# SUPPLEMENTAL SITE INVESTIGATION
# REPORT ADDENDUM
# JUNE 2007

# FORMER GORHAM MANUFACTURING SITE
# 333 ADELAIDE AVENUE
# PROVIDENCE, RHODE ISLAND

MACTEC

engineering and constructing a better tomorrow

June 28, 2007

MACTEC PN: 3650050041

Mr. Joseph T. Martella II
Senior Engineer
State of Rhode Island
Office of Waste Management
Department of Environmental Management
235 Promenade Street
Providence, RI 02908-5767

**RE: Submittal of Addendum Letter**
**Supplemental Site Investigation Report**
**Former Gorham Manufacturing Site**
**333 Adelaide Avenue**
**Providence, Rhode Island**

Dear Mr. Martella:

On behalf of Textron, Inc., MACTEC Engineering and Consulting, Inc. (MACTEC) is pleased to submit a four hard copies and one electronic copy of the Addendum Letter for the July 2006 Supplemental Site Investigation Report (SIR) for the Former Gorham Manufacturing Site located at 333 Adelaide Avenue, Providence, Rhode Island. This Addendum Letter is being submitted in response to our meeting of June 14, 2007 to complete the site investigation work within the Phase I area of the Park Parcel. This Addendum Letter has also been prepared consistent with the provisions of Section 8 of the Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases.

Should there be any questions please to do not hesitate to contact either Mr. Michael Murphy or myself at 781-245-6606, or Mr. Greg Simpson at Textron, Inc. at 401-457-2635.

Sincerely,
**MACTEC Engineering and Consulting, Inc.**

David E. Heislein
Project Manager

Michael J. Murphy
Sr. Principal Environmental Scientist

Enclosures: Addendum Letter to 2006 Supplemental Site Investigation Report – Four bound hard copies and one electronic copy on compact disk

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MACTEC Project Files [P:\W2-mfg\TEXTRON\GORHAM\SupplementSI 2007\Cover Ltr SIR Addendum Ltr 062807.doc]

**SUPPLEMENTAL SITE INVESTIGATION**
**REPORT ADDENDUM**
**JUNE 2007**

**FORMER GORHAM MANUFACTURING SITE**
**333 ADELAIDE AVENUE**
**PROVIDENCE, RHODE ISLAND**

***Prepared For:***

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***Prepared By:***

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MACTEC Project No. 3650-05-0041

June 28, 2007

Michael J. Murphy
Principal Risk Assessor

David E. Heislein
Project Manager

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# GLOSSARY OF ACRONYMS

| | |
|---|---|
| bgs | Below the Ground Surface |
| COC | Chain of Custody |
| CY | Cubic Yards |
| DDE | Dichlorodiphenyldichoroethylene |
| DDT | Dichlorodiphenyltrichloroethane |
| DEC | Direct Exposure Criteria |
| ELUR | Environmental Land Use Restriction |
| GPS | Global Positioning System |
| I/CDEC | Industrial/Commercial Direct Exposure Criteria |
| LOW | Limit of Work |
| MACTEC | MACTEC Engineering & Consulting, Inc. |
| mg/kg | milligrams per kilogram |
| PAH | Polynuclear Aromatic Hydrocarbon |
| ppt | Parts Per Trillion |
| QA/QC | Quality Assurance/Quality Control |
| RAWP | Remedial Action Work Plan |
| RDEC | Residential Direct Exposure Criteria |
| RIDEM | Rhode Island Department of Environmental Management |
| SSIR | Supplemental Site Investigation Report |
| SPLP | Synthetic Precipitation Leaching Procedure |
| TEFs | toxic equivalence factors |
| TEQ | toxic equivalence |
| TPH | total petroleum hydrocarbon |
| UCL | Upper Concentration Limit |
| WHO | World Health Organization |

# 1 INTRODUCTION

On behalf of Textron, Inc., MACTEC Engineering & Consulting, Inc. (MACTEC) has prepared this Addendum to the Supplemental Site Investigation Report (SSIR) submitted to the Rhode Island Department of Environmental Management (RIDEM) on July 31, 2006 for the Former Gorham Manufacturing Site located at 333 Adelaide Avenue, Providence, Rhode Island (Site). This addendum is in conformance with the RIDEM Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations). This addendum is consistent with discussions at a June 14, 2007 meeting between representatives of RIDEM, Textron and MACTEC and describes the planned soil cap on the Park Parcel in support of planned recreational use, and specifically Phase I of the Park Parcel remediation. Detailed descriptions of Phase I soil cap will be provided in a Remedial Action Work Plan (RAWP) submitted to RIDEM under separate cover. This letter also presents results of additional soil investigation of the Park Parcel conducted by MACTEC in February 2007 to further assess the potential presence of dioxin in the Park Parcel surface soils and possible extension of the Phase I cap to address these areas.

## 1.1 PHASED-APPROACH

The July 31, 2006 SSIR presented an extensive investigation of surface soils, sediment, and surface water at the Site. Based on the analytical data, a remedial alternative evaluation (Section 6.0) for the Park Parcel and Mashapaug Cove was completed within the 2006 SSIR. The remedial alternatives have been divided into three Phases. Phase I addresses the western half of the Park Parcel, Phase II addresses Mashapaug Cove, and Phase III addresses the remaining eastern half of the Park Parcel. Refer to Figure 1 for the phases of remedial action at the Site.

The purpose of this phased-approach is to conduct necessary remedial activities in a timely manner on the portion of the Park Parcel that is closest to the High School. By completing Phase I in 2007, the potential contact of students with construction machinery and impacted soils is minimized. Work on the soil cap will proceed from west to east going away from the school. This will limit work near the students by the planned school opening of September 1, 2007. At this time, we anticipate that in order to complete Phase I capping activities in the vicinity of the school parcel prior September 1, 2007, all RIDEM approvals and contractor mobilization must occur by July 23, 2007.

The phased-approach will also allow for the simultaneous additional investigation of the groundwater at the Gorham Site and the Mashapaug Cove sediments, which are required to support future remedial activities. Textron is planning to prepare a work plan for RIDEM review later this summer and conduct the work later this year. This data will be used to complete the SSIR for the remainder of the Park Parcel and to develop the remedial alternatives and prepare the selected remedial alternative design for Phases II and III. Completion of the Phase II cove sediment and wetland remediation work is planned for June 2008 after the students are out of school for the summer. The Phase III soil cap will also be performed immediately following Phase II; this area will be used to stage material and equipment necessary to complete Phase II activities. The chain-link fence following the upland (southern) portion of the Park Parcel will be maintained through the completion of Phase III when all soils exceeding RIDEM residential direct exposure criteria (RDEC) have been addressed. Both Phase II and Phase III will be described in detail to RIDEM under a separate SSIR Addendum. The purpose of this Addendum is to address Phase I only.

# 2 REGULATORY COMPLIANCE

As currently proposed, Textron will go beyond its requirements as stated in the March 29, 2006 Consent Order to remediate the Park Parcel to Industrial/Commercial Standards (previously proposed Industrial/Commercial Land Use Cap in the July 2006 SSIR) and has proposed a "Recreational Use" Cap that will bring the Park Parcel into compliance, per the Remediation Regulations, with soil RDEC. The compliance demonstration is accomplished by using Method 1 and Method 2 (dioxin toxic equivalence (TEQ) and several other analytes) soil objectives approach. In the absence of any recreational land use criteria, the RDEC are health protective criteria for recreational land use. The exposure assumptions used to calculate the RDEC would clearly overestimate likely recreational exposures and compliance with these criteria will create a health protective environment for use of the Park Parcel for recreational purposes.

The following paragraphs, tables, and figures document that the portions of the Park Parcel that are outside the footprint of the proposed "Recreational Use" Cap are in compliance with the RDEC. The cap will be constructed with material that meets RDEC, so overall, the soils both inside and outside the footprint of the Recreational Use cap will be in compliance with the health protective RDEC.

Figure 2 documents the extent of the proposed "Recreational Use" Cap and also shows the soil sampling locations that are outside the footprint of the cap. Those soil sampling locations are representative of potential soil exposures outside the cap footprint. Table 1 documents the comparison of uncapped soil analytical data to the direct exposure criteria (DEC) and documents that there are no applicable Leachability Criteria for detected analytes. The RDEC was calculated as a Method 2 Risk Assessment activity because the Remediation Regulations do not include soil criteria for dioxins. Calculation of the Method 2 DEC is presented in Appendix F of the July 2006 Supplemental SSIR.

As set forth in Section 8.10 of the Remediation Regulations, compliance with soil RDECs is demonstrated as discussed below.

<u>For less than twenty soil samples</u> (this applies to acetone, the pesticides 4,4-dichlorodiphenyldichoroethylene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), delta-

BHC, Endosulfan II, Endrin ketone, gamma-chlordane, barium, beryllium, cadmium, chromium, mercury, nickel, silver, zinc, and total petroleum hydrocarbon (TPH)):

- The analytical results for all samples using this approach must be below the appropriate soil objective to demonstrate compliance.

As shown in Table 1, the maximum detected concentrations and maximum reporting limits for non-detects of 4,4-DDE, 4,4'-DDT, delta-BHC, Endosulfan II, Endrin ketone, gamma-chlordane, barium, beryllium, cadmium, chromium, mercury, nickel, silver, zinc, and TPH in soil samples are below the corresponding RDECs. One exception is a soil sample analyzed for beryllium that exceeds RDECs. Therefore, these concentrations from outside the footprint of the "Recreational Use" Cap for these chemical parameters are in compliance with the RDECs.

For twenty or more samples (this applies to the 13 detected polynuclear aromatic hydrocarbon (PAH) compounds, arsenic, copper, lead, and dioxin TEQ):

- A statistical approach may be proposed for determining compliance;
- No single sample result exceeds the soil objective by a factor of 5;
- No more than 10% of the individual sample results exceed the soil objective; and
- No single sample result exceeds any Upper Concentration Limit (UCL) as defined by Rule 8.07.

For chemicals with twenty or more samples, the statistical approach selected for determining compliance is that the arithmetic mean concentration for all samples is representative of potential exposures and if the arithmetic mean is below the RDEC and the data set also meets the specific criteria identified above, the data are in compliance with the RDEC. The arithmetic mean is calculated using all sample results, including one-half the reporting limit for non-detects. As shown in Table 1, the arithmetic mean concentrations of the 13 detected PAH compounds, arsenic, copper, lead, and dioxin TEQ are all below the corresponding RDECs. Therefore, the compliance criteria for these compounds have been met.

In addition, the maximum detected concentrations and the maximum reporting limits for non-detects of arsenic and lead are below the RDEC. Obviously, for arsenic and lead, no single sample result exceeds the soil objective by a factor of 5; and no more than 10% of the individual sample results exceed the soil objective; and no single sample result exceeds any UCL as defined by Rule 8.07. Therefore arsenic and lead concentrations in soil are in compliance with the RDECs.

Copper was detected in all samples but below the RDEC. Obviously, for copper, no single sample result exceeds the soil objective by a factor of 5; and no more than 10% of the individual sample results exceed the soil objective; and no single sample result exceeds any UCL as defined by Rule 8.07. Therefore copper concentrations in soil are in compliance with the RDECs.

For the detected PAHs, only three compounds (benzo(a)pyrene, benzo(b)fluoranthene, and chrysene) have at least one detected concentration that is greater than the RDEC. However, none of the detected concentrations are more than 5 times the corresponding RDEC. For all three compounds, there is only one detected concentration above the RDEC among 27 samples. Therefore, less than 10% of the samples had a detected concentration greater than the RDEC. Therefore the RIDEM compliance for these compounds is met.

For dioxin TEQ, the arithmetic mean concentration 2.1 parts per trillion (ppt) ($2.1 \times 10^{-6}$ milligrams per kilogram (mg/kg)) is below the calculated RDEC of 4.3 ppt. The maximum dioxin TEQ concentration is 8.5 ppt (not more than 5 times the RDEC) and only two of twenty samples (10%) have a concentration greater than the RDEC. Therefore, the compliance criteria identified above are met for dioxin TEQ in the portion of the Park Parcel that is outside the "Recreational Use" Cap footprint.

As seen in Table 1, none of the detected concentrations or reporting limits for any chemical parameters (including the PAH compounds) are above the UCL of 10,000 mg/kg for non-TPH parameters and the TPH concentrations and reporting limits are well below the UCL of 30,000 mg/kg.

