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DRAFT Analysis of Brownfields Cleanup Alternatives and Remedial Action Plan

Prime Tanning Facility Lots 4, 5, and 6
20 Sullivan Street
Berwick, Maine

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Town of Berwick
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Community Revitalization, Economic Development, Environmental Remediation & Engineering

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1. INTRODUCTION

Credere Associates, LLC (Credere) has prepared this Analysis of Brownfields Cleanup Alternatives and Remedial Action Plan (ABCA/RAP) for the Prime Tanning Facility Lots 4, 5, and 6 located at 20 Sullivan Street in the Town of Berwick, Maine (the Site). This document was prepared for the Town of Berwick using funding provided by three (3) EPA site-specific Brownfields Cleanup Grants (BF-00A00037-0). The following report provides a technical evaluation of remedial alternatives for addressing the identified environmental conditions at the Site and presents a work plan for implementing the selected remedial alternative.

1.1 PURPOSE AND SCOPE

The purpose of this report is to evaluate appropriate cleanup alternatives to mitigate identified environmental conditions at the Site, which have been identified through numerous environmental investigations and cleanup measures completed between 2007 and the present. These previous environmental investigations are described in detail in **Section 2**. Consistent with the findings of these environmental investigations, environmental conditions to be addressed at the Site include the following:

- Surficial and accessible soil across the Site containing concentrations of polycyclic aromatic hydrocarbons (PAHs) and lead exceeding applicable residential and/or commercial Maine Department of Environmental Protection (DEP) Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (RAGs).
- Buried solid waste fill materials identified across the Site including leather tannery scraps, wood chips, urban fill, ash/coal ash, and railroad ties. Contaminants associated with the fill materials include semi-volatile organic compounds (SVOCs) and metals.
- Methyl tert-butyl ether (MTBE), vinyl chloride, chromium, and naphthalene identified in groundwater on the Site exceeding applicable Maine Center for Disease Control (CDC) Maximum Exposure Guidelines (MEGs) for Drinking Water.
- Tetrachloroethylene (PCE), trichloroethylene (TCE), 1,3-butadiene, and chloroform identified in soil vapor at concentrations exceeding applicable residential and/or commercial soil gas targets (SGTs) across the southern and central portion of the Site.
- Asbestos-containing building materials (ACM) documented to be present on and in the buildings at the Site.
- Mercury containing fluorescent lighting, PCB-containing light ballasts, and other universal/hazardous or other regulated wastes present at the Site.

1.2 SITE DESCRIPTION

The 7.7-acre Prime Tanning facility is located at 20 Sullivan Street at the intersections of School Street (Route 9), Sullivan Street, and Wilson Street in the center of downtown Berwick, Maine. It is located within a mixed residential and commercial area of Berwick. The Prime Tanning facility is currently owned by the Town of Berwick and is identified as tax map U-4, lot 146, but was

subdivided in 2014 into 7 contiguous lots (Lots 1 through 7, see **Figure 2**). **The parcels covered by this ABCA/RAP only include Lots 4, 5, and 6 (2.9 acres).**

The Site (Lots 4, 5, and 6) is covered mostly by one mill building that was constructed over many years with numerous additions as well as several smaller out buildings. The Site building is currently unheated. Previous heat was provided via fuel oil fired steam boilers. Fuel oil was stored in aboveground storage tanks (ASTs), which were drained during closure of the facility. Water service is provided publicly by the municipal Berwick Water Department. Electrical service is provided by Central Maine Power.

Wastewater is not currently generated at the Site; however, the Site is connected to the Berwick Sewer District. Historically, process wastewater was discharged to Prime Tanning's pretreatment plant prior to being discharged to the municipal wastewater system. The pretreatment plant is located on an adjacent parcel (Lot 147) owned by the Town of Berwick. The pretreatment plant discharged to the adjacent wastewater pump station (Lot 148) owned by the Berwick Sewer District. The pretreatment plant operated from the 1970s to the facility closure in 2008. Prior to the 1970s, discharges were likely directly to the channelized stream that runs adjacent to the Site building, which discharges to the Salmon Falls River.

1.3 SITE HISTORY

Various manufacturing operations occurred at the Site from 1877 to 1930 including a tannery, wool pulling works facility, a sash and door manufacturer, a reed manufacturer, a carriage manufacturer, an oil company, a laundry facility, a shoe factory, and a lumber company. Tannery operations occurred at the Site from approximately 1930 until 2008 when the mill closed and the Prime Tanning owners filed for bankruptcy protection. In 2014, the Town of Berwick acquired the Prime Tanning property for back property taxes.

1.4 PROPOSED REUSE

The current redevelopment plans for the Prime Tanning Facility involves the redevelopment of some portions of the buildings and demolition of others. The proposed redevelopment includes the following:

Lot 1 (69,041 total square feet [ft^2])	31,000 ft^2 light industrial (reuse of existing building) 8,000 ft^2 office (reuse of existing building)
Lot 2 (90,491 total ft^2)	42,500 ft^2 light industrial (reuse of existing building)
Lot 3 (33,503 total ft^2)	79,000 ft^2 3-story mixed use retail and residential (new construction)
Lot 4 (69,630 total ft^2)	69,000 ft^2 “Main Street” and parking area (new construction)
Lot 5 (18,708 total ft^2)	8,500 ft^2 convenience retail (new construction)
Lot 6 (39,011 total ft^2)	39,000 ft^2 greenspace and trail (new construction)
Lot 7 (21,654 total ft^2)	52,000 ft^2 3-story mixed retail and residential (reuse and new construction)

2. SUMMARY OF PREVIOUS INVESTIGATIONS

The follow are summaries of prior environmental reports completed for the Site. Please note that these investigations focused on the larger 7.7-acre parcel as well as three (3) adjoining parcels to the north and northwest. **Only information pertaining to the Site (lots 4, 5, and 6) is summarized below.**

Secondary Sourced Hazardous Waste Documents, 1985-1997

The following summary of pertinent environmental information from 1985 through 1997 was obtained from Ransom Environmental Consultant, Inc.'s (Ransom's) June 14, 2010, Environmental Site Assessment (ESA) for the Site:

On June 21, 1985, Maine DEP inspected the Prime Tanning facility for hazardous waste and associated violations. Improper storage area sizes, labeling, training plans, and contingency plans were identified as violations. A shut-off gate valve was installed for closure whenever chemicals or hazardous materials were handled at the facility; however, as a result of improper use, releases continued to occur to the Salmon Falls River. As a result of identified violations and continued discharges to the Salmon Falls River, a 1988 Administrative Consent Agreement and Enforcement Order required the installation of corrosion resistant tanks, restricting the unloading area at the facility, the completion of employee training, and sealing a floor drain. Prime Tanning agreed to prepare a contingency plan for the Site to address the new requirements and avoid future violations. However, a subsequent DEP inspection on November 18, 1994, identified omissions from the contingency plan, improper spill containment, and improper labeling of hazardous waste as violations.

Additionally, Summit Environmental Consultants, Inc. (Summit) prepared closure documentation for removal of a 5,000-gallon mineral spirits and non-halogenated solvent hazardous waste storage tank from the Neutralization Plant that was used between 1986 and 1997.

Phase I ESA, ENSR Corp. (ENSR), October 2007

ENSR prepared a Phase I ESA for the Prime Tanning Facility on behalf of Meriturn Partners and identified the following recognized environmental conditions (RECs):

- Former tannery operations that likely included the use and disposal of oils, solvents, chromium solutions, and wastewater; as well as the potential burial of waste hide (leather) scraps
- Potential use and disposal of petroleum or dry-cleaning chemicals associated with a former oil company and laundry facility
- Potential release of petroleum from six underground storage tanks (USTs, four (4) fuel oil, one (1) diesel, one (1) gasoline) removed from the Site with little or no documentation about conditions or closure
- Likely industrial and sanitary discharge from the Site to the Salmon Falls River prior to connection to the municipal sewer in 1970

Secondary Sourced Hazardous Waste Documents and RCRA Closure, 2008-2010

The following summary of pertinent environmental information regarding the Site from 2008 through 2010 was obtained from Ransom's June 14, 2010, ESA for the Site:

On September 10, 2008, Prime Tanning notified Maine DEP of their intention to close out their Large-Quantity Generator status in conjunction with closure of the Berwick, Maine, facility. The facility formerly generated D001 ignitable wastes derived from mineral spirits and D007 chromium wastes. The letter documented 33 spills of hazardous and non-hazardous materials to the Site between 1983 and 2008, and the locations of hazardous waste storage and accumulation areas.

Tewhey Associates prepared a Hazardous Waste Closure Plan that outlined steps for closure of the Berwick facility in November 2008 in accordance with Maine DEP Chapter 851, Section 11. Per the plan, Maine DEP RAGs were to be used as cleanup goals during Site closure certification. Remedial actions included cleaning the internal floor trench system, assessment and remediation of the hazardous waste storage and satellite accumulation areas, testing and remediation of the dye/dry weigh up rooms, shutdown and remediation of the wastewater treatment plant (located off-Site), locating and properly disposing of leather residue, completing an inventory, proper documentation, and shipment of remaining chemicals and chemical waste, and conducting a historical assessment and interviews.

Maine DEP provided conditional approval of the plan on November 20, 2008, particularly highlighting the need to remove all leather waste from the Site. To address DEP's conditions, subsequent plan addendums indicated, per interviews, waste material was not intentionally disposed onsite but were temporarily stored south of Wilson Street with a gravel fill cover (Addendum No. 1); and test pitting was proposed for additional investigation (Addendum No. 2).

Tewhey Associates prepared a Test Pit Program at Prime Tanning Berwick letter report date February 16, 2009. The report indicated leather scraps were identified in test pits excavated north of the main facility along Wilson Street (Lots 1 and 2). Based on these results and the need for removal of the observed leather wastes, Addendum No. 3 recommended further delineation of leather wastes.

A Follow-up Test Pit Program letter report dated April 8, 2009, indicated an approximately 6-inch layer of dark-brown to black leather waste at a depth of 2.5 feet below ground surface (bgs) underlain by clay was identified on the northern portion of the Prime Tanning Facility along Wilson Street (Lots 1 and 2). Leather waste was estimated to be approximately 200 cubic yards in an 800-square yard area. Removal of the overlying 2.5 feet of sand, removal and offsite disposal of the leather waste, and backfilling with sand and additional fill, as necessary, was recommended.

On April 22 to 23, 2009, approximately 400 tons of leather debris was removed from the parking lot north of the main facility. After this removal action, the RCRA Closure Certification was submitted to Maine DEP in May 2009. The report documented chemicals formerly used at the

Site, disposal of hazardous and universal wastes, remediation and cleaning of the floor drain system, cleaning the treatment plant pipelines, emptying ASTs, disposal of leather scraps, and consolidating machinery and unused chemicals to the Prime Tanning's Hartland, Maine, facility. As of June 2010, Maine DEP indicated closure activities appeared to have met closure requirements.

Phase I ESA, Ransom, June 14, 2010

Ransom prepared a Phase I ESA for Southern Maine Regional Planning Commission (SMRPC) on behalf of Prime Tanning Co. Inc. and identified the following RECs and other environmental concerns for the Site:

- Former tannery operations including documented use and release of oils and hazardous materials at the Site including observed oil and chemical staining throughout the facility
- Former use of portions of the Site by an oil company and laundry facility, and potential use, storage and disposal of petroleum or dry-cleaning chemicals
- Historical generation, storage, and releases of hazardous materials at the Site that may have impacted soil, soil vapor, and/or groundwater
- The lack of information available about conditions or closure of diesel or fuel oil USTs, and potential release of petroleum from these former USTs
- Documented buried leather debris (hides) identified on the Site and the unknown construction history of the Site buildings indicate hides, leather scraps, construction/demolition debris, or other solid waste may have been buried at the Site
- Use, storage and potential releases of oil and/or hazardous materials associated with historical occupation by a shoe factory and lumber company
- Unknowns associated with the former garage in the northwest portion of the Site
- Historical uses of adjacent and upgradient properties including industrial uses may have impacted environmental conditions at the Site
- Potential release to soil and groundwater as evidence by oil and chemical staining throughout the tannery facility

Additionally, the following non-scope items were identified in the Phase I ESA:

- Suspect ACM, PCB-containing building materials, and lead-based paint (LBP) observed in/on the Site buildings

PCB Caulk Screen, Summit, August 26, 2010

Summit collected ten (10) samples of caulking associated with exterior wall and window systems and submitted them for PCB analysis. No PCBs were detected above the laboratory reporting limits in the ten caulking samples.

