PHASE III
IDENTIFICATION, EVALUATION AND SELECTION OF COMPREHENSIVE REMEDIAL ACTION ALTERNATIVES (REMEDIAL ACTION PLAN)

(FOR PUBLIC COMMENT)

Acquired Residential Properties and Nemasket Street Lots
Portion of Parker Street Waste Site
New Bedford, Massachusetts

Release Tracking Number 4-15685

Prepared for:

City of New Bedford
Department of Environmental Stewardship
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April 2012

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) prepared this Massachusetts Contingency Plan (MCP) Phase III Identification, Evaluation and Selection of Comprehensive Remedial Action Alternatives (Phase III) for the properties located at 101, 102, and 111 Greenwood Street, and 98, 108, and 118 Ruggles Street (hereinafter "Acquired Residential Properties"), and the following Nemasket Street parcels: map 69, blocks 86 through 93 and blocks 96 through 100 (hereinafter "Nemasket Street Lots"). The Acquired Residential Properties and Nemasket Street Lots (hereinafter the "Site") are tracked by the Massachusetts Department of Environmental Protection (MassDEP) under Release Tracking Number (RTN) 4-15685, as a portion of the Parker Street Waste Site (PSWS). The Site is located on the eastern end of Greenwood and Ruggles Streets at or near the intersection of Hathaway Boulevard in New Bedford, Massachusetts. The Universal Transverse Mercator (UTM) coordinates for the Site are 337,689.99 meters east and 4,612,013.82 meters north in Zone 19.

This Phase III was completed for the City of New Bedford, Massachusetts (the "City"), and is intended to compliment the documentation of response actions detailed in the Phase II Comprehensive Site Assessment (hereinafter "Phase II CSA") report submitted on September 2, 2011 (TRC, 2011). Response actions at this Site continue to be conducted under a Special Project designation due to logistical complexities.

The Site owner and Licensed Site Professional (LSP) contact information is as follows:

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2.0 SITE DESCRIPTION AND BACKGROUND INFORMATION

A Site Location Map is provided as Figure 1, which illustrates the general Site vicinity within the City of New Bedford, Massachusetts. The New Bedford High School (NBHS) campus is located to the east of the Site across Hathaway Boulevard. The new Andrea McCoy Field and a church situated at the intersection of Parker Street and Hathaway Boulevard are located to the south of the Site. The Dr. Paul F. Walsh Athletic Complex (Walsh Field) is situated to the southeast of the Site, and the Keith Middle School (KMS) is located to the north of the Site. The remaining properties in the vicinity of the Site consist of single- or multi-family residential properties.

The Site properties are primarily level with shallow slopes leading to an isolated vegetated wetland on the northwestern boundary of the Nemasket Street Lots. The Acquired Residential Properties are grass-covered and the former structures, including foundations, have been removed. The Nemasket Street Lots were cleared in October 2010 to facilitate environmental investigation activities but vegetation has since begun to reestablish; these parcels have never been residentially or commercially developed. Cumulatively, the Site encompasses approximately 2.9 acres.

A drinking water well is located within 500 feet of the northwest corner of the Nemasket Street Lots. Remaining properties in the vicinity of the Site are connected to municipal water and sewer. New Bedford Harbor is located approximately 1.4 miles east of the Site.

2.1 Site Geology and Hydrogeology

Observation of Site soils and review of historic topographic maps indicates that surficial geology at the Site consists of glacial outwash sediments and potentially eolian derived deposits. Drumlins flank the Site to the east and west. Based on review of the USGS Bedrock Geologic Map of Massachusetts (Zen et al., 1983), bedrock beneath the Site is light gray, pinkish-gray to tan, mafic-poor granite known as Alaskite (Zagr).

The Acquired Residential Properties portion of the Site (Figure 2A) is underlain by topsoil and up to approximately 9 feet of anthropogenic fill material that includes sandy material with ash. In places, the ash fill includes without limitation broken glass, porcelain, brick fragments, rubber, slag, coal, cinders, fabric, plastic, concrete, asphalt, paper, leather and/or metallic fragments. The location of the top and bottom of the fill material is varied throughout the Acquired Residential Property portion of the Site, ranging from approximately 0.5 to 5 feet and 3 to 10.5 feet below ground surface, respectively. Fill thickness ranges from approximately 0.6 feet to 9 feet. Anthropogenic fill materials are underlain by approximately 0.2 to 3.4 feet of native dark brown organic peat material, mixed with silt and clay in places that remain from the wetland that predates the development of the area. Native soils below (or in the absence of the organic peat layer) are characterized as tan to gray fine to coarse sands with trace gravel and/or silty sand. Boring logs were included in the Phase II CSA.

The Nemasket Street Lot portion of the Site (Figure 2B) is underlain by topsoil and up to approximately 12 feet of anthropogenic fill material that includes sandy material with ash. In places, the ash fill includes without limitation broken glass, porcelain, brick fragments, rubber, slag, coal, cinders, fabric, plastic, concrete, asphalt, wood and/or metallic fragments. The location of the top and bottom of fill material is varied throughout the Nemasket Street Lot portion of the Site, ranging from approximately 0.4 to 1.5 feet and 5 to 13 feet below ground surface, respectively. Fill thickness ranges from approximately 7.5 feet to 12.5 feet. Anthropogenic fill materials are underlain by approximately 0.3 to 3 feet of native dark brown organic peat material, mixed with silt and clay that remains from the wetland that predates the development of the area. Native soils below or in the absence of the organic peat layer are characterized by gray fine sands with trace gravel and/or silty sand.

The depth to groundwater across the Site ranges from approximately 10 to 14 feet. Groundwater beneath the Site flows through an unconfined aquifer, predominantly to the southeast, at a gradient of about $5x10^{-3}$ ft/ft. The unconfined aquifer is composed of ash fill, organic peat, and/or glacial/eolian outwash sediments (listed from the ground surface down, as typically observed).

2.2 Site History

Based on a prior review of historical USGS topographic maps from 1941 and 1949, the Site was the location of a wetland area prior to activity associated with the PSWS. In the 1942 (1936 survey data) map and 1949 (1948 survey data) map, the Site is illustrated as a wetland.

Investigations revealed that the chemical profile of fill materials found at some locations at the Site were similar to those of industrial landfills, which suggests that the fill material was associated with dumping from industrial sources. NBHS was constructed to the east of the Site between 1970 and 1972. Soils displaced for construction of the building's foundation were reportedly transported across Hathaway Boulevard to what was then vacant land (the present-day location of the KMS and the Site). In 1994, much of the stockpiled soil was used for grading to create the Former Andrea McCoy Soccer Field (Former McCoy Field) across Hathaway Boulevard (McCoy Field PCB Approval Tech Support Document, USEPA, dated August 24, 2005). During an environmental investigation of the Former McCoy Field as a possible location for a middle school in 2000, concentrations of polychlorinated biphenyls (PCBs) above regulatory reporting criteria were detected, triggering a reporting condition to MassDEP. MassDEP assigned RTN 4-15685 to the PSWS.

2.3 Previous Site Investigations by Others

Following the detection of PCBs at the Former McCoy Field, additional investigations of the surrounding area (NBHS, Walsh Field, and the Site) were undertaken by the BETA Group, Incorporated (BETA) on behalf of the City in connection with a conditional approval issued by the United States Environmental Protection Agency (EPA) [PCB Risk-Based Cleanup and Disposal Approval, McCoy Field (New Keith Middle School), New Bedford, MA, USEPA August 24, 2005].

2.3.1 Acquired Residential Properties Investigations

Previous subsurface environmental investigations at the Acquired Residential Properties portion of the Site were conducted by BETA between December 2005 and June 2006 to evaluate the presence of soil impacts. Soil samples collected by BETA were analyzed for PCBs, Resource Conservation and Recovery Act (RCRA) 8 metals, polynulclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), dibenzofuran, and/or Total Petroleum Hydrocarbons (TPH). Several of the samples indicated individual detections of compounds at concentrations above MCP Method 1 S-1 soil standards. Data collected by BETA from the residential area are summarized in the following BETA reports:

- *Summary of Analytical Data, Volume I of II, Properties Located on: Greenwood Street, Ruggles Street, Durfee Street, New Bedford, Massachusetts,* dated March 15, 2006;
- *Summary of Analytical Data, Volume II of II, Properties Located on: Greenwood Street, Ruggles Street, Durfee Street, New Bedford, Massachusetts,* dated March 15, 2006;
- *Summary of Analytical Data, 98 Ruggles Street, New Bedford, Massachusetts,* dated September 14, 2006; and
- *Summary of Analytical Data, 102 Greenwood Street, New Bedford, Massachusetts,* dated September 14, 2006.

During that time, BETA advanced 164 soil borings throughout the Acquired Residential Properties portion of the Site.

TRC submitted a Phase II Comprehensive Site Assessment (Phase II CSA) that includes investigation of the Acquired Residential Properties to MassDEP in September 2011. In the Acquired Residential Properties portion of the Site, TRC advanced 75 borings, including surface soil sampling, and 17 test pits at the Acquired Residential Properties.

2.3.2 Nemasket Street Lots Investigations

BETA conducted subsurface environmental investigations at the Nemasket Street Lots portion of the Site between September 2004 and August 2005. Soil samples were analyzed for PCBs, RCRA 8 metals, SVOCs, PAHs, and dibenzofuran. Several of the samples indicated individual detections of chemicals at concentrations above MCP Method 1 S-1 soil standards. Summaries of the data collected by BETA from the residential area were submitted in the following BETA reports:

- *MEMORANDUM Subsurface investigations along the northern portion of Ruggles Street R.O.W. October 22, 2004,* dated November 12, 2004.
- *MEMORANDUM Subsurface investigations along Nemasket Street September 24, 28, 29 and October 1, 2004,* dated November 16, 2004.
- *Wetlands Risk-Based Cleanup Request*, dated September 1, 2005.

During that time, BETA advanced 22 soil borings throughout the Nemasket Street Lots portion of the Site.

