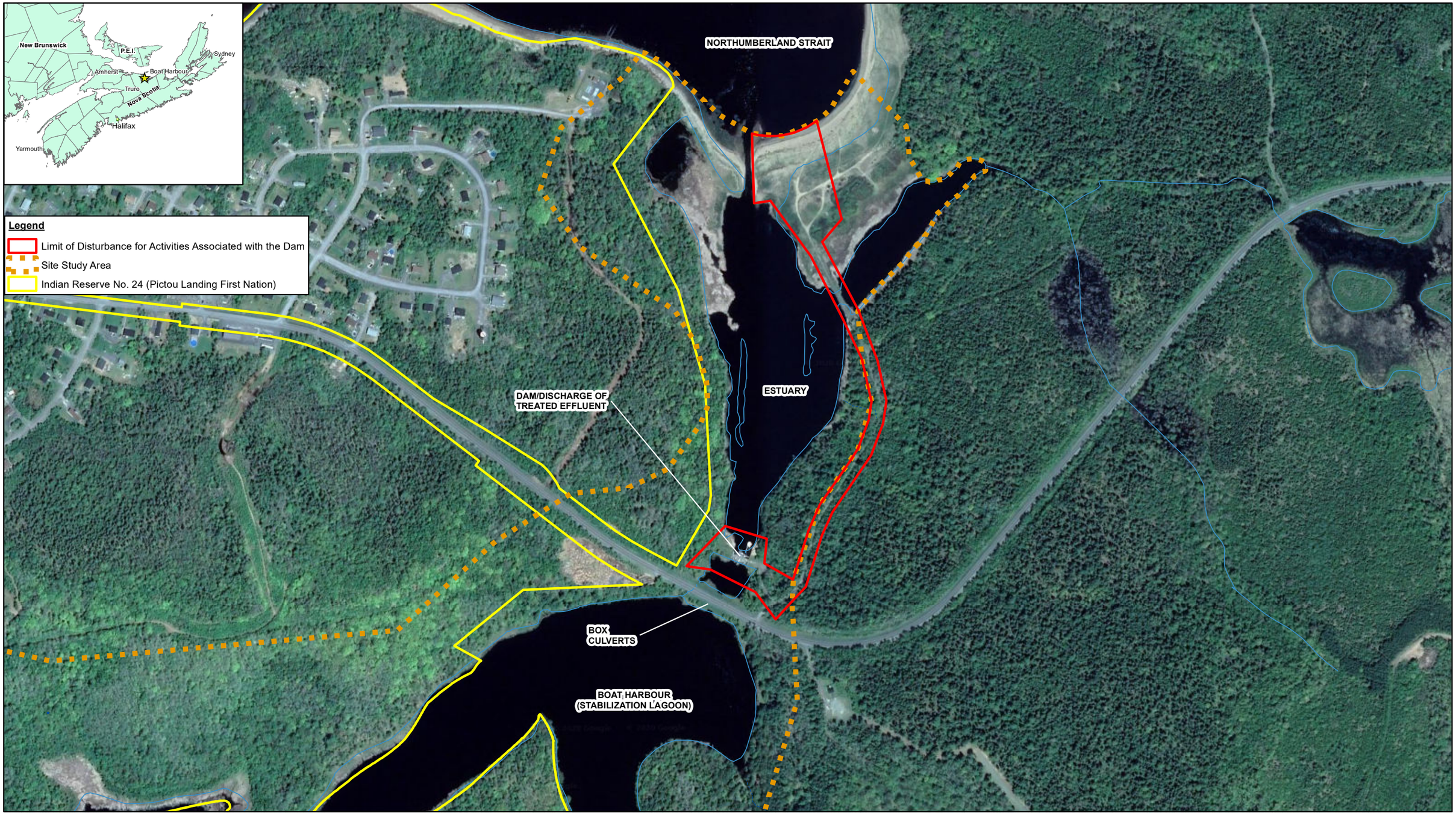
2.3.6.3 Dam

The dam is used to regulate the water level in the BHSL and is located north of the causeway at Highway 348 at the mouth of the estuary (Figure 1.1). The dam is a flat concrete slab structure with retaining walls supporting the earth embankments at both ends, the bottom elevation of the slab is approximately at minus 0.92 metres above mean sea level (mAMSL)[3] which is about the equivalent of low tide. The water levels are controlled by an adjustable weir/stop log arrangement within the dam structure. Under current operations, salt water intrusion of Boat Harbour occurs during high tide situations.



At completion of remediation activities within Boat Harbour, the remedial approach involves the demolition of the dam structure, stabilization of the estuary embankment slopes and dredging of the channel to ensure the hydraulics are maintained throughout the channel. Access to the location point for dredging of the channel will require the widening of an existing unmaintained road and establishment of a staging area. The limit of disturbance associated with removal of the Dam, widening of the access road and establishment of the staging area is shown in Figure 2.8.

[3] Above Mean Sea Level (AMSL); Based on CGVD26 Datum



Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus; WSP Canada Inc., Project No. 171-10478

0 50 100 150
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

11148275-31-03
Dec 2, 2020

LIMIT OF DISTURBANCE - DAM

FIGURE 2.8

GIS File: I:\GIS_DATA\Projects\8-chars\1114----\11148275 Boat Harbour\11148275-REPORTS\11148275-Rpt-29\11148275-31-03(029)GIS-HX0E2.8.mxd

Decommissioning and Abandonment

The demolition of the dam structure would consist of using mechanical equipment to break the concrete structure into smaller components to be excavated and dumped into a dump truck for off-site disposal at a construction and demolition facility licensed to accept the waste/recyclable materials The smaller elements of the structure would be demolished by hand, such as the timber screens and fences. The earthen berm connecting the dam to the banks would also be removed, as needed, to facilitate boat access to Boat Harbour.

Demolition would commence once the remediation is complete and Boat Harbour is ready to be reinstated back to tidal conditions. Once the dam structure is removed, the channel would be dredged to match the channel shape and depth of the bridge (that would be installed to replace the causeway) to ensure the hydraulics are maintained throughout the channel.

2.3.7 Remediation Infrastructure

In order to facilitate the proposed remedial works described in the preceding subsections, additional Site infrastructure would be required as outlined below.

Water Supply (Drinking and Industrial)

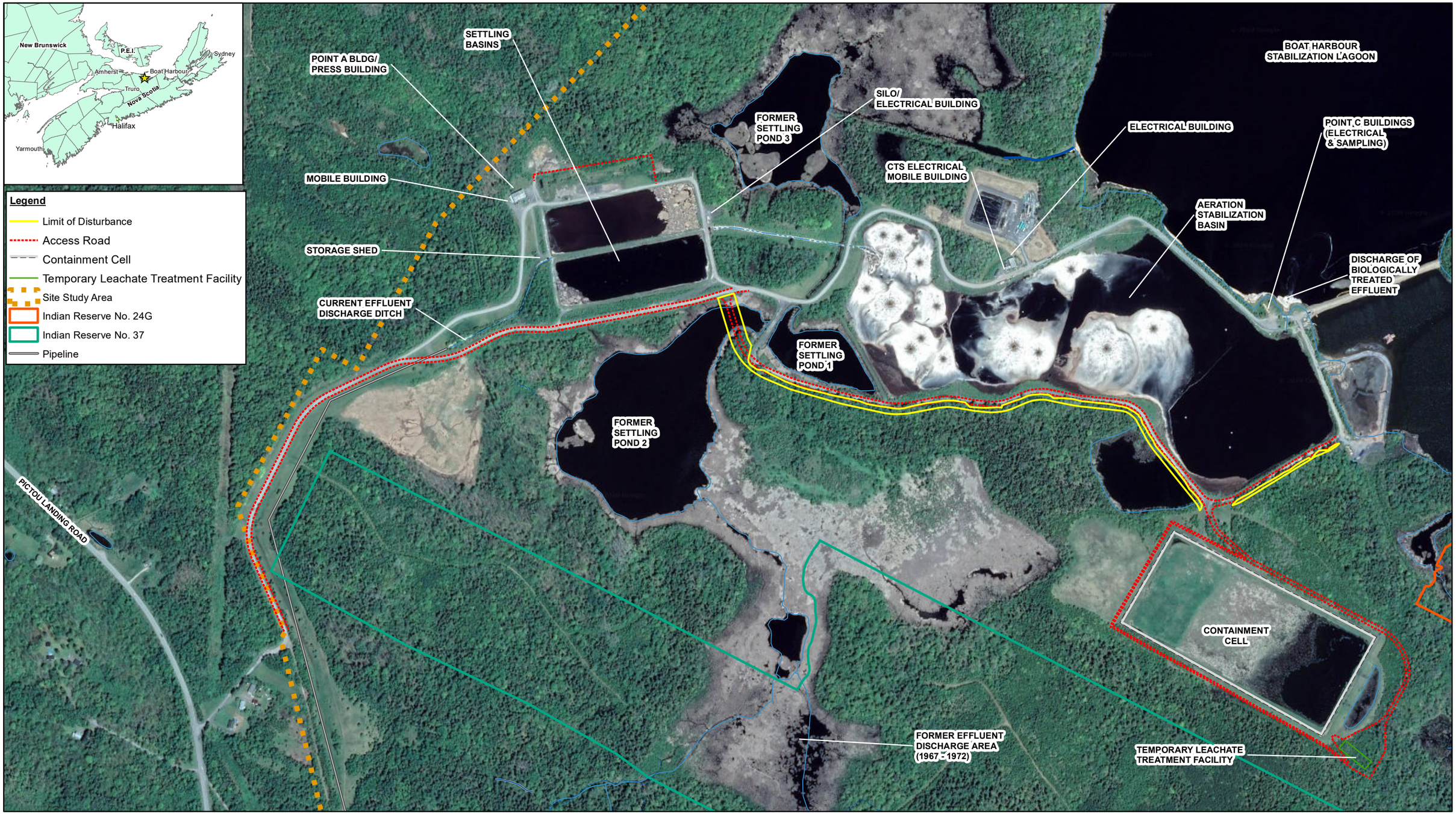
The proposed bridge would be designed to accommodate the potable water supply line from PLFN Well Field to the community, in accordance with potable water guidelines (Atlantic Canada Guidelines for Drinking Water Supply Systems). Temporary water supply service would be required during causeway removal and bridge construction activities. Upon completion of bridge construction, permanent water supply services would be reinstated. Permanent water supply services would be conveyed by a pipeline suspended from the bridge and would require continual electric power source/supply for heat tracing.

Industrial water is not anticipated to be required on-site. Boat Harbour water will be recycled and used for polymer preparation for treatment of the Geotube® or equivalent technology dewatering effluent during dredging operations. Dredging operations will be recycling water from and back to Boat Harbour at a rate estimated to be 12,000 m^3/day.

Site Access

The Site has an existing access road (Simpsons Road) that extends from Pictou Landing Road/Highway 348 to the berm separating the ASB from BHSL.

Access to the containment cell is via a single lane gravel roadway off the perimeter road along the southern bank of the ASB. Vehicle access to the containment cell would need to be upgraded to facilitate cell improvements, waste placement, construction of final cover, and post-closure monitoring and care including leachate management. As such, the existing access road would be realigned and widened to facilitate vehicle access. Figure 2.9 identifies the approximate limit of disturbance required for access road upgrades.



Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus; WSP Canada Inc., Project No. 171-10478

0 60 120 180
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

11148275-31-03
Dec 2, 2020

ACCESS ROADS AND LIMIT OF DISTURBANCE

FIGURE 2.9

GIS File: I:\GIS_DATA\Projects\8-chars\1114----\11148275 Boat Harbour\11148275-REPORTS\11148275-Rpt-29\11148275-31-03(029)GIS-HX0E2.9.mxd

Construction of temporary access roads into the wetlands to facilitate dewatering and removal activities would also be required. These access points would utilize previously disturbed areas wherever possible.

Permanent and Temporary Linear Infrastructure

Temporary linear infrastructure includes floating pipelines, booster pumping station, temporary power supply to several areas around the Site, wash down areas, and road improvements across existing berms. These components would be removed on conclusion of the works and any disturbed areas stabilized prior to demobilization from the Site.

Energy Supply

In the earliest stages of the Project the energy supply to the Site on the west side would be improved and extended to reach the containment cell. This extension is required to permanently power the leachate collection system and truck loading station. This same line would be used for temporary power supply to construction trailers and water management pumps in the cell area in order to minimize impact to the surrounding area.

The dredging operations would require power for both dredge operation and pumping of dredged material to the containment cell. These systems would be diesel powered, as they are typically required to be mounted on floating equipment/barges.

2.4 Schedule

The remedial works would be generally sequenced from upstream to downstream as follows (years following approval). Note that the conceptual schedule shown is based on initiation of site works in spring of that year:

Years	1	2	3	4	5	6	7	Ongoing
Site Preparation and Construction								
Site Preparation and Controls	■							
Pipeline Cleaning and Settling Basins Initial Remediation	■							
Influent Ditch Remediation	■							
Water Level Controls Installation	■							
Containment Cell Modifications	■	■						
Operation and Decommissioning								
Wetland Remediation		■						
ASB Remediation			■					
Boat Harbour Stabilization Lagoon Remediation			■	■	■			
Berm Removal				■	■			
Final Sedimentation Basin Remediation					■			
Containment Cell Interim Closure					■			

Years	1	2	3	4	5	6	7	Ongoing
Temporary Leachate Treatment								
Causeway Removal and Bridge Construction								
Containment Cell Consolidation Period (2-4 years)								
Temporary Infrastructure Removal and BHETF Infrastructure Decommissioning								
Dam Removal								
Containment Cell Operation and Maintenance and Final Closure								

Seasonality and Frequency of Activities

All planned Project activities will be governed under the overall environmental assessment approval; however, many activities will require separate approvals such as an Industrial Approval(s). The EIS describes planned Site activities, however, should deviations from the plans described in the EIS occur during Project implementation, separate approvals or amendments to existing approvals may be required. NSLI has spent over 5 years in the planning of the Project and liaised closely with regulatory agencies and therefore is fully aware of the requirements and the processes involved with obtaining the necessary approvals and any amendments. The knowledge gained through consultation with regulatory agencies and other external stakeholders such as PFLN has been carefully considered in the planning of the Project and will continue to be considered throughout the tendering, implementation and post remediation monitoring stages of the Project.

3. Alternative Means of Carrying out the Project

Alternative means of carrying out the Project are defined as means of similar technical character or methods that are functionally the same. Alternative means differ from alternatives in that they represent the various technical and economically-feasible ways that a project can be carried out, and which are within the Proponent's scope and control.

With the above in mind, alternative means of carrying out the Project that are technically and economically feasible were identified and considered in addressing the purpose of the BHRP in accordance with the EIS guidelines.

