

**US Army Corps
of Engineers®**

FIVE-YEAR REVIEW REPORT

FIRST FIVE-YEAR REVIEW

FOR

**WATERTOWN ARSENAL - FORMER GSA PROPERTY
FORMERLY USED DEFENSE SITE PROJECT NUMBER D01MA0019_02
TOWN OF WATERTOWN
MIDDLESEX COUNTY, MASSACHUSETTS**

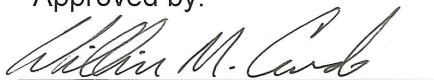
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3 August 2018

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EXECUTIVE SUMMARY

This is the first Five Year Review of Watertown Arsenal – Former GSA Property, Formerly Used Defense Site Project Number D01MA0019_02, located in Watertown, MA. The Decision Document's Remedial Action Objective is to reduce human health and ecological risks associated with exposure to PCBs, dioxin, and metals in the PCB Impacted Area. The selected remedy included excavating and transporting offsite fill material with PCBs greater than 50 milligrams per kilogram, constructing a soil cover over residual PCB-contaminated fill material, wetland replication (referred to as Compensatory Wetlands in later documents), and institutional controls.

The site achieved construction completion with the completion of the Remedial Action Closeout Report on 30 September 2014. USACE constructed the remedy in accordance with the 2012 Decision Document requirements and the 2013 Remedial Action Work Plan. The five-year review trigger date is 15 August 2013, the start of soil excavation and removal in the PCB Impacted Area.

The Former GSA Property's soil cover remedy is functioning as designed by severing the fill material (soil) exposure pathway. The Decision Document's soil and surface water Applicable or Relevant and Appropriate Requirements have been met. The compensatory wetlands are functioning as intended, with maintenance.

The Former GSA Property's remedy is protective of human health and the environment. The remedy's elements that protect human health and the environment are:

- Excavated and transported offsite contaminated soil and fill material in the PCB Impacted Area greater than 50 mg/kg PCBs.
- Installed a soil cover and geotextile fabric (marker material) over residual PCB contamination less than 50 mg/kg.
- Completed a Grant of Environmental Restriction and Easement, which includes land use controls limiting site and intrusive activities.
- Conduct soil cover inspections and five-year reviews.



FIVE-YEAR REVIEW REPORT

SITE IDENTIFICATION		
Site Name: Watertown Arsenal - Former GSA Property		
EPA ID: Not Applicable		
Region: 1	State: MA	City/County: Watertown, Middlesex
SITE STATUS		
NPL Status: Non-NPL		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: Other Federal Agency If "Other Federal Agency" was selected above, enter Agency name: United States Army Corps of Engineers (USACE)		
Author name (Federal or State Project Manager): Drew Clemens, PG		
Author affiliation: USACE		
Review period: 10/27/2017– 8/15/2018		
Date of site inspection: 8 Nov 2017		
Type of review: Statutory		
Review number: 1		
Triggering action date: 8/15/2013		
Due date (five years after triggering action date): 08/15/2018		
Issues/Recommendations		

No issues were identified during this five-year review.

Protectiveness Statement(s)		
Operable Unit: Site-Wide	Protectiveness Determination: Protective	Addendum Due Date (if applicable):
Protectiveness Statement: The former GSA Property's remedy is protective of human health and the environment.		



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LIST OF ABBREVIATIONS AND ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COCs	Contaminants of Concern
DERP	Defense Environmental Restoration Program
DU	Depleted Uranium
EPC	Exposure Point Concentration
FUDS	Formerly Used Defense Site
FYR	Five Year Review
VOC	Volatile Organic Compounds
SVOC	Semi-Volatile Organic Compounds
GE	Google Earth
GERE	Grant of Environmental Restriction and Easement
GSA	General Services Administration
HI	Hazard Index
IEUBK	Integrated Exposure Update Biokinetic
LOAEL	Lowest Observed Adverse Effect Level mg/kg - milligrams per kilogram
MassDCR	Department of Conservation and Recreation
MassDEP	Massachusetts Department of Environmental Protection
MCLs	Federal Maximum Contaminant Concentrations
MCP	Massachusetts Contingency Plan
MDC	Metropolitan District Commission
mg/kg	milligrams per kilogram
MGL	Massachusetts General Law
NA	Not Applicable
NAIP	National Agricultural Imagery Program
NC	Not Carcinogenic (by oral/ingestion routes)
NCOC	Not a Chemical of Concern
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanographic and Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated biphenyl
PRG	Preliminary Remediation Goal
RA	Remedial Action
RAO	Remedial Action Objective
RIFS	Remedial Investigation/Feasibility Study
TEQ	Toxicity Equivalence
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey



1.0 INTRODUCTION

1.1 Regulatory Background

The Watertown Arsenal – Former General Services Administration (GSA) Property is listed in the United States Army Corps of Engineers (USACE) records as Formerly Used Defense Site (FUDS) Project Number D01MA0019_02. The site is not listed on the National Priorities List (NPL). USACE must comply with, manage, and execute site closure consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under the Defense Environmental Restoration Program (DERP), to include five-year reviews.

CERCLA §121(c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first five-year review for the former GSA Property site. This review is required by statute because the selected soil cover remedy for site results in contaminants remaining at concentrations exceeding unlimited use and unrestricted exposure to site media.

1.2 Purpose of the Five Year Review

The purpose of this five-year review is to determine whether the remedy for the former GSA Property site (the Site, Figure 1) is protective of human health and the environment. Specifically, the report addresses the following three questions stated in EPA's 2001 Five-Year Review Guidance Document (USEPA, 2001):

Question A: *Is the remedy functioning as intended by the decision documents?*

Question B: *Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?*

Question C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

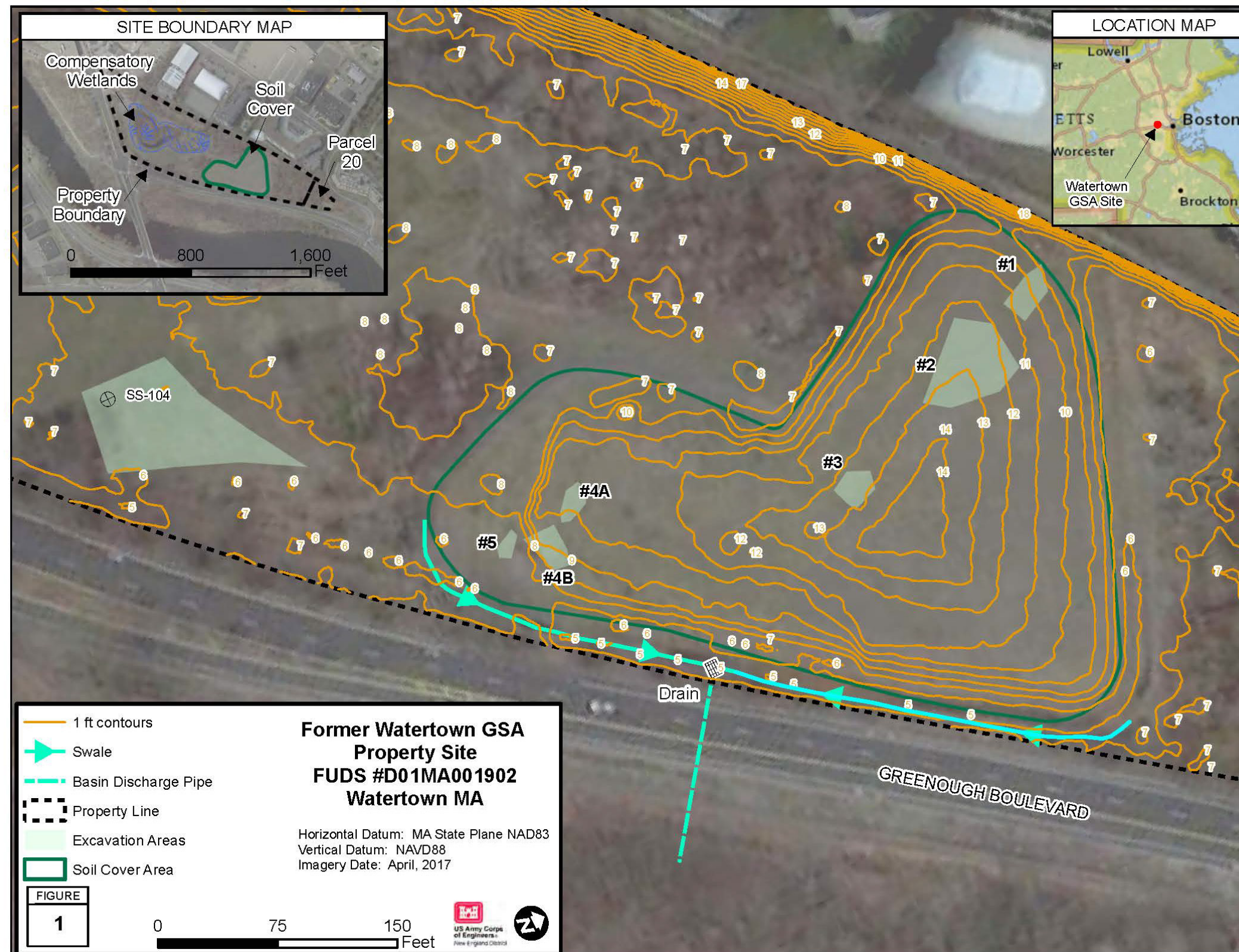


Figure 1. Watertown Arsenal – Former GSA Property, Watertown, Massachusetts (eastern swale highlighted) (Google Earth, 2017, USGS, 2016, Charter, 2014a, b).