TRC submitted a Phase II CSA that includes investigation of the Nemasket Street Lots to MassDEP in September 2011. In the Nemasket Street Lots portion of the Site, TRC advanced 47 borings, including surface soil sampling, and 23 test pits at the Site.

2.4 Risk Summary and Substantial Hazard Evaluation

A Method 3 Risk Characterization was performed for the Site, and was included in the Phase II CSA. The Risk Characterization concluded the following:

- No Imminent Hazard (IH) conditions exist at the Site;
- For current Site conditions a Condition of No Significant Risk exists, assuming the fence remains in place;
- Under unlimited future use scenarios, A Condition of No Significant Risk does not exist for potential soil impacts associated with the Site;
- A Condition of No Significant Risk does not exist for dermal contact by construction workers in connection with groundwater at the 102 Greenwood property; and
- A condition of No Substantial Hazard currently exists at the Site. A risk assessment documenting the absence of a Substantial Hazard will be included with the forthcoming Class C Response Action Outcome (RAO) per 310 CMR 40.1050(1)(a).

2.5 Special Project Designation

The RTN 4-15685 disposal site has a Special Project Designation, in accordance with 310 CMR 40.0060. An application was first submitted to MassDEP for a Special Project Designation on August 27, 2001. The Special Project Designation was granted for the Site on December 20, 2001. On June 2, 2007, MassDEP granted a five-year extension of the Special Project Designation. In February 2012, the City of New Bedford submitted an application for Special Project Designation Extension and Modification to MassDEP.

Public involvement meetings are held on a regular basis to inform concerned citizens of the project status. The public involvement meetings are broadcast on local public access television and include visual presentations by the LSP; interpretive services are provided for Portuguese and/or Spanish speaking attendees when requested.

3.0 PHASE III REMEDIAL ACTION ALTERNATIVES

The purpose of this Phase III is to document the results of the Identification, Evaluation, and Selection of Comprehensive Remedial Action Alternatives process, which was performed for the Site. This section satisfies MassDEP requirements for the selection and design of remedial response actions in accordance with 310 CMR 40.0850. The certifications required by the MCP were provided on the electronic Bureau of Waste Site Cleanup transmittal form submitted to MassDEP via eDEP concurrent with the submittal of this document.

3.1 Scope

If feasible, the objective of remediation at the Site will be to achieve a Permanent Solution and Class A RAO by demonstrating that a condition of No Significant Risk has been achieved.

The identification and evaluation of the remedial action alternatives process includes:

1. An initial screening to identify those remedial technologies that are reasonably likely to be feasible and effective.

2. Assembly of feasible remedial technologies into remedial action alternatives that are reasonably likely to achieve a level of No Significant Risk under the MCP.

3. A detailed, comparative evaluation of the selected remedial action alternatives with respect to effectiveness, reliability, difficulty of implementation, cost, risk, benefits, and timeliness. Additional details are provided for a selection of conceptual potential remedial approaches.

4. Selection of remedial alternative.

3.2 Alternatives Analysis

3.2.1 Remedial Action Objectives and Cleanup Goals

The objective of remediation at the Site is to address the requirements of the MCP and the federal Toxic Substances Control Act (TSCA) related to the cleanup of PCB impacts in soil where applicable. If feasible, MCP remediation seeks to eliminate the risks identified in the Phase II CSA Risk Characterization. Elimination of significant risks and the achievement of a Permanent Solution and Class A RAO would require the demonstration that a condition of No Significant Risk has been achieved by:

- Reducing concentrations in soil to levels below UCLs; and

- Eliminating or restricting future exposures to soils and groundwater that exceed potentially applicable MassDEP risk thresholds.

A Permanent Solution must conform to the requirements set forth in 40 Code of Federal Regulations (CFR) Part 761 to the extent that portions of the site are regulated under TSCA.

Specifically, TSCA remediation must meet the requirements of either §761.61(a), which outlines performance standards for a "self-implementing" cleanup approach, or §761.61(c), which outlines performance standards for a "risk-based" cleanup approach. For the purposes of this Phase III, TRC conducted an evaluation of alternatives to determine baseline cleanup conditions, assuming the more conservative self-implementing [61(a)] approach would be utilized. The final implementation may utilize 61(c), subject to regulatory concurrence.

For areas of the Site that are subject to the TSCA PCB regulations, post-remedial conditions must meet the following standards with respect to total PCB concentrations and occupancy:

- **High occupancy -** For future use of the Site as a high occupancy area (e.g., commercial site or public park), remaining soils must exhibit concentrations of total PCBs no greater than 1 mg/kg, or no greater than 10 mg/kg if a cap constructed in accordance with the requirements of §761.61(a)(7) is utilized as part of the cleanup remedy.

- **Low occupancy -** For future use of the Site as a low occupancy area (e.g., electrical substation, parking lot, or area where access is appropriately restricted to less than 16.8 hours per week per person), remaining soils must exhibit concentrations of total PCBs no greater than 25 mg/kg, or no greater than 50 mg/kg if the site is secured with a permanent fence marked with a sign including the PCB M_L mark (40 CFR 761.61(a)(4)(i)(B)(*2*)), or no greater than 100 mg/kg if a cap constructed in accordance with the requirements of §761.61(a)(7) is utilized as part of the cleanup remedy.

The MCP states that a Phase III evaluation shall result in the selection of a remedial action alternative which is a likely Permanent Solution, except where it is demonstrated pursuant to 310 CMR 40.0850 that a Permanent Solution is not feasible, or that the implementation of a Temporary Solution would be more cost-effective and timely than the implementation of a feasible Permanent Solution. If it is determined that a Permanent Solution is not feasible, the objective of remediation at the Site would be to eliminate any Substantial Hazards and achieve a Temporary Solution.

3.2.2 Areas Requiring Remediation

The MCP Method 3 Risk Characterization has concluded that a Condition of No Significant Risk does not exist for potential exposure to soil under unlimited future use scenarios at each exposure point. The Risk Characterization also concluded that a Condition of No Significant Risk does not currently exist for potential exposure to groundwater at the 102 Greenwood Street property.

Some areas are subject to the requirements of the federal PCB regulations under TSCA.

Achievement of a Temporary Solution and Class C RAO would involve maintaining the existing condition of No Substantial Hazard.

3.2.3 Identification and Initial Screening of Potential Remedial Technologies

<u>Identification of Potential Remedial Technologies</u>

The identification process focused on technologies that exhibited the potential to eliminate or significantly reduce exposure to the elevated levels of PCBs, metals, PAHs, and dioxins observed in the soil at the Site. The range of technologies includes:

<u>No Action</u>

No Action assumes no additional efforts are undertaken to eliminate potential future exposures to surface and subsurface soil contamination at the Site. It appears that this alternative would not achieve a Permanent Solution. However, a condition of No Substantial Hazard currently exists assuming existing Site controls remain in place. No additional remedial actions are necessary to achieve a Temporary Solution. Therefore, this technology is retained for further evaluation.

<u>Use Restrictions/Institutional Controls</u>

Institutional controls through the use of an Activity and Use Limitation (AUL) establish restrictions on the use of a site that may otherwise result in exposure to the soil impacts that remain.

Institutional controls are commonly used to maintain a condition of No Significant Risk or No Substantial Hazard at sites and are appropriate, where necessary, to control risks associated with potentially accessible soils.

An institutional control in the form of an AUL is not appropriate if the remediation objective is to achieve unrestricted future use of this Site. An AUL may be used in conjunction with other alternatives to achieve a condition of no significant risk of harm to human health and the environment.

Institutional Controls have been retained for consideration in the development of a comprehensive remedial scenario at the Site. Institutional controls are optional in the context of a Temporary Solution.

<u>In-situ Treatment</u>

In-situ treatment is an option that involves "in-place" treatment of soils by physical, biological, or chemical processes. The purpose of in-situ treatment is to transfer chemicals to another media or transform/destroy chemicals to less toxic chemicals, without the need to excavate the soil first. The particular technological process selected is usually dictated by the targeted chemical.

Thermal in-situ treatment of soils is an effective method of mitigating organic chemicals by increasing their volatilization. By raising the temperature of the soil with electric rods, organic chemicals will more readily volatilize, and can then be captured and treated as necessary. Organic chemicals are present at the Site, but these chemicals are co-located with inorganic chemicals. Therefore, this method of treatment cannot address all chemicals of concern at the Site.

Vitrification utilizes electrodes inserted into the ground to heat the soil to a liquid state. As the soil cools it will vitrify to a glass-like solid block trapping any and all chemicals. In order to safely perform vitrification, surrounding soils must be dried to prevent the release of steam during the vitrification process. Remedial cost becomes incrementally high in or near wetlands areas, where the water table is close to grade/zone of treatment. Generally, vitrification has the potential to be unsafe, has a limited history of practical applications, and also may result in future land use limitations, because the soil block must be left intact to properly contain the chemicals.

Chemical oxidation in-situ treatment may be an effective method of mitigating organic chemicals. Chemicals with oxidizing properties are introduced to the soil via direct push method, then react with and subsequently degrade the chemicals. Chemical oxidation treatment offers little benefit to this Site because it does not address all chemicals of concern.

Due to the lack of any single, practical technology that could potentially treat all co-located, targeted chemicals on-site, in-situ treatment of soils was not retained for further evaluation.

Ex-situ Treatment/Reclamation/Recovery

Ex-situ treatment is an option that involves excavation of soils for treatment by physical, biological, or chemical processes. Ex-situ treatment transfers chemicals to another media or transforms/destroys chemicals to less toxic compounds. The specific technological process selected is usually dictated by the targeted chemical. Ex-situ treatment may be conducted on-Site or off-Site. Following treatment, the excavated soil may be returned to the place of origin, or transported to a disposal facility, depending on the success of the treatment to reduce/destroy chemical concentrations.

At this Site, ex-situ treatment of some metals in soils may be appropriate prior to disposal, depending on disposal characterization sampling, toxicity and leaching procedure (TCLP) analysis, and MassDEP requirements listed in *Policy #COMM-97-001: Reuse & Disposal of Contaminated Soil at Massachusetts Landfills*. This technology, therefore, was retained for future consideration.