In conclusion, the analytical data for soils outside the footprint of the proposed "Recreational Use" Cap have been compiled, summarized, and compared to RDECs and UCLs. Using the criteria contained in Section 8.10 of the Remediation Regulations, the soils in areas outside the proposed "Recreational Use" Cap have arithmetic mean chemical concentrations that are below the RDECs, no single concentration is greater than 5 times the corresponding RDECs, not more than 10% of the samples have concentrations greater than the RDECs, and no concentrations of chemicals in soil are greater than the soil UCLs. Therefore, the soils outside the proposed "Recreational Use" Cap are in compliance with the RDECs. In the absence of any recreational land use criteria, the RDECs are health protective criteria for recreational land use. The exposure assumptions used to calculate the RDECs would clearly overestimate likely recreational

exposures. Therefore, the soils outside the proposed "Recreational Use" Cap represent a health protective condition for recreational land use.

In addition, the cap will be constructed with material that also meets RDECs, so overall, the soils both inside and outside the footprint of the "Recreational Use" Cap will be in compliance with the health protective RDECs. Therefore, upon construction of the "Recreational Use" Cap, Park Parcel soils will represent a health protective condition for recreational use by the community.

# 3 SUPPLEMENTAL SOIL EXCAVATION

The major components of Phase I Soil Cap are detailed in the following sections of this addendum. The Phase I activities include the following major components:

- Dioxin Field Sampling Program;
- Supplemental soil investigation of Park Parcel soils for dioxin;
- Supplemental soil excavation in former slag area;
- Access clearance to work area and installation of gates where needed;
- Clearing and Grubbing;
- Grading; and
- Capping.

## 3.1 DIOXIN FIELD SAMPLING PROGRAM AND RESULTS

On February 28, 2007, MACTEC collected 10 surface soil samples for dioxin analysis to augment the dioxin data set for the Park Parcel and to increase the representativeness of the soil investigation. The soil samples were collected from 0 to 6 inches below the ground surface (bgs) under chain of custody (COC) to ESS Laboratory in Cranston, RI. ESS Laboratory shipped samples under COC to PACE Analytical Services, Inc. for dioxin analysis. The samples submitted to ESS Laboratory were temperature-controlled, which was independently verified by the laboratory and listed on the COC. Sampling locations were selected to provide representative coverage for surface soils along the Western Peninsula. Refer to Figure 3 for a graphical depiction of surface soil sample locations.

A Global Positioning System (GPS) unit with sub-meter accuracy was used to locate the seven 2006 sample locations. Dedicated stainless steel spoons and bowls were used to collect the soil samples. In addition, a hand auger and chisel and hammer were used to loosen moist soils that were frozen. These tools were decontaminated between use at different sampling locations using LiquiNox® cleaning solution and distilled water. Soil sample field data records for each sample describe the sampling technique, soil conditions, and analyses requested. These are provided in Appendix A. Collected surface soil samples appeared to be from undisturbed native sandy soil.

Eight of the 10 samples were environmental samples representative of site conditions and two were Quality Assurance/Quality Control (QA/QC) samples. The 10 surface soil samples were collected from 7 surface sample locations identified in the 2006 SSIR and one newly identified location designated SS-SI201. These sample locations are BK-2, SS-104, SS-105, SS-106, SS-109, SS-212, SS-215, and SS-SI201. The ninth and tenth soil sample were a duplicate sample

and a matrix spike sample collected from surface soil sample location SS-215 and identified as SS215DUP and SS215MS, respectively. The surface soil sample locations from this February 2007 sampling event were identified with the original sample name, minus any dashes and adding a "01" identifier. For example, the sample collected from SS-104 in February 2007 is identified as SS10401. Soil samples were delivered to ESS Laboratories in Cranston, Rhode Island under COC. The COCs and laboratory data package are presented in Appendix B.

Table 2 summarizes the laboratory results and calculated TEQs for the February 2007 soil samples. The TEQ has been calculated in accordance with the human/mammalian toxic equivalence factors (TEFs) published by the World Health Organization (WHO) (Van den Berg et al, 2006) which are recommended for use by the USEPA Region I Superfund Program. The laboratory report for these analyses are included in Attachment B (Laboratory Report for Dioxin Analysis of February 2007 Park Parcel Soil Samples).

## 3.2 SUPPLEMENTAL SOIL EXCAVATION

Based on RIDEM comments on the Slag Removal Summary Report dated September 2006, Textron has committed to provide additional excavation, test pitting, and sampling within the location of the former slag pile. The detailed scope of work was submitted to RIDEM on January 16, 2007 and MACTEC received comments from RIDEM on February 2, 2007. A final response to comments was submitted to RIDEM by Textron on February 26, 2007 concurring with the additional soil sampling requested. This work at the former slag pile has been incorporated into the Phase I cap.

An existing pile of stone will be removed from the former slag area and staged at the laydown area (Phase III area). Approximately 75 cubic yards (CY) of soil will be excavated from two locations (Figure 4) and transported to a disposal facility by Clean Harbors. Approximately 10 test pits will be excavated by the contractor at locations where the lead concentrations exceed the Industrial/Commercial Direct Exposure Criteria (I/CDEC) to further define the extent of lead contaminated soil; MACTEC will collect confirmatory soil samples from these test pits and the excavated area for total lead and Synthetic Precipitation Leaching Procedure (SPLP) analytical testing. A geotextile liner is proposed for the cap of this former slag pile area to be protective for the recreational use of the Park Parcel. The test pitting activities performed as part of supplemental soil excavation may determine that the proposed liner in this area needs to be extended over a larger area. The cap in this former slag area is described below in Section 3.0.

## 3.3 ACCESS

Access to the Phase I work area will be at three locations. One access point is the existing gate on Adelaide Avenue, west of Parcel C. The gate at this access point will be repaired or replaced, and it will be used after Phase I Construction. In addition, an access road will be constructed in the northwestern corner of the Parcel C down to the western end of the Phase I cap (near Mashapaug Cove). The other two access points will be the existing gate at the slag area and at the laydown area in the northeast of the Site (behind the retention basin).

An 8' high security fence and gate will be installed along the limit of work (LOW) at the north end of the Parcel C and it will tie into the existing fence at the school property for vehicular access to the western end of the cap near Mashapaug Cove. It is assumed that plantings along the new fence will not be required with the installation of the fence around the High School restricting access to the Park Parcel and planned remedial activities in support of a recreational use. This fence will be maintained through the completion of the Phase III remediation.

## 3.4 CLEARING AND GRUBBING

The LOW, as detailed within the Phase I RAWP, will coincide with the wetland boundary of the Mashapaug Cove. Erosion and sedimentation control will be placed on the inside (uphill side) of the LOW. MACTEC logged the location of the large healthy trees with GPS within the Phase I cap area and is working to maintain as many of the larger and healthiest trees, where practical. The contractor will attempt to save these trees by placing construction fencing around the trees to remain at an appropriate distance away from the trees. The designation of these trees will be based on grading requirements of the soil cover for slope stabilization. The root mass at the base of these preserved trees will continue to provide a barrier to subsurface soils. The remaining trees and vegetation will be cleared and grubbed. All vegetation will be removed off-site. Concrete and steel debris from within the Phase I work area will be removed and disposed (or recycled) off-site in accordance with the 2006 Consent Agreement.

## 3.5 SITE GRADING

Based on a May 2007 survey of the Phase I area, MACTEC has developed a grading plan for the Phase I cap. This grading plan will provide the base onto which the soil cap can be successfully applied. The grading will aid in the long-term slope stability and effectiveness of the cap. Grading will include the earth work and regrading across the Phase I area to ensure that proper, stable slopes exist for the soil cap.

# 4 PHASE I CAP CONSTRUCTION

The Phase I soil cap contains three distinct components. These components are color-coded on Figure 1 and include a waste fill cap, a wetland buffer cap, and a former slag area cap. All components of these caps will be tested and meet RIDEM RDEC. Refer to Figure 5 and Drawing C-503 for cross sections of the cap across Phase I that show the anticipated construction including grading of slopes that exceed a one-to-three slope. Figure 5 depicts the approximate location of the cross sections and Drawing C-503 depicts typical cross sections of the Phase I cap.

During the construction of the Phase I soil cap, soil thickness will be measured following final grading as a quality control (contractor) and quality assurance (Textron/RIDEM) measure to ensure the proper soil cap has been constructed. Storm water management will be included with the construction of the cap to maintain its integrity and recharge storm water runoff into the buffer zone, wetlands, and Cove.

Waste Fill Cap

The waste fill area consists of casting sands, concrete, rubble, and other debris. Waste fill was historically characterized through soil borings and test pits. The waste fill areas will be capped with two feet of clean fill (18" cover soil and 6" topsoil). The finished surface for the upland waste fill area will be seeded or stabilized with erosion control matting. The top of upland waste fill cap will meet slope at the existing High School and Parcel C.

A small area at the west/southwest corner of the Park Parcel (Figure 1) will either be capped with 2 feet of soil or the soil in these small areas that exceed RIDEM RDEC will be relocated under the main part of the Phase I soil cap. Due to scheduling constraints the western shore capping may be completed after the Phase I cap closest to the school. This would be done to aid in completing activities closest to the High School by the September 1, 2007 opening.

Wetland Buffer Cap

The wetland buffer area consists of the area within 50' of the delineated wetland boundary (approximate cove shoreline). As the Park Parcel cap abuts the shore of Mashapaug Cove, special considerations for wetlands have been included as part of Phase I. The wetland delineation was completed in May 2007 and the location of the wetland boundary and high water mark was surveyed. Refer to the RAWP for Phase I for figures depicting the location of these

site features (note that "delineated" wetlands are typically located 5' to 10' upland from the shoreline). The LOW for Phase I will be conducted outside of this wetland boundary such that all of the remediation work within the freshwater wetlands will be conducted as part of Phase II in June 2008 along with the Cove sediment remediation. This will allow for water access to the wetland area for the capping and construction of a natural transition zone from the wetlands into the Cove.

The contractor will attempt to save as many large trees within the buffer zone as possible as these provide habitat for the Mashapaug Cove wildlife. Clearing and grubbing of the wetland buffer zone scrub material will be conducted to support the installation of the soil cap. One foot of soil at the toe of the LOW will be removed to allow the soil cap to key into the existing grade above the wetland boundary. Twelve inches of clean soil will then be spread throughout the buffer zone to provide the soil cap.

The finished surface for the wetland buffer cap will be stabilized with erosion control matting, and wetland vegetation will be planted. This cap will restrict the contact with the subsurface soils. Please refer to the Technical Memorandum from EA Engineering, Science, and Technology, Inc. detailing the existing wetland condition and the planned restoration strategy in Appendix C.

Former Slag Area Cap

In response to RIDEM questions regarding the potential leaching from the soil in contact with the former slag pile, the cap design for the former slag area contains a geotextile membrane to limit infiltration and restrict contact with the underlying soils. Following the grading of the existing soil, the slag area will be capped with 6" sand, 40-mil geomembrane, drainage composite layer, 12" clean cover soil, and 6" clean fill topsoil. The finished surface for the slag area will be seeded or stabilized with erosion control matting. The haul road access to the slag area will be improved during construction and removed after construction is complete.

Wetland Restoration within the Phase I Cap

The Site is located along the shoreline of Mashapaug Cove within Mashapaug Pond within the Pawtuxet River watershed. Existing vegetative communities include forested and scrub-shrub wetlands, mixed oak woodland and mid-successional woodland cover types.

Wetlands at the Site occur as fringe features forming a narrow band along the cove shore (Photo 2 within Appendix C). Tree species within the wetland areas include, red maple (*Acer rubrum*), silver maple (*A. saccharinum*), and black willow (*Salix nigra*). The shrub layer consists of sweet pepperbush (*Clethra alnifolia*), red osier dogwood (*Cornus stolonifera*), and buttonbush (*Cephalanthus occidentalis*). Sensitive fern (*Onoclea sensibilis*), blue flag iris (*Iris versicolor*), and poison ivy (*Toxicodendron radicans*) occur in the herbaceous understory.

