



**REMEDIAL ACTION WORK PLAN**

**PHASE II AREA – MASHAPAUG INNER COVE,  
PHASE III AREA – NORTHEAST UPLAND,  
AND PARCEL C  
FORMER GORHAM MANUFACTURING FACILITY  
333 ADELAIDE AVENUE  
PROVIDENCE, RHODE ISLAND**

**MARCH 11, 2015**

Textron, Inc.  
Former Gorham Manufacturing Facility, Providence, RI  
Remedial Action Work Plan: Phase II Area – Mashapaug Inner Cove,  
Phase III Area – Northeast Upland And Parcel C  
Project No.: 3652140032  
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333 ADELAIDE AVENUE  
PROVIDENCE, RHODE ISLAND**

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Project No. 3652140032

March 11, 2015

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## **APPENDICES**

- Appendix A Parcel C and C-1 Program Letters and Remedial Decision Letters
- Appendix B Drawings
- Appendix C Rhode Island Residential Direct Exposure Criteria
- Appendix D Wetland Restoration Plan
- Appendix E Parcel C and C-1 Draft Environmental Land Use Restriction and Soil Management Plan  
(Draft ELUR being reviewed by RIDEM)
- Appendix F Amec Foster Wheeler Health and Safety Plan
- Appendix G Water Quality Certification and Notice of Intent
- Appendix H Section 404 Permit
- Appendix I Wildlife Management Plan

## ACRONYMS

ABB-ES	ABB Environmental Services
ACGHI	American Conference of Governmental Industrial Hygienists
AMEC	AMEC Environment & Infrastructure, Inc.
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
COPC	Constituents of Potential Concern
1,2-DCE	1,2-dichloroethene
DO	Dissolved oxygen
ELUR	Environmental Land Usage Restriction
Fuss & O'Neil	Fuss & O'Neil, Inc.
GAC	Granular Activated Carbon
GPS	Global Positioning System
GZA	GZA GeoEnvironmental, Inc.
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HLA	Harding Lawson Associates
I/C DEC	Industrial/Commercial Direct Exposure Criteria
LEL	Lower explosive limit
LOD	Limit of Disturbance
LOW	Limit of Work
MACTEC	MACTEC Engineering and Consulting, Inc.
mg/m <sup>3</sup>	Milligrams per Cubic Meter
NOI	Notice of Intent
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
PCE	Tetrachloroethene
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PNOC	Particulates Not Otherwise Characterized
PP13	Priority pollutant metals
PPE	Personal protective equipment
PRA	Providence Redevelopment Agency
PVC	Polyvinyl Chloride

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RAWP	Remedial Action Work Plan
RDEC	Residential Direct Exposure Criteria
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
ROW	Right of way
SI	Site Inspection
SIR	Site Investigation Report
SMP	Soil Management Plan
SPLP	Synthetic Precipitation Leaching Procedure
SSIR	Supplemental Site Investigation Report
SVOCs	Semi-volatile Organic Compounds
SWPPP	Storm Water Pollution Prevention Plan
1,1,1-TCA	1,1,1-trichloroethane
TCE	Trichloroethene
TEQ	Toxic Equivalence
TEXTRON	Textron, Inc.
TLV	Threshold Limit Value
TMDL	Total Maximum Daily Load
TOC	Total organic carbon
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment Storage and/or Disposal Facility
URI	University of Rhode Island
USEPA	United States Environmental Protection Agency
VHB	Vanasse Hangen Brustlin, Inc.
VOCs	Volatile Organic Compounds
WQC	Water Quality Certification



## 1.0 INTRODUCTION

The Former Gorham Manufacturing Facility is located at 333 Adelaide Avenue, Providence, Rhode Island and is comprised of four parcels (Figures 1 and 2). A phased approach to remediating all of Parcel C-1 was developed. The Phase I Area, which is the western area along Mashapaug Pond and the area north of the Alvarez High School (Figure 2) was addressed first in 2012. The next phase of remediation will cover the two remaining areas of Parcel C-1, which are Mashapaug Inner Cove (Phase II) and the northern portion of Parcel C-1 (Phase III). The area immediately west of the high school, Parcel C, has also been included in this remediation plan to complete the closure of the upland and pond areas of the Project Site (Figure 3). This Remedial Action Work Plan (RAWP) consolidates the remedial actions proposed by Textron for the Phase II Area – Mashapaug Inner Cove and the Phase III Area – Northeast Upland of Parcel C-1 with the Parcel C RAWP originally proposed by the City of Providence (Figure 3). Construction of the remedy will be completed at all three areas under this RAWP.

Site investigation activities were conducted between 1986 and 2014 across the three areas of the Site that are the focus of this RAWP. Based on the results of these sampling events, surface soil within the Parcel C area adjacent to the high school will be capped to address soils exhibiting contaminant concentrations exceeding RIDEM Residential Direct Exposure Criteria (RDEC) for metals, polynuclear aromatic hydrocarbons (PAHs), and dioxin. Metals, PAHs and dioxin were also found in the Mashapaug Inner Cove (Phase II Area) and Phase III Area – Northeast Upland. The sediment contaminant concentrations within the Inner Cove exceeded the ecological risk criteria and the Northeast Upland Area surface soils exceeded the RDEC. Both areas require remediation to address the risks.

The selected final remedy for these areas include capping Parcel C, removing approximately two feet of sediment from the Inner Cove (Phase II Area), and then placing and capping the dewatered sediment within a defined location of the Phase III Area Northeast Upland. The Inner Cove and the delineated wetlands located along the downgradient edge of the Phase I and Phase III Areas (Figure 4) will then be restored. This restoration will provide a smooth transition from the perimeter wetland (50 feet above the delineated fringe wetland) into the water. The placed sediment and the soils in the Phase III Area will be capped as detailed in subsequent sections of this RAWP. This final remedy also includes institutional controls in the form of an Environmental Land Usage Restriction (ELUR) that will incorporate Parcel C and Parcel C-1 into an ELUR. This ELUR will be implemented at the completion of the Parcels C and C-1 capping activities and Inner Cove sediment remediation.

This RAWP has been prepared pursuant to Section 9.0 (Remedial Action Work Plans) of the State of Rhode Island Department of Environmental Management (RIDEM) *Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases*, as amended November 9, 2011 (hereafter referred to as the Remediation Regulations) on behalf of Textron, Inc. (Textron) by Amec Foster Wheeler, Environment and Infrastructure, Inc. (Amec Foster Wheeler; formerly known as AMEC Environment & Infrastructure, Inc.). This RAWP provides details for the preferred remedial alternative as specified in the RIDEM Program Letters issued October 10,

2001 for Parcel C (RIDEM, 2001b), and January 20, 2015 (RIDEM, 2015a) for Phase II and Phase III for Case No. 2005-059 (Appendix A).

## 1.1 Property and Site History

The Former Gorham Manufacturing Facility is a 37-acre parcel of land where Gorham Silver engaged in the manufacture of silverware, both sterling and plated, and bronze castings from approximately 1890 to 1985 (Figure 1). Operations included casting, rolling, polishing, lacquering, forging, plating, annealing, soldering, degreasing, machining, and melting. Vapor degreasers reportedly used trichloroethene (TCE), tetrachloroethene (PCE), and 1,1,1-trichloroethane (1,1,1-TCA). More recent Site conditions are shown in the aerial photograph in Figure 2. In this figure, the Site is located immediately north of Adelaide Avenue and west of the Amtrak railroad tracks. The former manufacturing facility was razed in 2001.

Parcel C (formerly known as the YMCA main parcel) and Parcel C-1 (formerly known as the Park Parcel) are two of the four parcels that comprise the 333 Adelaide Avenue Former Gorham Manufacturing Facility property as identified in the 2006 Consent Order between RIDEM and the City of Providence (Figure 3), and are currently owned by the City of Providence. A retail development has been completed on the southeastern portion of the Site (Parcel A). A public high school (Alvarez High School) has been constructed on a second parcel (Parcel B).

Parcel C is a vacant empty lot located adjacent to the Alvarez High School. Parcel C-1 extends from the intersection of Adelaide Avenue and Crescent Street north and east along Mashapaug Pond/Inner Cove to the northeast corner of the property behind the Parcel A detention basin and Mashapaug Pond (Figure 2). Parcel D, the fast food restaurant, is not owned by the City of Providence and not part of the Site.

## 1.2 Physical Setting

The 333 Adelaide Avenue property is bordered to the east by Amtrak railroad tracks (Figure 2). Adelaide Avenue and a residential neighborhood bound the 333 Adelaide Avenue property to the south. To the north and west, the Site is bounded by Mashapaug Pond. The property includes Mashapaug Inner and Outer Cove. Parcel C-1 constitutes the northern portions of the 333 Adelaide Avenue property. On the opposite (northern) shore of Mashapaug Pond is an industrially-zoned area.

### 1.2.1 Phase I Area of Parcel C-1

Parcel C-1 was divided into three phases of remediation, as discussed previously. The Phase I Area of Parcel C-1 (Figure 3) extends from the corner of Adelaide Avenue and Crescent Street, northward along Mashapaug Pond to the western peninsula and east along the southern shoreline of Mashapaug Inner Cove. The western portion of the Phase I Area has moderate to steep slopes that descend to Mashapaug Pond. The central portion borders the southern shore of Mashapaug Inner Cove and includes a steep embankment north of the Alvarez High School (Parcel B) that leads down to wooded lowland adjacent to the Inner Cove. The embankments along the southern end of Mashapaug Inner Cove are underlain by heterogeneous fill, consisting of granular re-

worked soils with varying amounts of historic fill material (primarily casting sands). A slag pile was previously located in this portion of the Phase I Area (Figure 2) and was removed from the Property by Textron in July 2006. The Phase I Area was remediated in 2012 to address soil impacts above the RDEC. This area is shown in blue on Figure 3. The contaminated soil, including the area of the former slag pile, was capped with fabric and soil, and is vegetated with native grasses. Areas of Parcel C-1 Phase I Area that did not require capping remain heavily wooded.

### **1.2.2 Phase II Area of Parcel C-1 - Mashapaug Cove**

Mashapaug Cove consists of both the Inner and Outer Coves (Figure 3). The Inner Cove abuts the Phase I and Phase III Areas while the Outer Cove is located between the Inner Cove and Mashapaug Pond to the north. The remediation of the Inner Cove is addressed within this RAWP.

Based on investigations conducted by AMEC in June 2006, December 2011, and April 2014, the Inner Cove consists of a soft organic (peaty) silt or silty clay sediment. The Inner Cove has a shallow flat bottom with water depths that vary between 2.4 and 3.5 feet at locations greater than 20 feet from the shore. The Inner Cove sediments are generally a very dark, organic silt layer in the top two to eight feet underlain by sandy strata. A soil boring extending through the bottom of the Inner Cove identified sandy/gravel material to a depth of approximately 38 feet. Bedrock was not encountered. The south shore of the Inner Cove, near the former slag pile, contains silt and sand layers. Slag debris that was previously present in upper parts of the sediment cores was removed in 2006 as stated previously. Soil from a former storm water outfall that discharged into the Inner Cove was removed in July 2006 due to elevated metals concentrations and disposed of off-site. This former outfall was located east of the former slag pile and was capped as part of the Phase I remediation. During the summer months, aquatic vegetation is abundant within the Inner Cove and in recent years contains a large amount of blue green algae.

Most of the Outer Cove consists of sandy strata with organic silt located within the minor channel extending from the Inner Cove into Mashapaug Pond. The eastern and western shorelines of the Outer Cove generally consist of sand and very little organics. A soil boring extended through the bottom of the Outer Cove identified sandy/gravel material to a depth of approximately 45 feet. Bedrock was not encountered. Water depths within the Outer Cove range from four to eleven feet. A bathymetric survey was conducted in December 2011 over the entire Mashapaug Pond and Mashapaug Cove to map the bottom contours. These survey results are presented in Figure 5.

Mashapaug Cove and Mashapaug Pond were investigated by the University of Rhode Island (URI), RIDEM, HLA and stakeholders between 1986 and 2005 to initially assess surface water and sediment quality (Figure 6). Mashapaug Pond was previously classified as Class C water quality or eutrophic conditions (low dissolved oxygen [DO] and excessive algae/nutrients). In August 2002, RIDEM and the Rhode Island Department of Health (RIDOH) issued a letter (RIDEM and RIDOH, 2002a) to inform the public that fish caught from Mashapaug Pond was not safe to eat due to contamination by polychlorinated biphenyls (PCBs), dioxins, and/or high bacteria levels, and that the pond was unsafe for direct contact and consumption. None of these conditions has been attributed to conditions at the Site itself or the former Gorham manufacturing facility

(MACTEC, 2006b). An advisory released to the public by RIDEM and RIDOH during that same time frame indicated that catch and release fishing and boating were safe activities for Mashapaug Pond, and that a Site visitor should be unlikely to have significant exposures to Site-related constituents during recreational activities at the pond (minimal exposure to Cove surface water and sediment) (RIDEM and RIDOH, 2002b).

In 2006, RIDEM reclassified Mashapaug Pond (including Mashapaug Cove) as Class B surface water (RIDEM, 2006b). RIDEM considers Class B waters as designated for fish and wildlife habitat and primary and secondary contact recreational activities. These waters should be suitable for compatible industrial process and cooling, hydropower, aqua-culture uses, navigation, and irrigation and other agricultural uses, and are expected to have good aesthetic value. In 2007, RIDEM published a Total Maximum Daily Load (TMDL) for DO and phosphorus for Mashapaug Pond (RIDEM, 2007). This report identified that area surrounding Mashapaug Pond is entirely urban and that phosphorus loading within storm water discharge points and surface water runoff is causing a low DO and growth of blue green algae blooms that are hazardous to humans and reduced aquatic habitat. Neither issue is related to the former Gorham manufacturing facility. Tributaries to Mashapaug Pond include Spectacle Pond (including runoff from Route 10) and Mashapaug Brook and six storm water discharge points.