The findings and conclusions of this review are documented in this report. The report also identifies other findings and recommendations identified during the five-year review process.

1.3 Personnel Conducting the Review

The U.S. Army Corps of Engineers (USACE) completed the review. The Five Year Review Team included Drew Clemens (Report Lead), Cindy Auld (Risk Assessor), Dara Gay (Geotechnical Engineer), and Mike Penko (Ecologist).



2.0 SITE CHRONOLOGY

Significant site events and dates are in Table 1. No enforcement orders have been issued for the Site.

Table 1. Chronology of site events (Charter, 2014, 2013, USACE, 2012).

Event	Date
US Army acquires the GSA property from the Commonwealth of Massachusetts	1920
US Army used the property for landfilling, outdoor vehicle and material storage,	1940s through early 1950s
US Army treated depleted uranium (DU) scrap by coating with oil and burning in a burn box	1961-1967
US Army transferred the property to GSA	1967
Radiological surveys and soil removal actions	1967, 1973, 1988
Comprehensive Site Assessment	1990
Interim Remedial Measure removing 130 cubic yards of soil, fill material, debris, and an underground tank	1989-1993
Preliminary Assessment	1992-1993
Radiation Characterization Survey	1993-1996
Historical Site Assessment and Report	200-2001
Focused Uranium Tailings Investigation and Report	2002-2003
Phase II Comprehensive Site Assessment	1994-2003
MassDEP and the Massachusetts Department of Public Health concurred with the Nuclear Regulatory Commission's (NRC) recommendation releasing the Site for unrestricted	November 2003
Draft Response Action Outcome and Activity and Use Limitation	January 2004
Tank Removal	August 2004
USACE Wetland Delineation	2007
Massachusetts Department of Conservation and Recreation (MassDCR) Due Diligence Investigation	2007
Supplemental Field Investigation	2008
Governing program changed from the MCP to the DERP-FUDS Program in accordance with CERCLA	2009-2010
Supplemental Field Investigation	2010
Remedial Investigation/Feasibility Study (RI/FS) completed, documenting polychlorinated biphenyls (PCBs) and dioxins	September 2011
Proposed Plan Approved	November 2011
Decision Document	May 23, 2012
Remedial Action Work Plan, initial clearing, demolition, and soil sampling completed.	July 2013
Soil cover construction begins with off-site disposal of areas with PCB contamination equal to/or than great than 50 mg/kg	15 August 2013
Remedial Action removed 424 cubic yards of PCB-contaminated fill material, constructed the soil cover and compensatory wetland.	September 30, 2014
Operations and Maintenance Plan approved by USACE and MassDEP	April 16, 2014
Semi-annual and Annual Monitoring	2014 to Present



3.0 BACKGROUND

3.1 Physical Characteristics

The Site is located at 670 Arsenal Street, in the eastern portion of the town of Watertown in Middlesex County, Massachusetts (Figure 1) (USACE, 2012). It occupies a former Charles River terrace comprised of glacial moraine mixed with till deposits (Chute, 1959). Much of the Site has been reworked, with the first several feet of overburden containing rubble and debris (urban fill). Land surface slopes northeast and southwest away from the Site's soil cover (Figure 1). A 20-25 ft tall retaining wall (northwest side) and chain link fence surround the Site.

The southwestern portion of the site, including the compensatory wetlands, is drained by Sawins Pond Brook, flowing eastward toward the Charles River (Figure 2). The northeastern portion of the site, including the Soil Cover area, is drained by a manmade ditch and catch basin that discharges to the Charles River under Greenough Avenue. Shallow groundwater flows northeast and southwest within the site, before discharging into the Charles River southeast of the site.

3.2 Land Resource and Use

The Site contains vacant land classified as high to medium density residential due to nearby high apartment buildings (MassGIS, 2017a). The boundaries are heavily vegetated, and the interior contains an engineered, compensatory wetland and maintained soil cover (Figure 1). Structures related to former site operations were removed as part of the remedy, and there is no active use of the property. The nearest located water supply wells are over 1.5 miles northwest of the site in central Watertown, (MassDEP, 2017, USACE, 2012). The Site is not within a current or a potential Drinking Water Source Area, and is not within a surface water protection zone. Public access is restricted by a fence and locked gates constructed by MassDCR. Historically, portions of the site were classified as both state and federal jurisdictional wetlands.

The nearly 12-acre site is bounded on the west by residential properties and parkland, on the south by Arsenal Street and further south by MassDCR-owned parkland, on the east by Greenough Boulevard and parkland owned by MassDCR, and on the northwest by condominiums, apartments, and businesses. Upgradient properties contain light industrial and commercial uses, as well as two condominium complexes, a parking lot, and tennis courts. The Arsenal Mall and the Watertown Mall, Harvard Community Health Plan offices, apartments, condominiums, and Arsenal Park and MassDCR parkland occupy the land area to the south, southwest of the site. The area to the east and northeast of the site contains recreational pedestrian paths, open and wetland areas.

The parcel was filled to facilitate development during World War II, and was subsequently used by the Army and by the GSA for storing various materials and equipment. The site was part of the former U.S. Army Watertown Arsenal, and was referred to as the "Northeast Area" and the Federal Property Resources Center. The site contains two parcels, the 11.91-acre GSA Property parcel, and the 1-acre, Metropolitan District Commission (MDC), now known as the Department of Conservation and Recreation-owned, Property 20 parcel (Figure 1). The GSA also leased portions of the property to various parties, including automobile dealers and a television production company. One building was used as a police firing range and to store flammable materials.