The mixed oak woodland community occurs in the upland areas on the western shore of the cove (west of the slag removal area) (Photos 1 and 3, within Appendix C). Tree species within this area include red oak (*Quercus rubra*), black oak (*Q. velutina*), and to a lesser extent white oak (*Q. alba*). Sweet birch (*Betula lenta*) and black cherry (*Prunus serotina*) are also present within this cover type. The understory includes a mix of low growing shrubs such as low bush blueberry (*Vaccinum angustifolium*), mountain laurel (*Kalmia latifolia*), and huckleberry (*Gaylussacia baccata*). There are few non native invasive species present within this habitat type. In addition, several signs of wildlife usage were observed including a fox den and a painted turtle shell.

The mid-successional community occurs in the perimeter wetland and upland areas along the eastern shore of the cove (east of the slag removal area) (Photos 1 and 4, within Appendix C). Tree species within this area include red maple, red oak, black oak, tree-of-heaven (*Ailanthus altissima*), and gray birch (*Betula populifolia*). The understory within this area is dominated by non native invasive plant species including, Asiatic bittersweet (*Celastrus orbiculatus*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese honeysuckle (*L. japonica*), and Japanese knotweed (*Fallopia japonica*). The dominance of invasive species in this habitat is likely a result of previous disturbances which allowed these opportunistic species to colonize.

***Invasive Species Management***

As noted earlier, portions of the Site are typical of disturbed sites in that they harbor numerous invasive plant species. Invasive plants of note at this site include; Japanese knotweed, Morrow's and Japanese honeysuckle, and Asiatic bittersweet. If these populations are not addressed they will undoubtedly compromise the integrity of the restoration project. The aggressive nature and superior competitive ability of these plants in disturbed habitats (i.e., newly planted areas), will negatively affect botanical diversity and survivorship of restorative plantings.

Therefore, potential treatment options include chemical and mechanical approaches. Mechanical removal (i.e., cutting) of above ground plant parts can aid in the management of certain invasive species. Mechanical treatment alone will not control the revegetation of the invasive species. Foliar, or cut stem, application of herbicidal chemicals (i.e., glyphosate (Rodeo)) will transport the herbicide to belowground parts detrimentally affecting the vigor of the belowground root/rhizome system and effect plant death or vigor. These options will be coordinated with the construction schedule as part of the site clearing and restoration activities.

***Revegetation***

Following Phase I remedial construction, the Site will be revegetated to stabilize soils and enhance species diversity and structural complexity. These activities shall be conducted using best management practices and every effort to minimize impacts to the surrounding landscape shall be taken.

The restoration planting plan consists of two distinct vegetation zones. The species composition of each zone reflects morphological and physiological adaptations of the species occupying them to their specific habitats. Since remediation activities will strive to preserve mature trees and other desirable native vegetation when possible, an enhancement planting approach has been developed. This approach stresses under-story, and shade tolerant plantings as the primary components of the revegetation activities. Species composition within the mixed oak woodland are proposed to be used as a reference condition to guide restoration and revegetation of upland portions of the Site. In addition, only woody species have been selected for these plantings in order to enable the anticipated installation between 1 September and 15 November.

The diversity of species outlined in the following zone descriptions is reflective of the inherent uncertainties of restorative planting success. For this reason many of the species are redundant throughout the various zones, these redundancies are also found in nature as certain plant species are tolerant of a wide range of hydrologic and soil saturation scenarios. Due to the uncertainty of post-remediation site hydrology in the restoration area specific elevation boundaries for these zones are not described.

***Forested Wetland***

This zone will occur in areas along the Cove shoreline that will be subject to wetland hydrology after remediation activities. Revegetation will focus on recreation of extant on-site habitats of

good quality (i.e., few invasive). Revegetation for these areas will include species selected from Table A. Selections will be based largely on availability and will only use plant species native to Rhode Island.

**TABLE A – FORESTED WETLAND SPECIES**

| Common Name | Botanical Name | Wetland Indicator Status |
|---|---|---|
| Red Maple | *Acer rubrum* | FAC |
| Silver Maple | *Acer saccharinum* | FACW |
| Black Willow | *Salix nigra* | FACW+ |
| Red-osier Dogwood | *Cornus sericea* | FACW+ |
| Northern Arrowwood | *Viburnum dentatum* | FACW- |
| Sweet pepper bush | *Clethra alnifolia* | FAC+ |
| Highbush blueberry | *Vaccinum corymbosum* | FACW |
| Buttonbush | *Cephalanthus occidentalis* | OBL |
| Sensitive fern | *Onoclea sensibilis* | FACW |
| Blue flag iris | *Iris versicolor* | OBL |

***Mixed Oak Woodland***

This zone will occur in areas upland of the cove shoreline that will not be subject to wetland hydrology after remediation activities. Revegetation will focus on recreation of extant on-site habitats of good quality (i.e., few invasive). Revegetation for these areas will include species selected from Table B. Selections will be based largely on availability and will only use plant species native to Rhode Island.

**TABLE B – MIXED OAK WOODLAND SPECIES**

| Common Name | Botanical Name | Wetland Indicator Status |
|---|---|---|
| Red Maple | *Acer rubrum* | FAC |
| Sweet Birch | *Betula lenta* | FACU |
| White Pine | *Pinus strobus* | FACU |
| White Oak | *Quercus alba* | FACU |
| Northern Red Oak | *Quercus rubra* | FACU- |
| Black Oak | *Quercus velutina* | UPL |
| Black Cherry | *Prunus serotina* | FACU |
| Gray Birch | *Betula populifolia* | FAC |
| Mountain Laurel | *Kalmia latifolia* | FACU |
| Lowbush Blueberry | *Vaccinum angustifolium* | FACU- |
| Black Huckleberry | *Gaylussacia baccata* | FACU |

# 5 ADDITIONAL PHASE I ACTIVITIES

In addition to the major components of the Phase I cap construction; other associated activities will be performed as part of the Phase I Remedial Action. These associated activities include:

- Installation of Monitoring Well(s)
- Creation of an Environmental Land Use Restriction (ELUR)
- Park Development with/by the City of Providence

## 5.1 INSTALLATION OF MONITORING WELLS

As groundwater infiltration and flow from the Park Parcel to Mashapaug Pond play a critical role in the Site conceptual model, MACTEC will restore GZA-5 and maintain existing monitoring wells within the Phase I Cap. These monitoring wells will provide information about groundwater flow and aid in developing remedial alternatives. Monitoring well GZA-5 was destroyed during the slag excavation activities in the summer of 2006 and will be re-installed. Existing monitoring wells within the cap (e.g., GZA-3) will be secured and maintained during the construction of the soil cap. Additional monitoring wells will be installed adjacent to, but outside the Phase I cap as part of the proposed groundwater investigations.

## 5.2 CREATION OF AN ELUR

The Phase I soil cap RAWP will contain an ELUR that provides for maintenance requirements for the cap of the Park Parcel to support the recreational use. As the owner of the Property, the City of Providence will sign and file the ELUR in the Registry of Deeds.

## 5.3 PARK DEVELOPMENT

It is anticipated that the City of Providence will construct walking trails for the community within the Park Parcel following the completion of the Phase III by Textron. It is expected that prior to the construction of this path, the City of Providence will seek input from the community on the park path location and design. The ELUR will place restrictions on the grading or digging in the completed cap areas under the ELUR, to avoid damaging the integrity of the cap.

# 6 CONCLUSIONS

This addendum to the July 31, 2006 SSIR summarizes the proposed Phase I soil cap activities. Implementation of the Phase I soil cap activities within the timeframe proposed will minimize the potential for exposure to surficial soils on portions of the parcel adjacent to the High School. The soil cap consists of three cap components – a waste fill cap, a wetland buffer cap, and a former slag area cap. Following the construction of the Phase I soil cap, a planting plan will be implemented to restore vegetation and stabilize the disturbed areas. In addition to the soil capping work, Phase I will include the installation and maintenance of monitoring wells, creation of an ELUR, and preparations for the City of Providence to build a park on the entire Park Parcel. The detailed descriptions of Phase I soil capping will be provided in a RAWP to be submitted to RIDEM under separate cover. Textron is committed to the cleaning up the Park Parcel for recreational use and will work with RIDEM and the City of Providence to develop and implement the Phase II remediation of the Cove sediments and the Phase III soil cap in the northeastern portion of the Property.

# TABLES

Table 1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

| Parameter | Frequency of Detection | Range of Nondetects | Range of Detected Concentrations | Average of Samples | DEC Residential (ppm) | GB Leachabiliity Criteria (ppm) | SD-002 GMSD0020 0101XX 10/13/1994 | SD-002 SD-002D 3/12/2001 |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (mg/kg)** | | | | | | | | |
| Acetone | 2 / 5 | 0.0462 - 0.168 | 0.209 - 0.313 | 0.14 | 7800 | | | |
| **Semivolatile Organics (mg/kg)** | | | | | | | | |
| Anthracene | 2 / 27 | 0.0261 - 3.3 | 0.0572 - 0.0811 | 0.177 | 35 | | 3.3 U | 0.468 U |
| Benzo(a)anthracene | 10 / 27 | 0.0261 - 3.3 | 0.0332 - 0.623 | 0.218 | 0.9 | | 3.3 U | 0.468 U |
| Benzo(a)pyrene | 11 / 27 | 0.0261 - 3.3 | 0.0273 - 0.694 | 0.226 | 0.4 | | 3.3 U | 0.468 U |
| Benzo(b)fluoranthene | 10 / 27 | 0.0261 - 3.3 | 0.0867 - 1.07 | 0.252 | 0.9 | | 3.3 U | 0.468 U |
| Benzo(g,h,i)perylene | 6 / 27 | 0.0261 - 3.3 | 0.0283 - 0.061 | 0.180 | 0.8 | | 3.3 U | 0.468 U |
| Benzo(k)fluoranthene | 9 / 27 | 0.0261 - 3.3 | 0.0638 - 0.192 | 0.209 | 0.9 | | 3.3 U | 0.468 U |
| Chrysene | 11 / 27 | 0.0261 - 3.3 | 0.0284 - 0.749 | 0.230 | 0.4 | | 3.3 U | 0.468 U |
| Dibenzo(a,h)anthracene | 2 / 27 | 0.0261 - 3.3 | 0.0277 - 0.033 | 0.174 | 0.4 | | 3.3 U | 0.468 U |
| Fluoranthene | 12 / 27 | 0.0261 - 3.3 | 0.0626 - 1.74 | 0.363 | 20 | | 3.3 U | 0.468 U |
| Fluorene | 1 / 27 | 0.0261 - 3.3 | 0.0438 - 0.0438 | 0.174 | 28 | | 3.3 U | 0.468 U |
| Indeno(1,2,3-cd)pyrene | 7 / 27 | 0.0261 - 3.3 | 0.0293 - 0.0682 | 0.181 | 0.9 | | 3.3 U | 0.468 U |
| Phenanthrene | 10 / 27 | 0.0261 - 3.3 | 0.0364 - 0.906 | 0.239 | 40 | | 3.3 U | 0.468 U |
| Pyrene | 12 / 27 | 0.0261 - 0.611 | 0.0375 - 6.92 | 0.475 | 13 | | 6.92 | 0.468 U |
| **Pesticide/PCBs (mg/kg)** | | | | | | | | |
| 4,4'-DDE | 3 / 14 | 0.00507 - 0.0061 | 0.0104 - 0.0165 | 0.0051 | 1.9 | | | |
| 4,4'-DDT | 5 / 14 | 0.00507 - 0.0061 | 0.0085 - 0.0253 | 0.0077 | 1.9 | | | |
| delta-BHC | 1 / 14 | 0.00507 - 0.00617 | 0.00804 - 0.00804 | 0.0032 | 0.5 | | | |
| Endosulfan II | 1 / 14 | 0.00507 - 0.00617 | 0.0135 - 0.0135 | 0.0036 | 470 | | | |
| Endrin ketone | 1 / 14 | 0.00507 - 0.00617 | 0.0131 - 0.0131 | 0.0035 | 23 | | | |
| gamma-Chlordane | 1 / 14 | 0.00507 - 0.00617 | 0.00736 - 0.00736 | 0.0031 | 1.8 | | | |
| **Inorganics (mg/kg)** | | | | | | | | |
| Arsenic | 15 / 20 | 1 - 3.4 | 1.5 - 5.1 | 2.59 | 7 | | 3 | 2.75 |
| Barium | 6 / 7 | 13.7 - 13.7 | 12.6 - 54.9 | 25.05 | 5500 | | | |
| Beryllium | 8 / 19 | 0.06 - 1 | 0.131 - 0.3 | 0.15 | 0.4 | | 1 U | |
| Cadmium | 1 / 19 | 0.6 - 1 | 1 - 1 | 0.458 | 39 | | 1 | |
| Chromium | 17 / 19 | 3 - 4 | 4 - 75 | 10.03 | 390 | | 75 | |
| Copper | 20 / 20 | | 3 - 1260 | 89.9 | 3100 | | 1260 | 25 |
| Lead | 17 / 20 | 6 - 7 | 6.8 - 153 | 33.45 | 150 | | **153** | 40.3 |
| Mercury | 5 / 19 | 0.032 - 0.5 | 0.055 - 0.145 | 0.0595 | 23 | | 0.5 U | |
| Nickel | 19 / 19 | | 3 - 23 | 6.40 | 1000 | | 23 | |
| Silver | 11 / 19 | 0.6 - 1 | 0.81 - 58 | 5.581 | 200 | | 58 | |
| Zinc | 19 / 19 | | 8 - 1020 | 76.2 | 6000 | | 1020 | |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | |
| Total Petroleum Hydrocarbons | 4 / 6 | 26 - 27 | 42 - 142 | 53.42 | 500 | | 59 | |
| **Dioxins/Furans (mg/kg)** | | | | | | | | |
| TEQ - Mammal | 20 / 20 | | 0.00000087 - 0.0000085 | 0.0000021 | 0.0000043 | | | |

