

**ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES
FRENCH ISLAND
15 CENTER STREET
OLD TOWN, MAINE**

**EPA GRANT # BF00A00039
ACRES ID 134225**

Prepared for:
Penobscot Indian Nation
Attn: Sean O'Brien
12 Wabanaki Way
Indian Island, Maine 04468

Prepared By:
Campbell Environmental Group
173 Gray Road, Falmouth, Maine 04105

December 16, 2025





December 16, 2025

Sean O'Brien
Penobscot Indian Nation
12 Wabanaki Way
Indian Island, Maine 04468

Re: Analysis of Brownfield Clean-up Alternatives
French Island
15 Center Street
Old Town, Maine 04468

Dear Sean:

Campbell Environmental Group, Inc. (CEG) was retained by the Penobscot Indian Nation to perform an Analysis of Brownfield Clean-Up Alternatives (ABCA) for the French Island site located at 15 Center Street, in Old Town, Maine (Site). This ABCA was prepared to evaluate cleanup alternatives, considering site characteristics, surrounding environment, land use restrictions, potential future uses, and cleanup goals for the specific site.

If you have any questions or comments, please do not hesitate to contact us. CEG appreciates working with you on this project.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin Hardwick", written in a cursive style.

Kevin Hardwick
Hydrogeologist

A handwritten signature in black ink, appearing to read "Richard B. Campbell", written in a cursive style.

Richard B. Campbell
Maine Certified Geologist
President

Enclosure

1.0 INTRODUCTION

Campbell Environmental Group, Inc. (CEG) was retained by the Penobscot Indian Nation (PIN) to perform an Analysis of Brownfields Clean-Up Alternatives (ABCA) on an empty lot located on French Island, in Old Town, Maine, hereafter referred to as the Subject Property (**Figure 1**). CEG has previously completed Phase I and multiple Phase II Environmental Assessments (ESA) of the Subject Property. During the Phase I ESA, CEG observed significant metal slag and metal cuttings along the river embankment. Subsequent sampling during the Phase II ESAs indicate elevated lead concentrations are present in soils along a majority of the embankment along the river.

The Subject Property is currently vacant and has a street address of 15 Center Street, Old Town. The Subject Property is approximately 0.7 acres in size and is bound to the west and north by the Penobscot River with approximately 325 feet of river frontage, to the south by Center Street (Route 2), and to the east by Dave's Service Center. The area surrounding the Subject Property is primarily a mixture of commercial and residential properties. There are currently no structures located on the property.

Prior to purchase by the Penobscot Indian Nation, the Subject Property had been historically utilized for commercial and industrial purposes as far back as the mid to late 1800s when the TM Chapman and Sons Company operated a machine shop and foundry. The machine shop was located directly adjacent to the western property boundary and appears to have been constructed almost directly on the shoreline of the Penobscot River. The foundry was located on the eastern portion of the Subject Property. Historical information indicates that the foundry was removed from the Subject Property sometime between 1948 and 1962. The Penobscot Indian Nation purchased the property in 1990. None of the previously discussed structures were present at that time.

1.1 Summary of Previous Investigations

CEG completed a Phase I ESA in 2011 and identified significant metal slag and soil staining along the entire river embankment. Subsequent Phase II ESAs in 2012 and 2018 identified arsenic and lead concentrations along the river embankment at concentrations above Maine Department of Environmental Protection (MEDEP) Remedial Action Guidelines (RAGs) Park User Scenario. Sample locations from 2018 are shown in **Appendix A, Figure 2** and lead and arsenic concentrations as presented in the Phase II drafted in 2018 are included in **Appendix B, Table B-1**.

To facilitate potential remedial options, CEG conducted additional sampling in 2021 to determine how the soils would need to be handled and disposed. The river embankment was divided into four equal sections as shown in **Appendix A, Figure 3**. A total of 16 discrete samples, four from each section, were collected from the embankment. The discrete locations were chosen such that soil exhibiting significant staining was selected to best characterize impacts. For each section, the four discrete samples were composited into a single waste profile sample, resulting in a total of four samples for off-site waste characterization.

Waste profile data collected along the southern portions of embankment exceeded corresponding hazardous waste requirements for lead. Composite waste profile data from the northern portion of the embankment did not indicate lead concentrations above corresponding hazardous waste requirements. However, discreet samples collected from this area did exceed standards at one location, indicating that hazardous levels of lead are present in soils along the northern embankment as well. Waste characterization data from 2021 is summarized in **Appendix B, Table B-2**.