3.1 Identification of Alternative Means

A logical and stepped approach was taken for the identification and assessment of remedial components; the methodology began with the identification of Approaches for each remedial component, which were then broken down to Alternative Means. The identification of Alternative Means for each remedial component was largely based on technical expertise of the team, collaboration with subject matter experts, and research.

To resolve uncertainties and verify the assumptions, pilot scale testing was completed and consisted of the determination, validation, and verification of selected technologies for the remediation of the BHETF. A quantitative HHERA and Supplemental Site Investigation (SSI) was also completed. The purpose of the HHERA was to assess potential risk to human health and ecological receptors from exposure to chemicals of potential concern Contaminants of Potential Concern (COPCs) in soil, sediment, surface water, and groundwater at the Site. The SSI was completed to supplement the existing dataset and provide Site-specific data, including invertebrate, plant, fish and game tissue analyses, to develop robust and scientifically defensible HHERA exposure models.

Results of the HHERA were used to determine if remediation or additional risk management is required to be incorporated into the remedial design for the BHETF or if natural attenuation is a technically and socially feasible remedial option for specific areas of the Project.

3.2 Alternative Means Considered

In developing the Alternative Means, NSLI took into account the overall vision of the Project that was developed through consultation and engagement with PLFN. Through the proposed Project, it is PLFN's desire and vision that Boat Harbour (known to PLFN as A'se'k) be returned to tidal estuary and allow the community to re-establish its relationship with the water and land of A'se'k. Through the application of filters, Alternative Means that were not feasible were eliminated. Below is an overview of the approaches considered and those carried forward for evaluation as Alternative Means for each of the Project components.

3.2.1 Waste Management

Four approaches were identified for the management of waste generated as part of the remediation of the BHETF. It is noted that under each approach, the existing containment cell would be left in place. The four approaches reviewed are as follows:

A. Use Existing Containment Cell | This Approach consisted of the use of the existing containment cell to manage waste generated as part of remediation. The containment cell has received sludge originating from the BHETF under IA 94-032 since 1996. The disposal cell operates under a separate approval from the BHETF.

B. Develop New Containment Cell | This Approach consisted of the establishment of a new containment cell using the existing settling basins as the preferred containment cell location. This proposed location is ideal as it is an already disturbed area on provincial land and is currently accessible using the BHETF site access road (Simpsons Road).

C. Use Existing and New Containment Cell | This Approach combines aspects of the above two Approaches through use of the existing containment cell and development of a new containment cell within the existing settling basins. This Approach was developed to provide the flexibility to manage a potentially greater volume of waste that may be generated as a result of the remediation of BHETF.

D. Off-site Disposal | This Approach consisted of hauling the waste materials to a licensed off-site facility.

Approach A | Use existing containment cell, was selected as the Preferred Alternative for the management of dewatered sludge and sediment waste. Under Alternative Mean 1, the 220,000 m^3

(waste) design capacity of the existing 6.7 hectares (ha) containment cell would be exceeded based on the physical properties of the waste and recommended final elevations. The containment cell would be modified to enhance the leachate collection layer and facilitate placement and dewatering of the sludge/sediment in a one-step operation, through vertical expansion. Final landfill cover contours would be designed to accommodate the anticipated range of final waste volumes, minimize precipitation infiltration through the cap, control the release of landfill gas, and accommodate end use.

3.2.2 Dredging

Three Approaches were identified for the sediment/sludge treatment as part of the BHRP implementation:

A. Natural Attenuation | This Approach involved natural attenuation of contaminants, which is commonly used as a remedial option to address residual impacts to an ecosystem after the contaminant source has been removed or eliminated.

B. Removal | This Approach involved sludge removal from impacted areas and ex-situ sludge management. Removal may be completed in wet or dry conditions.

C. Manage in Place | This Approach involved in-situ remediation Approaches to address contamination in place without the removal of the sludge.

Removal in the Wet with Geotube® or equivalent technology Dewatering was selected as the Preferred Alternative for the treatment of sludge and impacted sediment. Removal in the wet would involve dredging sludge from the ASB, Boat Harbour, and estuary under wet conditions, and would be predominantly completed through hydraulic dredging due to the ease of material transfer.

Hydraulically dredged sludge slurry would be pumped through discharge lines to the sludge management area, located directly in the containment cell. Multiple Geotubes® or equivalent technology would be set up as permitted by space.

3.2.3 Wetland Management

Two Approaches were identified for the management of wetlands as part of the BHRP implementation:

A. Natural Attenuation | This Approach involved natural attenuation of contaminants, which is commonly used as a viable remedial option to address residual impacts to an ecosystem after the contaminant source has been removed or eliminated.

B. Remediation | This Approach involved remediation of impacted sludge in the wetlands either through in-situ or ex-situ remediation Alternative Means. In-situ remediation refers to techniques to address contamination in place without the removal of the sludge (e.g., encapsulation or treatment); while ex-situ remediation involves direct removal of sludge from the wetlands.

Natural Attenuation was selected as the Preferred Alternative for the management of wetlands. Natural attenuation involves no physical removals of the contaminants from the wetlands. This option is available if the contaminants and physical setting they are in have been highly characterized and assessed, and it was determined that this option presents acceptable risk to all

possible receptors. Wetland function may be enhanced as well as vegetation density or location through plantings.

It should be noted that based on additional findings through the HHERA, portions of the wetlands and the estuary are impacted above the risk based criteria established in the HHERA and therefore will need to undergo ex-situ remediation discussed under Alternative Mean 2. Areas where the concentrations are below the risk based criteria will be managed though natural attenuation, as the Preferred Alternative.

3.2.4 Water Management

Two Approaches were identified for water management as part of the BHRP implementation. These Approaches included:

A. On-site Management | This Approach involved on-site management using appropriate technology in a wastewater treatment system prior to discharge to a natural water body.

B. Off-site Management | This Approach involved off-site management consisting of a conveyance system to a wastewater treatment plant (WWTP), with or without pre-treatment.

On-site Management Using Appropriate Technology Treatment System was selected as the Preferred Alternative for bulk water management and dewatering effluent management.

Off-site Disposal was selected as the Preferred Alternative for post-remediation leachate treatment. This alternative involves disposing of leachate at an off-site Nova Scotia Environment (NSE) approved facility for disposal by tanker truck. Leachate would drain from the containment cell to the storage tanks. A truck loading station would facilitate the loading of leachate into a tanker truck. The tanker truck would then transport and dispose of leachate at an off-site NSE approved facility for disposal.

3.2.5 Bridge at Highway 348

Two Approaches were identified for the Bridge at Highway 348 as part of the BHRP:

A. Do Nothing | This Approach involves leaving the existing causeway in place.

B. Demolish and Replace Infrastructure | This Approach involved demolishing the existing causeway at Highway 348 and replacement of the causeway with a bridge.

The Concrete Girder Bridge was selected as the Preferred Alternative for the Bridge at Highway 348. The new bridge structure would be an approximately 34 m long, single-span structure, maximizing the flow beneath the span through elimination of a center pier. A concrete superstructure is preferred by Nova Scotia Transportation and Infrastructure Renewal (NS TIR) due to its durability, longevity, and low long-term maintenance costs.

3.2.6 Infrastructure Decommissioning

3.2.6.1 Pipeline

Five Approaches were identified for decommissioning the pipeline as part of the overall infrastructure decommissioning to be conducted during BHRP implementation:

A. Do Nothing.

B. Clean, Inspect, and Abandon | This Approach involved cleaning the pipeline to remove accumulated solid residue and other liquids that might otherwise be released during decommissioning activities, or pose as an environmental risk/liability should the pipeline be abandoned in place, followed by an inspection of the pipeline to confirm its integrity followed by cutting and capping the pipeline to render it not usable in the future.

C. Clean and Fill | This Approach involved cleaning of the pipeline as noted in Approach B followed by filling of the pipeline to render it unusable in the future.

D. Complete Removal | This Approach involved cleaning of the pipeline as noted in Approach B followed by excavation, removal, and disposal of the pipeline.

E. Clean and Collapse | This Approach involved cleaning of the pipeline as noted in Approach B followed by excavation and crushing of the top of the pipeline, and backfilling with clean fill.

Clean, Inspect, and Abandon in place was selected as the Preferred Alternative for pipeline decommissioning under water. The Approach decision for the section of the pipeline between the East River and Highway 348 was delegated to PLFN as that specific section is adjacent to historic burial grounds. In January 2020, PLFN decided that the Approach for the pipeline adjacent to the historical burial grounds should be Approach D, Complete Removal. With this in mind, the section of pipeline on land from the shoreline of Indian Cross Point east up to the Highway 348 property line, adjacent to a historic Mi'kmaq burial ground will be removed completely, as requested by PLFN. The portion of the on land pipeline that goes under Highway 348 has been severed, filled, and capped by Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR). The rest of the on-land pipeline will be abandoned in place.

3.2.6.2 Treatment Buildings

Three Approaches were identified for decommissioning of the treatment buildings as part of the overall infrastructure decommissioning to be conducted during BHRP implementation:

A. Do Nothing.

B. Demolish | This Approach involved the decommissioning and demolition of multiple BHETF buildings in an environmentally sound manner and in accordance with acceptable health and safety practices.

C. Repurpose | This Approach involved repurposing a building consistent with overall Site end use objectives.

Decommissioning and Demolition of the treatment buildings was selected as the Preferred Alternative for the management of treatment buildings. Re-purposing of buildings will occur on an as-identified basis during operation and decommissioning phases of the Project.

3.2.6.3 Dam

Three Approaches were identified for decommissioning of the dam as part of the overall infrastructure decommissioning to be conducted during BHRP implementation:

A. Do Nothing.

B. Demolish | This Approach involved the decommissioning and demolition of the dam in an environmentally sound manner and in accordance with acceptable health and safety practices.

C. Repurpose | This Approach involved repurposing the dam consistent with overall Site end use objectives.

Decommissioning and Demolition of the dam was selected as the Preferred Alternative.

4. Public Participation

NSLI has extensively engaged and consulted with stakeholders, both formally and informally, prior to the CEAA 2012 process being initiated in early 2019 for the BHRP. Using key values of openness, transparency, collaboration and respect, NSLI has consulted with a number of stakeholders since the launch of the Project in 2014, including the Mi'kmaq of Nova Scotia and public.

NSLI continued to consult with the following stakeholders prior to and during the development of the EIA:

- Interested public members
- Property owners adjacent to the Site Study Area
- PLFN
- Residents, businesses and community groups in Pictou County and the surrounding area
- Agencies (federal and provincial)
- Boat Harbour Environmental Advisory Committee (BHEAC)
- Local municipal staff and elected officials
- Provincial and federal elected officials
- Northern Pulp Workforce and Northern Pulp Executive
- Environmental Services Association Maritimes
- Northumberland Fisherman's Association
- Academic experts

Methods of Consultation

Methods of communication and consultation used throughout Project planning and the development of the EIA included:

- Public stakeholder meetings with the broader community (October 2016, April 2018, and May 2018)
- BHEAC meetings, commencing in January 2016. The BHEAC is led by NSLI comprised of subject matter experts from, several provincial and federal departments (including Health Canada, Environment and Climate Change Canada, Fisheries and Oceans Canada, Indigenous Services Canada Nova Scotia Environment, Nova Scotia Lands and Forestry, and Nova Scotia

Office of Aboriginal Affairs), academic experts from several universities in Nova Scotia, consultants from GHD, and PLFN. It is aimed at providing expert advice on the environmental management of the Project throughout the life of the Project to ensure that it is carried out in a manner that is environmentally acceptable and safe to human health. The committee has met on average ten times per year since January 2016, typically held on a monthly basis, and plans to continue throughout the EIA process and Project implementation, on a bi-monthly basis.

- Public Open Houses, held on August 1, 2019 and December 10, 2019 to inform public stakeholders about the proposed plans for remediation of Boat Harbour, introduce the public to the EIA process and findings, and provide an opportunity for public comments and concerns to be heard and addressed.

Key Issues Raised

Key Project-related issues raised during consultation and engagement included the effectiveness and longevity of the containment cell to contain the waste placed in it as the Project progresses; odour and concerns regarding odour mitigation; pipeline decommissioning and the desire for complete removal of the pipeline; and concerns regarding the long-term safety and monitoring of the environment. NSLI' consideration of the comments received during the EIA are summarized below.

Containment Cell

In response to the public and PLFN concerns relating to the containment cell, including the effectiveness and the longevity of the containment cell to contain the waste placed in it as the Project progresses, NSLI committed to continue to engage with stakeholders on the topic of the containment cell. At this stage, to address concerns raised about the longevity and effectiveness of the containment cell, NSLI has designed an improved base liner system that will reduce the potential for leachate to migrate through the liner to the groundwater and has modelled the effectiveness of the liner. In addition, NSLI will:

- Ensure that the liner is installed and tested in accordance with best practices using quality control and assurance procedures.
- Develop a groundwater and surface water monitoring program to monitor the effectiveness of the containment cell during and post-closure of the modified cell.
- Implement a long-term post-closure monitoring and care program for the containment cell.

Odour

Remediation activities will result in a major improvement of air quality and odour at the Site. Mitigation measures have been proposed to limit any potential odours during remediation activities, which include, but, are not limited to:

- Minimize potential odour emissions by properly covering the dredged sediment to reduce the exposed area and the potential odour emissions during transportation of the dredged material.
- Implement Geotubes® or equivalent technology enclosures.
- Minimize the size/extent of open faces of the containment cell that have potential to emit odours or other contaminants.

Pipeline Decommissioning

The proposed solution for the pipeline under the East River is that it will be decommissioned, cleaned, inspected, plugged, and abandoned in place. This has been determined as being the most protective of the aquatic environment.

Based on the desire of PLFN, the pipeline will be removed in the area near the Mi'kmaq burial ground between Indian Cross Point and Highway 348. The portion of the on-land pipeline that goes under Highway 348 has been severed, filled, and capped by Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR). The rest of the on-land pipeline would be decommissioned and abandoned in place. Additional investigation will occur along the entire pipeline corridor to determine if there is any contamination in the surrounding soils, which will confirm the proposed approach for decommissioning the pipeline. Due to the intrusive nature of the additional investigation, it must occur once the pipeline is no longer in use.

Environmental Safety

Concerns around long-term safety and monitoring of the environment will be addressed through a long-term monitoring program. As part of the monitoring program, sampling results and regular updates will be made available on the Project's website.

The results of the monitoring programs will be documented and where appropriate, summaries of compliance and effects monitoring programs will be made available in a timely manner on the NSLI' Boat Harbour Remediation website: https://novascotia.ca/boatharbour/monitoring.