Asbestos Identification Survey, Summit, September 1, 2010

Summit collected samples of suspect ACM throughout the Prime Tanning buildings. Asbestos was identified in the following:

- Pipe insulation and mudded fittings
- Water tank insulation
- Transite wall board
- 9 inch by 9 inch green floor tile and associated mastic
- Refractory mud in boilers
- Gray asphalt siding on interior walls
- Lab table (assumed)
- Various roofing materials on 20 different roof areas
- Various asphalt sidings on exterior walls
- Black tank flashing

Phase II ESA, St. Germain-Collins (SGC), October 15, 2010

Based on previous Phase I ESA findings and conclusions, SGC identified six Areas of Concern (AOC) for the Prime Tanning Facility, as follows:

- AOC 1 – Tannery South (including Lots 5 and 6)
- AOC 2 – Tannery Central (including Lots 4 and 5)
- AOC 3 – Tannery North (Lot 1, 2 and 3)
- AOC 4 – Lot 133 (offsite parking lot)
- AOC 5 – Lot 95 (offsite former residential lot)
- AOC 6 – Lot 130 (offsite warehouse)

Contaminants of concern for the investigation were petroleum hydrocarbons, solvents, metals, PAHs, and PCBs. SGC collected soil vapor, soil, and ground water samples for analysis. Based on results SGC concluded the following:

- Vapor intrusion is a concern based on the detection of 1,3-butadiene, PCE and chloroform exceeding the residential and commercial SGTs in AOC 1 and AOC 2.
- Soil across the Site contained leather, brick, wood and metal debris.
- PAHs were detected in AOCs 1, 3, 4, and 6; however, results were considered representative of the urban environment.
- Lead results exceeded the residential and commercial RAGs in AOCs 1, 3, and 4.

- MTBE, vinyl chloride, chromium, and naphthalene were detected in groundwater in AOCs 1, 2, and 3 exceeding the Maximum Exposure Guidelines (MEGs). These compounds were not found in soil gas samples collected from the Site; therefore, were not considered to have an exposure pathway.
- Due to Site limitations, soil and groundwater was not assessed in areas beneath the Site buildings.

Maine DEP VRAP No-Action Assurance Letter, December 3, 2010

Maine DEP issued a No Action Assurance Letter on December 3, 2010, under their Voluntary Response Action Program (VRAP). This letter releases the VRAP applicants and future owner from certain environmental liabilities under the following conditions:

- A Soil Management Plan (SMP) to include/address worker health and safety issues, and the disposal, recycling/reuse and/or appropriate cover of contaminated soil or waste materials such as buried leather scrap, must be developed and the approved by Maine DEP prior to excavation and/or building foundation/slap demolition work in Areas 1, 2, 3, & 6. (An appropriate cover system must consist of a cover/marker layer and at least 12" of clean fill or a DEP-approved impervious layer over the area of concern).
- For soil excavation and/or building foundation slab demolition/removal activities planned for AOCs 1, 2, 3, & 6, the Department must be notified beforehand. Exposed soils must be inspected by a qualified environmental professional for evidence of release (e.g. staining, odor, etc.), especially near the floor drains and other conduits that penetrate the foundation. If contamination is suspected or confirmed, Maine DEP should be notified, and additional sampling, characterization, and remediation activities (removal/disposal, cover, deed restrictions, etc.) may be necessary. Plans for such activities should also be approved by Maine DEP beforehand.
- Groundwater extraction shall be prohibited without the written permission of the VRAP. It is understood that public water will be supplied to the property if future redevelopment requires water.
- If a new building(s) is planned to be constructed in AOC 1, 2, 3, then a vapor management system to prevent the potential migration of petroleum and VOC vapors into the structure, must be developed and approved by the Department. Plans for such system must be developed and stamped by a Maine Certified Professional Engineer. If existing building are to remain in place, indoor air quality sampling must be conducted and results must comply with current appropriate regulatory guidelines/standards for the proposed reuse of the building. If indoor air samples do not meet appropriate regulatory guidelines, a remedial plan must be submitted to the VRAP for review and approval and remedial measure must be implemented prior to Commencing use of such building for the intended purpose.
- Additional investigation is necessary to determine if the PCE contamination detected onsite is migrating offsite and impacting receptors.
- Additional investigation and remediation may be necessary for the property to be used for residential use.

- If building demolition/renovation activities are to be conducted onsite, building construction materials must be handled and disposed of appropriately (i.e., asbestos containing materials, etc.).
- A Declaration of Environmental Covenants consistent with the final Certificate of Completion or No Further Action letter that is acceptable to the Department, must be prepared and recorded at the York County Registry of Deeds. A copy of the recorded final DEP letter and DEC document must be supplied to the Department.

Preliminary Feasibility Study, Summit, January 6, 2011

Based on previous Phase I and Phase II ESA findings and conclusions and the past uses of different areas of the Prime Tanning Facility, Summit identified areas beneath the building slabs with varying levels of potential for soil contamination. Summit then evaluated two remedial alternatives for contaminated soil at the Site after potential removal of buildings, building slabs, and foundations at the Site. These options included:

- Option 1: Cover Entire Site: This option included covering the entire Site with a marker layer over the exposed soil surface, and placement/compaction of a 12-inch soil cover, which Summit estimated to cost $312,000.
- Option 2: Cover Areas with a Higher Potential for Soil Contamination: This option included covering those areas of Site identified with "medium to high" potential for subsurface contamination, as described above. This option was estimated to cost $228,000.

Supplemental Site Investigation, SGC, January 18, 2011

Based on previous Phase II ESA findings, SGC performed an additional investigation to clarify the extent of PCE in soil vapor that was identified on the southern end of the Site. The results indicated PCE and/or TCE exceeded residential and/or commercial SGTs in 5 locations across the southern half of the Site. These and/or other VOCs were detected in soil gas below applicable SGTs at all other locations sampled on the Site. SGC concluded a PCE source area appeared to be beneath the main tannery complex, including the Site. SGC recommended additional characterization of VOCs in soil gas.

Phase I ESA and Phase I ESA Update, SGC, May 25, 2012, and August 9, 2013, respectively

SGC completed a Phase I ESA on May 25, 2012 on behalf of Verrill Dana. The report was updated after a period of 180 days on August 9, 2013. The Phase I ESAs identified the following RECs:

- The presence of heavy chemical and oil staining in the main tannery building, in proximity to trench drains whose connection to the sewer system could not be confirmed
- The long history of the Site as a tannery, involving the storage, use, and possible release of petroleum products and hazardous substances
- The detection of soil, groundwater, and soil vapor contamination on the Site
- Government spill reports documenting petroleum and chemical releases

3. UPDATED CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) was developed using the findings of the previous investigations and will be updated in subsequent reports as new information becomes available. This CSM includes a description of the physical setting of the Site, Contaminants of Concern (COCs), nature and extent of contamination, exposure pathways, and potential human and environmental receptors.

3.1 SITE DESCRIPTION

A detailed Site description consisting of Site use, Site location as depicted on **Figure 1**, and Site utilities is included in **Section 1.2**.

3.2 SITE HISTORY

A description of Site history as it relates to current environmental conditions at the Site is included in **Section 1.3**.

3.3 PHYSICAL SETTING

Topography

According to the United States Geological Survey (USGS) Topographic Map of the Somersworth Quadrangle, Maine, topography at the Site is generally gently sloping to the southwest towards the Salmon Falls River. An excerpt from this map is included as **Figure 1**.

Geological Characteristics

Surficial Geology

According to the Maine Geological Survey (MGS) Surficial Geology map of the Somersworth Quadrangle, Maine, the Site is mapped as glacial till consisting of silt, clay, sand and gravel of variable composition. Soil borings from previous investigations indicate that surficial geology is layered sand, silty sand, and clay deposits. Artificial fill including leather scraps, metal, glass, and rubble were also identified on the Site.

Bedrock Geology

According to the MGS Bedrock Geology of the Somersworth Quadrangle, Maine, map, bedrock beneath the Site consists of Silurian feldspathic quartz-biotite granofels, calc-silicate granofels and subordinate quartz-biotite schist of the Berwick Formation. During drilling of soil borings and excavation of test pits across the Site, refusal indicating possible bedrock was encountered at 4 to 12 feet, although some locations went to up to 20 feet bgs without refusal.

Hydrology

Surface water at the Site drains to municipal storm drains that discharge to the Salmon Falls River (approximately 200 feet to the south) or to a channelized stream that runs across the Site and

discharges to the Salmon Falls River. The Salmon Falls River flows to the southeast and discharges to Piscataqua River and then to the Atlantic Ocean.

Previous investigation identified depths to groundwater across the Site ranging from approximately 3 to 6 feet bgs. Groundwater at the Site flows south towards the Salmon Falls River.

Changing Climate Concerns

Based on the National Oceanic and Atmospheric Administration (NOAA) interactive map of Sea Level Rise and Coastal Flooding Impacts (http:/coast.noaa.gov/slr/viewer/), sea level rise of up to 6 feet and associated increased coastal flooding is not expected to impact the Site.

The Site is located within 250-feet of the Salmon Falls River. According to FEMA Flood Zone Map 2301440006B, the southern tip of the Site is located within Zone AE, where base flood elevations have been determined during inundation by a 100 year flood; however, the majority of the Site is within zone X, which have been determined to be outside the 500 year flood plain. Greater storm frequency and intensity in a changing climate may result in more frequent high water levels and more frequent flooding of the southern portion of the Site. Increased frequency of extreme weather events may also impact exterior portions of the Site, and may results in increased erosion of improperly stabilized surface soil.

Based on the nature of the contaminants at the Site, a changing groundwater level may impact exposure to certain contaminants at the Site due to the changing distance between the water table and Site foundations.

Based on the nature of the proposed reuse of the Site, changing temperature, wildfires, changing dates of ground thaw/freezing, changing ecological zone, and saltwater intrusion table are not likely to effect the Site.

3.4 SOURCE AREAS & CURRENT COCS

Source Areas

Specific sources areas have not been identified at the Site to date; however, surface soil impacts appear ubiquitous across the Site. Buried leather waste and hides have previously been documented to contain COCs and are known to be present in the subsurface, and and partial remediation of leather waste has occurred in the northern portion of the Site. SGC speculated a VOC source area may be present beneath the main tannery building.

The Site buildings are also a source area for hazardous building materials.

COCs

Based on the identified source areas and previous environmental investigations, the following are COCs for the Site:

- PAHs including benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and/or indeno(1,2,3-cd)pyrene) exceeding applicable residential and commercial RAGs
- Lead exceeding applicable residential and/or commercial RAGs
- Chromium associated with subsurface tannery/leather waste
- PCE and TCE soil gas concentrations exceeding residential and/or commercial SGTs and other VOCs in soil gas
- MTBE, vinyl chloride, chromium, and naphthalene in groundwater
- Asbestos in Site building components
- Lead in lead-paint coated surfaces
- PCBs in certain untested building materials (e.g., paints and light ballasts)
- Mercury and/or PCBs in certain universal wastes

3.5 NATURE AND EXTENT OF CONTAMINATION

PAHs and lead in surface and accessible soil were identified throughout the Site, and surface soil in all areas of the Site are conservatively considered to contain these COCs above applicable residential and/or commercial RAGs.

VOCs, SVOCs, PAHs, dioxin, and metals are associated with buried hides and other solid wastes including wood chips, urban fill, ash/coal ash, railroad ties, and leather tannery scraps in numerous areas of the Site. Hides have previously been remediated from the northern parking lot portion of the tannery facility, but were also documented on other areas. The lateral extent on other areas of the Site, including beneath the Site building, is not fully known and is considered a data gap, but will be delineated prior to remediation.

Chromium and naphthalene in groundwater were identified above applicable standards in the northern portion of the Site. MTBE was identified above applicable standards in groundwater in two locations across the southern and central portion of the Site. Vinyl chloride was identified above applicable standards in groundwater at GW-108 on the central portion of the Site. Based on limited groundwater data and limitations associated with Site building locations, the extent of these impacts and possible sources have not been well assessed. Based on the lack of continuity of detections of these compounds across the Site, the COCs are likely localized to near the wells. This was not assessed further as the Site is serviced by public potable water. Potential source areas beneath the Site building are a data gap, and will be further characterized prior to remediation.

