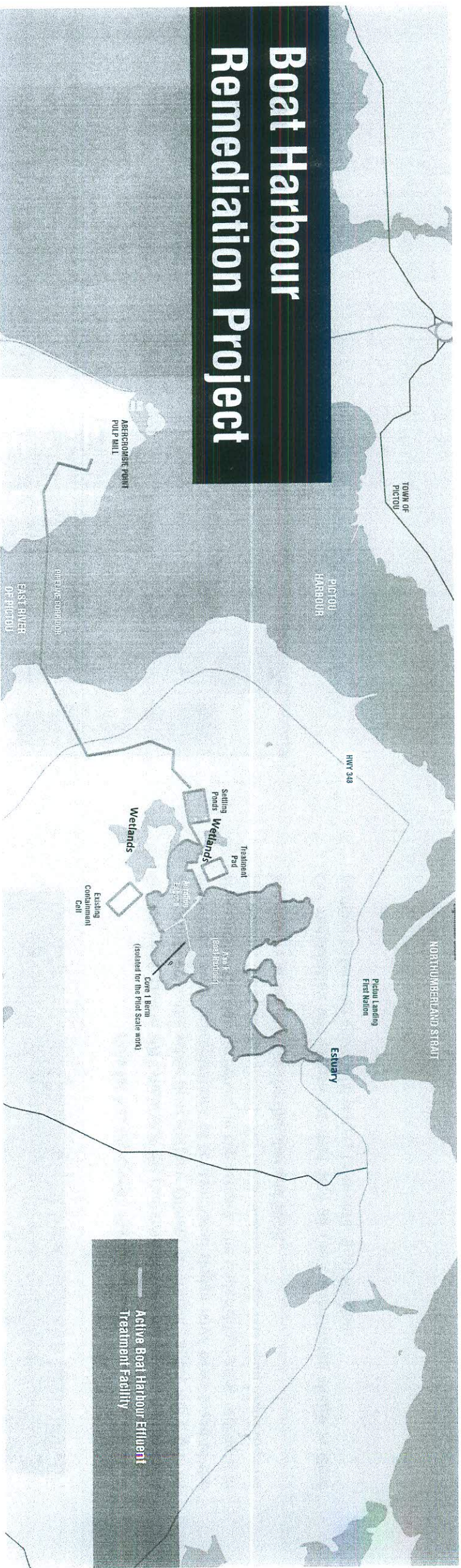


Boat Harbour Remediation Project



Boat Harbour Sludge – Our Problem

What contaminants are in Boat Harbour?

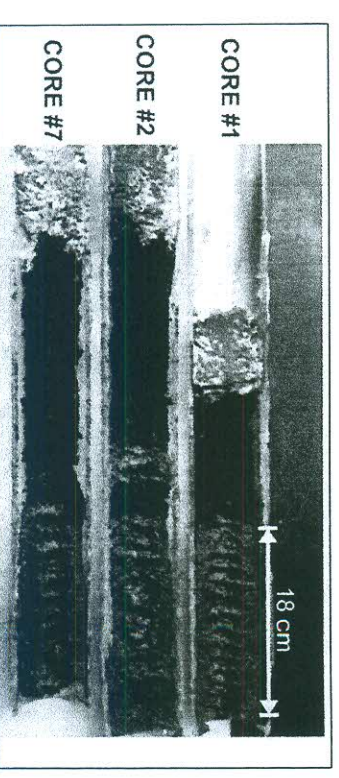
A layer of contaminated sludge has settled on top of the Boat Harbour bottom. This sludge has been accumulating since 1967. It has been sampled many times over the years. A full suite of testing was completed in 2017 which has confirmed the contaminants in the sludge. Over time, the contaminants have not changed.

We know the sludge contains:

- Dioxins and furans, the principal contaminants of concern are carcinogens which are residues of industrial processes
- Metals such as mercury, cadmium and zinc, which are residues of industrial processes
- Polycyclic aromatic hydrocarbons (PAHs), which can be produced by incomplete combustion of fossil fuels in engines and boilers or from forest fires
- Total petroleum hydrocarbons (TPH), a term used for any mixture of hydrocarbons that are found in crude oil and petroleum products
- Volatile organic compounds (VOCs), include human made residues from industrial processes and naturally occurring chemical compounds.

The contaminated sludge is generally less than a foot, or 30 centimeters, thick and is black in colour while the underlying marine sediment is brownish gray and is not contaminated.

The wetlands above Boat Harbour have also been impacted from the early years of Mill operations and contains contaminated sediments.