Ongoing Engagement and Consultation

In terms of ongoing consultation, a formal complaint protocol will be set up prior to commencing construction activities. This protocol will outline how complaints can be submitted and the steps taken to address the complaint. All complaints will be reviewed annually, summarized and reported on the Project's website.

NSLI will implement an issues resolution strategy in order to ensure that issues are effectively and appropriately addressed and resolved

5. Engagement with the Mi'kmaq of Nova Scotia

5.1 Formal and Informal Consultation Prior to the EIA

NSLI has implemented a robust engagement program with PLFN since 2014. Engagement activities with PLFN have included but are not limited to the following:

- Funding a full-time Community Liaison Coordinator (CLC) from PLFN, commencing in April 2016. The CLC is in the community full-time with a focus on providing Project information and facilitating the flow of Project information. In November 2017, the Province funded two additional full-time support staff to assist the CLC with the development and implementation of PLFN-specific community activities focused on information and knowledge sharing.

- Establishing a Boat Harbour Clean-up Committee (BHCC), which is led by the NSLI Project Leader and the Chief of PLFN and comprised of Band council members, PLFN community members and representatives from NSLI and the Nova Scotia Office of Aboriginal Affairs.
- Participation of the PLFN CLC and other members of the PLFN community in the BHEAC.

5.2 Consultation During the EIA

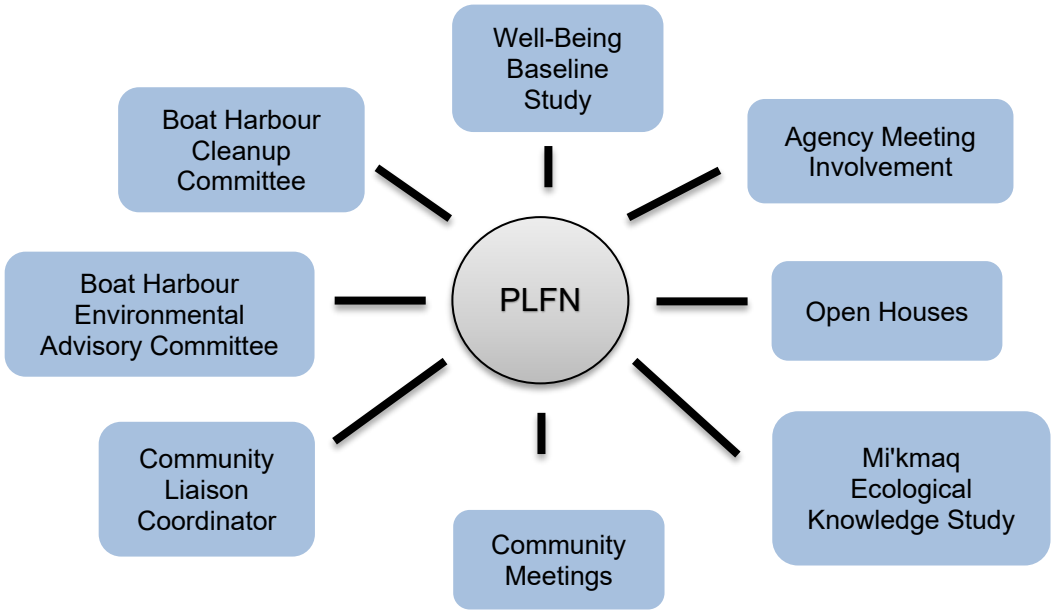
The engagement, consultation and Mi'kmaq participation in the EIA is focused on the PLFN community, as PLFN was delegated the authority by the Nova Scotia Mi'kmaq to speak on behalf of all First Nations relating to the remediation of Boat Harbour, as they have the potential to be the most affected by the Project.

The informal and formal consultation since 2014 that was undertaken before the Notice of Determination of Requirement for federal EIA was used to inform the details of the Project in the early planning stages and to shape the engagement and consultation process for the EIA.

Engagement Activities Undertaken

The existing committees and other engagement methods established prior to the EIA continued to operate throughout the EIA process, including the BHCC, BHEAC, the role of the CLC, and other community meetings. During the EIA, NSLI undertook additional activities to receive further input from the PLFN community including the commissioning of a Mi'kmaq Ecological Knowledge Study (MEKS), hosting two EIA open houses for PLFN, PLFN's inclusion in agency meetings, and the commissioning of a Well-Being Study. Figure 5.1 presents all methods of engagement with PLFN.

Figure 5.1 Methods of Engagement with PLFN During the EIA



Consideration of Key Issues Raised

The key issues raised by PLFN included the long-term storage of the impacted waste on-site in the containment cell, removal of the pipeline, and potential contamination levels in the surrounding environment. NSLI' consideration of the comments received during the EIA are summarized below.

Temporary By-Pass Causeway

As per PLFN's feedback, NSLI updated the design and plans to include a temporary by-pass causeway during removal of the existing causeway and construction of the new bridge.

Pipeline

Based on feedback received from PLFN, NSLI has updated the design to include complete removal of the section of the pipeline where it comes ashore at Indian Cross Point until it reaches the right-of-way for Highway 348.

Long-Term Storage of Waste On-site

In response to PLFN's concerns relating to the containment cell, including the effectiveness and the longevity of the containment cell to contain the waste placed in it, NSLI will continue to engage with PLFN on the topic of the containment cell.

To address concerns raised about the longevity and effectiveness of the containment cell, NSLI has designed an improved base liner system that will reduce the potential for leachate to migrate through the liner to the groundwater and has modelled the effectiveness of the liner.

Lands owned by the Province will be transferred to PLFN once they are no longer required for remediation or required for post-closure maintenance and monitoring of the containment cell. These land transfers provide some accommodation to PLFN relative to any diminished use of lands used by PLFN due to the existence of the containment cell.

Contamination Levels

Sampling has shown that vegetation such as trees and bushes in and around the areas of sediment and surface water contamination in the Boat Harbour area are not contaminated and would be safe to burn. However, additional monitoring will be completed to ensure vegetation is safe for other uses.

Ongoing Engagement and Consultation

NSLI is committed to ongoing engagement and consultation with PLFN during the remainder of the EIA process and implementation of the Project, building on the activities carried out to date. For instance, the BHCC and BHEAC meetings and the role of the CLC will continue throughout the remainder of the EIA process and through implementation of the Project.

NSLI is also proposing to continue engagement and consultation with PLFN during subsequent stages of the Project to present follow-up and monitoring results. This could include, but is not limited to, additional community meetings, workshops and visioning sessions.

5.3 Impacts to Potential or Established Aboriginal or Treaty Rights

The potential adverse impacts of the Project on PLFN's Aboriginal or Treaty rights are:

- Temporary disturbance due to noise, dust, odour, and visual alteration of the area. Long-term disturbance due to continued storage of waste material adjacent to Boat Harbour (e.g., visual disturbance, loss of use, etc.).
- Effects to the well-being of PLFN due to the continued storage of waste proximal to Boat Harbour.

The potential positive impacts of the Project on PLFN's Aboriginal or Treaty rights are:

- Transfer of land to PLFN that have occurred, are committed to and are contemplated.
- Long-term remediation of Boat Harbour, leading to the availability of the area for the exercise of fishing, hunting, gathering and other cultural and traditional use activities.

6. Summary of Valued Component Environmental Effects Assessment

Valued components (VCs) are environmental biophysical or human features that may be impacted by a project. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it. For example, it may have scientific, social, cultural, economic, historical, archaeological, or aesthetic importance. The VCs and aspects of the physical environment (atmospheric environment, groundwater and surface water, and riparian, wetland and terrestrial environments) that are relevant to this Project are:

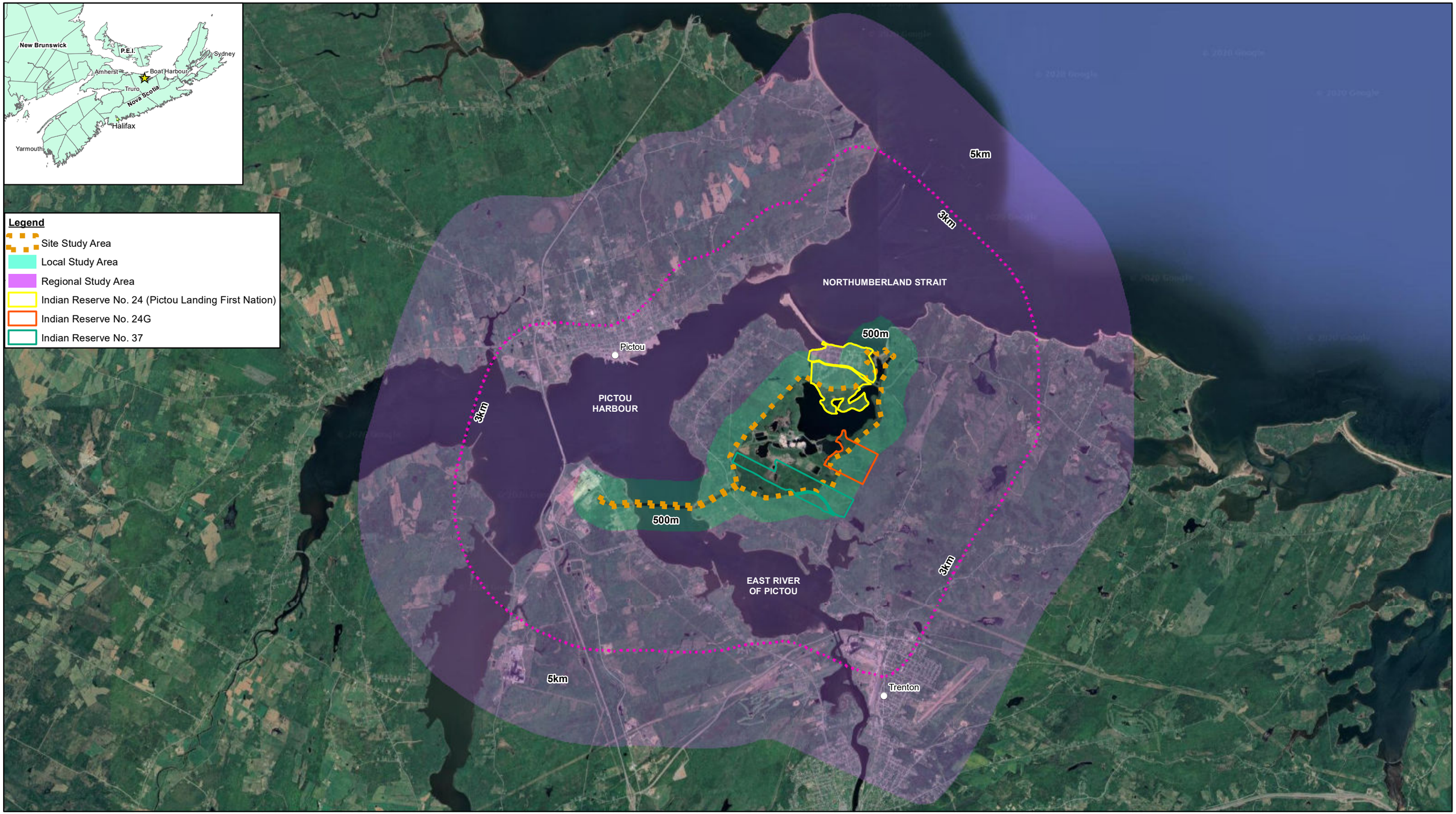
- Air Quality and Odour
- Greenhouse Gases
- Noise
- Light
- Geology, Geochemistry, and Soil
- Groundwater
- Surface Water
- Terrestrial Habitat and Vegetation
- Wetlands
- Mammals and Wildlife
- Marine Environment
- Fish and Aquatic Habitat
- Migratory Birds
- Species at Risk (SAR)

- Mi'kmaq of Nova Scotia
- Economic and Social
- Archaeological/Cultural Heritage Resources
- Human Health

In order to predict the full extent of environmental effects anticipated as a result of interactions between the Project and each identified VC and aspect of the physical environment, the general spatial boundaries within which environmental effects are expected to occur were defined. The following general spatial boundaries are used for this Project (see Figure 6.1):

- Site Study Area | Spans from the effluent pipeline from the first standpipe on the Kraft Pulp Mill property below the East River, through existing and historic BHETF lands, Boat Harbour and its banks, extending to Northumberland Strait, and PLFN, located between Boat Harbour and Northumberland Strait.
- Local Study Area | All lands and water within 500 m of the Site Study Area.
- Regional Study Area | All lands and water within approximately 3 and 5 kilometres (km) of the Site Study Area.

Specific spatial boundaries may vary for each aspect of the physical environment and identified VCs.



Source: Imagery @2017 Google CNES / Airbus, DigitalGlobe, Landsat / Copernicus

0 750 1,500 2,250
Meters

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

11148275-31-03
Dec 2, 2020

PROJECT STUDY AREAS (GENERAL)

FIGURE 6.1

GIS File: I:\GIS_DATA\Projects\8-chars\1114----\11148275 Boat Harbour\11148275-REPORTS\11148275-Rpt-29\11148275-31-03(029)GIS-HX0E6.1.mxd

6.1 Description of the Baseline

Environmental baseline studies were carried out to establish the physical and biological setting at the Site as part of the EIA. The vast array of environmental baseline studies completed as part of the EIA and Project planning were used to supplement the existing historical information and data collected. The baseline study program was developed following a workshop with regulatory agencies and covers the VCs listed above.

6.1.1 Atmospheric Environment

Air Quality and Odour

Ambient/existing air quality concentrations for the following contaminants and emissions were collected from existing monitoring data and compared to appropriate guidelines and standards:

- Total Suspended Particulates (TSP) Respirable particulates of less than 10 microns (PM_{10})
- Fine particulates smaller than 2.5 microns ($PM_{2.5}$)
- Carbon monoxide (CO)
- Sulphur oxides (SO_X)
- Nitrogen oxides (NO_X)
- Volatile organic compounds (VOCs)
- Hydrogen sulfide (H_2S)

Greenhouse Gas

A Greenhouse Gas (GHG) Mitigation Assessment calculated existing and anticipated carbon dioxide equivalent (CO_2e) emissions, assuming continued operation of the BHETF for the 25-year period from 2018 to 2043, as follows:

- Diesel – 28 tonnes CO_2e (tCO_2e)
- Disposal Cell – 184,302 tCO_2e
- Electricity – 184,250 tCO

Noise

Baseline conditions for Noise were established through an analysis of baseline noise levels. The baseline noise consisted of the collection of sound measurements at five locations that represent the worse-case sensitive receptors over a period of two days under calm weather conditions. The baseline ambient sound levels in the area are dominated by wildlife, light vehicle traffic, and operational noise from the BHETF (particularly aeration equipment in the ASB directly south of Station 2) and range from approximately 35 dBA to 57 dBA across the five stations monitored over the standard day, evening, and night-time periods. Baseline noise monitoring completed indicated that noise levels are within acceptable NSE Noise Guidelines levels.

