ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES
T.W. DICK
1 SUMMER STREET AND 2 & 12 HIGHLAND AVENUE
GARDINER, MAINE

Prepared for

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1.0 INTRODUCTION AND BACKGROUND

Sevee & Maher Engineers, Inc. (SME) prepared this Analysis of Brownfields Cleanup Alternatives (ABCA) to evaluate remedial alternatives for previously identified adverse environmental conditions at the T.W. Dick Site located at 1 Summer Street and 2 & 12 Highland Avenue in the City of Gardiner, Kennebec County, Maine (the "Site"). This report summarizes the evaluation of remedial alternatives for the Site and includes an analysis of cost, the degree of effectiveness, ease of implementation for each remedial alternative, and the resilience of each option in light of reasonably foreseeable changing climate conditions. This report also contains a Remedial Action Plan (RAP) with a discussion of the recommended remedial alternative for the Site. This report was prepared on the behalf of the City of Gardiner, using United States Environmental Protection Agency (U.S.EPA) Brownfields Assessment Grant No. 4B00A00915.

1.1 Purpose and Scope

The purpose of this ABCA is to evaluate potential remedial alternatives to mitigate previously identified adverse environmental conditions associated with the Site and select the most appropriate option. Based on the information obtained during previous environmental investigations (summarized in Section 2.0), three remedial options were considered for the Site and evaluated. Key consideration was given to eliminating or reducing, to the extent possible, the risk of exposure for existing and potential future Site occupants and construction workers to the identified contamination at the Site.

The overall objectives of this ABCA include the following:

- Evaluating the remedial alternatives against specific criteria, including overall protection of human health and the environment; technical practicality; ability to implement; reduction of toxicity, mobility, and volume of contaminants; time required until remedial action objectives are attained; costs; and resiliency to climate change conditions;
- Selecting the remedial alternative that best meets the objectives and considerations of the project; and
- Presenting a conceptual RAP for implementing the selected remedial alternative.

Remediation alternatives evaluated in this ABCA include: 1) No Action Alternative, 2) Soil Cover System Alternative, and 3) Soil Removal Alternative. The Evaluation of Remediation Alternatives (Section 5.0) discusses the requirements for each alternative. The alternatives were evaluated on the previously mentioned criteria, and one alternative was recommended for implementation at the Site. Furthermore, a Conceptual RAP is presented in Section 6.0 for the recommended alternative.

1.2 Site Description and Surrounding Land Use

The Site consists of an approximately 0.6-acre parcel of land identified by the City of Gardiner Assessor's Office as Lots 19, 19A, and 20 on Tax Map 37, which corresponds to 1 Summer Street, 2 Highland Avenue, and 12 Highland Avenue in Gardiner. The Site was most recently occupied by T.W. Dick, a steel fabrication company. T.W. Dick reportedly vacated the Site in 2010. The 1 Summer Street property was formerly improved with an office building and a cold-storage warehouse; however, these buildings were demolished utilizing Brownfields cleanup funds in 2016 and early 2017. The two parcels located at 2 and 12 Highland Avenue were formerly residential and were demolished between 2017 and 2020. The Site is currently vacant with no buildings or permanent structures present. The Site is bound by Highland Avenue and residences on Highland Avenue to the north, Bridge Street to the east, 25 Summer Street to the west, and Summer Street to the south. The Site is located in a primarily commercial area of Gardiner.

Several previous environmental investigations have been performed at the Site between 2014 and 2025 that identified contaminated soil, groundwater, and soil vapor (described in detail in Section 2.0). Remedial actions were performed at the Site between 2016 and 2018, including the installation of a soil cover system.

1.3 Potential Future Site Use

Mastway Development, LLC has proposed to redevelop the Site as a 32-unit, multi-family housing complex; The Iron Heights Apartments. The structure is proposed to be a four-story apartment building with a basement. Exterior portions of the Site are proposed to be improved with asphalt-paved parking areas.

1.4 Site Geology and Hydrogeology

According to the *2009 Surficial Geology of the Gardiner Quadrangle,* surficial soils at the Site are identified as stream alluvium and stream terraces. Stream alluvium consists of sand, gravel, and silt deposited on the floodplains of the Kennebec River and other streams. Stream terraces consist of sand and gravel deposited by the Kennebec River at elevations higher than recent floodplains. According to *1985 Bedrock Geologic Map of Maine*, bedrock in the Site vicinity is part of the Ordovician-Precambrian Z Cushing

Formation, which generally consists of weakly metamorphosed prehnite and pumpellyite, and mafic to felsic volcanic rocks. Bedrock outcrops were not observed on the Site during reconnaissance.

SME oversaw the advancement of eleven soil borings at the Site on January 3, 2025. Site soils generally consisted of sand with some gravel (presumed to be the cover system) over grayish brown silty clay. SME observed evidence of urban fill in subsurface soils below the cover system.

Shallow groundwater and surface water at the Site and in the vicinity is inferred to flow southeast, towards Cobbossee Stream and the Kennebec River. Groundwater flow direction at the Site cannot be confirmed without the completion of a groundwater elevation survey, and no documentation of a groundwater elevation survey was provided within the historical documentation reviewed for this assessment. Shallow groundwater flow may also be influenced by underground utilities, heterogeneous subsurface soil strata, and/or other subsurface structures, which may act as preferred pathways of flow.

2.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Numerous environmental investigations have been performed at the Site by Ransom Consulting Inc. (Ransom) and SME. Copies of these reports have been previously filed with the Maine Department of Environmental Protection (MEDEP) Voluntary Response Action Program (VRAP), and/or submitted to various MEDEP Agencies. The following paragraphs present a summary of historic environmental investigation that are directly pertinent to the Site.

Phase I Environmental Site Assessment: T.W. Dick Properties, 1, 24, 31 & 59 Summer Street, Gardiner, Maine: prepared by Ransom Consulting, Inc (Ransom), September 23, 2014

In September 2014, Ransom completed a Phase I ESA for the Former T.W. Dick properties, including 1 Summer Street. The Phase I ESA identified RECs related to the former use of the Site as a steel fabricator and other historic industrial operations at the Site. Ransom identified the likely presence of urban fill soils with elevated concentrations of oil and/or hazardous materials associated with historic fires and/or unreported releases of HSPP from former steel fabrication or other industrial operations at the Site. Ransom identified floor drains in the former Site buildings with unknown discharge locations. Ransom also identified the potential for residential fuel oil-impacted soils and/or groundwater associated with two former underground storage tanks (USTs) that were removed from the Site in 1989. Finally, a gasoline tank was reportedly installed at an adjacent residential property (25 Summer Street), which could have unreported releases that could have impacted the Site. Based on their Phase I ESA findings, Ransom recommended additional environmental investigation and suggested a Hazardous Materials Inventory to identify potential hazardous building materials and mitigation measures for the former Site buildings.

