REMEDIAL OPTIONS ANALYSIS

Farwell Mill
244 Lisbon Street
Lisbon, Maine 04250

December 2023

Project Number: 566346

Prepared For:
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EXECUTIVE SUMMARY

On behalf of the Maine Department of Environmental Protection (MEDEP), TRC Environmental Corporation (TRC) has prepared this Remedial Options Analysis (ROA) report for the former Farwell Mill property located at 244 Lisbon Street in Lisbon, Maine (the "Site"). The Site is currently owned and operated by Realty Development Group, Inc.

The ROA report has been prepared to evaluate remedial option alternatives and recommend a remedial approach to address oil impacted soils and the leaching of oil into the abutting Sabattus River. The overall goal of this report is to identify a remedial approach that will mitigate the release of oil into the river.

Using the evaluation criteria set forth in MEDEP's Request for Bids (RFB) #76, seven remedial option alternatives including no action, barrier only, limited excavation with/without barrier, expanded excavation with/without barrier, and complete excavation were evaluated to address the oil impacted soils and oil seepage into the adjacent river. Physical barriers and removal of soil are the primary remedial options. This analysis is based on engineering experience and information made available to TRC. TRC understands that a nature-like fishway (NLF) is proposed to be constructed downstream of the existing dam by Maine Department of Marine Resources (DMR), which will impact future conditions adjacent to the Site.

Based on the project goals and objectives, analyses of options presented in Section 5.0, and the Remedial Option Alternative Comparison Summary provided as **Table 1**, the overall evaluation of each proposed remedial option along with the recommended remedial option for the oil-saturated soil adjacent the Sabattus River at the former Farwell Mill site is summarized below.

Option 1: No Action is the least expensive alternative but does not adequately meet the project goals or address short- or long-term impacts and likely would not be accepted by the community.

Option 2: Barrier Only is more expensive than Option 1. Providing a physical barrier helps to address the remedial objectives, but this alternative leaves oil-saturated soils in place.

Option 3a: Limited Excavation Along Stream Bank with Barrier is more expensive than the previous two options as well as its counterpart, Option 3b. Removing a limited area of oil saturated soils in conjunction with installing a barrier is a satisfactory method of addressing the remedial objectives that limits site disturbance.

Option 3b: Limited Excavation Along Stream Bank without Barrier is less expensive, but the lack of barrier in this alternative fails to fully address the remedial objectives.

Option 4a: Expanded Excavation of Stream Bank Sediments and Soil with Barrier is more expensive than all previous options as well as its counterpart, Option 4b. Removing a limited area of oil saturated soils in conjunction with installing a barrier is a satisfactory method of addressing the remedial objectives that disturbs a large area of the site.

Option 4b: Expanded Excavation of Stream Bank Sediments and Soil without Barrier is less expensive, but the lack of barrier in this alternative fails to fully address the remedial objectives.

Option 5: Complete Excavation of Oil-Saturated Material is the most expensive and removes the largest amount of contaminated soils. While it addresses the remedial objectives, it disturbs a very large portion of the site and is the most difficult to execute.

Based on the information stated above and presented in **Table 1**, Option 3a is the highest scored remedial option. However, Option 5 is the most reliable option that addresses and accomplishes MEDEP's remediation goals set forth in RFB #76. Therefore, TRC recommends Option 5 as the selected remedial option.

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) provides the Town of Lisbon (the "Client") this Remedial Options Analysis (ROA) report for the Farwell Mill property located at 244 Lisbon Street, Lisbon, Maine 04250 (herein referred to as the "Site").

The purpose of the ROA is to evaluate remedial options to mitigate the discharge of free phase No. 6 oil into the Sabattus River emanating from the Site.

This Remedial Options Analysis evaluates seven remedial options for the following 10 criteria:

- Short-term costs;
- Long-term costs;
- Short-term effectiveness;
- Long-term effectiveness;
- Ease of implementation;
- On-site impacts;
- Off-site impacts;
- Reliability;
- Potential risks; and
- Timeliness.

1.1 Purpose

The purpose of the ROA report is to evaluate remedial option alternatives and recommend a remedial approach to address the remaining No. 6 oil-impacted soils and oil leaching into the Sabattus River.

1.2 Site Description

The Site is an approximately 4.5-acre parcel located at 244 Lisbon Street in Lisbon, Maine. The Site is zoned as commercial and residential and is currently owned by Realty Development Group, Inc. The site is located approximately 50 feet to the south from the Sabattus River, southeast of the intersection of Lisbon Road and Village Street. The Farwell Mill Dam sits in the river adjacent to the Site. The site is currently a commercial and residential apartment complex operated by Realty Resource Management (JMC Partners LLC). Three commercial units on the ground floor.

1.3 Historical Site Use

Based on previous Site reports prepared by TRC and others, the Site was used as a cotton mill from 1872 until the 1930s, when it was converted to a manufacturing facility of various materials (PVC, shoe packing materials, linoleum, etc.) until the 1980s. Typical historical operations at such sites would likely include releases of oils and process chemicals. The long historical industrial use of the Site is known to have impacted soil, groundwater, and sediments, in the basement and

southern portion of the Site. The potential for soil impacts in other areas of the Site exist, as well as potential vapor encroachment from Site and Site-adjacent releases.

Approximately 1.5-acres of the southern portion of the Site was used as a landfill for the disposal of coal ash, sawdust, demolition debris, and manufacturing wastes (including vinyl asbestos materials). Underground storage tanks (USTs) were also buried in this area, which have contributed to documented oil releases at the Site and into the Sabattus River. Much of the southern portion of the Site was excavated and the remaining area has since been encapsulated with a confining layer and a paved parking lot. A land use restriction was established to prohibit the disturbance of the subsurface in this area.

The USTs were discovered in the mid-1980s during an initial investigation of the property to redevelop the mill into a mixed residential/commercial building. It was determined that one of the USTs, a 15,000-gallon train tanker filled with No. 6 oil, leaked approximately 7,000 gallons of oil, which migrated downgradient towards the Sabattus River.

In 2019, the Mill St. Dam, located approximately one mile downstream of the Farwell Mill, was partially removed, which resulted in stream levels dropping upstream of the dam. The rapid lowering in stream levels resulted in the identification of oil discharge into the river adjacent to the Farwell Mill Site.

1.3.1 Oil Recovery System

Since the 1990s, the Farwell Mill has been involved in a long-term No. 6 fuel oil release and oil recovery project by MEDEP, Uncontrolled Sites Division (Spill number P-551-90). The Site is listed under the MEDEP Uncontrolled Site Program (REM00695 and REM03068).

Removal of oil-saturated soils and river sediments occurred in the mid-1980s through the early 1990s. The excavated material was reportedly buried on-Site, upgradient of an Oil Recovery System (ORS), which included a sloped 30-mil PVC geomembrane barrier, interceptor pipe, oil-water separator, submersible pumps, and an infiltration gallery downgradient of the ORS to discharge “clean” groundwater. The ORS was operational from 1990 through 2007 and recovered almost 13,000 gallons of oil mixed with groundwater. The ORS was shut down in the late 2000s with MEDEP approval based on reduced effectiveness in the amount of oil being recovered annually and the condition of the system which would require major upgrades. One significant malfunction of the ORS in the 2000s resulted in oil being discharged to the downgradient infiltration gallery and ultimately into the Sabattus River. Oil continues to seep into the river during warm summer months when stream water levels are generally low and air temperatures are high.

Sevee & Maher Engineers (SME) suggested in a 2009 Conceptual Site Model report that the source of oil to the Sabattus River is from oil-contaminated soils and river sediments that were left downgradient of the ORS during cleanup efforts in 1990. SME excavated three test pits in 2007 and based on that limited investigation concluded that the geomembrane appeared to be functioning as designed and limiting downgradient transport of No. 6 oil. Despite this, the potential exists that portions of the barrier are not currently functioning as intending.

1.4 Potential Future Site Use

The Maine Department of Marine Resources plans to partially remove the Farwell Mill Dam and construct a NLF downstream of the dam. Based on a schematic provided as part of RFB #76, the NLF is located adjacent to and upgradient of the site. As part of the NLF project, new sediment will be introduced into the river, raising the riverbed and water elevations in the vicinity of the Site.

The commercial units at the Site are intended to be renovated into additional residential spaces in the future.

1.5 Scope of Services

The ROA report will evaluate potential remedial alternatives for the Site based on the findings of previous investigations and the current proposed future use of the Site. The ROA will include the following:

- Evaluate the available remedial action options against the evaluation criteria;
- Select the remedial action that best meets the objectives and considerations of the project and proposed end use; and
- Present a general plan for implementation of the selected remedial alternative.

1.6 Objectives

Based on the information collected during previous environmental investigations (listed in Section 2.0), remedial options were considered for the Site and evaluated based on the short- and long-term costs and effectiveness for each remedial alternative, ease of implementation and on- and off-site impacts associated with each alternative, reliability, potential risks, and timeliness.

Remedial consideration was given to the following primary goal:

- Mitigate the seasonal discharge of petroleum from the Site to the Sabattus River.

Remedial solutions that achieve project goals, while following green remediation practices and taking into account effects of global climate change (i.e., increased frequency and intensity of storm events) will be given preference.

The remedial alternatives evaluated in this Remedial Options Analysis include:

- Option 1: No Action.
- Option 2: Barrier Only.
- Option 3a: Limited Excavation Along Stream Bank with Barrier.
- Option 3b: Limited Excavation Along Stream Bank without Barrier.
- Option 4a: Expanded Excavation of Stream Bank Sediments and Soil with Barrier.
- Option 4b: Expanded Excavation of Stream Bank Sediments and Soil without Barrier.
- Option 5: Complete Excavation of Oil-Saturated Material.

Sections 4.0 and 5.0 provide a discussion of the requirements for each alternative and evaluation of the proposed remedial alternatives.

2.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Several investigations have been completed at the Site. The following environmental reports regarding the Site were provided for TRC's review by the MEDEP:

- January 8, 2001, *Memorandum RE Farwell Mills Oil Collection System*, prepared by Fred Lavallee, P.E.;
- March 2009, *Conceptual Site Model for Farwell Mill Oil Recovery Site, Lisbon, Maine Androscoggin County,* prepared by Sevee & Maher Engineers, Inc.;
- December 2021, *Farwell Mill Site 2021 Geoprobe Investigation Logs and Results Map*, prepared by Maine Department of Environmental Protection;
- June 23, 2021, *Phase I Environmental Site Assessment. Farwell Mill, 244 Lisbon Street, Lisbon, Maine 04250,* prepared by TRC;
- September 30, 2023, *Farwell Mill Dam Nature-Like Fishway Design,* prepared by the Maine Department of Marine Resources.

These reports are summarized in the following sections.

2.1 January 8, 2001, *Memorandum RE Farwell Mills Oil Collection System*, prepared by Fred Lavallee, P.E.

The memorandum summarizes an evaluation performed to determine the reason for failure of the ORS. Pertinent findings of the evaluation are provided below:

- A small amount of product was escaping the oil-water separator and getting pumped to the distribution box and gallery, which was evidenced by heavy oil staining in the area surrounding the manway.
- The infiltration gallery was likely clogged, which resulted in an overflow of the ORS as oil and water discharged out of the box's manway and migrated down the bank into the Sabattus River.

The memorandum concluded that the ORS was still serving a valuable function and should continue to be used until a *de minimis* volume of product was collected. However, the report acknowledged the malfunction of the system resulted in an unlicensed overboard discharge to the Sabattus River, which was recommended to be addressed and corrected by the owner.

2.2 March 2009, *Conceptual Site Model for Farwell Mill Oil Recovery Site, Lisbon, Maine Androscoggin County,* prepared by Sevee & Maher Engineers

Sevee & Maher Engineers (SME) prepared a conceptual site model report in 2009 outlining the Site investigation activities that began in 1987, and the ensuing cleanup efforts. The report summarized:

- release history and contamination sources;
- UST leakage and removal;

- soil removal operations;
- ORS design and installation, and later shutdown after investigation;
- historic high and low water levels; and
- exposure pathways.

Specifically, when discussing the excavation, SME states:

> *"During the 1990 excavation of contamination oil from the riverbed, some contaminated soils were inaccessible and subsequently left in place. It was noted by MEDEP personnel present on-site during the removal that not all of the oil contamination was removed because the water level fluctuations and difficulties of heavy equipment working in and near the river made it impossible to excavate all of the oil from the riverbed (Ref. MEDEP, Final Site Inspection Prioritization Report, October 25, 1995 and August 29, 1991 memorandum)."*

SME also included historic high and low water levels in the report based on investigations from 1985-1991, stating that historic high water prior to 1990 was 151 feet above mean sea level (FT MSL). This report also stated the historic low water level prior to 1990 147 FT MSL. The average water table prior to installation of liner and extraction system was approximately 148-149 FT MSL

SME shut down the ORS in 2007. Later investigations in 2007 and 2008 determined the system was not functioning as intended and would require "significant retrofit." The report concluded there was little potential to recover the remaining residual free oil, even with retrofits. SME recommended to continue long-term monitoring to ensure pathways do not become active.

2.3 June 23, 2021, *Phase I Environmental Site Assessment. Farwell Mill, 244 Lisbon Street, Lisbon, Maine 04250,* prepared by TRC

TRC performed a Phase I ESA for the property on behalf of the Town of Lisbon in 2021. The report summarized several historical environmental reports and identified the following Site conditions:

- historical industrial Site use and its impact on soil, groundwater, and sediments;
- a historical landfill in the southern portion of the site was discovered containing coal ash, sawdust, demolition debris, and manufacturing wastes (including Asbestos Containing Material [ACM]);
- on-Site active ORS and long-term monitoring;
- potential hazardous building materials including lead-based paint, ACM, and polychlorinated biphenyl-based materials requiring a hazardous building materials survey prior to any structure disturbance; and
- observed universal waste in the form of fluorescent light tubes, spare electronics, and other items to be handled in accordance with universal waste regulations.