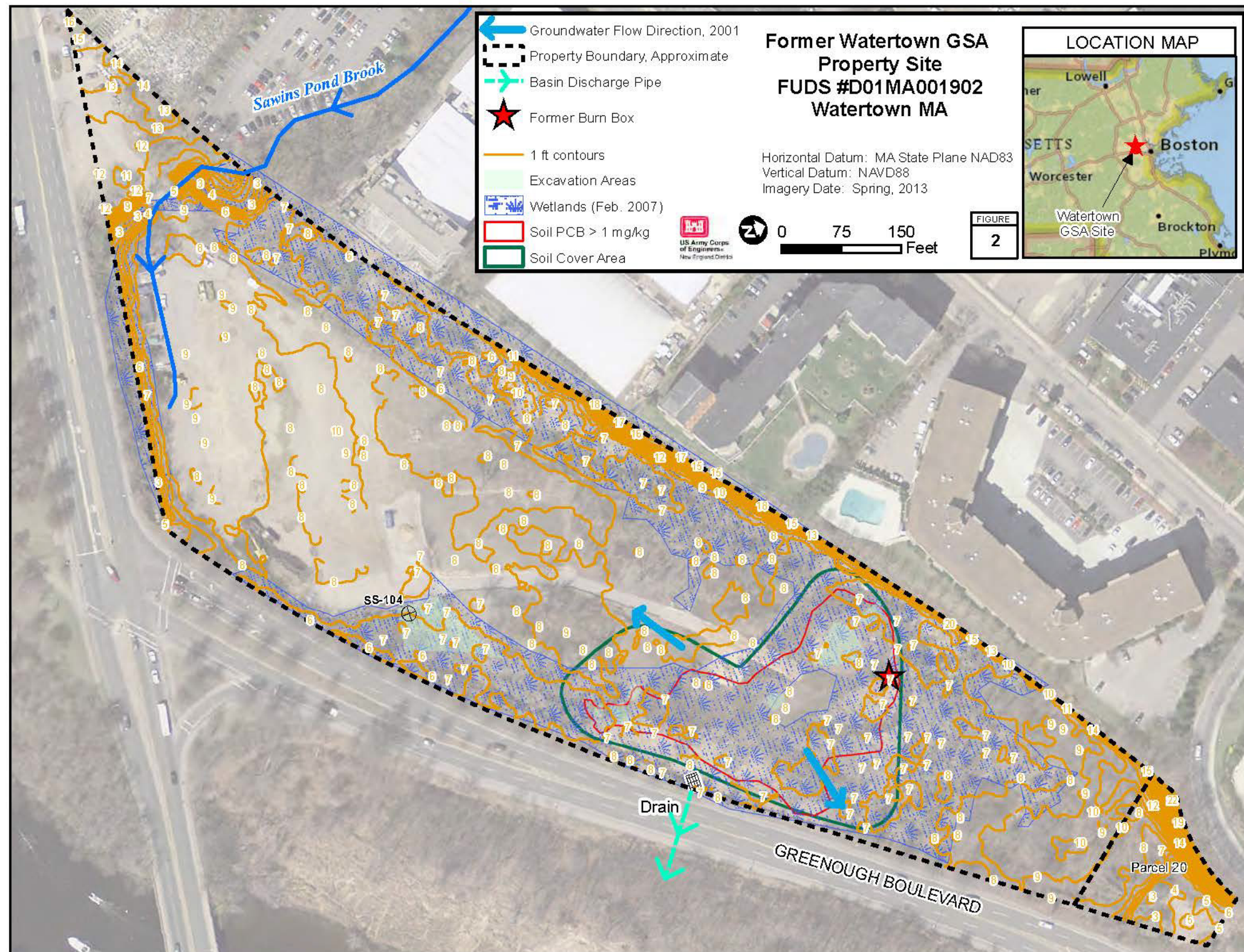


Figure 2. Site map showing the Former GSA Property's pre-construction features and final soil cover extent (Charter, 2014b, Holmberg & Howe, 2014, USGS, 2013, MacTec, 2011, NOAA, 2009, USACE, 2007).



3.3 History of Contamination

A 'burn area' was constructed in the northern portion of the property for scrap DU waste generated from machining operations at the former Watertown Arsenal (USACE, 2012). The NRC issued the U.S. Army a license in 1961 for processing the DU within an area at the site referred to as the former burn box area. The burn area vicinity was later classified as both state and federal jurisdictional wetlands (Figure 2).

Within this burn area, DU chips and turnings were coated with oil, placed in a drum, transferred to the site, and placed in a burn box located on a concrete pad surrounded by a chain link fence. The DU material was burned to convert the DU metal into a more chemically stable form. When the burn box container was full, it was welded shut and shipped off-site for appropriate disposal. A new burn box was then placed on the concrete pad.

Investigations conducted between 2007 and 2010 identified polychlorinated biphenyls (PCBs) and dioxin in site soil centered on the former burn box. It is suspected that the oil used to coat the DU chips may have contained PCBs. The dioxins may be a result of partially combusted, PCB-containing oil from the burning process. PCBs outside the burn pit may be a result of spillage during operations or oils used for dust suppression on roads.

3.4 Initial Response

From 1967 to 2003, several radiological surveys occurred at the Site, resulting in 140 cubic yards of soil, fill material, DU debris, and two tanks, being removed (MacTec, 2011). The NRC released the site for unrestricted use for radiological concerns in November 2003.

Supplemental investigations and the RI confirmed the presence, nature, and extent of volatile organic compounds, PCBs, and dioxins based on comparison values consistent with the MCP soil and groundwater criteria. Environmental investigations through 2008 followed the MCP process. All subsequent efforts made by the federal government prior to the property transfer conform to the specific requirements of the DERP-FUDS Program in accordance with CERCLA (USACE, 2012).

3.5 Summary of Basis for Taking Action

The investigations summarized in Table 1 show PCBs, metals, and dioxins are the primary COCs at the Site, broken down by media and location below. Analysis for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganics analyses were also performed. Exposure to PCB, metals and dioxin-contaminated sediment and soils and fill materials in the vicinity of the burn box (PCB-Impacted Area) defined by PCB concentrations exceeding 1 mg/kg in soil posed the only documented Site-related risk to human health and the environment (Figure 2). PCBs were assumed to have high chemical stability, very low solubility, and have low migration potential under site conditions (MacTec, 2011); therefore, no samples were taken for groundwater or sediment in the eastern swale.



Soil (includes historic fill material)

PCBs, metals, and dioxins were identified in the PCB Impacted Area shown in Figure 2 as the Soil Cover Area. The PCB Impacted Area included some upland areas, and defines the area above RAOs.

Surface Water

Sawins Pond Brook. No site-related COCs exceeded risk levels.
Eastern Swale Near Greenough Boulevard. Metals, VOC, SVOC, and Inorganics did not exceed risk levels.

Wetland Sediment (includes historic fill)

In the PCB Impacted Area shown in Figure 2 as the Soil Cover Area, PCBs, metals, and dioxins were identified in the above RAOs.

Groundwater

Metals, VOC, SVOC, and Inorganics did not exceed risk levels

Sediment

Sawins Pond Brook. No site-related COCs exceeded risk levels.
Eastern Swale Near Greenough Boulevard. Metals, VOC, SVOC, and Inorganics did not exceed risk levels.

Indoor Air

No buildings are within 100 feet of the site, so there are no receptors (USEPA, 2015).



4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The proposed plan and preferred alternative were presented to the public in November 2011. Based on comments received on the proposed plan, the preferred alternative was changed from Alternative 2/Option C to Alternative 3/Option C. The Site Decision Document was signed on 20 June 2012. The Site's Remedial Action Objective (RAO) is to *reduce human health and ecological risks associated with exposure to PCBs, dioxin, and metals in the PCB Impacted Area* (see Burn Box, Figure 2).

Alternative 3/Option C (PCB source removal greater than 50 mg/kg, demolition and in kind or compensatory wetlands replacement) was expected to achieve substantial and long-term risk reduction through excavation and offsite disposal (Remediation Goals in Table 2) and allowing the property to be used for the anticipated future land use of passive recreation by the MassDCR (USACE, 2012).

Alternative 3/Option C contained the following elements:

- Conduct clearing, grubbing, hazardous material abatement, cut and cap utilities, abandon monitor wells
- Demolish buildings and transport debris and hazardous waste for offsite disposal
- Delineate areas for excavation within the PCB Impacted Area
- Excavate contaminated soil and fill material in the PCB Impacted Area greater than 50 mg/kg PCBs
- Install a soil cover and geotextile fabric (marker material)
- Compensatory wetland construction in the former buildings' foot print
- Grant of Environmental Restriction and Easement (GERE)

4.2 Remedy Implementation

Charter completed mobilization and pre-remedy construction tasks between December 2012 and August 2013. Clearing and grubbing, building demolition, utility, and monitor well abandonment were completed between January and April 2013. PCB Impacted Area delineation sampling was completed in late July 2013, and the Remedial Action soil removal began 15 August 2013. Approximately 960 tons of PCB contaminated soil and fill material greater than 50 mg/kg was excavated from 1 to 7 feet below grade in the PCB Impacted Area, and transported to the Wayne Disposal Landfill in Belleville, Michigan between August and December 2013 (Charter, 2014a). MassDEP approved using soil and fill material removed as part of the compensatory wetland construction, and about 600 tons of material excavated from the area around historical soil sample SS-104, to build the soil cover.

The soil cover and filter fabric warning layer extended 10 feet beyond the 1 mg/kg boundary except where retaining walls or the Greenough Boulevard fence limited workspace. The filter fabric is overlain by 18 inches of clean fill and 6 inches of clean topsoil, respectively.



Table 2. Soil risk assessment results and remediation goals (USACE, 2012).