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Shaded cells indicated a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table 1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

| Parameter | SS-101 GMSS101X 01LDXX 5/27/1998 | SS-101 SS-SI101 6/8/2006 | SS-103 GMSS103X 01LDXX 5/27/1998 | SS-103 GMSS103X 01RAXX 4/15/1999 | SS-104 GMSS104X 01LDXX 5/27/1998 | SS-104 SS10401 2/28/2007 | SS-106 GMSS106X 01LDXX 5/27/1998 | SS-106 SS10601 2/28/2007 | SS-109 GMSS109X 01LDXX 5/27/1998 | SS-109 SS10901 2/28/2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (mg/kg)** | | | | | | | | | | |
| Acetone | 0.168 U | | | | 0.209 | | 0.313 | | 0.161 U | |
| **Semivolatile Organics (mg/kg)** | | | | | | | | | | |
| Anthracene | | 0.028 U | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Benzo(a)anthracene | | 0.108 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Benzo(a)pyrene | | 0.137 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Benzo(b)fluoranthene | | 0.174 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Benzo(g,h,i)perylene | | 0.0342 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Benzo(k)fluoranthene | | 0.128 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Chrysene | | 0.141 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Dibenzo(a,h)anthracene | | 0.028 U | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Fluoranthene | | 0.429 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Fluorene | | 0.028 U | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Indeno(1,2,3-cd)pyrene | | 0.0392 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Phenanthrene | | 0.123 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| Pyrene | | 0.267 | | 0.388 U | 0.359 U | | 0.344 U | | 0.34 U | |
| **Pesticide/PCBs (mg/kg)** | | | | | | | | | | |
| 4,4'-DDE | | 0.0061 U | | | | | | | | |
| 4,4'-DDT | | 0.0061 U | | | | | | | | |
| delta-BHC | | 0.0061 U | | | | | | | | |
| Endosulfan II | | 0.0061 U | | | | | | | | |
| Endrin ketone | | 0.0061 U | | | | | | | | |
| gamma-Chlordane | | 0.0061 U | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | |
| Arsenic | 4 | | 5 | | 3 | | 3 | | 1 U | |
| Barium | | | | | | | | | | |
| Beryllium | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | |
| Cadmium | 1 U | | 1 U | | 1 U | | 1 U | | 1 U | |
| Chromium | 7 | | 7 | | 5 | | 6 | | 3 U | |
| Copper | 12 | | 13 | | 6 | | 42 | | 3 | |
| Lead | 23 | | 29 | | 9 | | 23 | | 6 U | |
| Mercury | 0.1 U | | 0.1 | | 0.1 U | | 0.1 | | 0.1 U | |
| Nickel | 5 | | 4 | | 5 | | 6 | | 3 | |
| Silver | 2 | | 1 | | 1 U | | 14 | | 1 U | |
| Zinc | 11 | | 10 | | 11 | | 17 | | 11 | |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | | | |
| Total Petroleum Hydrocarbons | 42 | | 142 | | 27 U | | 51 | | 26 U | |
| **Dioxins/Furans (mg/kg)** | | | | | | | | | | |
| TEQ - Mammal | | 0.0000016 | | | | 0.0000009 | | 0.0000020 | | 0.0000010 |

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Shaded cells indicated a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table 1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

| Parameter | SS-202 GMSS202X 01RAXX 12/11/1998 | SS-202 SS-SI202 6/7/2006 | SS-205 GMSS205X 01RAXX 12/11/1998 | SS-205 SS-SI205 6/8/2006 | SS-206 GMSS206X 01RAXX 12/11/1998 | SS-206 SS-SI206 6/6/2006 | SS-207 GMSS207X 01RAXX 12/11/1998 | SS-207 SS-SI207 6/6/2006 | SS-208 GMSS208X 01RAXX 12/11/1998 | SS-208 SS-SI208 6/6/2006 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (mg/kg)** | | | | | | | | | | |
| Acetone | | | | | | | | | | |
| **Semivolatile Organics (mg/kg)** | | | | | | | | | | |
| Anthracene | | 0.0572 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0268 U |
| Benzo(a)anthracene | | 0.203 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0615 |
| Benzo(a)pyrene | | 0.203 | | 0.0273 | | 0.611 U | | 0.0277 U | | 0.0712 |
| Benzo(b)fluoranthene | | 0.24 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0867 |
| Benzo(g,h,i)perylene | | 0.0578 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0268 U |
| Benzo(k)fluoranthene | | 0.183 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0728 |
| Chrysene | | 0.229 | | 0.0284 | | 0.611 U | | 0.0277 U | | 0.0877 |
| Dibenzo(a,h)anthracene | | 0.033 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0268 U |
| Fluoranthene | | 0.646 | | 0.0626 | | 0.63 | | 0.0277 U | | 0.196 |
| Fluorene | | 0.0295 U | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0268 U |
| Indeno(1,2,3-cd)pyrene | | 0.0636 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.0268 U |
| Phenanthrene | | 0.3 | | 0.0268 U | | 0.611 U | | 0.0277 U | | 0.108 |
| Pyrene | | 0.45 | | 0.0375 | | 0.611 U | | 0.0277 U | | 0.133 |
| **Pesticide/PCBs (mg/kg)** | | | | | | | | | | |
| 4,4'-DDE | | 0.00578 U | | 0.00579 U | | 0.0136 | | 0.00579 U | | 0.00559 U |
| 4,4'-DDT | | 0.0085 | | 0.00579 U | | 0.0253 P | | 0.00579 U | | 0.00559 U |
| delta-BHC | | 0.00578 U | | 0.00579 U | | 0.00617 U | | 0.00804 P | | 0.00559 U |
| Endosulfan II | | 0.00578 U | | 0.00579 U | | 0.00617 U | | 0.00579 U | | 0.00559 U |
| Endrin ketone | | 0.00578 U | | 0.00579 U | | 0.00617 U | | 0.00579 U | | 0.00559 U |
| gamma-Chlordane | | 0.00578 U | | 0.00579 U | | 0.00617 U | | 0.00579 U | | 0.00559 U |
| **Inorganics (mg/kg)** | | | | | | | | | | |
| Arsenic | 2.9 | | 2.2 | | 2.4 | | 3.1 | | 3.4 | |
| Barium | | | | | | | | | | |
| Beryllium | 0.2 | | 0.2 | | 0.2 | | 0.2 | | 0.2 | |
| Cadmium | 1 U | | 1 U | | 1 U | | 1 U | | 1 U | |
| Chromium | 5 | | 4 U | | 4 | | 4 | | 4 | |
| Copper | 31 | | 15 | | 10 | | 27 | | 3 | |
| Lead | 61 | | 22 | | 25 | | 98 | | 7 U | |
| Mercury | 0.07 U | | 0.07 U | | 0.07 U | | 0.07 | | 0.06 U | |
| Nickel | 8 | | 3 | | 3 | | 3 | | 3 | |
| Silver | 5 | | 1 U | | 1 | | 2 | | 1 U | |
| Zinc | 143 | | 10 | | 8 | | 10 | | 9 | |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | | | |
| Total Petroleum Hydrocarbons | | | | | | | | | | |
| **Dioxins/Furans (mg/kg)** | | | | | | | | | | |
| TEQ - Mammal | | 0.0000020 | | 0.0000010 | | **0.0000085** | | 0.0000009 | | 0.0000012 |

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Shaded cells indicated a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table 1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

| Parameter | SS-209 GMSS209X 01RAXX 12/11/1998 | SS-209 SS-SI209 6/6/2006 | SS-211 GMSS211X 01RAXX 12/11/1998 | SS-212 GMSS212X 01RAXX 12/11/1998 | SS-212 SS21201 2/28/2007 | SS-213 GMSS213X 01RAXX 12/11/1998 | SS-214 GMSS214X 01RAXX 12/11/1998 | SS-215 GMSS215X 01RAXX 12/11/1998 | SS-215 SS21501 2/28/2007 | SS-216 GMSS216X 01RAXX 12/11/1998 | SS-306 SS306XX01 0-1 8/6/2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (mg/kg)** | | | | | | | | | | | |
| Acetone | | | | | | | | | | | |
| **Semivolatile Organics (mg/kg)** | | | | | | | | | | | |
| Anthracene | | 0.0283 U | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Benzo(a)anthracene | | 0.0736 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Benzo(a)pyrene | | 0.0923 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Benzo(b)fluoranthene | | 0.131 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Benzo(g,h,i)perylene | | 0.0283 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Benzo(k)fluoranthene | | 0.0861 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Chrysene | | 0.102 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Dibenzo(a,h)anthracene | | 0.0283 U | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Fluoranthene | | 0.289 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Fluorene | | 0.0283 U | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Indeno(1,2,3-cd)pyrene | | 0.03 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Phenanthrene | | 0.077 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| Pyrene | | 0.175 | 0.375 U | 0.37 U | | 0.375 U | 0.379 U | 0.379 U | | 0.383 U | 0.337 U |
| **Pesticide/PCBs (mg/kg)** | | | | | | | | | | | |
| 4,4'-DDE | | 0.00528 U | | | | | | | | | |
| 4,4'-DDT | | 0.00528 U | | | | | | | | | |
| delta-BHC | | 0.00528 U | | | | | | | | | |
| Endosulfan II | | 0.00528 U | | | | | | | | | |
| Endrin ketone | | 0.00528 U | | | | | | | | | |
| gamma-Chlordane | | 0.00528 U | | | | | | | | | |
| **Inorganics (mg/kg)** | | | | | | | | | | | |
| Arsenic | 4.1 | | | | | | | | | | 3.4 U |
| Barium | | | | | | | | | | | 13.7 U |
| Beryllium | 0.3 | | | | | | | | | | 0.131 |
| Cadmium | 1 U | | | | | | | | | | 0.687 U |
| Chromium | 5 | | | | | | | | | | 7.84 |
| Copper | 24 | | | | | | | | | | 87.6 |
| Lead | 26 | | | | | | | | | | 35.5 |
| Mercury | 0.06 U | | | | | | | | | | 0.0606 U |
| Nickel | 4 | | | | | | | | | | 3.67 |
| Silver | 3 | | | | | | | | | | 4.81 |
| Zinc | 16 | | | | | | | | | | 29.5 |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | | | | |
| Total Petroleum Hydrocarbons | | | | | | | | | | | |
| **Dioxins/Furans (mg/kg)** | | | | | | | | | | | |
| TEQ - Mammal | | 0.0000037 | | | 0.0000009 | | | | 0.0000011 | | |