The assessment revealed one Recognized Environmental Condition (REC) in connection with the Site's historical industrial site use, and two Controlled Recognized Environmental Conditions (CRECs) in connection with the Site's on-Site historical industrial landfill and on-Site active ORS and long-term monitoring.

2.4 December 2021, *Farwell Mill Site 2021 Geoprobe Investigation Logs and Results Map*, prepared by Maine Department of Environmental Protection

MEDEP prepared a geoprobe investigation log and results map of the Site, based on June 2021 boring activities in the Areas of Concern (AOCs).

- Oil-saturated soils were encountered in geoprobe borings installed within AOC-2 and AOC-3, and heavily saturated sediment was encountered in hand auger borings installed within AOC-1.
- MEDEP developed an Inferred Oil-Saturated Soils Area spanning from the Site parking area down to the banks of the Sabattus River.

2.5 June 2022, *Sabattus River Assessment – Mill Street Dam/ Farnsworth Mill Dam*, prepared by U.S. Fish and Wildlife Service Gulf of Maine Costal Program

The U.S. Fish and Wildlife Service (USFWS) Gulf of Maine Costal Program prepared a report in June of 2022 detailing the effects of the Mill Street dam removal on the Sabattus River. This former dam is located approximately one mile downstream of the Farwell Mill site. Removing the dam had an effect on the river levels adjacent to the Site.

The USFWS monitored river levels immediately upstream and downstream of the former Mill Street Dam location from August 2021 through April 2022. The report shows that the average water level upstream of the former Mill Street dam during this time period is approximately 144 FT MSL.

Though this data is not from the exact location of the proposed work, nor is it taken from over a long period of time, it shows that removing the Mill Street dam ultimately lowered the average water level of the Sabattus River adjacent to the Site.

2.6 September 30, 2023, *Farwell Mill Dam Nature-Like Fishway Design,* prepared by the Maine Department of Marine Resources (DMR)

DMR hired Inter-fluve to design a NLF to allow natural fish passage further up the Sabattus River. The submitted plans and documents included the following plans and details:

- Existing Conditions & Survey Control;
- Site Plan;
- Access;
- Staging;
- Erosion Control & Sequencing;

- Demolition Plan Overview;
- Nature Like Fishway Plan & Profile;
- Grading Sections;
- Typical Profiles & Channel Plan Details;
- Typical Sections;
- Typical Details;
- FES Lift Details; and
- Planting Plan.

The following structures will be demolished in connection with the proposed NLF project:

- The upgradient dam, including the spillway on the river left, left abutment, and any appurtenances associated with the river left side of the Farwell Dam; and
- The dilapidated trolley/footbridge.

Based on the design, the grade of the river immediately adjacent to the site will be raised approximately 5-6 feet. TRC understands that NLF design is not final and subject to change. Data received from Inter-fluve indicates the normal high-water line is approximately 147 to 148 FT MSL.

3.0 SITE SUMMARY AND CLEANUP GOALS

Historical environmental investigations completed for the Site identified soil impacted with No. 6 oil, free-phase product, and ACM, which are attributed to historic Site operations. These investigations are documented and briefly described in Section 2.0.

3.1 Site Use and Site Classification

The former Farwell Mill building is currently used for apartments and commercial use. The contaminated areas of the Site are adjacent to a parking area that serves the apartment building, located on an embankment area between the parking area and the Sabattus River. The area is currently wooded and would likely remain undeveloped following the completion of work.

3.2 Applicable Cleanup Goals:

The goal of the work is to mitigate the seasonal discharge of petroleum from the Farwell Mill site to the Sabattus River, as stated in RFB #76 by MEDEP. Based on the data obtained by MEDEP during the 2021 geoprobe investigation, oil-saturated soil exists throughout the Site. The source of the oil, the underground USTs, was removed from the Site in 1990. Some oil saturated soils were likely left in place after this work was conducted. As a result, oil continues to leach into the Sabattus River during periods of low river levels. The following sections of this report evaluate different methods of preventing further leaching of free phase oil into the river using physical barriers and remedial excavations.

3.3 Assumptions

TRC made the following assumptions while evaluating the effectiveness of each remedial option:

- With or without the construction of the NLF, if no action is taken, the possibility exists for oil to continue leaching into the Sabattus River.
- The area of contamination is limited to the geoprobe investigation area identified by MEDEP in 2021.
- Oil may be able to migrate past the existing geomembrane barrier.
- Since the construction of the NLF requires Natural Resource Protection Act (NRPA) and U.S. Army Corps of Engineers (USACE) permits, remediation work in or adjacent to the Sabattus River will be covered under these permits obtained for the NLF project.

Assumptions related to project costs are included below in Section 5.0 and within the cost tables provided in **Appendix A**.

4.0 IDENTIFICATION OF REMEDIAL OPTIONS

The following remedial options were evaluated to address the discharge of petroleum to the Sabattus River in accordance with RFB #76:

- Option 1: No Action.
- Option 2: Barrier Only.
- Option 3a: Limited Excavation Along Stream Bank with Barrier.
- Option 3b: Limited Excavation Along Stream Bank without Barrier.
- Option 4a: Expanded Excavation of Stream Bank Sediments and Soil with Barrier.
- Option 4b: Expanded Excavation of Stream Bank Sediments and Soil without Barrier.
- Option 5: Complete Excavation of Oil-Saturated Material.

5.0 EVALUATION OF REMEDIAL ALTERNATIVES

The following subsections describe the seven remedial options selected to mitigate the seasonal discharge of petroleum from the Site to the Sabattus River. In addition, the subsections evaluate each remedial option for the following ten criteria:

- Short-term costs;
- Long-term costs;
- Short-term effectiveness;
- Long-term effectiveness;
- Ease of implementation;
- On-site impacts;
- Off-site impacts;
- Reliability;
- Potential risks; and
- Timeliness.

The cost estimates presented in this document are based on soil quantities calculated utilizing proposed Site grades and the extent of contamination as identified in previous Site investigations. The estimates were prepared using recent contractor bid results from MaineDOT for similar projects and pay items. Costs for the proposed sheet pile barrier for certain alternatives were derived from published data from RS Means 2018, a construction cost estimating tool, and is marked up 20% to account for inflation. Each estimate includes a 20% contingency to allow for the relative comparison of the identified alternatives.

A value-based alternative comparison table was used to evaluate the remedial options (**Table 1**). Cost spreadsheets for each of these alternatives are included as **Appendix A**.

5.1 Remediation Option 1: No Action.

Option 1 does not include any removal of oil-contaminated materials. DMR will construct the NLF and place fill material along the bank of the Farwell Mill. As part of the NLF construction, sediment will be added to the stream bed resulting in an increased water level, which has the potential to reduce or mitigate the quantity of oil seeping into the river due to increased pressure being applied to the oil-saturated soils.

TRC evaluated the potential effectiveness of the No Action alternative by reviewing the final NLF design plans, understanding the Conceptual Site Model, estimating the new low- and high-water levels, and evaluating historical data related to water elevations and instances of oil discharge. The effectiveness of the Option 1 will be dependent on the final NLF design, impacts of the NLF on Site conditions, nature and extent of contamination, and functionality of the geomembrane barrier.

5.1.1 Short-Term Costs

No Action would not require capital and operation and maintenance costs outside of the construction of the NLF.

5.1.2 Long-Term Costs

No Action would not require capital and operation and maintenance costs outside of the construction of the NLF.

5.1.3 Short-Term Effectiveness

DMR's design of the NLF indicates the grade of the river will be raised 5-6 feet, raising the water level along with it. This would attempt to address the low water levels and a lack of pressure on sediment that were proposed causes of oil discharge.

Based on historical groundwater data, the water level can fluctuate approximately 5-6 feet between the low and high months. Thus, increasing the river grade would raise the low water level to previous standard levels to counterbalance the drop from removing the Farwell Dam.

Because of the assumption that oil may be able to migrate past the geomembrane barrier compounded by the presence of oil downgradient of the barrier, No Action cannot guarantee to be a reliable remedial option, mitigating oil discharge to the Sabattus River. However, this alternative has been included to demonstrate a comparison between the alternatives.

5.1.4 Long-Term Effectiveness

Although limited investigation activities performed by previous consultants indicate that the geomembrane barrier system appears to be functioning as designed, the potential exists that portions of the barrier are not currently functioning as intended, allowing oil to migrate towards the Sabattus River. Furthermore, oil-saturated materials have been identified downgradient of the existing barrier. As a result, the potential exists that oil would continue to seep into the Sabattus River following construction of the NLF.

5.1.5 Ease of Implementation

No remedial actions would be conducted at the Site, so no work would be required to implement Option 1 outside of the construction of the NLF.

5.1.6 On-Site Impacts

Oil- and ACM-contaminated soils remaining on-Site have associated negative impacts to safety, health, the environment, and public welfare.

5.1.7 Off-Site Impacts

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.1.8 Reliability

Because of the assumption that oil may be able to migrate past the geomembrane barrier compounded by the presence of oil downgradient of the barrier, No Action cannot guarantee to be a reliable remedial option, definitely mitigating oil discharge to the Sabattus River.

5.1.9 Potential Risks

There are risks associated with implementing this alternative.

5.1.10 Timeliness

No remedial actions would be conducted at the Site, so no work would be required to implement Option 1 outside of the construction of the NLF.

5.2 Remediation Option 2: Barrier Only

The Barrier Only alternative includes the installation of a barrier prior to placement of sediment for the NLF and does not include any removal of oil-contaminated materials.

TRC will evaluate the potential effectiveness of the Barrier Only alternative by reviewing historical environmental documents, understanding the Conceptual Site Model, and determining feasible and optimal barrier locations and types. The effectiveness of the Barrier Only alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, and the type and location of the proposed barrier. A site plan showing the proposed work for this alternative is included in **Figure 1**.

5.2.1 Short-Term Costs

The short-term cost associated with Option 2 is estimated to be approximately $455,000. Assumptions for preliminary costing purposes include:

- Installation of a new sheet pile barrier
- Work area dewatering and erosion control
- Consultant and oversight costs
- Potential geotechnical investigations
- Minor site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $379,200)

There are also site restoration costs associated with Option 2. Heavy machinery will likely have to make its way down an embankment to reach the location of the proposed work. Site restoration costs will include minor regrading of the embankment, if necessary, mulch, loam, and seed to restore vegetation, and rip rap stone and erosion control blanket to stabilize the embankment.

5.2.2 Long-Term Costs

Long-term costs associated with Option 2 consist of long-term monitoring costs. These services could include, but are not limited to:

- Soil sampling and testing
- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $25,000 per year.

5.2.3 Short-Term Effectiveness

The sheet pile barrier is proposed to be 25 feet in total height. Once installed, the bottom of the sheet pile barrier will extend beneath the elevation of contaminated soils, based on the geoprobe boring and hand auger data collected by MEDEP in 2021. The sheet pile steel is impermeable, and the connections will be sealed. The barrier will be effective in the short term from limiting further oil from leaching into the river. Oil may be discharged into the river in the short-term if the sheet pile barrier is installed upgradient from any contaminated soil.

5.2.4 Long-Term Effectiveness

Without removing any of the contaminated soils from the site, there is a possibility of the oil migrating towards the river over time. The sheet pile barrier may rust, and the sealed connections may deteriorate, which would reduce the long-term effectiveness of the barrier.

5.2.5 Ease of Implementation

Construction and installation of the sheet pile barrier can be conducted by experienced contractors with relative ease. Factors exist that could impede the installation of the barrier, such as running into ledge rock during installation or having to pump water from the installation area during periods of high river flow.

Site staging for the proposed work will involve creating an accessway down the river embankment and creating suitable platforms for equipment to safely conduct work. Installing a cofferdam may be necessary for the proposed work as well.

5.2.6 On-Site Impacts

The majority of the impacts caused by the sheet pile installation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed barrier and disturbed soils caused by the installation itself.

Oil- and ACM-contaminated soils remaining on-Site have associated negative impacts to safety, health, the environment, and public welfare.

5.2.7 Off-Site Impacts

Because the proposed location of the sheet pile barrier is below the normal high-water line, the potential exists for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken by the Contractor to limit sedimentation and any further contamination of the Sabattus River. Erosion and sedimentation controls costs are included in the cost tables in **Appendix A**.

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.2.8 Reliability

Overall, Option 2 is not the most reliable. The barrier may deteriorate over time and become less effective. Without removing any of the contaminated soil from the Site, there will always be the possibility of oil leaching into the river over time.

5.2.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during sheet pile installation. Machinery, laborers, and all site personnel must be mindful not to fall into the water or to slip on any muddy or wet rocks. Directly upstream of the proposed work is a dam. This creates the potential for changing water levels. The weight of the construction equipment needed to install the sheet pile barrier could potentially mobilize more oil from the soils into the river during installation. The contaminated materials in the soil may also pose a health risk to the workers involved.

5.2.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Sheet Pile barrier installation – 1 week
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 2 is approximately 11 weeks.

5.3 Remediation Option 3a: Limited Excavation along Stream Bank with Barrier

The Limited Excavation along Stream Bank with Barrier alternative includes excavating a small area of oil-contaminated soil below the normal high-water line (147-148 FT MSL) of the Sabattus River along with the installation of a barrier prior to placement of sediment for the NLF.