Chemical of Concern	EPC PCB Impacted Area (mg/kg)	Human Health Risk-Based PRGs (mg/kg) [a]					Ecological Risk-Based PRGs				Background Value [e] (mg/kg)	Site Remediation Goal [g] (mg/kg)
		Cancer Risk			HI 1		Robin		Shrew			
		1E-06	1E-05	1E-04			NOAEL	LOAEL	NOAEL	LOAEL		
PCBs	170	0.89	8.9	89	6.3	[b]					NA	1 [h]
Aroclor-1254	170						0.82	8.2	0.16	1.6	NA	1 [h]
Aroclor-1260	0.99						0.80	8.0	0.051	0.51	NA	1 [h]
Dioxin	0.00022	0.0000096	0.000096	0.00096	NA	[b]	0.000063	0.00063	0.0000016	0.000016	0.000208 [f]	0.00075 [i]
Antimony	414	NC	NC	NC	64	[c]	0.96	9.6	197	212	19.3	19.3
Cadmium	12.4	NCOC					7.2	27	6.0	23	2.18	N/A [j]
Chromium	264	NCOC					71	292	89	1305	25.2	N/A [j]
Copper	1000	NCOC					667	1333	1418	14185	66.2	N/A [j]
Lead	1031	984				[c,d]	100	176	165	5394	506	506
Nickel	17263	NC	NC	NC	1726	[c]	1213	1677	565	1129	22.3	565
Vanadium	74	NCOC					40	398	19	191	44.5	N/A [j]
Zinc	855	NCOC					232	2093	1158	3917	278	N/A [j]

[a] - For cancer-based values, calculated as: EPC x Target Risk /Risk for passive recreational visitor (sum of three populations) for non-cancer risk, calculated as: EPC/HI calculated for either young child subchronic scenario or young child chronic scenario (whichever is higher)

[b] - Based on young child chronic scenario

[c] - Based on young child subchronic scenario

[d] - Based on IEUBK modeling (AMEC, 2011)

[e] - Maximum concentration; Table 7-1 from Final Phase II CSA (MACTEC, 2004)

[f] - Concentration measured at reference location in southwest corner of site.

[g] - PRG is lowest value (rounded) of Human Health PRG, Ecological PRG or background if background is greater than Human Health and Ecological PRGs.

[h] - PRG based on USEPA guidance in lieu of background concentration.

[i] - Concentration of Dioxin found at "Other Areas Around site"

[j] - Not applicable as metals associated with unregulated fill material found on site and not related to site activities.



From September 2013 through June 2014, Charter constructed an approximately 2 acre compensatory wetland and adjacent upland meadow habitat at the Site and in the process found and removed an underground storage tank (Charter, 2014a). The compensatory wetland replaces the functions and values of the wetland area impacted during soil removal and cover construction, and mitigated incidental impacts to wetlands during remedy construction.

4.3 Grant of Environmental Restriction and Easement

The Remedy's Land Use Control Implementation Plan (LUCIP) addresses the Soil Cover and non-Soil Cover areas through the GERE as outlined in the Decision Document, and comprises the following (Charter, 2014b, USACE, 2012):

1. Prepare a map indicating the Soil Cover Area and Non-Cover Area boundary areas over which the LUCs will apply.
2. Submit a survey plan showing the property boundaries, Soil Cover Area and Non-Cover Area, prepared by a professional land surveyor registered by the Commonwealth of Massachusetts agency for the limited purpose of providing public notice of the environmental conditions of and limitations on the use of property (copies will be provided to MassDEP).
3. Prepare a title certification consistent with Massachusetts title certification standards, showing no encumbrances inconsistent with the GERE.
4. USACE conducts LUC monitoring to verify the LUCs are being properly implemented and that the LUC objectives are being met on an annual basis unless the frequency is reduced by agreement with MassDEP. The LUC monitoring results will be included in a separate report and provided to MassDEP.
5. Reporting and notification requirements include the following:
 - a. Notify MassDEP by telephone and by e-mail as soon as practicable, but no longer than ten days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs.
 - b. The United States, acting through GSA, shall provide a copy of executed lease of transfer documents to MassDEP.
 - c. USACE shall submit annual LUC monitoring reports to MassDEP no later than 30 days after the inspection. If the United States has transferred the land to another entity, the annual evaluation will address whether the LUCs were communicated in the GERE, whether the owners and state and local agencies were notified of the use restrictions and controls affecting the property, and whether use of the property has conformed to such restrictions and controls.
 - d. USACE shall notify MassDEP and MassDCR at least 7 days before any LUC compliance inspection so that either party will have the opportunity to participate in the LUC inspection if it so chooses.
6. Obtain MassDEP concurrence prior to modifying or terminating the LUCs or implementation actions.



7. Evaluate the effectiveness of the LUCs as part of each Five-Year Review.

The Soil Cover Area is defined by a series of boulders and survey markers outlining its extent. No intrusive, active maintenance or recreational activities (school, gardening) are permitted on the Soil Cover. The Non-Soil Cover area contains the rest of the Site, including Parcel 20, and is marked by a MassDCR-installed chain link fence following the surveyed site boundary and a retaining wall (Figure 2). Intrusive activities are permitted when done in accordance with the GERE's Soil Management Plan.

4.4 System Operation/Operation and Maintenance, and Monitoring

Long term monitoring and maintenance of the soil cover began in 2014 to insure the exposure pathway remains incomplete as required by the Decision Document. USACE and MassDCR, in coordination with MassDEP, conduct inspections of the soil cover and compensatory wetlands (Table 3) using the approved scheme based on the signed Decision Document and the resulting O&M Plan (Charter 2014a, b, 2013, USACE, 2012).

4.4.1 Eastern Swale

The soil cover extends about 50 ft to the northeast into a formerly classified wetland, which drained southeast toward the boundary fence along Greenough Boulevard before entering one of two catch basins discharging into the Charles River (MacTec, 2011). The eastern swale riprap or channel armor parallel to Greenough Boulevard has been iron-stained since at least September 2014, and retains water after major storm events. The ponded water in the eastern swale may be due to clogged check dams (maintained by MassDCR) or ground water break out. The swale and its catch basin occupy a pre-1951 drainage ditch and former wetland (Harding ESE, 2004, ABB Environmental, 1993) (Figure 2).

4.4.2 Compensatory Wetlands

USACE conducted inspections every two to four weeks starting May 2014, and continued through September 2014 (Charter, 2014b Lucas Environmental, 2014). Frequency was reduced to 3-4 month intervals through 2016 in accordance with the Operations and Maintenance Plan (Charter, 2014a). USACE began semi-annual inspections began in 2017, and will continue until MassDCR takes over the program in August 2018 (USACE, 2017c, Charter, 2014a). Monitoring indicates that wetland hydrology and wetland vegetation is successfully established throughout the compensatory wetland. Maintenance activities performed include:

- Planting of wetland trees and shrubs to compensate for browse damage caused by rabbits and voles
- Planting four landscape quality trees to replace two that died
- Watering tree and shrubs plantings
- Installation of TreePro protectors to reduce browse damage
- Control of invasive species, including Phragmites, black alder, autumn olive, Japanese knotweed, and garlic mustard.

Growth of Phragmites and black alder pose the most serious risks to a successful restoration. Approximately 60 small patches of Phragmites were treated with herbicide in 2017. In 2016, personnel from the East Middlesex Mosquito Control Program treated the moat with Bacillus



thuringiensis subspecies israelensis to control mosquito larvae in May. Although no mosquito larvae were found in the soil cover drainage swales, standing water in the swales is potential mosquito habitat. USACE will continue monitoring and maintenance activities until August 2018, when MassDCR becomes responsible for subsequent monitoring and maintenance of the compensatory wetland (Table 3). The MassDCR currently mows upland meadow habitat adjacent to the wetland twice each year.

4.4.3 Operation and Maintenance, and Monitoring Costs

O&M costs include cap and drainage structure inspection and maintenance, precipitation and settlement monitoring, and compensatory wetland monitoring, maintenance, and reporting. USACE costs were higher in 2016 due to failed planting replacements in the compensatory wetland (Figure 3), but are less than the \$50,000 per year estimated in the Decision Document (USACE, 2012). MassDCR costs were not available at the time of the writing of this five-year review. MassDCR takes over compensatory wetlands maintenance, monitoring, and reporting in August 2018.

Table 3. Remedy operations and maintenance summary (after Charter, 2014a).