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Shaded cells indicated a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table 1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

| Parameter | SS-SI001 SS-SI001 6/6/2006 | SS-SI004 SS-SI004 6/5/2006 | SS-SI012 SS-SI012 6/8/2006 | SS-SI013 SS-SI013 6/8/2006 | SS-SI014 SS-SI014 6/8/2006 | SS-SI018 SS-SI018 6/8/2006 | SS-SI019 SS-SI019 6/8/2006 | SSSI-201 SSSI20101 2/28/2007 |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics (mg/kg)** | | | | | | | | |
| Acetone | | 0.0462 U | | | | | | |
| **Semivolatile Organics (mg/kg)** | | | | | | | | |
| Anthracene | 0.581 U | 0.0299 U | 0.0277 U | 0.0811 | 0.0261 U | 0.0272 U | 0.0264 U | |
| Benzo(a)anthracene | 0.623 | 0.109 | 0.177 | 0.193 | 0.0261 U | 0.0717 | 0.0332 | |
| Benzo(a)pyrene | **0.694** | 0.132 | 0.211 | 0.165 | 0.0261 U | 0.0869 | 0.0585 | |
| Benzo(b)fluoranthene | **1.07** | 0.191 | 0.244 | 0.222 | 0.0261 U | 0.125 | 0.0886 | |
| Benzo(g,h,i)perylene | 0.581 U | 0.0401 | 0.061 | 0.0513 | 0.0261 U | 0.0272 U | 0.0264 U | |
| Benzo(k)fluoranthene | 0.581 U | 0.139 | 0.192 | 0.157 | 0.0261 U | 0.0934 | 0.0638 | |
| Chrysene | **0.749** | 0.132 | 0.184 | 0.195 | 0.0261 U | 0.0766 | 0.0427 | |
| Dibenzo(a,h)anthracene | 0.581 U | 0.0299 U | 0.0277 | 0.027 U | 0.0261 U | 0.0272 U | 0.0264 U | |
| Fluoranthene | 1.74 | 0.493 E | 0.495 | 0.504 | 0.0261 U | 0.273 | 0.116 | |
| Fluorene | 0.581 U | 0.0299 U | 0.0277 U | 0.0438 | 0.0261 U | 0.0272 U | 0.0264 U | |
| Indeno(1,2,3-cd)pyrene | 0.581 U | 0.0418 | 0.0682 | 0.0573 | 0.0261 U | 0.0293 | 0.0264 U | |
| Phenanthrene | 0.906 | 0.12 | 0.0621 | 0.413 | 0.0261 U | 0.0565 | 0.0364 | |
| Pyrene | 1.08 | 0.207 | 0.294 | 0.438 | 0.0261 U | 0.171 | 0.0828 | |
| **Pesticide/PCBs (mg/kg)** | | | | | | | | |
| 4,4'-DDE | 0.0165 | 0.0104 P | 0.00528 U | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| 4,4'-DDT | 0.0161 | 0.0237 P | 0.00976 | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| delta-BHC | 0.0061 U | 0.00607 U | 0.00528 U | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| Endosulfan II | 0.0135 | 0.00607 U | 0.00528 U | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| Endrin ketone | 0.0061 U | 0.0131 P | 0.00528 U | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| gamma-Chlordane | 0.00736 P | 0.00607 U | 0.00528 U | 0.00514 U | 0.00507 U | 0.00549 U | 0.00554 U | |
| **Inorganics (mg/kg)** | | | | | | | | |
| Arsenic | | 5.1 | 1.9 | 1.5 U | 1.5 | 1.5 U | 1.5 U | |
| Barium | | 12.6 | 12.7 | 54.9 | 36.1 | 29.4 | 22.8 | |
| Beryllium | | 0.19 | 0.06 U | 0.31 U | 0.06 U | 0.06 U | 0.06 U | |
| Cadmium | | 0.67 U | 0.61 U | 0.61 U | 0.6 U | 0.6 U | 0.61 U | |
| Chromium | | 6.1 | 7.4 | 10.8 | 9.8 | 11.8 | 11.4 | |
| Copper | | 130 | 8.4 | 26.3 | 22.8 | 28.1 | 23.7 | |
| Lead | | 74.7 | 15.4 | 8.5 | 9.3 | 6.8 | 6.1 U | |
| Mercury | | 0.145 | 0.055 | 0.034 U | 0.032 U | 0.034 U | 0.032 U | |
| Nickel | | 4.6 | 3.3 | 11.1 | 9.3 | 10.4 | 9.3 | |
| Silver | | 11.2 | 0.81 | 0.61 U | 0.6 U | 0.6 U | 0.61 U | |
| Zinc | | 19.9 | 16.2 | 29.4 | 27.3 | 26.2 | 23.6 | |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | |
| Total Petroleum Hydrocarbons | | | | | | | | |
| **Dioxins/Furans (mg/kg)** | | | | | | | | |
| TEQ - Mammal | **0.0000045** | 0.0000033 | 0.0000012 | 0.0000009 | 0.0000009 | 0.0000009 | 0.0000009 | 0.0000040 |

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Shaded cells indicated a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

**Table 2**
**Dioxin Analytical Data for February 2007 Park Parcel Surface Soil Samples**

**Former Gorham Manufacturing Site**
**333 Adelaide Avenue**
**Providence, Rhode Island**

| Chemical | TEF Values - 2005 | BK-2 BK201 2/28/2007 | SS-104 SS10401 2/28/2007 | SS-105 SS10501 2/28/2007 | SS-106 SS10601 2/28/2007 | SS-109 SS10901 2/28/2007 | SS-212 SS21201 2/28/2007 | SS-215 SS21501 2/28/2007 | SS-215 SS21501 DUP 2/28/2007 | SS-215 SS21501 MS 2/28/2007 | SS-215 SS21501 MSD 2/28/2007 | SSSI-201 SSSI20101 2/28/2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dioxins/Furans (mg/kg)** | | | | | | | | | | | | |
| 2,3,7,8-TCDD | 1 | 0.00000016 U | 0.00000016 U | 0.00000049 J | 0.00000018 U | 0.00000017 U | 0.00000016 U | 0.00000019 U | 0.0000002 U | 0.000021 | 0.000021 | 0.0000002 U |
| 1,2,3,7,8-PeCDD | 1 | 0.00000082 U | 0.00000079 U | 0.0000038 J | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.0001 | 0.000099 | 0.00000099 U |
| 1,2,3,4,7,8-HxCDD | 0.1 | 0.00000082 U | 0.00000079 U | 0.0000031 J | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00011 | 0.00000099 U |
| 1,2,3,6,7,8-HxCDD | 0.1 | 0.00000082 U | 0.00000079 U | 0.000049 | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00012 | 0.00000099 U |
| 1,2,3,7,8,9-HxCDD | 0.1 | 0.00000082 U | 0.00000079 U | 0.000017 | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00011 | 0.00000099 U |
| 1,2,3,4,6,7,8-HpCDD | 0.01 | 0.00000093 J | 0.00000079 U | 0.00017 | 0.0000043 J | 0.00000085 U | 0.0000008 U | 0.000001 J | 0.0000013 J | 0.000092 | 0.000093 | 0.0000038 J |
| OCDD | 0.0003 | 0.0000039 J | 0.000003 J | 0.00068 | 0.000032 | 0.0000039 J | 0.0000016 U | 0.0000069 J | 0.0000092 J | 0.00021 | 0.0002 | 0.000017 |
| | | | | | | | | | | | | |
| 2,3,7,8-TCDF | 0.1 | 0.00000058 JA | 0.00000018 J | 0.0000042 A | 0.0000015 | 0.00000023 J | 0.00000016 U | 0.00000054 J | 0.00000057 J | 0.000022 | 0.000022 | 0.0000022 |
| 1,2,3,7,8-PeCDF | 0.03 | 0.00000082 U | 0.00000079 U | 0.00000098 UE | 0.000001 J | 0.00000085 U | 0.0000008 U | 0.00000019 U | 0.000001 U | 0.00013 | 0.00013 | 0.0000014 J |
| 2,3,4,7,8-PeCDF | 0.3 | 0.000017 | 0.00000079 U | 0.0000082 | 0.0000022 J | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00012 | 0.00012 | 0.0000074 |
| 1,2,3,4,7,8-HxCDF | 0.1 | 0.00000082 UE | 0.00000079 U | 0.0000035 J | 0.00000092 UE | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.0001 | 0.0001 | 0.00000099 UE |
| 1,2,3,6,7,8-HxCDF | 0.1 | 0.0000023 J | 0.00000079 U | 0.0000041 J | 0.000001 J | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00012 | 0.0000018 J |
| 1,2,3,7,8,9-HxCDF | 0.1 | 0.00000089 J | 0.00000079 U | 0.0000022 J | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00011 | 0.00000099 U |
| 2,3,4,6,7,8-HxCDF | 0.1 | 0.0000065 | 0.00000079 U | 0.00000098 UE | 0.0000016 J | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00011 | 0.00011 | 0.0000035 J |
| 1,2,3,4,6,7,8-HpCDF | 0.01 | 0.0000023 J | 0.00000079 U | 0.00075 | 0.0000058 | 0.0000017 J | 0.0000008 U | 0.00000093 U | 0.0000012 J | 0.00011 | 0.00011 | 0.0000062 |
| 1,2,3,4,7,8,9-HpCDF | 0.01 | 0.00000082 U | 0.00000079 U | 0.0000036 J | 0.00000092 U | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00012 | 0.00012 | 0.00000099 U |
| OCDF | 0.0003 | 0.0000016 U | 0.0000016 U | 0.00039 | 0.000018 | 0.0000017 U | 0.0000016 U | 0.0000019 U | 0.000002 U | 0.00019 | 0.00022 | 0.0000054 J |
| | | | | | | | | | | | | |
| Total HpCDD | | 0.0000019 J | 0.00000079 U | 0.00031 | 0.0000084 | 0.00000085 U | 0.0000008 U | 0.000002 J | 0.0000027 J | 0.00000093 U | 0.00000094 U | 0.0000071 |
| Total HpCDF | | 0.0000056 | 0.00000079 U | 0.0012 | 0.000008 | 0.0000017 J | 0.0000008 U | 0.00000093 U | 0.0000012 J | 0.00000093 U | 0.00000094 U | 0.0000095 |
| Total HxCDD | | 0.0000038 J | 0.00000079 U | 0.00038 | 0.0000027 J | 0.00000085 U | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00000093 U | 0.00000094 U | 0.000006 |
| Total HxCDF | | 0.000088 | 0.00000079 U | 0.00031 | 0.000013 | 0.00000094 J | 0.0000008 U | 0.00000093 U | 0.000001 U | 0.00000093 U | 0.00000094 U | 0.000038 |
| Total PeCDF | | 0.00018 | 0.00000079 U | 0.00011 | 0.000025 | 0.0000015 J | 0.0000008 U | 0.00000093 U | 0.0000011 J | 0.00000093 U | 0.00000094 U | 0.000089 |
| Total TCDD | | 0.00000067 J | 0.00000017 J | 0.000021 | 0.000002 | 0.00000017 U | 0.00000016 U | 0.00000027 J | 0.00000083 J | 0.00000019 U | 0.00000019 U | 0.0000042 |
| Total TCDF | | 0.00003 | 0.00000046 J | 0.000035 | 0.000018 | 0.0000016 | 0.00000016 U | 0.0000026 | 0.0000027 | 0.00000019 U | 0.00000019 U | 0.000056 |
| | | | | | | | | | | | | |
| Dioxin Toxicity Equivalent (2005) | | 6.8E-06 | 9.1E-07 | 2.5E-05 | 2.0E-06 | 1.0E-06 | 9.1E-07 | 1.1E-06 | 1.2E-06 | 2.4E-04 | 2.4E-04 | 4.0E-06 |

A - detection limit based on signal-to-noise measurements
J - concentration detected is below the calibration range and is therefore estimated
B - less than 10 times higher than the method blank level
U - not detected, value is the reporting limit
E - PCDE (Polychlorinated diphenyl ether) Interference, potentially masking a furan concentration during analysis.
mg/kg - milligrams per kilogram

06/27/2007
Prepared by: KJC
Checked by: BJR

# FIGURES

Mashapaug Pond

Abandoned Garage

Railroad Tracks

Phase III

Mashapaug Cove

Phase II

Phase I

Retail

Parking Lot

Phase I

Planned Development 2006 / 2007

Adelaide Avenue

Legend

- Area to be capped
- Division of Phase I and III and access roads to cap and cove
- Approximate Waste Fill Area
- Wetland Buffer 12" Soil, Limited Clearing of Brush
- 12" Soil Cap with Geofabric
- 24" Soil Cap without Geofabric
- Slag Area 12" Soil Cap with Liner
- Delineation of Inner and Outer Cove
- Approximate Park Parcel Boundary
- Elevation