TRC will evaluate the potential effectiveness of the Limited Excavation along Stream Bank with Barrier alternative by reviewing historical environmental documents, understanding the Conceptual Site Model, and determining feasible and optimal barrier locations and types. The effectiveness of the Limited Excavation along Stream Bank with Barrier alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, volume and location of excavated soils, and the type and location of the proposed barrier. A site plan showing the proposed work for this alternative is included in **Figure 2**.

5.3.1 Short-Term Costs

The cost associated with Option 3a is estimated to be approximately $564,000. Assumptions for preliminary costing purposes include:

- Excavation and off-site disposal of contaminated soils
- Replacing soil in excavated area with clean fill
- Excavation dewatering and erosion control
- Installation of a new sheet pile barrier
- Consultant and oversight costs
- Potential geotechnical investigations
- Potential laboratory testing fees
- Site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $470,300)

5.3.2 Long-Term Costs

Long-term costs associated with Option 3a consist of long-term monitoring costs. These services could include, but are not limited to:

- Soil sampling and testing
- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $25,000 per year.

5.3.3 Short-Term Effectiveness

The area of excavation for this alternative is limited to a contaminated area directly adjacent to the Sabattus River. The contamination of this soil was verified through hand auger test pits conducted in 2021 by MEDEP. The soil is generally considered heavily saturated with oil in this area. The total volume of contaminated soil removed in this alternative is approximately 200 cubic yards. This alternative would remove contaminated soils closest to the river but leave in place more contaminated soils east of the riverbank. This area of proposed excavation is shown in the attached **Figure 2**.

The sheet pile barrier is proposed to be 25 feet in total height. Once installed, the bottom of the sheet pile barrier will extend beneath the elevation of contaminated soils, based on the geoprobe boring and hand auger data collected by MEDEP in 2021. The sheet pile steel is impermeable, and the connections will be sealed. The barrier and excavation will be effective in the short term from limiting further oil from leaching into the river. Oil may be discharged into the river in the short-term if the sheet pile barrier is installed upgradient from any contaminated soil.

5.3.4 Long-Term Effectiveness

Option 3a does not remove all of the contaminated soil from the site. Thus, oil may migrate downgradient and into the newly installed fill. The oil may eventually make its way around the sheet pile barrier. There is also a possibility of the oil migrating towards the river over time. The sheet pile barrier may rust, and the sealed connections may deteriorate, which would reduce the long-term effectiveness of the barrier.

5.3.5 Ease of Implementation

Excavation of contaminated soils is a typical remedial option for environmental remediation. However, excavation becomes more difficult adjacent to a surface water body due to required dewatering management and restoration work. The limited area of excavation is approximately 900 square feet and is located along the bank of the river.

Construction and installation of the sheet pile barrier can be conducted by experienced contractors with relative ease. Factors exist that could impede the installation of the barrier, such as running into ledge rock during installation or having to pump water from the installation area during periods of high river flow.

Site staging for the proposed work will involve creating an accessway down the river embankment and creating suitable platforms for equipment to safely conduct work. Installing a cofferdam may be necessary for the proposed work as well.

5.3.6 On-Site Impacts

The majority of the impacts caused by the excavation and sheet pile installation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed barrier and disturbed soils caused by the installation itself.

Oil- and ACM-contaminated soils remaining on-Site have associated negative impacts to safety, health, the environment, and public welfare.

5.3.7 Off-Site Impacts

All contaminated soils excavated from the site must be disposed off-site at an approved receiving facility. There are risks associated with transporting the contaminated soil long distances, and the soil could have potential off-site impacts during transportation. Because the proposed location of the sheet pile barrier is below the normal high-water line, the potential exists for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken

by the Contractor to limit sedimentation and any further contamination of the Sabattus River. Erosion and sedimentation controls costs are included in the cost tables (**Appendix A**).

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.3.8 Reliability

Overall, Option 3a is fairly reliable. Removing soils closest to the Sabattus River will limit discharge of oil in the short-term but may become less effective over time if oil upgradient of the excavation area migrates to the clean fill in the excavation area. The barrier may deteriorate over time and become less effective.

5.3.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during excavation and sheet pile installation. Machinery, laborers, and all site personnel must be mindful not to fall into the water, fall into the open excavation, or to slip on any muddy or wet rocks. Directly upstream of the proposed work is a dam. This creates the potential for rapidly changing water levels. This is further compounded by the likely need to dewater the work area. The weight of the construction equipment needed to excavate the area and install the sheet pile barrier could potentially mobilize more oil from the soils into the river during installation.

Transporting the contaminated soil to an approved landfill has associated risks. These risks include the soil mobilizing during transport and inherent health risks to the laborers, equipment operators, truck drivers, and landfill workers.

5.3.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Sheet Pile barrier installation – 1 week
- Soil excavation – 0.5 weeks
- Soil backfilling – 0.5 weeks
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 3a is approximately 12 weeks.

5.4 Remediation Option 3b: Limited Excavation Along Stream Bank without Barrier

The Limited Excavation Along Stream Bank without Barrier alternative includes excavating a small area of oil-contaminated soil below the normal high-water line (147-148 FT MSL) of the Sabattus River along with the installation of a barrier prior to placement of sediment for the NLF.

TRC will evaluate the potential effectiveness of the Limited Excavation Along Stream Bank without Barrier alternative by reviewing historical environmental documents and understanding the Conceptual Site Model. The effectiveness of the Limited Excavation Along Stream Bank without Barrier alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, and the volume and location of excavated soils. A site plan showing the proposed work for this alternative is included in **Figure 3**.

5.4.1 Short-Term Costs

The cost associated with Option 3b is estimated to be approximately $330,000. Assumptions for preliminary costing purposes include:

- Excavation and off-site disposal of contaminated soils
- Replacing soil in excavated area with clean fill
- Excavation dewatering and erosion control
- Consultant and oversight costs
- Potential geotechnical investigations
- Potential laboratory testing fees
- Site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $274,950)

5.4.2 Long-Term Costs

Long-term costs associated with Option 3b consist of long-term monitoring costs. These services could include, but are not limited to:

- Soil sampling and testing
- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $25,000 per year.

5.4.3 Short-Term Effectiveness

The area of excavation for this alternative is limited to a contaminated area directly adjacent to the Sabattus River. The contamination of this soil was verified through hand auger test pits conducted in 2021 by MEDEP. The soil is generally considered heavily saturated with oil in this

area. The total volume of contaminated soil removed in this alternative is approximately 200 cubic yards. This alternative would remove contaminated soils closest to the river but leave in place more contaminated soils east of the riverbank. This proposed area of excavation is shown in **Figure 3**.

Oil may be discharged into the river in the short-term if the excavation area does not include all of the contaminated soils adjacent to the river.

5.4.4 Long-Term Effectiveness

Option 3b does not remove all of the contaminated soil from the site. Thus, oil may migrate downgradient and into the newly installed fill and eventually into the river.

5.4.5 Ease of Implementation

Excavation of contaminated soils is a typical remedial option for environmental remediation. However, excavation becomes more difficult adjacent to a surface water body due to required dewatering management and restoration work. The limited area of excavation is approximately 900 square feet and is located along the bank of the river.

5.4.6 On-Site Impacts

The majority of the impacts caused by the excavation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed excavation and disturbed soils caused by the excavation itself.

Oil- and ACM-contaminated soils remaining in place have associated negative impacts to safety, health, the environment, and public welfare.

5.4.7 Off-Site Impacts

All contaminated soils excavated from the site must be disposed off-site at an approved landfill. There are risks associated with transporting the contaminated soil long distances, and the soil could have potential off-site impacts during transportation. Because the proposed location of the excavation is below the normal high-water line, there exists the potential for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken by the Contractor to limit sedimentation and any further contamination of the Sabattus River.

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.4.8 Reliability

Overall, Option 3b is somewhat reliable. Removing soils closest to the Sabattus River will limit discharge of oil in the short-term but may become less effective over time if oil upgradient of the excavation area migrates to the clean fill in the excavation area.

5.4.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during excavation. Machinery, laborers, and all site personnel must be mindful not to fall into the water, fall into the open excavation, or to slip on any muddy or wet rocks. Directly upstream of the proposed work is a dam. This creates the potential for rapidly changing water levels. This is further compounded by the likely need to dewater the work area. The weight of the construction equipment needed to excavate the area could potentially mobilize more oil from the soils into the river during installation.

Transporting the contaminated soil to an approved landfill has associated risks. These risks include the soil mobilizing during transport and inherent health risks to the laborers, equipment operators, truck drivers, and landfill workers.

5.4.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Soil excavation – 0.5 weeks
- Soil backfilling – 0.5 weeks
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 3b is approximately 11 weeks.

5.5 Remediation Option 4a: Expanded Excavation of Stream Bank Sediments and Soil with Barrier

The Expanded Excavation of Stream Bank Sediments and Soil with Barrier alternative includes excavating a larger area of oil-contaminated soil below the normal high-water line (147-148 FT MSL) of the Sabattus River and the embankment along with the installation of a barrier prior to placement of sediment for the NLF.

TRC will evaluate the potential effectiveness of the Expanded Excavation of Stream Bank Sediments and Soil with Barrier alternative by reviewing historical environmental documents, understanding the Conceptual Site Model, and determining feasible and optimal barrier locations and types. The effectiveness of the Expanded Excavation of Stream Bank Sediments and Soil with Barrier alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, volume and location of excavated soils, and the type and location of the proposed barrier. A site plan showing the proposed work for this alternative is included in **Figure 4**.

5.5.1 Short-Term Costs

The cost associated with Option 4a is estimated to be approximately $1,156,000. Assumptions for preliminary costing purposes include:

- Excavation and off-site disposal of contaminated soils
- Replacing soil in excavated area with clean fill
- Excavation dewatering and erosion control
- Installation of a new sheet pile barrier
- Consultant and oversight costs
- Potential geotechnical investigations
- Potential laboratory testing fees
- Site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $962,625)

5.5.2 Long-Term Costs

Long-term costs associated with Option 4a consist of long-term monitoring costs. These services could include, but are not limited to:

- Soil sampling and testing
- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $25,000 per year.

5.5.3 Short-Term Effectiveness

The area of excavation for this alternative is a larger contaminated area that encompasses the previous area adjacent to the Sabattus River as well as an expanded area up the river embankment to the east. The contamination of this soil was verified through hand auger test pits and geoprobe borings conducted in 2021 by MEDEP. The area of this excavation includes all borings and auger test pits that identified soil saturation with oil. The total volume of contaminated soil removed in this alternative is approximately 1,450 cubic yards. This alternative would remove a majority of contaminated soils from the site, but would leave in place minor, outlying areas of contaminated soils.

The sheet pile barrier is proposed to be 25 feet in total height. Once installed, the bottom of the sheet pile barrier will extend beneath the elevation of contaminated soils, based on the geoprobe boring and hand auger data collected by MEDEP in 2021. The sheet pile steel is impermeable, and the connections will be sealed.

5.5.4 Long-Term Effectiveness

Option 4a does not remove all of the contaminated soil from the site. Thus, oil may migrate downgradient and into the newly installed fill. The oil may eventually make its way around the sheet pile barrier. There is also a possibility of the oil migrating towards the river over time. The sheet pile barrier may rust, and the sealed connections may deteriorate, which would reduce the long-term effectiveness of the barrier.

5.5.5 Ease of Implementation

Excavation of contaminated soils is somewhat routine in the field of environmental restoration. However, excavation becomes more difficult adjacent to a surface water body due to required dewatering management and restoration work. The expanded area of excavation is approximately 4,300 square feet and is located along the bank of the river and includes areas east of the river on top of the riverbank. The excavation is large and deep, and therefore may require shoring and stabilization measures. This proposed area of excavation is shown in the attached **Figure 4**.

Construction and installation of the sheet pile barrier can be conducted by experienced contractors with relative ease. Factors exist that could impede the installation of the barrier, such as running into ledge rock during installation or having to pump water from the installation area during periods of high river flow.

5.5.6 On-Site Impacts

The majority of the impacts caused by the excavation and sheet pile installation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed barrier and disturbed soils caused by the installation itself.

Oil- and ACM-contaminated soils remaining on-Site have associated negative impacts to safety, health, the environment, and public welfare.

5.5.7 Off-Site Impacts

All contaminated soils excavated from the site must be disposed off-site at an approved landfill. There are risks associated with transporting the contaminated soil long distances, and the soil could have potential off-site impacts during transportation. Because the proposed location of the sheet pile barrier and a portion of the excavation area are below the normal high-water line, the potential exists for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken by the Contractor to limit sedimentation and any further contamination of the Sabattus River.

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.5.8 Reliability

Overall, Option 4a is more reliable than similar alternative, Option 3a. Removing soils from and expanded area will limit discharge of oil in the short-term but may become less effective over

longer periods of time if oil upgradient of the excavation area migrates to the clean fill in the excavation area. The barrier may deteriorate over time and become less effective.

5.5.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during excavation and sheet pile installation. Machinery, laborers, and all site personnel must be mindful not to fall into the water, fall into the open excavation, or to slip on any muddy or wet rocks. It is worth noting this excavation area is substantially larger than the previous alternatives. Directly upstream of the proposed work is a dam. This creates the potential for rapidly changing water levels. This is further compounded by the likely need to dewater the work area. The weight of the construction equipment needed to excavate the area and install the sheet pile barrier could potentially mobilize more oil from the soils into the river during installation.

Transporting the contaminated soil to an approved landfill has associated risks. These risks include the soil mobilizing during transport and inherent health risks to the laborers, equipment operators, truck drivers, and landfill workers.

5.5.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Sheet Pile barrier installation – 1 week
- Soil excavation – 1 week
- Soil backfilling – 1 week
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 4a is approximately 13 weeks.