Also, some waste materials could require incineration, and the need for this process will depend on facility acceptance processes for soils targeted for excavation and removal from the Site.

Reclamation and recovery is a process of soil washing that scrubs soil to remove and separate the portion of the impacted soil. Chemicals tend to sorb to certain soils such as fine-grained silt and clay. Silt and clay in turn stick to larger-grained sand and gravel. Soil washing is a process to separate the silt and clay from the larger-grained clean soils, which may decrease the soil volume requiring disposal.

Before using soil washing, soil is excavated from the impacted area and the material is sifted to remove large objects such as rocks and debris. The soil is then placed in a scrubbing unit with wash water and sometimes detergent. Output includes wash water that must be treated, impacted soil that must undergo additional treatment or landfilling, and clean soil and potential need for emissions controls.

An alternative ex-situ method is with a solvent-based solution to extract soil-bound compounds. This technology has proven successful with PCBs, but is not designed to treat metals or PAHs.

Commercialization of washing and solvent extraction processes is not yet extensive. The presence of a complex mixture of chemicals such as metals, non-volatile organics, and PAHs and a heterogeneous matrix makes it difficult to formulate single washing solutions.

The soil washing/solvent extraction option was not retained for further consideration.

Containment

Containment is an option that involves covering contaminated soils in place to prevent direct contact (exposure barrier), erosion at the soil surface, and in some cases water infiltration. Excavating soil can be difficult based on site conditions and expensive, particularly when the volume of contaminated soil is large. Capping provides an effective and proven alternative of containment. Capping is generally considered a cost-effective method for managing large volumes of impacted soil. Containment measures are designed to isolate chemicals to prevent direct contact, erosion, and depending on the chemicals, leaching.

A containment remedy could consist of a layer of soil, asphalt, or concrete, which will eliminate or minimize direct contact with the underlying soils, and will address all chemicals. An engineered barrier, as described in MassDEP's guidance document (MassDEP, 2002), could also be an effective method of minimizing exposure risks at the Site, given particular site characteristics. Generally, an engineered cap is chosen when implementation of other remedial options becomes unfeasible, after evaluation through a cost-benefit analysis. When containment is selected for a remedial solution, it is typically implemented in conjunction with an Institutional Control. Containment is retained as a remedy for further consideration in the detailed evaluation.

Removal

Physical removal addresses risk-driving compounds in soil by physically removing impacted media from the Site with disposal at an off-Site facility.

Excavation and off-Site disposal is a proven and commonly used method that addresses all chemicals. To meet requirements of some disposal facilities, pretreatment of the contaminated media may be required. Screening of fill material is sometimes required to remove garbage and other debris.

This alternative typically targets small volumes due to the increased costs associated with excavation, transportation, and disposal fees. In addition, site restoration may be necessary, thereby further increasing costs.

Impacted soil could be excavated by readily available excavation equipment. However, treatment of excavated soil may be required where concentrations are incompatible with disposal facility acceptance requirements. Pretreatment may be performed on-Site, at an alternative stockpile or staging area, or at the receiving disposal facility.

Removal and off-site reuse, recycling, and/or disposal are common methods of site remediation. Given the proven performance of excavation as a site remedy at similar sites, this technology will be retained for further evaluation.

3.2.4 Technologies Retained for Further Evaluation

From the initial screening evaluation, a limited number of practicable remedial alternatives to address impacts at the Site were identified as able to be implemented based on available Site data and TRC experience. TRC developed conceptual remedial scenarios using the technologies retained for further evaluation.

The conceptual remedial scenarios developed from the initial screening include:

- **No. 1 – No Action**
- **No. 2 – Maintenance of Existing Site Controls and Implementation of Institutional Controls**;
- **No. 3 – Partial Pavement, Soil Excavation/Disposal and Institutional Controls –** This alternative includes the installation of pavement on some parcels, soil excavation to three feet & off-site disposal for other parcels, and/or implementation of an AUL;
- **No. 4 – Partial Pavement, Soil Excavation/Disposal, Soil Exposure Barrier (Cap) and Institutional Controls –** This alternative includes the installation of pavement on some parcels, soil excavation to three feet & off-site disposal for some parcels, soil capping at some parcels, and/or implementation of an AUL; and
- **No. 5 – Soil Excavation/Disposal, Soil Exposure Barrier (Cap) and Institutional Controls –** This alternative involves soil excavation to three feet and off-site disposal, and/or implementation of an AUL. This alternative could be modified to accommodate a passive recreational/open green space land use.

3.3 Evaluation and Comparison of Comprehensive Remedial Solutions

The above-summarized suite of conceptual remedial alternatives, other than Scenarios #1 and #2, could each be advanced to the Phase IV Implementation of Selected Remedial Action Alternative (Phase IV) and Remedy Implementation Plan (RIP) stages and attain a Class A RAO. Conceptual Remedial Scenario #2 could be advanced to attain a Class C RAO. Descriptions of the Conceptual Remedial Alternatives are provided below, including a preliminary discussion of compliance with TSCA regulations, where appropriate. Please refer to Table 1 for a comparison of key features of each conceptual approach. Table 2 presents a summary of approximate remedial costs for each conceptual alternative.

3.3.1 Conceptual Remedial Scenario No. 1 - No Action

The No Action alternative involves no remedial actions, and represents a baseline for comparison of the remaining remedial alternatives. The No Action alternative would not result in a Permanent Solution under the MCP and may not prevent exposures to impacted media Site, if the integrity of the fence is not monitored and maintained. A Condition of No Substantial Hazard currently exists, but the No Action alternative may not meet the remedial action objectives and cleanup goals in the future due to reliability concerns. This alternative will not be evaluated further with respect to the comparative evaluation criteria.

3.3.2 Conceptual Remedial Scenario No. 2 - Maintenance of Existing Site Controls

This scenario involves no additional remedial actions, but the maintenance of existing Site controls. Currently, access to the majority of the Site is restricted by a six-foot high chain-link fence with locked gates, which limits exposure to the impacted soil on Site.

If Site conditions are maintained by monitoring and repair (where necessary) of the physical access restrictions, a condition of No Substantial Hazard would continue to exist at the Site. Under this alternative, Site conditions would meet the remedial action objectives of a Temporary Solution pursuant to a Class C RAO. The City could implement work toward a Permanent Solution under the appropriate regulatory vehicle if necessary funding and resources are acquired. Demonstration that TSCA-related remedial endpoints have been achieved would also be required in the future if funding and resources are acquired.

The condition of the fence should be monitored periodically, and deficiencies addressed. Five-year reviews of the remedy would need to be conducted and status reports would be submitted to MassDEP, until such time that a Permanent Solution could be reached.

A moderate degree of certainty exists that this alternative will be successful at actually limiting exposures to contaminants in soil because the majority of the Site is surrounded by a fence.

This alternative would be comparatively easy to implement. This alternative is not complex in nature, and does not require the availability of materials, equipment, coordination of remedial contractors, or significant financial resources. Periodic monitoring of the existing fence conditions would be necessary and repairs to the fence could be made promptly.

Very low risk during implementation is anticipated because the alternative does not involve excavation, transport, containment, or construction. The risk characterization has concluded that a Condition of No Significant Risk and No Substantial Hazard exists under current conditions, and monitoring and repairs will ensure that exposures to potential receptors are restricted.

Benefits gained from this alternative are high related to costs, because an RAO can be achieved quickly as the alternative does not require any action other than maintenance of the existing Site controls.

TRC estimates a total cost of approximately $24,000 to achieve a Temporary Solution and a Class C RAO. Additional maintenance and monitoring costs would total approximately $3,000 annually.

A Permanent Solution would be required in the future at this Site if feasible, and this cost is not reflective of work conducted towards a Permanent Solution. As long as the Site remains under a Class C RAO, five-year re-evaluations of the Site status would need to be performed, and status report would be submitted to MassDEP.

3.3.3 Conceptual Remedial Scenario No. 3 - Partial Pavement, Soil Excavation/Disposal and Institutional Controls

Conceptual remedial Scenario No. 3 consists of the installation of a pavement cap on some parcels, and soil excavation to three feet below grade on other parcels. All excavated soil would be disposed of off-Site and replaced with clean backfill. Future use of the Site may include without limitation paved parking lots and/or one area of continuous open space.

3.3.3.1 Site Preparation

The Site consists of approximately three acres of currently undeveloped land that is overgrown with grass, weeds, and shrubby growth. Initial Site preparation would include the installation of erosion controls along portions of the Site perimeter. Remaining vegetation would then be cleared so excavation equipment and personnel can safely maneuver during Site work. A temporary storage trailer for hand tools, portable facilities, and a dumpster for construction materials waste may be staged on-Site. Temporary concrete barriers and Police details may be necessary for traffic controls.

3.3.3.2 Soil Removal

1. Removal for Pavement Preparation/Construction

Removal activities would be performed with an excavator to a depth of two feet below grade at the target properties. See Figure 4 for typical cross-sectional details. Excavated soil would be hauled to a nearby staging yard for temporary stockpiling, or directly loaded into roll-off containers and properly disposed of off-Site. Existing topography slopes gradually upward from Ruggles Street to the Nemasket Street Lots, which would be addressed differently as described below. A two-foot excavation would be made parallel to the roadway and graded to slope inward at 2%. See Figure 4 for typical cross-sectional details. This approach would seek to minimize the volume of excavated soil requiring off-Site disposal, while maintaining acceptable grade for a parking lot.

2. Remedial Excavation to Three Feet

Removal activities would be performed with an excavator to a depth of three feet below grade at the remaining properties. See Figure 5 for typical cross-sectional details. Excavated soils would be hauled to a nearby staging yard or directly loaded into roll-off containers and properly disposed of off-Site, or could be managed on-site.