Prepared/Date: BJR 06/28/07
Checked/Date: MJM 06/28/07

N

0 75 150 Feet

Former Gorham Maufacturing Site
333 Adelaide Avenue
Providence, RI

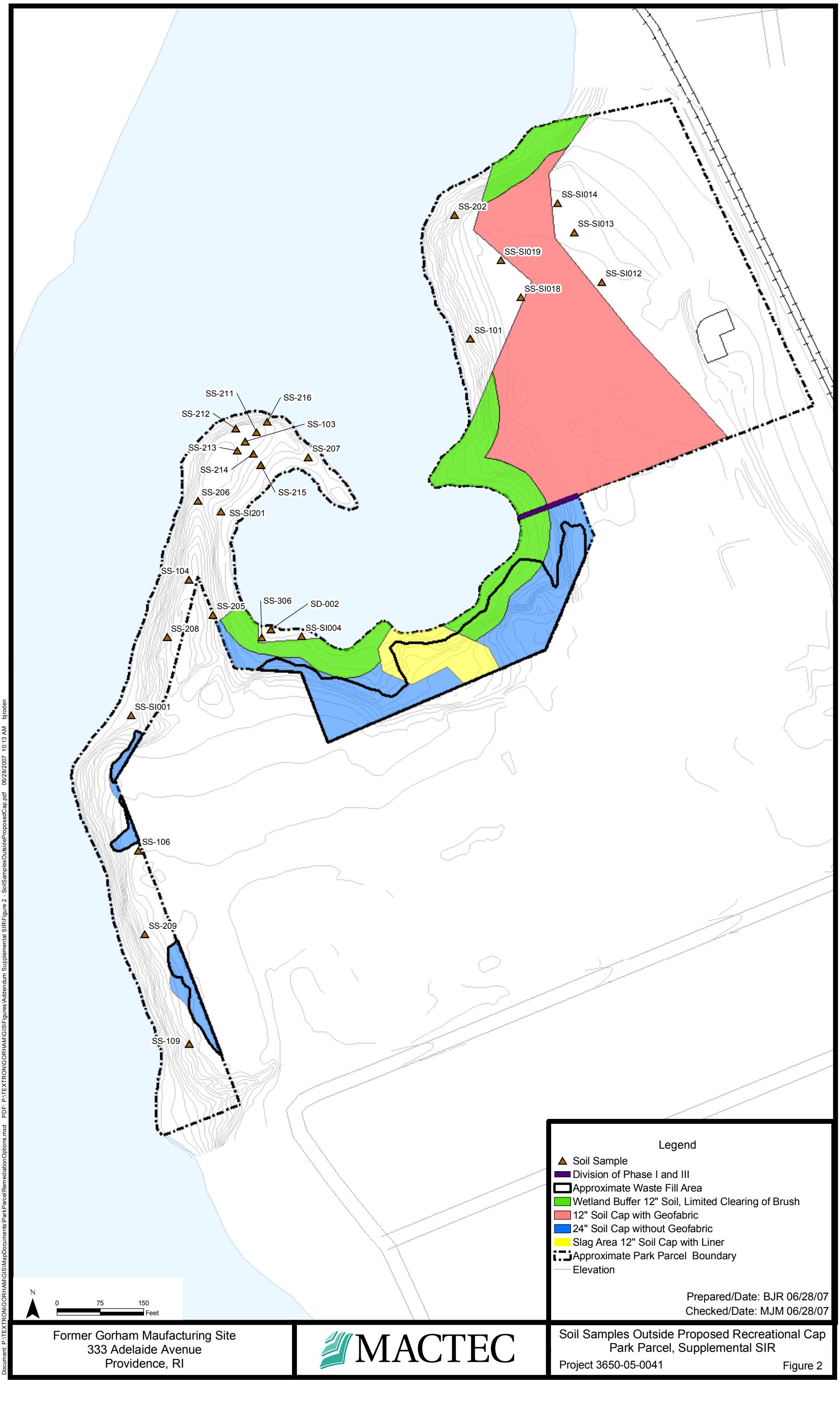
MACTEC

Park Parcel Three Phased Remediation
Supplemental SIR

Project 3650-05-0041

Figure 1

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ParkParcelRemediationOptions.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Addendum Supplemental SIR\Figure 1.pdf 06/28/2007 3:56 PM bjroden




Former Gorham Maufacturing Site
333 Adelaide Avenue
Providence, RI

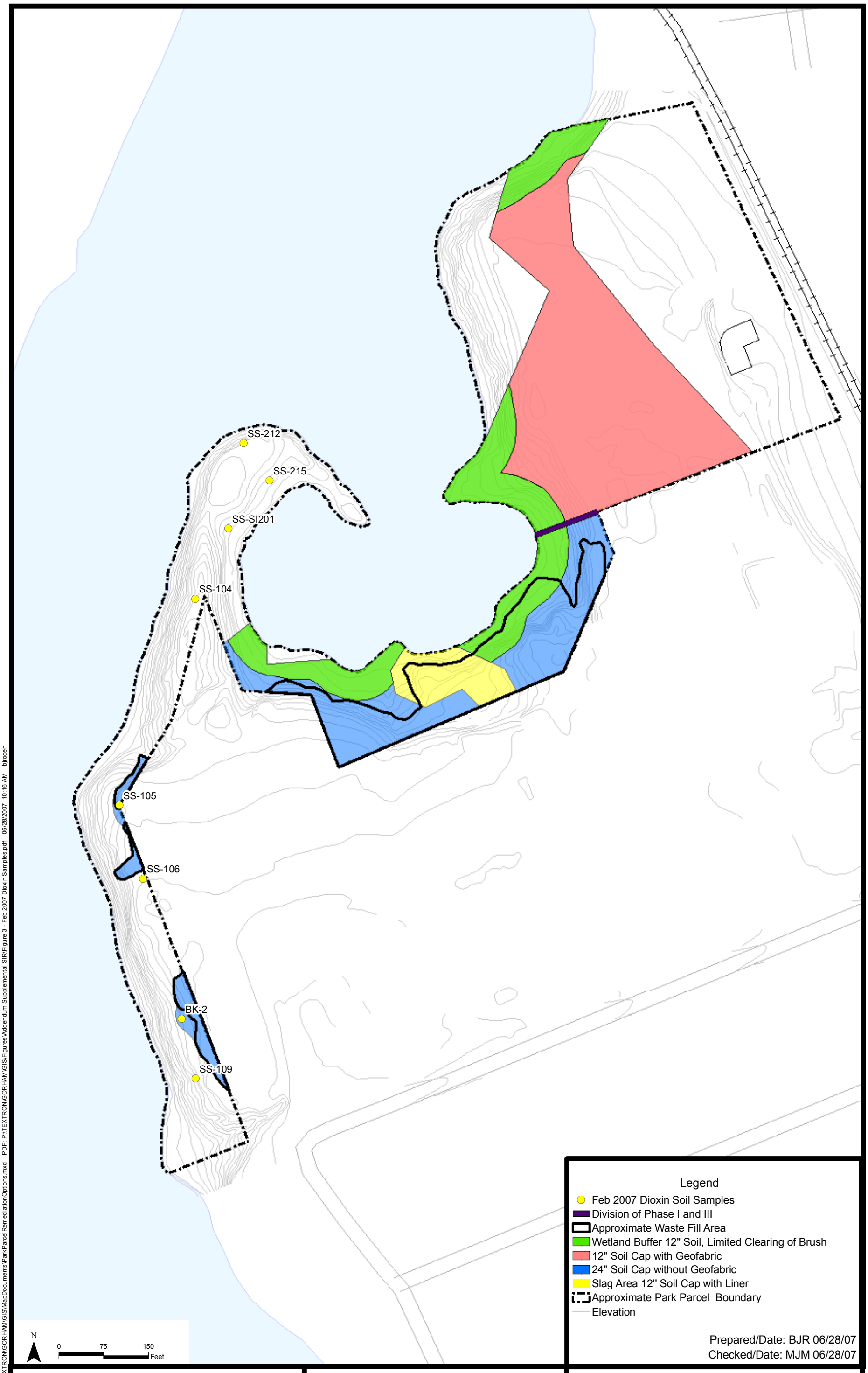
MACTEC

Soil Samples Outside Proposed Recreational Cap
Park Parcel, Supplemental SIR

Project 3650-05-0041

Figure 2

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ParkParcelRemediationOptions.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Addendum Supplemental SIR\Figure 2 - SoilSamplesOutsideProposedCap.pdf 06/28/2007 10:13 AM bjroden




Former Gorham Maufacturing Site
333 Adelaide Avenue
Providence, RI

MACTEC

February 2007 Surface Soil Dioxin Sample Locations
Park Parcel, Supplemental SIR

Project 3650-05-0041

Figure 3

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ParkParcelRemediationOptions.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Addendum Supplemental SIR\Figure 3 - Feb 2007 Dioxin Samples.pdf 06/28/2007 10:16 AM bjroden

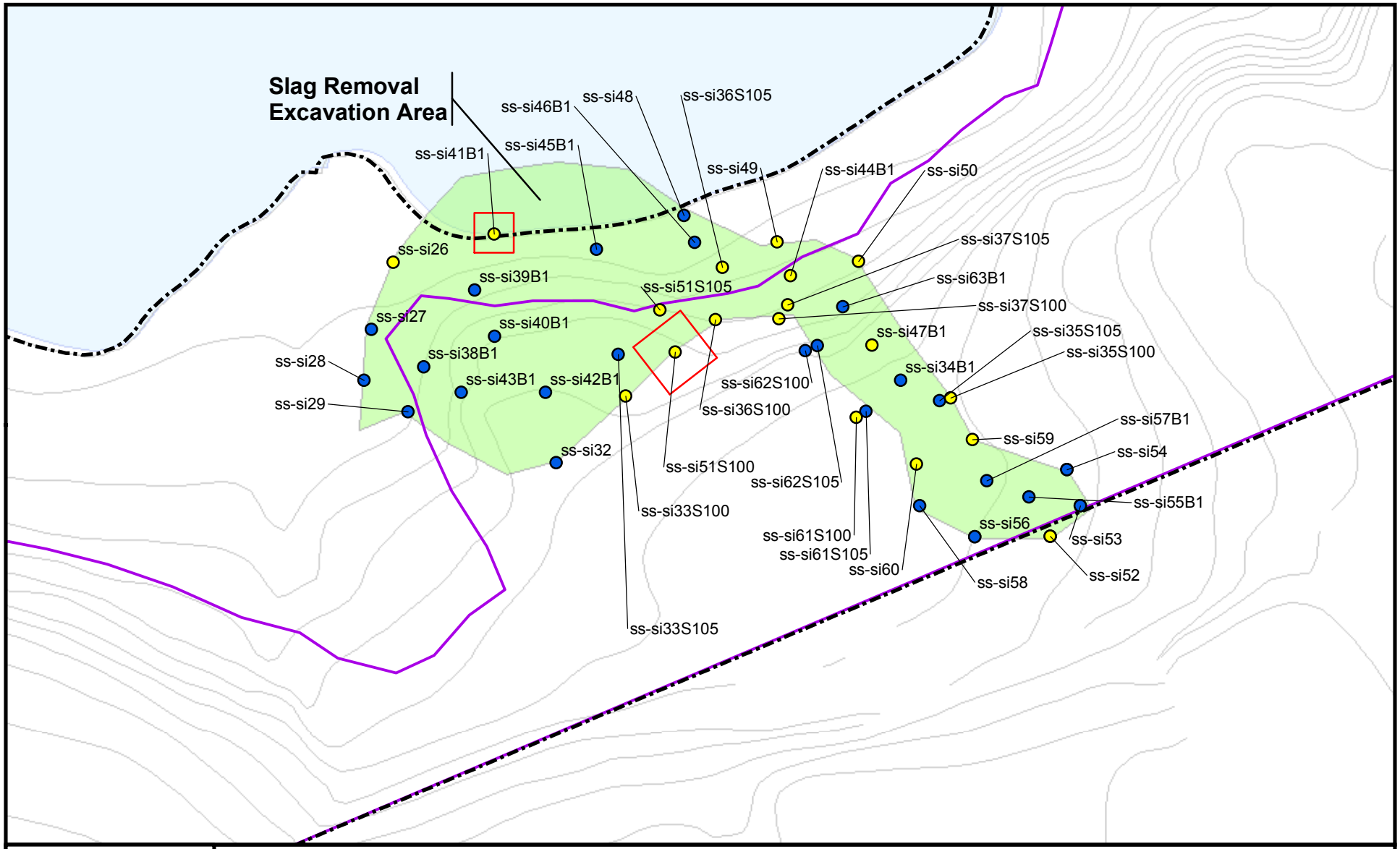



Figure 4
Supplemental Soil Excavation
Former Slag Pile, Park Pacel
Supplemental SIR
Former Gorham Site
333 Adelaide Avenue
Providence, Rhode Island