Concurrent with waste profile sampling, CEG collected 16 discreet samples for a treatability study to determine if metals could potentially be immobilized on-site during remediation. Eight of the treatability samples were left untreated, and eight of the samples were mixed with a stabilizer compound at 2-percent and 4-percent ratio by weight. Results were inconclusive and while the stabilizer compound did reduce lead concentrations in some samples, it often did not reduce the concentrations below the hazardous waste threshold, and at times did not reduce the lead concentrations at all.

In June 2024, CEG conducted additional sampling to better characterize the lateral and vertical extent of lead impacted soils along the embankment. CEG collected 48 samples from the river embankment for analysis of total lead and toxicity characteristic leaching procedure (TCLP) lead. At each location, a sample was collected from the surface and from approximately 12 to 18 inches below grade. Total lead concentrations exceed corresponding Maine Department of Environmental Protection (MEDEP) Remedial Action Guidelines (RAGs) along much of the southern portion of the embankment. Concentrations also exceed in soils along the northern embankment, although at a lower frequency. Samples collected from the surface more frequently exceeded the MEDEP RAGs than the deeper samples. When compared to the more stringent MEDEP RAGs Residential or Leaching to Groundwater Scenarios, nearly every sample collected exceeds corresponding standards. Sample locations are shown on **Figure 4** and data generated during the 2024 investigation is summarized in **Appendix B, Table B-3**.

2.0 REMEDIAL ALTERNATIVES

Four remedial alternatives have been considered: No Action, land use controls, excavation and off-site disposal, and in-situ stabilization with capping. A discussion of each of the remedial options is presented along with a cost estimate. The cost estimates are based on a series of assumptions due to existing uncertainties regarding the extent/volume of impacts and whether the soil is characteristically hazardous or not. Due to the nature of the impacted soil, CEG believes that lead concentrations may exhibit significant variation over very short distances making realistic estimates on volumes difficult. Furthermore, portions of the embankment are not conducive to hand explorations and the overall depth of impacts is somewhat uncertain. CEG has also observed that visually stained soil and slag material is visible below the water line of the river. Impacts below the waterline have not been characterized and could potentially add to the overall volume of impacted soil subject to remedial measures.

Regardless of these uncertainties, the analysis presented here will allow a relative comparison of the efficacy and cost of the four alternatives reviewed and is intended to provide a first step in the remedial process.

2.1 Alternative 1: No Action

No Action is a standard alternative used in remedial feasibility studies as a baseline for comparison. This alternative would take no steps to eliminate human health or ecological hazards from the metal debris or hazardous substances. Essentially, the No Action alternative would leave the Site conditions unchanged. There are no costs associated with this alternative.

2.2 Alternative 2: Land Use Controls

Alternative 2 would not physically remove or treat any of the soil and or debris, but rather would emplace physical controls to limit the potential for human exposure. This would involve fencing the site and posting warning signs to prevent potential human exposure to the physical or chemical hazards. The advantage of the Land Use Control alternative is that it is easy to implement and low cost. On the other hand, this alternative would not eliminate environmental hazards such as leaching to groundwater or impacts to aquatic receptors. Another disadvantage would be that the institutional controls would basically need to be permanent, which would limit the potential redevelopment options for the property. The cost estimate for Alternative 2 is \$70,613 which assumes a chain link fence installation and warning signs, and 30 years of maintenance and inspection costs.

Table 1. Cost Estimate for Alternative 2
Land Use Controls
French Island Lot, 15 Center Street, Old Town, Maine

Item	Estimated Cost	Basis/Assumptions
Pre-Job Planning and Permitting		
Planning and MDEP Permitting for work to include professional survey etc.	\$ 12,000	professional judgement
Place Fencing and Signs		
Chain Link around Entire Site	\$ 28,000	Assume \$40 per linear foot , installed. 700 ft.
CEG oversight	\$ 6,250	\$1,250/day x 5 days
Signs	\$ 1,000	Purchase and installs signs
Long Term Maintenance		
inspection and repair	\$ 15,000	Assume \$500 per year for 30 years
Project Management and Reporting		
Reporting	\$ 5,000	professional judgement
CEG Project management	\$ 3,363	Estimated as 5% of total job costs
TOTAL COST ESTIMATE	\$ 70,613	

2.3 Alternative 3: Excavation and Off-Site Disposal

Excavation and off-site disposal would physically remove the metal debris and impacted soil for subsequent transport and disposal at a regulated landfill. By completely removing the impacted material, Alternative 3 would eliminate the physical and chemical hazards to human health and the environment, as well as provide maximum flexibility to redevelop the property for future beneficial uses. The primary disadvantage to Alternative 3 is cost, as it is the most expensive option.