PCE, TCE, 1,3-butadiene, and chloroform were identified in soil vapor on the Site at concentrations exceeding applicable residential and/or commercial SGTs across the southern half of the Site. Other VOCs were detected in soil gas below applicable SGTs at all locations previously sampled on the Site. The extent and source of VOCs in soil gas has not be fully characterized; however, SGC speculated the source appeared to be beneath the main tannery building. Potential source areas beneath the Site building are a data gap, and will be characterized prior to remediation. Since groundwater does not appear to be impacted by these compounds, the source is presumed to be contained to soil; however, in a changing climate a rising water table may come into contact with contaminated soil., thereby mobilizing the compounds to groundwater and possibly increasing indoor air concentrations.

ACM were identified throughout the Site building, including pipe insulation, cement board, tank insulation, floor tiles and associated mastic, mudded boiler insulation, asphalt siding on interior and exterior walls, a lab table, and most roof areas of the Site buildings.

The quantity of universal/hazardous or other regulated wastes in the Site building has not been fully characterized and will be further characterized prior to remediation.

3.6 EXPOSURE PATHWAYS AND POTENTIAL RECEPTORS

Exposure pathways describe how a human or environmental receptor comes into contact with contaminants that may be present at the Site. Potential migration pathways through groundwater, surface water, air, soils, sediments, and biota were considered for each COC and each source. A migration pathway is considered an exposure pathway if there is a mechanism of contaminant release from primary or secondary sources, a transport medium, and a point of potential contact with receptors. Both current and potential future releases and migration pathways to receptors are considered. Exposure pathways presented in the CSM include the following:

Inhalation:	This pathway is primarily associated with soil or groundwater contamination within 30 (petroleum volatiles) to 100 (non-petroleum volatiles) feet of an occupied structure or preferential pathway. This pathway is applicable when receptors may inhale impacted media in the form of contaminated vapor. This pathway is also applicable when contaminated soil and/or groundwater are exposed via an excavation.
Dermal Absorption:	Exposure via dermal absorption occurs when receptors are exposed to chemical concentrations present in soil, groundwater, surface water, or hazardous building materials through direct contact with the skin.
Active Ingestion:	The active ingestion pathway represents exposure which may occur through the active ingestion of contaminant concentrations via a drinking water supply well, through agricultural products, or through direct consumption of soil (e.g., typically by children or improper hygiene/health and safety of soil workers).
Incidental Uptake:	This pathway is applicable when receptors may incidentally inhale or ingest impacted media in the form of contaminated dust, soil, chips, or airborne asbestos fibers.

Potential Receptors are categorized by duration of exposure and intensity of use at the Site. The receptor categories described in the CSM include the following:

Resident:	The residential receptor is defined by high durational exposure and high intensity usage which may occur through gardening, digging, and recreational sports. This group includes the occupants of a residential property or a residential neighborhood, or a daycare.
Commercial Workers:	Commercial receptors are those that are present at the Site for long durations but with low intensity exposure such as indoor office workers.
Excavation or Construction Worker:	Excavation or construction workers are present at the Site for short durations though intensity of use is high, such as during non-routine activities including construction or utility work. Examples include utility and construction contractors and landscapers.
Recreational or Park User:	Park users are characterized by low duration, i.e. less than two hours per day, and low intensity usage such as that which would occur during activities such as walking, shopping, and bird watching. For this project, this receptor class would apply to visitors to the Site and patrons of the restaurants, hotel, or other future commercial businesses at the Site.

3.7 CONCEPTUAL SITE MODEL SUMMARY

The COCs associated with contaminated soil and fill materials have the potential to impact future excavation/construction workers during the redevelopment, and future residents, park users, and commercial workers after redevelopment if the soil is not remediated appropriately. The potential exposure pathways to impacted soil are dermal absorption through contact with impacted media, active ingestion through consumption of impacted media (typically by children or soil workers), and incidental uptake of airborne soil particles that have migrated due to soil disturbance and wind erosion.

The COCs associated with contaminated groundwater have the potential to impact future excavation/construction workers during the redevelopment. The potential exposure pathways to impacted groundwater would be dermal absorption through contact with impacted media or inhalation of vapors from volatile COCs.

Volatile COCs in soil vapor on the Site could impact future residents, park users, and commercial workers after redevelopment via intrusions of vapor into indoor spaces and inhalation of volatile COCs.

If hazardous building materials (HBM, i.e., asbestos, lead paint, PCBs) are not properly addressed during redevelopment, primary impacted media would include indoor air, and interior and exterior surfaces. The COCs associated with these items have the potential to impact future residents, park users, commercial workers, and construction workers. The potential exposure pathways to HBM are dermal absorption through contact with impacted media, active ingestion through consumption

of impacted media (typically by children or soil workers), and incidental uptake of residual airborne particles or dust.

4. CLEANUP GOALS AND APPLICABLE GUIDELINES

The goal relative to the identified COCs is to eliminate or manage the risks to human health and the environment through proper abatement, management, mitigation, and/or disposal of identified COCs. To achieve this objective, the following cleanup goals or regulatory standards or guidelines will be applicable to the cleanup:

Soil, Groundwater and Indoor Air

The remediation goal for the impacted soil and fill materials on the exterior of the Site and likely beneath the Site buildings is to eliminate exposure to excavation/construction workers during the redevelopment and future residents, recreational/park users, and commercial workers after redevelopment. Remediation will be considered complete when the exposure pathways are reduced/eliminated such that exposure to the COCs are below the Maine DEP RAGs for the residential use scenario, which are the lowest values of the applicable RAGs. Soil and groundwater concentrations may not be reduced to below the RAGs; however, residual concentrations remaining at the Site will be protected from human contact by a means of exposure prevention. Regardless of soil and groundwater concentrations, remediation cannot be considered complete until indoor air concentrations are below the Maine DEP Indoor Air RAGs.

Based on the results of the previous investigations, excess soil generated under the selected alternative that cannot be reused onsite would be considered special waste. If excess soil is, generated, it will be disposed offsite at an appropriately licensed landfill or recycling facility. Offsite disposal will be done in accordance with Maine DEP Chapter 400 – Solid Waste Management.

Asbestos Containing Materials

Construction work involving exposure or potential exposure to any concentration of asbestos is regulated by OSHA 29 CFR 1910. The cleanup goal for ACM is any ACM to be impacted by renovation or demolition activities be properly removed prior to these activities to eliminate exposure to excavation/construction workers during the redevelopment and future residents, recreational/park users, and commercial workers after redevelopment. Post renovation conditions at the Site should be safe for reoccupancy as defined in Maine DEP Chapter 425: Asbestos Management Regulations (Chapter 425). Proper removal of ACM to be impacted by renovation or demolition activities in accordance with Chapter 425 is crucial to achieving this goal. Asbestos removal, handling, and oversight will be conducted by appropriately trained and certified personnel. Project monitoring and confirmatory air sampling will be conducted by a third party Maine DEP certified asbestos air monitor.

Lead Paint and PCB-Containing Building Materials

If lead paint or PCB containing materials are identified, building materials waste generated under the selected alternative that cannot be reused onsite would be considered special waste and will be disposed offsite at an appropriately licensed landfill or recycling facility. Offsite disposal will be done in accordance with Maine DEP Chapter 400 – Solid Waste Management.

If materials with PCB concentrations are identified that would be characterized as PCB Bulk Product Waste according to 40 CFR 761, then these materials would need to be fully characterized and removed and disposed in accordance with 40 CFR 761.

Universal and Other Regulated Wastes, Including Storage Tanks

Materials that would be characterized as universal, hazardous, or other regulated waste materials, including fluorescent light bulbs and ballasts, drums and other containers of waste, storage tanks, out-of-service transformers, and out-of-service boilers will be removed from service during the proposed redevelopment activities. As such, the goal of the remediation is to properly manage and dispose of universal, hazardous, or otherwise regulated waste materials in such a way as to prevent a release. Universal or other regulated waste will be identified and managed in accordance with Maine Hazardous Waste Management Regulations - Chapters 850 through 857, 49 CFR 100-199 - Transportation of Hazardous Materials, and 40 CFR 256 – Guidelines for Development and Implementation of State Solid Waste Management Plans.

5. PRESUMPTIVE REMEDIAL MEASURES

Each of the previous investigations at the Site indicated that environmental impacts and potential source areas of contamination under the current Site buildings are likely and are currently a data gap required to be assessed under the Maine DEP VRAP NAAL. The successful redevelopment of the Site is contingent on assessing and addressing environmental contamination in these unassessed areas. Therefore, the Site buildings will be abated and removed as presumptive remedial measures, as this is the only option that allows the characterization and remediation of source areas under the existing buildings. Based on this, the following items are considered presumptive remedial measures.

Asbestos

Full removal and proper disposal of asbestos in the Site buildings is considered presumptive because this must occur before removal of the Site buildings to allow the characterization and remediation of soil source areas under the existing buildings.

Universal and Other Regulated Wastes

Full removal and proper disposal of universal or other regulated waste in the Site buildings is considered presumptive because this must occur before removal of the Site buildings to allow the characterization and remediation of soil source areas under the existing buildings.

Building Removal

Removal and proper disposal of the Site buildings is considered presumptive because this must occur to allow the characterization and remediation of soil source areas under the existing buildings.

6. DESCRIPTION OF REMEDIAL ALTERNATIVES

The remedial actions selected for the Site should minimize the potential for human exposure and/or improper disposal of COCs at the Site. Multiple remedial alternatives are available to address the identified COCs at the Site. However, based on past experience at sites with similar contaminants and conditions, alternatives were pre-screened for general advantages and disadvantages and the following four (4) remedial alternatives were selected for further evaluation and comparison:

- Alternative #1 – No Action
- Alternative #2 – VOC Source Removal and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls
- Alternative #3 – VOC Soil Treatment and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls
- Alternative #4 - Complete Removal and Disposal of Soil, Vapor Intrusion Mitigation, and Institutional Controls

These remedial alternatives were evaluated for implementation at the Site and are further discussed in the following sub-sections.

6.1 ALTERNATIVE #1 - NO ACTION ALTERNATIVE

A "No Action" alternative signifies that no remediation activities would be implemented at the Site. The "No Action" alternative does not include a means for mitigating or eliminating potential exposure to impacted soil/fill, soil vapor, or groundwater both during and following redevelopment. Therefore, the potential for human exposure continues to exist for future residents, excavation/construction workers, commercial workers, and recreational/park users. This alternative is presented and discussed through the subsequent portions of this report as a baseline comparison, and represents the existing conditions at the Site.

6.2 ALTERNATIVE #2 – VOC SOURCE REMOVAL AND SOIL COVERING, VAPOR INTRUSION MITIGATION, AND INSTITUTIONAL CONTROLS

Under this alternative, contaminated soil/fill located on the Site exterior and beneath the current Site building would be managed as needed during the redevelopment. This would include additional investigation and identification of source areas for excavation and removal of VOC soil source areas of contamination (saturated petroleum soil or VOC sources), excavation and removal of other contaminated Site soil or buried solid waste fill as needed to facilitate components of the redevelopment, and proper offsite disposal of contaminated soil/fill that cannot be reused onsite.

PAH and metals impacted soil/fill that can be reused onsite would be covered with an engineered barrier system. The engineered barrier systems would include the following designs:

- Installation of asphalt or concrete parking areas, sidewalks, foundations, patios, etc. with appropriate top course and sub-base materials

- Two (2) feet of clean fill materials with no marker layer OR 1 foot of clean fill materials over a marker layer in landscaped areas (lawn areas, planting beds, paver-stone patios)

To address residual chlorinated solvent vapors, new buildings intended for human occupation built on the Site will be constructed with a vapor intrusion mitigation system to address any residual volatiles in the subsurface. This systems will include one of the following:

- Passive Vapor Intrusion Mitigation Methods:
  - Installing a passive venting layer beneath new building consisting of granular material and perforated piping, which vents vapors above the roof line. This will be used in conjunction with a vapor barrier.

- Active Vapor Intrusion Mitigation Methods:
  - Sub-slab depressurization by installing granular material and perforated piping beneath new foundations and connecting an electric fan to the piping to keep the sub-slab air pressure lower than the building interior air pressure and prevent vapors from moving into the building. This will be used in conjunction with a vapor barrier.