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ExcavatedArea_Revised.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Addendum Supplemental SIR\Figure 4 - Confirmatory Soil Sample Locations.pdf 06/28/2007 10:31 AM bjroden

Phase III

Mashapaug Cove

Phase II

Slag Removal Area

Phase I

Retail

Parking Area

School

Undeveloped
Parcel C

N

0 50 100 Feet

Legend

- Division of Phase I and III
- Approximate Park Parcel Boundary
- Location of Cross Sections
- Wetland Buffer 12" Soil, Limited Clearing of Brush
- 12" Soil Cap with Geofabric
- 24" Soil Cap without Geofabric
- Slag Area 12" Soil Cap with Liner
- Existing Structures

Prepared/Date: BJR 06/28/07
Checked/Date: MJM 06/28/07

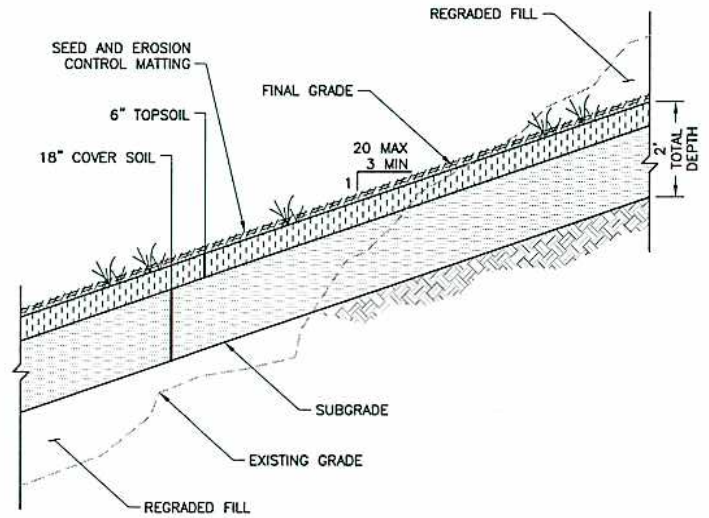
Former Gorham Maufacturing Site
333 Adelaide Avenue
Providence, RI

MACTEC

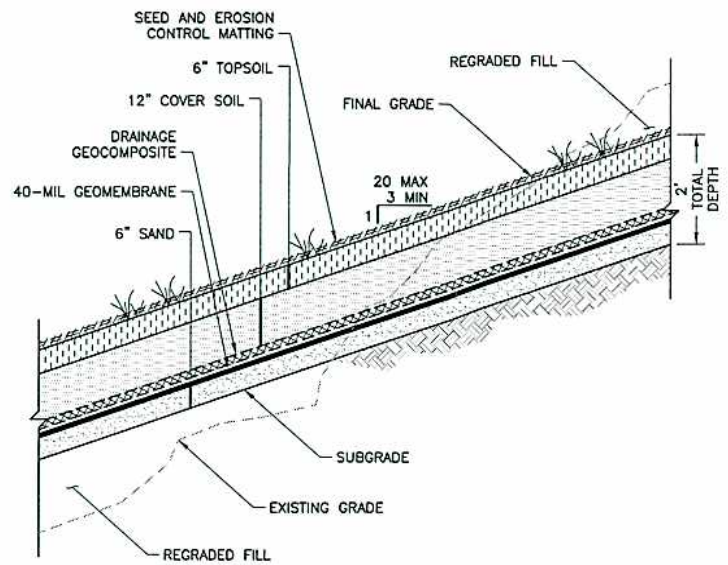
Approximate Location of Cap Cross Section Details
Park Parcel, Supplemental SIR

Project 3650-05-0041 Figure 5

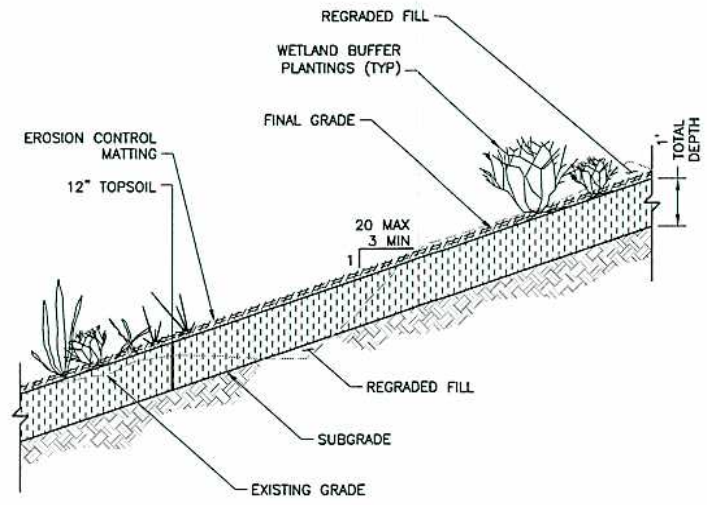
Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ParkParcelRemediationOptions.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Addendum Supplemental SIR\Figure 5 - X Section Locations.pdf 06/28/2007 10:25 AM bjroden



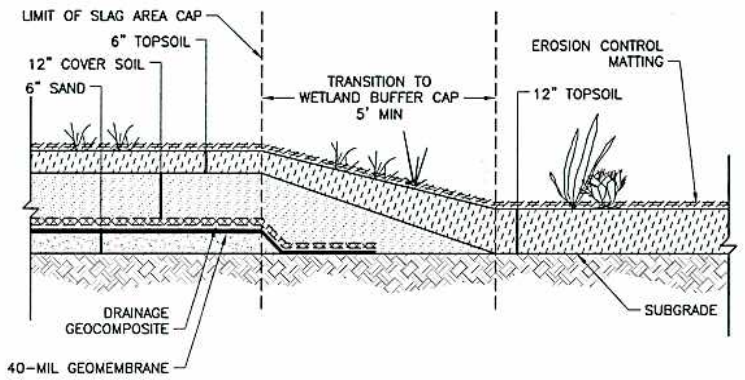

TYPICAL UPLAND CAP
NTS
C-104 | C-503
C-105



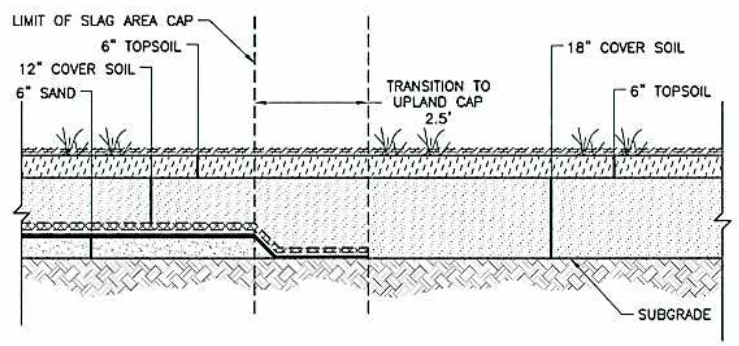

TYPICAL SLAG AREA CAP
NTS
C-104 | C-503
C-105



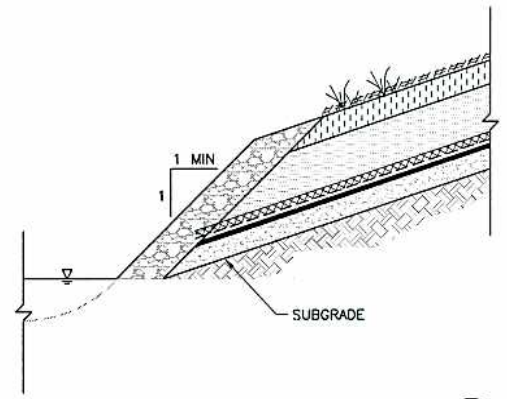

TYPICAL WETLAND BUFFER CAP
NTS
C-104 | C-503
C-105



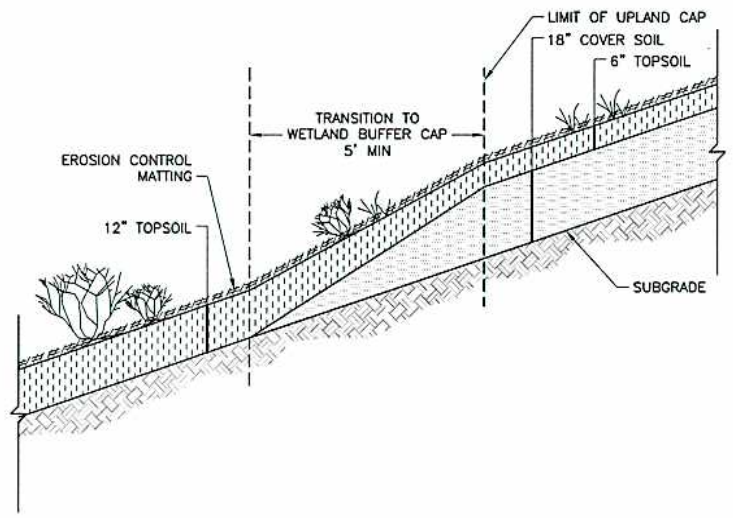

TYPICAL TRANSITION DETAIL:
SLAG AREA CAP TO WETLAND BUFFER CAP
NTS
C-104 | C-503
C-105



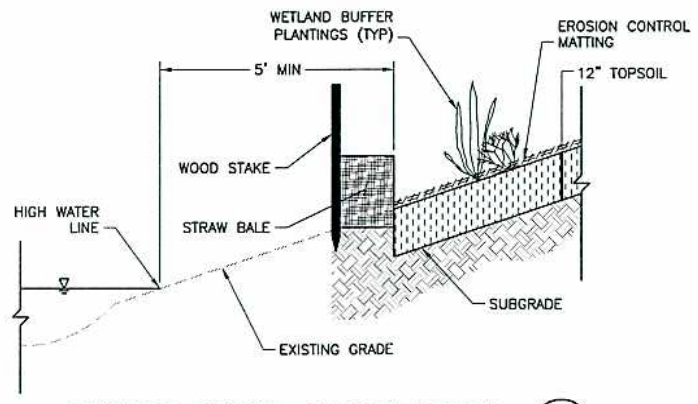

TYPICAL TRANSITION DETAIL:
SLAG AREA CAP TO UPLAND CAP
NTS
C-104 | C-503
C-105




SLAG AREA CAP TOE DETAIL
NTS
C-104 | C-503
C-105




TYPICAL TRANSITION DETAIL:
UPLAND CAP TO WETLAND BUFFER CAP
NTS
C-104 | C-503
C-105




WETLAND BUFFER CAP TOE DETAIL
NTS
C-104 | C-503
C-105

DRAFT

0 10 20 40
SCALE IN FEET

| NO. | DATE | DSGN | DR | CHK | APVD | BY |
|---|---|---|---|---|---|---|
| A | 6/29/07 | JPM | RHH | JPM | APVD | WJW |

DRAFT SUBMITTAL TO RIDEM
REVISION

Remedial Design - Phase 1 Recreational Cap
FORMER GORHAM MANUFACTURING SITE
333 Adelaide Avenue
Providence, Rhode Island

MACTEC Engineering and Consulting, Inc.
P.O. Box 7050, 511 Congress Street
Portland, Maine 04112-7050
(207) 775-5401

MACTEC

CIVIL
CIVIL DETAILS 2

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

| | |
|---|---|
| DATE | 6/06/07 |
| PROJ | 3650050041 |
| DWG | C-503 |
| SHEET | 15 OF 1 |



FILE NAME: Z:\Projects\CADD-PORT\Projects\TEXTRON\GORHAM SITE - PHASE I\RSC-C-503.dwg PLOT DATE: Thu, 28 Jun 2007 PLOT TIME: 3:21 PM

# APPENDIX A

## Soil Sampling Data Logs – February 2007

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAPMAN + D. KWIKJIAN |
| Field Sample ID: SS21201 | Sample Time: 10:00 2/~~28~~ 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] chisel + Hammer |
| | |

Soil Description:
same as SS21501, except frozen soil

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1x8oz Jar | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAPMAN |
| Field Sample ID: SS21501 | Sample Time: 0900 (2/28/07) |
| Top Depth: 0" ~~6 DUP~~ 2/27/07 | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [ ] _____ |
| | |

Soil Description: SILTY SAND, <5% GRAVEL, 75% SAND, 20% SILT,
↙ ↓ ↘
10% Coarse 50% Med. 15% Fine
LIGHT BROWN, DAMP, ODORLESS, NO STAINING.