### **1.2.3 Phase III Area of Parcel C-1**

The Phase III area of Parcel C-1 is located in the northeast corner of the Property. This area borders both the eastern shore of the Inner and Outer Coves and shoreline of Mashapaug Pond (Figure 3). A steep slope is present along the eastern shore of the Inner and Outer Coves and the eastern peninsula separating these coves. To the east of Mashapaug Outer Cove is a flat upland area that formerly housed an employee recreational building (known as the ‘Casino’) and associated parking lots. There are no visible building foundations or debris within this former Casino area. Also, in the northeast corner of the Phase III area is a separate plot of land that contains an active Amtrak High Speed railroad maintenance shed. Remnants of the former brick Carriage House are present in the area adjacent to the Amtrak railroad behind the existing retail building (Figure 2). An approximate 20-foot difference in elevation exists between the former “Casino” and parking lots upland parcel and the lower shoreline of Mashapaug Cove and Pond. A City sewer easement is also located in the southeast corner of the Phase III area between the Amtrak access road and the railroad right of way (ROW). The Eastern Peninsula has trees and vegetation, but is generally more open and accessible than the Western Peninsula. Parcel C-1 is fully enclosed by a chain-link fence installed and maintained by the City in accordance with the 2006 Consent Order. A locking gate for Amtrak access is located behind the retail building (Parcel A).

### **1.2.4 Parcel C (west of High School)**

Parcel C (formerly known as the YMCA parcel) is an undeveloped, relatively flat 6-acre portion of the Site located in the western area of the property, adjacent to the Alvarez High School (Parcel B), as shown on Figure 2. Buildings formerly located on Parcel C were associated with historic operations at Gorham Silver and were only used for storage. In 2001, the historic buildings and structures were demolished and some remnants remain in a pile in the center of Parcel C. A

locking gate which allows access to Parcel C and the western portions of Parcel C-1 is located in the southeast corner of Parcel C nearest the high school.

### **1.3 Regulatory Background and Previous Investigations**

Environmental investigations have been carried out at the 333 Adelaide Avenue property beginning in 1985 related to the potential sale of the property. RIDEM completed a United States Environmental Protection Agency (USEPA) Potential Hazardous Waste Site Identification Form in 1987 in response to a complaint by the Providence Police Department. This occurred after the facility ceased operations in 1986. RIDEM completed a Preliminary Assessment (PA) of the 333 Adelaide Avenue property in 1989 which designated the property as a Medium Priority for a Site Inspection (SI). A SI Report was prepared by Camp Dresser & McKee in 1993 under contract to RIDEM. The SI recommended further investigation of the property. ABB Environmental Services (ABB-ES), subsequently, Harding Lawson Associates (HLA and Harding ESE), MACTEC, and AMEC (now Amec Foster Wheeler) completed several environmental investigations on behalf of Textron since 1993.

In 1995, a Remedial Investigation Report and a Supplemental Remedial Investigation Report (ABB-ES, 1995a and ABB-ES, 1995b respectively) were prepared to assess site conditions, including portions of Parcel C-1 (formerly known as the Park Parcel). The results of the earlier investigations (circa 1986 to 1995) were summarized in this Remedial Investigation Report. In 1998, a Supplemental Site Investigation Report (HLA, 1998) was prepared for the Site. In 1999 a Site Investigation Summary Report and Risk Assessment (HLA, 1999) was prepared and submitted to RIDEM that addressed the entire 333 Adelaide Avenue property. This report was formally approved by RIDEM in a June 15, 2001 RIDEM Remedial Decision Letter (RIDEM, 2001). In April 2001, Harding ESE (now Amec Foster Wheeler), prepared and submitted to RIDEM on Textron's behalf the Remedial Action Work Plan, Former Gorham Manufacturing Facility, Providence, Rhode Island.

In November 2002, MACTEC (now Amec Foster Wheeler) submitted a Method 3 Risk Assessment Work Plan (MACTEC, 2002) to RIDEM to assess the proposed redevelopment of the undeveloped portion of the 333 Adelaide Avenue property (Parcel C-1) as a park with walking trails, as proposed by the City of Providence and the YMCA. Following review comments from RIDEM in September 2003, MACTEC submitted the Method 3 Human Health Risk Assessment (HHRA) – Park Parcel (MACTEC, 2004) to RIDEM in August 2004. No comments were received on this submittal.

In December 2005, soil conditions at selected locations within the Site, material from the slag pile, and sediment conditions at selected locations in Mashapaug Cove were investigated by Fuss & O'Neill, Inc. (Fuss & O'Neil) on RIDEM's behalf and are documented in a Site Investigation Report (Fuss & O'Neill, 2006). Surface soil sampling, including both surface soils and surface sediment found in erosion channels along the bank that leads into the Inner Cove, was also conducted by MACTEC in 1994, 1998, 2001, 2002, 2006 and 2007. The 1998 surface soil analytical results are presented in the Supplemental Site Investigation Report, Proposed Park Subdivision, Former Gorham Manufacturing Facility, 333 Adelaide Avenue, Providence, Rhode Island (HLA, 1998). MACTEC conducted additional surface soil sampling along the bank of the Cove in 2001 and

2002 with the results presented in the Method 3 HHRA – Park Parcel (MACTEC, 2004). Supplemental soil sampling results from samples collected along the western side of Parcel C-1 are summarized and presented in the Supplemental Site Investigation Report (SSIR) Addendum (MACTEC, 2006b and 2007).

The previous environmental investigations demonstrated that soil at the 333 Adelaide Avenue Property, particularly the former manufacturing facility parcel, was impacted by historical industrial operations. Constituents of potential concern (COPC) in soils at the Site include volatile organic compounds (VOCs) (principally the chlorinated hydrocarbons TCE, PCE, and 1,1,1-TCA and their degradation products 1,2-dichloroethene [1,2-DCE] and vinyl chloride), semi-volatile organic compounds (SVOCs, principally PAHs), metals (primarily arsenic, copper, and lead), dioxin, and total petroleum hydrocarbons (TPH). Variable concentrations of VOCs, PAHs, metals and TPH were reported to be associated with these fill materials. The available information indicated that limited manufacturing activities (other than withdrawal of groundwater for use in manufacturing operations and the operation of Building V) were conducted within the Parcel C-1 Phase I Area. Building V, the former smelting building, was located south of the Inner Cove within Parcel C-1 and the former slag pile was associated with that building (Figure 2). This Phase I Area was capped in 2012.

Constituents detected in sediments and surface soils adjacent to the Mashapaug Inner Cove include TPH, SVOCs, VOCs, metals, and dioxins. Sediment samples from drainage swale and erosion channels that previously served as a pathway for the discharge into Mashapaug Inner Cove showed sporadic detections of SVOCs, TPH, and some metals. Surface soil samples from low lying areas adjacent to the Cove also showed some detections of metals. The contaminated soil found within a drainage swale east of the former slag pile was removed for off-site disposal in August 2006. Confirmatory soil sampling results were included in the January 2007 summary report (MACTEC, 2007a). This former drainage swale was also capped as part of the Phase I remediation in 2012.

Based on discussions with RIDEM and comments received on earlier reports and Work Plans, MACTEC prepared a Supplemental SI Work Plan in June 2006. On July 31, 2006 MACTEC submitted a Supplemental Site Investigation Report to RIDEM. On June 28, 2007 MACTEC submitted an addendum to the SSIR to RIDEM (MACTEC, 2007b) to further define the soil contamination requiring remediation within the Phase I Area of Parcel C-1. A RAWP for the Phase I Area was subsequently submitted and approved by RIDEM in August 2012. Construction of the Phase I Area cap was completed in November 2012 and a Remedial Action Closure Report was submitted to RIDEM in April 2013.

In November 2013, AMEC submitted a draft Site Investigation Report (SIR) to RIDEM that described the nature and extent of contamination, human health and ecological risks, and identified and evaluated remedial alternatives for the Phase II and Phase III Areas of Parcel C-1, and formally documented the final remedy for Parcel C. Based on a review by RIDEM, AMEC submitted the Final SIR on December 19, 2014 (AMEC, 2014). RIDEM issued a Program Letter approving of the Final SIR and proposed remedy on January 20, 2015 (Appendix A) and a public meeting was held on February 5, 2015 at the High School where Textron presented the details of

the remedial actions proposed for Parcel C and Parcel C-1 Phase II and Phase III Areas. No public comments have been received to date.

Based on discussions with and comments from RIDEM on the SIR, Amec Foster Wheeler has prepared this RAWP to document the selected remedy for the Phase II and Phase III Areas of Parcel C-1, and formally documenting the final remedy for Parcel C.

### **1.3.1 Phase II Area of Parcel C-1 - Mashapaug Inner Cove**

The 2006 SSIR summarized the extensive investigations of the surface water and sediment within the Mashapaug Inner and Outer Cove. This concluded that the surface water did not pose an unacceptable risk, but that the sediment within the Inner Cove needed to be remediated. Additional investigation was required to complete the ecological risk assessments of Mashapaug Outer Cove. In November 2011 AMEC submitted a work plan for the supplemental investigation of Mashapaug Pond (AMEC, 2011) to complete the delineation of the nature and extent of contaminated sediments, specifically for metals and dioxin, and to support an ecological risk assessment of the Outer Cove. The work plan proposed collecting background sediment and surface water data from Mashapaug Pond and engineering data from the Inner and Outer Cove Study Area to support the identification and evaluation of potential response actions (Figure 7). A bathymetric survey was also conducted of the Inner/Outer Cove and Mashapaug Pond to supplement the 2006 survey of the Inner Cove (Figure 5). These 2011 data were used to update the human health and ecological risk assessments for the Mashapaug Inner and Outer Cove.

In December 2013, AMEC submitted the Mashapaug Inner Cove Pre-Design Sediment Sampling Work Plan (AMEC, 2013c) to RIDEM to supplement the existing data and further characterize the physical properties for the top two (2) feet of sediment proposed for removal in the draft SIR (AMEC, 2013b). This pre-design sampling event (Figure 8) was conducted to confirm that a temporary barrier wall could be anchored into the subsurface, temporary equipment roads could be constructed within the Inner Cove for access to conduct the sediment removal, and to evaluate the leaching potential of the dewatered sediment for placement on the Phase III Area Northeast Upland (former Carriage House area). The data was incorporated into the remedial alternatives evaluation included in the 2014 SIR (AMEC, 2014).

As presented within the 2014 Final SIR (AMEC, 2014), the 2006 HHRA, updated to include the 2011 data, did not identify any unacceptable risk from the Inner Cove surface water or sediment for the worker; however, the trespasser scenario and ecological risk assessment did identify that the Inner Cove sediment needed to be remediated. Surface water and sediment in the Outer Cove did not pose an unacceptable risk to human health or the environment, and does not require remediation (AMEC, 2014). The remediation of the Inner Cove is proposed to extend to the two peninsulas that separate the Inner and Outer Cove and include sediment sample locations SED-33 and SED-34 (Figure 9).

### **1.3.2 Phase III Area of Parcel C-1**

The 2006 SSIR (MACTEC, 2006b) concluded that additional soil sampling was required along the eastern side of the Phase III Area to further define the extent of a proposed soil cap and to fill

data gaps on the most northern, southern and eastern ends of the Phase III Area. AMEC conducted pre-design soil sampling in June 2013 (Figure 10) (AMEC, 2013a) to close those data gaps and complete the delineation of surface soils exceeding RDEC that required capping. The former Carriage House area was not sampled in June 2013 since the fire that previously destroyed the building would likely have resulted in detections of metals and PAHs above the RDEC in surface soil. This portion of the Phase III Area offers an existing depression that can be used to consolidate the dewatered sediment from the Phase II Inner Cove, prior to the entire area being capped. Based on the analytical results for the additional soil samples and use of the Former Carriage House area for the placement of dewatered sediment, the lateral extent of the proposed soil cap on the Phase III Area is shown in Figure 10.

### 1.3.3 Parcel C (west of Dr. Jorge Alvarez High School)

GZA GeoEnvironmental, Inc. (GZA), on behalf of the YMCA, prepared the SIR for Parcel C adjacent to the Alvarez High School in May 2003. The 2003 SIR summarized the historical soil and groundwater investigations previously conducted by ABB-ES and HLA (predecessors of MACTEC, AMEC, and Amec Foster Wheeler). GZA also completed test pit investigations and a soil gas survey of the property. Consistent with the types of contaminants found throughout the Site, metals and PAHs were found in the soil exceeding RDEC. VOCs were also found at low levels in the groundwater at the north end of the property near the Inner Cove and in the soil vapor in the central portion of the property. Based on the proposed construction of a YMCA on the property, GZA recommended that a cap be constructed (pavement, building and soil cover), an ELUR be applied restricting future access to metals and PAHs in Site soils, and a sub-slab ventilation system be installed beneath the building to address the low level of VOCs found in the soil vapor. The proposed construction of the YMCA was canceled in 2007 and the property development reverted back to the City of Providence.

In August 2010, Vanasse Hangen Brustlin, Inc. (VHB), on behalf of the City, submitted a draft RAWP (VHB, 2010) for Parcel C (west of the high school). The 2010 draft RAWP proposed the construction of an engineered cap consisting of roadways, walkways, paved parking areas, and vegetative cover to address potential direct contact concerns to soils. The institutional controls identified in the 2003 SIR (GZA, 2003) remained part of the remedy. The sub-slab ventilation system was no longer required since no building was to be constructed on the property. RIDEM reviewed the draft 2010 RAWP and issued a comment letter (RIDEM, 2011). The remedial action proposed for Parcel C is now incorporated into this RAWP, and the RIDEM comments associated with the 2010 draft RAWP by VHB have been addressed.

This RAWP details the approach for capping Parcel C, the Phase II Area - Mashapaug Inner Cove sediment remediation, and the Phase III Area soil capping following applicable RIDEM regulations as specified in the Program Letter issued January 20, 2015 (RIDEM, 2015a), and Remedial Decision letter dated **Month X, 2015** (RIDEM, 2015b) (Appendix A). This RAWP also includes the draft ELUR for Parcels C and C-1.