  - Building over-pressurization by adjusting the building's heating, ventilation, and air-conditioning system to increase the pressure indoors relative to the sub-slab area. This method is typically used for office buildings and other large structures. This will be used in conjunction with a vapor barrier.

In addition to limited soil removal, installation of an engineered barrier, and use of vapor intrusion mitigation techniques, institutional controls would be implemented at the Site through a Declaration of Environmental Covenant (DEC) consistent with the Maine "UECA", 38 M.R.S.A. § 3001 et seq. Filing of the DEC with the Site deed will minimize potential exposure to remaining contaminants through restrictions on soil excavation and groundwater extraction, and ensure the operation and maintenance of vapor mitigation systems. These controls will ensure longevity of the alternative through maintenance and monitoring, and ensure future owners, users, or utility workers do not disturb contaminants remaining at the Site; or if disturbance is necessary, that the Maine DEP will be notified and contaminants will be properly managed under the direction of an Environmental Professional in accordance with the applicable regulatory guidelines.

Following the completion of redevelopment activities, potential risk posed by concentrations of hazardous substances that may remain at the Site will be managed though the preparation and use of an Environmental Management Plan (EMP). The EMP will govern future activities with regards to soil, groundwater, and soil vapor, and describe the inspection and maintenance requirements for institutional controls located at the Site.

6.3 ALTERNATIVE #3 – VOC SOIL TREATMENT AND SOIL COVERING, VAPOR INTRUSION MITIGATION, AND INSTITUTIONAL CONTROLS

Under this alternative, contaminated soil/fill located on the Site exterior and beneath the current Site building would be managed as needed during the redevelopment. This would include remedial

assessment and identification of VOC source areas (saturated petroleum soil or VOC sources) beneath the current Site buildings, pilot testing for treatment of VOC source area soil, and subsequent treatment using an applicable innovative technology (e.g., method of in situ chemical oxidation [ISCO]) given the observed geology and geochemical conditions.

Note: PAHs, metals and vapor intrusion related to residual VOCs summarized in the rest of this sub-section will be addressed in the same way as Alternative #2 and has been repeated here for easy reference.

PAH and metals impacted soil/fill that can be reused onsite would be covered with an engineered barrier system. The engineered barrier systems would include the following designs:

- Installation of asphalt or concrete parking areas, sidewalks, foundations, patios, etc. with appropriate top course and sub-base materials
- Two (2) feet of clean fill materials without a marker layer OR 1 foot of clean fill materials over a marker layer in landscaped areas (lawn areas, planting beds, paver-stone patios)

To address residual chlorinated solvent vapors, new buildings intended for human occupation built on the Site will be constructed with a vapor intrusion mitigation system to address any residual volatiles in the subsurface. These systems will include the following:

- Passive Vapor Intrusion Mitigation Methods:
  - Installing a passive venting layer beneath new building consisting of granular material and perforated piping, which vents vapors above the roof line. This will be used in conjunction with a vapor barrier.

- Active Vapor Intrusion Mitigation Methods:
  - Sub-slab depressurization by installing granular material and perforated piping beneath new foundations and connecting an electric fan to the piping to keep the sub-slab air pressure lower than the building interior air pressure and prevent vapors from moving into the building. This will be used in conjunction with a vapor barrier.

  - Building over-pressurization by adjusting the building's heating, ventilation, and air-conditioning system to increase the pressure indoors relative to the sub-slab area. This method is typically used for office buildings and other large structures. This will be used in conjunction with a vapor barrier.

In addition to *in situ* soil treatment, limited soil removal, installation of an engineered barrier, and use of vapor intrusion mitigation techniques, institutional controls would be implemented at the Site through a Declaration of Environmental Covenant (DEC) consistent with the Maine "UECA", 38 M.R.S.A. § 3001 et seq. Filing of the DEC with the Site deed will minimize potential exposure to remaining contaminants through restrictions on soil excavation and groundwater extraction, and ensure the maintenance of vapor mitigation systems. These controls will ensure longevity of the alternative through maintenance and monitoring, and ensure future owners, users, or utility workers do not disturb contaminants remaining at the Site; or if disturbance is necessary, that the

Maine DEP will be notified and contaminants will be properly managed under the direction of an Environmental Professional in accordance with the applicable regulatory guidelines.

Following the completion of redevelopment activities, potential risk posed by concentrations of hazardous substances that may remain at the Site will be managed though the preparation and use of an EMP. The EMP will govern future activities with regards to soil, groundwater, and soil vapor, and describe the inspection and maintenance requirements for institutional controls located at the Site.

6.4 ALTERNATIVE #4 - COMPLETE REMOVAL AND DISPOSAL OF SOIL, VAPOR INTRUSION MITIGATION, AND INSTITUTIONAL CONTROLS

This alternative would use standard techniques to remove and properly dispose of all contaminated soil (VOC, petroleum, PAH and metals impacted soil) located at the Site to meet applicable Maine DEP RAGs. This would involve additional characterization and delineation of Site soil and fill materials to ensure remaining soil or fill meet the applicable RAGs.

Note: Vapor intrusion related to residual VOCs summarized in the rest of this sub-section will be addressed in the same way as Alternatives #2 and #3, and has been repeated here for easy reference.

To address residual chlorinated solvent vapors in groundwater, new buildings intended for human occupation built on the Site will be constructed with a vapor intrusion mitigation system to address any residual volatiles in the subsurface. These systems will include the following:

- Passive Vapor Intrusion Mitigation Methods:
  - Installing a passive venting layer beneath new building consisting of granular material and perforated piping, which vents vapors above the roof line. This will be used in conjunction with a vapor barrier.

- Active Vapor Intrusion Mitigation Methods:
  - Sub-slab depressurization by installing granular material and perforated piping beneath new foundations and connecting an electric fan to the piping to keep the sub-slab air pressure lower than the building interior air pressure and prevent vapors from moving into the building. This will be used in conjunction with a vapor barrier.

  - Building over-pressurization by adjusting the building's heating, ventilation, and air-conditioning system to increase the pressure indoors relative to the sub-slab area. This method is typically used for office buildings and other large structures. This will be used in conjunction with a vapor barrier.

In addition to the soil removal and use of vapor intrusion mitigation techniques, institutional controls would be implemented at the Site through a Declaration of Environmental Covenant (DEC) consistent with the Maine "UECA", 38 M.R.S.A. § 3001 et seq. Filing of the DEC with

the Site deed will minimize potential exposure to remaining contaminants through restrictions on groundwater extraction, and ensure the maintenance of vapor mitigation systems. These controls will ensure longevity of the alternative through maintenance and monitoring, and ensure future owners, users, or utility workers do not disturb contaminants remaining at the Site; or if disturbance is necessary, that the Maine DEP will be notified and contaminants will be properly managed under the direction of an Environmental Professional in accordance with the applicable regulatory guidelines.

Following the completion of redevelopment activities, potential risk posed by concentrations of hazardous substances that may remain at the Site will be managed though the preparation and use of an EMP. The EMP will govern future activities with regards to groundwater and soil vapor, and describe the inspection and maintenance requirements for institutional controls located at the Site.

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7. COMPARISON OF ALTERNATIVES

The comparison and evaluation of the remedial alternatives has been conducted using the five criteria listed below:

1. risk reduction and effectiveness
2. feasibility and ease of implementation
3. cost effectiveness
4. green remediation potential
5. estimated time to reach "No Further Action"

A brief summary of these five criteria and a discussion as to how they pertain to the remedial alternatives is presented below.

7.1 DESCRIPTION OF EVALUATION CRITERIA

Risk Reduction and Effectiveness

Since the primary objective of any remedial action is to reduce or eliminate exposure of humans and the environment to COCs, risk reduction and effectiveness is considered the primary threshold criterion. Alternatives must pass this criterion to be considered for implementation as the recommended alternative. It addresses whether or not a remedy provides adequate protection and describes how the risks posed by the Site are eliminated, reduced, or controlled. Protection of human health is assessed by evaluating how risk from each exposure route is eliminated, reduced, or controlled through each specific alternative. This criterion also addresses the ability of the alternative to achieve the cleanup goal and applicable guidelines. This criterion also evaluates the long term reliability of the alternative with respect to upkeep and the resilience of the alternative with respect to reasonably foreseeable changing climate conditions.

Feasibility and Ease of Implementation

This criterion analyzes technical feasibility and the availability of services and materials. 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.

Cost Effectiveness

Cost information presented for the alternatives evaluates the estimated capital, operational and maintenance costs of each alternative. Capital costs include direct capital costs such as materials and equipment. Costs are presented as a balancing criterion such that if a number of remedial alternatives are comparable for the previously discussed criteria, cost may be used as a distinguishing factor in the selection of the remedial action. Estimated costs were developed based on prior project and contractor experience, and current estimates received from contractors.

Remediation is scheduled to take place in 2016, and as such, costs presented are in year 2016 dollars.

Green Remediation Potential

This criterion also evaluates the extent of green remediation techniques that can be employed as part of the project and their associated benefits relative to other alternatives. This criterion will be evaluated based on its consistency with EPA's *Principle for Greener Cleanup* policy.

Estimated Time to Reach "No Further Action"

This criterion is defined as the time it will take to achieve "No Further Action" in accordance with Maine 38 M.R.S.A. 343-E as well as to meet the requirements of the Maine DEP VRAP and receive a Certificate of Completion from VRAP. Please note this criterion does not take into account redevelopment and other time for non-environmental tasks.

7.2 EVALUATION OF ALTERNATIVES

Alternative #1 – No Action Alternative

The "No Action" alternative involves no remediation of contaminated soil/fill, soil vapor, or groundwater and would not include a means for mitigating or eliminating potential exposure to contaminants both during and following redevelopment. Therefore, the potential for human exposure continues to exist for future excavation/construction workers, residents, recreational/park users, and commercial workers. As such, the "No Action" response is not wholly protective of human health and the environment. Additionally, without action, the toxicity, mobility, and volume of contaminants will not be reduced. Therefore, this alternative is ineffective as a permanent remedial solution. As a result, this alternative cannot be considered as a final alternative for the Site and will not be considered or discussed further.

Alternative #2 – VOC Source Removal and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls

Risk Reduction and Effectiveness

Once the VOC source areas are removed; PAH and metals impacted soil are covered with an engineered barrier; vapor intrusion mitigation systems are installed and operational; and institutional controls and EMP have been implemented for the Site; the remedial action objective will have been attained and determination of success is easy to demonstrate. Source removal, soil covering, vapor intrusion mitigation, and institutional controls have been proven as an effective and reliable means of remediating exposure risk if properly maintained. The mobility and volume of contaminants will be reduced but not eliminated. This alternative is effective for the Site because the risk of exposure by potential receptors is significantly reduced.

Although the southern end of the Site may be impacted by increased flooding in a changing climate, the Site is planned to be redesigned during development as a mixture of hardscapes and landscaping; therefore, there will be limited areas for erosion to occur, and those areas will be covered with at least 1 foot of clean fill. Additionally, any damage will be repaired according to

the EMP. Therefore, the engineered barrier system will be continually effective in a changing climate despite the need for potential minor cover system repairs. Groundwater at the Site is already shallow and a rising water table in a changing climate will bring the water table even closer to the surface. This may affect the usefulness of sub-slab vapor intrusion mitigation systems if the systems become inundated with groundwater and cannot properly ventilate beneath the slab. Since the VOC source areas will have been removed, residual concentrations will attenuate over time.

This alternative reduces risk and institutional controls make this alternative continually effective since the engineered barrier is considered continually effective in a changing climate, and the sub-slab ventilation system will be effective to address residual soil gas concentrations.