Light

The Site Study Area can be currently classified as Institution of Lighting Engineers' "E2 Low district brightness areas", with low district brightness typical of rural areas. Ambient night-time light conditions would be minimal and typical of an undeveloped rural area. Based upon this classification, the light trespass limit at an off-site receptor after curfew (typically considered to be 11:00 p.m.) is 1 lux, which is the accepted equivalent to moonlight.

Meteorological

Climate normal (30-year averages) for temperature, precipitation, and snowfall from the weather station located at Lyons Brook were received for the 1981 to 2010 time period. Temperature normal data from Lyons Brook (1981-2010) indicate the daily mean temperature during that period at 6.6 Degrees Celsius (°C). The annual mean daily maximum temperature during that period was 11.4°C and the annual daily minimum temperature was 1.8°C. Total annual mean precipitation for the same 30-year time period is given as 1,232.2 millimetres (mm), 279 centimetres (cm) of which fell as snow. The total annual mean precipitation is defined as the total water equivalent of snowfall plus rainfall. Average annual snow depth was 6 cm with no snow cover for the months of April to October.

Based on a review of the 1981 to 2010 climate normal (the most complete dataset in the region) for wind at the Halifax Stanfield International weather station, the 30-year annual mean wind speed for the station was 16.5 kilometres per hour (km/h), with winds most frequently blowing from the south. Wind speed and wind direction are key parameters that are measured on a weekly basis at the Site. Data collected is available on the Boat Harbour Remediation Project website: https://novascotia.ca/boatharbour/monitoring/.

6.1.2 Geology, Geochemistry and Soil

The Site Study Area is within the Northumberland Lowlands physiographic region of Nova Scotia. This section includes imperfectly drained soils and is subject to a wide range of climatic conditions. Surficial geology within the Site Study Area is mainly composed of hummocky ground moraine and areas with silty till drumlins. The silty till plains bordering the area of interest are composed of silty, compact till with moderate drainage, and contain materials deposited through glacial activity from outside Nova Scotia.

Geologic hazards (e.g., karst topography, unstable slopes, faults) for proposed construction areas have not been documented in literature or observed in the studies completed. Shoreline instability along the Northumberland Strait located north of the Site is observed and well documented but was examined through publicly available literature and has been accounted for in the Project design.

No seismic activity is recorded for the Site Study Area above an earthquake of magnitude 2.5, which is the lowest recorded by Earthquakes Canada database.

Soil samples collected across the Site exceeded the applicable provincial and/or federal soil criteria for metals, VOCs, and general chemistry. Criteria exceedances were not reported for Polycyclic Aromatic Hydrocarbons (PAHs), Petroleum Hydrocarbons (PHCs), Polychlorinated Biphenyls (PCBs), phenols, and dioxins and furans.

6.1.3 Groundwater and Surface Water

Groundwater

PLFN Well Field

Based on investigative work, it was determined that there is not a direct hydrogeological connection between the deep groundwater accessed by the PLFN Well Field and the shallow groundwater/surface water flow regime. The report also concluded dewatering Boat Harbour during remediation and returning it to tidal conditions will not affect either the quality or the quantity of the groundwater extracted by the PLFN Well Field.

Groundwater Quality

Groundwater samples exceeded the applicable provincial and/or federal groundwater criteria for some metals and general chemistry parameters. Criteria exceedances were not reported for PAHs, PHCs, VOCs, PCBs, phenols, and dioxins and furans.

Four groundwater samples were collected in the vicinity of the containment cell. The samples were submitted for laboratory analyses of general chemistry, metals, mercury, PCBs, PAHs, VOCs, PHC, phenols, cyanide, and dioxins and furans. Analytical results for the samples indicated that only one sample exceeded groundwater criteria for general chemistry (pH).

An additional seven monitoring wells were installed near the Boat Harbour Stabilization Lagoon (BHSL). Groundwater samples exceeded the applicable provincial and/or federal groundwater criteria for various metals, VOC, and general chemistry parameters.

Surface Water

A total of 19 watercourses (two ephemeral channels, 13 intermittent channels, three small permanent channels, one large permanent channel), and three small drainage corridors were noted on-site. Of the watercourses identified, six of them were dry. The average water temperature of the watercourses was 13.6°C.

Surface Water Quality

During the well field investigation at the site, water quality was sampled at three locations in Boat Harbour. At two of the three locations, metals, PHCs, and general chemistry parameters exceeded surface water criteria. At the third location, general chemistry (pH and temperature) exceeded freshwater surface water criteria.

Two surface water sample locations were monitored regularly from February to May of 2017. Aluminum, cadmium, copper, iron, lead, manganese, silver, zinc, and modified Total Petroleum Hydrocarbons concentrations did not meet NSE surface water Tier 1 environmental quality standards (EQS).

6.1.4 Riparian, Wetland and Terrestrial Environments

Terrestrial Habitat & Vegetation

Habitat types ranged from landscaped areas to well-drained drumlin hills comprised mostly of upland species such as Eastern hemlock and large-toothed aspen. Seven main types of forest stands are

found within the Site Study Area and include: Softwood, Eastern Hemlock, Red Pine, Tolerant Hardwood, Intolerant Hardwood, Mixed, and Regenerating. The majority of the site is dominated by mixed forest stands, with Tolerant Hardwood stands most notably located along the steep slopes of the Northern boundary and Eastern Hemlock stands dominating the western and eastern portions of the Site. Other terrestrial habitat types observed within the Site Study Area included fallow pasture lands, open field, and landscaped areas.

Over 240 vascular and non-vascular species were identified during the botanical surveys completed during the terrestrial habitat surveys, wetland assessments and spring ephemeral surveys. Of these, only one species (Black ash [*Fraxinus nigra*]) is classified as a species at risk (SAR) with another two species (Heart-leaved foam flower [*Tiarella cordifolia*] and Horned Sea-blight [*Suaeda calceoliformis*]) classified as Species of Conservation Concern (SOCC).

In general, vegetation species observed are largely native species, with exotic species confined mainly in the disturbed areas of the site. The species and communities of vascular and non-vascular plants encountered were typical given the eco-regional context, nutrient regimes, moisture regimes, and disturbance regimes.

Wetlands

There were 25 wetland areas identified and assessed during wetland surveys. Of these, three were identified as marsh, 10 as swamp, 11 as marsh/swamp complexes and one as a marsh/saltmarsh complex. The total wetland area delineated in the Site Study Area is approximately 86.24 ha which represents 15.8 percent of the total Site Study Area (approximately 545.04 ha).

Mammals and Wildlife

Evidence of white-tailed deer, black bear, Eastern coyote, striped skunk, snowshoe hare, North American porcupine, raccoon, muskrat and beaver mammal species were observed from July to October 2017, in addition to the maritime garter snake, leopard frog, green frog, American bull frog, spring peeper, and American toad which were also noted.

Mammals such as the white-tailed deer, porcupine, striped skunk, and raccoon were all present in several areas of the Site Study Area, which is to be expected, as these species are considered habitat generalists, who utilize a variety of forest types and wetland areas. Other mammals identified in the Site Study Area include the black bear, coyote, red fox, and rodents such as the red squirrel, woodland jumping mouse, chipmunk, beaver, muskrat, and possibly groundhog.

There was no evidence of SAR such as the mainland moose, or Canada lynx on-site.

6.1.5 Aquatic Environments

Marine Environments

Estuary and Pictou Road Shoreline

The estuary is comprised of marsh/salt marsh complex wetlands with a combined approximate area of 10.02 ha. The bottom type at the mouth of Boat Harbour was a combination of sand, mud, kelp and eelgrass. Towards Pictou Landing, on the eastern side of the Local Study Area, the water is

darker and the bottom appears to be composed mainly of mud and sand with a small amount of kelp present.

Within the marine environment, various marine species, including fish and shellfish, depend on the diverse habitat provided by the Northumberland Strait. The Northumberland Strait is considered to be an important feeding and foraging area within the Atlantic Ocean. Of particular note is the sandy substrate of the Pictou Road section of the Northumberland Strait which provides significant foraging habitat for some marine species.

A fish survey was conducted in the fall of 2019 to evaluate the fish community within the estuary. In total, 402 fish were captured in the estuary. Four different species were captured – Mummichog, Ninespine stickleback, Tomcod and White Perch. Of the 402 fish captured, 393 were Mummichog (*Fundulus heteroclitus*).

Northumberland Strait/East River Marine Pipeline Corridor

Given the absence of bottom structure, due to the predominance of fine sediment, species that thrive in this habitat are mostly burrowed into the soft sediments. Most organisms living in this type of habitat are deposit feeders, feeding on the organic material. Most abundant species observed were *Mulinia lateralis*, *Retusa obtuse*, and *Nephtys neotena*, which are respectively within the bivalves, gastropods, and polychaetes classes.

Underwater video surveys provided additional information on the epibenthic community. While mussels were the most common taxon, Atlantic rock crabs were found on every transect and clams on almost half of them. None of the identified species are designated as a threatened or endangered within the federal and provincial authorities' lists.

Northumberland Strait - East of the Confederation Bridge to the Eastern Cost of Prince Edward Island

Several species listed at risk under the *Species at Risk Act* (SARA) or recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) can be encountered in the Regional Study Area. These at-risk species include several: 1) marine mammals (Blue whale, Fin whale, North Atlantic Right Whale, Harbour porpoise); 2) elasmobranch (Smooth skate, Winter skate, Thorny skate, and White shark); 3) ray-finned fishes (Lumpfish, Atlantic Wolffish, and Atlantic salmon); and 4) one reptilian (Leatherback sea turtle). An assessment of these species was completed and used in the Project design.

Several other marine mammals without an at-risk status can also be present in the Regional Study Area, including Minke whale, Dolphins (species not identified), Grey seal, Harbour seal, Harp seal, and Hooded seal. An assessment of these species was completed and used in the Project design.

Fish and Aquatic Habitat

A total of 19 watercourses were identified: two ephemeral channels, 13 intermittent channels, three small permanent channels, and one large permanent channel. Three small drainage corridors were also identified on-site. In 2017 fish species were visually observed in two of the watercourses on-site, but only one of the two encounters resulted in a positive species identification (Three-spined Stickleback).

An additional fish survey was conducted in the fall of 2019 to evaluate the fish community within Boat Harbour and tributary streams and wetlands. In total, 16 fish were captured in Boat Harbour and 101 in the wetlands and watercourses, as shown in Table 6.1.

Table 6.1 List of Fish Species Captured in Boat Harbour and Boat Harbour Wetlands and Watercourses

Common Name	Scientific Name	Boat Harbour	Boat Harbour Wetlands and Watercourses
Mummichog	*Fundulus heteroclitus*	5	3
Ninespine stickleback	*Pungitius*	1	55
Golden shiner	*Notemigonus crysoleucas*	10	1
Juvenile golden shiner	*Notemigonus crysoleucas*	0	42

The majority of watercourses at the BHETF site lack the appropriate physical habitat features to sustain populations of adult Brook Trout. A select few streams may have adequate spawning or rearing habitat for portions of the year, but no stream on site appeared adequate for year-round adult Brook Trout habitat.

6.1.6 Migratory Birds

Avian surveys completed at the BHETF between September 2017 and July 2018 resulted in the observation of 5,398 individuals (including incidental observations), representing 126 species within the Site Study Area. The highest number of birds were observed during fall migration, but the highest species diversity was observed during the breeding season. Of the species observed, 40 were priority species, of which six were SAR.

Additional surveys were completed between July 25 and September 12, 2019 to address comments received from Environment and Climate Change Canada (ECCC) on the 2017 and 2018 avian surveys. These studies included an early shorebird migration survey and a Bank Swallow roost survey.

Bank Swallow Roosts (August –September 2019)

Bank Swallow (*Riparia riparia*) roosting in cattail habitat was investigated through surveys conducted 20 minutes prior to and 20 minutes after sunset at four watch stations (two near the estuary, two within Boat Harbour) once weekly over a period of 4 weeks starting August 7, 2019.

No Bank Swallows were observed during the dedicated roost surveys. An incidental observation of about 60 Bank Swallows and 12 Barn Swallows (*Hirundo rustica*) were observed foraging near the berm on September 12, 2019 (i.e., post hurricane Dorian, which came through the area on September 7, 2019).

Shorebird Migration Survey (July – September 2019)

Over the 8-week survey period, 827 individual shorebirds (13 species) were observed, the majority of which were observed during low tide at the beach near the BHETF estuary outlet, followed by the beach near the BHETF estuary outlet at low tide and, finally, the inland BHETF berm at high tide.

The most abundant species was the Semipalmated Sandpiper (*Calidris pusilla*) followed by Semipalmated Plover (*Charadrius semipalmatus*) and Lesser Yellowlegs (*Tringa flavipes*). None of the shorebird species observed are SAR, but all are ranked as Species of Conservation Concern (SOCC).

6.1.7 Species at Risk

Table 6.2 provides the list of priority species observed within the Site Study Area during field programs. It is noted that Piping Plover (*Charadrius melodus melodus*) habitat is located north of the Site Study Area.

NOVA SCOTIA

Table 6.2 Priority Species Observed in Site Study Area

Common Name	Scientific Name	COSEWIC	SARA	NS ESA	S-Rank
Black Ash	*Fraxinus nigra*	Threatened	Threatened	Threatened	S1S2
Heart-leaved Foam Flower	*Tiarella cordifolia*	-	-	Sensitive	S2
Appressed Jellyskin Lichen	*Leptogium subtile*	-	-	Sensitive	S3
Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened	Threatened	S2B
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Special Concern	Vulnerable	S3S4B
Bank Swallow	*Riparia*	Threatened	Threatened	Endangered	S2S3B
Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Endangered	S2S3B
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	Vulnerable	S3S4B
Canada Warbler	*Cardellina canadensis*	Threatened	Threatened	Endangered	S3B
Black-bellied Plover	*Pluvialis squatarola*	-	-	-	S3M
Greater Yellowlegs	*Tringa melanoleuca*	-	-	-	S3B, S3S4M
Killdeer	*Charadrius vociferus*	-	-	-	S3B
Least Sandpiper	*Calidris minutilla*	-	-	-	S1B, S3M
Lesser Yellowlegs	*Tringa flavipes*	-	-	-	S3M
Ruddy Turnstone	*Arenaria interpres*	-	-	-	S3M
Semipalmated Plover	*Charadrius semipalmatus*	-	-	-	S1B, S3S4M
Semipalmated Sandpiper	*Calidris pusilla*	-	-	-	S3M
Short-billed Dowitcher	*Limnodromus griseus*	-	-	-	S3M
Spotted Sandpiper	*Actitis macularius*	-	-	-	S3S4B
White-rumped Sandpiper	*Calidris fuscicollis*	-	-	-	S3M
Willet	*Tringa semipalmata*	-	-	-	S2S3B
Wilson's Snipe	*Gallinago delicata*	-	-	-	S3B

Presence of Marine SAR

In the desktop study completed by WSP in 2019, the potential presence of aquatic species with an at-risk status was evaluated as "high" for the Atlantic salmon, while it was evaluated as "moderate to high" for the Harbour porpoise and the Winter Skate and as "moderate" for the Smooth skate, the Thorny skate and the Lumpfish. Species with a "low to moderate" presence potential were the Atlantic Wolffish and the Leatherback Sea turtle. Species with a low potential all belonged to mysticete cetaceans, such as the Blue whale, the Fin whale and the North Atlantic Right Whale. Concerning the White shark, its presence potential was "rare".