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 3x 8oz Amber | 4°C |
| [ ] _____ | | |

Notes:
MS/MSD
+Dup also collected SS21501 MS/MSD
SS21501 Dup

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. Kuhrman + D. Chalmer |
| Field Sample ID: SSSI20101 | Sample Time: 11:15 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] Chisel + Hammer |
| | |

Soil Description: Silty SAND, <5% Gravel, 10% Coarse Sand, 50% Med. Sand, 15% Fine Sand, 20% fines, dark brown, no odor or staining

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1x 8 oz Glass Jar | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAPMAN + D. KAKKIAN |
| Field Sample ID: SS10401 | Sample Time: 12:45 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] chisel + hammer |
| | |

Soil Description: SILTY SAND, MOSTLY FROZEN, <5% organic, <10% coarse sand, 50% med. sand, 15% fine sand, 20% fines/silt, <5% organics. Brown to light brown, no odor or staining, moist

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1x8oz glass | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAPMAN + D. KUKKULA |
| Field Sample ID: SS10501 | Sample Time: 2:00 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] Chisel + Hammer |
| | |

Soil Description: LOAMY SILTY SAND, 10% organics, < 5% gravel, 10% Coarse Sand, 50% Medium Sand, 10% fine sand, 15% silt. Dark brown to black, no odor or staining

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1 x 8 oz glass | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAPMAN + D. KULIKIAN |
| Field Sample ID: SS10601 | Sample Time: 14:20 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] Chisel + hammer |
| | |

Soil Description:
SILTY SAND, 10% Gravel, 10% Coarse Sand, 50% Medium Sand, 20% fine sand, 10% silt. brown to dark brown, odorless no staining, moist.

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1x8 oz Glass | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. KURKJIAN + D. CHAPMAN |
| Field Sample ID: SS10901 | Sample Time: 15:30 2/28/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [ ] _____ |
| | |

Soil Description: SAND, <5% gravel, 10% coarse sand, 75% medium sand, 10% fine, <5% silt. brown, odorless, no visible staining, moist

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1x 8oz glass | 4°C |
| [ ] _____ | | |

Notes:

SURFACE SOIL SAMPLE FIELD DATA RECORD

FORMER GORHAM MANUFACTURING SITE
333 ADELAIDE AVENUE, PROVIDENCE, RI

| | |
|---|---|
| Project: 2006 SUPPLEMENTAL SITE INVESTIGATION | Sampler(s): D. CHAMARD + D. KWEKA, AD |
| Field Sample ID: DUP ~~BK201~~ | Sample Time: 15:00 2/22/07 |
| Top Depth: 0" | Equipment: |
| Bottom Depth: 6" | [X] Hand Auger |
| | [ ] Shovel |
| | [X] SS Spoon/Spatula |
| | [X] SS Bowl |
| | [X] chisel + hammer |
| | |

Soil Description: SILTY SAND, 10% Gravel, 10% Coarse Sand, 50% Medium Sand, 15% fine sand, 15% silt, light brown, no odor, no staining, moist/damp.

| Analyses Requested: | Bottle(s): | Preservation: |
|---|---|---|
| [ ] VOA (8260) | | |
| [ ] PAH (8270c SIM) | | |
| [ ] 13 Priority Pollutant Metals plus Barium (6010b/7470a) | | |
| [ ] PCBs (8082) | | |
| [ ] Pesticides (8081) | | |
| [X] Dioxins / Furans (8290) | 1 x 8oz glass | 4°C |
| [ ] _____ | | |

Notes:

# APPENDIX B

## ESS Laboratory Data Package

***(Provided on CD)***

# APPENDIX C
# EA Memorandum

12 June 2007

**TECHNICAL MEMORANDUM**

**TO:** David Heislein, P.E.
Mactec Engineering

**FROM:** Jonathan Petrillo
EA Engineering, Science, and Technology, Inc.

**SUBJECT:** Former Gorham Manufacturing Facility – Remediation / Restoration Strategy
EA Project No. 14501.01

***Introduction***

Previous studies of 333 Adelaide Avenue in Providence, Rhode Island (hereafter referred to as the "Site"), identified impacts to environmental media from former manufacturing activities. Remediation of the Site is on-going with several new phases being planned for the Park Parcel. The objective of this memorandum is to outline a strategy for restoration of natural areas as part of site remediation activities. This memorandum addresses restoration/remediation strategy for the portion of the site identified as "Phase I" on Figure 1 *Proposed Recreational Soil Cap and Cove Restoration*, dated 5/1/07, prepared by MACTEC Engineering & Consulting, Inc. (MACTEC).

***Existing Conditions***

The Site is located along the shoreline of Mashapaug Cove within Mashapaug Pond (Photo 1); both the cove and the pond are within the Pawtuxet River watershed. Surrounding land use is best characterized as mixed residential and commercial/retail spaces. Other notable land uses include a recently constructed public school facility, retail space, and parcels planned for development for a YMCA and public recreation. Existing vegetative communities include forested and scrub-shrub wetlands, mixed oak woodland and mid-successional woodland cover types.

Wetlands at the site occur as fringe features forming a narrow band along the cove shore (Photo 2). Tree species within the wetland areas include, red maple (*Acer rubrum*), silver maple (*A. saccharinum*), and black willow (*Salix nigra*). The shrub layer consists of sweet pepperbush (*Clethra alnifolia*), red osier dogwood (*Cornus stolonifera*), and buttonbush (*Cephalanthus occidentalis*). Sensitive fern (*Onoclea sensibilis*), blue flag iris (*Iris versicolor*), and poison ivy (*Toxicodendron radicans*) occur in the herbaceous understory.

The mixed oak woodland community occurs in the upland areas on the western shore of the cove (west of the slag removal area) (Photos 1 and 3). Tree species within this area include red oak (*Quercus rubra*), black oak (*Q. velutina*), and to a lesser extent white oak (*Q. alba*). Sweet birch (*Betula lenta*) and black cherry (*Prunus serotina*) are also present within this cover type. The understory includes a mix of low growing shrubs such as low bush blueberry (*Vaccinum angustifolium*), mountain laurel (*Kalmia latifolia*), and huckleberry (*Gaylussacia baccata*). There are few non native invasive species present within this habitat type. In addition, several signs of wildlife usage were observed including a fox den and a painted turtle shell.

The mid-successional community occurs in the perimeter wetland and upland areas along the eastern shore of the cove (east of the slag removal area) (Photos 1 and 4). Tree species within this area include

red maple, red oak, black oak, tree-of-heaven (*Ailanthus altissima*), and gray birch (*Betula populifolia*). The understory within this area is dominated by non native invasive plant species including, Asiatic bittersweet (*Celastrus orbiculatus*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese honeysuckle (*L. japonica*), and Japanese knotweed (*Fallopia japonica*). The dominance of invasive species in this habitat is likely a result of previous disturbances which allowed these opportunistic species to colonize.

***Proposed Conditions***

Site remediation activities will precede restoration activities. Remediation activities will remove and or manage contaminated soil, debris, and invasive vegetation. Efforts will be taken to preserve mature trees and other desirable native vegetation to the extent practicable. The restoration area will be backfilled and re-graded with a clean topsoil mix. The depth of clean topsoil will vary depending on location; these details are currently being developed by MACTEC. EA has included brief descriptions of recommended invasive species management and revegetation actions for the Site.

***Invasive Species Management***

As noted earlier, portions of the Site are typical of disturbed sites in that they harbor numerous invasive plant species. Invasive plants of note at this site include; Japanese knotweed, Morrow's and Japanese honeysuckle, and Asiatic bittersweet. If these populations are not addressed they will undoubtedly compromise the integrity of the restoration project. The aggressive nature and superior competitive ability of these plants in disturbed habitats (i.e. newly planted areas), will negatively affect botanical diversity and survivorship of restorative plantings.

Therefore, potential treatment options include chemical and mechanical approaches. Mechanical removal (i.e., cutting) of above ground plant parts can aid in the management of certain invasive species. Mechanical treatment alone will probably not produce the desired level of control unless multiple cuts in one growth season are executed. Foliar, or cut stem, application of herbicidal chemicals (i.e., glyphosate (Rodeo)) will transport the herbicide to belowground parts detrimentally affecting the vigor of the belowground root/rhizome system and effect plant death or vigor. These options will be coordinated with the construction schedule as part of the site clearing and restoration activities.

***Revegetation***

Following site remediation the site should be revegetated to stabilize soils and enhance species diversity and structural complexity. These activities will be conducted using best management practices and every effort to minimize impacts to the surrounding landscape should be taken. EA understands that existing grades will be re-established where possible to return the area it's to pre-construction character.

The restoration planting plan consists of two distinct vegetation zones. The species composition of each zone reflects morphological and physiological adaptations of the species occupying them to their specific habitats. Since remediation activities will strive to preserve mature trees and other desirable native vegetation when possible, an enhancement planting approach has been taken. This approach stresses under-story, and shade tolerant plantings as the primary components of the Revegetation activities. Species composition within the mixed oak woodland are proposed to be used as a reference condition to guide restoration and revegetation of upland portions of the site following the completion of remediation activities. In addition, only woody species have been selected for these plantings in order to enable the anticipated installation between 1 September and 15 November.

The following passages briefly describe the physical characteristics which are commonly associated with these zones. The diversity of species outlined in the zone descriptions is reflective of the inherent uncertainties of restorative planting success. For this reason many of the species are redundant throughout the various zones, these redundancies are also found in nature as certain plant species are tolerant of a

wide range of hydrologic and soil saturation scenarios. Due to the uncertainty of post-remediation site hydrology in the restoration area specific elevation boundaries for these zones are not described.

***Forested Wetland*** - This zone will occur in areas along the cove shoreline that will be subject to wetland hydrology after remediation activities. Revegetation will focus on recreation of extant on-site habitats of good quality (i.e., few invasive). Revegetation for these areas will include species selected from Table 1. Selections will be based largely on availability and will only use plant species native to Rhode Island.

TABLE 1 – FORESTED WETLAND SPECIES

| Common Name | Botanical Name | Wetland Indicator Status |
|---|---|---|
| Red Maple | *Acer rubrum* | FAC |
| Silver Maple | *Acer saccharinum* | FACW |
| Black Willow | *Salix nigra* | FACW+ |
| Red-osier Dogwood | *Cornus sericea* | FACW+ |
| Northern Arrowwood | *Viburnum dentatum* | FACW- |
| Sweet pepper bush | *Clethra alnifolia* | FAC+ |
| Highbush blueberry | *Vaccinum corymbosum* | FACW |
| Buttonbush | *Cephalanthus occidentalis* | OBL |
| Sensitive fern | *Onoclea sensibilis* | FACW |
| Blue flag iris | *Iris versicolor* | OBL |

***Mixed Oak Woodland*** - This zone will occur in areas upland of the cove shoreline that will not be subject to wetland hydrology after remediation activities. Revegetation will focus on recreation of extant on-site habitats of good quality (i.e., few invasive). Revegetation for these areas will include species selected from Table 2. Selections will be based largely on availability and will only use plant species native to Rhode Island.

TABLE 2 – MIXED OAK WOODLAND SPECIES

| Common Name | Botanical Name | Wetland Indicator Status |
|---|---|---|
| Red Maple | *Acer rubrum* | FAC |
| Sweet Birch | *Betula lenta* | FACU |
| White Pine | *Pinus strobus* | FACU |
| White Oak | *Quercus alba* | FACU |
| Northern Red Oak | *Quercus rubra* | FACU- |
| Black Oak | *Quercus velutina* | UPL |
| Black Cherry | *Prunus serotina* | FACU |
| Gray Birch | *Betula populifolia* | FAC |
| Mountain Laurel | *Kalmia latifolia* | FACU |
| Lowbush Blueberry | *Vaccinum angustifolium* | FACU- |
| Black Huckleberry | *Gaylussacia baccata* | FACU |

SITE PHOTOS

*Photo 1 – View north of cove from slag removal area*

*Photo 2 – Typical fringe wetland*

*Photo 3 – View of mixed oak woodland (typical); western cove shore*

*Photo 4 – View of mid-successional woodland (typical); eastern cove shore*

JP