There are several uncertainties and technical challenges to implementing Alternative 3. The primary challenge with implementation is addressing water level fluctuations and the steep embankment. During portions of the year, the impacted embankment is largely submerged. A review of the river data from United States Geological Survey (USGS) station #01036390 at Eddington, Maine showed that minimum flows occur from July through September. Conducting the excavation during this time period is imperative, as it would provide the easiest and safest access to the areas requiring removal. There may also be an opportunity to work with the upstream dam owners to lower flows during the excavation period. However, even with the optimal season and possible assistance with water flow management, it is likely that some isolation from the river will be required in order to access and excavate impacts in the riverbed. At a minimum, a silt curtain would be required to control sediment releases in the river while excavation occurred. If flows are not reduced enough, the high energy of the river next to the Site may make placement of a silt curtain impossible. For this reason, a temporary bladder dam (Aqua Dam - aquadam.net) was included in the cost estimate.

The bladder dam would be placed in a semi-circle around the area of impact, effectively isolating it from the main channel of the river. Depending on the nature of the river substrate, it is possible that the land side of the bladder dam could be completely dewatered. It is also possible that a more conductive substrate (e.g., cobble) would allow substantial seepage under the bladder dam, in which case the area would remain flooded. The presence of the bladder dam would still likely isolate the excavation zone from the stronger flow of the river such that excavation could proceed. A site reconnaissance during the low water period, with water flow control help from the dam operator, if possible, would be needed to finalize the design/strategy and select an appropriately sized bladder dam, if needed. For the purposes of the current evaluation, an 8 ft diameter bladder dam (providing 5 feet of water control) was included in the cost estimate.

The steep embankment (12 to 15 ft) presents another challenge. It may be possible that a long-stick excavator could sit atop the embankment and have adequate reach to excavate impacted river substrate. It is also possible that a temporary access road would be needed to allow machinery to traverse the bank and reach the impacted river substrate. Similarly, the placement of the bladder dam requires an excavator and may require a temporary access to be established. For the purposes of this cost estimate, it was assumed that work could be completed without the need to establish a temporary access road. Lastly, for the purposes of this cost estimate the debris and or soil is assumed to be hazardous due to the presence of elevated lead and arsenic. Excavated material could either be directly loaded for transport and disposal as a hazardous waste. This would entail trucking the waste to Waste Management's Emelle, Alabama landfill. Alternatively, the excavated material could be treated with a stabilizer compound such as Free Flow Technologies "Free Flow 200" to render it non-hazardous. This compound is physically mixed with excavated soil to immobilize heavy metals. A treatability test was conducted in 2021 and results were inconclusive. If this alternative were to be chosen, additional sampling and testing would be required prior to excavation. Once rendered non-hazardous, the excavated material could be disposed at Waste Management's Crossroads landfill in Norridgewock, Maine.

Cost estimates were generated for two excavation scenarios: Alternative 3A, excavation and disposal as hazardous waste (**Table 2**), and Alternative 3B, excavation with on-site treatment and disposal as non-hazardous waste (**Table 3**). As previously discussed, the extent and volume of hazardous material is

difficult to estimate as CEG believes that lead concentrations may vary greatly over very short distances. For this cost estimate CEG has used existing data and our professional judgement to estimate the volume of hazardous and non-hazardous lead impacted soil at 1000 cubic yards and 1300 cubic yards respectively. Both estimates have incorporated a 30-percent increase in the volume to account for uncertainties in the extent of submerged impacts and depth. Assuming a soil density of 1.4 this would equate to approximately 1,400 tons of hazardous material and 1,820 tons of non-hazardous material. The cost estimate is further based on the assumption of 8 to 10 truck load production rate per day (or 80 to 100 cubic yards of material).

Additional substantial cost increases could occur if: (1) a larger bladder dam is required; (2) water control via pumping and treatment is required; (3) site size or conditions limit the number of truck load outs that can be achieved per day; or (4) the State requires evaluation and/or mitigation for threatened or endangered mussel species during the remedial implementation. CEG has included a potential overage line item of 30-percent of the total cost to account for the above. The cost estimate for Alternative 3A is \$3,999,515 and for Alternative 3B is \$1,681,433.