Activity	Performing Agency	Frequency/Duration
Inspect vegetative (soil) cover (includes surface elevation or settlement monitoring)	USACE in coordination with MassDCR and MassDEP	Quarterly to semi-annually
Mow vegetative (soil) cover, including swales; remove deep-rooted vegetation; clean drainage swales, check dam, and catch basin	MassDCR	Once per year for mowing; Once per year or more often as needed for other activities.
Maintenance of remedy, including vegetative cover not delegated to MassDCR; repair of vegetative cover; and the correction of design flaws in the vegetative cover	USACE	As identified during inspections
Maintenance and inspection of compensatory wetlands	USACE	Quarterly to semi-annually/ Initial 5 years
Maintenance and inspection of compensatory wetlands	MassDCR	Semi-Annual After 15 August 2018
Soil cover and compensatory wetlands reports	USACE	Annually/ Initial 5 years
Compensatory wetlands monitoring and reporting	MassDCR	Annually After 15 August 2018
Soil cover reports	USACE	Annual after initial 5 years
Five-year review reports	USACE	Every 5 Years



Fiscal Year	Soil Cover	Compensatory Wetlands	Project Management	Total	Notes
FY14 Actuals	\$6,000	\$5,000	\$5,000	\$16,000	
FY15 Actuals	\$4,000	\$3,000	\$3,000	\$10,000	
FY16 Actuals	\$3,000	\$24,000	\$2,000	\$29,000	Includes replacing failed plants
FY17 Actuals	\$4,000	\$14,000	\$2,000	\$20,000	
FY18 Projected	\$12,000	\$4,000	\$2,000	\$18,000	Includes filling animal burrows in soil cover

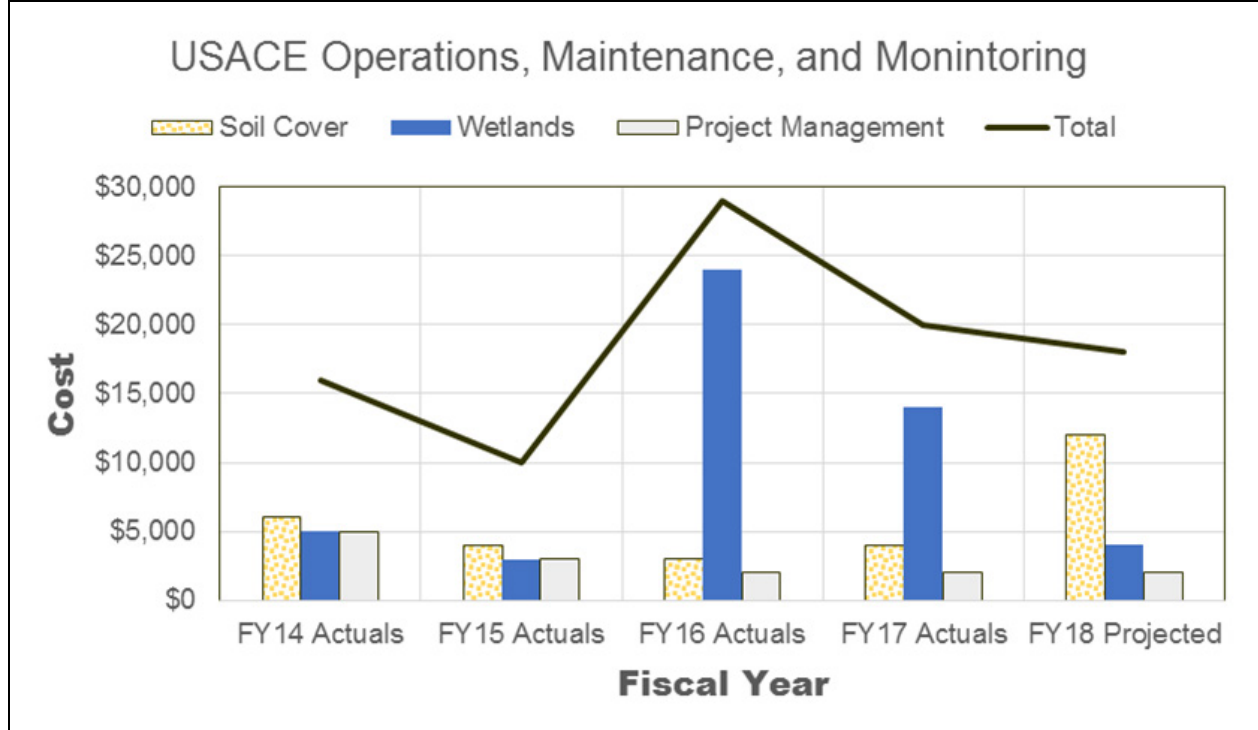


Figure 3. Breakdown of USACE operations, maintenance, and monitoring costs by fiscal year (Oct 1 through 30 Sep).

5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the first five-year review, so there are no prior protectiveness statements, recommendations or other considerations.



6.0 FIVE YEAR REVIEW PROCESS

This five-year review was conducted using USEPA's 2001 five-year review guidance (USEPA, 2001), applicable updates (USEPA 2011, 2012). Tasks completed as part of this five-year review include review of pertinent site-related documents, interviews with parties associated or familiar with the site, an inspection of the site, and a review of the current status of regulatory or other relevant standards.

6.1 Administrative Components

Members of the MassDEP and MassDCR were notified of the initiation of the five-year review on 27 October 2017. The USACE Five-Year Review Team was led by Drew Clemens and included team members with expertise in hydrogeology (Drew Clemens), ecology (Mike Penko), geotechnical engineering (Dara Gay), and risk assessment (Cindy Auld).

6.2 Community Involvement

USACE placed a public notice in the legal notice section of the Wicked Local Watertown online news on 24 November 2017 announcing the start of the five-year review process and the USACE point of contact for questions and comments (Appendix A).

6.3 Document Review

Site-related documents reviewed and referenced as part of this effort are listed in Section 12. ARAR review and Toxicity and Chemical Characteristics are presented in Appendix B.

6.4 Data Review

6.4.1 Soil Excavation

Remedial design, excavation, and confirmatory soil sampling were done in an iterative process to insure all material containing greater than 50 mg/kg PDBs was identified and removed for offsite disposal. Final confirmation sampling showed residual contamination levels were less than 50 mg/kg, and the 1 mg/kg remediation goal boundary is within the property boundary (red polygon in Figure 2) (Charter, 2014b, USACE, 2012). Soil and fill material excavated as part of the compensatory wetland construction contained 1 to less than 50 mg/kg PCBs, and was placed into the PCB Impacted Area excavations. The constructed soil cover encompasses the 1 mg/kg boundary except for a small portion on the eastern swale (Figure 2).

6.4.2 LUCIP Survey

The LUCIP and GERE review found the soil cover area correctly located, but the site plan's boundary data contained positional data documentation errors (Charter, 2014c, USACE, 2014). These errors were carried over from the as-built site survey, and include the property boundaries and co-located fence (Holmberg & Howe, 2014). The surveyor reversed the northing and easting coordinates in the table provided on the site plan, and one boundary corner contains transposed values.

The property boundary available through MassGIS was used for all figures provided in this Five Year Review (MassGIS, 2017b). Site features assessed in this five-year review were taken



from digital orthophotos and LiDAR-based digital elevation models within MassGIS (Google Earth, 2017, National Agricultural Imagery Program, 2017, USGS, 2016, 2013, WorldView Imagery, 2015, and National Oceanographic and Atmospheric Administration, 2009).

The soil cover design was modified using additional sampling during construction to further delineate the horizontal and vertical extent of contamination. Survey markers, buried rebar, and the placed boulders after construction show the areal extent of the soil cover with the exception of the eastern swale.

6.4.3 Soil Cover Area

Soil cover inspections began in April 2015, and were conducted quarterly for the first two years, and semi-annually through year 5 due to PCBs remaining at the site between 50 and 1 mg/kg concentration (USACE, 2016a, Charter, 2014a). Animal burrows are the most commonly reported soil cover problem ranging from 1 to 12 per inspection. Two settlement observations were documented over the monitoring period (March 14 and April 26, 2016), but their locations were not recorded and appear to be data entry errors. A review of the electronic soil cover record drawing topography (1 elevation data point every 50 square feet) and the 2016 digital elevation model (1 elevation data point every 3.3 square feet) and three available image years showed no large-scale post construction settlement features (Figure 4). Comparing the 2016 land surface, 2014 record drawing, and the electronic version of the 2014 record drawing show a contour line is missing from the electronic data, suggesting the electronic record drawing data is missing a contour line (USGS, 2016, Holmberg & Howe, 2014). Minor soil erosion occurs on the eastern slopes where slopes are steeper than 1 to 5 design criteria (Charter, 2013).