Feasibility and Ease of Implementation

This remedial alternative utilizes standard excavation and construction techniques for excavation, soil removal, installation of the engineered barrier system, installation of a vapor mitigation systems, and long-term management and institutional controls. **Therefore, this alternative is more feasible and easily implementable than Alternatives #3 and #4.**

Cost Effectiveness

Based on prior project and contractor experience and current estimates received from contractors, the estimated cost of this alternative is broken down below:

Remedial Investigation	$30,000
Presumptive Remedies	$500,000
VOC Source and Unsuitable Soil Removal	$50,000
Engineered Barrier System Installation	$425,000
Vapor Mitigation System Installation	$60,000
Engineering/Construction Oversight/Reporting	$125,000
Environmental Management Plan/Deed Restriction	$2,500
Long Term Engineered Barrier Maintenance*	$71,300
10% Contingency	$126,380
Total	$1,390,180

*$1,500 cost per year (year 1) with 3% annual inflation over 30 years

Green Remediation Potential

This alternative requires limited offsite disposal of impacted soil resulting in fuel consumption and greenhouse gas emissions during transport, and limited volumes of material to be disposed in a landfill. However, this alternative leaves relatively stable impacted soil onsite, eliminating the otherwise transport and disposal of all impacted soil. Backfill materials can be sourced locally to reduce shipping distances. Local contractors with green businesses practices (i.e., biofuel converted utility trucks, renewable/sustainable heating and electricity at their office/yard, etc.) can be given preference during the bidding process. **Therefore, green remediation practices can be**

implemented with this alternative, and this alternative has greater potential for green remediation practices than Alternative #4, but less than Alternative #3.

Estimated Time to Reach "No Further Action"

Immediately following receipt of disposal certificates, final inspection of the engineered barrier system, and implementation of the Institutional Controls, the Site would meet the requirements for "No Further Action" and could attain a Certificate of Completion from the Maine DEP VRAP. **Using this alternative, "No Further Action" could be attained within one year of implementation.**

Alternative #3 – VOC Source Treatment and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls

Risk Reduction and Effectiveness

Assuming appropriate remedial investigation and pilot testing prior to implementation of this alternative to ensure adequate treatment of the VOC source area, this alternative will reduce risk associated with vapor intrusion of VOC compounds. Additionally, this alternative would also treat shallow impacted groundwater if it was found to be impacted after removal of the building foundations. A limited amount of PAH and metals impacted soil would be removed and properly disposed as needed to facilitate the redevelopment. Once the remaining PAH and metals impacted soil is covered with an engineered barrier, and vapor mitigation systems, institutional controls and the EMP have been implemented for the Site, the remedial action objectives will have been attained and determination of success is easy to demonstrate. Soil treatment, soil removal, soil covering, vapor intrusion mitigation, and institutional controls removal have been proven effective means of remediating exposure risk.

Although the southern end of the Site may be impacted by increased flooding in a changing climate, the Site is planned to be redesigned during development as a mixture of hardscapes and landscaping; therefore, there will be limited areas for erosion to occur, and those areas will be covered with at least 1 foot of clean fill. Additionally, any damage will be repaired according to the EMP. Therefore, the engineered barrier system will be continually effective in a changing climate despite the potential need for minor cover system repairs. Groundwater at the Site is already shallow and a rising water table in a changing climate will bring the water table even closer to the surface. This may affect the usefulness of the sub-slab vapor intrusion mitigation systems if the systems become inundated with groundwater and cannot properly depressurize beneath the slab. Since the VOC source areas will have been treated, residual concentrations will attenuate over time.

This alternative reduces risk and institutional controls make this alternative continually effective since the engineered barrier is considered continually effective in a changing climate, and the vapor intrusion mitigation will be effective to address residual soil gas concentrations.

Feasibility and Ease of Implementation

This remedial alternative for VOC source areas requires more detailed remedial investigation and pilot testing prior to implementation, but utilizes standard treatment and application techniques. This remedial alternative also utilizes standard construction techniques for installation of the engineered barrier system, installation of vapor mitigation systems, and long-term management and institutional controls. **Therefore, this alternative is feasible and easy to implement; however, requires more resources and effort than Alternative #2, but less than Alternative #4.**

Cost Effectiveness

Based on prior project and contractor experience and current estimates received from contractors, the estimated cost of this alternative is broken down below:

Remedial Investigation	$30,000
Presumptive Remedies	$500,000
In Situ Treatment Pilot Testing	$50,000
VOC Source In Situ Treatment	$100,000
Engineered barrier system installation	$425,000
Vapor Mitigation System Installation	$60,000
Engineering/Construction Oversight/Reporting	$160,000
Environmental Management Plan/Deed Restriction	$2,500
Long Term Engineered Barrier Maintenance*	$71,300
10% Contingency	$139,880
Total	$1,538,680

*$1,500 cost per year (year 1) with 3% annual inflation over 30 years

Green Remediation Potential

This alternative requires the least amount of offsite transport and disposal of impacted soil from the Site reducing greenhouse gas emissions and disposal in a landfill. Engineered barrier system materials can be sourced locally to reduce transportation distance. Additionally, subcontractors with green business practices (i.e., biofuel converted utility trucks, renewable/sustainable heating and electricity at their office/yard, etc.) can be given preference in the bidding process. **Therefore, green remediation practices can be implemented with this alternative, and this alternative has greater potential for green remediation practices than Alternatives #2 and #4.**

Estimated Time to Reach "No Further Action"

Immediately following confirmation of source area treatment and receipt of disposal certificates, the Site would meet the requirements for "No Further Action" and could attain a Certificate of Completion from the Maine DEP VRAP. **Using this alternative, "No Further Action" could be attained within 2 years of implementation.**

Alternative #4 – Complete Removal and Disposal of Soil, Vapor Intrusion Mitigation, and Institutional Controls

Risk Reduction and Effectiveness

Once the identified contaminated soil is removed from the Site and confirmatory sample results are verified, the remedial action objective with respect to soil will have been attained and determination of success is easy to demonstrate. Soil removal has been proven an effective means of remediating exposure risk.

Groundwater at the Site is already shallow and a rising water table in a changing climate will bring the water table even closer to the surface. This may affect the usefulness of the sub-slab vapor intrusion mitigation systems if the systems become inundated with groundwater and cannot properly depressurize beneath the slab. Since the VOC source areas will have been removed, residual concentrations will attenuate over time.

This alternative reduces risk and institutional controls make this alternative continually effective since soil removal is permanently effective in a changing climate, and the vapor intrusion mitigation will be effective to address residual soil vapor concentrations.

Feasibility and Ease of Implementation

This remedial alternative for soil utilizes standard excavation and construction techniques for removal of impacted accessible soil and replacement with clean fill. Since all contamination is to be removed, no continued management or restrictions are necessary. Portions of the exterior soil material that may require removal may be providing structural support to nearby structures. The complete extent of contamination is not currently known, and based on the long history of industrial operation at the Site and in the surrounding area, complete removal of impacted soil may be difficult and unknowns may be encountered at deeper interval where industrial debris and historical building foundations may be encountered. This alternative for soil is feasible but less easy to implement due to unknowns. This remedial alternative also utilizes standard construction techniques for installation of vapor mitigation systems, and long-term management and institutional controls. **Therefore, this alternative is feasible but not as easily implementable as Alternatives #2 and #3.**

Cost Effectiveness

Based on prior project and contractor experience and current estimates received from contractors, the estimated cost of this alternative is broken down below:

Remedial Investigation	$30,000
Presumptive Remedies	$500,000
Excavation/Stockpile/Loading	$250,000
Transportation and Disposal	$1,100,000
Backfill, Delivered, Placed, and Compacted	$510,000
Site Restoration	$100,000

Vapor Mitigation System Installation	$60,000
Engineering/Construction Oversight/Reporting	$160,000
Environmental Management Plan/Deed Restriction	$2,500
10% Contingency	$271,250
Total	$2,983,750

Green Remediation Potential

This alternative requires a significant amount of offsite disposal of impacted soil resulting in greater fuel consumption and greenhouse gas emissions during transport, and greater volumes of material to be disposed in a landfill. It is possible to reduce the transportation impacts by using local contractors, local disposal facilities, and a local source of clean fill. Additionally, subcontractors with green business practices (i.e., biofuel converted utility trucks, renewable/sustainable heating and electricity at their office/yard, etc.) can be given precedence in the bidding process. **Therefore, this alternative has lower potential for green remediation practices than Alternatives #2 and #3.**

Estimated Time to Reach "No Further Action"

Immediately following receipt of disposal certificate, and implementation of the Institutional Controls, the Site would meet the requirements for "No Further Action" and could attain a Certificate of Completion from the Maine DEP VRAP. **Using this alternative, "No Further Action" could be attained within 18 months of implementation.**

7.3 JUSTIFICATION FOR THE SELECTED REMEDIAL ALTERNATIVE

Based on the evaluation of the remedial alternatives presented above:

- **The recommended alternative is Alternative #2, VOC Source Removal and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls**.

This alternative was selected because it is effective at reducing the risk of exposure and remains effective in a changing climate assuming proper maintenance in accordance with an EMP; is feasible and easy to implement; has greater green remediation potential than Alternative #4, can be completed at a lower cost than Alternatives #3 and #4, and can be implemented in the shortest time frame.

8. PROPOSED REMEDIAL ACTION WORK PLAN

This section describes activities that will be completed as part of the Site remediation. A Health and Safety Plan for cleanup activities will be prepared prior to the start of construction. In addition, Credere will present the proposed remediation activities for review and approval by the Maine DEP VRAP prior to initiating this project.

Asbestos Abatement

Prior to or concurrent with the building removal, an Asbestos Abatement Contractor licensed by Maine DEP will remove and dispose of identified ACM pursuant to Maine DEP Chapter 425. Following the completion of asbestos abatement activities and once waste disposal and successful clearance results are obtained, all documentation will be submitted to the Maine DEP.

Universal and Other Regulated Waste Removal and Disposal, Including Storage Tanks

Prior to or concurrent with the building removal, identified universal, hazardous, or other regulated wastes in the Site building will be removed and properly disposed by qualified personnel in accordance with the Maine DEP Hazardous Waste Management Rules (Chapters 850 through 857).

Building Removal and Management of Debris

To characterize and remediate contaminated soil or fill materials beneath the Site building, the Site building and foundations will be removed. Building materials will be screened for lead or PCBs prior to building removal, and building material waste will be properly removed, handled, transported, and disposed in accordance with Maine DEP Hazardous Waste Management Rules (Chapters 850 through 857).

Additional Soil Characterization

Prior to the removal of the Site buildings, Credere will implement screening of sub-slab soil gas beneath the Site buildings to identify potential source areas of the chlorinated solvent contamination on the Site. After the removal of the Site building, Credere will conduct a Ground Penetration Radar (GPR) survey of the Site to identify potential subsurface anomalies. Following the GPR survey, Credere will conduct test pitting in areas of concern identified during soil gas screening and GPR survey. Credere will focus on locating source areas of VOC contamination or petroleum, and evaluating fill materials (hides, ash, etc.) at the Site.

Soil and Groundwater Management Plan

In order to meet the regulatory requirements inherent in the handling of contaminated soil and the possible generation of Special Waste; to properly manage risk posed by the soil/fill that will be encountered during redevelopment; and to manage the risk posed by contaminated groundwater and soil vapor at the Site, a Soil & Groundwater Management Plan (SGMP) was developed for use at the Site, and will include the following:

- A description of soil conditions and associated regulatory applicability

- A listing of proper health and safety work practices and protective equipment for use during Site work activities
- A description of onsite soil management procedures including soil handling, stockpiling, and dust control for use during Site work activities
- A description of the onsite soil reuse procedures including the soil engineered barrier system
- A summary of the methods to be used for the proper transport and disposal of excess soil that may be generated during redevelopment
- A description of groundwater management procedures including general dewatering of excavations and groundwater collection/treatment/disposal at an offsite treatment facility

A copy of this SGMP is attached as **Appendix A**.

Limited Soil Removal

Any soils identified during the remediation and Site redevelopment that are contaminated with VOCs and may be acting as source areas for the soil vapor contamination at the Site will be removed and properly disposed offsite. Additionally, any free product petroleum or petroleum saturated soil will be removed and properly disposed offsite. During redevelopment of the Site, any residual soil or fill waste that is disturbed as part of Site activities and cannot be kept onsite will be removed and properly disposed offsite as Special Waste.

Engineered Barrier

In order to manage risk posed by concentrations of PAHs and lead in Site soil and fill materials located on the Site, the following engineered barrier system is proposed:

- As necessary to meet final grades, conduct grading, install Site features and subsurface infrastructure, and/or to provide structurally suitable sub-grade materials in accordance with the Site design. In addition, impacted/unsuitable soil will be removed in accordance with the SGMP.
- A marker layer consisting of a permeable geotextile fabric or similar material will be placed directly over the contaminated soil in landscaped areas to indicate the distinction between the clean cover and the underlying contaminated soil.
- A minimum of 12 inches of clean fill will be placed over the marker layer as cover material over contaminated soil in landscaped areas. Landscaped areas will be seeded or mulched to prevent erosion of the clean cover.
- As an alternative to the marker layer, 2 feet of clean fill with no marker layer can be placed above the contaminated soil.
- Areas planned for hardscape construction (asphalt, concrete, etc.) will be installed directly over the impacted soil and the hardscape will serve as the cover.