Hazardous Materials Inventory: T.W. Dick Properties, 1, 24, 31 & 59 Summer Street, Gardiner, Maine. Ransom, December 23, 2014.

In December 2014, Ransom completed a Hazardous Building Materials Inventory (HBMI) and identified asbestos-containing materials (ACM), lead-based painted surfaces, and potential polychlorinated biphenyls (PCB)-containing fluorescent light ballasts in both former Site buildings. In addition, potential mercury-containing thermostat switches and ozone-depleting substances, including refrigeration units and window/wall-mounted air-conditioning units were found in the former Office Building.

Ransom also conducted visual and X-ray Fluorescence (XRF) screening of the ground surface in areas where elevated concentrations of lead were detected in painted materials on the building exterior. Specifically, Ransom screened surficial soils along the east side of the former Office Building, and portions of the north, east, and west sides of the former cold-storage warehouse, using the soil analytical mode of the Innov-X Delta series XRF. Ransom pulled back the grass at the building "drip edge," where paint chips were observed, consistent with the identified lead-based paint on the building exteriors in these locations. XRF screening indicated concentrations of lead ranging from 42 parts per million (ppm) to 1,403 ppm along the building drip edges.

Phase II Environmental Site Assessment: T.W. Dick Properties, 1, 24, 31 & 59 Summer Street, Gardiner, Maine: prepared by Ransom, February 27, 2015

In February 2015, Ransom completed a Phase II ESA for the Former T.W. Dick properties, including 1 Summer Street. Ransom determined that surficial soils throughout the Site contained urban fill, coal and/or wood combustion products, elevated concentrations of arsenic and lead, and polycyclic aromatic hydrocarbons (PAHs). Elevated concentrations of volatile petroleum constituents and chlorinated compounds were detected in soil vapor samples collected beneath a former Site building. Groundwater throughout the former T.W. Dick property and pore-water samples collected along Cobbossee Stream were found to contain elevated concentrations of metals. No evidence of contaminated soil or groundwater associated with the former USTs, or the off-site gasoline tank, was found at levels that would present an exposure risk to future Site occupants or construction workers. Finally, Ransom oversaw a floor drain investigation and found low-level contaminants in soil and groundwater samples in the inferred discharge points. Based on the results of their Phase II ESA, Ransom concluded that contaminants found at the Site would pose an exposure risk to future residential occupants, commercial workers, and/or construction workers unless remedial activities and/or mitigation measures are enacted at the property.

Phase I Environmental Site Assessment: Residential Property, 2 Highland Avenue, Gardiner, Maine: prepared by Ransom, September 2, 2016

In September 2016, Ransom completed a Phase I ESA for a parcel located at 2 Highland Avenue. The parcel was improved with a vacant four-unit apartment building. The Phase I ESA identified two RECs, including 1) the likely presence of urban fill soils containing oil and/or hazardous materials associated with historic fires and/or former industrial operations, and 2) staining and odor and potentially fuel-impacted soils associated with two 275-gallon fuel oil ASTs in the basement of the Site building. Ransom recommended additional investigation, including a Phase II ESA and an HBMI to identify any potentially hazardous building materials in the Site building.

Phase II Environmental Site Assessment: Residential Property, 2 Highland Avenue, Gardiner, Maine: prepared by Ransom, October 26, 2016

In October 2016, Ransom completed a Phase II ESA for a property located at 2 Highland Avenue. Ransom collected three surficial soil samples for laboratory analysis of extractable petroleum hydrocarbons (EPH) and RCRA 8 Metals and one surficial soil sample collected from the dirt floor of the basement for laboratory analysis of EPH. All four samples were field screened using the oleophilic dye test. Ransom also screened soils in the drip zone for concentrations of lead using an XRF. One sample was collected from this area and submitted for laboratory analysis of total lead. Benzo(a)pyrene, arsenic, and lead were detected in surficial soil samples collected from the Site exterior and C_9-C_{18} aliphatics and C_{11}-C_{12} aromatics were detected in the soil sample collected from the Site building basement at concentrations that exceed the MEDEP RAGs for Residential exposure scenarios. Ransom noted that the arsenic concentrations were likely attributed to background conditions in the area of the property, and it is unlikely that past residential uses of the property contributed to elevated arsenic concentrations. Ransom also identified ACM, lead-

based materials, and additional items that may contain PCBs, mercury, and other potentially hazardous materials. Ransom recommended 1) that all hazardous building materials be abated prior to demolition, 2) that contaminated soils be mitigated via installation of a cover system, importation of clean fill, and/or removal of contaminated soil, and 3) that all contaminated soil removed from the property be disposed at a licensed disposal facility.

Phase I Environmental Site Assessment: T.W. Dick Properties, 1, 24, 31 & 59 Summer Street, Gardiner, Maine: prepared by Ransom, October 28, 2016

In October 2016, Ransom completed a Phase I ESA for the former T.W. Dick properties, including 1 Summer Street. The Phase I ESA identified one REC related to the presence of elevated concentrations of contaminants previously identified in soil, groundwater, soil vapor, and/or pore-water throughout the Site. At the time of this Phase I ESA, remediation/mitigation activities at the Site were in progress; however, Ransom recommended that additional investigation be conducted after the removal of Site building foundations. Ransom also recommended that all hazardous building materials be abated prior to demolition and that the RAP should be implemented during redevelopment/remediation.

Phase I Environmental Site Assessment: T.W. Dick, 1 Summer Street and 2 & 12 Highland Avenue, Gardiner, Maine prepared by SME, July 17, 2024

In July 2024, SME completed a Phase I ESA for the T.W. Dick Site. The Phase I ESA reclassified formerly identified RECs as Controlled RECs (CRECs) due to the installation of a soil cover system over the 1 Summer Street and 2 Highland Avenue properties in 2016. Note that the soil cover system does not extend over the 12 Highland Avenue parcel. However, no former RECs were associated with the 12 Highland Avenue Parcel. The Phase I ESA identified potential contamination associated with the upgradient and adjacent former Irving gas station, however the soil cover system also addressed potential adverse impacts from off-site properties.