The most common storm water management findings are vegetation, iron-staining and ponded water in the eastern drainage swale near Greenough Boulevard (USACE, 2017a-c, 2016a-d). Vegetation growing within the drainage swales and its accumulation on the catch basin grate was a problem through 2017, but is now addressed by MassDCR. The earliest indication of iron staining in the eastern swale is visible on September 27, 2014 Google Earth imagery, and is most intense in and near the Eastern Drainage Swale (Google Earth, 2017). The iron staining was first reported during the 25 April 2016 Soil Cover Inspection. It is not clear if the ponded, oxidizing water in the Eastern Drainage Swale is the result of clogged check dams or seasonal groundwater discharging from under the soil cover into the swale. MassDCR maintains the check dams and catch basin following inspections, but below grade sediment and debris conditions are not known.

Field observations have not been located on the checklist's accompanying imagery in accordance with the requirements of the O&M Plan checklist, preventing problem analysis over time and across the site for many findings identified in the inspection reports (June 2015 used for all USACE 2015-2017 inspections) (Charter, 2014a).



Figure 4. Changes to the soil cover area from 2013 to 2017 (Google Earth, 2017, NAIP, 2017, NOAA, 2016, Worldview Orthoimagery, 2015, USGS, 2013).



6.5 Site Inspection

A site inspection was conducted on the afternoon of 8 Nov 2017, which included visual inspection of the soil cover, fencing, storm water management system, and compensatory wetlands (Appendix C, D, and E). Drew Clemens, Cindy Auld, Dara Gay, Mike Penko, and Emily Pottier from USACE performed the site inspection. Mr. David Fabiano from MassDCR accompanied the USACE team.

The soil cover integrity has not been compromised. The observed burrows did not contain filter fabric debris, and will be filled in 2018. The soil cover's perimeter survey markers and boulders are still in place. The site's perimeter chain link fence and gates installed by MassDCR shows no signs of vandalism or damage, and prevents public access to the eastern swale.

Phragmites is growing along the eastern swale's edges. Plant debris clogs the check dams and catch basin discharge grate. Persistent standing water in the swales suggests the check dams may be clogged, and provides habitat for mosquito larvae. The eastern swale's riprap channel armor is iron stained.

No significant findings were identified regarding the compensatory wetland.

6.6 Local Interviews

Interviews were conducted with representatives of MassDEP, the MassDCR, and the Town of Watertown (Appendix D).

Interviews with MassDEP and MassDCR indicate remedy implementation has proceeded without significant findings or concern. Town representatives stated there have no issues regarding the site and the associated activities. Comments were solicited from community members recommended by MassDEP and MassDCR.

The main findings identified in the interviews were:

Animal burrows are present, leading to minor soil cover erosion and potential cover integrity problems.

- Improved maintenance practices have reduced vegetation and debris in the eastern swale.
- MassDCR and former Restoration Advisory Board members suggested the Watertown Conservation Commission be included on future public involvement, such as interviews for the next five-year review.



7.0 TECHNICAL ASSESSMENT

7.1 Technical Assessment Questions

This section addresses the three technical assessment questions identified in the EPA's Five-Year Review guidance document as noted below:

Question A: Is the remedy functioning as intended by the decision document?

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The following discussion details how each question has been answered based on the findings of this five-year review using the 2001 USEPA guidance (USEPA, 2001).

Question A: Is the remedy functioning as intended by the decision documents?

Yes. Confirmation sampling shows soil, sediment, and fill exceeding 50 mg/kg of PCBs were successfully excavated and transported to regulated landfill offsite. Remaining soils contaminated with less than 50 mg/kg of PCBs were consolidated on site, covered with a filter fabric warning layer, and clean soil as designed. The soil cover successfully prevents receptor access to the underlying contaminated materials. Soil cover inspections show no indication that the filter fabric warning layer has been penetrated by burrowing rodents. The soil cover is maintained in accordance with the O&M plan.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Yes. The remedy's exposure assumptions remain valid. Appendix B summarizes exposure pathways and routes evaluated in the human health and ecological risk assessments.

No toxicity factors for COCs have changed since the completion of the Decision Document, so cleanup levels and RAOs used at the time of the remedy remain valid. The only two COCs with RGs based on risk were lead (No Observed Adverse Effect Level for the Shrew) and PCBs (USEPA guidance). The remedial action is complete and has achieved its RAOs.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.



7.2 Summary of the Technical Assessment

Review of the monitoring data, site inspection and interview results, RI/FS and Remedial Action data, and available regional information indicate the remedy prevents human and environmental exposure to the contaminated fill materials. The Decision Document's soil and surface water ARARs have been met, so are no longer applicable due to construction complete. There has been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy (Appendix B).

8.0 ISSUES

This Five-Year Review identified no issues affecting protectiveness. Findings made as part of the five-year review process are presented in Section 9.1.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The five-year review identified no issues.

9.1 Other Findings

- GERE Boundary Survey Data Documentation Errors. The boundary should be resurveyed and the GERE corrected.
- Operations & Maintenance Plan Execution. Inspection findings should be geo-referenced and tracked over time in accordance with the O&M Plan.
- Eastern Swale. Iron-staining is present in the swale and should be assessed.
- Swale Check Dams. The drainage swale's check dams retain water for several days after precipitation events and should be assessed. The check dams and receiving catch basin should be inspected and serviced if needed.

10.0 PROTECTIVENESS STATEMENT

The former GSA Property's remedy is protective of human health and the environment. The remedy's elements that protect human health and the environment are:

- Excavated and transported offsite contaminated soil and fill material in the PCB Impacted Area greater than 50 mg/kg PCBs.
- Installed a soil cover and geotextile fabric (marker material) over residual PCB contamination less than 50 mg/kg.
- Completed a Grant of Environmental Restriction and Easement, which includes land use controls limiting site and intrusive activities.
- Conduct soil cover inspections and five-year reviews.

11.0 NEXT REVIEW

The next five-year review report for the Watertown Arsenal – Former GSA Property is required five years from the completion date of this review.



12.0 REFERENCES

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- USACE, 2012. Decision Document GSA Property Formerly Used Defense Site # D01MA001902 Watertown, Massachusetts D01MA001902, signed 20 June 2012. Prepared by: Woods Hole Group, Inc. 81 Technology Park Drive East Falmouth, Massachusetts and AMEC Environment & Infrastructure, Inc. 107 Audubon Road Wakefield, Massachusetts Contract Number: W912WJ-09-D0001, 97 p.
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APPENDIX A - Public Notice



GSA PROPERTY

LEGAL NOTICE

The US Army Corps of Engineers is conducting a five-year review of the GSA Property at the former Watertown Arsenal. The review will focus on the soil cover and how well it is preventing exposure to residual poly-chlorinated biphenyl contaminated soils. Anyone having questions about the remedy or the five year review process can contact the USACE project manager Maryellen Iorio at 978-318-8433. The five-year review is scheduled to be completed in September 2018.

AD# 13632520

Watertown TAB 11/24/17



APPENDIX B – ARAR, Toxicity, and Chemical Characteristics Review



1.0 REVIEW OF ARARS

Applicable or Relevant and Appropriate Requirements (ARARs) for the Site were identified in the Decision Document (USACE, 2012) are shown in Table B-1 and include the following:

- Massachusetts Surface Water Quality Standards (chemical specific)
- Federal Toxic Substance & Control Act (TSCA) on Storage and Disposal (action specific)
- Federal TSCA regulations on Decontamination (action specific)
- Federal Compensatory Mitigation for Losses of Aquatic Resources (Federal - location specific)

No “To-Be Considered” criteria were identified in the Decision Document.

The Federal TSCA ARARs are action specific and do not apply to operation and maintenance. The Decision Document highlighted the Massachusetts Surface Water Quality Standards chemical specific criteria as ARARs. The remedial action is complete and has achieved those standards as applicable.

2.0 HUMAN HEALTH TOXICITY AND CHEMICAL CHARACTERISTICS

Examination of the EPA’s Integrated Risk Information System (www.epa.gov/iris) indicates no change to the toxicity values assigned to COCs identified in the 2012 Decision Document, so the cleanup goals remain protective.

3.0 HUMAN HEALTH EXPOSURE ASSESSMENT

The following exposure pathways were evaluated in the 2011 Human Health Risk Assessment:

- Park Visitors (adults and children) by incidental ingestion of, dermal contact with, and inhalation of particulates entrained from soil.
- Occupational Workers by incidental ingestion of, dermal contact with, and inhalation of particulates entrained from soil.
- Construction Worker by incidental ingestion of, dermal contact with, and inhalation of particulates from total soil during excavation activities.