- Each covered area will be graded so that the stormwater runoff is directed to an appropriate area.
- Additional sub-base materials may be necessary beyond the minimum cover requirements discussed herein to maintain the structural integrity of the proposed Site features.

Institutional Controls

Following the completion of redevelopment activities, potential risk posed by concentrations of hazardous substances that may remain in soil, groundwater, or soil vapor at the Site will be managed in accordance with an Environmental Management Plan (EMP). The owner will also prepare and record a Declaration of Environmental Covenant (DEC) consistent with the VRAP NAAL and the Maine UECA, 38 M.R.S.A. § 3001 et seq.

State and Federal Permits Required

Proper notification of asbestos projects to the Maine DEP will be required. Local building and planning approvals will also be required. No other permits are anticipated to be required as a part of this remediation.

Remedial Action Reporting

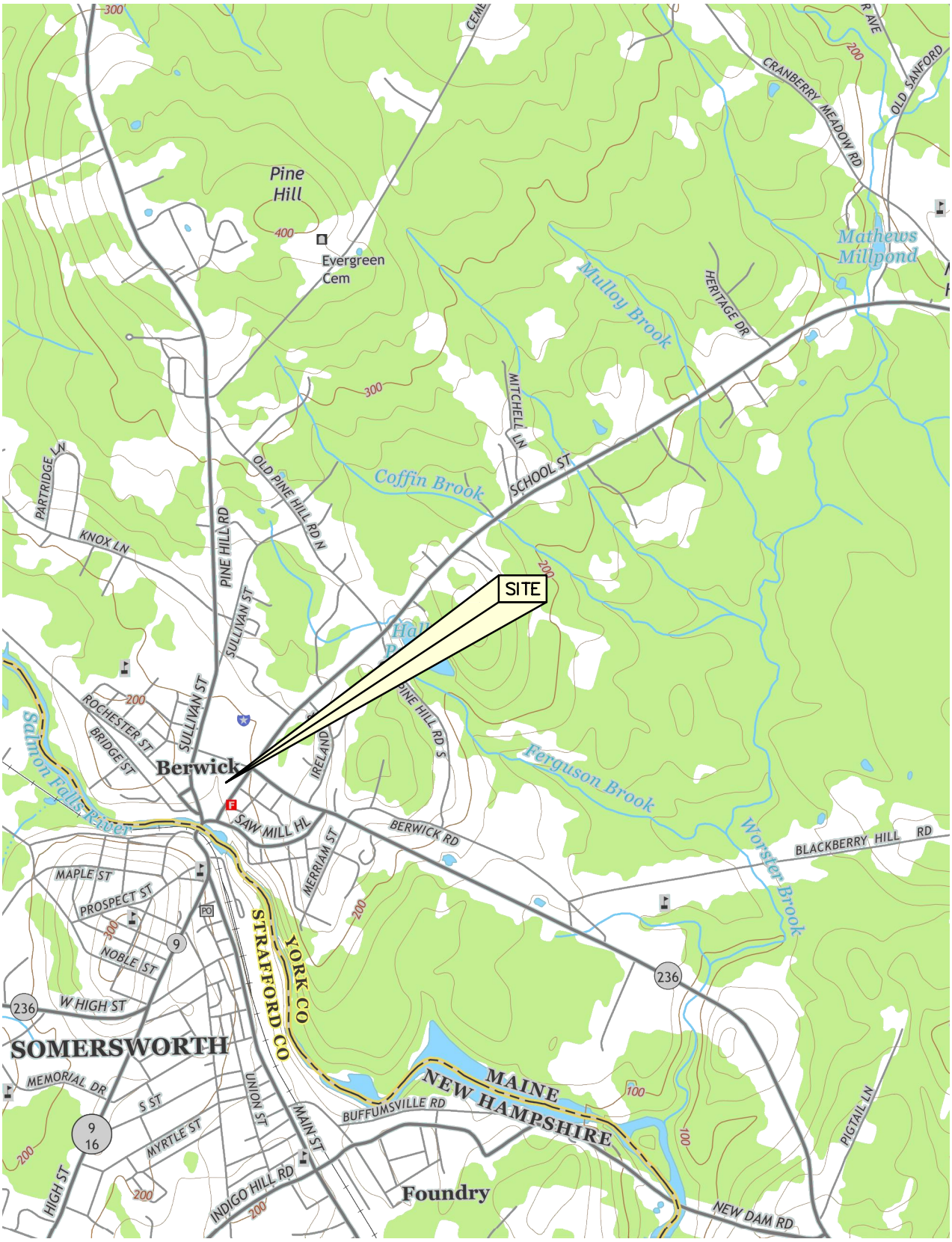
Once cleanup activities are completed, Credere will prepare and submit a Remedial Action Completion Report to the Maine DEP summarizing the field activities conducted as part of the remediation effort including all applicable post-cleanup verification sampling results and disposal documentation. Figures depicting the location of soil removal and engineered barrier system will be included in the report.

9. SUMMARY

Credere developed this ABCA/RAP for Lots 4, 5, and 6 of the Prime Tanning Facility located in Berwick, Maine. The purpose of this study was to evaluate potential remedial action alternatives to mitigate identified environmental conditions at the Site. Based on the findings of this study, a summary of the ABCA/RAP process is presented below:

1. Remedial action is necessary to address contaminated soil and fill materials across the Site; contaminated soil vapor on the Site; contaminated groundwater on the Site; and regulated wastes in building materials, including asbestos, lead, PCBs, and universal wastes. In consideration of the Conceptual Site Model, applicable regulatory guidelines, and the nature of the specific contaminants detected, Credere evaluated four alternatives to identify the most appropriate cleanup. The four evaluated remedial alternatives were compared for risk reduction and effectiveness, feasibility and ease of implementation, cost effectiveness, green remediation potential, and estimated time to reach No Further Action.
2. Based on the evaluation of the remedial alternatives presented herein, the recommended alternative for cleanup of the Site is Alternative #2: VOC Source Removal and Soil Covering, Vapor Intrusion Mitigation, and Institutional Controls.
3. This alternative was selected because it is effective at reducing the risk of exposure and remains effective in a changing climate assuming proper maintenance in accordance with an EMP; is feasible and easy to implement; has greater green remediation potential than Alternative #4, can be completed at a lower cost than Alternatives #3 and #4, and can be completed in a shorter time frame than the other alternatives.
4. A remedial action plan that summarizes the execution of the remedial activities is included in this document as **Section 8**.
5. Long-term risk posed by environmental conditions remaining at the Site following the completion of the above-described remedies will be managed through the filing of a DEC and long-term implementation of an EMP.

FIGURES



USGS QUADRANGLE INFORMATION: SOMERSWORTH MAINE 7.5 MINUTE SERIES 2015

DRAWN BY: MTG	DATE: 12/01/15
CHECKED BY: JBO	PROJECT: 15001312

FIGURE 1 - SITE LOCATION PLAN

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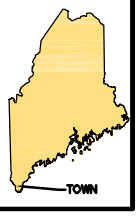
776 MAIN STREET
WESTBROOK, MAINE 04092
TEL: 207.828.1272
FAX: 207.887.1051
WWW.CREDERELLC.COM

PRIME TANNING FACILITY
20 SULLIVAN STREET
BERWICK, MAINE

GRAPHIC SCALE
2,000 0 1,000 2,000
1 inch = 2,000 ft.



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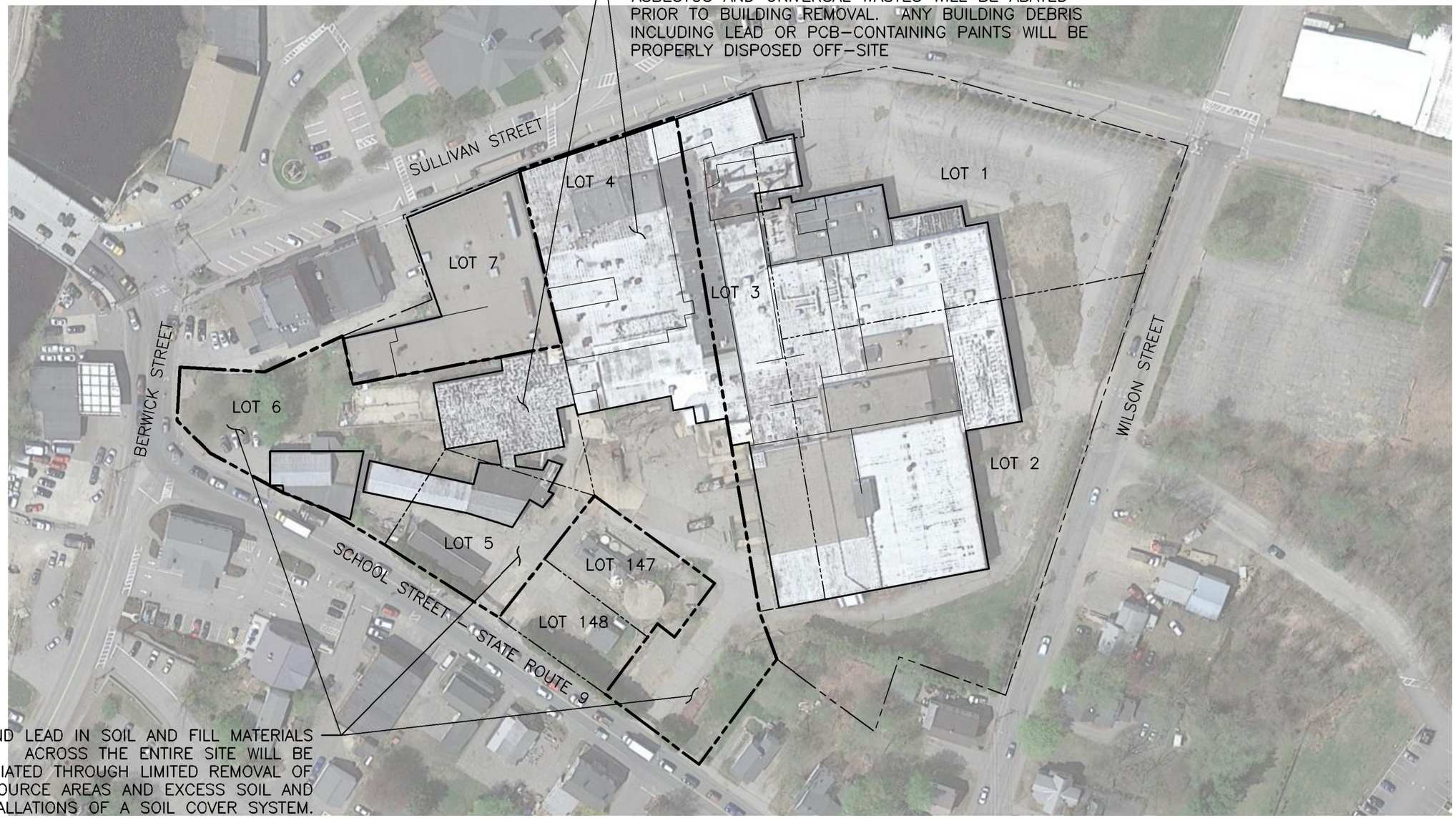

NOTES

1. EXISTING FEATURES SHOWN ON THIS PLAN ARE APPROXIMATE AND BASED ON A COMBINATION OF AERIAL IMAGERY DOWNLOADED FROM GOOGLE EARTH, TOWN OF BERWICK TAX MAP, AND OTHER FIGURES FROM PREVIOUSLY PUBLISHED HISTORICAL REPORTS BY OTHERS.
2. PARCEL BOUNDARIES ARE APPROXIMATE AND BASED ON THE OCTOBER 8, 2014, DRAWING ENTITLED "FINAL PLAN – TANNERY ROW" FILED AT THE YORK COUNTRY REGISTRY OF DEEDS.

LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING FOOTPRINT
- INTERIOR BUILDINGS WALL

GRAPHIC SCALE
100 50 0 100
1 inch = 100 ft.