Waste Characterization Soil Sampling, T.W. Dick, 1 Summer Street and 2 & 12 Highland Avenue, Gardiner, Maine. Prepared by SME, January 23, 2025.

On January 7, 2025, SME oversaw the advancement of eleven Geoprobe direct-push soil borings throughout the Site. SME observed evidence of urban fill soils in subsurface soils below the cover system from the 1 Summer Street property. SME also observed visual and olfactory evidence of petroleum in surficial and subsurface soils from borings in the central portion of the Site in the 2 Highland Avenue parcel. SME collected soil samples from each boring for laboratory analysis of RCRA 8 metals. Laboratory results were compared to Hatch Hill Landfill's soil acceptance criteria. Lead was detected in subsurface soils (5 to 10 feet-bgs) from one boring in the central portion of the Site at a concentration of 5.98 mg/L, which is above Hatch Hill's acceptance criteria of 5.0 mg/L. All other results for RCRA 8 metals from remaining borings at the Site were below laboratory reporting limits and/or below Hatch Hill's acceptance criteria for RCRA 8 Metals.

Phase I Environmental Site Assessment: T.W. Dick, 1 Summer Street and 2 & 12 Highland Avenue, Gardiner, Maine prepared by SME, February 10, 2025

In February 2025, SME completed an updated Phase I ESA for the Site. The Phase I ESA did not find any evidence of RECs and was in agreement with the findings of the 2024 Phase I ESA.

3.0 SITE CHARACTERIZATION AND CLEANUP GOALS

Previous environmental investigations completed at the Site identified environmental contamination associated with historical Site operations. The identified contamination and appropriate cleanup goals are summarized below.

3.1 Soils

A soil cover system was installed at the Site in 2016, which consisted of eight inches of clean fill with four inches of seeded loam over a geotextile marker layer. 12 inches of riprap were installed over the steep banks in the central/western portion of the Site. The following paragraphs describe soils beneath the cover system:

Surficial soils contain anthropogenic urban fill with coal and/or wood combustion byproducts and elevated concentrations of arsenic and PAHs. Based on laboratory analytical results, the concentrations of benzo(a)pyrene and arsenic detected in surficial soils would present an exposure risk to future residential occupants and commercial workers. Lead was also detected in the surficial soils at concentrations that would present an exposure risk to future residential occupants. Additionally, based on XRF field screening results, the arsenic and/or lead concentrations in surficial soils on the 1 Summer Street property have the potential to create an exposure risk to future residential occupants.

Apparent weathered, petroleum-impacted surficial and subsurface soils and apparent creosote-impacted subsurface soils and groundwater were identified at the 1 Summer Street property. Laboratory analysis of petroleum-impacted soils indicated that they contained elevated levels of EPH fractions and PAHs at concentrations that would present an exposure risk to future residential and commercial workers. Laboratory analysis of creosote-impacted subsurface soils indicated that they contain low-level concentrations of petroleum-related volatile organic compounds (VOCs) and elevated concentrations of PAHs, specifically benzo(a)pyrene. The elevated concentration of benzo(a)pyrene detected in subsurface soils on the 1 Summer Street property would present an exposure risk to future excavation/construction workers at this portion of the Site.

Low-level EPH fractions were detected in subsurface soils at the former locations of two 1,000-gallon fuel oil USTs between the former Site buildings. The low-level EPH fractions were detected at concentrations that did not exceed their respective risk-based guidelines. Therefore, it is inferred that residual fuel oil-impacted soil associated with these former, removed USTs does not appear to pose an exposure risk to current and/or future Site occupants or construction workers.

Benzo(a)pyrene, arsenic, and lead were detected in surficial soils and C_9-C_{18} aliphatics and C_{11}-C_{12} aromatics were detected in the subsurface soils from the 2 Highland Avenue property at concentrations that would present an exposure risk to future residential occupants. The arsenic concentrations were likely attributed to background conditions in the area of the property, and it is unlikely that past residential uses of the property contributed to elevated arsenic concentrations.

The Site is proposed to be redeveloped for residential reuse. As such, the cleanup goal for the Site is to eliminate or reduce the risk of human contact to the contaminated surficial soils at portions of the Site that are impacted by petroleum-related VOCs, volatile petroleum hydrocarbon (VPH) and EPH fractions, PAHs, and metals. Targeted soil removal activities and/or the installation of a barrier or engineered cover system over contaminated soils would likely eliminate human exposure through direct contact, ingestion, or inhalation to contaminated soils. If a cover system were selected as the remedial activity, a deed restriction will be required, which would outline requirements for proper maintenance of the cover system, and would prohibit disturbing the cover and/or performing excavation activities at the Site, without prior notification and approval of MEDEP.

3.2 Groundwater

Groundwater throughout the Site was identified to contain elevated concentrations of metals, specifically antimony, arsenic, chromium, lead, and nickel. The detected concentrations of these metals in groundwater would present a drinking water ingestion and residential dermal exposure risk but would not present an exposure risk to construction workers at the Site.

An Environmental Media Management Plan (EMMP) was prepared by Ransom in 2019 which outlined requirements for managing soil and groundwater during future Site work. The EMMP states that an environmental professional should be notified if excavation is proposed at depths below the groundwater table. Contaminated groundwater must be temporarily stored on-site or transported off-site under a Uniform Hazardous Waste Manifest. If off-site transport is not practical, groundwater may be discharged to the sewer system after proper treatment with approval from the City of Gardiner Wastewater Treatment Plant. In addition, the Certificate of Completion, issued in 2019, states that no groundwater shall be extracted from the Site without the express written consent of MEDEP.

3.3 Soil Vapor

Elevated concentrations of volatile petroleum constituents and chlorinated compounds were detected in sub-slab soil vapor samples collected beneath the former Site buildings that may present an exposure risk to future residential and commercial occupants of the buildings. Low-level volatile petroleum constituents and chlorinated compounds were detected in the sub-slab soil vapor sample collected beneath the former Cold-Storage Warehouse, but at concentrations that would not present an exposure risk to future residential and commercial occupants of the building.