## 2.0 LIMITED DESIGN INVESTIGATION

A work plan was submitted to RIDEM on December 23, 2013 (AMEC, 2013c) proposing to collect additional sediment samples from the Inner Cove to support the design of the remedial action (Figure 8). The objective of this pre-design sediment sampling program was to:

- supplement the existing data and further characterize the physical properties for the top two (2) feet of sediment proposed for removal from Mashapaug Inner Cove;
- confirm the ability to anchor a temporary barrier wall into the Outer Cove subsurface sediment and construct an access road(s) into the Inner Cove for equipment to remove the sediment; and
- evaluate the leaching potential of the dewatered sediment for placement on the Phase III Area Northeast Upland (former Carriage House area).

In April 2014, AMEC conducted the pre-design sediment sampling at five (5) locations within the Inner Cove using a barge mounted vibracore rig. Sediment cores were collected to a depth of 2 feet below the sediment surface, and the sediment core logged and photographed. Sample locations were logged using global positioning system (GPS). Samples of sediment from the 0 to 2 foot interval were submitted to the contracted laboratory for analysis including total organic carbon (TOC), grain size, Priority Pollutant (PP13) metals, and synthetic precipitation leaching procedure (SPLP) of PP13 metals. Three sediment samples were also collected from the 2 to 8 foot depth for grain size analysis to document the physical characteristics of the Inner Cove at the intervals of 0 to 2 feet and 2 to 8 feet below the top of sediment. As shown in Table 1, the SPLP results from the five (5) sediment samples indicate that the dewatered Inner Cove sediment would not pose a risk of leaching when placed on the former Carriage House area of the Phase III area and capped as proposed. Note that the samples were collected for pre-design purposes and are representative of the sediment that will be removed during the Inner Cove remediation.

### **3.0 REMEDIAL OBJECTIVE AND REMEDY**

#### **3.1 Remediation**

##### **3.1.1 Parcel C-1 Phase II Sediment Remediation**

Based on the results of the risk assessments as documented in the 2014 SIR (AMEC, 2014), Inner Cove (Phase II Area) sediments pose an unacceptable human health (Trespasser) and ecological risk and require remediation. The COCs requiring the remediation are dioxin (TEQ), PAHs and metals. Up to two feet of impacted Inner Cove sediment will be removed and replaced with one foot of clean sandy fill (Appendix B, Drawing C-102). The removed sediment will be transported by truck to the Phase III Area Northeast Upland where it will be dewatered and augmented as necessary for solidification and odor control. The sediment will then be placed in the former Carriage House area and capped (Appendix B, Drawing C-103).

As part of the remediation of the Phase II and Phase III Areas, the delineated wetland and perimeter wetlands along the shore line of the Inner and Outer Cove will also be remediated as described in Section 3.1.4 below.

##### **3.1.2 Parcel C-1 Phase III Soil Remediation**

Results of the HHRA conducted on the Phase III Area soils found that the majority of compounds detected in Site soils are in compliance with the Industrial/Commercial Direct Exposure Criteria (I/C DEC) and the leachability criteria, but a few including arsenic, lead and several PAHs were not at specific locations (Figure 10). The HHRA recommended the capping of the surface soil exceeding the I/C DEC. However, as documented in the SIR (AMEC, 2014), Textron is voluntarily remediating the northeast upland area to RDEC (Appendix C) to be protective of the proposed passive recreational use of Parcel C-1. The Phase III Area cap, which will be constructed in conjunction with the Phase II sediment remediation, will be extended to cover soils that exceed RDEC based on the results of the June 2013 Phase III Area pre-design soil sampling (Figure 10). A one-foot soil cap (six inches cover soil and six inches topsoil) with high-visibility marker fabric meeting RDEC will also be constructed over the former Carriage House area that is used for the placement of dewatered sediment from the Phase II Area Inner Cove. The Phase III Area cap will extend alongside the Amtrak Maintenance Facility and railroad ROW as shown in Figure 4 and Appendix B, Drawing C-103.

For the Phase III Area and Parcel C, a marker fabric, six inches of clean soil and six inches of topsoil will be placed over the contaminated soil to eliminate potential for contact with surface soil, and is proposed to be constructed in conjunction with the Phase II sediment remediation. Locations where RDEC were exceeded will be included under the Phase III Area soil cap as shown in Figure 10 and Appendix B, Drawing C-103. Textron will also construct a one-foot soil cap and marker fabric meeting RDEC over the former Carriage House area alongside the Amtrak Maintenance Facility and railroad ROW to address the dewatered sediment from the Phase II Area. A bonded fiber mat will be used on the side slopes (3:1) and below storm water management features to stabilize soils and provide structural integrity. Soil components of the cap (imported soil) will be sampled to meet RIDEM RDEC.

### 3.1.3 Parcel C Soil Remediation

Following the 2010 RAWP and incorporating RIDEM comments on that document, soils within Parcel C will be capped to prevent direct-contact by the public. In 2001, the historic buildings and structures were demolished and some remnants remain in a pile in the center of Parcel C. This pile of construction debris and soil was previously tested and will be spread on site, as discussed in Section 3.3.4.3. The Parcel C capping area will be graded to achieve sub-grade elevation to support the planned use of the property by the City of Providence (Appendix A). Grading will be conducted using GPS technology. Any remaining pavement within the capped area will be broken up to allow for infiltration of storm water. The soil and debris pile on Parcel C will be spread on Site, graded and compacted. A permeable, high-visibility marker fabric will be placed over the compacted, surface soil, and then overlain by six inches of cover soil and six inches of clean, imported topsoil. Topsoil will be seeded using an appropriate seed mix applied with fertilizer and mulch. A bonded fiber mat will be used on slopes of the side slopes (3:1) and below storm water management features to stabilize soils and provide structural integrity. Soil components of the cap (imported soil) will be sampled to meet RIDEM RDEC (Appendix C).

### 3.1.4 Wetland Restoration

Two wetland areas will require restoration as part of the remediation of the Inner Cove and capping of the Phase III Area; 1) the fringe wetlands that form a narrow band along the shore of the Inner Cove (Appendix B, Drawing C-102), and 2) the perimeter wetlands that extend 50 feet upgradient of the delineated wetland edge. Figure 4 shows the restoration plan of these two wetland areas. Appendix D includes the Wetland Restoration Plan previously dated February 6, 2014 and updated to incorporate SIR review comments provided by RIDEM in November 2014.

The perimeter and fringe wetlands downgradient of the former slag pile geomembrane (Parcel C-1 Phase I Area cap completed in 2012) will be restored to the approximate pre-2006 slag removal water line. This will require the installation of clean soil to bring the existing elevation up to subgrade. The perimeter and fringe wetlands will then be constructed as described below. The Phase I geomembrane cover will not be extended into the proposed construction area as shown on Appendix B, Drawing C-102

#### 3.1.4.1 Fringe Wetlands

The vegetated fringe wetland extends approximately 10 feet from the water's edge around the Inner Cove (Figure 4 and Appendix B, Drawing C-102). The approximately 11,000-square foot wetland area is vegetated with herbaceous plants, shrubs, and some trees. Dominant species include red maple, silver maple, black willow, sweet pepperbush, red osier dogwood, buttonbush, sensitive fern, poison ivy, along with other herbs and graminoids.

Site grading will be limited within the fringe wetland area to within the Inner Cove. To minimize damage to existing vegetation, a variable thickness layer of organic-rich soil will be placed by hand over the entire fringe wetland from the existing ground surface to a maximum thickness of up to 12 inches. This thickness of soil is proposed to maintain wetland hydrology, but still serve

as a physical barrier to impacted soil until vegetation is well-established. The soil thickness will be determined in the field to match the contours of organic-rich soil to be placed off shore (below water level) within the Inner Cove shoreline and will be tapered to a minimum around existing large woody vegetation to maintain existing plantings where possible. However, all occurrences of the non-native, invasive species (e.g., purple loosestrife) will be mechanically removed prior to soil placement. An invasive species plan has been included within the 404 General Permit. Compost will be used to amend the soil cover material to achieve an organic content of 20%. The material source area will be tested to meet RDEC (Appendix C) prior to its use within the fringe wetland.

A seed mixture of native New England wetland species including sedges, other graminoids, and herbaceous species with wetland indicator status from obligate to facultative, will be hand-spread over the emplaced soil to ensure thorough and even coverage. The seed mixture will be the New England Wetland Plants “Wetmix” or a similar mixture that has the range in wetland indicator species that will promote local establishment of species best suited to the varied hydrology and microtopography expected to result after soil placement.

Existing woody vegetation will be amended by planting a select list of native shrub species in the locations where existing vegetation is sparse or has been damaged or removed by the soil placement process. Plants will be installed only within approximately four feet of the water’s edge, with an average spacing of four feet on center, placed in clusters. This dense planting is required to aid in resisting incursion by invasive species and create thickets to prevent access to the water’s edge by trespassers. Native species were selected based on their wildlife habitat value, and their ability to quickly re-vegetate. The rapidly growing shrubs species selected will prevent soil erosion in the disturbed area and allow the establishment of a dense community that will resist incursion by non-native invasive species. As a collateral benefit, greenbrier, swamp rose, and blackberry/rubus species have been specified because of their dense spines and propensity to form shrub thickets, which will serve as a barrier to human access to this area.

#### **3.1.4.2 Perimeter Wetland**

The perimeter wetland within the Phase III Area consists of variably steep forested uplands with mature trees, a thin mixed herbaceous and woody understory, and patches of woody invasive species. The plant community includes oak species (white, red, black), gray birch, black birch, black cherry, mountain laurel, low-bush blueberry, huckleberry, ailanthus, oriental bittersweet, Japanese knotweed, and honeysuckle. The crowns of many of the mature trees are damaged, indicating that the trees are more susceptible to other injury and likely have shortened expected life spans.

Grading for slope stabilization (maximum 3:1 slope) will be implemented within the perimeter wetland where needed. To facilitate soil placement within this wetland, damaged trees will be removed prior to grading. A permeable fabric warning barrier and a one-foot thick soil cover (six inches cover soil and six inches clean, imported topsoil meeting RDEC) will be placed to serve as a physical barrier to underlying impacted soils. Some trees and shrubs may require removal to allow equipment access and soil cover placement; however, viable trees and shrubs will be saved where possible. All invasive species will be eradicated by cutting and treating with an

herbicide prior to placement of the soil cover. An invasive species plan has been included within the 404 General Permit.

To stabilize the soil cap and to rapidly restore the vegetated community impacted by the cap, the seed mix “New England Erosion Control/Restoration Mix for Dry Sites” or a similar mixture will be spread over the emplaced soil using a hydroseeding method, which includes a hydromulch with a tackifier. The seed mix contains native New England herbaceous species grasses to ensure that dry or recently disturbed sites will be quickly re-vegetated and the soil surface stabilized. Trees and woody shrubs remaining in the perimeter wetland will be amended by planting a select list of native species such as the red osier dogwood (*Cornus sericea*), sweet pepperbush (*Clethra alnifolia*), black willow (*Salix nigra*), and the red maple (*Acer rubrum*). Emphasis will be placed on areas where existing vegetation is sparse or has been damaged or removed by the site grading and soil placement process. Native species were selected based on their wildlife habitat value, and their ability to grow and thrive in a disturbed area. The rapidly growing tree/shrubs species selected will prevent soil erosion in the disturbed area and allow the establishment of a dense community that will resist incursion by non-native invasive species. Greenbrier and blackberry/rubus species are included because of their dense spines and propensity to form shrub thickets, which will serve as a barrier to human access. Plants will be installed randomly in clusters, with an average spacing of eight feet on center.

### **3.2 Remedial Objectives**

#### **3.2.1 Parcel C-1 Phase II Sediment Remedial Objectives**

The remedial objective for the Phase II Inner Cove work is to limit access to impacted sediments within the Inner Cove that present ecological risks.

#### **3.2.2 Parcel C-1 Phase III Soil Remedial Objectives**

The remedial objective for the Phase III Area is to prevent and eliminate direct-contact human exposure to contaminated soil exceeding RIDEM RDEC.

#### **3.2.3 Parcel C Remedial Objectives**

The remedial objective for Parcel C is to prevent and eliminate direct-contact human exposure to contaminated soil and fill material exceeding RIDEM RDEC.

#### **3.2.4 Wetland Restoration Objectives**

The wetland restoration objectives are to stimulate the re-growth of native plants and allow the wetlands to re-vegetate in a natural, wild manner, while limiting human access to the shoreline of the Inner Cove. This limited access will support the existing RIDOH restriction on swimming due to blue-green algae and the fishing restriction for catch and release (no consumption) of fish from Mashapaug Pond (Section 1.2.2). The restored fringe and perimeter wetland areas will be designated as “no cut” zones within the draft ELUR for Parcel C-1, Phase I and III Areas (Appendix E). This no-cut zone includes the Phase I Area perimeter wetland cap constructed in 2012.

### **3.3 Preferred Remedial Alternative**

This subsection describes the technical approach of the remedial action proposed for Parcel C-1 Phase II and Phase III Areas, Parcel C and the wetlands. Upon selecting a contractor, a detailed work plan describing their approach, means and methods to implement the approved remedy or an equivalent approach as approved by the engineer will be developed. This will be submitted to RIDEM to support their issue of the Remedial Decision Letter.

This section is subdivided into each working area, describing a proposed construction methodology for each phase. The order of tasks outlined in this section will not correspond to the construction sequence schedule. Construction work may be performed on different phase areas simultaneously and may not be completed in one discrete area at a time.