3. Additional Remedial Excavation for TSCA/MCP UCL Requirements

Six distinct locations exhibiting total PCB concentrations greater than 100 mg/kg have been identified at the Site. Two of these locations also exceed MCP UCLs. These six locations would be excavated and disposed of off-Site. Removal of soil in these areas would allow for high occupancy use of these properties in the future.

The total volume of soil that would be excavated and disposed off-Site under Remedial Scenario No. 3 is approximately 11,650 cubic yards.

3.3.3.3 Ex-Situ Treatment

Due to the levels of lead observed in soil samples collected at the Site, it is anticipated that some Site soils will require testing for TCLP lead and potentially other compounds. Soils exhibiting concentrations greater than twenty times the regulatory limit listed in 310 Code of Massachusetts Regulations (CMR) 30.125 Table 1 would be tested by TCLP analysis. Ex-situ treatment of the soils may be appropriate prior to off-Site disposal depending on TCLP results. Ex-situ treatment of soils would consist of manually mixing soil stockpiles with a stabilizing agent using an excavator or similar means. Certain waste-receiving facilities can perform this treatment at their facilities. Other requirements may apply depending upon available off-site facilities and associated facility acceptance processes.

3.3.3.4 Backfill

Once excavation and removal activities are completed, a geotextile separation fabric would be placed in the bottom of the excavation areas. A brightly-colored demarcation layer would be placed on top of the first foot of backfill to provide a visual warning for future activities that may disturb surface soils. Approximately 18,300 cubic yards of backfill materials would be delivered from a clean, off-Site source for the purposes of filling areas excavated for remedial purposes and preparing a sub-base for asphalt pavement. The quality of the backfill would be guaranteed through a sufficient number of backfill characterization analyses. The backfill would be compacted to a minimum thickness of two feet below areas of pavement, and minimum thickness of three feet below areas with no proposed pavement. The final six inches of backfill in areas with no proposed pavement would consist of a layer of topsoil, and would be graded at the finished surface elevation. Conceptual cross-sectional details depicting the proposed remedial actions for the Acquired Residential Properties are provided as Figure 5. Sloped areas of the Nemasket Street Lots, which are unsuitable for paved parking, would be capped with a three-foot soil cap that is flush with the pavement elevation. One proctor test and one backfill characterization analysis would be performed for every five hundred cubic yards of backfill to determine compaction parameters. Two compaction tests would be completed for each one-foot lift.

3.3.3.5 Pavement Installation

A bituminous binder layer in addition to a bituminous wearing layer would be placed on top of the backfill materials (backfill materials below paved areas would consist of a minimum six-inch layer of densely graded gravel compacted over structurally sound borrow material). The finished surface would result in a two-foot, asphalt-finished cap over the contaminated soil, which would limit future exposures. See Figure 4 for typical cross-sectional details. To limit the impact the new pavement would have on stormwater runoff, catch basins may be installed beneath each individual parking lot.

3.3.3.6 Stormwater Management Considerations

State and local regulations state that post-development peak discharge rates should not exceed pre-development peak discharge rates at development sites. The total amount of impervious surface cover would increase under this scenario, due to the construction of additional paved areas. To maintain a peak discharge rate equal to or less than pre-development conditions, a stormwater retention system could be installed. Such systems could be constructed in a variety of configurations, and would require additional excavation for installation.

A preliminary stormwater analysis of pre-development and post-development conditions using the same cover-type comparison method indicates a system may also be appropriate for the areas of paving/parking. It is anticipated that a single system could be constructed for these areas, to be determined in detailed design, and would require additional excavation for installation.

Because the Site area is approximately three acres, a Stormwater Pollution Prevention Plan would be required to comply with the EPA's National Pollutant Discharge Elimination System (NPDES) regulations. This plan would be filed with the EPA prior to construction.

3.3.3.7 Confirmatory Sampling

Confirmatory sampling would be necessary to ensure the desired limits of remedial excavation have been achieved. Simultaneous compliance with both MCP and TSCA regulations can be achieved with the approaches available under 40 CFR 761.

3.3.3.8 Landscaping

The areas of exposed soil at the Site would be seeded with grass cover. To further limit the possibility of future exposures to contaminated soil, and to meet the low occupancy requirements of TSCA, a permanent fence would be installed around the grass covered areas of the Nemasket Street Lots. A warning sign would be fixed to visible locations on the fence to alert passers-by of the presence of PCBs, per 40 CFR 761.61(a)(4)(i)(B)(*2*). Access to areas within the fence would be restricted to authorized personnel only.

3.3.3.9 Environmental Monitoring

Environmental monitoring would be conducted throughout the remedial activities to prevent the migration of chemicals by air, dust, stormwater, and vehicles. Dust suppression equipment would also be kept on-Site; should nuisance dust conditions arise. Although elevated levels of VOCs are not anticipated, a PID would be utilized as a precaution to monitor VOC concentrations during remedy implementation along with dust monitoring instrumentation.

3.3.3.10 Implementation of an AUL

An AUL would be implemented in conjunction with this remedial alternative to ensure that future activities that may disturb soils below three feet or below areas of pavement are restricted The AUL must also meet TSCA requirements listed at 40 CFR 761(a)(4)(i)(B) and 761.61(a)(7) and (a)(8).

3.3.3.11 Summary

A comparative summary matrix of remedial action evaluation criteria is included in Table 1. This remedial action alternative would result in a Permanent Solution in accordance with the MCP, and would be relatively effective in accordance with Section 40.0858(1) of the MCP because:

1. Most surface soil impacts would be treated or destroyed; and
2. Overall chemicals concentrations would be reduced.

A moderate degree of certainty exists that this alternative would be successful at actually limiting exposures to chemicals in soil. Surface soil impacts would be removed/controlled, and subsurface soils would be separated by an asphalt or soil cap, with a fence also utilized in certain areas.

This alternative would be relatively difficult to implement. The expansive amount of pavement would require additional equipment compared to the other remedies and the incorporation of a larger stormwater detention system.

Monitoring would be conducted to mitigate potential risks during implementation due to chemical migration (dust, erosion, vehicles, etc.) During non-working hours, a security fence would prevent unauthorized access to potentially exposed soils in open excavation areas. Upon completion of the remedial alternative, moderately low risk associated with remaining contaminated soil is expected, due to the three-foot soil cover, the areas of pavement, the restricted access fence, and the restrictions imposed by the AUL. Future risks related to potential construction work could be mitigated by implementation and adherence to a Soil Management Plan.

This alternative provides the benefit of achieving a Permanent Solution, providing for limited reuse of parts of the Site including additional parking near schools. In addition, this alternative could be implemented relatively quickly. The estimated capital cost of this alternative is $7 million. Annual monitoring costs are estimated to be approximately $7,000 per year following site closure.

The excavation and backfilling of soil and paving would likely take the course of ten to twelve weeks, not including public comment, any related permitting, and/or regulatory review.

3.3.4 Conceptual Remedial Scenario No. 4 - Partial Pavement, Soil Excavation/Disposal, Soil Exposure Barrier (Cap) and Institutional Controls

Conceptual Remedial Scenario No. 4 consists of the installation of pavement on some parcels, soil excavation to three feet at some parcels, and placing a three-foot soil cap at some parcels. Excavated soil would be properly disposed of off-Site, and excavation areas would be backfilled with clean material.

3.3.4.1 Site Preparation

Initial Site preparation would include the installation of erosion controls along portions of the Site perimeter. Vegetation would then be cleared so excavation equipment and personnel can safely maneuver during Site work. A temporary storage trailer for hand tools, portable facilities, and a dumpster for construction materials waste may be staged on-Site. Temporary barriers and police details may be necessary for traffic controls and would be implemented if needed.

3.3.4.2 Soil Removal

1. Removal for Pavement Preparation

Removal activities would be performed with an excavator to a depth of two feet below grade at target properties. See Figure 4 for typical cross-sectional details. Excavated soils would be hauled to a nearby staging yard for temporary stockpiling, or directly loaded into roll-off containers and disposed of off-Site in accordance with their classification, which would be determined by existing sampling data and waste characterization sampling.

2. Remedial Excavation to Three Feet

Removal activities would be performed with an excavator to a depth of three feet below grade at target properties. Existing topography slopes gradually upward from Ruggles Street to the Nemasket Street Lots, which would be addressed differently as described below. A three foot excavation would be made parallel to the roadway and sloped upwards at a 3:1 slope. This approach would attempt to minimize the volume of excavated soil requiring off-Site disposal, while maintaining an acceptable grade for standard landscaping equipment. See Figure 5 for these typical cross-sectional details. Excavated soil would be hauled to a nearby staging yard or directly loaded into roll-off containers and properly disposed of off-Site, or could be managed on-site.

3. Excavation to Prepare for Soil Capping

To maintain three feet of cover at the edges of a cap, borders of this portion of the Site would be excavated to three feet below grade parallel to the roadway and slope inward at a 3:1 slope. This approach would seek to minimize the volume of excavated soil, while maintaining an acceptable grade for standard landscaping equipment. See Figure 5 for these typical cross-sectional details. Excavated soils would be hauled to a nearby staging yard or directly loaded into roll off containers and properly disposed of off-Site, or could be managed on-site.

4. Additional Remedial Excavation for TSCA/MCP UCL Requirements

Six distinct locations exhibiting total PCB concentrations greater than 100 mg/kg have been identified at the Site. Two of these locations also exceed MCP UCLs. These six locations would be excavated and properly disposed of off-Site. In addition, two locations are identified as exceeding TSCA high-occupancy criteria (10 mg/kg total PCBs) on the 98 & 118 Ruggles Street properties, as shown on Figure 3. Removal of soil in these areas would allow for high occupancy use of these properties in the future.

A total of approximately 7,750 cubic yards of soil would be excavated and disposed of off-Site under Remedial Scenario No. 4.

3.3.4.3 Ex-Situ Treatment

Due to the levels of lead observed in field samples collected at the Site, it is anticipated that some Site soils would be tested for TCLP analysis. Soils exhibiting concentrations greater than twenty times the regulatory limit listed in 310 CMR 30.125 Table 1 would be tested by TCLP analysis Ex-situ treatment of the soils may be appropriate prior to off-Site disposal based upon TCLP results. Ex-situ treatment of soils would consist of manually mixing soil stockpiles with a stabilizing agent using an excavator or similar means. Certain waste receiving facilities can perform this treatment at their facilities. Other requirements may apply depending upon available off-site facilities and associated facility acceptance processes.