Based on these results, it's possible that small pockets of petroleum and chlorinated solvent impacted soils are present at the Site. A sub-slab depressurization system should be incorporated into the design of the proposed residential structure to mitigate impacts to indoor air quality from potential vapor intrusion of volatile contaminants.

4.0 DESCRIPTION OF EVALUATION CRITERIA

The comparison of the remediation alternatives was conducted using the evaluation and threshold criteria described below.

4.1 Overall Protection of Human Health and the Environment

Alternatives must pass this threshold criterion to be considered for implementation as the recommended alternative. The goal of this criterion is to determine whether a remediation alternative provides adequate protection of human health and the environment. It also addresses how identified risks are eliminated, reduced, or controlled. Protection of human health is assessed by evaluating how site risks from each exposure route are eliminated, reduced, or controlled through the specific alternative.

4.2 Technical Practicality

The focus of this evaluation criterion is to determine technical practicality of instituting the specific alternative. This criterion evaluates the likelihood that the alternative will meet project specifications.

4.3 Ability to Implement

This criterion analyzes technical feasibility and the availability of services and materials. Technical feasibility assesses the ability to implement and monitor the effectiveness of the alternative. Availability of services and materials evaluates the need for off-site treatment, storage or disposal services and the availability of such services. Necessary equipment, specialists, and additional resources are also evaluated.

4.4 Reduction of Toxicity, Mobility, and Volume

This criterion evaluates the ability of the remediation alternative to significantly achieve reduction of the toxicity, mobility, and volume of the hazardous substances present at the Site. This analysis evaluates the quantity of hazardous substances and/or petroleum-impacted media to be removed, the degree of expected reduction in toxicity, the type and quantity of residuals to be reduced, and the manner in which the principal threat is addressed through the remediation alternative.

4.5 Short Term Effectiveness

This criterion addresses the period of time needed to complete the remediation, potential adverse impacts on human health and the environment that may exist until the cleanup goals are achieved, and the timeframe for accomplishing the associated reduction in the identified environmental conditions.

4.6 Resiliency to Climate Change Conditions

This criterion evaluates the resilience of the remediation alternative to reasonably foreseeable changing climate conditions, such as: increasing/decreasing temperatures; increasing/decreasing precipitation; extreme weather events; rising sea level; changing flood zones; and higher/lower groundwater tables, among others.

4.7 Preliminary Cost

The preliminary cost criterion for the remediation alternatives evaluates the estimated capital, operation, and maintenance costs of each alternative. Capital costs include direct capital costs, such as materials and equipment, and indirect capital costs, such as engineering, sampling contingencies, and licenses. Costs were developed as a balancing criterion for the remedial alternatives and should not be construed as bid costs or engineer's cost estimates. Cost may be used as a distinguishing factor in the selection of the remedial action. The preliminary costs developed should in no way be construed as a cost proposal, but rather a guide for selecting a remedial action.

5.0 EVALUATION OF REMEDIATION ALTERNATIVES

Based on the evaluation criteria outlined in the previous section and the potential exposure pathways identified for the Site, the remedial actions selected for the Site should accomplish the following objectives:

- Minimize the potential for direct contact, incidental ingestion, or inhalation of contaminated surficial and subsurface soils and groundwater located at the Site;
- Minimize the potential for inhalation of petroleum- and chlorinated VOC-impacted soil vapor detected on the Site; and
- Conduct the remedial action in a feasible, resilient, expedient, and cost-effective way.

Three remedial alternatives were considered to address the contaminated soils on-site, including: 1) No Action Alternative, 2) Soil Cover System Alternative, and 3) Soil Removal Alternative. These alternatives were evaluated using the criteria described in Section 4.0 and are summarized below. The attached Table 1 includes a Summary of the Evaluation and Comparison of the Remedial Alternatives.

5.1 No Action Alternative

A No Action Alternative signifies that no further Site remediation activities would be conducted at the Site. Excavation is proposed at the Site to construct a four-story residential structure with a basement. The proposed excavation would disturb the existing soil cover system and expose previously identified contaminants beneath the cover system. Therefore, the No Action Alternative is not protective of human health or the environment and does not meet the project objectives.

The No Action Alternative does not include a means for mitigating potential exposure to identified adverse environmental conditions or unacceptable risks remaining from contaminated soils, groundwater, or soil vapor. The No Action Alternative would not allow for redevelopment of the Site into the proposed residential structure without the potential for human exposure through direct contact, ingestion, and/or inhalation for future Site occupants and construction workers.

The No Action Alternative would not achieve reduction of the toxicity, mobility, or volume of the hazardous substances present at the Site. The No Action Alternative was not selected for implementation or further consideration.

5.2 Cover System Alternative

The second remediation alternative evaluated in this ABCA is the Cover System Alternative. As stated previously, excavation has been proposed at the Site, which would disturb the existing soil cover system

and expose previously identified contaminants. This alternative involves the construction of a new Cover System over areas of previously identified impacted soil. The Cover System would consist of a combination of landscape cover systems, asphalt cover systems, and building foundation cover systems. This alternative involves mitigating the potential for human exposure to impacted soils through installation of a cover system over impacted soils at the Site.

5.2.1 Overall Protection of Human Health and the Environment

This alternative provides protection of human health by mitigating the risk of human exposure to the petroleum-, PAH-, and/or heavy metals-impacted soils. As part of this alternative, soils would be covered by an approved MEDEP cover system, most likely a combination of landscape cover systems, asphalt cover systems, and building foundation cover systems. In addition, the existing EMMP will be implemented to minimize and manage future exposures to contaminated soils and groundwater during Site redevelopment. The goal of reducing the risk of human exposure to impacted soils on-site would be achieved through this alternative.

5.2.2 Technical Practicality

Cover system construction activities are relatively common construction practices. Contractors with this type of experience are readily available in the greater Gardiner area. This alternative supports the redevelopment of the Site. Therefore, this alternative is technically practical.

5.2.3 Ability to Implement

This cleanup alternative is technically feasible and is a common approach for reducing human health exposure risks associated with impacted soils. Services and materials for this work are readily available in the greater Gardiner area.