- Section 3.3.1 outlines the work to be done prior to the beginning of construction, such as survey control, environmental monitoring, erosion and sediment control, clearing and grubbing, etc. This work encompasses all work areas and will be maintained throughout the duration of the project.
- Section 3.3.2 outlines the Phase II work of the Inner Cove. This section includes tasks such as the dam installation, methods for sediment removal, dewatering and permitting.
- Section 3.3.3 details the Phase III Area work, including the capping of Phase III and the Phase II dewatered sediment.
- Section 3.3.4 discusses the work to be completed on Parcel C, including the grading and capping of the parcel.

#### **3.3.1 Pre-Construction Work**

The following subsections outline the work that must be completed prior to the beginning of Parcel C, Phase II and Phase III work.

##### **3.3.1.1 Fence and Screen**

There is an existing chain link fence extending along Adelaide Avenue, around the high school to the northeast corner of the high school parking lot, around the existing storm water detention basin and to the southeast corner of the former Carriage House area (Appendix B, Drawing V-101). There is an access gate to Parcel C in the southwest corner of the high school property (intersection of Parcels B and C). A shared access gate with Amtrak is also located behind the northeast corner of the retail building.

For security and dust control, a mesh fabric panel will be installed along the outside of the fence prior to beginning any work. The fabric screen will be secured with zip ties. The screen will extend from the intersection of Crescent Street and Adelaide Avenue to the northeast corner of the high school parking lot. The screen will continue around the north side of the existing storm water detention basin and end at the southeast corner of the former Carriage House Building area.

Existing signage installed by the City on the outside of the fence will be maintained throughout the construction in accordance with the Consent Agreement between the City and RIDEM.

The perimeter fencing, screen and signage will be regularly inspected and maintained in good condition until remedial activities on the Site are completed. The gates will be locked at the end of each day. This fence and screen will remain in place until all phases of remediation on Parcel C-1 and C have been completed or when the City of Providence has completed their future construction on Parcel C and the Phase III Area.

### **3.3.1.2 Dust Control and Monitoring**

A potential respiratory hazard associated with prolonged exposure to contaminants in soil exists for invasive activities, particularly those activities that will disturb soils and could generate dust (e.g., road grading, tree clearing/grubbing and excavation of contaminated soil). This hazard will be mitigated by the use of engineering controls such as water to suppress visible dust and dust that exceeds 0.29 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) in air. Although not likely based on investigation activities and the conditions encountered during the Phase I Cap construction in 2012, inhalation of VOCs is possible from impacted soil and will be monitored by a Photoionization Detector (PID) to prevent respiratory exposure. Table 4-1 of Amec Foster Wheeler's Health and Safety Plan (HASP) (Appendix F) lists the potential contaminants of concern and the threshold limits to be used during the construction monitoring.

Amec Foster Wheeler will conduct dust monitoring in the work zone during activities that have potential to disturb soil (grading and excavation) using hand held real-time continuous air monitoring instruments. Dust monitoring will also be conducted at various perimeter work zone locations using MIE DR4000 monitors or equivalent. These instruments measure aerosol dust and will automatically store data for subsequent retrieval. One perimeter dust monitor will be placed on each of the four points outside and within 30 feet of the construction activities in order to confirm that areas outside of the work zone are not impacted by the construction activities. There will be fixed dust monitors in the southwest and northwest corner of Parcel C, along the southern shore of the Inner Cove, and along the southern perimeter of the Phase III Area. The fixed monitoring points will be set to trigger an alarm when the dust level reaches  $0.20 \text{ mg}/\text{m}^3$  as warning that the action level is being approached.

Continuous visual dust monitoring will also be conducted and recorded in the Site field Logbook. If visible dust conditions continue for more than a minute within the work zone, dust suppression methods will be implemented to reduce airborne dust levels.

### **3.3.1.3 Storm Water Management Plan**

The design and construction of the Phase III Area and Parcel C cap has included storm water management requirements to control surface water flow from Parcel C and C-1 into Mashapaug Pond and the Inner Cove. Storm water from Parcels A and B are currently directed to the existing storm water detention basin for infiltration and discharge into the Inner Cove through existing piping. During the dewatering and excavation work of Phase II, the basin discharge pipe will be plugged and the surface water will continue to infiltrate into the groundwater. If the depth of water

within the detention basin should rise up near the blocked outfall pipe, it will be rerouted to discharge into the Outer Cove beyond the proposed, temporary dam. Surface water runoff from Parcel C and Parcel C-1 currently infiltrates on property.

A storm water pollution prevention plan will be prepared to support the construction activities and will be maintained on Site during the construction. Storm water and erosion control measures to be implemented during the construction activities are detailed in Appendix B, Drawing G-002 and C-501.

These measures include the installation and maintenance of hay bales and silt fence, stabilized construction entrances, erosion control matting on the cap surface, as necessary, and maintenance of a proposed turbidity curtain in the Outer Cove. The erosion and sediment controls will be installed above the Phase I cap to prevent sediment from discharging into the previously capped areas.

A Notice of Intent (NOI) and Water Quality Certification (WQC) are being submitted to RIDEM for the Phase II and III Area sediment remediation (Appendix G). A Storm Water Pollution Prevention Plan (SWPPP) will be maintained on Site during all ground disturbance and restoration activities. Monitoring and reporting of the storm water management systems will continue until the Site surface has stabilized and the permit is closed with RIDEM.

#### **3.3.1.4 Construction Entrance**

Access to the Phase II and Phase III Areas will be through the existing shared gate with Amtrak in the northeast corner of the retail building. This access road is used by Amtrak to access their maintenance facility located within the Phase III work area. This construction entrance and road will support and continue to allow Amtrak access. The access point to Parcel C is through the existing gate in the southwestern corner of Parcel B. The construction entrance and pad were installed at this gate during Phase I construction in 2012 and have been maintained.

Signs and barricades and all necessary equipment for the protection of the traveling public shall be furnished and maintained through the duration of the construction.

A bulletin board will be placed on the outside of the entrance gate in the southwestern corner of Parcel B, facing the High School entrance. The board will display upcoming work, dust and PID monitoring results and points of contact if the public has any questions or concerns.

#### **3.3.1.5 Construction Office**

A construction office will either be placed on site in the Phase III Area or may be located in available space within the retail building, as was done for the Phase I construction. This office will have access to existing telephone and power. The contractor's office will include adequate facilities for the Engineer as well as a sanitary facility conforming to local codes and OSHA requirements.



### **3.3.1.6 Monitoring Well Abandonment**

Several existing monitoring wells will be abandoned as they no longer support active groundwater monitoring or were found to have groundwater that meets applicable RIDEM criteria. Well construction logs will be provided to the contractor within the construction bid documents. Well abandonment will occur prior to the capping of the Site. If wells are located within the Phase I cap they will be accessed by a track geoprobe rig traveling on plywood to prevent rutting of the existing Phase I cap surface.

The casing will either be removed by pulling or overdrilling, or the well casing will be cut off at least 4 feet below the ground surface. The remaining well casing will be filled with pressure grout so that natural migration of groundwater is not significantly influenced. The contractor will backfill the next four feet with clean soil meeting RDEC. The well will then be covered by marker fabric and a one foot soil cover consistent with the rest of the Parcel C cap. Locations of the abandoned wells will be surveyed prior to well abandonment for Record Drawing submission.

The driller will not penetrate the existing geomembrane liner within the Phase I limits. The driller will prepare a well abandonment form for each well to be included within the Completion Report.

Based on historical monitoring data from 1985 through 2013, the following groundwater monitoring wells are proposed for abandonment as shown on Appendix B, Drawing C-101: MW-C/B-3, MW-111D, MW-242, MW-D/B-4, MW-FD/B-6D, MW235D, MW-236D, MW-237D, MW-239 and MW-240, as shown on Appendix B, Drawings C-101 and C-102.

### **3.3.2 Phase II Inner Cove**

#### **3.3.2.1 Permitting**

The following subsections outline required permits for Phase II and Phase III work.

#### **Section 404 Permit**

The remediation of the wetlands and Mashapaug Inner Cove will result in unavoidable impacts to a shallow freshwater pond (2.8 acres) and the adjacent palustrine wetland (11,075 square feet or 0.254 acres), for a total of approximately 3 acres of wetland impacts. All impacts will be temporary, and wetlands will be restored in place, in accordance with General Permit conditions.

The Mashapaug Pond Inner Cove Sediment Remediation Project qualifies for coverage under the Department of the Army General Permit for the State of Rhode Island, Category 2 – Reporting/Application Required. The project meets the category I Inland Waters and Wetlands regarding “Specific activities with impacts  $\geq 5,000$  SF required to effect the containment, stabilization, or removal of hazardous or toxic waste materials performed, ordered or sponsored by a government agency with established legal or regulatory authority. Wetlands must be restored in place.”

The project is exempt from state permitting under the Rhode Island Wetlands Rules 6.01 General Conditions for Exempt Activities, and 6.08 Site Remediation (“Activities which may affect

freshwater wetlands and which are required by the Department for remediation of contamination resulting from releases of oil or hazardous materials are allowed in accordance with Rule 6.01...”). All state conditions for exempt projects will be met during performance of the work. The project is regulated by the RIDEM Office of Waste Management as a remediation project, in consultation with the RIDEM Freshwater Wetland Program and Water Resources.

Based on available maps reviewed using the RIDEM Geographic Data Viewer and internet consultation with the U.S. Fish and Wildlife Service’s New England Field Office, no state or federal listed endangered species are present at the Site. Amec Foster Wheeler performed a functions and values assessment for the palustrine wetland and shallow Inner Cove in accordance with the USACE New England District guidance document “The Highway Methodology Workbook Supplement: Wetland Functions and Values – A Descriptive Approach”. Three functions were identified – reduction of sediments impacting water quality, maintaining the effectiveness of the wetlands for the control of nutrient loading and the use of the wetlands to stabilize the banks of the Inner and Outer Cove. The remediation and restoration of the wetlands and Inner Cove sediment will address the three functions identified at this Site. A complete copy of the Section 404 Permit submittal to the USACE is included in Appendix H of this RAWP.

### **Mashapaug Pond Water Level**

The water level within Mashapaug Pond can be retained during the remediation of the Inner Cove. However, the remediation and restoration of the Inner Cove could be expedited by the lowering of the Mashapaug Pond water level by one to two feet. To efficiently dewater the Inner Cove, Textron and Amec Foster Wheeler requests that the Mashapaug Pond water level be decreased by one to two feet. The pond elevation is maintained by a dam structure located at the western end of Mashapaug Pond. The lowering of the pond water elevation would not only support an expedited construction and restoration of the Inner Cove and but it would also provide additional water storage within the Pond should a major storm event occur during the construction while the Inner Cove has been temporarily dammed (Section 3.3.2.3). This temporary decrease in water elevation would also give the state and RIDEM Water Resources access for the maintenance of the six (6) storm water headwalls that discharge storm water runoff from developed areas into Mashapaug Pond. These discharges currently contribute nutrients to the growth of blue-green algae and degradation of the pond water quality. The lowering of Mashapaug Pond would only be implemented during the actual construction and restoration within the Inner Cove which is estimated to occur for approximately four to six weeks.

### **3.3.2.2 Wildlife Management Plan**

Wildlife management and monitoring will take place prior to, and throughout remediation activities at the Inner Cove. No threatened or endangered species are known to be present within the Project vicinity. A combination of methods for removing aquatic wildlife will be used prior to and during dewatering of the Inner Cove, including a technique using seine nets and noise makers to herd fish out of the Inner Cove prior to the installation of the temporary dam, as well as capturing and manually transporting wildlife. Best professional judgment will be used in determining sequence of activities, best management practices and safety in handling and transporting of

wildlife to the Outer Cove. A more detailed wildlife management plan is included in Appendix I of this Draft RAWP.

### 3.3.2.3 Dam Installation

A temporary dam will be installed in the Outer Cove of Mashapaug Pond in order to separate and dewater the Inner Cove. The dam will be placed between the Inner Cove and the Outer Cove, north of the peninsulas separating the Inner and Outer Coves. Appendix B, Drawing C-102 shows the approximate location of the proposed temporary dam. This location ensures that the two outer sediment sampling locations where contaminated sediment was encountered (SED-33 and SED-34) are included within the Phase II sediment removal area as requested by RIDEM (Response to RIDEM comments on the Site Investigation Report, November 2013, comment 5b.). The soil characterization of the Outer Cove is a sandy strata with organic silt located within the minor channel, which runs through the proposed dam location from the Inner Cove to Mashapaug Pond. There is a 5 to 6 foot difference in elevation from the shoreline to the deepest part of the channel. Within the approximate location of the proposed dam, soil samples showed that generally from 0-8 feet, the soil is characterized as dark brown with medium course sand and some gravel/cobble (Sediment boring logs SED-33 through SED-36, Figure 9), directory 3.3, 5.1). These soil samples confirmed a sandy/gravel material to a depth of 38 feet bgs and no bedrock contact. The dam will be keyed into the existing shoreline by extending the selected dam up to the land surface on the outside of each side of the peninsula.

Alternative dam configurations were evaluated. Three designs that are widely used by contractors may be used as listed below or an alternative solution may be proposed by the selected contractor, as approved by RIDEM. The selection of the dam will be determined by the contractor and will be presented within their work plans submitted to RIDEM and USACE prior to starting the construction. The potential dam designs include the Aqua-Barrier®, sheet piles or a PortaDam® as discussed below:

- The Aqua-Barrier® is a temporary water-inflated dam that provides access to underwater areas for construction operations, including sediment removal. Aqua-Barriers® are single tube devices with an inner restraint baffle stabilizing system. The water-inflated dam is a stand-alone barrier produced from heavy gauge polyvinyl chloride (PVC) reinforced with polyester. The water-inflated dam has fill ports and drain ports for rapid inflation and draining, and allows for the connection of individual units at various angles. The water-inflated dam ranges in sizes from 2-8 feet in height and is free standing providing easy installation. (<http://www.hydrologicalsolutions.com/product-specification/>)
- Sheet pile walls consist of interlocking steel structures that are vertically driven to a determined depth. The depth in which sheet piles are driven is based on the sediment composition and depth to bedrock. Two soil borings were performed in the vicinity of the proposed dam, SED-33 and SED-34. The total depth of boring was 37.4 feet and 44.7 feet without making contact with bedrock. The recovered soil samples from SED-33 and SED-34 show that generally from 0-8 feet is medium course sand with some gravel. Most of the Outer Cove consists of sandy strata with organic silt located within the minor channel extending from the Inner Cove into Mashapaug Pond. The Outer Cove water depth ranges from four to eleven feet deep and a sandy/gravel material was identified to a depth

of approximately 45 feet (SIR, 2014 Section 2.2.2). The dam will be installed to a sufficient depth in order to prevent seepage from the Outer Cove into the Inner Cove during sediment removal.