Table 2. Cost Estimate for Alternative 3A		
Soil Excavation and Off-Site Disposal (as hazardous waste)		
French Island Lot, 15 Center Street, Old Town, Maine		
Item	Estimated Cost	Basis/Assumptions
Pre-Job Planning and Permitting		
Planning and MDEP Permitting for work along and within river, to include professional survey, waste permitting, etc.	\$ 50,000	Similar project / professional judgement
Bladder dam purchase and install		
500 ft of bladder dam, purchase	\$ 200,000	Quote from Aqua Dam. 8 ft tall x 17 ft wide (provides 5 ft of water control)
Shipping	\$ 10,500	estimated from online freight shipping calculator
Aqua Dam Super to oversee set up	\$ 28,000	Travel from CA for two weeks of work
Labor and Equipment for bladder dam set up and break down	\$ 85,000	2 wk for backhoe, crew, and pump.
Bladder dam disposal	\$ 7,000	place in roll off and dispose at local landfill; estimate
CEG oversight	\$ 17,775	\$3555/day x 5 days. Assumes two staff.
Soil Excavation		
Sub Labor and Equipment	\$ 80,000	Four weeks total. Assuming 8 to 10 truck load outs per day (80 to 100 yards per day, or 400 to 500 yards per week), excavation will take 2 weeks. Add one week of backfilling and site restoration.
Fill Material, geotextile, and rip-rap to re-construct stream bank	\$ 45,000	1650 cubic yards at \$20/yard. Gorham Sand and Gravel pricing from web site. Assume \$2,000 for geotextile
Lab costs	\$ 8,000	Confirmation sampling post-excavation. Assumes 10 foot grid and 80 samples.
CEG oversight	\$ 60,000	20 days, two staff
Waste Transportation, and Disposal		
Soil Transportation and disposal	\$ 2,216,240	\$1300 per ton HAZARDOUS to Alabama (1,450 tons) \$182 per ton NON-HAZARDOUS to Norridgewok (1,820 tons)
Potential Overages		
	\$ 900,000	Potential overages estimated at 30-percent total project
Project Management and Reporting		
Reporting	\$ 20,000	professional judgement
CEG Project management	\$ 272,000	Estimated as 10% of total job costs
TOTAL COST ESTIMATE	\$ 3,999,515	

Table 3. Cost Estimate for Alternative 3B		
Soil Excavation and Off-Site Disposal (hazardous soil treated on-site)		
French Island Lot, 15 Center Street, Old Town, Maine		
Item	Estimated Cost	Basis/Assumptions
Pre-Job Planning and Permitting		
Planning and MDEP Permitting for work along and within river, to include professional survey, waste permitting, etc.	\$ 50,000	Similar project / professional judgement
Bladder dam purchase and install		
500 ft of bladder dam, purchase	\$ 200,000	Quote from Aqua Dam. 8 ft tall x 17 ft wide (provides 5 ft of water control), \$140 per linear foot
Shipping	\$ 10,500	estimated from online freight shipping calculator
Aqua Dam Super to oversee set up	\$ 28,000	Travel from CA for two weeks of work
Labor and Equipment for bladder dam set up and break down	\$ 85,000	1 wk for backhoe, crew, and pump. Estimated from Allstate quote.
Bladder dam disposal	\$ 7,000	place in roll off and dispose at local landfill; estimate
CEG oversight	\$ 17,775	\$3555/day x 5 days. Assumes two staff.
Soil Excavation		
Sub Labor and Equipment	\$ 80,000	Four weeks total. Assuming 8 to 10 truck load outs per day (80 to 100 yards per day, or 400 to 500 yards per week), excavation will take 2 weeks. Add one week of backfilling and site restoration.
Fill Material, geotextile, and rip-rap to re-construct stream bank	\$ 45,000	1650 cubic yards at \$20/yard. Gorham Sand and Gravel pricing from web site. Assume \$2,000 for geotextile
Lab costs	\$ 8,000	Confirmation samplig. Assumes 10 foot grid and 80 samples
CEG oversight	\$ 60,000	Assumes two staff for 20 days
Waste Transportation, and Disposal		
Soil Transportation and disposal	\$ 534,800	\$200 per ton treated Hazardous(1,400 tons) \$140 per ton NON-HAZARDOUS to Norridgewok (1,820 tons)
Potential Overages		
	\$ 380,000	#0-percent total estimate
Project Management and Reporting		
Reporting	\$ 22,500	professional judgement
CEG Project management	\$ 152,858	Estimated as 10% of total job costs
TOTAL COST ESTIMATE	\$ 1,681,433	

2.4 Alternative 4: On-Site Treatment and Cover

Alternative 4 would follow the same implementation steps and involve the similar implementation costs described above for the excavation scenario. However, rather than shipping material off-site for disposal, the treated debris and or soil would be returned to the upland areas of the site and then covered with a geotextile and clean fill. Essentially the stabilization/treatment would eliminate the chemical hazards and the covering would eliminate the physical hazards. Treated material would not be used to re-construct the river bank but would rather be spread in a designated area and capped. Clean fill and rip rap would be used to re-construct the river bank. The advantage of Alternative 4 is that it avoids off-site disposal costs. The disadvantage is that it would require some long-term maintenance to ensure the physical barriers remain in place, and property redevelopment options may be limited. As shown in Table 4, the cost estimate for Alternative 4 is \$726,556.