4.0 HUMAN HEALTH RISK RESULTS

Risks above target action levels (i.e., Excess Lifetime Cancer Risk > 1×10^{-4} and/or Hazard Index >1) were found for the future passive recreational for the following areas and media:

- The PCB Impacted Area (Figure 1-3) could pose risks to human health that exceed NCP risk management criteria based on presumed exposure to PCBs, antimony, lead, and nickel in soil.
- Surface soil (soil 0 to 3 ft bgs) Area Outside of the PCB Impacted Area would not pose risks to human health in excess of the NCP risk management criteria.

Subsurface Soil throughout the site at 3 to 15 ft bgs would not pose risks to human health in excess of NCP risk management criteria if the public was fully exposed to these soils (e.g., ground surface).



Table B-1. Applicable or Relevant and Appropriate Requirements (USACE, 2012).

REGULATORY AUTHORITY	AREA	CHEMICAL, ACTIVITY, OR LOCATION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Surface Water	Chemical Specific	Massachusetts Surface Water Quality Standards [314 CMR 4.04 (1) and (7)4.]	Applicable	Protection of Existing Uses. In all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.	Cleanup actions will be designed, implemented, and monitored to attain Massachusetts Surface Water Quality Standards if Site surface water is generated (e.g., construction dewatering).
Federal	TSCA	Action Specific	TSCA [40 CFR Part 761.61b Subpart D] Storage and Disposal	Relevant and Appropriate	Performance-based disposal. Disposing of non- liquid PCB remediation waste by a chemical waste landfill has been approved.	These requirements were incorporated into a remedial action that results in the excavation, transport, and disposal of PCB impacted soils.
Federal	TSCA	Action Specific	TSCA regulations on Decontamination [40 CFR 761.79 (b), (e), (g)]	Applicable	This regulation applies to concentrations of PCBs >50 ppm and establishes decontamination standards and procedures for removing PCBs from water, organic liquids, and various types of surfaces including equipment used in excavation or other handling of PCB containing materials.	These requirements would be attained through the proper use of decontamination procedures.
Federal	Wetlands	Location Specific	40 CFR Part 230.93 (f), (1) Compensatory Mitigation for Losses of Aquatic Resources	Relevant and Appropriate	Requires a compensation ratio of at least one-to- one by acreage or linear foot for lost aquatic resources.	These requirements were incorporated into remedial actions that result in the loss of wetlands.



5.0 ECOLOGICAL RISK ASSESSMENT

The Ecological Risk Assessment evaluated the following:

- Robin: ingestion of soil, ingestion of invertebrates and plants that have accumulated COPCs from soil;
- Shrew: ingestion of soil, ingestion of invertebrates, plants, and other small mammals that have accumulated COPCs from soil; and
- Raccoon: ingestion of soil and invertebrates that have accumulated COPCs from soil.

The ERA of the PCB Impacted Area concluded:

- HQs for individual contaminants, as indicators of the potential for hazard, were greater than 1 indicating the potential for risks at the site may be greater than hazards at background areas for robins and shrews at the PCB Impacted Area.
- HQs for individual contaminants were less than 1 for raccoons at the PCB Impacted Area.
- Site-related COCs were identified as PCB Aroclors, dioxin TEQ, antimony, lead and nickel based on incremental hazard NOAEL and LOAEL HQs greater than 1.
- When the PCB Impacted Area is excluded, the site poses no significant hazard to environmental receptors.
- The ERA was ultimately of limited value in the decision making process.

6.0 BASIS FOR REMEDIATION GOALS

The only two COCs with Site Remediation Goals (RGs) based on risk were lead (No Observed Adverse Effect Level for the Shrew) and PCBs (USEPA guidance). Antimony and nickel RGs were based on background, and the dioxin RG was based on “other areas around the site”.



APPENDIX C - 8 NOV 17 Five-Year Review Site Inspection Checklist

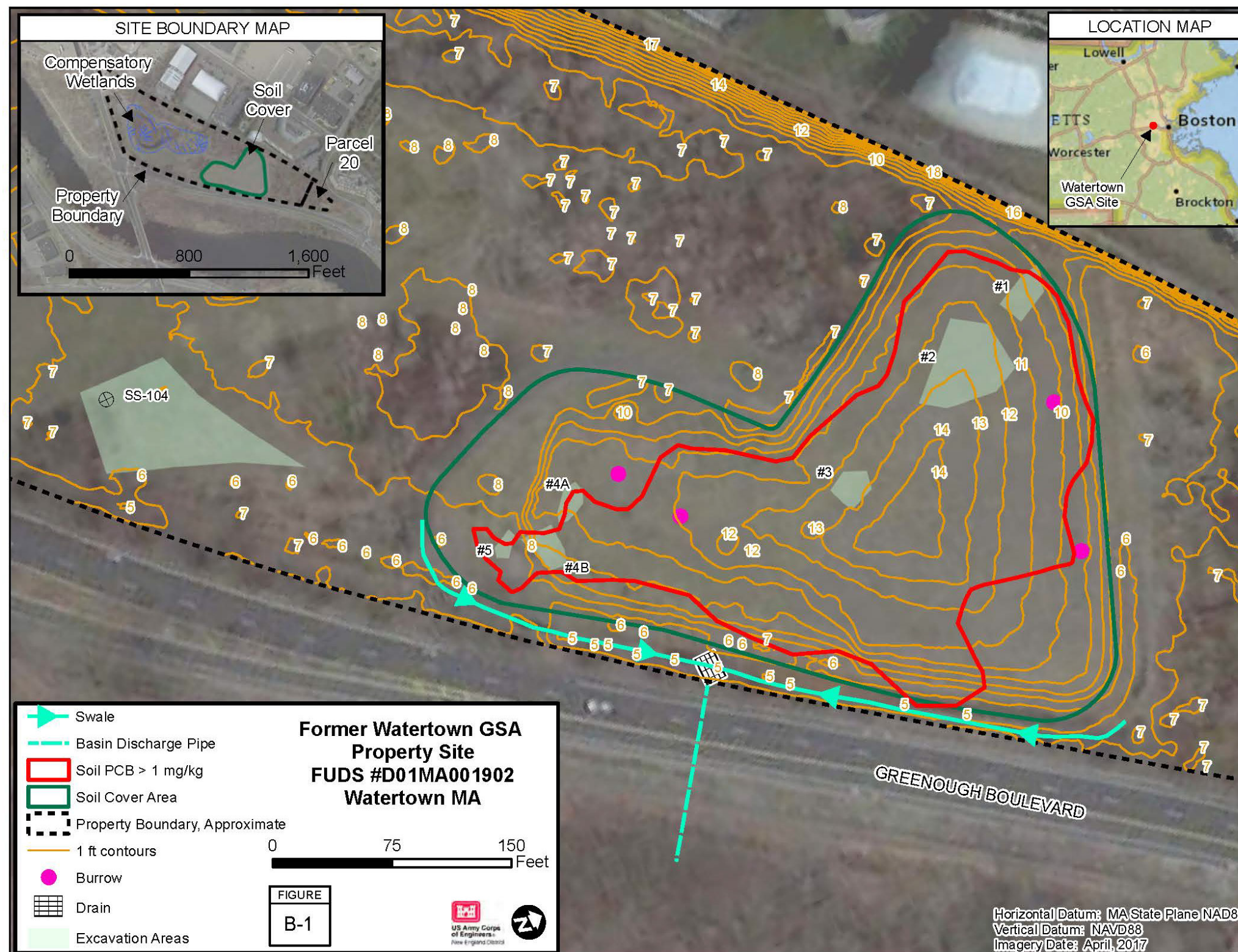


Figure C-1. Site visit map showing excavated areas, PCB and cover extents, highlighted eastern swale with discharge pipe, and site topography as of 2016 (USGS, 2016, Charter, 2014b). Property boundary and burrow locations area approximate (latter from cellphone GPS). PCB excavation areas are georeferenced from drawing and soil borings (Charter, 2013b).



I. SITE INFORMATION	
Site Name: Former GSA Property	Date of inspection: 8 Nov 2017
Location and Region: Watertown MA, Region I	EPA ID: Not on the NPL
Agency, office, or company leading the five-year review: USACE New England District	Weather/temperature: Sunny, 40-44°F, winds <10 mph
Remedy Includes: (Check all that apply) <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input checked="" type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other <u>Storm water runoff ditch and drain</u> </div> <div style="width: 50%;"> <input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls </div> </div>	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input checked="" type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager _____ <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Name Title Date </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ <u>This site does not have an onsite O&M Site Manager</u>	
2. O&M staff _____ <div style="display: flex; justify-content: space-between; margin-top: 5px;"> Name Title Date </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ <u>This site does not have an onsite O&M staff. The USACE 5YR geotechnical and ecology team members also conduct the soil cover and compensatory wetlands inspections</u>	

Inspection Team:	
Drew Clemens	Lead Author
Cindy Auld	Risk Assessor, Human and Ecological
Dara Gay	Geotechnical Engineer
Mike Penko	Ecologist
Emily Pottier	Department of the Army Intern



3. Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency MassDCR

Contact <u>David Fabiano</u>	<u>Assis. Dir. Boston Region</u>	<u>8 NOV 17</u>	<u>857-270-8697</u>
Name	Title	Date	Phone no.