- The Portadam® is a temporary fluid retention system for use in open water up to 12 feet deep. The system consists of a free standing steel support system and an impervious fabric membrane that is sealed and stabilized by the hydraulic loading. The structure is free-standing and eliminates the need for pile driving equipment, cross-bracing and anchorage. (<http://www.csigeo.com/Portadam.html>)

#### **3.3.2.4 Inner Cove Equipment Access**

A construction and equipment access road will be installed from the southwest corner of the Phase III Area into the Inner Cove at the eastern peninsula, splitting into two separate roadways within the Cove, to allow excavating equipment within the Inner Cove for sediment removal. The construction of the access road includes tree and shrub clearing along the Phase III slope and limited clearing within the perimeter wetland and wetland area to allow vehicle access (Appendix B, Drawings C-102 and C-501). This area will be graded down to the water's edge. Once the Inner Cove sediment has been removed and restoration completed this access road area will be capped and the wetlands and perimeter wetlands restored as discussed below. The clearing for the access road with the Phase III area is discussed further in Section 3.4.1.1.

#### **3.3.2.5 Dewatering of Inner Cove**

Following the implementation of the Wildlife Management Plan (Appendix I) and installation of the dam between the Inner and Outer Coves, the next step will be the initial dewatering of the Inner Cove. To accomplish this, Amec assumes that the contractor will install a pump system in the Inner Cove to dewater the area in preparation for sediment removal. A piping system from the Inner Cove around the eastern side of the dam can be used to pump the Inner Cove water into the Outer Cove/Mashapaug Pond. The Inner Cove, including the area just beyond the peninsula, SED-33 and SED-34 sampling points, is approximately 2.8 acres in size, ranging in water depths of 2-4 feet. The bottom of the Inner Cove is fairly flat, with the deepest point being about 4 feet near the mouth between the two peninsulas separating the Inner and Outer Cove. The initial dewatering of the Inner Cove will be completed for the entire 2.8 acre area to a one-foot water depth. As discussed previously in Section 3.3.2.1, by lowering the water level of Mashapaug Pond, the remediation of the Inner Cove can be expedited and the Inner Cove habitat restored. Extensive surface water sampling and analysis during the Site Investigation has determined that the water in the Inner Cove is not contaminated and therefore it is proposed to discharge the Inner Cove water into Mashapaug Pond. Surface water samples collected within one foot of the sediment-surface water interface were found to contain trace levels of VOCs that quickly dissipated after the groundwater discharged through the sediment and into the Inner Cove surface water (Table 4-1, 2014 SSIR). Textron installed a groundwater treatment system in 2012 to provide hydraulic containment of this groundwater discharge supporting the proposed dewatering, remediation and restoration of the Inner Cove. The Screening Level Ecological Risk Assessment determined that the detected VOCs in the Inner Cove surface water samples at the sediment-surface water interface were below corresponding RIDEM aquatic life criteria and other surface water benchmarks (Section 4.2.1 SIR 2014). Further, the Inner Cove surface water does not pose

an adverse risk to human health and can be discharged into the Outer Cove during the dewatering process.

Dewatering the Inner Cove to a one-foot depth will prevent turbid water from being pumped into Mashapaug Pond. A splash block or turbidity curtain will also be installed within Mashapaug Pond at the discharge point to prevent scour of the pond bottom and/or mixing during dewatering. The remaining water within the Inner Cove will be pumped into a proposed Phase III Area infiltration gallery to promote water infiltration and collection of the sediment particulate for dewatering, stabilization and consolidation in the former Carriage House area. The infiltration gallery is discussed further in Section 3.3.2.6.

Following the initial dewatering down to the sediment surface, construction dewatering of Site groundwater will be conducted to temporarily depress the groundwater table below the sediment layer within the Inner Cove to allow sediment removal. The contractor may decide to segment the Inner Cove into separate excavation units. Berms can be installed to divide the Inner Cove into sections and prevent standing water from infiltrating into the section being dewatered and excavated. The section to be excavated can be drained with sump pumps to suppress the groundwater table. The sumps are estimated to be about 4x4 feet and dug to an elevation about 5 feet below the deepest anticipated sediment excavation depth. This will limit the pumping rate of groundwater and support the discharge of groundwater into Mashapaug Pond. In order to remove potential sediment captured from the pumping of groundwater, construction dewatering will pass through a frac tank prior to discharge into the Outer Cove or may be discharged to an infiltration gallery located on the Phase III Area for infiltration on site.

Amec Foster Wheeler will conduct sampling of the construction dewatering discharge on a scheduled basis prior to discharge into Mashapaug Pond. If the extracted groundwater does not meet RIDEM surface water discharge criteria, the water will be pumped to the Phase III area where it will be pass through filter bags and granular activated carbon drums in series prior to discharge into Mashapaug Pond. Further testing of this treated groundwater will be conducted prior to discharge into the pond.

Textron will defer to the construction contractor to identify the most effective method for sediment removal (number of sections to dewater in the Inner Cove) and construction dewatering based on the their sediment removal and handling expertise. These dewatering methods will be included in the contractors work plan submitted to RIDEM and USACE prior to the start of construction.

Treated effluent from the Parcel A groundwater treatment system and storm water from the large retail development and High School (Parcels A and B) currently discharges to a storm water detention basin north of the retail building on Parcel A. The storm water within the detention basin naturally infiltrates within the basin, however if there is an overflow, an outfall is located in the southwest corner of the detention basin which discharges to the Inner Cove. During Inner Cove construction, the overflow pipe will be plugged at the pipe inlet to prevent storm water from entering the Inner Cove. In the event of a major storm event such that the water level within the basin is up to the outfall pipe, the contractor will install a pump and pipe within the detention basin to transfer the clean storm water to the Outer Cove.

During the former slag pile removal from the Phase I Area in 2006, a sediment curtain and boom was installed within the Inner Cove to prevent contaminated material from entering the Inner Cove. Concurrent with the dewatering of the Inner Cove during Phase II, the existing boom will be removed for off-site disposal.

### **3.3.2.6 Infiltration Gallery**

As mentioned in Section 3.3.2.5, an infiltration gallery will be constructed in the Phase III Area for the dewatering process of the removed Inner Cove sediment. Section 4.5.1 of the 2014 SIR, discusses the chemical makeup of the upland soils in Parcel C-1 and the Inner Cove sediments and determines that they have the same contaminants of concern and therefore comingling is not a concern. The construction of the infiltration gallery will occur prior to the dewatering of the Inner Cove. The Cove will be pumped down to within one foot of the surface water-sediment interface, at this time, the water will no longer be pumped directly into Mashapaug Pond, and instead it will be pumped into the infiltration gallery to allow the suspended sediment to settle out of the water. The infiltration gallery will allow residual water to filter through the sediment and into the groundwater that flows north towards the eastern portion of Mashapaug Pond. The sediment recovered in this process will be mixed with Phase III area soils for dewatering and stabilization for disposal in the former Carriage House area.

After the standing water has been removed from the Inner Cove, the infiltration gallery area will be re-graded to slope to a sump in the corner for further dewatering of the Inner Cove sediment. The area will be covered with a liner for placement of the excavated sediment. Water will drain by gravity to the low end of the pad and into the sump. The sump water will be pumped through a water treatment system (bag filter and GAC) prior to being discharged into Mashapaug Pond. The sediment will be dewatered and stabilized for consolidation within the former Carriage House Area. Following the treatment and removal of the Inner Cove sediment, the dewatering pad will be removed and the site re-graded to support the capping and reuse of the Site by the City.

### **3.3.2.7 Inner Cove Sediment Removal, Dewatering and Sediment Replacement**

Based on the 2006 SIR (MACTEC, 2006b) (SIR 2014 section 6.1), the sediment and pore water within the Inner Cove contain PAHs, metals and dioxins. The metals in the sediment were found to be the risk driver in the Inner Cove, which included barium, cadmium, chromium, copper, lead, nickel, silver and zinc. Based on the sediment sampling cores the depth of sediment across the Inner Cove ranges from 0.5 feet to 8 feet before Amec Foster Wheeler encountered a sandy/gravel soil. The sediment will be removed down to the sandy/gravel material to a maximum depth of approximately 2 feet resulting in an average removal of one to two feet of sediment from across the Inner Cove.

The Inner Cove area to be excavated is about 2.8 acres. The Inner cove sediments are generally characterized as soft organic (peaty) silt or silty clay sediment underlain by sandy strata. The results of the soil borings and sediment conditions within the Inner Cove are further described in the SIR 2014 Section 4. Taking into account the removal of the surface water and construction dewatering, the volume of excavated sediment was estimated to be approximately 4500 CY. An access road(s) into the Inner Cove will be constructed using timber mats or geotextile material

and crushed stone or gravel to gain access to the entire Inner Cove. The construction of the access road is described in Section 3.3.3.5. Following the construction of the access road, excavating equipment, restricted to the access road, will be used to remove the contaminated sediment. The removed sediment will be piled along the edge of the Inner Cove to compress the sediment and remove pore water prior to its removal from the Inner Cove. The sediment will then be placed in dump trucks to be brought up the Phase III Area slope to the dewatering pad. As discussed in Section 3.3.2.6, the sediment dewatering pad will be lined and graded to a sump where the pore water will be collected for treatment and discharge to the Outer Cove.

The dewatered sediment will be mixed with Phase III Area soil and other additives such as lime or kiln dust or an approved equal drying agent to aid in stabilization of the sediment. The contractor may also provide agents to the dewatered sediment for odor control in accordance with RIDEM Air Pollution Control Regulation No. 17. The dewatered sediment will be placed within the former Carriage House area of Phase III by land spreading and grading. As discussed in the 2014 SIR, Section 4.5.1, the upland soils in Parcel C-1 and the Inner Cove surface sediments have the same COCs (Table 4.10 SIR 2014). Section 2.0 of this RAWP summarizes the Limited Design investigations conducted in 2014 that confirmed the Inner Cove surface sediments do not exceed SPLP criteria and would not leach metals; therefore, the stabilized sediments will be placed in the former Carriage House area to be capped. A high-visibility marker fabric will be placed over the sediment, overlain with a one-foot clean imported soil cap (six inches cover soil and six inches of topsoil).

Once the Inner Cove sediment is removed, dewatered, consolidated and capped, the Inner Cove and surrounding delineated wetlands along the downgradient edge of the Phase I and Phase III areas will be restored. This includes the installation of one foot clean imported soil placed over the exposed Inner Cove sediment. Clean backfill material placed within 10 feet of the shoreline will have higher organic content to further replicate the former shoreline habitat as discussed in the Wetland Restoration Plan (Appendix D). The Inner Cove bottom will be graded and natural materials, such as tree branches, may be placed on the bottom of the Cove to better replicate the former habitat area within the Inner Cove.

### **3.3.2.8 Dam Removal**

After completion of the Inner Cove sediment removal, restoration and wetland restoration, the sump pumps will be removed to allow natural groundwater discharge into the Inner Cove. After the Inner Cove is recharged at least three feet, the dam will slowly be removed in order to let the Inner Cove refill without turbulence, preventing erosion or scour. The process in which this is done is dependent on the type of dam used and the manufacturer's removal guidelines. This will be detailed in the contractors work plan submitted to RIDEM and USACE.

### **3.3.2.9 Surface Water Monitoring Post Construction**

Surface water samples will be collected from the Inner and Outer Coves 30 days after the completion of Phase II Inner Cove restoration is complete. These samples will be submitted for analyses to confirm effectiveness of the remedy. Amec Foster Wheeler proposes to sample surface water locations, SED/SW11 (Mashapaug Pond), SED/SW27 and SED/SW28 (Inner

Cove), and SED/SW36 and SED/SW39 (Outer Cove). The sample locations were chosen based on location within the excavation area and the historic sampling data from 2006 and 2011 (Final SIR Tables 4-1 and 4-2). Surface water samples will be analyzed for PAHs, dissolved metals and dioxins.

### **3.3.3 Phase III Area Remediation**

#### **3.3.3.1 Erosion and Sediment Control**

As previously discussed in Section 3.3.1.3, a NOI and WQC are being submitted to RIDEM for the Phase II and III Area sediment remediation (Appendix G). A Storm Water Pollution Prevention Plan (SWPPP) will be maintained on Site during all ground disturbance and restoration activities.

The erosion and sediment controls discussed within this plan will include the installation or restoration of the silt fence and hay bales prior to the start of construction. The proposed controls will protect the Phase I wetland cap and existing wetlands/Outer Cove from sediment erosion and washout caused by the construction on Parcel C and Parcel C-1 Phase II and Phase III Areas. This barrier will be installed along the limit of disturbance (LOD) beginning at the southwest corner of the Phase III Area near the detention basin, extending down to the Inner Cove (Appendix B, Drawings C-101 through C-103). Erosion control will then extend from the Outer Cove shoreline up to the top of slope on the Phase III Area, extending to the northwest corner of the Phase III Area along the LOD and back down to the Outer Cove/Mashapaug Pond. Grading is not proposed along the shoreline of Mashapaug Pond such that erosion control measures will be installed upgradient of the delineated wetlands. Erosion control measures will then be installed along the east and southern boundaries of the Phase III Area. The silt fence and hay bale barrier will be removed prior to wetland restoration as part of the Phase II work to ensure the restoration is completed.