3.3.4.4 Backfill

Once excavation and removal activities are complete, a geotextile separation fabric would be placed in the bottom of the excavation areas. A brightly-colored demarcation layer would be placed on top of the first foot of backfill to provide a visual warning for future activities that may disturb surface soils. Approximately 18,700 cubic yards of backfill materials would be delivered from a clean, off-Site source for the purposes of filling areas excavated for remedial purposes and preparing a sub-base for asphalt pavement. The quality of the backfill would be guaranteed through a sufficient number of backfill characterization analyses. The backfill would be compacted to a minimum thickness of two feet below areas of pavement, and minimum thickness of three feet below areas with no proposed pavement. The final six inches of backfill in areas with no proposed pavement would consist of a layer of topsoil, and would be graded at the finished surface elevation. Conceptual cross-sectional details depicting the proposed remedial actions for the Acquired Residential Properties are provided as Figure 5. The majority of the Nemasket Street Lots, excluding the slope towards Ruggles Street and Hathaway Boulevard, would be capped with three feet of fill on top of existing material. The portions of the Site adjacent to these streets would be excavated first, so that final grades at the Site would be flush with the existing elevations at street level. Typical cross-sectional details are provided as Figure 5. One proctor test and one backfill characterization analysis would be performed for every five hundred cubic yards of backfill to determine compaction parameters. Two compaction tests would be completed per each one-foot lift.

3.3.4.5 Pavement Installation

A two-inch bituminous binder layer, and one-inch bituminous wearing layer would be placed on top of the backfill materials (backfill materials below paved areas would consist of a minimum six-inch layer of densely graded gravel compacted over structurally sound borrow material). The finished surface would result in a two-foot, asphalt-finished cap over the contaminated soil, which would limit future exposures. See Figure 4 for typical cross-sectional details. Catch basins may be installed to limit the impact the new pavement may have on stormwater runoff.

3.3.4.6 Stormwater Management Considerations

A stormwater detention system may be necessary for the parking lots or other paved surfaces. Such systems could be constructed in a variety of configurations, and would require additional excavation for installation.

A storm water detention system is not anticipated for the Nemasket Street Lots portion of the Site under this remedial scenario.

Because the Site area is approximately three acres, a Stormwater Pollution Prevention Plan would be required to comply with the EPA NPDES regulations. This plan would be filed with the EPA prior to construction.

3.3.4.7 Confirmatory Sampling

Confirmatory sampling would be necessary to ensure the desired limits of remedial excavation have been achieved. Simultaneous compliance with both MCP and TSCA regulations can be achieved with the methods indicated in 40 CFR 761 Subpart O.

3.3.4.8 Landscaping

Areas of exposed soil at the Site would be seeded with grass cover. To further limit the possibility of future exposures to impacted soil, and to meet the low occupancy requirements of TSCA, a permanent fence would be erected surrounding the grass covered areas of the Nemasket Street Lots. A warning sign would be fixed to visible locations on the fence to alert passers-by of the presence of PCBs, per 40 CFR 761.61(a)(4)(i)(B)(*2*). Access to areas within the fence would be restricted to authorized persons only.

3.3.4.9 Environmental Monitoring

Environmental monitoring would be conducted throughout the remedial activities to prevent the migration of chemicals by air, dust, stormwater, and vehicles. Dust suppression equipment would also be kept on-Site; should nuisance conditions arise. Although elevated levels of VOCs are not anticipated, a PID would be utilized as a precaution to monitor VOC concentrations during remedy implementation, as well as dust monitoring instrumentation.

3.3.4.10 Implementation of an AUL

An AUL would be implemented in conjunction with this remedial alternative to ensure that future activities that may disturb soils below three feet or below areas of pavement are restricted. The AUL must also meet TSCA requirements listed at 40 CFR 761(a)(4)(i)(B) and 761.61(a)(7) and (a)(8).

3.3.4.11 Summary

Please see Table 1 for a comparative summary matrix of remedial action evaluation criteria. This remedial action alternative would result in a Permanent Solution in accordance with the MCP, and would be moderately effective in accordance with Section 40.0858(1) of the MCP because:

1. Surface soil impacts would be treated or destroyed; and
2. Overall chemical concentrations would be reduced.

A moderately high degree of certainty exists that this alternative would be successful at actually limiting exposures to chemicals in soil. Surface soil impacts would be removed and subsurface soils would be separated by a cap. In addition, the Nemasket Street Lots would be surrounded by a fence to ensure they remain a low occupancy area.

This alternative would be moderately difficult to implement.

Monitoring would be conducted to mitigate potential risks during implementation due to chemical migration (dust, erosion, vehicles, etc.). During non-working hours, a security fence would prevent unauthorized access to potentially exposed soils in open excavation areas. Upon completion of the remedial alternative, moderately low risk associated with remaining impacted soil is expected, due to the three-foot soil cover and the restrictions imposed by the AUL. Future risks related to construction work could be mitigated by adherence to a Soil Management Plan.

This alternative provides the benefit of achieving a Permanent Solution, providing for limited reuse of parts of the Site, and improving aesthetics. Access to the Nemasket Street Lots would be restricted, and this portion of the Site would not be available for public use. The estimated cost of this alternative is $5 million. Annual monitoring costs are estimated to be approximately $7,000 per year following site closure. This alternative would likely take the course of 8-10 weeks to implement, not including public comment, any related permitting, and/or regulatory review.

3.3.5 Conceptual Remedial Scenario No. 5 - Soil Excavation to Three Feet and Off-Site Disposal, Implementation of an AUL

Conceptual Remedial Scenario Number 5 generally consists of removing soils at the Site to a depth of three feet and backfilling with clean fill and topsoil material. Distinct areas of soils exhibiting concentrations greater than MCP UCLs or 100 mg/kg total PCBs would also be removed. Alternative 5 may be executed in a way that would allow for the recreational use of all Site properties.

3.3.5.1 Site Preparation

Initial Site preparation would include the installation of erosion controls along portions of the perimeter. Vegetation would then be cleared so excavation equipment and personnel can safely maneuver for Site work. A temporary storage trailer for hand tools, portable facilities, and dumpster for construction materials waste may be staged on-Site.

3.3.5.2 Soil Removal

Removal activities would be performed with an excavator to a depth of three feet below grade across the entire Site. See Figure 5 for typical cross-sectional details. Excavated soil would be hauled to a nearby staging yard for temporary stockpiling, or directly loaded into roll-off containers and properly disposed of off-Site, or could be managed on-site.

Six distinct locations exhibiting total PCB concentrations greater than 100 mg/kg have been identified on the Site. Two of these locations also exceed MCP UCLs. These six locations would be excavated and properly disposed of off-Site. In addition, one location is identified as exceeding TSCA high-occupancy criteria (10 mg/kg total PCBs) on the 118 Ruggles Street property, as shown on Figure 3. Removal of soil in this area would allow for high occupancy use of these properties in the future.

The total volume of soil that would be excavated and disposed off-Site under Remedial Scenario No. 5 is approximately 15,750 cubic yards.

3.3.5.3 Ex-Situ Treatment

Due to the levels of lead observed in field samples collected at the Site, it is anticipated that some Site soils would be tested by TCLP analysis. Soil exhibiting concentrations greater than twenty times the regulatory limit listed in 310 CMR 30.125 Table 1 would be tested by TCLP analysis Ex-situ treatment of the soils may be necessary prior to off-Site disposal. Ex-situ treatment of soils would consist of manually mixing soil stockpiles with a stabilizing agent using an excavator or similar means. Certain waste receiving facilities can perform this treatment at their facilities. Other requirements may apply depending upon available off-site facilities and associated facility acceptance processes.

3.3.5.4 Backfill

Prior to backfill, a separation fabric would be placed in the bottom of the excavation areas. A brightly-colored demarcation layer would be placed on top of the first foot of backfill to provide future visual delineation between the potentially-contaminated subgrade and clean surface soil. Approximately 18,900 cubic yards of borrow would be delivered from a clean, off-Site source, backfilled, and compacted to a minimum thickness of two and a half feet. The quality of the backfill would be guaranteed through a sufficient number of backfill characterization analyses. A six inch layer of loam would be placed and graded over the borrow to be revegetated. See Figure 5 for typical cross-sectional details. Two compaction tests would be completed for each one foot lift. One proctor test and one backfill characterization analysis would be performed for every five hundred cubic yards of backfill.

3.3.5.5 Confirmatory Sampling

Confirmatory sampling would be necessary to ensure the desired limits of remedial excavation have been achieved. Simultaneous compliance with both MCP and TSCA regulations can be achieved with the methods indicated in 40 CFR 761 Subpart O.

3.3.5.6 Landscaping

The areas of exposed soil at the Site would be seeded with grass cover. To further limit the possibility of future exposures to impacted soil, and to meet the low occupancy requirements of TSCA, a permanent fence would be erected surrounding the grass covered areas of the Nemasket Street Lots and at 101 and 102 Greenwood. A warning sign would be fixed to visible locations on the fence to alert passers-by of the presence of PCBs, per 40 CFR 761.61(a)(4)(i)(B)(*2*) at the Nemasket Street Lots. Access to areas within the fence would be restricted to authorized personnel only.

3.3.5.7 Environmental Monitoring

Environmental monitoring would be conducted throughout the excavation activities to prevent the migration of chemicals by air, dust, stormwater, and vehicles. Dust suppression equipment would also be kept on-Site; should nuisance conditions arise. Although elevated levels of VOCs are not anticipated, a PID would be utilized as a precaution to monitor VOC concentrations during remedy implementation along with dust monitoring instrumentation.