6.1.8 Mi'kmaq of Nova Scotia

A Mi'kmaq Ecological Knowledge Study (MEKS) was conducted by Membertou Geomatics Solutions. The Study found that Mi'kmaq land and resource use was reported on the Project Site, and that hunting and gathering were found to be the most common activities described as occurring. Within the broader Study Area, hunting, fishing, and gathering were the most commonly reported activities. All activities were recounted as taking place in the recent and long-term past. Current use is limited mainly to fur-bearing creatures as species of harvest. Recreational aquatic activities such as swimming and canoeing are reported as having been historically common in the waters surrounding PLFN in Pictou Harbour, Chance Harbour, Boat Harbour, and other local waters.

A Well-Being Baseline Study (Well-Being Study) was completed over a three-month period (October to December 2019) by Lewis, Denny et al., to determine and document baseline conditions for PLFN. The Well-Being Study reports a significant experience of loss in terms of cultural heritage and cultural practices as related to the establishment and operation of the BHETF and subsequent contamination of the physical environment. The interconnectedness of cultural practices with the natural environment and the loss of this relationship has resulted in a disruption to the practices and to the passing along of this knowledge between generations. This represents a significant loss and impediment to cultural identity and overall well-being for PLFN.

6.1.9 Human Environment

Economic and Social

The Regional Study Area for the social environment includes Pictou County and the following communities in Pictou County: Town of New Glasgow, Town of Pictou, Town of Stellarton, Town of Trenton, Town of Westville, and PLFN.

The total population of Pictou County saw a decline of approximately 6 per cent in overall population from 2006 (45,513) to 2016 (43,748)[4]. The towns of New Glasgow, Pictou, Stellarton, Trenton, and Westville have, on aggregate, seen a slightly greater decline in population (approximately 8 percent) from 2006 (24,531) to 2016 (22,571) as compared to Pictou County as a whole.

[4] Statistics Canada, Census of Population 2011, 2016

The economy of Pictou County, including PLFN and the towns of New Glasgow, Pictou, Stellarton, Trenton, and Westville, is generally based on manufacturing, natural resource, and tourism industries. Major employers include:

- Empire Company Limited
- Michelin Tires Canada
- Northern Pulp Nova Scotia Ltd (ceased operations in January 2020)
- CMS Steel Pro Inc.
- Fishing and Forestry
- Tourism

Archaeological/Cultural Heritage Resources

Most of the Study Area for Boat Harbour Remediation is ascribed elevated (moderate or high) archaeological potential. The following four archaeological sites were identified during screening and reconnaissance:

- James & Christina Sproull Site
- Donald McArthur Site
- Peter McArthur Site
- A'se'k 1 Site | A small Pre-contact archaeological site identified during shovel testing - eastern edge of proposed footprint of Conceptual Pilot Treatment Pad Option.
- The lands around Indian Cross Point to Highway 348 have a high historical, archaeological potential for the presence of Mi'kmaq burials based upon historical research and archaeological ground penetrating radar assessment conducted during 2019. Further follow-up archaeological work is proposed.

Human Health

A HHRA was conducted, utilizing the data and findings of the HHERA and the associated baseline conditions to evaluate potential risks to human health from changes to the environment associated with BHRP related activities (via an operational pathway).

Concentrations of COPCs in soil, groundwater, surface water, sediment, country foods and air quality were compared to guidelines protective of residential receptors, construction workers and/or background conditions in the area. Results of this comparison indicated that concentrations of COPCs in various environmental media associated with BHRP related activities are within acceptable levels for protection of human health.

Potential risks to human health have been identified as exposure to COPCs in sediment by direct contact (incidental and dermal contact) and in plants, fish, shellfish, and game (organs) through ingestion. However, as there is currently no documented recreational activity in the Site Study Area by non-PLFN residents, these pathways (incidental and dermal contact, ingestion) are not identified as current impacts to human health. There are no residential potable wells of concern that share groundwater sources with Project areas.

Additional factors affecting the existing quality of life, psychological/emotional, and potentially physical health are related to the establishment and operation of the BHETF and include a pervasive stench, a lack of fresh air, limited outdoor activity based on air quality issues and concern over exposure to contaminants, a distrust of tap water, and displacement from recreational activities in the local environment related to intergenerational knowledge exchange and familial traditions.

6.2 Anticipated Changes to the Environment

The operation at the BHETF over the past 50 years has caused direct impacts to waters and surrounding lands within the Site Study Area. As stated above, parameters from soil and water samples taken on-site have exceeded the applicable provincial and/or federal levels.

With respect to water and sediment quality, during the early years of operation the greatest impacts occurred when the effluent was sent directly through a watercourse into wetlands. Since then, effluent treatment techniques improved and the effluent was treated prior to arriving into two man-made settling ponds which then lead into twin aeration lagoons and then into the BHSL. As noted, production of pulp and generation of mill effluent ceased in January 2020. These areas are limited in species diversity and are dominated largely by a monoculture of cattail species (*Typha spp.*).

Due to the elevated contaminant levels, and disturbance and fragmentation of habitat on-site from the operation of the BHETF, Boat Harbour is not currently considered to be high value habitat for mammals and wildlife.

The remediation activities proposed would effectively reduce or eliminate the potential for unacceptable risk of contaminants to ecological receptors by removing the exposure pathway. However, the remediation activities would cause potential short-term impacts to the existing habitat, including changes to fish and fish habitat and marine plants as defined in the *Fisheries Act*; and migratory birds, as defined in the *Migratory Birds Convention Act*, 1994. It should be noted that as the proposed Project is the remediation of BHETF and subsequent return to a tidal estuary condition, the long-term changes to fish and fish habitat, marine plants, and migratory birds will be positive. There will also be long-term benefit to wetlands and the resources they provide including habitat for birds and potential SAR and use for traditional purposes.

While there is the potential for odours to be present during the remediation activities, once remediation is completed the overall atmospheric environment is anticipated to be better than baseline conditions as odour impacts with the operation at the BHETF will no longer be present.

6.3 Potential Effects, Mitigation Measures and Significance of Residual Effects

6.3.1 Air Quality and Odour

The key potential effects resulting from the Project on air quality and odour include temporary elevated emissions of particulate matter resulting from construction activities. This is as a result of an increase in odour and the release of VOCs into the surrounding ambient air from removal of the contaminated soil/sludge as well as temporary emissions from diesel combustion engines during site preparation and construction and operation phases.

Mitigation measures that will be implemented to address potential effects to air quality and odour include, but are not limited to, the following:

- Manage dust emissions through the use of water or dust suppressants, where applicable and based on regulatory direction and approval.
- Cover stockpiles on-site to reduce emissions of particulate matter from wind erosion.
- Cover the dredged sediment properly to minimize the exposed area and the potential odour emissions with tarps and or neutralizing foam, as necessary.
- Keep waste material contained through use of Geotubes® or equivalent technology.
- Implement reduced speed zones for Project vehicles traveling within the Site.
- Reduce engine idling where possible and use fuel efficient vehicles and equipment to reduce diesel combustion emissions, as well as conduct regular equipment maintenance.
- To further support the predicted changes to air quality and odour, an Air Quality Impact Analysis was completed for the Project. The Analysis estimated emissions from Project activities and undertook air dispersion modelling in order to estimate the ambient air concentrations and the soil deposition rates of COPC.
- Air quality modelling of sources from the Project showed maximum predicted concentrations of a majority of the COPCs at the boundary of the Site Study Area are well below applicable air quality criteria. The only exceptions are PM, iron, and H_2S odours under a very specific set of conditions. These exceedances occur for the small portion of time that both the meteorological conditions (wind direction) and Project activities align.

There are no exceedances of any of the air quality assessment criteria at any of the residential or other sensitive receptors for any of the worst case scenarios evaluated.

Once the mitigation measures are considered, the anticipated residual effect is temporarily degraded air quality; however, it is not anticipated to be significant. A significant adverse environmental effect for air quality and odour has not been predicted for the Project due to the following mitigation measures:

- Implementation of Geotubes® or equivalent technology.
- Wet suppression controls on all unpaved surfaces.
- Speed reduction on the Site to keep dust levels to a minimum.
- Air quality monitoring including dust and ambient-air monitoring, as required.

6.3.2 Greenhouse Gas

The potential effect resulting from the Project on GHG emission levels is the long-term production of landfill gas (LFG) from the containment cell. The following mitigation measures will be implemented to limit LFG produced from the containment cell:

- Cap the containment cell after remediation is complete, reducing methane migration.
- Final landfill cover contours will be designed to accommodate the anticipated range of final waste volumes and control the release of LFG.

- Implement best management measures to control the amount LFG that is released (passive venting).

Over the 25-year period from 2018 to 2043, the baseline scenario GHG emissions (no remediation, continuing to use the BHETF) were estimated to be 368,580 tonnes of CO_2e. Over the same time period, the emissions from the project scenario were estimated to be 53,500 tonnes of CO_2e, a net reduction of 315,080 tonnes of CO_2e, which results in a positive effect.

6.3.3 Noise

The potential effect resulting from the Project on noise is temporarily elevated sound levels in the Local Study Area due to increased heavy equipment and, the operation of Site infrastructure required for remediation, dredging and demolition activities.

The Project team has quantified the proposed noise levels in the Study area by using the appropriate CadnaA Acoustical Modelling Software (CadnaA) to model the potential impacts of the significant noise sources based on assumptions of typical construction equipment number and locations.

Mitigation measures that will be implemented to address potential effects to noise include, but are not limited to, the following:

- Implement Best Management Practices (BMPs) for noise control during demolition activities such as equipment management, worker training, preventative maintenance plans and complaint response plan.
- Restrict traffic generally to 16 hours per day during the construction and operation phases.
- Regular checks by site manager for excessive noise on Site and in proximity to sensitive receptors so that resolution can be timely.
- Site designed to minimize the need for reversing and vehicle reversing alarms.

Once the mitigation measures are taken into account, the anticipated residual effect of temporary elevation of sound levels in the Local Study Area is not anticipated to be significant, as effects on residential areas from the remediation of the BHETF are projected to be low in magnitude and mostly short-term in nature. Furthermore, there were no exceedances with NSE noise limits identified within BHETF. Effects mostly pertain to the demolition and construction of infrastructure, and the associated trucking activities on haul roads adjacent to existing residences. The residual effects are temporary in nature and are only anticipated during construction/demolition and therefore after the application of the noise reduction BMPs, along with the Project specific mitigation measures, the effects are not considered significant.

6.3.4 Light

The potential effect resulting from the Project on light is a temporary elevation in light with respect to flora, fauna, and sensitive receptors in the Local Study Area.

Mitigation measures that will be implemented to address potential effects to light will include, but are not limited to, the following:

- Install downward-facing lights for on-site infrastructure and Site roads.

- Install, wherever possible, motion-sensor to ensure lights are not turned on when they are not necessary.
- Only direct and focused light will be used for worker safety.

Once the mitigation measures are taken into account, the anticipated residual effect of temporary elevation of light in Local Study Area is not anticipated to be significant, as effects on residential areas from the remediation of the BHETF are projected to be low in magnitude, and short-term in nature. Effects mostly pertain to the 24-hour dredging activities. However, no exceedances of the Institution of Lighting Engineers guidelines post and pre-curfew limits were projected. As such, a direct light trespass that would limit the use and enjoyment of nearby areas by residents on a permanent basis is not anticipated.

Furthermore, since only direct and focused light will be used when required for worker safety, residual effects to the surrounding ecosystem from light disrupting the habitats of native species are also anticipated to be not significant.

6.3.5 Geology, Geochemistry and Soil

The key potential adverse effect resulting from the Project on geology, geochemistry and soil is a degradation of soil quality if there was a spill/release or if impacted sediments are mobilized to previously un-impacted areas during construction activities. The positive effect to geology, geochemistry and soil will result through the removal of impacted material, which will eliminate future impacts to geology, geochemistry, and soil from occurring.

Mitigation measures that will be implemented to address potential degradation of soil quality include, but are not limited to, the following:

- In areas where sludge is to be completely removed, remaining sediments will meet risk-based sediment criteria that is protective of ecological and human health.
- Develop and implement a Spills Management Plan (SMP).
- Monitor and manage a temporary leachate treatment facility (TLTF) and effluent conveyance piping to ensure no release occurs.
- Monitor to limit/eliminate the mobilization of impacted material to other areas of the Site that have not been previously impacted (i.e., soil, wetlands, watercourses, habitats).

Once the mitigation measures are taken into account, the adverse residual effect of degradation of soil quality, is not anticipated to be significant.

6.3.6 Groundwater

The key potential effects resulting from the Project on groundwater include the contamination of groundwater from a spill/release of leachate, and construction and dredging activities. These is also the potential for a change to groundwater flow through dredging activities and removal of the Dam.

Mitigation measures that will be implemented to address potential contamination of groundwater and change to groundwater flow downgradient include, but are not limited to, the following:

- Develop and implement a SMP.
- Monitor perimeter groundwater wells for contaminants of concern.

- Construct a leachate holding tank with appropriate seals and construct spill containment in case of spill while pumping from the holding tank to tanker truck to haul leachate off-site.
- Monitor and maintain leachate collection system within containment cell.
- Reduce interaction between surface water and groundwater by implementing surface water mitigation measures and BMPs.

The potential effects are mainly short-term in nature and confined to the Site Study Area. Furthermore, based on the groundwater samples that were taken within the Site exceeding the applicable provincial and/or federal groundwater criteria for some metals and general chemistry parameters, it is expected that through dredging the exceedances will be reduced. Therefore, once the mitigation measures are taken into account, the anticipated residual effects of potential contamination of groundwater and change to groundwater flow downgradient are not anticipated to be significant.