These erosion control measures will be maintained throughout the construction period and during the growth and stabilization of the new ground cover. Once the ground cover is stabilized the erosion control measures will be removed and the area cleaned and restored to grade. Monitoring and reporting of the storm water management systems will continue until the Site surface has stabilized and the permit is closed with RIDEM.

#### **3.3.3.2 Tree Clearing and Wetland Preparation**

The Phase III Area is approximately a 3.25 acre portion of Parcel C-1 that is mainly open space, with the exception of the wetland border along the north and western shoreline and a section of trees and shrubs in the northeast portion of the Site. The soils in the northeastern wooded area are clean and do not exceed RDEC and therefore do not require remediation (Figure 10); however for grading purposes, tree clearing and grubbing is necessary. This area is outside the perimeter wetland and will also be part of the future recreational fields proposed by the City in the future.

The existing trees and shrubs will be preserved along the northwestern side of the Phase III Area along with the exiting wetlands on the northern end of the Phase III Area, as shown in Figure 10



and Appendix B, Drawing C-103. These soils do not exceed the RDEC and do not require remediation.

Prior to the beginning of work, tree and shrub removal will occur and the waste will be properly disposed off-site as described above.

Minor tree clearing will be done along the Outer Cove and Mashapaug Pond in the northern section of the Phase III Area within the perimeter wetland. The capping of these areas will include limited grading of the slope and subgrade using GPS technology, a permeable high-visibility marker fabric and one foot of clean topsoil. The wetland replication plan (Appendix D) includes the proposed planting and seeding to promote revitalization of the perimeter wetland area. Planting and seeding within the fringe wetlands along the Inner and Outer Cove will help restore the natural habitat while creating a natural fence along the shoreline preventing human access to the pond, as detailed in the Wetland Restoration Plan, Appendix D.

### **3.3.3.3 Monitoring Well Installation**

During the slag removal in 2006 (MACTEC, 2006c), monitoring well GZA-5 was removed due to slag excavation activities in the area. Under Phase II, the former slag area cap will be extended down to the original water line and as part of this cap extension the replacement well GZA-5 will be installed. The location of the former monitoring well GZA-5 is shown on Appendix B, Drawing C-102. This replacement well may be used to monitor the performance of the groundwater treatment system on Parcel A and the geomembrane cap within the Phase I/II Area of Parcel C-1 in the future.

A geoprobe rig will be used to install one, 2-inch well as overburden monitoring wells. The well will be installed with a well screen and riser. The annular space between the well screen and borehole will be filled with gravel/sand pack to serve as a filter media. Bentonite chips will fill the annular space above the filter pack and then cement/bentonite grout will fill the space above the bentonite chip layer. The well will be installed with a removable, locking well cap to seal the top of the monitoring well riser. A boring log and well construction log will be prepared following the installation of the well. Details for monitoring well installation are shown on Appendix B, Drawing C-502.

### **3.3.3.4 Wetland Restoration Phase III Area**

As discussed in Sections 3.1.4.1 and 3.1.4.2, the fringe and perimeter wetlands will be covered with up to 12-inches of clean organic soil and planted with a wetland seed mix to stabilize soils and provide structural integrity. Note that work will not be conducted on the western and northern slopes of the Phase III Area (Outer Cove and Mashapaug Pond shoreline) in order to protect these existing wooded areas from any disturbance.

The use of wetland grasses within the perimeter wetland cap, as described in the Wetland Restoration Plan (Appendix D), will create a transition from the upland area, through the perimeter wetland, to the fringe wetlands along the shoreline of the Inner Cove. This will also create a natural barrier for human access to the Inner Cove. These activities will be conducted using best

management practices and every effort to minimize impacts to the surrounding landscape will be taken. Remediation activities will strive to preserve mature trees and other desirable native vegetation when possible located outside the LOD.

### **3.3.3.5 Temporary Access Road into Inner Cove**

As previously mentioned, a temporary access road from the southwest corner of the Phase III Area into the Inner Cove will be constructed to support the equipment access for the Inner Cove sediment removal. The access road will extend from the flat surface of the Phase III Area down the slope to the peninsula between the Inner and Outer Cove and south of the temporary dam. The construction of the temporary access road will include, limited tree and shrub removal, grading and the installation of fabric and gravel or other methods such as timber mats or approved equivalent. The road will follow the perimeter fence along the north side of the detention basin and down slope into the northeast corner of the Inner Cove. This portion of the access road will be constructed prior to the commencement of the Phase II work.

Once the Inner Cove is adequately dewatered, the temporary road construction will continue into the Inner Cove. The temporary access road will provide access to the different segments within the Inner Cove for the construction equipment to reach, remove and dewater the sediment from within the Inner Cove. The construction details of the access road within the Inner Cove will be determined by the contractor; however, the use of fabric, matting (logging mat or composite mat) and gravel/stone to accommodate the anticipated loads on saturated sediment/soil may be used. The removal of up to two foot of sediment, installation of one foot clean soil and removal of the proposed access road(s) or timber mats will be done after the entire Inner Cove work zone has been remediated.

The access road along the Phase III Area slope will be removed following completion of the Inner Cove sediment removal/restoration and wetland restoration. The area will be graded and capped as described within this RAWP and the Wetland Restoration Plan (Appendix D).

### **3.3.3.6 Asphalt Removal**

The existing asphalt at the former “Casino” parking lot within the Phase III Area will be crushed and spread on the Phase III Area to be capped with high visibility marker fabric and one-foot of clean topsoil (six inches of clean cover soil and six inches topsoil). There are no visible building foundations or debris within the former Casino area other than pieces of asphalt.

### **3.3.3.7 Storm Water Detention Basin**

As previously discussed in Section 3.3.1.3, the storm water detention basin located north of the retail building on Parcel A has an existing outfall pipe that discharges into the Inner Cove in the event that the detention basin overflows. Treated groundwater and storm water from Parcels A and B (retail building and high school) currently discharge into the detention basin. The groundwater treatment system discharges at a rate of 12-16 gallons per minute. During the dewatering and construction/restoration of the Inner Cove and wetlands, the overflow pipe will be plugged and the surface water accumulating within the detention basin will continue to infiltrate,

unless the depth of water increases up to the blocked outfall pipe. Then the clean storm water will be rerouted into the Outer Cove beyond the proposed temporary dam. A pump will be installed near the bottom of the basin, surrounded by filter pack, to direct the clean surface water into the Outer Cove.

### **3.3.3.8 Former Carriage House Area Preparation**

Debris from the former Carriage House building including burnt timbers and other organic materials and metals will be removed from the debris and recycled or disposed of off-site. The remaining building walls and retaining walls will be crushed to create a homogenous subgrade material and to minimize the creation of voids. The existing asphalt and concrete surfaces will be broken up and crushed to promote infiltration. The existing paved City sewer easement extending between the Amtrak access road and the high speed rail line (Figure 10) will remain in place.

### **3.3.3.9 Capping of Inner Cove Sediment**

The dewatered sediment from the Inner Cove will be consolidated within the former Carriage House Area (Figure 10). The former Carriage House area is bound by the City Sewer Easement and the Amtrak Access Road, in the southeastern portion of the Phase III Area of Parcel C-1 (Appendix B, Drawing C-103). The former Carriage House was not sampled as part of the June 2013 investigation, but the area will be capped due to the burned structure and the likelihood that the soil would not meet RDECs regarding the presence of PAHs and metals, similar to the rest of the Phase III Area.

Following the placement of the dewatered sediment, the area will be covered with a marker fabric and capped with one foot of imported clean soil (six inches cover soil and six inches topsoil). The marker fabric will be a high-visibility non-woven orange geotextile used to prevent intermixing of contaminated soil with the imported clean soil. The marker fabric will be anchored down at all edges of the cap and joined together by overlapping, sewing, stapling or bonding. The finished topsoil surface will be seeded and stabilized with erosion control matting or an approved equal along the side slopes to provide structural integrity. The soil cap will prevent direct contact with the sediment, and restrict the potential migration of contaminants through the action of wind, erosion and surface run-off.

The results of the SPLP tests at the five sediment sample locations shown in Figure 8, indicate that the dewatered Inner Cove sediment does not pose a risk of leaching when placed on the former Carriage House area, therefore allowing the dewatered Inner Cove sediment to be capped with a permeable high-visibility marker fabric overlain with a one foot imported soil cap. As discussed in Section 14.0 the draft ELUR for Parcels C and C-1 (Appendix E) will include this former Carriage House Area. This area will not be used for any proposed future activity.

All imported soil will be tested to meet RIDEM RDEC (Appendix C). During the construction of the Phase III Area 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 manage storm water runoff into the Amtrak facilities. Storm water management is discussed further in Section 3.3.1.3 of this RAWP.

### **3.3.3.10 Grading of Phase III Area**

The Phase III Area abuts the northern section of the Phase I cap, west of the existing detention basin and extends east to the Amtrak access road and north to the delineated wetlands along Mashapaug Pond (Figure 10 and Appendix B, Drawing C-103). The area along the western and northern shoreline (excluding the northwestern shoreline which will remain in its present wooded condition) is the Phase III perimeter wetland. The restoration of this perimeter wetland has already been discussed in Section 3.1.4.2.

The Phase III area was characterized through soil borings and test pits, and is characterized as a layer of fill with medium sand and some gravel, or soil above a layer of tan to yellow coarse to fine sand. The test pits were performed to a depth of 15 feet while the soil borings reached a depth of 32 feet. The top 2 feet of soil were found to contain elevated concentrations of metals and PAHs. A layer of asphalt was found on the surface scattered around the area from the historic Casino Building parking. The existing pavement will be crushed to create a homogenous subgrade material and spread on site. The Phase III Area soil will be graded in order to support the proposed reuse of the Phase III Area by the City (Appendix B, Drawing C-103).

### **3.3.3.11 Capping of Phase III Area**

The remedial action on Parcel C-1 Phase III Area will consist of the grading and installation of a soil cap on a 3.25 acre section as shown on Appendix B, Drawing C-103. Once complete, the Phase III Area will be relatively level and ready for future development by the City. The soil cap will prevent direct contact exposure, and restrict the potential migration of contaminants through the action of wind erosion and surface run-off into the wetland and Mashapaug Cove and Pond.

All imported soil will be tested to meet RIDEM RDEC (Appendix C). During the construction of the Phase III 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 manage storm water runoff into the wetland and Mashapaug Cove and Pond. Storm water management is discussed in Section 3.3.1.3 of this RAWP.

The Phase III cap will extend from the northern limits of the Phase I cap on the southeastern shore of the Inner Cove to the northern edge of the Parcel C-1 and south along the Amtrak access road to the Parcel A detention basin.

Following the grading and consolidation of the Phase III area, the soil will be covered with a marker fabric and capped with one foot of imported clean soil (six inches cover soil and six inches topsoil). The marker fabric will be a high-visibility non-woven orange geotextile used to prevent intermixing of contaminated soil with the imported clean soil. The marker fabric will be anchored down at all edges of the cap and joint together by overlapping, sewing, stapling or bonding. The finished surface will be seeded and stabilized with erosion control matting or an approved equal.

Soil components of the cap will be sampled to meet RIDEM RDEC. The fill area cap finished topography will generally support the City's proposed future development of the area.

### **3.3.4 Parcel C Capping**

#### **3.3.4.1 Western Plume Monitoring**

Extensive groundwater investigations have been conducted throughout the upland portions of the property, including Parcel C, from 2006-2010. In the northwest corner of Parcel C is a historic low-level remnant PCE/TCE plume (western plume) that is believed to have originated from the fill material on the property. The details of the plume and groundwater data are further discussed in Section 3.3 and 4.5 of the December 2014 SIR. As summarized in the 2006 SSIR, groundwater data supports the fact that the western plume is undergoing biodegradation. The data shows a clear trend of decreasing contaminant concentrations over time.

Textron proposes to sample a select group of monitoring wells in the Western Plume prior to and twice following Phase II/III remediation to confirm that the Western Plume on Parcel C and C-1 have degraded to below applicable criteria (AMEC, 2014). The monitoring wells will be developed and groundwater samples will be collected prior to construction and following construction from the following groundwater wells; MW-235S, MW-236S, MW-237S, MW-241, and MW-FS/B-6S as shown on Appendix B, Drawings C-101 and C-102. These wells are located in the northern portion of Parcel C, following the direction of groundwater flow into the Inner Cove, and were selected based on location, depth and historic groundwater data. Groundwater samples will be analyzed for VOCs (USEPA Method 8260B) and the results compared to GW-3 criteria for the subsequent discharge of shallow groundwater into the Inner Cove.

A total of 5 groundwater samples will be collected in addition to one duplicate groundwater sample. One trip blank will also be run during the groundwater sampling program along with a matrix spike and matrix spike duplicate analysis for VOCs via USEPA Method 8260. Water level gauging will be conducted at these five wells to monitor groundwater flow within the immediate area during each sampling event.

#### **3.3.4.2 Tree Clearing**

The southern and western portions of Parcel C are heavily wooded while the rest of the parcel is mainly cleared. Tree clearing and grubbing will be conducted in these areas to support the grading and capping of Parcel C. Tree clearing will be limited immediately along Adelaide Avenue to attempt to preserve the green buffer of trees between the proposed future parking lot and the residential neighborhood. Prior to clearing, the clearing limit will be flagged and trees to be saved within the perimeter wetland and along Adelaide Avenue will be marked accordingly. Trees, shrubs and brush will be removed above the ground surface within the Limit of Clearing. Cleared material will be stockpiled within the construction staging area. The contractor is responsible for the off-site disposal of all clear cut trees and chipped branches. All stumps, roots over 2 inches in diameter, matted roots and vegetative matter including grasses and weeds within the limit of grading will be removed, stockpiled and covered if necessary. The grubbed material will be

disposed of off-site as solid waste. The remaining soil on all grubblings will be removed prior to disposal off-site and will remain on site.