5.6 Remediation Option 4b: Expanded Excavation of Stream Bank Sediments without Barrier

The Expanded Excavation of Stream Bank Sediments without Barrier alternative includes excavating a larger area of oil-contaminated soil below the normal high-water line (147-148 FT MSL) of the Sabattus River and the embankment prior to placement of sediment for the NLF.

TRC will evaluate the potential effectiveness of the Expanded Excavation of Stream Bank Sediments without Barrier alternative by reviewing historical environmental documents and understanding the Conceptual Site Model. The effectiveness of the Expanded Excavation of Stream Bank Sediments without Barrier alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, and the volume and location of

excavated soils. A site plan showing the proposed work for this alternative is included in **Figure 5**.

5.6.1 Short-Term Costs

The cost associated with Option 4b is estimated to be approximately $920,000. Assumptions for preliminary costing purposes include:

- Excavation and off-site disposal of contaminated soils
- Replacing soil in excavated area with clean fill
- Excavation dewatering and erosion control
- Consultant and oversight costs
- Potential geotechnical investigations
- Potential laboratory testing fees
- Site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $767,275)

5.6.2 Long-Term Costs

Long-term costs associated with Option 4b consist of long-term monitoring costs. These services could include, but are not limited to:

- Soil sampling and testing
- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $25,000 per year.

5.6.3 Short-Term Effectiveness

The area of excavation for this alternative is a larger contaminated area that encompasses the previous area adjacent to the Sabattus River as well as an expanded area up the river embankment to the east. The contamination of this soil was verified through hand auger test pits and geoprobe borings conducted in 2021 by MEDEP. The area of this excavation includes all borings and auger test pits that identified soil saturation with oil. The total volume of contaminated soil removed in this alternative is approximately 1,450 cubic yards. This alternative would remove a majority of contaminated soils from the site, but would leave in place minor, outlying areas of contaminated soils.

5.6.4 Long-Term Effectiveness

Option 4b does not remove all of the contaminated soil from the site. Thus, oil may migrate downgradient and into the newly installed fill and eventually into the river.

5.6.5 Ease of Implementation

Excavation of contaminated soils is somewhat routine in the field of environmental restoration. However, excavation becomes more difficult adjacent to a surface water body due to required dewatering management and restoration work. The expanded area of excavation is approximately 4,300 square feet and is located along the bank of the river and includes areas east of the river on top of the riverbank. The excavation is large and deep, and therefore may require shoring and stabilization measures. This proposed area of excavation is shown in the attached **Figure 5**.

5.6.6 On-Site Impacts

The majority of the impacts caused by the excavation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed excavation and disturbed soils caused by the excavation itself.

Oil- and ACM-contaminated soils remaining on-Site have associated negative impacts to safety, health, the environment, and public welfare.

5.6.7 Off-Site Impacts

All contaminated soils excavated from the site must be disposed off-site at an approved landfill. There are risks associated with transporting the contaminated soil long distances, and the soil could have potential off-site impacts during transportation. Because the proposed location of the excavation is below the normal high-water line, there exists the potential for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken by the Contractor to limit sedimentation and any further contamination of the Sabattus River.

If oil continues to seep into the river over time, free-phase product and contaminated water may affect downstream properties, flora and fauna, subsequent water bodies, and other receptors.

5.6.8 Reliability

Overall, Option 4b is fairly reliable. Removing soils from an expanded area of the Site will limit discharge of oil in the short-term but may become less effective over time if oil upgradient of the excavation area migrates to the clean fill in the excavation area.

5.6.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during excavation and sheet pile installation. Machinery, laborers, and all site personnel must be mindful not to fall into the water, fall into the open excavation, or to slip on any muddy or wet rocks. It is worth noting this excavation area is substantially larger than the previous alternatives. Directly upstream of the proposed work is a dam. This creates the potential for rapidly changing water levels. This is further compounded by the likely need to dewater the work area. The weight of the construction equipment needed to excavate the area could potentially mobilize more oil from the soils into the river during installation.

Transporting the contaminated soil to an approved landfill has associated risks. These risks include the soil mobilizing during transport and inherent health risks to the laborers, equipment operators, truck drivers, and landfill workers.

5.6.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Soil excavation – 1 week
- Soil backfilling – 1 week
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 4b is approximately 12 weeks.

5.7 Remediation Option 5: Complete Excavation of Oil-Saturated Materials

The Complete Excavation of Oil-Saturated Materials alternative includes excavating a very large area of oil-contaminated soil below the normal high-water line (147-148 FT MSL) of the Sabattus River that extends up the embankment and adjacent to the parking area prior to placement of sediment for the NLF.

TRC will evaluate the potential effectiveness of the Complete Excavation of Oil-Saturated Materials alternative by reviewing historical environmental documents and understanding the Conceptual Site Model. The effectiveness of the Complete Excavation of Oil-Saturated Materials alternative will be dependent on the final NLF design, nature and extent of contamination, other Site conditions, and the volume and location of excavated soils. A site plan showing the proposed work for this alternative is included in **Figure 6**.

5.7.1 Short-Term Costs

The cost associated with Option 5 is estimated to be approximately $1,601,000. Assumptions for preliminary costing purposes include:

- Excavation and off-site disposal of contaminated soils
- Replacing soil in excavated area with clean fill
- Excavation dewatering and erosion control
- Removal and disposal of ORS
- Consultant and oversight costs
- Potential geotechnical investigations
- Potential laboratory testing fees

- Site restoration costs
- Mobilization
- A 20% contingency (cost without contingency would be $1,334,225)

5.7.2 Long-Term Costs

Long-term costs associated with Option 5 consist of long-term monitoring costs. These services could include, but are not limited to:

- Groundwater sampling and testing
- Potential consultant fees

These items have an estimated cost of approximately $15,000 per year.

5.7.3 Short-Term Effectiveness

The area of excavation for this alternative is a larger contaminated area that encompasses the previous area adjacent to the Sabattus River as well as an expanded area up the river embankment to the east. The contamination of this soil was verified through hand auger test pits and geoprobe borings conducted in 2021 by MEDEP. The area of this excavation includes all borings and auger test pits that identified soil saturation with oil and traces of oil. The total volume of contaminated soil removed in this alternative is approximately 2,650 cubic yards. This alternative would remove nearly every area of contaminated soils from the site identified by MEDEP in 2021, with the exception of a small area to the south of the proposed excavation with just traces of oil.

5.7.4 Long-Term Effectiveness

Option 5 is the most effective at achieving the goal of completely mitigating the discharge of oil into the Sabattus River. Removing all the identified oil-impacted soil and the pre-existing ORS will be the best way to ensure the longevity of the remedial efforts. Due to the limited nature of the data, a possibility exists that new areas of oil-impacted soil may be discovered. Therefore, long-term monitoring is recommended.

5.7.5 Ease of Implementation

Excavation of contaminated soils is somewhat routine in the field of environmental restoration. However, excavation becomes more difficult adjacent to a surface water body due to required dewatering management and restoration work. The expanded area of excavation is approximately 7,750 square feet and is located along the bank of the river and includes large areas east of the river on top of the riverbank. The excavation is large and deep, and therefore may require shoring and stabilization measures. This proposed area of excavation is shown I the attached **Figure 6**.

5.7.6 On-Site Impacts

The majority of the impacts caused by the excavation will be contained on site. These include disturbance of the site soils and vegetation to access the location of the proposed excavation and disturbed soils caused by the excavation itself.

5.7.7 Off-Site Impacts

All contaminated soils excavated from the site must be disposed off-site at an approved landfill. There are risks associated with transporting the contaminated soil long distances, and the soil could have potential off-site impacts during transportation. Because the proposed location of the excavation is below the normal high-water line, there exists the potential for off-site impacts to manifest in the form of impacts to the Sabattus River. During installation, steps should be taken by the Contractor to limit sedimentation and any further contamination of the Sabattus River.

5.7.8 Reliability

Overall, Option 5 is the most reliable alternative. Removing all previously identified contaminated soils from the site is the only way to completely prevent oil from continuing to leach into the Sabattus River.

5.7.9 Potential Risks

Working directly adjacent to the Sabattus River presents some potential risks during excavation and sheet pile installation. Machinery, laborers, and all site personnel must be mindful not to fall into the water, fall into the open excavation, or to slip on any muddy or wet rocks. It is worth noting this excavation area is substantially larger than the previous alternatives. Directly upstream of the proposed work is a dam. This creates the potential for rapidly changing water levels. This is further compounded by the likely need to dewater the work area. The weight of the construction equipment needed to excavate the area could potentially mobilize more oil from the soils into the river during installation.

Transporting the contaminated soil to an approved landfill has associated risks. These risks include the soil mobilizing during transport and inherent health risks to the laborers, equipment operators, truck drivers, and landfill workers.

5.7.10 Timeliness

The major project work items for this Option with an approximate timetable are described below:

- Mobilization to the Site – 2 weeks
- Site staging – 1 week
- Cofferdam and dewatering equipment installation – 1 week
- Soil excavation – 2 weeks
- Soil backfilling – 2 weeks
- De-mobilization and site restoration – 3 weeks
- Contingency time for unknowns – 3 weeks

Therefore, the total estimated time to execute Option 5 is approximately 14 weeks.

5.8 Potential Enhancements

As an added remedial measure, TRC recommends considering the addition of Oxygen Release Compounds (ORC) to the remaining Site soils for each alternative that includes excavation (Options 3a, 3b, 4a., 4b, and 5). ORCs are engineered and designed specifically for enhanced, in situ anaerobic bioremediation of petroleum hydrocarbons in saturated soils. The compounds can accelerate the biodegradation processes by 10 to 100 times their naturally occurring rates. The additional cost would be minimal compared to the overall costs of the remedial options.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses presented in Section 5.0 and the Remedial Option Alternative Comparison Summary provided as **Table 1**, the following summarizes the overall evaluation of each remedial option and presents the recommended remedial option for the oil-saturated soil adjacent the Sabattus River at the former Farwell Mill site.

- Option 1: No Action – This alternative is the least expensive but does not reliably address the remedial objectives.
- Option 2: Barrier Only – This alternative is more expensive than Option 1. Providing a physical barrier helps to address the remedial objectives, but this alternative leaves oil-saturated soils in place.
- Option 3a: Limited Excavation Along Stream Bank with Barrier – This alternative is more expensive than the previous two options as well as its counterpart, Option 3b. Removing a limited area of oil saturated soils in conjunction with installing a barrier is a satisfactory method of addressing the remedial objectives that limits site disturbance.
- Option 3b: Limited Excavation Along Stream Bank without Barrier – While less expensive, the lack of barrier in this alternative fails to fully address the remedial objectives.
- Option 4a: Expanded Excavation of Stream Bank Sediments and Soil with Barrier - This alternative is more expensive than all previous options as well as its counterpart, Option 4b. Removing a limited area of oil saturated soils in conjunction with installing a barrier is a satisfactory method of addressing the remedial objectives that disturbs a large area of the site.
- Option 4b: Expanded Excavation of Stream Bank Sediments and Soil without Barrier – While less expensive, the lack of barrier in this alternative fails to fully address the remedial objectives.
- Option 5: Complete Excavation of Oil-Saturated Material – This alternative is the most expensive and removes the largest amount of contaminated soils. While it addresses the remedial objectives, it disturbs a very large portion of the site and is the most difficult to execute.

Therefore, based on the information stated above and presented in **Table 1**, Option 3a is the highest scored remedial option. However, Option 5 is the most reliable option that addresses and accomplishes MEDEP's remediation goals set forth in RFB #76. Therefore, TRC recommends Option 5 as the selected remedial option.

7.0 LIMITATIONS

TRC's study was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and TRC observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. TRC's findings and conclusions must be considered not as scientific certainties, but rather as our professional opinion concerning the significance of the limited data gathered during the course of the study. No other warranty, express or implied is made. Specifically, TRC does not and cannot represent that the subject property contains no hazardous material, oil, or other latent condition beyond that observed by TRC during its study. Additionally, TRC makes no warranty that any response action or recommended action will achieve all of its objectives or that the findings of this study will be upheld by a MEDEP audit.

The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client. The work described in this report was carried out in accordance with the Terms and Conditions referenced in our contract with the Client.

In preparing this report, TRC has relied on certain information obtained from previous reports, and on information contained in the files of state and/or local agencies available to TRC at the time of the study. Although there may have been some degree of overlap in the information provided by these various sources, TRC did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

No specific attempt was made to check on the compliance of present or past owners or operators of the Site with federal, state, or local laws and regulations, environmental or otherwise. The conclusions and recommendations contained in this report are based in part upon the data obtained from a limited number of soil samples and groundwater samples obtained from widely spread subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

TRC has relied upon the quantitative laboratory analyses data provided by various laboratories and has not conducted an independent evaluation of the reliability of these data.

The conclusions and recommendations contained in this report are based in part upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their migration pathways may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed by TRC and the conclusions and recommendations presented herein modified accordingly. Historic chemical analyses have been performed for specific parameters as described in the text. However, it should be noted that additional chemical constituents not searched for during the referenced studies might be present at the subject property. Nothing herein limits, changes or modifies TRC’s contract with the client.

8.0 REFERENCES

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TRC, 2021. *Phase I Environmental Site Assessment. Farwell Mill, 244 Lisbon Street, Lisbon, Maine 04250.* June 23, 2021.

MEDEP, 2021. *Farwell Mill Site 2021 Geoprobe Investigation Logs and Results Map*, Maine Department of Environmental Protection. December 2021.

MEDMR, 2023. *Farwell Mill Dam Nature-Like Fishway Design,* Maine Department of Marine Resources. October 2023.