6.3.7 Surface Water

The key potential effects resulting from the Project on surface water include the effect on water quality due to the re-suspension of sediment resulting in increased suspended solids and turbidity. In addition, a potential leachate spill or the release of petroleum products has the potential to result in surface water impacts; however, a potential spill or release is not considered likely.

Mitigation measures that will be implemented to address potential effects to surface water include, but, are not limited to, the following:

- Use silt curtains to control sedimentation.
- Control effluent discharge to estuary at the outlet control structure to respect the Total Suspended Solids (TSS) Canadian Council of Ministers of the Environment (CCME) criteria (< 25 mg/L from background level), confirm by applying a TSS monitoring program.
- Maintain existing vegetation cover whenever possible and minimize overall areas of disturbance; also, ensure contractors minimize travel across areas of exposed soil, maintaining existing vegetation cover is the best and most cost-effective erosion control practice.
- Develop and implement a SMP.

After the mitigation measures have been implemented, the adverse residual effects anticipated on surface water are limited to a temporary increase of sedimentation. The increase in sedimentation will be short-term in nature and confined to the Local Study Area. As such, the adverse residual effects to surface water resulting from the Project are not anticipated to be significant, and the general surface water quality is predicted to improve in the Project area when tidal influences are reintroduced to Boat Harbour.

6.3.8 Terrestrial Habitat and Vegetation

The key potential effects resulting from the Project on terrestrial habitat and vegetation include the temporary loss of vegetative cover, resulting in landscape disturbance and habitat fragmentation. Increased dust and heavy vehicle traffic may degrade air quality, which could reduce the amount of usable habitat for lichen species. As well, there is the potential for introduction of invasive species

through the transfer of seeds and roots from construction equipment, transportation vehicles, or workers into adjacent natural habitat during Project activities.

Mitigation measures that will be implemented to address potential effects to terrestrial habitat and vegetation, include, but, are not limited to, the following:

- Maintain existing vegetation cover whenever possible; minimize overall areas of disturbance; and, ensure contractors minimize travel across areas of exposed soils.
- Maintaining existing vegetation cover is the best and most cost-effective erosion control practice.
- Vegetation management will be conducted by cutting (e.g., no use of herbicides).
- Maintain riparian wetland and watercourse buffers (where practical) to reduce adverse effects to wetlands, watercourses, and downstream receiving environments by clearly defining the limits of work.
- Manage dust emissions through the use of water, where applicable.
- To reduce the potential for introduction of non-native species, equipment that is brought to Site shall be cleaned prior to arrival and inspected for cleanliness prior to commencing work.

The residual effects are associated with vegetation removal due to Project activities. The effects are limited to habitat disturbance, temporary loss of vegetative cover, and minor degradation of air quality and are not considered as significant after mitigation measures have been implemented.

6.3.9 Wetlands

Wetland Management activities would result in a positive long-term effect to habitat quality through removal of contaminated sediments.

The key potential adverse effects resulting from the Project on wetlands include the temporary disturbance, alteration and loss of 31 ha of freshwater wetland habitat that will be remediated and returned to tidal influence. Removal of sediment and vegetation in impacted wetlands has the potential to increase water temperatures and the possible introduction of invasive species. As well, hydraulic and/or mechanical dredging may cause impacted sediments to be suspended, which would increase levels of TSS, total dissolved solids (TDS), turbidity, and conductivity.

Mitigation measures that will be implemented to address potential adverse effects to wetlands, include, but are not limited to, the following:

- Implement wetland compensation plan.
- Maintain riparian wetland and watercourse buffers (where practical) to reduce adverse effects to wetlands, watercourses, and downstream receiving environments by clearly defining the limits of work.
- Complete pre-construction Site meetings with relevant construction staff to educate staff on the locations of wetlands and policies related to working around wetlands and watercourses.
- Identify and communicate schedule of construction activities as it relates to alteration of wetland habitat.
- To protect wetland habitat from accidental spills, ensure that the SMP is in effect and its procedures fully communicated to staff.

The predicted residual environmental effects on wetlands are disturbance and habitat loss. These effects are assessed to be adverse, but not significant. Since Boat Harbour is not currently considered to be high value habitat, once the contaminated sediment is removed and wetland remediation activities are complete, the overall impacts of the Project on wetlands are anticipated be positive.

6.3.10 Mammals and Wildlife

Remediation activities would result in a positive long-term effect to habitat quality through removal of contaminated sediments.

The key potential adverse effects resulting from the Project on mammals and wildlife are temporary loss of wetland habitats; temporary disturbance, alteration and loss of terrestrial habitat; and sensory disturbance as a result of increased vehicle and construction equipment use on-site.

Mitigation measures that will be implemented to address potential adverse effects to mammals and wildlife, include, but, are not limited to, the following:

- Maintain riparian wetland and watercourse buffers (where practical) to reduce adverse effects to wetlands, watercourses, and downstream receiving environments by clearly defining the limits of work.
- Limit vegetation clearing to approved areas.
- Vegetation management conducted by cutting; no use of chemicals or herbicides.
- Maintain speed limits in Project area, reduce speed and install signage where specific wildlife concerns have been identified.
- Noise controlled by attenuation (distance between source and receptor) vertical separation, and equipment design where feasible.
- Wildlife awareness training will be provided to all Site personnel during Site-specific orientation; wildlife awareness training will include measures to manage interactions between Site personnel and wildlife.
- Establish wildlife reporting protocol so wildlife activity can be tracked throughout the BHETF. This information can be used to install signage, if appropriate, in areas with high wildlife sightings.

The potential adverse residual effects include disturbance, habitat loss, and temporary habitat fragmentation and degradation. However, the residual effects are projected to be low in magnitude, and mostly short-term in nature and reversible. Therefore, no residual adverse effects are anticipated to be significant.

6.3.11 Marine Environment

Remediation activities would result in a positive long-term effect to habitat quality through removal of contaminated sediments in the estuary. There will also be a positive impact to the marine environment, once the dam has been removed, as the re-introduction of tidal influence will result in the accessibility of several hundred hectares of habitat to anadromous fish species and other marine organisms.

The key potential adverse effects resulting from the Project on the marine environment are an increased disturbance to the marine environment from heavy machinery operation in and around the estuary, the release of contaminants that have been historically contained in sediments during the wetland remediation process, and removal of marine vegetation resulting in loss of aquatic habitat during dredging of the estuary and removal of the dam.

Mitigation measures that will be implemented to address potential adverse effects to the marine environment, include, but, are not limited to, the following:

- Complete pre-construction site meetings to educate staff on policies related to working around the estuary. Personnel will be instructed not to enter areas of the estuary that are outside of approved alteration areas.
- Care will be taken to keep riparian vegetation in good condition surrounding areas of potential fish habitat. No herbicides shall be used near possible fish habitat.
- Ensure proper sediment and erosion controls are in place prior to the removal of the dam control structure.
- To protect the marine environment from accidental spills, ensure that the SMP is in effect and its procedures fully communicated to staff.

The predicted residual environmental effects on the marine environment—temporary loss of marine habitat; temporary increase in sedimentation; and a disturbance to marine habitat and organisms—are assessed to be adverse, but not significant. The potential residual effects to the marine environment are short-term in nature and will have little significance once operation is complete. Further, residual effects to the marine environment from this Project are considered not significant because the goal of the Project is to return Boat Harbour back to a tidal estuary, which would improve water quality and increase marine habitat. Since Boat Harbour is not currently considered to be a high value habitat, once the contaminated sediment is removed and remediation activities are complete, the overall impacts of the Project on the marine environment are anticipated to be positive.

6.3.12 Fish and Aquatic Habitat

Remediation activities would result in a positive long-term effect to fish and aquatic habitat through removal of contaminated sediments in the Site Study Area. There will also be a positive impact once the dam has been removed, as the re-introduction of tidal influence will result in the accessibility of several hundred hectares of habitat to anadromous fish species.

The key potential adverse effects resulting from the Project on fish and aquatic habitat are the direct destruction of contaminated fish during the removal of impacted sediments, the disturbance, alteration and loss of aquatic habitat, and the suspension of impacted sediments which would increase levels of TSS, TDS and turbidity. There will also be a decrease in surface water volume when the flow control structure is removed.

Mitigation measures that will be implemented to address potential adverse effects to the fish and aquatic habitat include, but are not limited to, the following:

- Surface water alteration applications (wetlands and watercourses) will be submitted during Project planning and design to request an authorization to alter fish habitat. Loss of fish habitat

will be addressed in these alteration applications and recommended timing windows will be adhered to for potential direct loss of fish and fish habitat.

- Care will be taken to keep riparian vegetation in good condition surrounding areas of potential fish habitat. No herbicides shall be used near possible fish habitat.
- Erosion and sediment control planning will be completed and implemented to ensure site run-off is not directed towards fish habitat.
- Compensation for permanent loss of fish habitat will be completed through fish habitat restoration activities, subject to Fisheries and Oceans Canada (DFO) direction and approval.
- To protect the marine environment from accidental spills, ensure that the SMP is in effect and its procedures fully communicated to staff.

Predicted adverse residual effects to fish and aquatic habitat include temporary habitat disturbance, minor loss of aquatic habitat, and the destruction of contaminated fish. These effects are assessed to be adverse but not significant, as the potential project interactions with fish and fish habitat are short-term in nature and will have little significance once remediation is complete. As well, since populations of fish in the BHSL are small and scarce, the effects on fish will be lessened further. In addition, the direct impact to fish habitat is thought to be not significant due to the number of contaminants and degraded materials found presently at the BHETF. While the Project may disturb these sediments, and cause localized siltation during the remediation process, the fish habitat will improve significantly when remediation is complete.

The re-introduction of tidal influence is thought to have a significant positive residual effect on fish and fish habitat in Boat Harbour, as this area has been inaccessible to fish and degraded for more than 50 years.

6.3.13 Migratory Birds

Remediation will improve water quality at the site and avian species will no longer land/swim/forage in the waters that have been impacted by effluent as many do currently. This is an overall positive effect.

The key potential adverse effects resulting from the Project on migratory birds are temporary loss of wetland habitat; temporary disturbance, alteration and loss of terrestrial habitat; and sensory disturbance as a result of project lighting and increased vehicle and construction equipment use on-site.

Mitigation measures that will be implemented to address potential adverse effects to migratory birds, include, but are not limited to, the following:

- Avoid removal of native vegetation during the breeding season for migratory birds where practical (beginning of April to end of August for migratory birds). Where this is not practical, a bird nest mitigation plan will be developed prior to construction and in consultation with Environment and Climate Change Canada (ECCC) and provincial regulators.
- To discourage ground-nesting or burrow-nesting species (such as common nighthawk and bank swallows), large piles or patches of bare soil will not be left uncovered or un-vegetated during the breeding season, wherever possible.

- Routes for machinery are to be shown on a figure, and then ground-truthed and corridors are to be surveyed for nesting birds during nesting season.
- Noise controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design where feasible.
- Only use direct and focused light when needed for worker safety.
- Reduce light pollution on-site by installing downward-facing lights on Site infrastructure and roads. Wherever possible, install motion-sensing lights to ensure lights are turned on only when necessary.
- Compensate for lost wetland functions that support migratory birds as part of the wetland compensation plan that will be submitted to NSE.

The potential adverse residual effects on migratory birds include temporary habitat fragmentation, habitat loss and sensory disturbance resulting in attraction and disorientation. These effects on avian species and their habitat are assessed to be slightly adverse, due to the increase in ambient noise, and localized forest clearing activities. However, the residual effects are projected to be low in magnitude, and mostly short-term in nature and reversible. Therefore, no residual adverse effects on migratory birds are anticipated to be significant.

6.3.14 Species at Risk

It is anticipated that in the long-term, the impact of the Project will have a net benefit to the area as the species biodiversity will increase and habitat for SAR and SOCC species will develop.

The key potential adverse effects resulting from the Project on SAR are temporary loss of wetland habitat; temporary disturbance, alteration and loss of terrestrial habitat; and sensory disturbance as a result of project lighting and increased vehicle and construction equipment use on-site.

Mitigation measures that will be implemented to address potential adverse effects to SAR, include, but are not limited to, the following:

- Intact forest stands and wetlands will be avoided wherever possible during detailed Project planning and design in favor of previously disturbed areas (e.g., stands disturbed by timber harvesting, existing roads, or other development). Of special concern are predominantly mature softwood stands as several Species of Conservation Concern (SOCC) lichens utilize this type of habitat.
- Wildlife awareness training will be provided to all Site personnel during Site-specific orientation. Wildlife awareness training will include measures to manage interactions between Site personnel and wild species.
- Noise controlled by attenuation (the distance between a noise source and a receptor), vertical separation, and equipment design where feasible.
- Reduce light pollution on-site by installing downward-facing lights for on-site infrastructure and roads. Wherever possible, install motion-sensing lights to ensure lights are only turned on when necessary.

The potential adverse residual effects on SAR include temporary habitat fragmentation, habitat loss and sensory disturbance resulting in attraction and disorientation. These effects on SAR and their

habitat are assessed to be slightly adverse, due to the increase in ambient noise, and localized forest clearing activities. However, the residual effects are projected to be low in magnitude, and mostly short-term in nature and reversible. Therefore, no residual adverse effects on SAR are anticipated to be significant.

6.3.15 Mi'kmaq of Nova Scotia

The overall potential effect of Project activities for PLFN is positive in returning A'se'k to a tidal estuary, enabling traditional land and resource use. Project activities will also generate employment opportunities. The construction and renewed lifespan of the bridge at Highway 348 is a positive benefit, as is the increased height and thus restored access for recreational boat traffic into Boat Harbour. The complete removal of a portion of the pipeline from Indian Cross Point east to Highway 348 property line is also a positive effect for PLFN in terms of participating in decision-making on this aspect of the Project.

A HHRA was completed to evaluate potential risks to human health from changes to the environment associated with BHRP related activities (via an operational pathway).

Concentrations of COPCs in soil, groundwater, surface water, sediment, country foods and air quality were compared to guidelines protective of residential receptors, construction workers and/or background conditions in the area. Results of this comparison indicated that concentrations of COPCs in various environmental media associated with BHRP related activities are within acceptable levels for protection of human health. However, the following exposure pathways that required risk mitigation/monitoring were identified in relation to the human health of PLFN:

- Recreational or PLFN resident consumption of aquatic country foods present in the BHETF post-remediation.
- Residential inhalation exposure from road dust (Total Suspended Particulate Matter [TSP], PM_{10} and iron).

The results of the HHRA indicate that there is the potential for unacceptable health risks as a result of human health exposure during the Project activities.