FIGURE 2
DETAILED SITE PLAN

PRIME TANNING COMPANY
35 SULLIVAN STREET
BERWICK, MAINE

DRAWN BY: MTG
CHECKED BY: JBO
DATE: 12/11/15
PROJECT: 15001312

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Economy Community Environment

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APPENDIX A

SOIL AND GROUNDWATER MANAGEMENT PLAN

CREDERE ASSOCIATES, LLC
776 Main Street
Westbrook, Maine 04092
Phone: 207-828-1272
Fax: 207-887-1051

January 28, 2016

John Stoll
Town Planner
Town of Berwick
11 Sullivan St.
Berwick, Maine 03901

RE: **Soil and Groundwater Management Plan**
Prime Tanning Facility, Lots 4, 5, and 6
20 Sullivan Street, Berwick, Maine

Dear Mr. Stoll:

The following document describes methods and procedures to be used during the redevelopment of Lots 4, 5, and 6 of the Prime Tanning property located at 20 Sullivan Street in Berwick, Maine (the Site). The activities and practices described below are necessary to fulfill the applicable regulatory requirements and to manage potential risk to human and environmental receptors associated with contaminated soil. Included in this Soil and Groundwater Management Plan (SGMP) are:

- A description of soil conditions and associated regulatory applicability
- A listing of proper health and safety work practices and protective equipment for use during Site work activities
- A description of onsite soil management procedures including soil handling, stockpiling, and dust control for use during Site work activities
- A description of the onsite soil reuse procedures including the soil engineered barrier system (**Figure 1**)
- A summary of the methods to be used for the proper transport and disposal of excess soil that may be generated during redevelopment
- A description of groundwater management procedures including general dewatering of excavations and groundwater collection/treatment/disposal either on-site or at an off-site treatment facility

1. INTRODUCTION & APPLICABILITY

The 7.7-acre Prime Tanning facility is located at 20 Sullivan Street at the intersections of School Street (Route 9), Sullivan Street, and Wilson Street in the center of downtown Berwick, Maine. It is located within a mixed residential and commercial area of Berwick. The Prime Tanning facility

is currently owned by the Town of Berwick and is identified as tax map U-4, lot 146, but was subdivided in 2014 into 7 contiguous lots (Lots 1 through 7, see **Figure 2**). The parcels covered by this SGMP only include Lots 4, 5, and 6 and comprise 2.9 acres.

The current redevelopment plans for the Site involves the redevelopment of some portions of the buildings and demolition of others.

Various manufacturing operations occurred at the Site from 1877 to 1930 including a tannery, wool pulling works facility, a sash and door manufacturer, a reed manufacturer, a carriage manufacturer, an oil company, a laundry facility, a shoe factory, and a lumber company. Tannery operations occurred at the Site from approximately 1930 until 2008 when the mill closed and the Prime Tanning owners filed for bankruptcy protection. In 2014, the Town of Berwick acquired the Prime Tanning property for owed back property taxes. Environmental conditions that have been identified at the Site include the following:

- Surficial and accessible soil across the Site containing concentrations of polycyclic aromatic hydrocarbons (PAHs) and lead exceeding applicable residential and/or commercial Maine Department of Environmental Protection (DEP) Remedial Action Guidelines for Sites Contaminated with Hazardous Substances (RAGs).
- Buried solid waste fill materials identified across the Site including leather tannery scraps, wood chips, urban fill, ash/coal ash, and railroad ties. Contaminants associated with the fill materials include semi-volatile organic compounds (SVOCs) and metals.
- Methyl tert-butyl ether (MTBE), vinyl chloride, chromium, and naphthalene identified in groundwater on the Site exceeding applicable Maine Center for Disease Control (CDC) Maximum Exposure Guidelines (MEGs) for Drinking Water.

Based on the proposed reuse of the Site, results were compared to the Maine DEP RAGs for the residential use scenario, which are the lowest values of the applicable RAGs. Soil and groundwater concentrations may not be reduced to below the RAGs; however, residual concentrations remaining at the Site will be protected from human contact by a means of exposure prevention.

2. GENERAL HEALTH AND SAFETY PLAN

The following serves as guidelines for health and safety procedures to be employed during general construction activities at the Site. These guidelines should be supplemented by a Site-specific health and safety plan to be prepared by the contractor.

The primary route for exposure to impacted materials at the Site is dermal absorption via direct contact with impacted media. Secondary routes include inhalation of vapor, incidental uptake of dust that may be impacted and active ingestion through improper hygiene. As such, the utilization of basic personal protective equipment (PPE) will minimize the potential for exposure while conducting construction activities at the Site.

Training

All personnel who will be directly handling or otherwise may be exposed to impacted groundwater and/or soil shall have 40-hour Occupational Safety & Health Administration (OSHA) CFR 1910.120 training, 3 days of supervised field experience, and current 8-hour OSHA refresher training.

Personal Protective Equipment

Based on the hazard evaluation, Level D PPE has been initially designated for all personnel who will be directly handling or otherwise may be exposed to impacted groundwater and/or soil at the Site. The contractor's Health and Safety Officer may upgrade PPE to Level C or higher if additional hazards are identified during Site work.

Specific Level D PPE to be used at the Site includes the following:

- Steel toe work boots with latex over boots as required
- Safety glasses with side shields
- Work gloves
- Nitrile inner gloves
- Hard hat
- Coveralls (optional)

Work Zone Monitoring

Due to the potential for impacts to ambient air during construction, the work zone should be monitored periodically using a photoionization detector (PID), particularly when petroleum impacted soil and/or groundwater is exposed or disturbed. Ambient air should not exceed 10 parts per million by volume (ppm_v) sustained for a 15 minute period.

Additionally, the property boundaries should be monitored for ambient dust levels to ensure fugitive dust is not migrating from the Site onto adjoining or nearby properties. As a general rule of thumb, visible ambient dust should be controlled using wet suppressant methods and any stockpiles should be covered during down time. Access should be limited to applicable personnel during periods when impacted soil is exposed at the surface.

General Operating Procedures

In addition to the above basic health and safety guidelines, the following procedures should be followed during activities conducted at the Site that create the potential for exposure to impacted soil and/or groundwater:

- Work involving excavation or management of impacted soil and/or groundwater conducted at the Site shall be directed by a qualified environmental professional.
- The Site shall be surveyed and cleared by DigSafe.

- All equipment used during excavation activities shall be properly cleaned and decontaminated.
- Any indication of conditions more hazardous than those anticipated, or the observation of circumstances that would render the above basic health and safety procedures inappropriate, shall result in the evacuation of the work area and a reassessment of health and safety procedures by a qualified environmental professional.

3. SOIL MANAGEMENT

The following section will provide procedures for the excavation, re-use, storage, and disposal of excess soil generated during construction activities at the Site. These activities assume USTs are not present at the Site; however, if excavation in the area of the anomalies indicates a UST is present, the UST will require removal and closure by a Maine Certified Geologist in accordance with Maine DEP Chapter 691: Rules for Underground Storage Facilities.

Impacted soil that will remain at the Site, including materials planned for reuse and undisturbed *in situ* impacted soil, will be covered to minimize the direct contact hazard for future Site users.

Onsite Reuse of Soil

All areas of the Site should be covered according to the below specifications:

- All features and subsurface infrastructure will be installed and the grading of impacted materials shall be completed consistent with the design requirements for the Site.
- Any excess impacted soil that cannot be re-used at the Site will be removed in accordance with **Offsite Soil Disposal Section** of this SGMP.
- The engineered barrier system will cover the entire Site and will consists of the following in each of the areas:
    - Landscaped Areas: A permeable geotextile fabric or similar material, such as snow fence, will be placed as a marker layer directly over the impacted soil to indicate the distinction between the clean fill cover and the underlying impacted soil to remain at the Site. A minimum of 12 inches of clean fill will be placed as cover material over the marker layer. Alternatively, 2 feet of clean fill and no marker layer can be installed. The source of fill will be documented to be a local native source or will be documented to be clean through analytical testing. The covered areas will be loamed, seeded, mulched, or otherwise permanently stabilized to prevent erosion and damage to the soil cover. If the marker layer must be compromised to facilitate landscape installation, a replacement marker layer shall be installed prior to the placement of any new non-impacted material.
    - Asphalt and Concrete Areas: Areas planned for impermeable construction (e.g., asphalt parking lots, concrete walkways, and the Site building foundation) will be installed directly over the impacted soil. A separate marker layer will not be necessary below impermeable surfaces since these materials will serve as the

marker layer. The geotextile marker layer will extend from landscaped areas to the exterior limit of these impermeable areas.

- Each covered area will be graded so that the stormwater runoff is directed to an appropriate area.
- Additional sub-base materials may be necessary beyond the minimum cover requirements discussed herein to maintain the structural integrity of the proposed Site features.

An engineered barrier system schematic is included as **Figure 1**. A detailed existing conditions site plan is included as **Figure 2**.

Soil Stockpiling and Storage

Soil removal will be limited to excess soil generated during construction that cannot be relocated onsite and petroleum saturated soil.

Impacted soil excavated from the Site may be temporarily stored or removed following waste disposal characterization and acceptance at an appropriate receiving facility. Soil stockpiled at the Site should be placed atop 20-mil polyethylene sheeting to prevent contamination of surrounding cover materials, and securely covered by 10-mil or 20-mil polyethylene sheeting. Berms shall be constructed around the edges of the stockpiles, the base shall be sloped to create leachate collection points, and storm water runoff will be diverted away from any soil stockpile or storage area when feasible.

Soil to be removed from the Site may be more conveniently live loaded into trucks for offsite disposal at an appropriate facility or temporarily stored within secure, water resistant, DOT-approved bulk containers. All stockpiled or containerized soil will be stored within a secure area of the Site and properly labeled to minimize potential contact. In addition, all soil stockpiled or otherwise stored at the Site will be inspected daily for tears, holes, or other failures in the polyethylene sheeting or storage container.

Dust Control

Dust control requirements will be a contractual responsibility of the contractor for the Site and will be documented by the qualified environmental professional during remediation activities. Dust control measures shall be employed by the contractor during excavation and grading, and to control dust around stockpiles, haul roads, and any other exposed soils.

- At a minimum, wet suppression shall be used to provide temporary control of dust. Wet suppression will be applied on a routine basis and/or as directed by the qualified environmental professional to adequately control dust. Depending upon weather conditions and work activity, several wet suppression applications per day, and/or the use of granular calcium chloride or similar commercially manufactured dust control agents, may be necessary to adequately control dust. Aside from routine wet suppression, alternate dust control measures are subject to approval by the qualified environmental professional.
- Water runoff generated by dust control will be retained and disposed in accordance with the requirements of the appropriate regulatory agencies.

- Vehicles leaving the Site shall have no mud or dirt on the vehicle body or wheels. Any foreign matter on the vehicle body or wheels will be physically removed prior to vehicles entering a public roadway or adjoining mill driveways. Vehicles will not be permitted to leave the Site with exterior mud or dirt that has the potential to be deposited on public roadways.

Offsite Soil Disposal

Petroleum saturated soil, or excess impacted soil that cannot be reused will be transported and disposed offsite in accordance with applicable federal and state regulations. Written notification to the Maine DEP is required prior to removal of soil from the Site. The following subsections provide appropriate procedures for the characterization and offsite disposal of special waste soil.

Waste Characterization Sampling

Waste characterization sampling will be required in order to meet facility acceptance requirements. As such, the contractor will collect representative samples from the special waste soil for analysis by an independent, Maine-certified laboratory. At a minimum, and in accordance with disposal facility requirements, laboratory criteria will include, but may not be limited to, the following analyses:

- Total petroleum hydrocarbons (TPH)
- Volatile organic compounds (VOC)
- Semi-volatile organic compounds (SVOC)
- Polychlorinated biphenyls (PCB)
- RCRA 8 Metals
- Pesticides
- Herbicides
- pH
- Ignitibility, conductivity, and reactivity (sulfide and cyanide)
- Additional toxicity characteristics leaching procedure (TCLP) analysis, where necessary

Following the results of the above analyses, an appropriate disposal or recycling method will be selected and a soil disposal acceptance package will be prepared and submitted to the facility.