TABLES

Table 1 – Remedial Option Alternative Comparison Summary

Criteria	Option 1	Option 2	Option 3a	Option 3b	Option 4a	Option 4b	Option 5
1. Short-term costs	10	6	5	7	2	3	0
2. Long-term costs	10	4	5	5	5	5	7
3. Short-term effectiveness	0	4	7	5	8	6	10
4. Long-term effectiveness	0	3	6	4	7	5	10
5. Ease of implementation	10	9	8	9	7	7	6
6. On-site impacts	0	8	7	8	6	6	5
7. Off-site Impacts	0	5	5	5	5	5	5
8. Reliability	0	3	7	1	9	6	10
9. Potential Risks	5	5	7	7	6	6	6
10. Timeliness	10	7	5	7	3	5	1
Total Ranking	**45**	**54**	**62**	**58**	**58**	**54**	**60**

Key

Criteria 1 - Short-term costs

0 - highest predicted implementation cost

5 - median predicted implementation cost

10 - lowest predicted implementation cost

Criteria 6 - On-site impacts

0 - highest negative impact on environment/sustainability

5 - median or neutral impact on environment/sustainability

10 - lowest negative impact on environment/sustainability

Criteria 2 - Long-term costs

0 - highest predicted long-term costs

5 - median predicted long-term costs

10 - lowest or no predicted long-term costs

Criteria 3 - Short-term effectiveness

0 - ineffective immediately following implementation

5 - somewhat effective immediately following implementation

10 - highly effective immediately following implementation

Criteria 4 - Long-term effectiveness

0 - ineffective over time

5 - somewhat effective over a long period of time

10 - highly effective and permanent based on experience

Criteria 5 - Ease of implementation

0 - difficult to implement using readily available technologies

5 - possible to implement using readily available technologies

10 - high likelihood of implementation using readily available local technologies

Criteria 7 - Off-site impacts

0 - highest negative impact on environment/sustainability

5 - median or neutral impact on environment/sustainability

10 - lowest negative impact on environment/sustainability

Criteria 8 - Reliability

0 - not reliable to achieve intended remediation goals

5 - somewhat reliable to achieve intended remediation goals

10 - most reliable to achieve intended remediation goals

Criteria 9 - Potential Risks

0 - highest risk posed to public and workers.

5 - median risk posed to public and workers

10 - lowest risk posed to public and workers

Criteria 10 - Timeliness

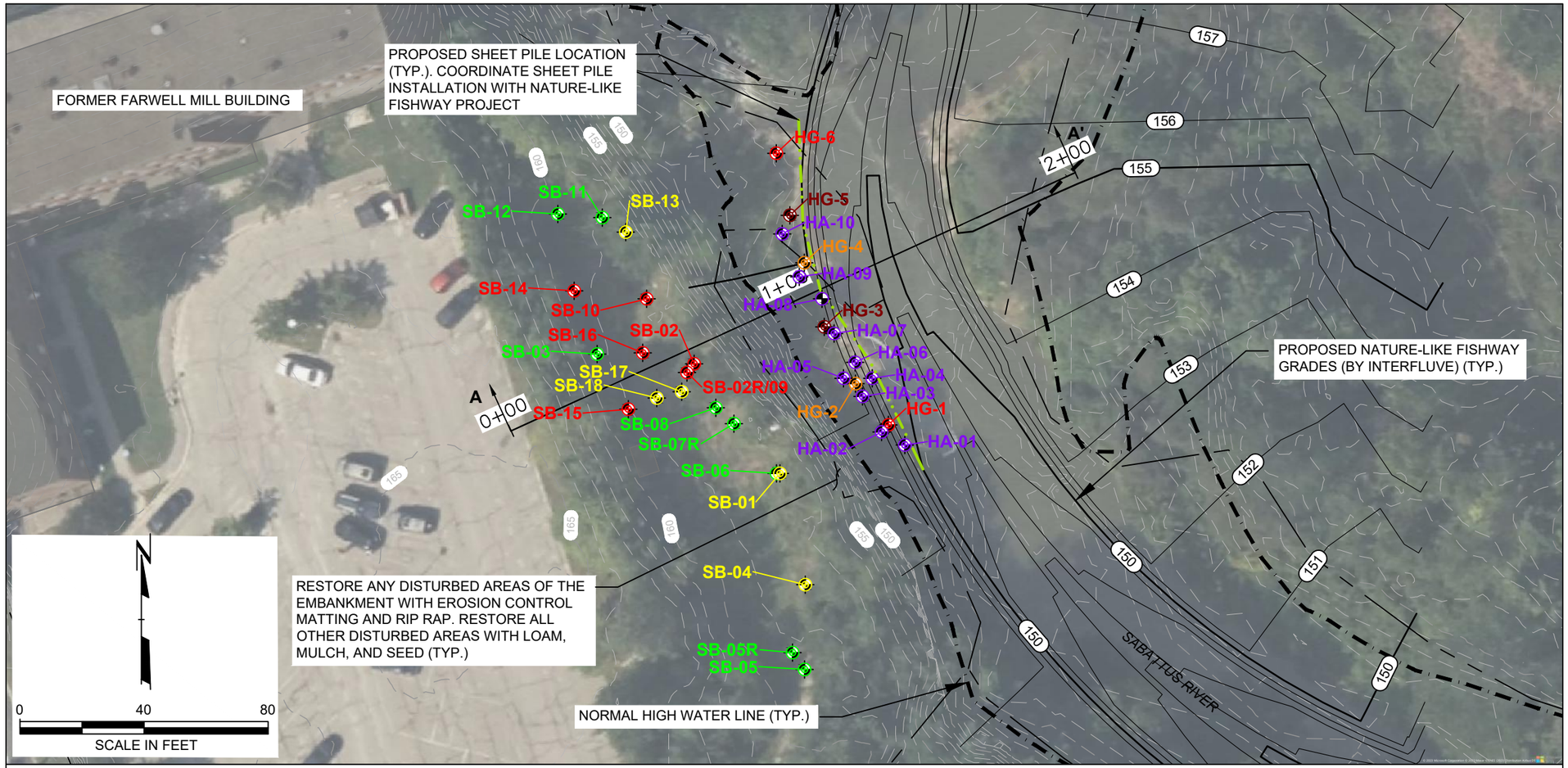
0 - requires the most amount of time to implement

5 - requires a median amount of time to implement

10 - requires the least amount of time to implement

***Note: All criteria utilize a 1-10 scale. The values listed above may be interpolated in the table above.**

FIGURES



LEGEND

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NOTES

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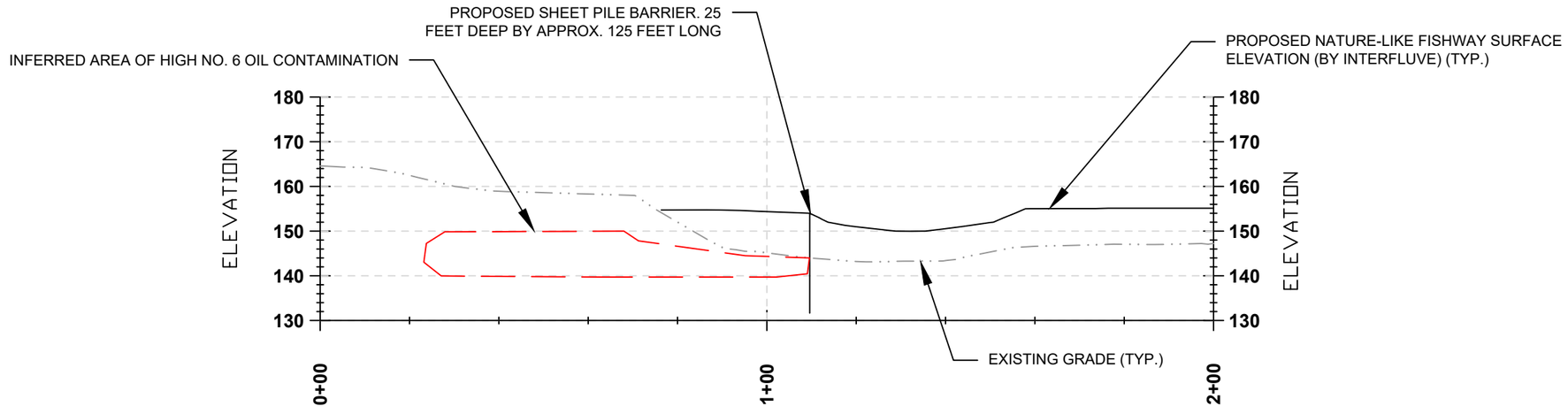

SECTION A-A'

PROJECT:	MAINE DEP FORMER FARWELL MILL - LISBON, ME REMEDIAL OPTIONS ANALYSIS (ROA) 244 LISBON STREET, LISBON, ME 04250
TITLE:	ALTERNATIVE 2 - BARRIER ONLY
DRAWN BY: CJD/TRC	PROJ NO.: 566346
CHECKED BY: TAB	FIGURE 1
APPROVED BY: TAB	
DATE: DECEMBER 2023	

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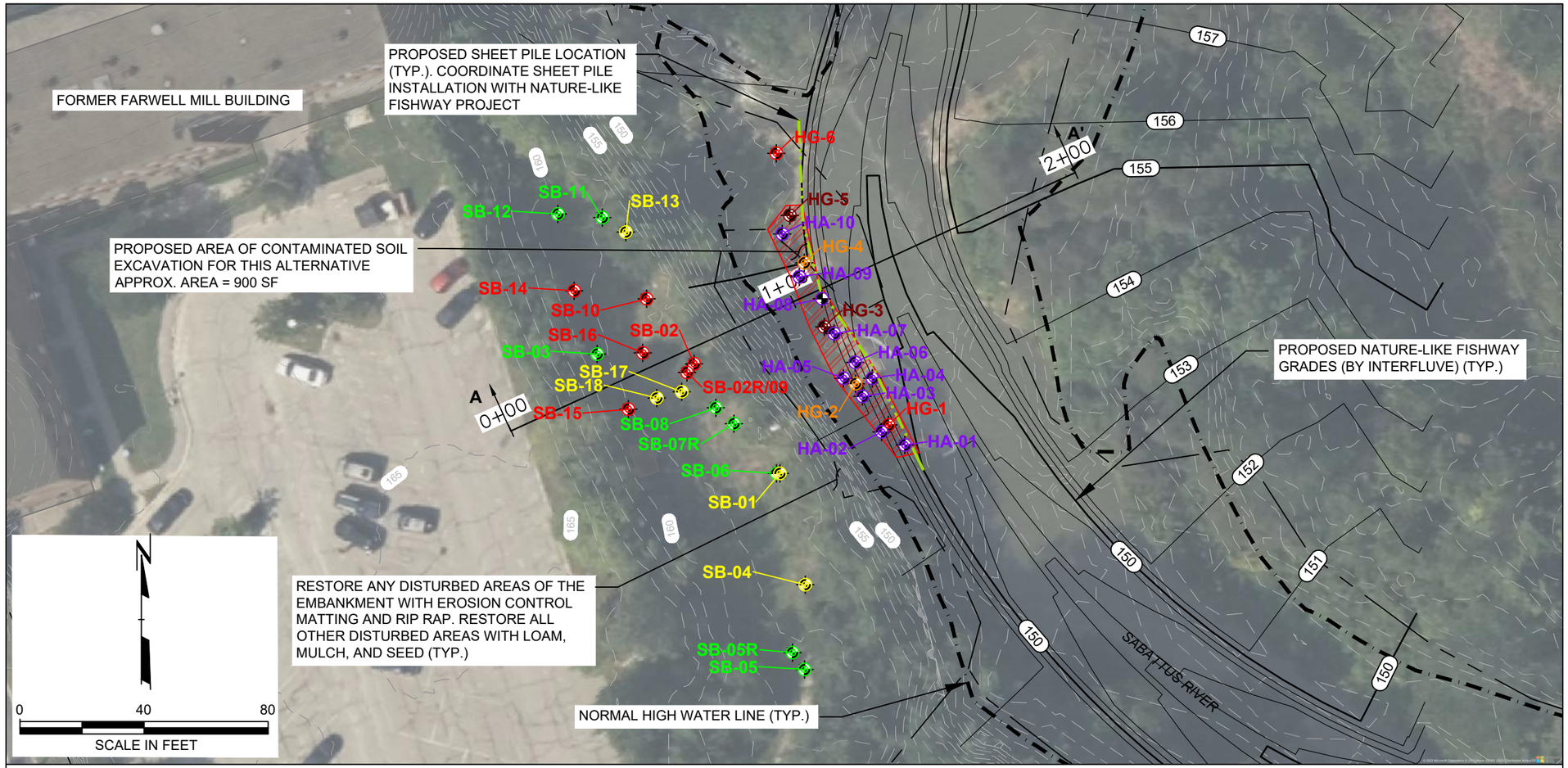
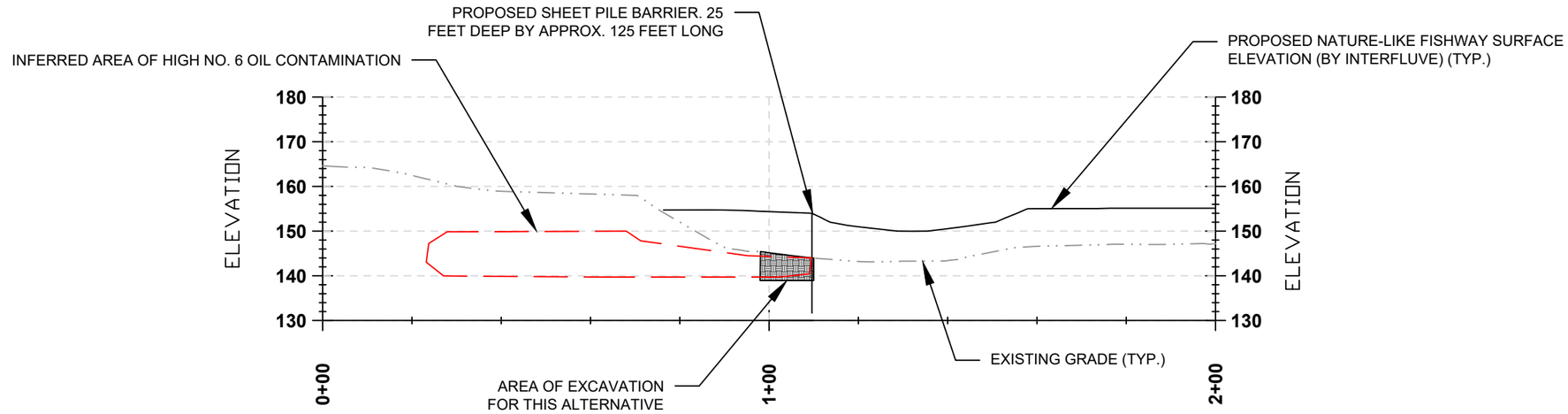
FILE NO.: 566346 - BASE.dwg