The key potential adverse effects resulting from the Project on the Mi'kmaq of Nova Scotia include the temporarily increased traffic volumes, possible degradation of air quality, temporarily increased noise, and light emissions, and potential effects on residents in close proximity and/or water sources in the event of an accident or spill when transporting leachate. The intended ongoing and long-term use of the existing containment cell is also a key potential adverse effect.

Mitigation measures that will be implemented to address potential adverse effects to Mi'kmaq of Nova Scotia, include, but, are not limited to, the following:

- Traffic, noise, light, and air mitigation measures
- Ensuring regulatory compliance in transporting Dangerous Goods
- Post-remediation monitoring and evaluation of COPCs in aquatic biota
- Adequate driver training and training in accident or malfunction protocols
- All accommodations in Section 6.5 to restore Aboriginal and Treaty Rights

The potential adverse residual effect on Mi'kmaq of Nova Scotia is the negligible to minor disturbance to local residents. Potentially negative residual environmental effects include noise, light, and air emissions resulting from site activities such as the import and use of heavy machinery. However, due to the short-term nature of the residual effects they are not anticipated to be significant.

In ongoing engagement in the community, as also disclosed in the PLFN Well-Being Study, concern is expressed regarding the emotional impacts and perceived risks to physical health of the waste being perpetually stored in the existing containment cell on-site. The baseline conditions recognize the existence and use of the containment cell for the storage of waste dredged from Boat Harbour since the mid-1990s. While there may be some temporary impacts to the community from disturbance during the project activities, the containment cell will be upgraded and improved prior to its ongoing use during the project and will be capped and closed at the end of the Project.

There are recognized existing adverse impacts to the Mi'kmaq of Nova Scotia's ability to practice aboriginal rights due to limitations on land use associated with the existing containment cell, as well as due to the current conditions of a contaminated site in general. The ability to practice aboriginal rights in the use of the land and water around A'se'k will be improved with a remediated Site. While there may be some ongoing adverse impacts relative to the use of lands around the containment cell, that particular impact will be partially mitigated by an improved containment cell which is capped at Project completion and managed, monitored and maintained in perpetuity by the Province of Nova Scotia.

In addition, the Province of Nova Scotia has committed to the transfer of the parcel of land upon which BHETF is sited to the PLFN after remediation. As well, the Province of Nova Scotia is undertaking the steps necessary for the transfer of multiple parcels of provincially owned property to PLFN which are primarily around the estuary and which comprise the vast majority of lands around the estuary. The transfer of these lands to the PLFN is intended as an accommodation to mitigate the limitations in land use which currently exist and which will continue into the future as a consequence of the containment cell component of the Project.

In considering the degree of potentially negative effects in relation to baseline conditions, that is the long-term storage of the containment cell and temporarily increased atmospheric emissions during the Project, as compared to conditions under the operational BHETF, the effects assessment has not resulted in a determination of significant adverse effects resulting from the containment cell being located on-site. Although this is not consistent with the determination presented in the Well-Being Study, that until A'se'k is reclaimed impacts are considered significant, it is consistent with the methodology applied to all VCs for determining significance of effects.

6.3.16 Economic and Social

The potential effects of the Project on the economic environment are anticipated to be positive with respect to job creation and economic spinoff. The construction and renewed lifespan of the bridge at Highway 348 is a positive benefit to the social environment, as is a long-term reduction in odours and air emissions through closure of the settling basins, aeration stabilization basin and filling of effluent ditches with clean fill.

The key potential adverse effects resulting from the Project are related to the social environment and include noise, light, and air emissions resulting from site activities such as the import and use of heavy machinery which may affect local residents.

Mitigation measures that will be implemented to address potential adverse effects to economic and social environment, include, but, are not limited to, the following:

- BMPs for noise, light, and air emission control during construction activities will be followed including equipment management, worker training, preventative maintenance plans and complaint response plan.
- Vehicle traffic on the Site will generally be restricted to 16 hours per day.
- Management of dust emissions through the use of water, where applicable.

The potential adverse residual effects to the social and economic environment are limited to the negligible to minor disturbance to local residents. The overall residual effect of the Project on the economic and social environment is assessed as not significant after mitigation measures have been implemented.

6.3.17 Archaeological/Cultural Heritage Resources

The potential adverse effect resulting from the Project on archaeological/cultural heritage is the disturbance, destruction and/or loss of archaeological/cultural heritage resources.

Mitigation measures that will be implemented to address potential adverse effects to archaeological/cultural heritage, include, but are not limited to, the following:

- In areas ascribed as high archaeological potential, complete additional shovel testing, as required, prior to ground disturbance.
- Complete Site-specific background research, shovel testing and/or test excavation for ground disturbances within 50 m of the identified archaeological sites.
- Complete operator training for identification of potential archaeological/cultural heritage resources.
- Implement construction monitoring throughout the duration of the Project in areas that will be disturbed and are identified currently as moderate to high archaeological potential.
- In the event that archaeological/cultural resources are encountered during waste management activities, all work will be halted and immediate contact made with the Coordinator of the Special Places Program. In the event that human remains are encountered, immediate contact will be made with the Coordinator of Special Places and Assembly of Nova Scotia Mi'kmaq Chiefs via the Kwilmu'kw Maw-klusuaqn Negotiation Office.
- Complete underwater archaeological reconnaissance if ground disturbance is required as part of the Project activities within the waters of the East River of Pictou (underwater pipeline corridor).

The potential residual effects to the archaeological/cultural heritage is the potential disturbance, destruction, and/or loss or archaeological/cultural heritage resources. The predicted residual environmental effects on archaeological/cultural heritage resources are assessed to be potentially adverse, due to below grade disturbance and construction activities that could disturb, damage, and/or cause loss of previously identified or unknown archaeological/cultural heritage resources.

Most of the Site Study Area has been described as having moderate or high archaeological potential. If resources are damaged and/or destroyed through the remediation process, the effect is permanent and irreversible. However, the overall residual effect of the Project to archaeological/cultural heritage is assessed as not significant after mitigation measures have been implemented.

6.3.18 Human Health

The potential effects of the Project on human health are anticipated to be positive with respect to long-term air quality improvements and containment of contaminated sediment. Positive effects on human health resulting from the Project also include restored access to outdoor recreational activities and employment opportunity during the Project

A HHRA was conducted to evaluate potential risks to human health from changes to the environment associated with BHRP related acitivites (via an operational pathway). The HHRA involved the following steps:

- Identification of study boundaries
- Identification of human receptors
- Identification of chemicals of potential concern
- Exposure pathway analysis and development of conceptual site model

Concentrations of COPCs in soil, groundwater, surface water, sediment, country foods and air quality were compared to guidelines protective of residential receptors, construction workers and/or background conditions in the area. Results of this comparison indicated that concentrations of COPCs in various environmental media associated with BHRP related activities are within acceptable levels for protection of human health.

However, the following exposure pathways that required risk mitigation/monitoring were identified in relation to the human health of PLFN:

- Recreational or PLFN resident consumption of aquatic country foods present in the BHETF post-remediation
- Residential inhalation exposure from road dust (Total Suspended Particulate Matter [TSP], PM_{10} and iron)

The results of the HHRA indicate that there is the potential for unacceptable health risks as a result of human health exposure during the Project activities.

The following COPCs and receptors/exposure pathways could potentially result in unacceptable health risks:

- Resident inhalation exposure to particulates (TSP, PM_{10} and iron) in ambient air – specifically during final capping of the containment cell which involves construction-related activities primarily related to truck traffic on the Site access road.
- Construction worker inhalation exposure to vapours/emissions/particulates in ambient air during all construction related Project activities.

- Construction worker direct contact exposure to sediment COPCs during any Project activities that would involve direct contact exposure to BHETF sediment/sludge.

The key potential adverse effects resulting from the Project related to human health include increased traffic volumes, noise, light, and air emissions resulting from site activities such as the import and use of heavy machinery for remediation activities which may affect local residents. Potential negative effects are not significant and are primarily temporary during remediation work.

Mitigation measures that will be implemented to address potential adverse effects to human health, include, but are not limited to, the following:

- BMPs for noise, light, and air emission control during construction activities will be followed at a minimum such as equipment management, worker training, preventative maintenance plans and a complaint response plan.
- Minimize potential odour emissions by properly covering the dredged sediment to minimize the exposed area and the potential odour emissions.
- Vehicle traffic on the haul road will generally be restricted to 16 hours per day.
- Ensure proper road signage.
- Regular check by Site manager for excessive noise on-site and in relation to sensitive receptors so that resolution can be timely.

The potential adverse residual effects to human health is limited to the negligible to minor disturbance to local residents. The overall residual effect of the Project to human health is assessed as not significant after mitigation measures have been implemented.

6.4 Other Effects to Consider

6.4.1 Effects of Potential Accidents or Malfunctions

Accidents and malfunctions are events that are not part of any planned activity or normal operation of the Project. Potential credible accidents or malfunctions that were reviewed as part of the BHRP EIS included:

- Accidental discharges of contaminated sediments during dredging
- Erosion and sediment control failure
- Containment cell failure (liner or cap)
- Leachate storage tank failure/tanker truck spill
- On-site hazardous materials spill
- Failure of a surface water management pond
- Bridge failure
- Off-site trucking accident
- Vehicle collision
- Fire

The environmental effects of the above credible accidents and malfunctions on each applicable VC was assessed, and a determination of significance was made in consideration of the various significance criteria previously defined for each VC during the impact assessment phase. All of the credible accidents and malfunctions that were examined and the potential environmental effects that might arise were predicted to be either unlikely to occur or rated as not significant.

6.4.2 Effects of the Environment on the Project

The natural environment has the ability to potentially adversely impact the Project through events which may include the following:

- Climate Change and Severe/Extreme Weather, including:
  - Flooding
  - Drought
  - Extreme temperatures
  - Snow, ice, rain, and windstorms
  - Lightning strikes
- Seismic Events

Effects of the environment are largely addressed through design and through compliance with appropriate standards that provide margins of safety to prevent damage from environmental forces. None of the identified interactions between the environment and the project during any of the Project phases affect the Project to such a degree that the residual adverse effect will occur or is considered to be significant.

As part of the initial Project design stages, numerous works and activities have been undertaken and developed to avoid and/or withstand potential effects on the project due to climate change and extreme weather events. No potential for adverse effects from seismic events has been identified due to design standards, infrequent occurrence and limited magnitude of any such events in the geographical context.

In addition to Project features inherent to the design, the various Project components will include regular inspection, monitoring and maintenance. This will ensure that damage to any of the design features or operational aspects will be identified and repaired.

6.4.3 Cumulative Effects Assessment

Major industrial projects that have taken place, are taking place or will take place within a 20 km radius of the Site Study Area were identified (Figure 6.2). The cumulative effects assessment was completed to determine possible cumulative effects from the interaction of the residual effects from BHRP and from the effects of other projects in the area.

Pictou
Advocate Printing
Northern Pulp
Michelin
NS Power
Trenton
New Glasgow
Westville
Stellarton
McLellans Bk Quarry
Colchester County
Antigonish County
Antigonish
Pictou County

Legend

- Projects
- Hwy 104 Twinning Project
- Site Study Area
- Local Study Area
- Regional Study Area
- Cummulative Effects Boundary (20 km)

Protected Lands

- Nature Reserve
- Provincial Park
- Wilderness Area

Source: Service Nova Scotia; GHD

0 2.5 5 7.5
Kilometres

Coordinate System:
NAD 1983 CSRS UTM Zone 20N

N

NOVA SCOTIA LANDS INC
BOAT HARBOUR, NS
ENVIRONMENTAL IMPACT STATEMENT

11148275-31-03
Dec 2, 2020

PAST, PRESENT, AND FUTURE PROJECTS

FIGURE 6.2

GIS File: I:\GIS_DATA\Projects\8-chars\1114----\11148275 Boat Harbour\11148275-REPORTS\11148275-Rpt-29\11148275-31-03(029)GIS-HX0E6.2.mxd

The following projects were considered as having cumulative effects on at least one VC:

- Michelin Canada
- Nova Scotia Power – Trenton Plant
- Advocate Printing
- Northern Pulp, Replacement Effluent Treatment Facility Project
- Highway 104 Twinning Project
- MacLellans Mountain Quarry Expansion

It was determined that once the mitigation measures are taken into account, there are no significant residual cumulative effects anticipated for any of the VCs. The predicted residual cumulative effects on the Mi'kmaq of Nova Scotia with regards to indirect effects from impacts to air quality and odour, wetlands, mammals and wildlife, the marine environment, and migratory birds are assessed to be adverse, but not significant.

Historical and current land use within the region has undeniably affected the local habitats in ways that have affected the local distribution and abundance of several species of mammals and migratory birds, including SAR. However, the BHRP will result in a long-term positive impact to local habitat within the Site Study Area and will enable the Mi'kmaq of Nova Scotia to once again use the land for traditional purposes, which they have not been able to do since the operation of the BHETF commenced.

7. Mitigation, Follow-up and Monitoring Programs Proposed

7.1 Proposed Mitigation

NSLI has committed to protect the environment from any adverse environmental effects while carrying out the Project. That commitment is articulated in its draft Environmental Management Plan (EMP) and draft Project Environmental Protection Plan (PEPP) which are found in Appendix B to this EIS. The draft EMP along with the draft PEPP include all commitments made in the EIS.

A variety of mitigation measures are available to eliminate, reduce, or control the effect that Project components may have on the environment. These include standard operating procedures, compliance with regulatory standards, Project specific mitigation measures, and standardized Best Management Practices[5] (BMPs). All mitigation measures and BMPs are detailed in the draft PEPP and are also included in the draft EMP where appropriate.

7.2 Follow-up Programs

The purpose of a follow-up program is "to verify the accuracy of the effects assessment and to determine the effectiveness of the measures implemented to mitigate the adverse effects of the Project." Follow-up programs are an integral part of a broader environmental management plan that

[5] General term for techniques or methods widely used to achieve an objective in a field due to their effectiveness and practicality.

will be implemented post-approval for the purposes of verifying environmental effects predictions and the effectiveness of mitigation. Follow-up programs also provide NSLI with a means of ensuring compliance with applicable laws and regulations, and targets and objectives for continuous improvement.

Table 7.1 summarizes the preliminary follow-up programs that are currently proposed for the Project. The preliminary programs will be finalized following discussions with regulators, public stakeholders, and PLFN. NSLI will continue to engage and consult with PLFN specifically relating to follow-up programs to address the EIS Guidelines. This will ensure suggestions from PLFN regarding the design of and involvement in follow-up and monitoring programs are considered in finalizing the preliminary follow-up programs included in the EIS.