5.2.4 Reduction of Toxicity, Mobility, and Volume

The implementation of a cover system over impacted soils would not reduce the toxicity, mobility, and volume of these materials since they would remain on-site; however, the cover system would mitigate exposure to these materials.

5.2.5 Short-Term Effectiveness

The risk of exposure to impacted soils would be mitigated upon implementation of the cover system. The work described under this alternative could be performed on a relatively short timeframe, likely within a few months after mobilizing contractors. Long-term maintenance and monitoring of the condition of the cover system would be required as part of this alternative. Maintenance and monitoring activities are relatively easy to implement with a cover system maintenance plan.

5.2.6 Resiliency to Climate Change Conditions

Although the Site is near the Cobbossee Stream, climate change effects from rising sea level and changing flood zones are not anticipated to represent a major threat due to the significant rise/elevation between the stream bank and the Site. Therefore, the primary climate change concerns would be associated with extreme weather, increased rainfall, and rising groundwater tables. This remedial alternative meets the objectives associated with these criteria by capping impacted soils, which may come into contact with rain/stormwater. However, the cover/cap system will shed or redirect stormwater runoff and minimize infiltration within the impacted areas. Because impacted soils would remain on-site, rising groundwater tables have the potential to come into contact with impacted soils; however, the contaminants of concern are not expected to be significantly leachable, thus reducing potential groundwater impacts.

5.2.7 Preliminary Cost

The estimated costs associated with this remedial alternative are outlined in the attached Table 3 – Summary of Estimated Remediation Costs for Cover System Alternative. Capital costs include direct capital costs, such as materials and equipment, and indirect capital costs, such as engineering and sampling contingencies.

5.3 Soil Removal Alternative

The third remediation alternative evaluated in this ABCA is the "Soil Removal" Alternative. This alternative involves mitigating the potential for human exposure to impacted soils through excavation and off-site disposal of impacted soils at the Site. It should be noted that the additional remedial actions outlined in Section 5.6, would also be incorporated into this alternative to address contaminated groundwater at the Site.

5.3.1 Overall Protection of Human Health and the Environment

This alternative provides adequate protection of human health and the environment through eliminating the risk of human exposure to the petroleum-, PAH- and/or heavy metals-impacted soils via soil removal activities. The existing EMMP will be implemented to minimize and manage future exposures to contaminated soils (below the water table, if present) and groundwater during future Site excavations. The goal of reducing or eliminating the risk of human exposure to impacted soils could be achieved through this alternative.

5.3.2 Technical Practicality

Soil removal activities are technically practical. The removal of petroleum, PAH- and/or heavy metals-impacted soil could be completed utilizing accepted construction techniques. Both contractors and disposal facilities with experience with similar projects are readily available in the region.

5.3.3 Ability to Implement

This alternative is technically feasible and is an effective action for reducing the risk of human exposure. Services and materials necessary to conduct this alternative are readily available.

5.3.4 Reduction of Toxicity, Mobility, and Volume

This remediation alternative can achieve reduction in the mobility and volume of the impacted soils at the Site. The removal of impacted soils would reduce the risk of direct contact by future Site occupants and construction workers.

5.3.5 Short-Term Effectiveness

The remedial action objective would be attained when the impacted soils are removed from Site. Potential adverse impacts to human health from exposure to contaminated soils and groundwater may exist until the cleanup goals are achieved. No long-term maintenance would be required for this alternative.

5.3.6 Resiliency to Climate Change Conditions

Although the Site is near the Cobbossee Stream, climate change effects from rising sea level and changing flood zones are not anticipated to represent a major threat due to the significant rise/elevation between the stream bank and the Site. Therefore, the primary climate change concerns would be associated with extreme weather, increased rainfall, and rising groundwater tables. This remedial alternative meets the objectives associated with these criteria by removing impacted soils, which may come into contact with rain/stormwater. Because impacted soils may remain on-site (below the water table), rising groundwater tables have the potential to come into contact with impacted soils; however, the contaminants of concern are not expected to be significantly leachable, thus reducing potential groundwater impacts.

5.3.7 Preliminary Cost

The estimated costs associated with this remedial alternative are outlined in the attached Table 2 – Summary of Estimated Remediation Costs for Soil Removal Alternative. Capital costs include direct capital costs, such as materials and equipment, and indirect capital costs, such as engineering and sampling contingencies. The preliminary cost provided were developed to compare alternatives and should not be considered engineering cost estimates.

5.4 Selection of Proposed Remediation Alternative

Based on the results of the initial screening of each alternative as shown on Table 1 and discussed above, Alternative 3: Soil Removal Alternative has been selected as the preferred remediation alternative. This alternative was evaluated against the remedial objectives outlined in Section 5.0 and was determined to best fit the ranking alternatives outlined in Section 4.0 to promote redevelopment of the Site.

6.0 REMEDIAL ACTION PLAN

The Soil Removal Alternative was evaluated against the remedial objectives outlined in Section 5.0 and was determined to best fit the ranking alternatives outlined in Section 4.0 to promote redevelopment of the Site. Because this alternative meets the evaluation criteria and is not cost-prohibitive, this alternative has been selected for implementation at the Site for remediation of contaminated soils at the property. Remedial tasks proposed for completion at the Site are discussed below.

6.1 Soil Removal Alternative

Approximately 2,500 tons of soil are anticipated to be excavated and transported off-site for disposal at Hatch Hill Landfill in Augusta. Soils are anticipated to be repurposed as cover material at Hatch Hill Landfill.

Soils impacted with lead will be delineated in accordance with MEDEP Standard Operating Procedure (SOP) #RWM-DR-025 through use of an x-ray fluorescence (XRF) meter. Horizontal and vertical delineation of the lead-impacted sample location will occur to determine the extent of contamination and field , and confirm the removal of soils suitable for use as cover material at Hatch Hill. The excavation will be backfilled with clean materials to match existing grade. Soils 4 feet below ground surface (bgs) and lower will be screened in the immediate location of WC107 and extending outwards approximately halfway to the four nearest borings (WC104, WC105, WC106, and WC110). The approximate area of soils that are proposed to be screened is shown on Figure 1.