3.3.5.8 Implementation of an AUL

An AUL would be implemented in conjunction with this remedial alternative to ensure that future activities that may disturb soils below three feet are restricted. The AUL must also meet TSCA requirements listed at 40 CFR 761(a)(4)(i)(B) and 761.61(a)(7) and (a)(8).

3.3.5.9 Summary

Please see Table 1 for a comparative summary matrix of remedial action evaluation criteria. This action alternative would result in a Permanent Solution in accordance with the MCP, and would be moderately effective in accordance with Section 40.0858(1) of the MCP because:

1. Surface soil impacts would be treated or destroyed; and
2. Overall chemicals concentrations would be reduced.

A high degree of certainty exists that this alternative would be successful at actually limiting exposures to chemicals in soil. Surface soil impacts would be removed, subsurface soils would be separated by a cap, and property boundaries would be surrounded by locked fences.

This alternative would be relatively simple to implement.

Monitoring would be conducted to mitigate potential risks during implementation due to chemical migration (dust, erosion, vehicles, etc.) During non-working hours, a security fence would prevent unauthorized access to potentially exposed soils in open excavation areas. Upon completion of the remedial alternative, moderately low risk associated with remaining impacted soil is expected, due to the three-foot soil cover, fencing, and the restrictions imposed by the AUL. Future risks related to construction work could be mitigated by adherence to a Soil Management Plan.

This alternative would provide the benefit of achieving a Permanent Solution, and could be implemented if the City obtains financial resources. The estimated cost for this alternative is $8 million. Annual monitoring costs are estimated to be approximately $7,000 per year following site closure. The excavation and backfill of soil would likely take the course of 11 weeks, not including public comment, any related permitting, and/or regulatory review.

As noted above and in Table 1, this alternative may be expanded to enable the use of all of the Acquired Residential properties for passive recreational/open green space purposes. In order to accomplish this, additional soils below three-foot depths and exhibiting concentrations of PCBs greater than the high occupancy use thresholds identified in Section 3.2.1 would be removed. The estimated cost to enable the use of these properties for passive recreational/ open green space purposes is $9 million. While the comparative benefits to the local residents would be increased (high), the level of effort would also increase with moderate implementation risk, and the timeline lengthened depending upon desired design elements.

3.4 Selection of Remedial Action Alternative

In addition to the No Action alternative, four Comprehensive Remedial Scenarios were evaluated for addressing the risk associated with impacts to soil and groundwater at the Site. One scenario was identified as being potentially able to achieve a Temporary Solution under the MCP and three scenarios were identified as being potentially able to achieve a Permanent Solution. Each alternative was evaluated with consideration given to the comparative evaluation criteria contained in 310 CMR 40.0858 of the MCP (effectiveness, reliability, difficulty of implementation, cost, risks, benefits, and timeliness).

A Temporary Solution is determined to be more feasible than the implementation of a Permanent Solution. Due to the existing condition of No Substantial Hazard at the Site, Remedial Scenario #2 could be implemented relatively easily, quickly, and cost-effectively. Under the Temporary Solution scenario, the immediate cost represents a fraction of the immediate cost to implement a Permanent Solution. In addition, the timeframe to implement a Temporary Solution is also significantly shorter than the implementation of a Permanent Solution. The incremental benefits that would be associated with immediately implementing response actions toward a Permanent Solution would not be justified by the substantial costs. However, it is anticipated that a Permanent Solution would be achieved in the future via a scenario similar to the other options that were evaluated, and subsequently a Class A RAO could be filed. Therefore, Comprehensive Remedial Scenario #2 is chosen as the most feasible remedy.

3.5 Schedule

Per 310 CMR 40.0861(2)(i), a projected schedule for submittal of a Class C Response Action Outcome is presented in Appendix B.

4.0 FEASIBILITY ANALYSES

A Feasibility Evaluation was completed in accordance with 310 CMR 40.0860 and with consideration of the guidance presented in MassDEP's document *Conducting Feasibility Assessments Under the MCP* (Policy #WSC-04-160).

4.1 Feasibility of Implementing a Permanent Solution

In certain cases, remedial actions to achieve or approach background may be considered to be categorically infeasible. Such is the case when the incremental cost of conducting a remedial action would be substantial and almost always disproportionate to the incremental benefit or risk reduction (see Policy #WSC-04-160).

A condition of No Substantial Hazard currently exists at the Site due to existing access restrictions. The cost of remediating the soil and groundwater on the approximately 2.9 acre Site in an attempt to achieve a Permanent Solution would be disproportionate to the incremental benefits of risk reduction and environmental restoration.

The City has reached a condition of No Substantial Hazard by purchasing the properties of concern, and restricting access to impacted areas. A demonstration of costs necessary to achieve a Permanent Solution has been provided, estimated to range from $5 million to $9 million. At this time, funding is not currently available to undertake further response actions at such a scale.

4.2 Critical Exposure Pathways

There are no critical exposure pathways at this Site.

5.0 PUBLIC INVOLVEMENT

In accordance with 310 CMR 40.0863 and 310 CMR 40.1400 thru 310 CMR 40.1406, the Mayor and the Board of Health for the City of New Bedford have been notified in writing of the availability of this report. The notifications were completed concurrent with the submittal of this report. Copies of the letters are provided in Appendix A.

6.0 PHASE III COMPLETION STATEMENT AND LSP OPINION

This Phase III Remedial Action Plan was completed in accordance with the requirements of 310 CMR 40.0850 and the performance standards of 310 CMR 40.0853. Pursuant to 310 CMR 40.0862(3), it is the opinion of the LSP overseeing this Phase III Remedial Action Plan that the selected remedial action alternative is likely to achieve a Class C RAO for this portion of the PSWS.

The LSP overseeing this Phase III Remedial Action Plan is:

Mr. David M. Sullivan, LSP, CHMM
LSP License Number: 1488
TRC Environmental Corporation
Wannalancit Mills
650 Suffolk Street
Lowell, Massachusetts 01854
(978) 656-3565

____________________________________ ______________________________

David M. Sullivan, LSP, CHMM **Date**
TRC Environmental Corporation
Licensed Site Professional No. 1488

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Stamp

TABLES

Table 1
Remedial Alternative Evaluation Matrix
Nemasket and Acquired Residential Properties
New Bedford Massachusetts

Remedial Action Alternative	Comparative Evaluation Criteria*:	Comparative Effectiveness	Comparative Reliability	Comparative Difficulty of Implementation	Comparative Cost	Comparative Implementation Risks	Comparative Benefits	Comparative Timeliness	Notes
#1	No Action	Ineffective	Unreliable	N/A	Zero	High	Low	N/A	This alternative may not meet the remedial action objectives and cleanup goals in the future due to reliability concerns.
#2	Maintenance of Existing Site Controls and Implementation of Institutional Controls	Low	Moderately Low	Easy	Low	Moderate to High	Low	Long	This alternative would not be as effective as the remaining options, since a Permanent Solution would not be achieved at this time. However, it is the most cost-effective alternative, and can be implemented immediately with relative ease.
#3	Partial Pavement, Soil Excavation/Disposal, and Institutional Controls	Effective	Moderate	Difficult	High	Low to Moderate	High	Moderate (10-12 weeks)	This options offers the highest benefit because it would allow the City to add parking in a high traffic area near two schools. A stormwater management system would be required to control stormwater flow for some of the paved areas of the Site.
#4	Partial Pavement, Soil Excavation/Disposal, Soil Exposure Barrier (Cap), and Institutional Controls	Moderately Effective	Moderate to High	Low to Moderate	Moderate	Low to Moderate	Moderate	Short (8-10 weeks)	This alternative represents a moderately-priced option because less contaminated soil is excavated removed from the Site than in Alternatives #2 and #4. However, this option eliminates some possible future uses for some portions of the Site.
#5	Soil Excavation/Disposal, Soil Exposure Barrier (Cap), and Institutional Controls	Effective	High	Low to Moderate	High	Low	Low to Moderate	Moderate (10-12 weeks)	This would likely be the second most costly option, and would eliminate some possible future uses for some portions of the Site. This alternative may be executed to enable the use of these properties for passive recreational purposes/open green space (Alternative #5a). While the benefits to the local residents would be high, the level of effort would also increase with moderate implementation risk, and the timeline lengthened depending on desired design elements.

* Effectiveness - the ability of the remedy to treat, destroy, detoxify, reuse, or recycle contaminants at the Site, and achieve a Permanent Solution under the MCP.
Reliability - the degree of certainty that the remedy will be successful over the short- and long-term timeframes.
Difficulty of Implementation - comparative difficulty in terms of technical complexity, integration with facility operations, monitoring requirements, and material and labor availability.
Relative Costs - Costs in terms of remedy design and implementation.
Implementation Risks - comparative risks posed by the Site to workers, the community, and the environment during and after remedy implementation.
Benefits - the comparative benefits of the alternative including the provision for productive Site reuse, restoration of natural resources, and other non-pecuniary benefits.
Timeliness - the relative time for the alternative to eliminate uncontrolled hazardous material and achieve a condition of No Significant Risk at the Site.