This image shows several core samples taken from Boat Harbour, the black contaminated sludge is clearly visible; the brownish gray is the clean Pre-industrial marine sediment and, the bentonite is a clay product put in the core during sampling as a plug - **Note:** The figure shows from left to right bentonite plug, black contaminated sludge, brownish gray pre-industrial marine sediment

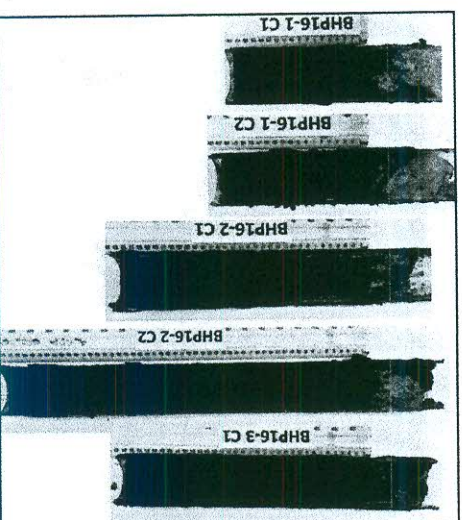
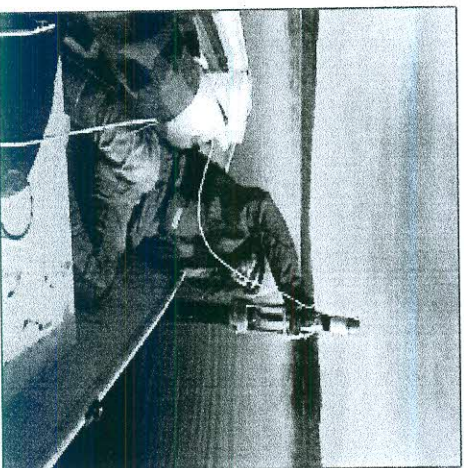
Boat Harbour Remediation Project

How much is there?

The contaminated sludge in Boat Harbour is of a soft, wet nature and is unevenly distributed along the harbour bottom. We have estimated the volume of material to be removed from Boat Harbour to be as much as 1,000,000 cubic meters. This number includes some of the marine sediment on the harbour bottom that will accompany removal of the contaminated sludge. To effectively remove the contaminated sludge, we need to take some of the marine sediment. Once the material is removed it will be treated, dewatered and its volume will be significantly reduced to about 500,000 cubic meters.

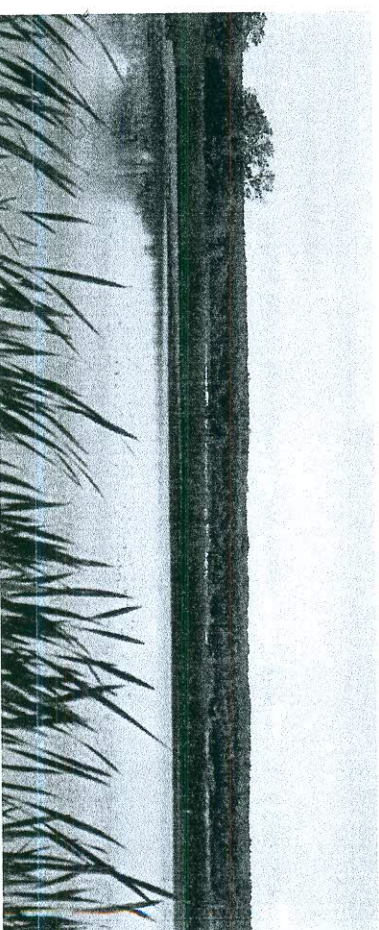
Sampling procedure

All sampling followed scientific protocols based upon generally accepted procedures. These protocols were vetted with Dr. Ian Spooner, a geoscientist and sampling expert from Acadia University.



The wetlands

Twenty-five wetland areas are around Boat Harbour and are identified as marsh and/or swamp complexes. One wetland of about 36 hectares in area, pictured below, is situated near the existing settling ponds and was impacted by early years of effluent discharge. The remediation planning is considering either removal of all the impacted sediments or a risk-based approach which may involve removal of areas of higher contamination and allowing monitoring and natural attenuation (treatment) for the balance of the wetland.



How far has the contamination spread?

Studies conducted in 2017 show that the contaminated sediments are, for the most part, confined to the active Boat Harbour Effluent Treatment Facility and within its shoreline. Lower concentrations of contaminated sludge have been found in the area outside the dam structure, in the estuary. The underlying marine sediment in the estuary is not contaminated. No contaminated sludge has been found beyond the estuary or out into the Northumberland Strait.

Our remediation will ensure we deal with all the contaminated sludge in Boat Harbour before we allow tidal waters to re-enter Boat Harbour.