### **3.3.4.3 Stockpiles**

Located on Parcel C is a stockpile of construction debris that will be crushed and spread out on the property. In 2005, GZA submitted a RAWP (GZA, 2005) to RIDEM for construction on Parcel C. They conducted soil sampling to characterize the existing stockpile of construction debris, crushed asphalt, concrete and rock, and the results showed elevated concentrations of PAHs and TPH exceeding RDEC. The stockpile is currently covered with vegetation and trees, therefore prior to the crushing and spreading of the stockpile, the trees must be removed from the pile. The soil remaining on the tree roots will be removed and the trees will be disposed of off-site as discussed in Section 3.3.4.2. Concrete within the stockpile will be crushed prior to spreading. The stockpile will be spread on Parcel C in the general vicinity of the existing stockpile and compacted as subgrade prior to the installation of the remedial cap. Based on interest expressed by a local resident at the February 5, 2015 meeting, dust control measures will be thoroughly implemented by the contractor during this phase of work.

Amec Foster Wheeler proposes that the contractor stockpile the imported clean cover and topsoil for the Parcel C cap along either the western side of the site along the tree line away from the residences along Adelaide Avenue and the high school. The imported clean soil will be stockpiled on plastic covers to separate it from the graded and compacted surface soil. All imported soil will be tested to meet RIDEM RDEC (Appendix C).

### **3.3.4.4 Storm water Drainage**

Storm water will be managed on Parcel C during and after construction through engineered storm water controls. These controls will be designed and constructed such that they are in accordance with Rhode Island Storm water Design and Installation Standards Manual for the remedial cap on Parcel C. These controls may include swales, level spreaders, detention ponds or other features to support storm water management off-site and to protect the Phase I remedial cap.

### **3.3.4.5 Capping of Parcel C**

Parcel C has already completed the SIR process and received RIDEM approval (RIDEM, 2001). On April 24, 2006, RIDEM issued an Order of Approval (RIDEM, 2006a) for the RAWP prepared by GZA (GZA, 2006) that supported the construction of a YMCA building and parking lot. In August 2010, VHB, on behalf of the City, submitted a revised draft RAWP (VHB, 2010) that documented the change in remedy for Parcel C and proposed the construction of an engineered cap. Textron summarized the Parcel C 2003 SIR and draft 2010 RAWP information into the 2014 Final SIR (AMEC, 2014) to consolidate the site information into a single document and to confirm the remedial action proposed for Parcel C in coordination with the proposed remediation of Parcel C-1 Phase II and Phase III Areas.

The remedial action on Parcel C will consist of the grading and installation of a high-visibility marker fabric and soil cap within the approximate 6 acre section at the location shown on

Appendix B, Drawing C-101. Parcel C will be level graded to support the City's future site development. The soil cap will prevent direct contact exposure, and restrict the potential migration of contaminants through the action of wind, erosion and surface run-off into Mashapaug Inner Cove to the north and Mashapaug Pond to the west. The Parcel C fill area, as shown on Appendix B, Drawing V-102 extends from the southwest corner of Parcel C (near Adelaide Avenue and Crescent Street intersection) north and east around the construction debris stockpile to the north side of the high school. The fill material also extends north and west from Adelaide Avenue along the Phase I Cap. This fill material was historically characterized through soil borings and test pits and found to contain a sandy fill varying fine to coarse (ABB, 1994). The heterogeneous fill is made up of debris deposited throughout the course of industrial activities and contains casting sands, construction, demolition and miscellaneous debris such as fire bricks, wood beams, metal debris, pipes, cloth, glass and crushed drums (GZA, 2005). The characterization of Parcel C soil was completed during previous site investigations, the results of which are presented in previously submitted reports (GZA, 2003). Following site grading, the fill area's surface will be smooth, uniform and relatively free from abrupt changes in grade, rocks and stones. The area will then be covered with a marker fabric and capped with six inches of cover soil and six inches of imported clean topsoil. The marker fabric will be a high-visibility non-woven orange geotextile used to serve as a warning to deter further excavations and delineate the re-graded contaminated soil beneath the soil cover. The marker fabric will be anchored down at all edges of the cap and joined together by overlapping, sewing, stapling or bonding.

All imported soil will be tested to meet RIDEM RDEC (Appendix C). During the construction of the Parcel C 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. The finished surface will be seeded and stabilized with erosion control matting on side slopes (3:1) or within and below storm water management features. Soil components of the cap will be sampled to meet RIDEM RDEC. The fill area cap will generally support the City's future development of the area.

Storm water management will be included with the construction of the cap to maintain its integrity and manage storm water runoff into the perimeter and fringe wetlands. Storm water management is discussed further in Section 3.3.1.3 of this RAWP.

## **4.0 POINTS OF COMPLIANCE & COMPLIANCE DETERMINATION**

### **4.1 Points of Compliance**

In accordance with Section 9.06 and 9.18 of the Remediation Regulations, soil sampling has already been performed outside of the Phase II Area, and Phase III Area and Parcel C caps to define the extent of contamination, sediment and soils posing a potential human health and ecological risk and those areas requiring remediation (AMEC, 2014). The points of compliance are the existing sample locations outside of the Phase III Area and Parcel C (west of the High School) cap that are detailed in Section 4.2 below.

### **4.2 Compliance Determination**

#### **4.2.1 Phase II Inner Cove Sediment Remediation**

The lateral extent of Inner Cove sediment to be removed has already been defined based on sediment sampling conducted between 2006 and 2014. A temporary barrier wall will be constructed outside of SED-33 and SED-34 (Figure 9) so that up to 2 feet of sediment may be removed from the Inner Cove. The organic sediment will be removed down to the natural sand material where possible to a maximum depth of three feet. This will remove the contaminated bioactive zone for the ecological habitat found at the Site. No confirmatory sediment sampling will be conducted on the surface of the excavation; however one foot of sandy soil will be placed over the exposed surface restoring the Inner Cove in a manner that creates additional storage capacity and to benefit the future aquatic conditions.

#### **4.2.2 Phase III Area and Parcel C Caps**

Textron has proposed a passive recreational use cap that will bring Parcel C upland areas into compliance, per the Remediation Regulations, with RDEC (Appendix C). The compliance demonstration is accomplished by comparing soil sampling conducted between 2006 and 2013 along the lateral extents of the cap against RIDEM Method 1 and Method 2 (dioxin toxic equivalence (TEQ)) soil objectives. In the absence of any recreational land use criteria, the RDEC are health protective criteria for passive recreational land use. The exposure assumptions used to calculate the RDEC clearly overestimate likely recreational exposures and compliance with these criteria will create a health protective environment for use of Parcel C for passive recreational purposes. The soil cap has also been designed to extend over those areas where surface soil exceeds the RDEC. The comparison of the data for Parcel C with the soil data collected in the adjoining Parcel C-1 is provided in the Final SIR (AMEC, 2014).

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 passive recreational use cap will be in compliance with the health protective RDECs. Therefore, upon construction of the soil cap, Parcel C and Parcel C-1 soils will represent a health protective condition for recreational use by the community.



Procedures for determining compliance with cap construction requirements and specification (e.g., materials, thicknesses, and construction methods) have been summarized in Section 3 of this RAWP and will be detailed in the construction drawings and specifications.

#### **4.2.3 Wetland Restoration**

The restoration of the fringe wetland and perimeter wetland areas (Figure 4) will be completed consistent with the Exempt Activities of the Rhode Island Fresh Water Wetlands Act. The restored fringe wetland and perimeter wetland areas will be conducted over a one-year growth period to provide early indication of problems and corrective actions. Observations will be made at least two times during the growing season (late spring, late summer). The restored areas will be monitored for performance standards to include the minimum 80% vegetation coverage in the fringe wetland and perimeter wetland; successful establishment of species with a wetland indicator status of facultative, facultative-wetland, or obligate within the fringe wetland; and absence of invasive species. Monitoring reports will be prepared bi-annually and will be submitted to RIDEM and the City of Providence.

Other compliance procedures that will be incorporated into the construction of the Phase II Inner Cove sediment remediation, and Phase III Area and Parcel C caps will include the following:

- Any portion of the geosynthetic liner (geomembrane, geocomposite, geotextile, etc.) within the existing Phase I cap that is damaged during excavation, maintenance and/or related activities will either be repaired or replaced in a timely manner with a section of new geosynthetic liner in accordance with the approved construction specifications.
- Copies of the material shipping records (e.g., metal debris, trees, etc.) will be maintained by Textron and included in the Completion Report following the Phase II/III and Parcel C construction.
- All non-disposable equipment used during the soil disturbance activities will be properly decontaminated as appropriate prior to removal from the Site. All disposable equipment used during the soil disturbance and sediment removal activities will be properly containerized and disposed of following completion of the work. All vehicles utilized during the work will be properly decontaminated as appropriate prior to leaving the Site.
- Vegetation pulled from Inner Cove and sediment handling will be dried, shredded and mixed into the dewatered sediment for disposal in the former Carriage House Area.
- Aquatic and terrestrial wildlife encountered and removed from the Inner Cove during sediment remediation will be relocated to the Outer Cove in accordance with the Wildlife Management Plan (Appendix I).



## 5.0 PROPOSED SCHEDULE FOR REMEDIATION

The following schedule is proposed to minimize conflicts with the proposed redevelopment plans. This schedule is contingent upon the timing of approvals and subcontractor availability.

<b>Description</b>	<b>Completion Date</b>
Submit 404 Permit to USACE	March 12, 2015
Draft RAWP to RIDEM	March 12, 2015
Final RAWP to RIDEM	May 2015
Solicit Qualified Contractors	May 2015
Submit Selected General Contractor Information to RIDEM	June 2015
Distribute Public Notice Materials for RIDEM comment	Within four weeks of Final RAWP
Mobilization	July 2015
Complete Construction	November 2015
Construction Completion Report	January 2016

Detailed schedules will be provided to the RIDEM for the Phase II Area – Inner Cove, Phase III Area – Upland Area and Parcel C preparation and construction. Construction schedules will be posted and updated on the bulletin board at the southeast entrance to Parcel C to keep the public updated on the project progress. Follow-up verification and monitoring will also be conducted in a phased approach. Schedules will also be provided for the wetland restoration and monitoring activities.

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## **6.0 CONTRACTORS AND/OR CONSULTANTS**

Following the submittal of the Final RAWP to RIDEM, Textron will issue a construction bid package to qualified contractors and a contractor will be selected. Textron will notify RIDEM and the City of Providence of the selected contractor. This contractor will prepare a work plan for submittal to RIDEM, the USACE and the City for review that clarifies their technical approach and project schedule for the Parcel C-1 Phase II and III Areas and Parcel C remediation.

The general contractor may subcontract some of the required services. All other services including environmental monitoring, construction management and survey services will be provided by Amec Foster Wheeler. Laboratory services will be conducted by a subcontractor to Amec Foster Wheeler. The selected contractor and Textron will provide RIDEM with a list of contractors and roles and responsibilities for the construction of the Phase II Area sediment remediation, Phase III Area cap, and Parcel C cap within the work plan.

## **7.0 DESIGN STANDARDS AND TECHNICAL SPECIFICATIONS**

Construction drawings and specifications (Division 0, 1 and 2) will be developed consistent with this RAWP and will be made available to RIDEM, at their request. The preliminary drawings presented in Appendix B of this RAWP provide general design information including limits of work, and construction components and dimensions. The construction drawings and specifications will outline the required standards, products, and execution to implement the remedial action. In some cases, the construction is defined by performance based requirements as will be noted in the specifications and drawings. In other cases, products will be specified by fabricator/vendor/manufacturer and model.

Actual material and products to be incorporated into the work will be based on the contractors Work Plan prepared by selected contractor and submitted to RIDEM. The contractor will propose a material/product for the project and submit requisite product information and literature to Amec Foster Wheeler for review and approval. If the submittal satisfactorily meets the requirements of the construction documents (specification and drawings), Amec Foster Wheeler will approve the product/material.

## 8.0 SET UP PLANS

Set-up Plans as defined by the Rhode Island Remedial Regulations describe pre-operational staging or construction requirements that must be in place prior to implementation of the remedial action. A Work Plan will be prepared by the selected contractor prior to implementing the remedial action. This Plan will include descriptions and information as outlined in construction specifications and a HASP. The measures and controls required will be shown on the Construction Drawings and will be described in construction specifications for “Temporary Facilities and Controls”. Information provided within the Contractors work plan will be referenced within the SWPP prepared by Textron (Amec Foster Wheeler, 2015) and submitted to RIDEM. The purpose of these measures and controls include the following:

- To maintain a healthy and safe work environment for remediation construction and oversight personnel;
- To minimize erosion of soil from the upland areas and migration of contaminated sediment from the Inner Cove into the Outer Cove and Mashapaug Pond;
- To minimize waste generation and migration outside of the Exclusion Zone
- To provide proper collection and storage of generated wastes until characterization and off-site disposal can occur
- To provide dust monitoring and engineering controls during construction activities; and
- To provide odor monitoring and engineering controls during the removal and dewatering of the Inner Cove sediment.

## 9.0 EFFLUENT DISPOSAL

Effluents as defined by the Rhode Island Remediation Regulations are any products or by-products from the proposed remedial action. Waste or waste by-products that will be produced as a result of the remedial action include the following:

1. Clearing and miscellaneous debris;
2. Grubbings and tree stumps;
3. Liquid waste (decontamination water, storm water management water, etc.);
4. Site trash; and
5. Remediation waste (personal protective equipment [PPE], plastic sheeting, sampling equipment, etc.).

Waste handling and disposal requirements will be detailed within the construction specification “Waste Excavation, Removal, and Handling” and “Off-Site Transportation and Disposal”. The selected contractor will submit a Work Plan to RIDEM and the City of Providence prior to commencing construction. The plan will contain project specific proposals for waste handling, transportation, and disposal. Characterization of the waste will occur in accordance with the requirements of the Treatment Storage and/or Disposal Facility (TSDF). The selected contractor will be responsible for characterizing waste materials for off-site disposal, not including clearing debris (wood), construction and demolition debris (e.g., concrete from the two water well structures), sanitary waste and site trash. Disposal will occur at licensed facilities approved by Textron.