SECTION A-A'

LEGEND

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PROJECT:
MAINE DEP
FORMER FARWELL MILL - LISBON, ME
REMEDIAL OPTIONS ANALYSIS (ROA)
244 LISBON STREET, LISBON, ME 04250

TITLE:
ALTERNATIVE 3A - LIMITED EXCAVATION WITH BARRIER

DRAWN BY:	CJD/TRC	PROJ NO.:	566346
CHECKED BY:	TAB		
APPROVED BY:	TAB		
DATE:	DECEMBER 2023		

FIGURE 2

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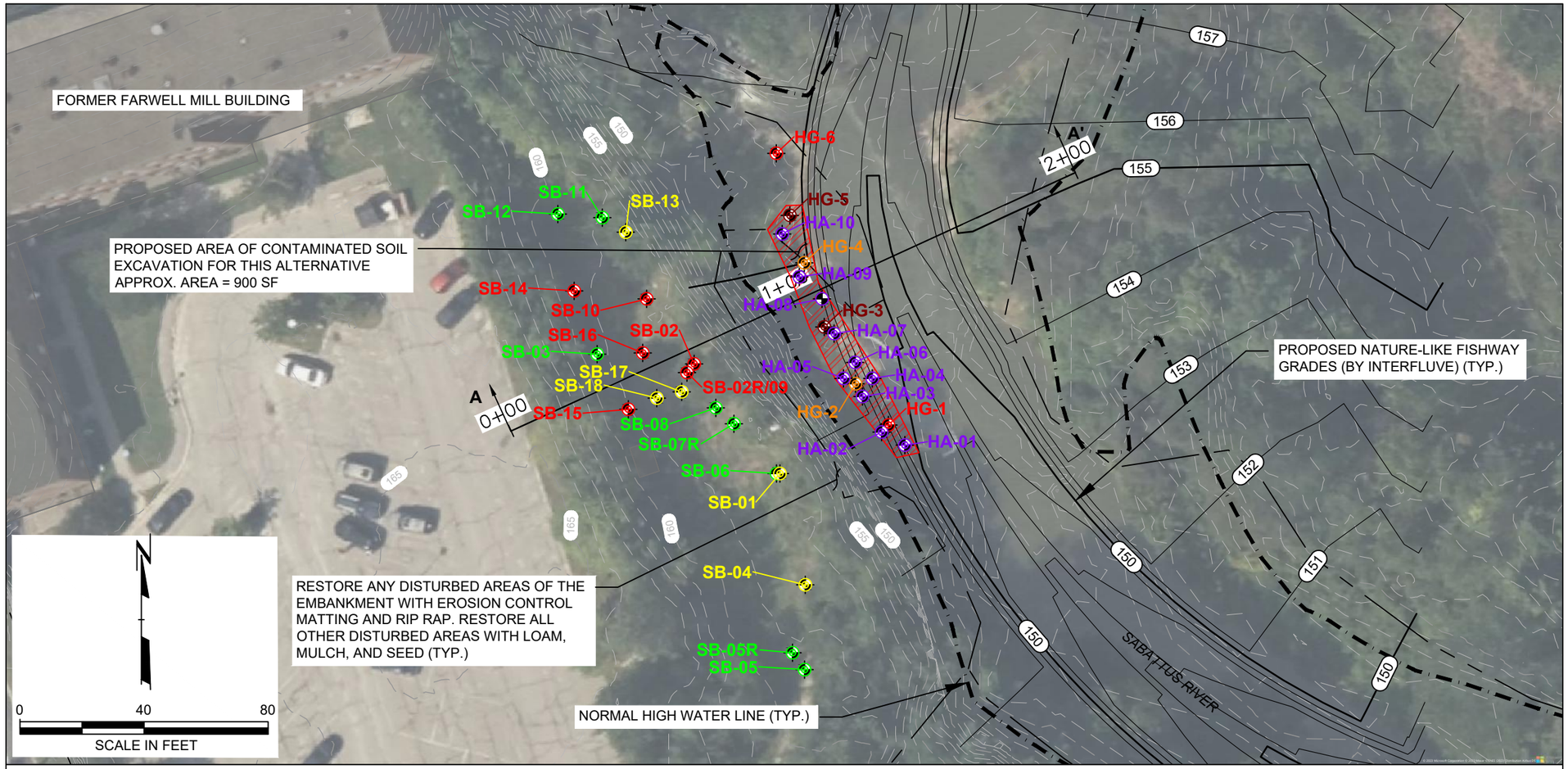

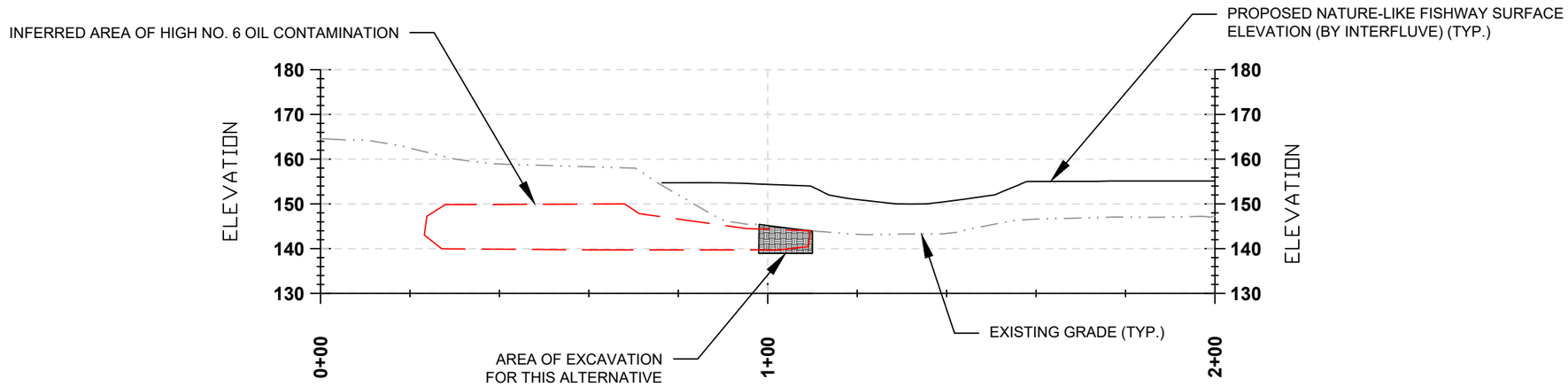

SECTION A-A'

LEGEND

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PROJECT:
MAINE DEP
FORMER FARWELL MILL - LISBON, ME
REMEDIAL OPTIONS ANALYSIS (ROA)
244 LISBON STREET, LISBON, ME 04250

TITLE:
ALTERNATIVE 3B - LIMITED EXCAVATION WITHOUT BARRIER

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CHECKED BY:	TAB		
APPROVED BY:	TAB		
DATE:	DECEMBER 2023		

FIGURE 3

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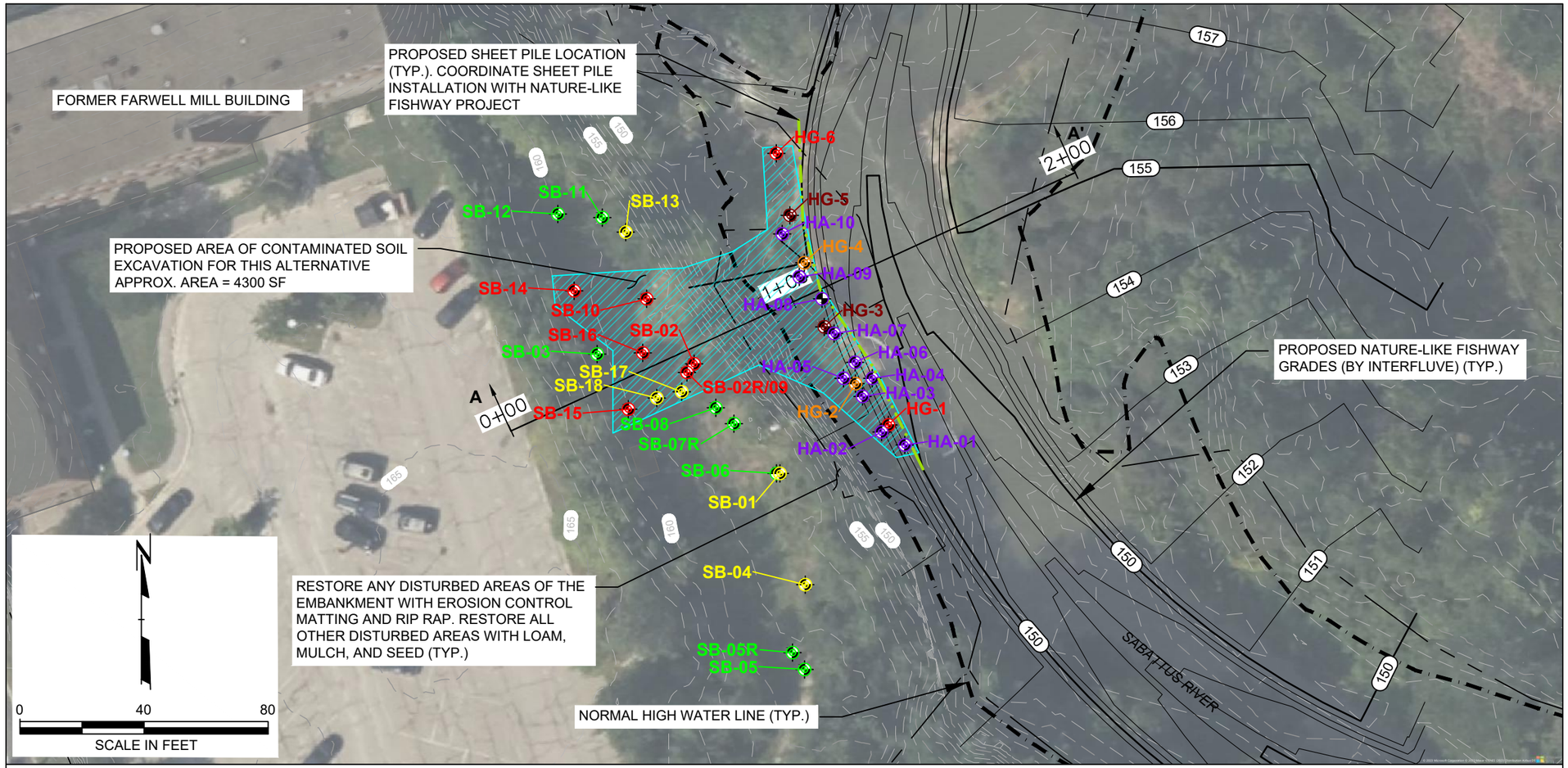

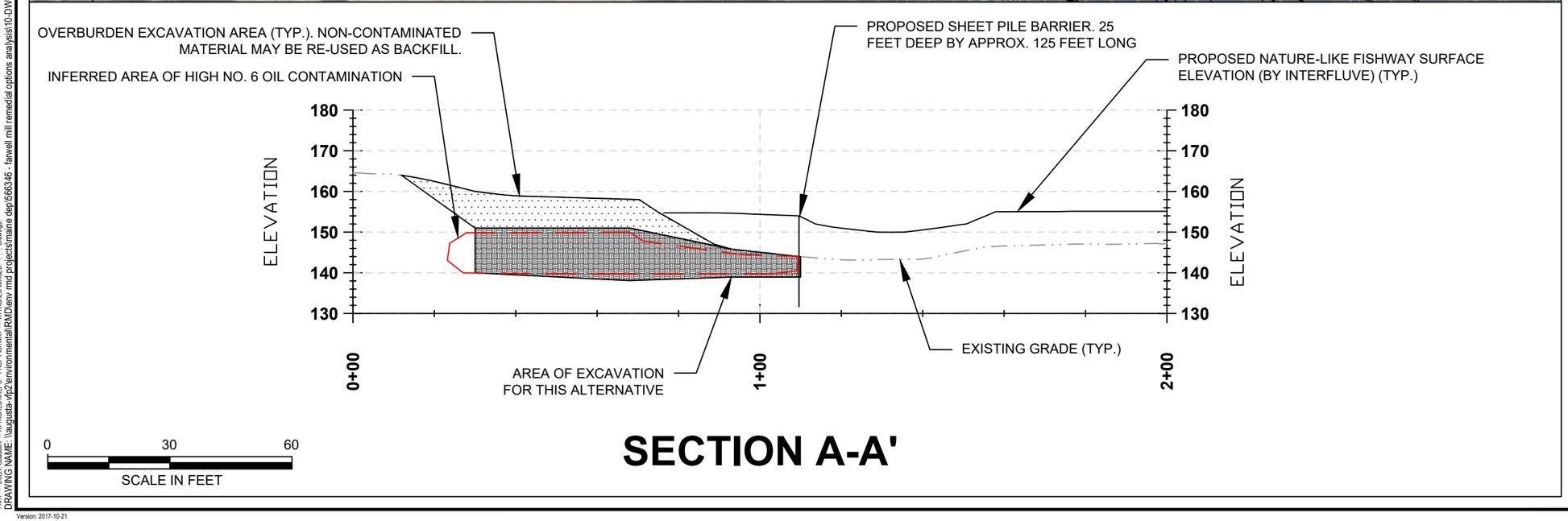

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PROJECT:
MAINE DEP
FORMER FARWELL MILL - LISBON, ME
REMEDIAL OPTIONS ANALYSIS (ROA)
244 LISBON STREET, LISBON, ME 04250