XRF field screening results will be compared using an additive 20 percent adjustment factor. Adjusted screening results will be compared to 100 mg/kg (i.e., the “20x Rule”: the lead concentration could theoretically exceed TCLP limits with a 20 times dilution). Soils with lead concentrations below 100 mg/kg will be transported to Hatch Hill to be used as cover material. If lead is detected at concentrations that exceed 100 mg/kg, soils will remain on-site and will be placed at depth beneath an appropriate cover system such as a building slab or paved parking area.

Visual or olfactory indication of petroleum contamination identified during excavation will be assessed by the field engineer and samples for laboratory analysis may be taken based on field screening results. If encountered, petroleum-saturated soil will be excavated, covered, and stockpiled on-site for additional waste characterization sampling.

6.2 Project Oversight

The remedial actions proposed in this plan will be coordinated with and conducted under the oversight of a qualified environmental professional (QEP). Department of Economic and Community Development (DECD) grant funds will be utilized to pay for the State of Maine $25 per ton tipping fees.

The selected QEP will observe the cleanup activities and conduct Site observations to monitor the cleanup contractor and document that work is conducted in accordance with the plans and applicable regulations and requirements. At the completion of the cleanup activities, the QEP will prepare a closure report detailing the remedial activities that occurred during the DECD Brownfields cleanup. An updated MEDEP VRAP Certificate of Completion is anticipated at the completion of this cleanup.

6.3 Green and Sustainable Remediation

U.S.EPA Region 1's Office of Site Remediation and Restoration is committed to using and promoting strategies and practices that reduce the environmental footprint during cleanup and restoration activities, to the extent feasible and consistent with applicable statutes, regulations and guidance, with the goal of minimizing total energy use, maximizing use of renewable energy, minimize air emissions and greenhouse gas generation, minimizing impacts to water resources, reusing/recycling materials and wastes, and minimizing adverse impacts to land and ecosystems.

For this project, we have proposed specific green remediation principles that will be incorporated into the cleanup process, as follows. This list is not intended to be a comprehensive list, but rather examples of typical actions that will be incorporated into the different phases of the cleanup project, as feasible.

- Contractors will be encouraged to use energy-efficient vehicles and construction equipment, use fuel-efficient/alternative fuel vehicles, maximize use of machinery equipped with advanced emission controls, and incorporate anti-idling policies. Contractors will be encouraged to use diesel engines that meet the most stringent U.S.EPA on-road emissions standards available upon time of project's implementation;
- Contractors will be encouraged to recycle disposal and cleanup byproducts to the highest extent, and the QEP will review disposal manifests to confirm recycling quantities. The contractor will be encouraged to seek disposal facilities with the closest proximity to the Site that still meet regulatory requirements;
- The project will be designed such that cleanup contractors can minimize the number of mobilizations to the Site; and
- Best management practices for erosion and stormwater management, dust control, and Site security will be incorporated into the design plans.

These green and sustainable measures will be tracked and reported by the QEP during cleanup activities.

7.0 SIGNATURE(S) OF ENVIRONMENTAL PROFESSIONAL(S)

The following SME personnel possess the sufficient training and experience necessary to conduct an Analysis of Brownfields Cleanup Alternatives, and from the information generated by such activities, have the ability to develop opinions and conclusions regarding remediation alternatives and a Conceptual Remedial Action Plan, as presented herein, for the Site.

Caitlin Keady
Environmental Engineer

Nicholas O. Sabatine, P.G.
Brownfields Program Lead

TABLES

SME
SEVEE & MAHER
ENGINEERS

TABLE 1 – SUMMARY OF THE EVALUATION AND COMPARISON OF REMEDIAL ALTERNATIVES
T.W. DICK
1 SUMMER STREET AND 2 & 12 HIGHLAND AVENUE
GARDINER, MAINE

Remedial Action Alternative (RAA)	Overall Protection of Human Health and the Environment	Technical Practicality	Ability to Implement	Reduction of Toxicity, Mobility and Volume	Short Term Effectiveness	Resiliency to Climate Change	Estimated Cost	Notes
1) No Action	• Not protective of human health and the environment and does not meet the threshold criteria	• Not Applicable	• Not Applicable	• No Reduction of Toxicity, Mobility and Volume	• Not Applicable	• Not Applicable	• Not Applicable	
2) Cover System Alternative	• This alternative provides protection of human health by mitigating the risk of human exposure to the petroleum-, PAH-, and/or heavy metals-impacted soils. • As part of this alternative, soils would be covered by an approved MEDEP cover system, most likely a combination of landscape cover systems, asphalt cover systems, and building foundation cover systems. • The existing EMMP will be implemented to minimize and manage future exposures to contaminated soils and groundwater during Site redevelopment.	• Cover system construction activities are relatively common construction practices. Contractors with this type of experience are readily available in the greater Gardiner area. This alternative supports the redevelopment of the Site. Therefore, this alternative is technically practical.	• This cleanup alternative is technically feasible and is a common approach for reducing human health exposure risks associated with impacted soils. Services and materials for this work are readily available in the greater Gardiner area.	• The implementation of a cover system over impacted soils would not reduce the toxicity, mobility and volume of these materials sine they would remain on Site; however, the cover system would mitigate exposure to these materials.	• The risk of exposure to impacted soils would be mitigated upon implementation of the cover system. The work described under this alternative could be performed on a relatively short timeframe, likely within a few months after mobilizing contractors. Long-term maintenance and monitoring of the condition of the cover system would be required as part of this alternative. Maintenance and monitoring activities are relatively easy to implement with a cover system maintenance plan.	• Although the Site is near the Cobbossee Stream, climate change effects from rising sea level and changing flood zones are not anticipated to represent a major threat due to the significant rise/elevation between the stream bank and the Site. • Because impacted soils would remain onsite, rising groundwater tables have the potential to come into contact with impacted soils.	• The estimated cost associated with this alternative is approximately $740,000. • Capital costs include direct capital costs, such as materials and equipment and maintenance; indirect capital costs include engineering and sampling. • These cost estimates are for budgetary purposes only and in no way should be construed as a cost proposal.	
3) Soil Removal Alternative	• This alternative provides adequate protection of human health and the environment through eliminating the risk of human exposure to the petroleum-, PAH- and/or heavy metals-impacted soils via soil removal activities. • The existing EMMP will be implemented to minimize and manage future exposures to contaminated soils (below the water table, if present) and groundwater during future Site excavations.	• Soil removal activities are technically practical. The removal of petroleum, PAH- and/or heavy metals-impacted soil could be completed utilizing accepted construction techniques. Both contractors and disposal facilities with experience with similar projects are readily available in the greater Gardiner area.	• This alternative is technically feasible and is an effective action for reducing the risk of human exposure. Services and materials necessary to conduct this alternative are readily available.	• This remediation alternative will achieve reduction in the mobility and volume of the impacted soils at the Site. The removal of impacted soils would reduce the risk of direct contact by future site occupants and construction workers.	• The risk of exposure to impacted soils would be eliminated upon abatement and removal activities. The work described under this alternative could be performed on a relatively short timeframe, likely within a few months after mobilizing contractors	• Although the Site is near the Cobbossee Stream, climate change effects from rising sea level and changing flood zones are not anticipated to represent a major threat due to the significant rise/elevation between the stream bank and the Site. • Because impacted soils may remain onsite (below the water table), rising groundwater tables have the potential to come into contact with impacted soils.	• The estimated cost associated with this alternative is approximately $600,000. • Capital costs include direct capital costs, such as materials and equipment, and indirect capital costs such as engineering and sampling. • These cost estimates are for budgetary purposes only and in no way should be construed as a cost proposal.	