## 10.0 CONTINGENCY PLAN/ HEALTH AND SAFETY PLAN

Amec Foster Wheeler's Contingency Plans are documented within the Amec Foster Wheeler HASP for Phase II Area sediment remediation, Phase III Area capping, and Parcel C capping found in Appendix F. This document contains the names and phone numbers of emergency coordinators and the emergency response procedures and arrangements for the Site. The HASP with contingency procedures will be available on site at all times during the implementation and operations of the Phase II Area sediment remediation, Phase III Area capping, and Parcel C capping.

The selected general contractor will prepare and follow a site-specific HASP for the work described and referred to in this RAWP. The contractor's HASP will cover their personnel and their subcontractors, will be maintained on the project site and available to all site personnel.

A potential respiratory hazard associated with prolonged exposure to contaminants in soil and sediment exists for invasive activities, particularly those activities that will disturb soils/sediment and could generate dust (e.g., road grading, tree clearing/grubbing and excavation of contaminated soil). This hazard will be mitigated by the use of engineering controls such as water to suppress visible dust and dust that exceeds 0.29 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) in air. Dermal exposure should be suppressed by use of task-specific PPE. Although not likely based on investigation activities or actual conditions encountered during the Phase I cap construction activities completed to date, inhalation of VOCs is possible from impacted soil and should be monitored to prevent respiratory exposure. Table 4-1 of Amec Foster Wheeler's HASP (Appendix F) lists the potential contaminants of concern and the threshold limits to be used during the construction monitoring.

Amec Foster Wheeler will conduct dust monitoring in the work zone and at the work area perimeter during activities that have the potential to disturb soil (grading, excavation, trenching, drilling) using hand held real-time continuous air monitoring instruments. Work area perimeter dust monitoring will be performed using the MIE DR4000 monitors or equivalent placed in weatherproof cases. These instruments measure aerosol dust and will be set to automatically store data (data logging) for subsequent retrieval. One perimeter dust monitor will be placed on each of the four points outside and within 30 feet of the soil capping and sediment removal activities (North, South, East, and West) to confirm that areas outside of the work zone are not impacted by the capping activities. Real-time dust monitoring will continue throughout the construction activities, unless a significant precipitation event occurs, at which time dust monitoring may be suspended per manufacturer specifications and standard industrial hygiene practices. The fixed monitoring points will be set to trigger the alarm when the dust level reaches  $0.20 \text{ mg}/\text{m}^3$  as a warning that we are approaching the action level.

The sustained respirable dust meter action level is  $0.29 \text{ mg}/\text{m}^3$ . Amec Foster Wheeler believes that this action level is protective of worker health under the Occupational Safety and Health Administration (OSHA) lead standard and given the known levels of contaminants in Site soils. If this level is exceeded, Amec Foster Wheeler will instruct the contractor to use water to suppress dust as an engineering control. If this action level is sustained for one minute, Amec Foster Wheeler will halt work and require upgrade to Level C PPE. It is important to note that the upgrade

action level for (upgrading from Level D to Level C) was not exceeded at any time during the Slag Removal Action in July 2006 or the Phase I Cap construction in 2012.

Continuous visual monitoring of dust (particulate) levels will also be conducted and recorded in the Site field logbook. If visible dust conditions are sustained for more than one minute within the work zone, dust suppression methods (i.e., water spray) will be implemented to reduce airborne dust levels. Dust suppression will be performed throughout the capping activities as needed and will include spraying of fine mist of water over exposed soils to suppress dust as needed. A portable water tank containing municipal water or a nearby fire hydrant if approved by the City of Providence will be used as the water supply for dust suppression activities. If heavy precipitation (rain or snow) is adequate to suppress dust, additional water spray will not be applied. This real time monitoring of air quality will be summarized on a log sheet for each day and at the end of each week they will be scanned and emailed to RIDEM for uploading to the project website. Data from the fixed monitoring points will also be provided to RIDEM and uploaded to the website.

The selected contractor is responsible for conducting personal exposure monitoring using direct reading instruments and with the collection of personal air samples. The selected contractor will use appropriate sampling pumps and media to collect and document time-weighted average exposures to lead and other metals.

A photoionization detector (PID) will also be used at the Site for soil sampling and excavation tasks to monitor the breathing zone for VOCs. This information will be maintained in the field logbook and response actions will be taken based on the threshold values listed in Table 4-1 of the HASP (Appendix F).

Methane gas was detected in three locations on of Parcel C, but nowhere else on Site. In 2002, GZA reported methane at 5.4% in soil vapor probe sample SG-11 in the northwest corner of Parcel C. All other detections were 0.7% methane to non-detect. OSHA considers methane to be a simple asphyxiant, and has not established a methane-specific PEL. The American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Value (TLV) for methane (as an aliphatic hydrocarbon gas) is 1,000 ppm. Amec Foster Wheeler does not anticipate methane exposure to be an issue since work will be conducted outdoors and not in a confined or enclosed space. Also, the fill found on Parcel C-1 is industrial and does not include municipal waste, the primary source of methane gas. The cuts and fills required for site grading have been minimized typically to the top few feet to balance the Site and limit as much as possible the movement of the existing fill material. However, methane is flammable within a range of concentration of 5% by volume (the lower explosive limit [LEL]) and 15% by volume (the upper explosive limit [UEL]). Since concentrations of methane were detected at the LEL, the contractor will be required to monitor the work area for LEL using a combustible gas instrument that measures % LEL and % oxygen and that is calibrated to methane. The %LEL action level is >10% LEL. At this action level, work will cease in the work area and the crew will back off and allow the gas to dissipate. The contractor will recheck the atmosphere while approaching the work area to confirm LEL levels have dropped. If LEL levels continue to exceed the action level, provisions for active ventilation and spark proof/intrinsically safe equipment may be necessary.



## 11.0 OPERATING LOG

All on-site activities will be recorded in an operating logbook to document progress associated with the proposed remedial activities. The logbook will include, at a minimum, detailed information on the following:

- Personnel on-site and their time of arrival and departure.
- Time of system (if applicable) operation, including startup time, time of shutdown due to equipment malfunction or failure, and time of completion for the remedial activity.
- Records of materials transported off-site, and materials brought on-site.
- Instances during remedial activities where a Contingency Plan may be implemented.
- Records of any accidents or injuries incurred on the Site.
- Documentation of inspections and any instances where remedial activity procedures must be changed and/or equipment must be repaired or replaced. An inspection plan will be designed for all remedial activities to ensure that all equipment or activities are operating properly.
- Details of the work stages and activities, as will records of sampling and any field screening (e.g., dust monitoring) that is performed.
- Perimeter air monitoring dust readings will be logged in the Site field logbook, making note of the time the readings were obtained, the concentrations observed, the weather conditions, the prevailing wind direction, and the general site conditions and activities. Time weighted averages of total dust concentrations from perimeter monitoring stations will be compared the OSHA Permissible Exposure Limit (PEL) of particulates not otherwise regulated including aerosol dust (referred to as particulates not otherwise characterized or (PNOC)), which is  $0.29 \text{ mg/m}^3$ . The fence line monitoring equipment alarms will be set at  $0.20 \text{ mg/m}^3$  to warn Amec Foster Wheeler and the contractor that dust levels are approaching the action level of  $0.29 \text{ mg/m}^3$ .
- Field monitoring of air/dust by the mini-RAM and VOCs by the PID will be logged in the field logbook. This data will be summarized on daily log sheets and scanned weekly for submittal to RIDEM.

In addition to documentation of field activities, quality assurance procedures for cap construction, sediment removal and restoration and wetland capping and restoration, as described in the construction specifications will be recorded in the operating log.

The operating log will be readily available at the Site during all activities outlined in this RAWP.

## 12.0 SECURITY PROCEDURES

Access to the Phase II, Phase III, and Parcel C work areas will be at two locations. One access point is the existing Parcel C gate in the southwestern corner of Parcel B near the high school. The other access point will be the existing shared gate with Amtrak in the northeast corner of the Site (behind the retail building on Parcel A).

The existing 8' high security fence and gate installed along the limit of work (LOW) west and northern sides of Parcel C ties into the existing fence at the school property. This is a temporary fence and gate that will be removed prior to initiating construction. The remaining fence extending along Adelaide Avenue to the northeast corner of Parcel A at the railroad tracks will be maintained through the completion of the Phase II remediation and Phase III and Parcel C cap construction. A mesh fabric material will be installed on this Site fence extending from the corner of Adelaide Avenue and Crescent Street, along the high school property line and retail property line and detention basin to the corner at the railroad. This fence will remain in place until the contractor has achieved the required stabilization and wetland growth required under the construction specifications. The City may choose to retain the fence at the completion by Textron to support their future development of Parcels C and C-1 Phase III Area.

Only authorized personnel (e.g., engineer, construction personnel, and approved visitors) will be permitted to access the work zone. All visitors are required to check in with the Site Superintendent upon entering.

Fencing and gates will be secured at the close of each working day. Areas where fencing is removed will be gated and/or properly secured with temporary fencing and signage. Signage will be in English and Spanish and will include a Site contact phone number and other pertinent information. The signs will be installed approximately every 200 feet along the fence.

### 13.0 SHUT-DOWN, CLOSURE AND POST-CLOSURE REQUIREMENTS

Shutdown will consist of final cleanup, removal of temporary facilities and controls, and equipment demobilization from the site. Points of compliance and compliance determination for capping activities are discussed in Section 4.0. Security and siltation fencing will not be removed before construction is complete, specified erosion control measures (e.g., rock dams, erosion control mats, etc.) have been installed, and specified erosion control vegetation is established. Also, a Remedial Action Closure Report will be prepared and submitted to the Department documenting the work performed and including, at a minimum, the following items:

- A post remediation survey of the entire Phase II Area, Phase III Area, and Parcel C with as-built plans demarcating the exact location (e.g., vertical and horizontal extent and type) of the installed engineered controls, including: marker fabric, clean fill, and, as applicable, any utilities, structures, basins, swales, storm water management features, current groundwater monitoring locations, and no cut zones in the fringe and perimeter wetland areas.
- Analytical results and summary of all air and dust monitoring and/or sampling performed throughout the project.
- All original laboratory analytical data results from the remedial activities, compliance and confirmation sampling, as applicable.
- Documentation that excess regulated soil, solid waste, and remediation waste was properly disposed of off-site at an appropriately licensed facility in accordance with applicable laws.

## 14.0 INSTITUTIONAL CONTROLS AND NOTICES

A draft Environmental Land Usage Restriction (ELUR), in accordance with Rule 8.09 of the Remediation Regulations, will be developed with the Providence Redevelopment Agency (PRA) as property owner and RIDEM, and will be formerly recorded with the property deed at the conclusion of Parcel C-1 remediation activities. A Soil Management Plan (SMP) which outlines the procedures for managing the soils on Site should disturbances below the cap be required, will be recorded with the ELUR. The designated no cut zones within the fringe and perimeter wetland areas will be included in the ELUR and the SMP. The draft ELUR and SMP are provided in Appendix E of this RAWP for review by the City and RIDEM.

This ELUR will address all three phases of Parcel C-1 (upland and Mashapaug Cove) and Parcel C. Textron will maintain and monitor the completed remediation of Parcels C and C-1 until the responsibility is taken over by the City of Providence or PRA at the time the ELUR is recorded.

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March 11, 2015



## 15.0 CERTIFICATION REQUIREMENTS

The following certifications are provided pursuant to Rule 9.19 of the Remediation Regulations.

The undersigned hereby certifies that to the best of their knowledge the information contained in this report is complete and accurate based on the information available at the time of its preparation. Furthermore, the undersigned certifies that to the best of their knowledge the report is as complete and accurate a representation of the Site and the release based on the available information, and contains the known facts surrounding the release.

Amec Foster Wheeler Environment & Infrastructure, Inc.

_____	_____
David E. Heislein Senior Project Manager	Date

Textron, Inc.

_____	_____
Gregory Simpson Senior Project Manager, Site Remediation	Date

## 16.0 REFERENCES

- ABB-ES, 1995a. Remedial Investigation Report, Gorham Manufacturing Facility, May.
- ABB-ES, 1995b. Supplemental Remedial Investigation Report, Gorham Manufacturing Facility, December.
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## FIGURES

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## **APPENDIX A**

### **PARCEL C AND C-1 PROGRAM LETTERS AND REMEDIAL DECISION LETTER**

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## **APPENDIX B**

## **DRAWINGS**

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## **APPENDIX C**

### **RHODE ISLAND RESIDENTIAL DIRECT EXPOSURE CRITERIA**

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**APPENDIX D**  
**WETLAND RESTORATION PLAN**

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## APPENDIX E

### PARCEL C AND C-1 DRAFT ENVIRONMENTAL LAND USE RESTRICTIONS AND SOIL MANAGEMENT PLAN

**(under review by RIDEM and City of Providence)**

**Note:** This RAWP references two parcels, *Parcel C* and *Parcel C-1*, as the subject of this work plan. These parcel identifications have been carried from previous reports (e.g., Site Investigation Report) into this work plan for clarity and continuity. However, based on the Subdivision Plan for the property the legal description and land survey contained within this Environmental Land Use Restriction, encompass all of the land of these two parcels and identifies the affected land as one parcel; Parcel C.

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## **APPENDIX F**

### **AMEC FOSTER WHEELER HEALTH AND SAFETY PLAN**

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## **APPENDIX G**

### **WATER QUALITY CERTIFICATION AND NOTICE OF INTENT**



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**APPENDIX H**  
**SECTION 404 PERMIT**

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**APPENDIX I**  
**WILDLIFE MANAGEMENT PLAN**