Table 7.1 Summary of the Preliminary Follow-up Programs Proposed for the Boat Harbour Remediation Project

Preliminary Follow-up Program	Objective	Elements for Follow-up	Studies to be Completed (parameters to be measured)	Planned Implementation Schedule
Atmospheric Environment	To ensure mitigation measures proposed for air quality and odour are sufficient at addressing potential effects to nearby sensitive receptors.	• Ambient air quality. • Complaint response protocol.	Independent Ambient Air Monitoring Program The Independent Ambient Air Monitoring Program currently ongoing for the Project will continue until full scale remediation has been completed. Background data will continue to be monitored until commencement of site preparation and construction. This will assist in confirming the predicted residual effects and to determine if additional mitigation measures are required. Parameters to measured are disused in Table 7.2.	Site preparation and construction and operation.
			Complaint Response Protocol (CRP) Follow-up regarding noise and light will occur only on an as needed basis as per the complaint response protocol, as directed by NSE.	CRP will be in place throughout the duration of the Project.
Geology, Geochemistry and Soil, Groundwater and Surface Water	To ensure the mitigation measures, erosion and sediment control measures and the environmental controls proposed for the Project are successful at preventing adverse effects to geology, geochemistry and soil, groundwater or surface water.	• Groundwater quality and groundwater elevation. • Surface water quality and quantity.	Monitoring of Erosion and Sediment Control Measures Erosion and sediment control measures and soil stabilization practices will be monitored and maintained until slopes have stabilized/areas have been re-vegetated.	Site preparation and construction and operation (and post closure for the containment cell).
			Groundwater Quality and Quantity Monitoring A comprehensive list of analytes will be measured to identify any operations-related alterations to groundwater quality. Should impacts above applicable criteria for the Site area be detected the effects would be further evaluated by a re-sampling and if found to be indicative of an effect mitigation measures would be employed in consultation with appropriate regulatory agencies.	Site preparation and construction and operation (and post closure for the containment cell).
			Water Discharge Criteria and Sampling Program The will include at a minimum monitoring the biochemical oxygen demand of the water that is to be discharged into the Northumberland Strait during active dredging and operation of the Temporary Leachate Treatment System (TLTS). The Proponent will work with regulators to confirm the details of the effluent discharge sampling program.	Years 2-6 during dredging and during operation of the TLTF.
			Containment Cell Monitoring Infrastructure for long-term monitoring and care of the containment cell will be constructed, including the required groundwater and leachate monitoring wells and a surface water monitoring station.	Closure and post-closure of the containment cell (6-25+ years).
Riparian, Wetlands and Terrestrial Environments	To ensure there are no permanent adverse effects to terrestrial habitat and vegetation, wetlands or mammals and wildlife by reviewing baseline conditions and conduct post remediation monitoring. The follow-up program will also ensure periods of environmental sensitivity are avoided during construction.	• Compliance Monitoring. • Success in wildlife's re-establishment of the habitat provided at the Site after remediation.	Compliance Monitoring Complete regular observations during remediation to ensure mitigation measures are properly implemented. Communicate with contractor and Project staff on the location of monitoring stations within remaining wetland habitat that is not approved for alteration. Re-evaluate wetland areas following the decommissioning of the Site to identify trends or impacts to wetlands due to project operations.	Site preparation and construction, operation and decommissioning and abandonment.
Aquatic Environments	To ensure there are no permanent adverse effects by conducting baseline marine environment studies along pipeline and post remediation monitoring of fish and aquatic habitat.	• Sediment contamination sampling along the pipeline corridor. • Monitoring of remedial activities to evaluate their success in establishing high quality aquatic habitat. • Success in establishing high quality aquatic habitat after remediation.	Sediment sampling will be completed along the pipeline corridor to determine if there is any contamination of the soil adjacent to the pipeline.	Site preparation and construction, operation and decommissioning and abandonment.

Table 7.1 Summary of the Preliminary Follow-up Programs Proposed for the Boat Harbour Remediation Project

Preliminary Follow-up Program	Objective	Elements for Follow-up	Studies to be Completed (parameters to be measured)	Planned Implementation Schedule
Migratory Birds	To ensure there are no permanent adverse effects to migratory birds by reviewing baseline conditions and conducting post-remediation monitoring.	• Compliance Monitoring. • Monitor known nests near equipment.	Compliance Monitoring Verify the effectiveness of mitigation measures related to heavy machinery usage in wetland areas, and areas (if any) where excessive light pollution may disorient or attract avian species.	Implement at the start of construction until the end of the decommissioning phase.
Mi'kmaq of Nova Scotia/Human Health	To ensure there are no significant temporary effects during remediation activities to the Mi'kmaq of Nova Scotia or to human health through compliance monitoring. To ensure beneficial impacts related to employment opportunities are occurring.	• Atmospheric environment elements. • Archaeological resources. • Follow-up with contractors to ensure meaningful employment opportunities are offered to PLFN and local residents as a priority. • Post-remediation monitoring of COPCs in aquatic biota	Compliance Monitoring Verify the effectiveness of mitigation measures related to air quality, odour, noise and light.	Implement at the start of construction until the end of the decommissioning phase.

7.3 Monitoring Programs

The purpose of a monitoring program is "to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during all phases of project development, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety." Monitoring programs provide NSLI with the means for identifying undesirable change and a basis for adaptive management (if and as required).

Table 7.2 summarizes the preliminary monitoring programs presently proposed for the Project that were developed based on a conceptual level of design (including the management of leachate from the containment cell and groundwater monitoring). The preliminary monitoring programs will be finalized based on discussions with regulators, public stakeholders, and PLFN, as appropriate. The finalized monitoring programs will include specific measures to ensure that post-remediation contaminant levels meet standards so that the area can return to a naturalized state.

PLFN will be provided with the opportunity to participate in the monitoring activities where appropriate.

Table 7.2 Summary of the Preliminary Monitoring Programs Proposed for the Boat Harbour Remediation Project

Valued Component	Preliminary Monitoring Programs
Air Quality and Odour	Independent Ambient Air Monitoring Program The Independent Ambient Air Monitoring Program will continue until full scale remediation has been completed. It will include the following air contaminants for long-term monitoring at the Fixed Monitoring Station and real-time monitoring within Boat Harbour. Long-term monitoring parameters may include: • Total Suspended Particulate (TSP) • Particulate Matter with Aerodynamic Diameter less than or equal to 10 microns (PM_{10}) • Particulate Matter with Aerodynamic Diameter less than or equal to 2.5 microns ($PM_{2.5}$) • Metals and Mercury • Polycyclic Aromatic Hydrocarbons (PAHs) • Speciated Volatile Organic Compounds (VOCs) • Dioxins and Furans • Ammonia, Acetaldehyde, and Formaldehyde • Speciated Reduced Sulphur Compounds • Chlorine, Chlorine Dioxide, and Methanol Real-time monitoring may include: • Total Suspended Particulate (TSP) • Particulate Matter with Aerodynamic Diameter less than or equal to 10 microns (PM10) • Hydrogen Sulfide (H2S) • Total Volatile Organic Compounds (TVOCs) The monitoring program will include action levels for monitored parameters such as TSP and PM_{10} along with Site-specific corrective actions (additional watering, reduced daily truck traffic, reduced speeds,

Table 7.2 Summary of the Preliminary Monitoring Programs Proposed for the Boat Harbour Remediation Project

Valued Component	Preliminary Monitoring Programs
	etc.) to ensure protection of residential receptors in the area. Based on the results of the ongoing Independent Ambient Air Monitoring Program and in consultation with regulators, the parameters to be sampled and the frequency during remediation will be confirmed.
Greenhouse Gas	• No monitoring is proposed for greenhouse gas.
Noise	• No monitoring is proposed for noise.
Light	• No monitoring is proposed for the light.
Geology, Geochemistry and Soil	• No monitoring is proposed for geology, geochemistry, and soil outside of the monitoring of erosion and sediment control measures included in the geology, geochemistry and soil, groundwater and surface water follow-up program.
Groundwater	Groundwater Quality and Quantity Monitoring • The groundwater quality and quantity monitoring program will at a minimum involve the locations, frequency and parameters of the existing program in place at the Site and will be supplemented if directed by regulatory authorities. Containment cell Monitoring • As part of containment cell closure, infrastructure for long-term monitoring and care of the containment cell will be constructed, including the required groundwater and leachate monitoring wells. • Leachate collection system cleanout riser piping will be installed to allow for long-term inspection, maintenance, and cleaning of the leachate collection piping. • The long-term groundwater monitoring program will track changes in groundwater quality and flow over time and will be used to assess the validity of the model predictions regarding the containment cell and liner systems performance. • The results of long-term monitoring will be reviewed and interpreted in detail annually as part of the annual reporting process. • Annual data interpretation and reporting is used to ensure any deteriorations in environmental performance are identified and addressed through changes in operational practices or implementation of augmented remedial responses.
Surface Water	Water Quality Monitoring (during operations) • Two samples, one during a wet event[6] and one during a dry event[7] are collected during each of the spring, summer, and fall periods. • Samples from each of the main streams entering Boat Harbour, plus one from the pond outfall near the containment cell will be collected. Total Suspended Soils (TSS) Monitoring • Monitoring will include the enforcement of limits on specific contaminants of concerns (COCs) that may be associated with the suspended solids (i.e., metals, dioxins and furans).

6 A wet event is defined as a sampling event following a rainfall event in excess of 5 mm

7 A dry event is defined as a sampling event following a minimum of 3-4 days of no rain

Table 7.2 Summary of the Preliminary Monitoring Programs Proposed for the Boat Harbour Remediation Project

Valued Component	Preliminary Monitoring Programs
	Water Quantity Monitoring • Flow measurements will be collected at the Boat Harbour outlet throughout remediation. Containment cell Monitoring • As part of containment cell closure, a surface water monitoring station will be constructed to facilitate ongoing surface water monitoring.
Terrestrial Habitat and Vegetation	• No monitoring is proposed for terrestrial habitat and vegetation beyond the compliance monitoring proposed in the riparian, wetlands and terrestrial environments follow-up program.
Wetlands	Post Remediation Monitoring • Areas within the wetlands will be re-evaluated following the decommissioning of the Site to identify trends or impacts to wetlands due to Project operations. The specific parameters that will be measured during post-remediation monitoring will be confirmed based on the results of the HHERA and through conversations with regulators.
Mammals and Wildlife	Post Remediation Monitoring • Environmental monitoring will take place in areas thought to have a potential for contamination after the Site is decommissioned. These include wetland areas found near the containment cell, and monitoring water quality at the mouth of the BHSL. • Monitoring of remedial activities to evaluate their success in establishing habitat for native species and monitoring wetlands for condition and integrity may be necessary post decommissioning phase.
Marine Environment	Post-Remediation Monitoring • Areas within the estuary will be re-evaluated following the decommissioning of the Site to identify trends or impacts to wetlands due to project activities. • The specific parameters that will be measured during post-remediation monitoring will be confirmed based on the results of the HHERA and through conversations with regulators.
Fish and Aquatic Habitat	Monitoring of Pipeline Decommissioning Activities • Monitoring and site supervision will be conducted during the cleaning and decommissioning of the underwater effluent pipeline. • Visual surveys of the pipeline will be completed using remote sensing video cameras which will traverse the pipeline in its entirety to ensure adequate removal of material has been realized, and that no leaks or damage to the pipe is apparent. BHSL and Basins Confirmatory Sampling • Confirmatory sampling of BHSL and Basins (settling and aeration) will be completed after remediation has been completed. • The specific parameters that will be measured during post remediation monitoring will be confirmed based on the results of the HHERA and through conversations with regulators.

Table 7.2 Summary of the Preliminary Monitoring Programs Proposed for the Boat Harbour Remediation Project

Valued Component	Preliminary Monitoring Programs
Migratory Birds	Bird Monitoring • Should Project Components/Activities occur during the breeding bird season, a nest survey will be conducted within 10 days of any activity occurring. Should a nest be identified, a buffer must be established and the nest is to be monitored. • Monitor known nests near equipment or material stockpiles and exposed areas from a distance with a spotting scope or binoculars to verify the effectiveness of the buffer until the nests are inactive. • Conduct routine inspections as directed by regulators. Inspections are anticipated to be conducted daily by operators, and as required by qualified avian experts during the remediation phase of the project and all other phases that interact directly or indirectly with those areas.
Species at Risk	Post-Remediation Monitoring • Environmental monitoring shall take place after the site is decommissioned at wetland areas found near the containment cell, and the water quality will be monitored at the mouth of the BHSL. • Monitoring of remedial activities to evaluate their success in establishing habitat for wildlife and monitoring wetlands for condition and integrity may be necessary post decommissioning phase.
Mi'kmaq of Nova Scotia	Country Food Monitoring • Post-Remediation Monitoring of country foods (such as edible fish, shellfish, birds and/or aquatic plants) will be conducted within the remediated sediment areas (aquatic areas) at the Site. Country foods sampling requirements will be determined based on the results of the HHERA. HHERA • Confirmatory sediment sampling will be completed to confirm Site Specific Target Levels (SSTLs) are met, based on human health sediment contact. • The specific parameters that will be measured during post remediation monitoring will be confirmed based on the results of the HHERA and in consultation with regulators. Additional Well-being Follow-up Survey • An additional PLFN well-being survey will be conducted once remediation activities have been completed to assess and document any related changes in well-being.
Economic and Social	Roadway Monitoring • Monitor roads and highways for pavement conditions and liaise with Nova Scotia Transportation and Infrastructure Renewal (NSTIR) as needed to facilitate repairs. Air Monitoring • See the proposed monitoring programs associated with Air Quality and Odour.
Archaeological/Cultural Heritage Resources	• Members of PLFN community will be given the opportunity to be on-site during all ground disturbance work. • In the event that human remains or intact archaeological deposits are encountered during any work associated with Project Components/Activities, all work in the associated area(s) will be halted

Table 7.2 Summary of the Preliminary Monitoring Programs Proposed for the Boat Harbour Remediation Project

Valued Component	Preliminary Monitoring Programs
	and immediate contact made with the Coordinator of the Special Places Program (Sean Weseloh McKeane: 902-424-6475). • If human remains are encountered, immediate contact will also be made with the Assembly of Nova Scotia Mi'kmaq Chiefs via the Kwilmu'kw Maw-klusuaqn Negotiation Office (Heather MacLeod-Leslie: 902-843-3880). • An exclusion zone of 100 m surrounding the area will be established should any cultural resources be encountered. • If human remains or intact archaeological deposits are discovered no further ground disturbance work will be permitted at the Site until approval has been received from the appropriate regulatory agency to resume the work.
Human Health	Air Monitoring • See the proposed Monitoring programs associated with the air quality and odour VC. Country Food Monitoring • See the proposed monitoring program for Mi'kmaq of Nova Scotia. HHERA • See the proposed monitoring program for Mi'kmaq of Nova Scotia.

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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