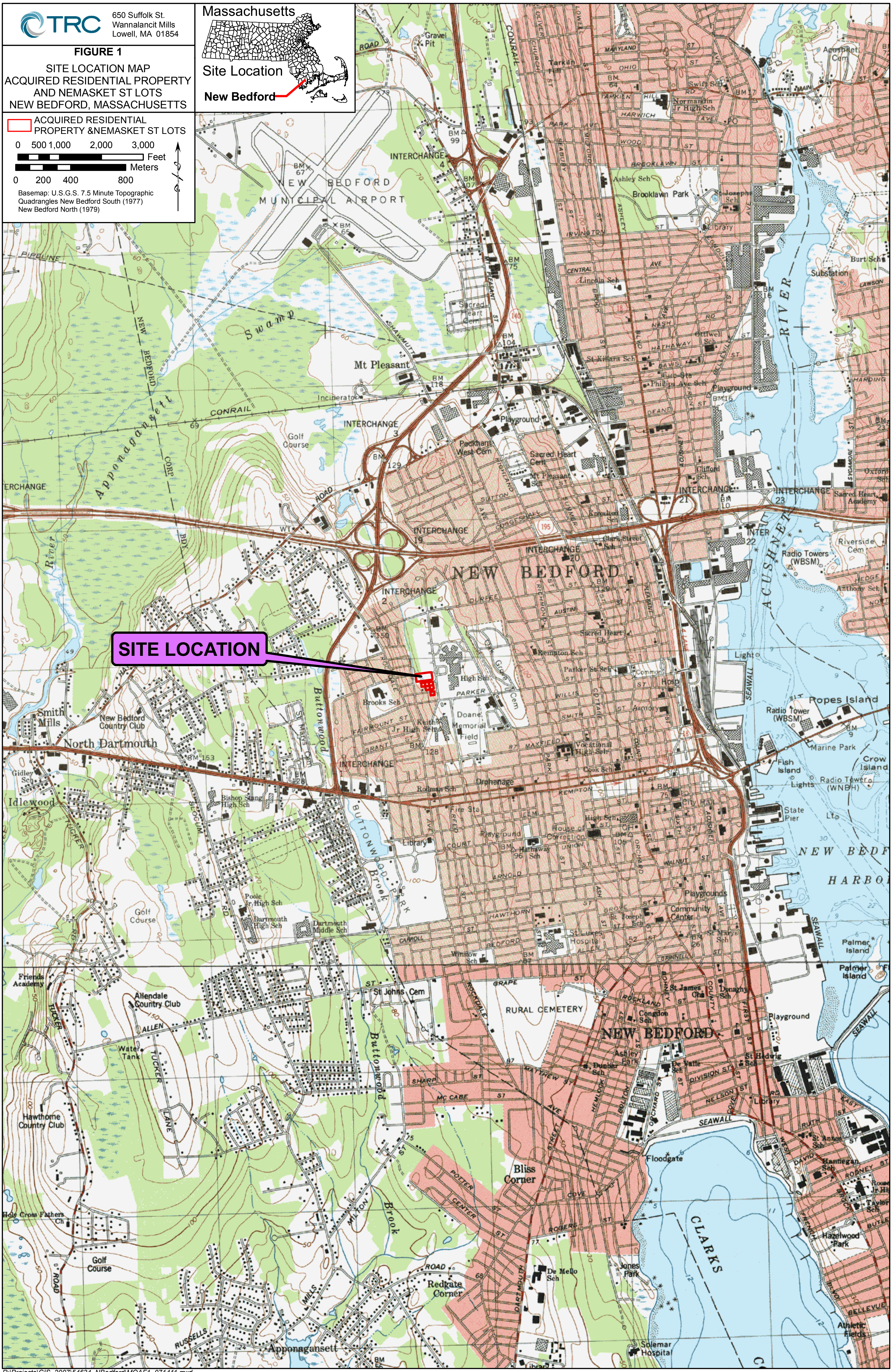
Table 2 - Cost Estimate Summary for the Remedial Alternatives Proposed in the MCP Phase III Report
Acquired Residential Properties and Nemasket Street Lots
New Bedford, Massachusetts

Remedial Alternative	Approximate Estimated Capital Cost	Approximate Estimated Annual Monitoring Cost
ALTERNATIVE 2 - Maintenance of Existing Site Controls	$24,000	$3,000
ALTERNATIVE 3 - Partial Pavement, Soil Excavation/Disposal, and Institutional Controls	$7,000,000	$7,000
ALTERNATIVE 4 - Partial Pavement, Soil Excavation/Disposal, Soil Exposure Barrier (Cap), and Institutional Controls	$5,000,000	$7,000
ALTERNATIVE 5 - Soil Excavation to Three Feet/Disposal and Institutional Controls	$8,000,000	$7,000
ALTERNATIVE 5a - Soil Excavation to Three Feet, Removal of Additional Soil for High-Occupancy Use, and Institutional Controls	$9,000,000	$7,000

Notes:

1) Costs provided represent comparative numbers for the scenarios described in the Phase III, and were derived for the purposes of a comparative evaluation in accordance with the criteria listed at 310 CMR 40.0858(4). These estimated costs cannot be used as design-level assessments.
2) Each alternative assumes regulatory closure is conducted under the Massachusetts Contingency Plan coordinated with a self-implementing cleanup in accordance with 40 CFR 761.61(a).
3) MCP and Federal reporting costs to reach a Permanent Solution are not included.
4) Each alternative assumes all soil will be treated for Toxicity Characteristic Leaching Procedure (TCLP) Lead.
5) Excavation dewatering is not anticipated nor included in the cost estimates.
6) The percent of the total soil volume required to be disposed at a RCRA Subtitle D landfill was estimated based on existing data and the conceptual extents of excavations (Alternative 3 - 40%; Alternative 4 - 25%, Alternative 5 - 50%, Alternative 5a - 50%). Percentages may change based on disposal characterization sampling and final design extents of excavation.
7) Additional scope contingency is associated with increased TSCA post excavation sampling under Alternative 5a.
8) Costs do not include taxes, labor premiums, or contractor markups.
9) Alternative 5a represents cost to achieve high-occupancy (i.e., unfenced) use of all Acquired Residential Properties, and assumes that any risk associated with groundwater concentrations is reduced by source removal concurrent with the excavation.
10) Post-excavation sample results may alter the total volume of soil required to be removed to meet risk thresholds and/or TSCA occupancy requirements.
11) The impact of additional sampling (pre- or post- excavation) on soil volumes and/or remedial efficacy cannot be forecast.

FIGURES


TRC
650 Suffolk St.
Wannalancit Mills
Lowell, MA 01854
FIGURE 1
SITE LOCATION MAP
ACQUIRED RESIDENTIAL PROPERTY
AND NEMASKET ST LOTS
NEW BEDFORD, MASSACHUSETTS
ACQUIRED RESIDENTIAL PROPERTY &NEMASKET ST LOTS
0 500 1,000 2,000 3,000 Feet
0 200 400 800 Meters
Basemap: U.S.G.S. 7.5 Minute Topographic Quadrangles New Bedford South (1977) New Bedford North (1979)
Massachusetts
Site Location
New Bedford
SITE LOCATION
NEW BEDFORD MUNICIPAL AIRPORT
NEW BEDFORD
North Dartmouth
Smith Mills
Idlewood
Apponagansett
Bliss Corner
Redgate Corner
Mt Pleasant
ACUSHNET RIVER
NEW BEDFORD HARBOR
CLARKS
Popes Island
Palmer Island
Fish Island
Crow Island
RURAL CEMETERY
Buttonwood Brook
Apponagansett Swamp

LEGEND:

- SITE OF DEMOLISHED BUILDING
- MAJOR CONTOUR
- MINOR CONTOUR
- FENCE (APPROXIMATE)
- SITE BOUNDARY
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- BETA SOIL BORING LOCATION
- PREVIOUS TRC SOIL BORING LOCATION
- PREVIOUS EPA SOIL BORING LOCATION

APPROXIMATE GRAPHIC SCALE
0' 10' 20' 40'

ENVIRONMENTAL INVESTIGATION AND RELATED
ENVIRONMENTAL CONSULTING SERVICES
NEW BEDFORD HIGH SCHOOL & SURROUNDING NEIGHBORHOOD
NEW BEDFORD, MASSACHUSETTS

ACQUIRED RESIDENTIAL PROPERTIES
SAMPLE LOCATIONS

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 2A

DRAWN BY: HWB
CHECKED BY: DNP
DATE: AUG 2011

FILE: T:\E_CAD\115058\ACQ RES PROP SAMP LOCS.dwg

NOTES:

1. EM AND GPR RESULTS BASED ON "COMBINED EM AND GPR RESULTS, NEMASKET STREET LOT, NEW BEDFORD, MA" BY HAGER GEOSCIENCE, INC. WOBURN, MA DATED NOVEMBER 2010.
2. BETA INFORMATION DERIVED FROM "PERIPHERAL AREAS SOUTH OF McCOY FIELD" UNDATED AND "BETHEL A.M.E. SOIL SAMPLE LOCATION PLAN" DATED 9-9-2005, BOTH FROM BETA GROUP. INC. OF NORWOOD MA.

LEGEND:

- TEST PIT LOCATION
- TRC SOIL BORING LOCATION
- PREVIOUS BETA SOIL BORING LOCATION
- EPA SOIL BORING LOCATION
- GPR ANOMALY
- GPR ANOMALY MARKED IN FIELD
- EM METAL ANOMALY
- EM METAL ANOMALY MARKED IN FIELD
- EM SOIL CONDUCTIVITY ANOMALY
- LOT LINES
- NEMASKET STREET EASEMENT
- SITE BOUNDARY

APPROXIMATE GRAPHIC SCALE
0' 5' 10' 15' 30'

ENVIRONMENTAL INVESTIGATION AND RELATED ENVIRONMENTAL CONSULTING SERVICES
NEW BEDFORD HIGH SCHOOL & SURROUNDING NEIGHBORHOOD
NEW BEDFORD, MASSACHUSETTS