TITLE:
ALTERNATIVE 4A - EXPANDED EXCAVATION WITH BARRIER

DRAWN BY:	CJD/TRC	PROJ NO.:	566346
CHECKED BY:	TAB		
APPROVED BY:	TAB		
DATE:	DECEMBER 2023		

FIGURE 4

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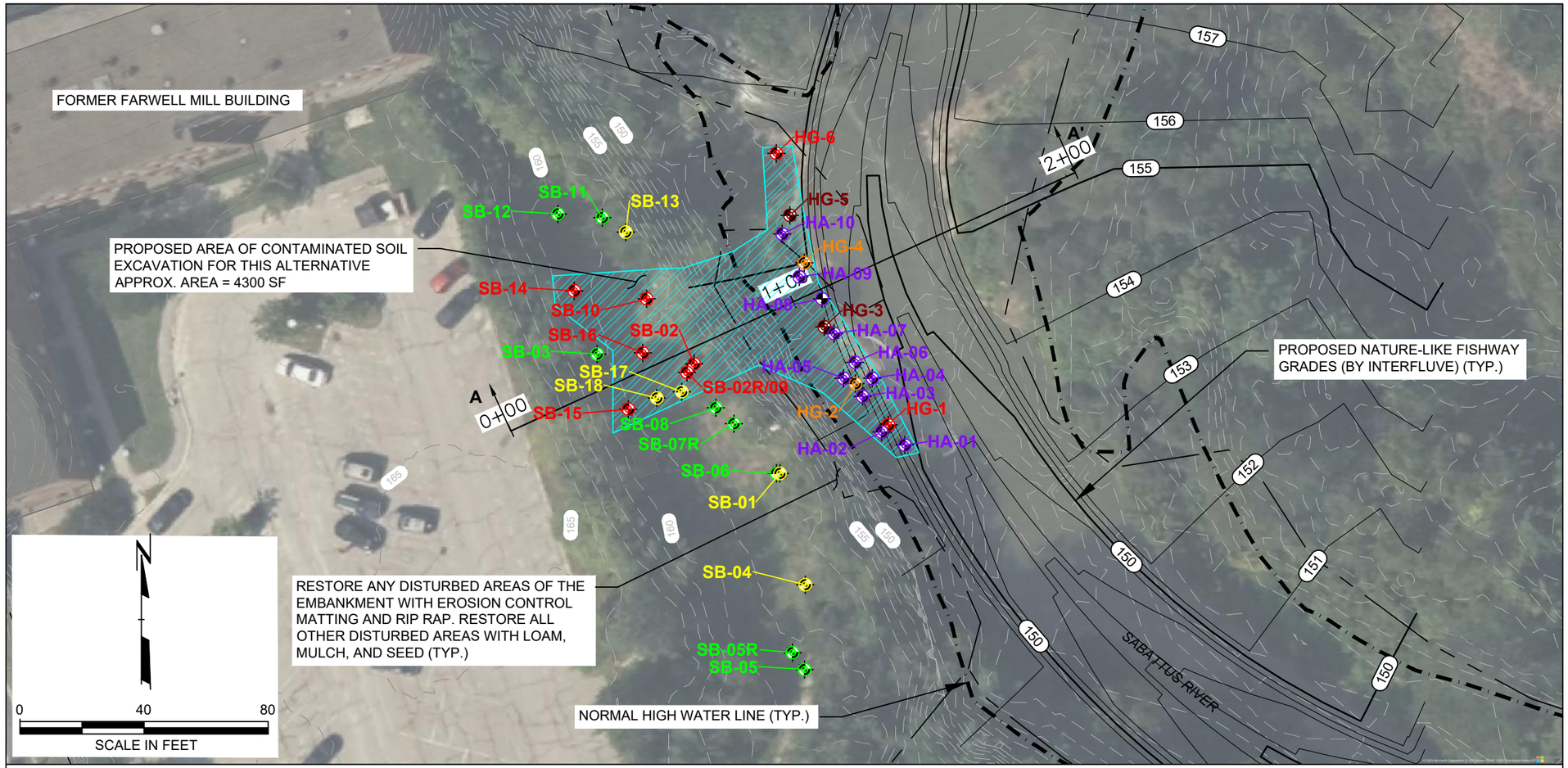

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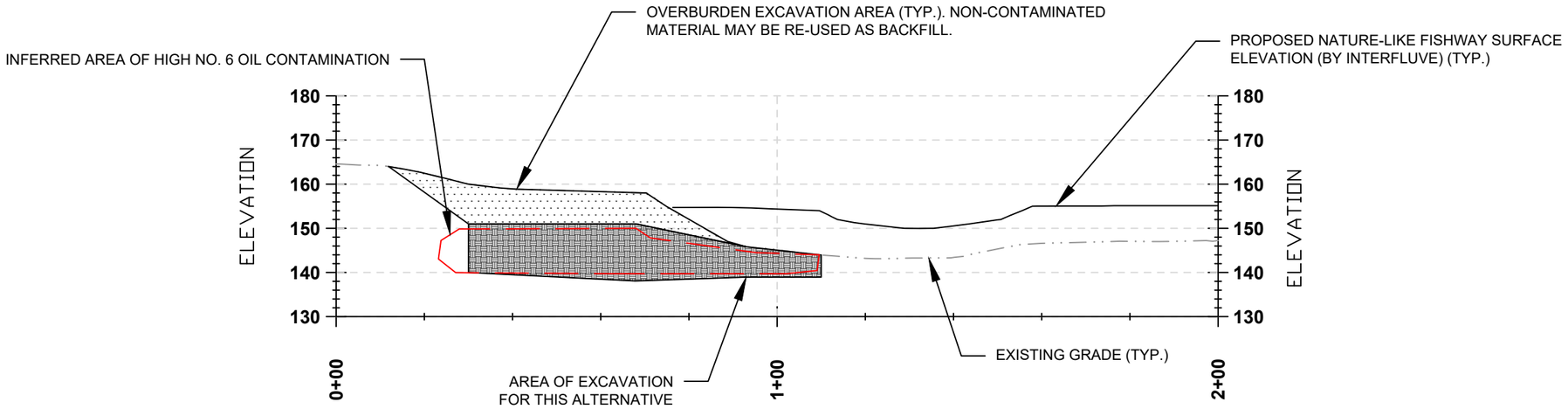

SECTION A-A'

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PROJECT:
MAINE DEP
FORMER FARWELL MILL - LISBON, ME
REMEDIAL OPTIONS ANALYSIS (ROA)
244 LISBON STREET, LISBON, ME 04250

TITLE:
ALTERNATIVE 4B - EXPANDED EXCAVATION WITHOUT BARRIER

DRAWN BY:	CJD/TRC	PROJ NO.:	566346
CHECKED BY:	TAB		
APPROVED BY:	TAB		
DATE:	DECEMBER 2023		

FIGURE 5

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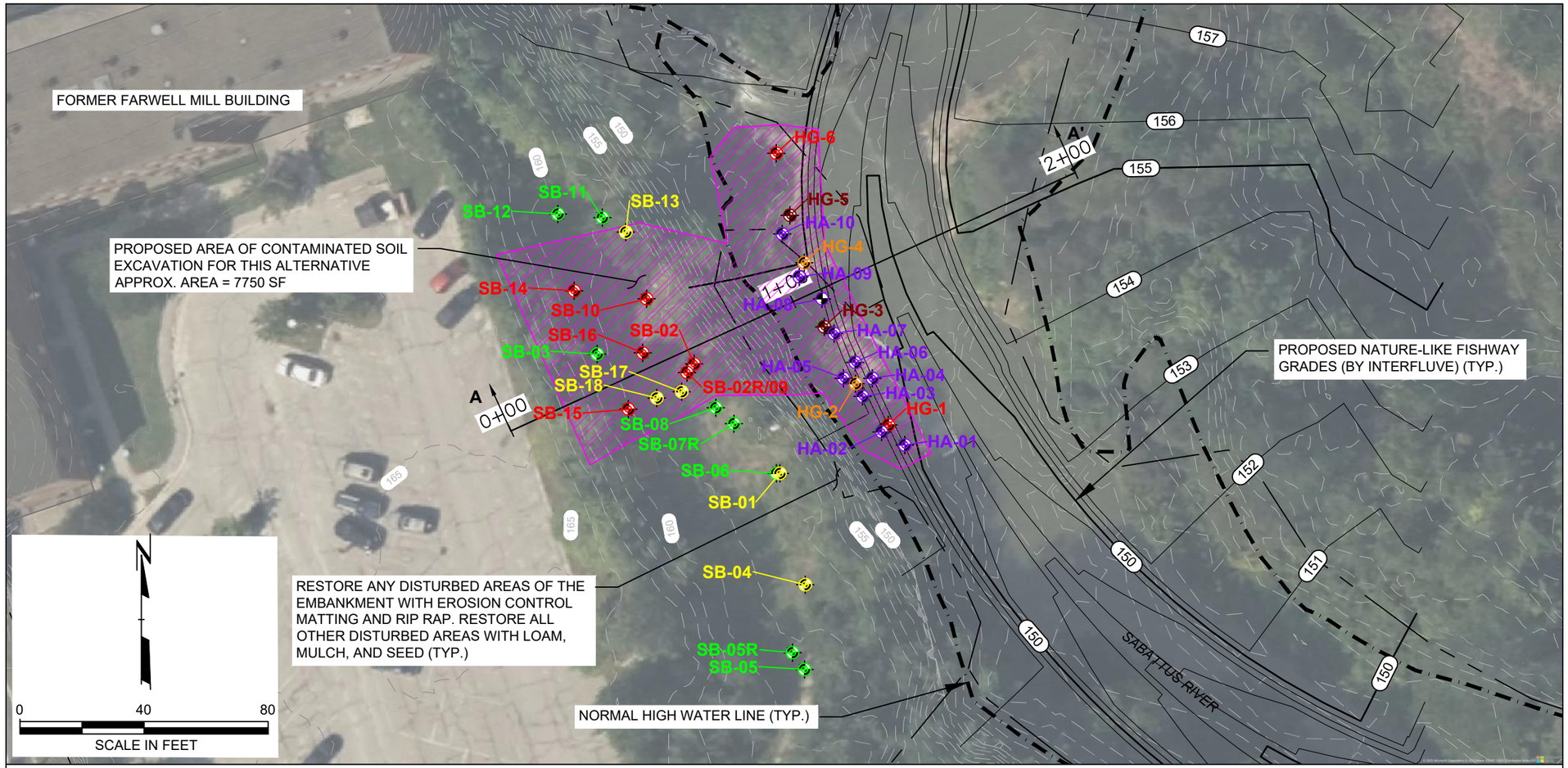

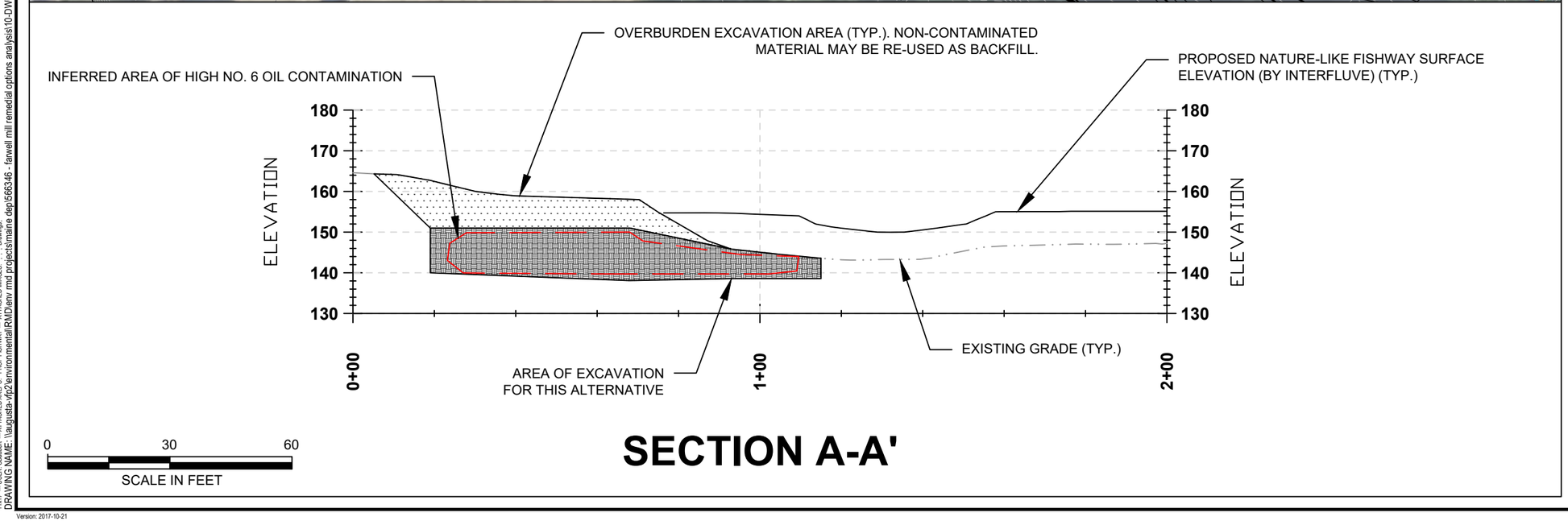

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MAINE DEP
FORMER FARWELL MILL - LISBON, ME
REMEDIAL OPTIONS ANALYSIS (ROA)
244 LISBON STREET, LISBON, ME 04250

TITLE:
ALTERNATIVE 5 - COMPLETE EXCAVATION

DRAWN BY:	CJD/TRC	PROJ NO.:	566346
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APPROVED BY:	TAB		
DATE:	DECEMBER 2023		

FIGURE 6

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Appendix A:
Cost Worksheets for Remedial Options Analysis

ALTERNATIVE 2 - BARRIER ONLY
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS AND DEWATERING					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
2	Cofferdam and dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be paved for under this item.
	II. SITE RESTORATION					
3	Common Excavation	50	CY	$ 30.00	$ 1,500.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
4	Common Borrow	10	CY	$ 30.00	$ 300.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
5	Loam, Seed, and Mulch	200	SY	$ 15.00	$ 3,000.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
6	Erosion Control Blanket	200	SY	$ 7.00	$ 1,400.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
7	Rip Rap Stone	50	CY	$ 150.00	$ 7,500.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	III. SHEET PILE BARRIER					
8	Sheet Piles & Installation (25' Height)	3,125	SF	$ 50.00	$ 156,250.00	**Price includes, material, labor, and equipment costs.
	IV. CONSULTANT AND OVERSIGHT COSTS					
9	Engineering and Construction Oversight Fees	1	LS	$ 44,250.00	$ 44,250.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I, II, & II).
10	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	V. MOBILIZATION					
11	Mobilization	1	LS	$ 15,000.00	$ 15,000.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I, II, and III.