Table 4. Cost Estimate for Alternative 4
Soil Excavation, Treatment, and Covering On-Site
French Island Lot, 15 Center Street, Old Town, Maine

Item	Estimated Cost	Basis/Assumptions
Pre-Job Planning and Permitting		
Planning and MDEP Permitting for work along and within river, to include professional survey, wast permitting, etc.	\$ 60,000	Similar project / professional judgement
Bladder dam purchase and install		
500 ft of bladder dam, purchase	\$ 200,000	Quote from Aqua Dam. 8 ft tall x 17 ft wide (provides 5 ft of water control), \$140 per linear foot
Shipping	\$ 10,500	estimated from online freight shipping calculator
Aqua Dam Super to oversee set up	\$ 28,000	Travel from CA for two weeks
Labor and Equipment for bladder dam set up and break down	\$ 85,000	1 wk for backhoe, crew, and pump. Estimated from Allstate quote.
Bladder dam disposal	\$ 7,000	place in roll off and dispose at local landfill; estimate
CEG oversight	\$ 17,775	\$3555/day x 5 days. Assumes two staff.
Soil Excavation Stabilization		
Sub Labor and Equipment	\$ 80,000	Assume four weeks total to excavate, treat, and place cover/backfill.
Free Flow 200 for lead treatment	\$ 19,150	Quote from free flow for 40 tons plus shipping
Fill Material, geotextile, and rip-rap to re-construct stream bank	\$ 45,000	1000 cubic yards at \$20/yard. Gorham Sand and Gravel pricing from web site. Assume \$5,000 for geotextile
Lab costs	\$ 3,080	4 sets full scan pre-characterization (~1 per 250 tons) and 5 lead TCLP samples post treatment (1 per 200 tons); Lab pricing from Katahdin
CEG oversight	\$ 60,000	Two staff 20 days
Long Term Maintenance		
inspection and repair	\$ 30,000	Assume \$1000 per year for 30 years
Project Management and Reporting		
Reporting	\$ 15,000	professional judgement
CEG Project management	\$ 66,051	Estimated as 10% of total job costs
TOTAL COST ESTIMATE	\$ 726,556	

3.0 SUMMARY AND COMPARISON OF ALTERNATIVES

Table 5 compares the four alternatives evaluated. Alternative 1 (No Action) and Alternative 2 (Land Use Controls) do not meet the remedial objectives. Alternative 3A (Excavation and disposal as hazardous waste) meets the remedial objectives but is much more expensive than Alternative 3B (Excavation with treatment and disposal as non-hazardous waste). Alternative 4 meets the remedial objectives but may limit options to re-use the property, and also would involve long term maintenance.

Table 5
Summary and Comparison of Alternatives
French Island Lot, 15 Center Street, Old Town, Maine

Objectives and Evaluation Criteria	Comparison of Alternatives				
	Alternative 1 No Action	Alternative 2 Land Use Controls	Alternative 3A Excavation and Disposal as Hazardous Waste	Alternative 3B Excavation and Disposal as Non- Hazardous Waste	Alternative 4 Stabilization and Cover
Eliminate Physical Hazard	No	Partially	Yes	Yes	Yes
Eliminate Chemical Exposure Hazard	No	Partially	Yes	Yes	Yes
Allow Future Development or beneficial re-use	No	No	Yes	Yes	Partially
Ease of Implementation	Easy	Easy	Difficult	Difficult	Difficult
Cost	\$ -	\$ 70,613	\$ 3,999,515	\$ 1,681,433	\$ 726,556

4.0 RECOMMENDATIONS

The following activities should be considered if further refinement to the above cost estimates are desired.

- If on-site soil treatment is considered, a treatability test should be conducted using Free Flow 200 or similar product to determine the efficacy of treatment and dose rate. The previous study was conducted using a 2% by weight and 4% by weight dosage test and results were inconclusive. These rates should be reevaluated and adjusted prior to any further testing.
- A site visit should be conducted with the excavation contractor to evaluate the logistics and challenges to implementation of the excavation scope.
- Aqua Dam or a similar vendor should be engaged to review the site configuration and properly select the bladder dam size, configuration, and deployment strategy. The depth of water over the impacted area needs to be determined, as it is a critical factor. An initial evaluation could be conducted remotely, as Aqua Dam has project definition questionnaire to support project designs. Ideally, the bladder dam vendor could conduct a site visit at the same time as the excavation contractor.