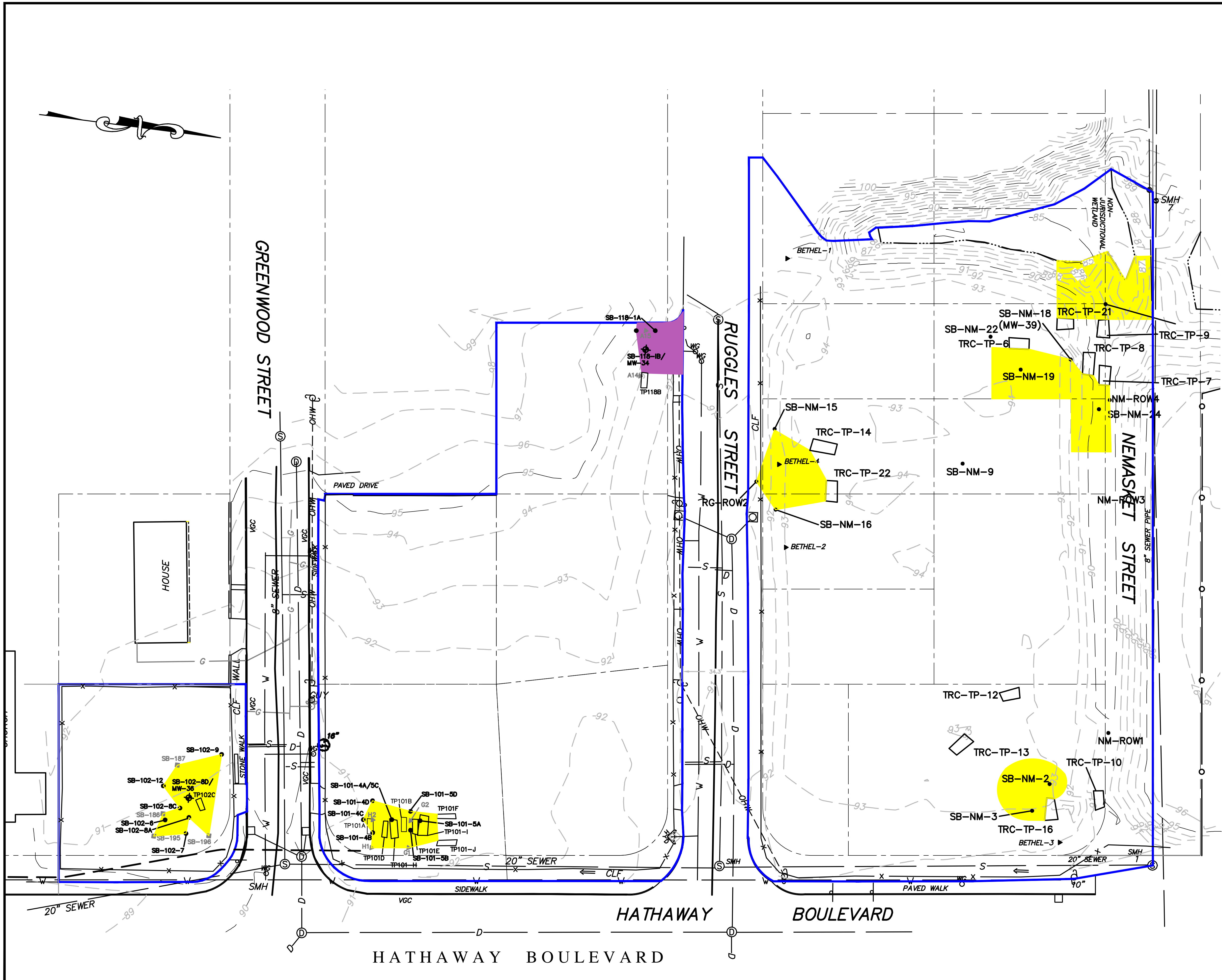
NEMASKET STREET LOTS
SAMPLE LOCATIONS

TRC Wannalancit Mills, 650 Suffolk Street, Lowell, MA 01854, (978) 970-5600

FIGURE 2B

DRAWN BY: HWB | DATE: AUG 2011
CHECKED BY: DNP

FILE: T:\E_CAD\115058\NEMASKET ST LOT BORINGS 8-12-11.dwg



NOTES:

1. THIS PLAN SHOWS AREAS PROPOSED FOR EXCAVATION TO REMOVE SOILS IN ACCORDANCE WITH TSCA OCCUPANCY REQUIREMENTS, AND SOILS EXHIBITING CONCENTRATIONS GREATER THAN MCP UPPER CONCENTRATION LIMITS.

LEGEND:

- SITE BOUNDARY
- PARCEL BOUNDARY
- EXISTING 1' CONTOUR
- EXISTING 5' CONTOUR
- DELINEATED WETLAND
- EXISTING FENCE LINE
- DELINEATED WETLAND
- SOIL BORING BY BETA
- SOIL BORING BY TRC
- TEST PIT BY TRC
- TARGETED AREA FOR EXCAVATION BASED ON MCP UCL AND/OR TSCA LOW-OCCUPANCY CRITERIA
- EXCAVATION AREA TO MEET TSCA HIGH-OCCUPANCY REQUIREMENTS

GRAPHIC SCALE

25' 0' 25' 50' 100'

SCALE: 1"=50'

CONCEPTUAL SPOT EXCAVATION LOCATIONS

NEMASKET/ ACQ. RES. PROPERTIES NEW BEDFORD, MA

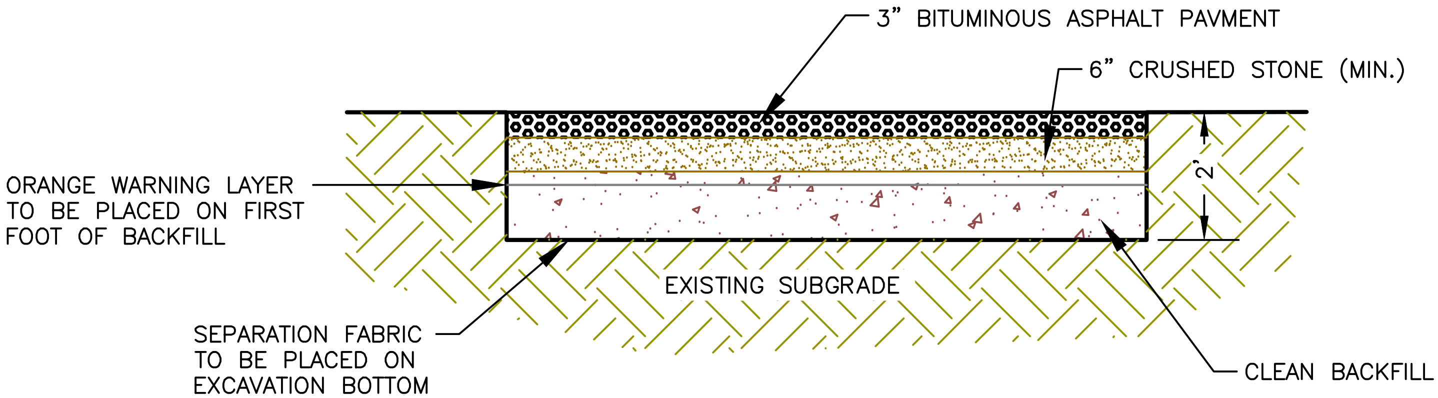
TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 3

DRAWN BY: SM

CHECKED BY: DP

DATE: AUGUST 2011



D-1

TYPICAL ASPHALT CAP - CONCEPTUAL

TRC | NOT TO SCALE | DATE: 8/26/2011

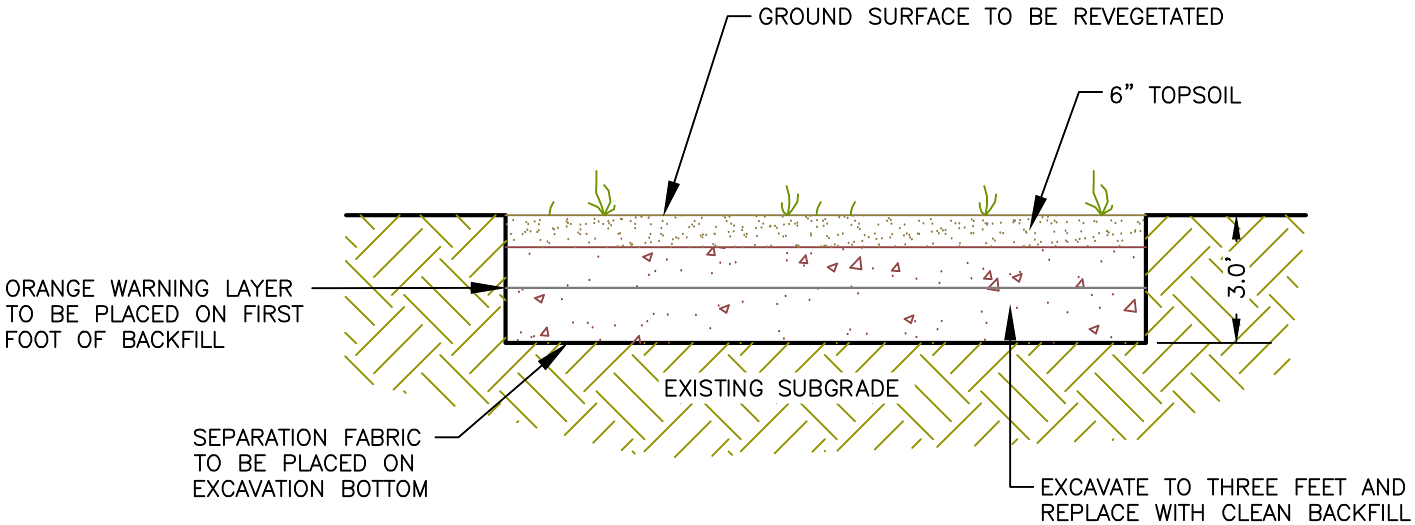
TYPICAL ASPHALT CAP
LEVEL CROSS-SECTION

NEMASKET/ACQ. RES. PROPERTIES
NEW BEDFORD, MA

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 4

DRAWN BY: SM
CHECKED BY: DP
DATE: AUGUST 2011



D–3

TYPICAL 3-FT EXCAVATION & BACKFILL

TRC NOT TO SCALE DATE: 8/26/2011

TYPICAL 3-FOOT EXCAVATION & BACKFILL	
NEMASKET/ ACQ. RES. PROPERTIES NEW BEDFORD, MA	
TRC — Wannalancit Mills, 650 Suffolk Street, Lowell, MA 01854, (978) 970–5600	FIGURE 5
DRAWN BY: SM / CHECKED BY: DP	DATE: AUGUST 2011

APPENDIX A

PUBLIC INVOLVEMENT NOTIFICATIONS

APPENDIX B

PROJECT SCHEDULE

Acquired Residential/Nemasket

Proposed Schedule for Site Closure

- Prepare Partial Class C RAO May 2012