Table 2: Summary of Estimated Remediation Costs
T.W. Dick Soil Cover System
1 Summer Street and 2 & 12 Highland Avenue
Gardiner, Maine

T.W. Dick Soil Cover System	Number	Units	Unit Cost	Total
Engineered Cover Systems				
Pavement Cover System	1,200	SY	$200	$240,000
Loam/Fill Cover System	1,000	SY	$20	$20,000
Building Cover System	800	SY	$250	$200,000
Erosion Control				
Erosion Control	1	LS	$5,000	$5,000
Vapor Mitigation System				
Design	1	LS	$20,000	$20,000
Soil Remediation Engineering Design/Oversight/Closure Report				
Cooperative Agreement	1	LS	$15,000	$15,000
Community Involvement Plan & Public Meetings	1	LS	$11,000	$11,000
Design, Bidding Documents & Cleanup Planning	1	LS	$25,000	$25,000
Cleanup Oversight	1	LS	$60,000	$60,000
Closure Reporting & Grant Closesout	1	LS	$25,000	$25,000
Subtotal				*$621,000*
Contingency 25% [2]				$116,250
TOTAL				$737,250

Assumptions and Footnotes:
1 - Engineering cost estimates based on recent comparable projects in Maine.
2 - Contingency does not include costs associated with Remediation Engineering Design/Oversight/Closure Report.

Table 3: Summary of Estimated Remediation Costs
T.W. Dick Soil Removal
1 Summer Street and 2 & 12 Highland Avenue
Gardiner, Maine

T.W. Dick Soil Removal	Number	Units	Unit Cost	Total
Soil Removal, Disposal, and Transportation				
Soil Removal	2,000	CY	$150	$300,000
Clean Fill	1,000	CY	$50	$50,000
Vapor Mitigation System				
Design	1	LS	$5,000	$5,000
Soil Remediation Engineering Design/Oversight/Closure Report				
Cooperative Agreement	1	LS	$15,000	$15,000
Community Involvement Plan & Public Meetings	1	LS	$11,000	$11,000
Design, Bidding Documents & Cleanup Planning	1	LS	$25,000	$25,000
Cleanup Oversight	1	LS	$75,000	$75,000
Closure Reporting & Grant Closesout	1	LS	$25,000	$25,000
Subtotal				*$506,000*
Contingency 25% [2]				$88,750
TOTAL				$594,750

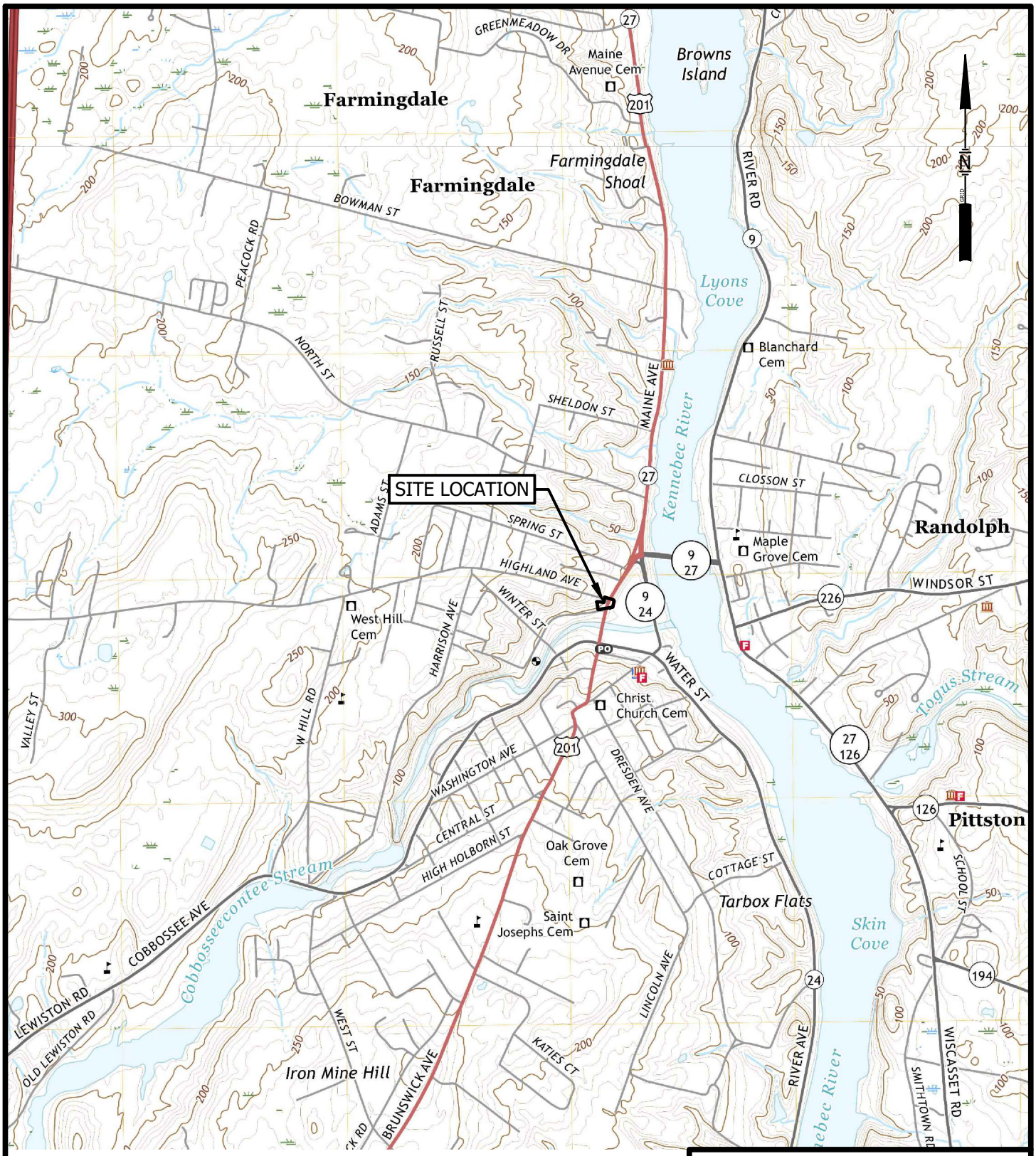
Assumptions and Footnotes:

1 - Engineering cost estimates based on recent comparable projects in Maine.

2 - Contingency does not include costs associated with Remediation Engineering Design/Oversight/Closure Report.

FIGURES

SME
SEVEE & MAHER
ENGINEERS



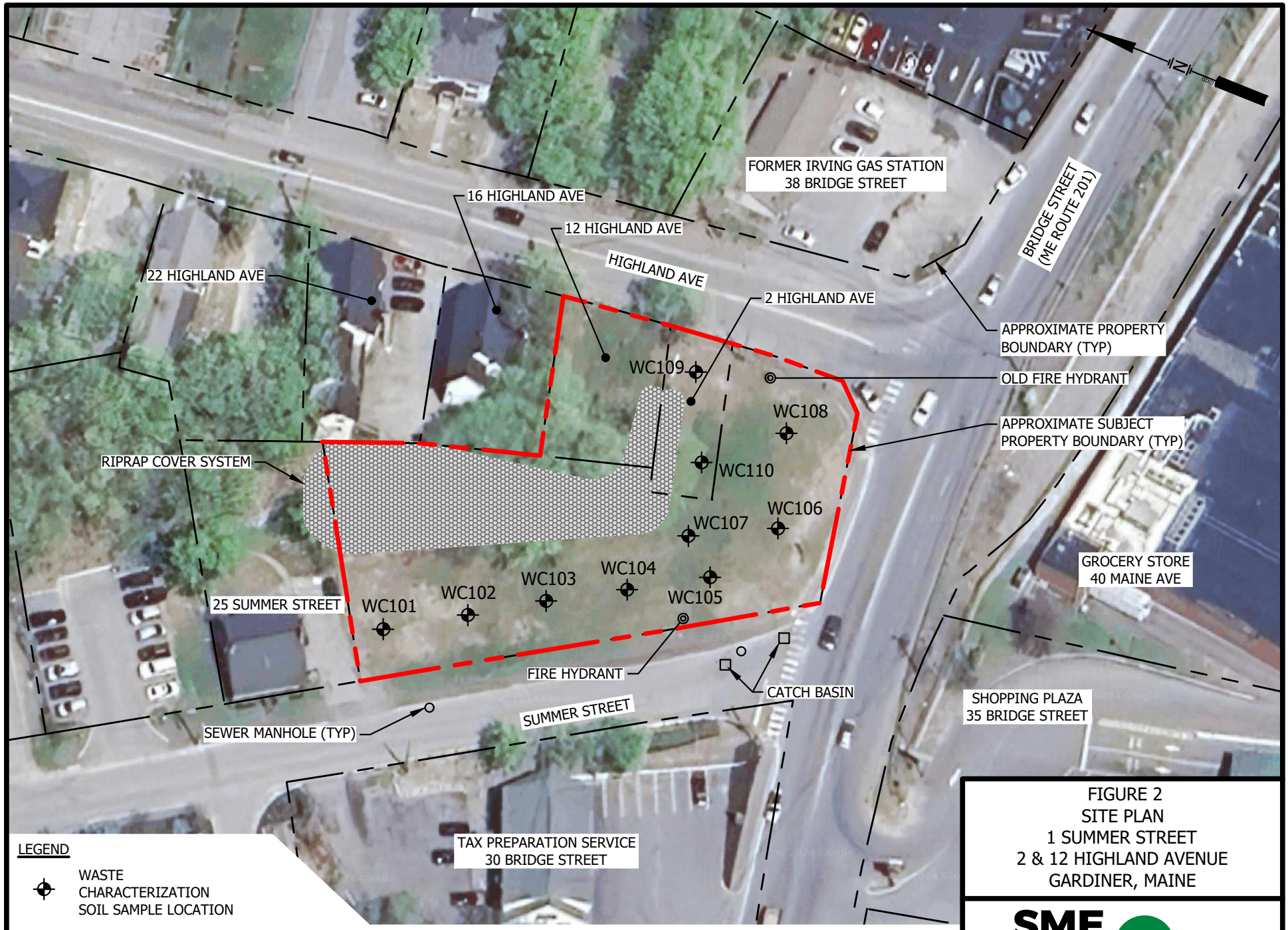
BASEMAP ADAPTED FROM 7.5 MIN USGS TOPO QUADS
GARDINER, MAINE - 2021

1000 0 2000 FEET

DWG: BASE LMN: USGS CTB: SME-STD.CTB REV: 6/20/2024

FIGURE 1
SITE LOCATION MAP
1 SUMMER STREET
2 & 12 HIGHLAND AVENUE
GARDINER, MAINE

SME
SEVEE & MAHER ENGINEERS



LEGEND

WASTE CHARACTERIZATION SOIL SAMPLE LOCATION

NOTE:
AERIAL IMAGE FROM GOOGLE EARTH DATED 5/7/2023

30 0 60 FEET

FIGURE 2
SITE PLAN
1 SUMMER STREET
2 & 12 HIGHLAND AVENUE
GARDINER, MAINE

SME
SEVEE & MAHER ENGINEERS

DWG: BASE LMN: WC SITE CTB: SME-STD.CTB REV: 11/26/2024

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