SUBTOTAL	**$ 379,200**
20% CONTINGENCY	**$ 76,000**
TOTAL	**$ 455,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

- This cost estimate was prepared under the supervision of a professional engineer licensed in the State of Maine. The opinion of probable costs is based on recent highway and earthwork construction bids from the City of Auburn, Maine and Maine DOT bid archives from 2023. Costs assumes the work will be performed by a contractor experienced in the construction of similar facilities.

ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.

ALTERNATIVE 3A - LIMITED EXCAVATION WITH BARRIER
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
	II. CONTAMINATED SOIL EXCAVATION					
2	Contaminated Soil Excavation	200	CY	$ 60.00	$ 12,000.00	Unit Price is an assumed 300% markup of typical common excavation pricing. Cost of this item includes containment and temporary storage on-site.
3	Contaminated Soil Trucking & Offsite Disposal	200	CY	$ 200.00	$ 40,000.00	Unit Price is an assumed price for trucking to a landfill in Maine, either Norridgewock or Hartland.
4	Excavation Dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be paved for under this item.
	III. SITE RESTORATION					
5	Common Excavation	50	CY	$ 30.00	$ 1,500.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
6	Common Borrow	250	CY	$ 30.00	$ 7,500.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
7	Loam, Seed, and Mulch	225	SY	$ 15.00	$ 3,375.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
8	Erosion Control Blanket	225	SY	$ 7.00	$ 1,575.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
9	Rip Rap Stone	60	CY	$ 150.00	$ 9,000.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	IV. SHEET PILE BARRIER					
10	Sheet Piles & Installation (25' Height)	3,125	SF	$ 50.00	$ 156,250.00	**Price includes, material, labor, and equipment costs.
	V. CONSULTANT AND OVERSIGHT COSTS					
11	Engineering and Construction Oversight Fees	1	LS	$ 53,500.00	$ 53,500.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I - IV).
12	Potential Laboratory Testing Fees	1	LS	$ 17,800.00	$ 17,800.00	Assume lab testing is 5 percent of construction subtotal (Items I - IV).
13	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	VI. MOBILIZATION					
14	Mobilization	1	LS	$ 17,800.00	$ 17,800.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I - IV.

SUBTOTAL	**$ 470,300**
20% CONTINGENCY	**$ 94,000**
TOTAL	**$ 564,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

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ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.

ALTERNATIVE 3B - LIMITED EXCAVATION WITHOUT BARRIER
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
	II. CONTAMINATED SOIL EXCAVATION					
2	Contaminated Soil Excavation	200	CY	$ 60.00	$ 12,000.00	Unit Price is an assumed 200% markup of typical common excavation pricing. Cost of this item includes containment and temporary storage on-site.
3	Contaminated Soil Trucking & Offsite Disposal	200	CY	$ 200.00	$ 40,000.00	Unit Price is an assumed price for trucking to a landfill in Maine, either Norridgewock or Hartland.
4	Excavation Dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be paved for under this item.
	III. SITE RESTORATION					
5	Common Excavation	50	CY	$ 30.00	$ 1,500.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
6	Common Borrow	250	CY	$ 30.00	$ 7,500.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
7	Loam, Seed, and Mulch	225	SY	$ 15.00	$ 3,375.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
8	Erosion Control Blanket	225	SY	$ 7.00	$ 1,575.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
9	Rip Rap Stone	60	CY	$ 150.00	$ 9,000.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	IV. CONSULTANT AND OVERSIGHT COSTS					
10	Engineering and Construction Oversight Fees	1	LS	$ 30,000.00	$ 30,000.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I, II, & III).
11	Potential Laboratory Testing Fees	1	LS	$ 10,000.00	$ 10,000.00	Assume lab testing is 5 percent of construction subtotal (Items I, II, & III).
12	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	V. MOBILIZATION					
13	Mobilization	1	LS	$ 10,000.00	$ 10,000.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I, II, and III.

SUBTOTAL	**$ 274,950**
20% CONTINGENCY	**$ 55,000**
TOTAL	**$ 330,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

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ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.

ALTERNATIVE 4A - EXPANDED EXCAVATION WITH BARRIER
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
	II. CONTAMINATED SOIL EXCAVATION					
2	Contaminated Soil Excavation	1,450	CY	$ 60.00	$ 87,000.00	Unit Price is an assumed 200% markup of typical common excavation pricing. Cost of this item includes containment and temporary storage on-site.
3	Contaminated Soil Trucking & Offsite Disposal	1,450	CY	$ 200.00	$ 290,000.00	Unit Price is an assumed price for trucking to a landfill in Maine, either Norridgewock or Hartland.
4	Excavation Dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be paved for under this item.
	III. SITE RESTORATION					
5	Common Excavation	750	CY	$ 30.00	$ 22,500.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
6	Common Borrow	1,800	CY	$ 30.00	$ 54,000.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
7	Loam, Seed, and Mulch	320	SY	$ 15.00	$ 4,800.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
8	Erosion Control Blanket	225	SY	$ 7.00	$ 1,575.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
9	Rip Rap Stone	60	CY	$ 150.00	$ 9,000.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	IV. SHEET PILE BARRIER					
10	Sheet Piles & Installation (25' Height)	3,125	SF	$ 50.00	$ 156,250.00	**Price includes, material, labor, and equipment costs.
	V. CONSULTANT AND OVERSIGHT COSTS					
11	Engineering and Construction Oversight Fees	1	LS	$ 112,500.00	$ 112,500.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I - IV).
12	Potential Laboratory Testing Fees	1	LS	$ 37,500.00	$ 37,500.00	Assume lab testing is 5 percent of construction subtotal (Items I - IV).
13	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	VI. MOBILIZATION					
14	Mobilization	1	LS	$ 37,500.00	$ 37,500.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I - IV.

SUBTOTAL	**$ 962,625**
20% CONTINGENCY	**$ 193,000**
TOTAL	**$ 1,156,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

- This cost estimate was prepared under the supervision of a professional engineer licensed in the State of Maine. The opinion of probable costs is based on recent highway and earthwork construction bids from the City of Auburn, Maine and Maine DOT bid archives from 2023. Costs assumes the work will be performed by a contractor experienced in the construction of similar facilities.

ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.

ALTERNATIVE 4B - EXPANDED EXCAVATION WITHOUT BARRIER
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
	II. CONTAMINATED SOIL EXCAVATION					
2	Contaminated Soil Excavation	1,450	CY	$ 60.00	$ 87,000.00	Unit Price is an assumed 200% markup of typical common excavation pricing. Cost of this item includes containment and temporary storage on-site.
3	Contaminated Soil Trucking & Offsite Disposal	1,450	CY	$ 200.00	$ 290,000.00	Unit Price is an assumed price for trucking to a landfill in Maine, either Norridgewock or Hartland.
4	Excavation Dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be paved for under this item.
	III. SITE RESTORATION					
5	Common Excavation	750	CY	$ 30.00	$ 22,500.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
6	Common Borrow	1,800	CY	$ 30.00	$ 54,000.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
7	Loam, Seed, and Mulch	320	SY	$ 15.00	$ 4,800.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
8	Erosion Control Blanket	225	SY	$ 7.00	$ 1,575.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
9	Rip Rap Stone	60	CY	$ 150.00	$ 9,000.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	IV. CONSULTANT AND OVERSIGHT COSTS					
10	Engineering and Construction Oversight Fees	1	LS	$ 89,000.00	$ 89,000.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I, II, & III).
11	Potential Laboratory Testing Fees	1	LS	$ 29,700.00	$ 29,700.00	Assume lab testing is 5 percent of construction subtotal (Items I, II, & III).
12	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	V. MOBILIZATION					
13	Mobilization	1	LS	$ 29,700.00	$ 29,700.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I, II, and III.

SUBTOTAL	**$ 767,275**
20% CONTINGENCY	**$ 153,000**
TOTAL	**$ 920,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

- This cost estimate was prepared under the supervision of a professional engineer licensed in the State of Maine. The opinion of probable costs is based on recent highway and earthwork construction bids from the City of Auburn, Maine and Maine DOT bid archives from 2023. Costs assumes the work will be performed by a contractor experienced in the construction of similar facilities.

ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.

ALTERNATIVE 5 - COMPLETE EXCAVATION OF OIL-SATURATED MATERIAL
MEDEP FARWELL MILL ROA - LISBON, ME

	DESCRIPTION OF ITEM	QUANTITY	UNIT	UNIT RATE	TOTAL COST (2023)	LOGIC
	I. SITE ACCESS					
1	Site staging and access	1	LS	$ 25,000.00	$ 25,000.00	Assumed price. Will likely vary widely in contractor bids.
	II. CONTAMINATED SOIL EXCAVATION					
2	Contaminated Soil Excavation	2,650	CY	$ 60.00	$ 159,000.00	Unit Price is an assumed 200% markup of typical common excavation pricing. Cost of this item includes containment and temporary storage on-site.
3	Contaminated Soil Trucking & Offsite Disposal	2,650	CY	$ 200.00	$ 530,000.00	Unit Price is an assumed price for trucking to a landfill in Maine, either Norridgewock or Hartland.
4	Removal and Disposal of ORS	1	LS	$ 75,000.00	$ 75,000.00	Cost includes excavating and removing Oil Recovery System, demolishing on site, and trucking to approved facility for disposal.
5	Excavation Dewatering	1	LS	$ 100,000.00	$ 100,000.00	Lump sum price derived from culvert replacement projects bid in 2023 by MaineDOT. Assumes cofferdam, pumping, any necessary treatment, and sedimentation control will be payed for under this item.
	III. SITE RESTORATION					
6	Common Excavation	1,360	CY	$ 30.00	$ 40,800.00	*MaineDOT Item #203.200. Cost aggregated from recent public bids for similar work.
7	Common Borrow	3,300	CY	$ 30.00	$ 99,000.00	*MaineDOT Item #203.240. Cost aggregated from recent public bids for similar work.
8	Loam, Seed, and Mulch	550	SY	$ 15.00	$ 8,250.00	*MaineDOT Item #615.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
9	Erosion Control Blanket	225	SY	$ 7.00	$ 1,575.00	*MaineDOT Item #613.319. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
10	Rip Rap Stone	60	CY	$ 150.00	$ 9,000.00	*MaineDOT Item #610.080. Cost aggregated from recent public bids for similar work. Quantity assumed for reconstructing embankment.
	IV. CONSULTANT AND OVERSIGHT COSTS					
11	Engineering and Construction Oversight Fees	1	LS	$ 157,000.00	$ 157,000.00	Assume consultant and oversight is 15 percent of construction subtotal (Items I, II, & III).
12	Potential Laboratory Testing Fees	1	LS	$ 52,300.00	$ 52,300.00	Assume lab testing is 5 percent of construction subtotal (Items I, II, & III).
13	Potential Geotechnical Investigation	1	LS	$ 25,000.00	$ 25,000.00	Assume geotech investigation consists of 5 to 6 borings deeper than 20 feet and lasts 1 day.
	V. MOBILIZATION					
14	Mobilization	1	LS	$ 52,300.00	$ 52,300.00	Assume mobilization cost is approx. 5 percent of subtotal for Items I, II, and III.

SUBTOTAL	**$ 1,334,225**
20% CONTINGENCY	**$ 267,000**
TOTAL	**$ 1,601,000**

Legend:

* = Costs derived from recent public bids for similar work, 2023.

** = Costs derived from RS Means, 2018 Edition, marked up 20% for inflation.

References:

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ASSUMPTIONS: Any tree or vegetation clearing necessary to complete the work shall be considered incidental to the project. The only physcial barrier being considered is steel sheet piling. Dewatering line item includes provisions for treatment when necessary. Disposal and abatment costs for ACM are included in the contaminated soil excavation line item in the event ACM is encountered during excavation. Excavation activites will not require a support system.