Soil Transport and Recycling/Disposal

Prior to shipment, an waste profile will be submitted by the contractor to the selected facility to obtain facility acceptance. Following facility acceptance, impacted soil will be removed from the Site for proper recycling or disposal. Impacted soil loading and transport activities will be overseen by the qualified environmental professional. Equipment used for the transport of impacted soil will be properly licensed in accordance with applicable state and federal regulations. Haul truck cargo areas shall be securely and completely covered during material transport on public roadways.

Each shipment of impacted soil will be accompanied by appropriate transport documentation, such as a hazardous waste manifest or bill of lading. An official record of each shipment of impacted soil from the Site, including tonnage, will be presented to the qualified environmental professional following delivery to the receiving facility.

4. GROUNDWATER MANAGEMENT

Impacted groundwater was identified at the Site during previous assessment activities. As part of Site redevelopment, any excess groundwater generated during excavation activities for utilities, foundations, and other subsurface structures will be collected and managed in accordance with this section.

General Dewatering of Excavations

- Surface water will be prevented from flowing into excavations at the Site and trench excavations will not be used as temporary drainage ditches.
- Pumps, well points, sumps, hoses, filters, and all other dewatering system components will be provided and maintained as necessary to convey water away from excavations.
- The suspended solids content in the water shall be minimized during dewatering activities by lining the excavation collection area with crushed stone and placing the pump intake in a perforated bucket.
- Water removed from excavations shall be conveyed to an onsite frac tank.
- Silt laden or untreated water shall not be discharged directly to the storm, sanitary or combined sewer without first receiving appropriate approvals and meeting appropriate state and local pretreatment requirements.

Collection and Disposal at an Off-Site Treatment Facility

Groundwater that requires removal during redevelopment will be collected, tested, and disposed of at an off-site treatment facility. The methods for storage, testing, and disposal are described below:

- Water removed from excavations shall be stored in a frac tank to allow settling of solids and testing prior to discharge. The frac tank inlet shall be placed at the opposite end from the tank outlet.
- If needed for additional detention or storage volume, additional tanks shall be placed in series for secondary settlement.
- The contractor shall obtain all local, state, and federal approvals necessary for the discharge of the water to the off-site treatment facility.
- Prior to discharge of the initial tank load, the contractor shall collect water samples for laboratory analysis in accordance with the applicable requirements of the off-site treatment

facility. Test results will be provided to the Environmental Professional and to the off-site treatment facility personnel.

- Once sampled, no water or other materials shall be added to the frac tank.
- All additional frac tank loads shall be tested in accordance with the off-site treatment facility's requirements prior to discharge.
- Bag filters will be installed on the discharge piping and water will meet the off-site treatment facility's discharge limitations prior to discharge. Groundwater determined to have contaminant levels exceeding the off-site facility's limits shall be treated prior to discharge.
- Water shall be transferred from each tank by suspending the intake line immediately below the water level to minimize disturbance of sediment at the bottom of the tank.
- The contractor will cease discharge immediately upon discovery through testing or other means that discharge is not in compliance with the requirements of local, state, or federal regulations or permits.
- Following the discharge of water from the frac tank(s), any accumulated sediment or other solid materials will be managed in accordance with **Section 3** of this SGMP.

Incidental Groundwater

Groundwater may percolate up to the ground surface during the installation of piles and/or during the compaction of soils. This groundwater may be allowed to infiltrate back into the subsurface environment, however it must be prevented from entering the stormwater system.

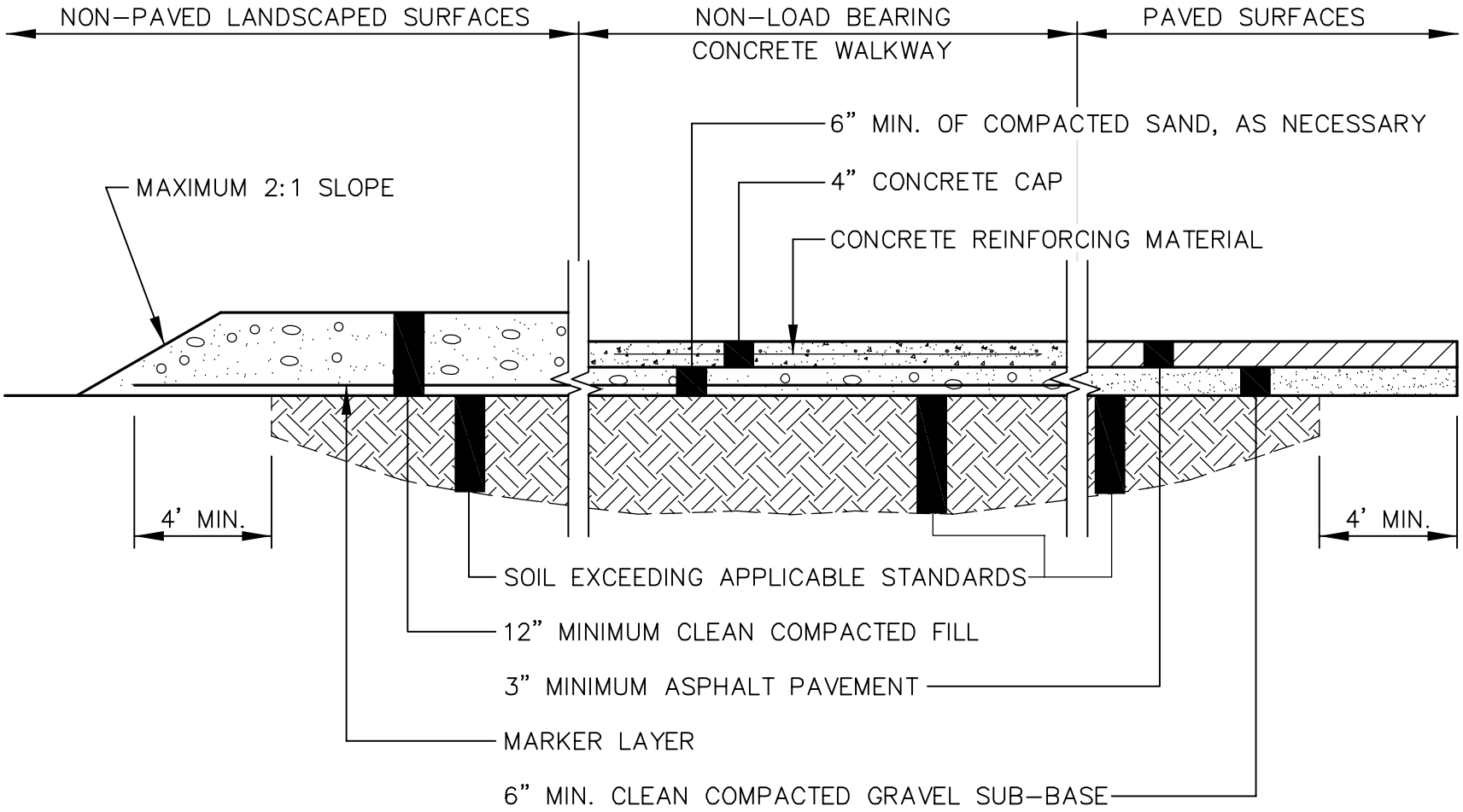
If there are any questions, please contact the undersigned.

Sincerely,
Credere Associates, LLC

Jonathan O'Donnell
Credere Associates, LLC
Project Manager

Rip Patten, PE, LSP, LEED-AP
Credere Associates, LLC
Vice President

Attachments: Figure 1 – Engineered Barrier System Schematic
Figure 2 – Detailed Site Plan



NOTE

THE QUANTITIES IDENTIFIED ARE MINIMUM REQUIREMENTS FOR COVERING OF THE IDENTIFIED CONTAMINATED SOILS. ADDITIONAL SUB-BASE MATERIALS MAY BE REQUIRED IN AREAS PROPOSED FOR ASPHALT PAVING AND/OR CONCRETE SIDEWALKS AS NECESSARY AND IF APPLICABLE, TO MAINTAIN STRUCTURAL INTEGRITY OF THESE MATERIALS.

DRAWN BY: WTE
CHECKED BY: RIP
DATE: 2/15/2013
PROJECT: 12001156

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TEL: 207.828.1272
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SOIL COVERING SCHEMATIC

SKETCH NO: Figure 1

SCALE: N.T.S.

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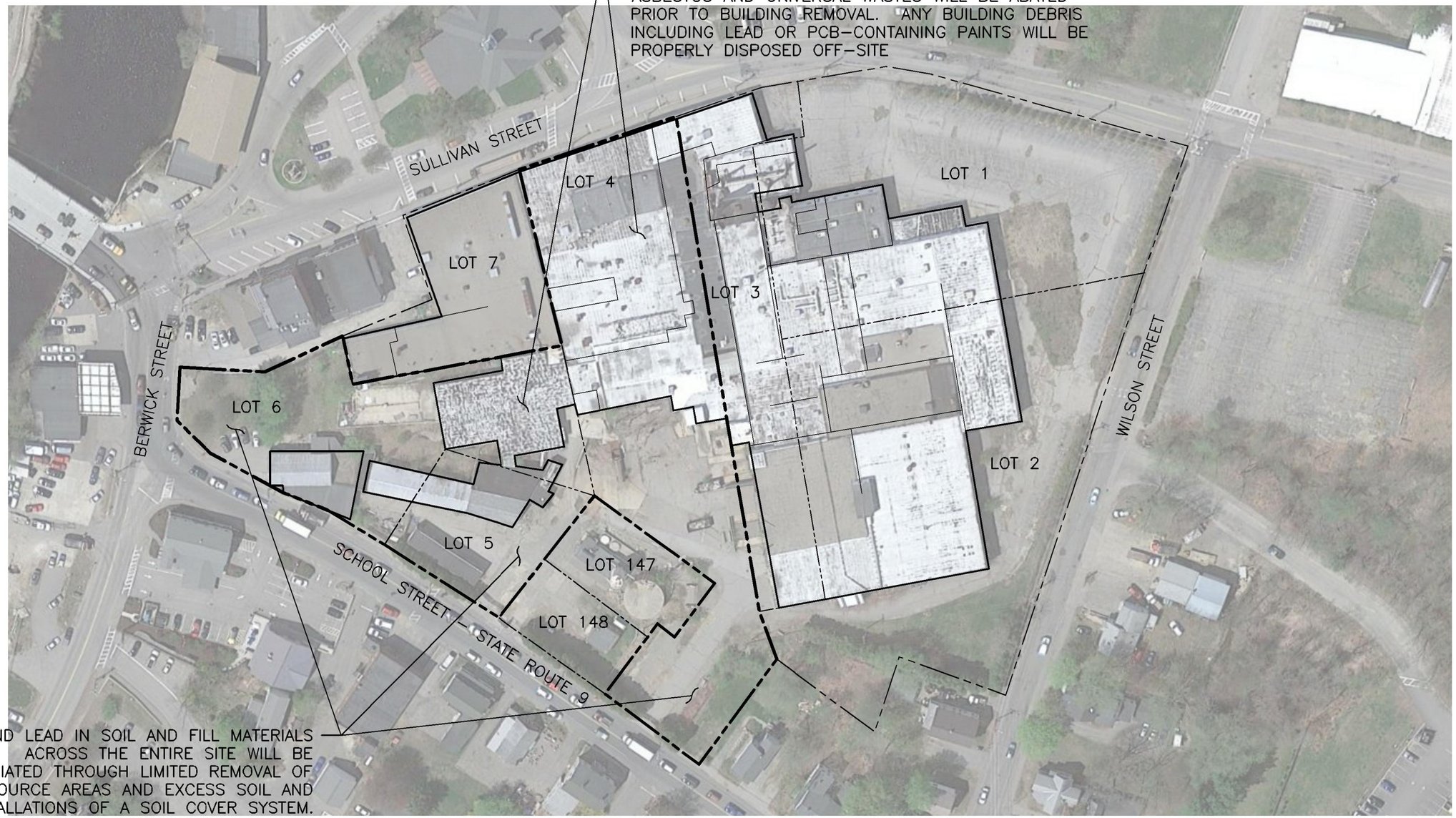

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- PARCEL BOUNDARY
- BUILDING FOOTPRINT
- INTERIOR BUILDINGS WALL

GRAPHIC SCALE
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FIGURE 2
DETAILED SITE PLAN

PRIME TANNING COMPANY
35 SULLIVAN STREET
BERWICK, MAINE

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Economy Community Environment

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