Problems; suggestions; ☒ Report attached (Appendix D, Interviews)
Trimmed foliage that used to block ditch drain. It is now part of the MassDCR maintenance contract and the problem has not recurred.

Agency _____	_____	_____	_____
Contact _____	_____	_____	_____
Name	Title	Date	Phone no.

Problems; suggestions; ☐ Report attached

Agency _____	_____	_____	_____
Contact _____	_____	_____	_____
Name	Title	Date	Phone no.

Problems; suggestions; ☐ Report attached

Agency _____	_____	_____	_____
Contact _____	_____	_____	_____
Name	Title	Date	Phone no.

Problems; suggestions; ☐ Report attached

4. Other interviews (optional) ☐ Report attached.



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	O&M Documents <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
Remarks <u>Drawing files have no layer documentation and are incomplete. AutoCAD and ArcGIS files do not match when overlain. Property boundary survey data contains positional data errors, and tabulated property corner data column headers are switched (northing data is under the easting column header), Property plan information is a scanned map (no native data or supporting files available). Soil cover inspection Google Earth Maps do not locate features discussed in the in the inspection checklists, and lack scale bars & north arrows.</u>			
2.	Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
Remarks <u>No site Safety and Health Plan was prepared for the soil cover inspections, but the Accident Prevention Plan & Activity Hazard Analysis prepared for the site visit meets USACE safety document requirements, filling this gap.</u>			
3.	O&M and OSHA Training Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
Remarks _____			
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks <u>No settlement monuments were installed as part of the remedy. Settlement is qualitatively assessed.</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
Remarks _____			



10.	Daily Access/Security Logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks _____				

IV. O&M COSTS																																									
1.	O&M Organization <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input checked="" type="checkbox"/> Federal Facility in-house <input checked="" type="checkbox"/> Contractor for Federal Facility <input type="checkbox"/> Other _____																																								
2.	O&M Cost Records <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input checked="" type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate <u>\$50,000/year</u> <input type="checkbox"/> Breakdown attached <p style="text-align: center;">Total USACE annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From <u>1 OCT 13</u></td> <td style="width: 20%;">To <u>30 SEP 14</u></td> <td style="width: 20%; text-align: right;"><u>\$16,000</u></td> <td style="width: 40%;"><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>1 OCT 14</u></td> <td>To <u>30 SEP 15</u></td> <td style="text-align: right;"><u>\$10,000</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>1 OCT 15</u></td> <td>To <u>30 SEP 16</u></td> <td style="text-align: right;"><u>\$29,000</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>1 OCT 16</u></td> <td>To <u>30 SEP 17</u></td> <td style="text-align: right;"><u>\$20,000</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> <tr> <td>From <u>1 OCT 17</u></td> <td>To <u>30 SEP 18</u></td> <td style="text-align: right;"><u>\$18,000 (Projected)</u></td> <td><input checked="" type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> </tr> </table>	From <u>1 OCT 13</u>	To <u>30 SEP 14</u>	<u>\$16,000</u>	<input checked="" type="checkbox"/> Breakdown attached	Date	Date	Total cost		From <u>1 OCT 14</u>	To <u>30 SEP 15</u>	<u>\$10,000</u>	<input checked="" type="checkbox"/> Breakdown attached	Date	Date	Total cost		From <u>1 OCT 15</u>	To <u>30 SEP 16</u>	<u>\$29,000</u>	<input checked="" type="checkbox"/> Breakdown attached	Date	Date	Total cost		From <u>1 OCT 16</u>	To <u>30 SEP 17</u>	<u>\$20,000</u>	<input checked="" type="checkbox"/> Breakdown attached	Date	Date	Total cost		From <u>1 OCT 17</u>	To <u>30 SEP 18</u>	<u>\$18,000 (Projected)</u>	<input checked="" type="checkbox"/> Breakdown attached	Date	Date	Total cost	
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3.	Unanticipated or Unusually High O&M Costs During Review Period Describe costs and reasons: <u>FY16 – replaced failing plants in the compensatory wetland.</u>																																								

Breakdown of USACE operations, maintenance, and monitoring costs by fiscal year. MassDCR are not included.

Fiscal Year	Soil Cover	Compensatory Wetlands	Project Management	Total	Notes
FY14 Actuals	\$6,000	\$5,000	\$5,000	\$16,000	
FY15 Actuals	\$4,000	\$3,000	\$3,000	\$10,000	
FY16 Actuals	\$3,000	\$24,000	\$2,000	\$29,000	Includes replacing failed plants
FY17 Actuals	\$4,000	\$14,000	\$2,000	\$20,000	
FY18 Projected	\$12,000	\$4,000	\$2,000	\$18,000	Includes filling animal burrows in soil cover



V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable □ N/A			
A. Fencing			
1.	Fencing damaged □ Location shown on site map ■ Gates secured □ N/A	Remarks <u>Fence and gates are in good condition.</u>	
B. Other Access Restrictions			
1.	Signs and other security measures □ Location shown on site map □ N/A	Remarks <u>Posted signs on access gate and fence are secured and legible.</u>	
C. Institutional Controls (ICs)			
1.	Implementation and enforcement Site conditions imply ICs not properly implemented □ Yes ■ No □ N/A Site conditions imply ICs not being fully enforced □ Yes ■ No □ N/A Type of monitoring – (e.g., self-reporting, drive by) <u>Self-reported soil cover and wetlands inspections</u> Frequency <u>Every 3 to 6 months (depending on the year), with annual reporting.</u> Responsible party/agency <u>US Army Corps of Engineers New England District</u> Contact <u>Maryellen Iorio</u> <u>Project Manager</u> <u>23 Oct 2017</u> <u>978-318-8433</u> <div style="display: flex; justify-content: space-between; width: 100%;"> Name Title Date Phone no. </div> Reporting is up-to-date ■ Yes □ No □ N/A Reports are verified by the lead agency ■ Yes □ No □ N/A Specific requirements in deed or decision documents have been met ■ Yes □ No □ N/A Violations have been reported □ Yes □ No ■ N/A Other problems or suggestions: □ Report attached <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div>		
2.	Adequacy ■ ICs are adequate □ ICs are inadequate □ N/A Remarks <u>Soil cover is in good condition with no ruts or obvious settlement areas (depressions holding water). Animal burrow up to 1 ft deep and unknown horizontal extent are present, up to 6-in in diameter.</u>		
D. General			
1.	Vandalism/trespassing □ Location shown on site map ■ No vandalism evident	Remarks _____	
2.	Land use changes on site □ N/A	Remarks <u>No change in land use since construction completed.</u>	
3.	Land use changes off site □ N/A	Remarks <u>No change in land use since construction completed.</u>	



VI. GENERAL SITE CONDITIONS			
A. Roads <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
Remarks <u>Access road is in good condition.</u>			
B. Other Site Conditions			
Remarks <u>Overall site is in good condition. At least four large rodent holes that need to be filled. Vegetation in the drainage swales has been cut down and awaiting herbicide treatment for root removal. Debris covering the catch basin needs to be removed.</u>			
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Landfill Surface			
1.	Settlement (Low spots)	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
Areal extent _____		Depth _____	
Remarks _____			
2.	Cracks	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident
Lengths _____		Widths _____ Depths _____	
Remarks _____			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Areal extent _____		Depth _____	
Remarks _____			
4.	Holes	<input checked="" type="checkbox"/> Location shown on site map	<input type="checkbox"/> Holes not evident
Areal extent <u>See map</u>		Depth <u>Up to 1 foot deep, unknown horizontal extent.</u>	
Remarks <u>Backfill rodent holes on the landfill cap.</u>			
5.	Vegetative Cover	<input checked="" type="checkbox"/> Grass <input checked="" type="checkbox"/> Cover properly established	<input checked="" type="checkbox"/> No signs of stress
<input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram)			
Remarks <u>Cover is in good condition.</u>			
6.	Alternative Cover (armored rock, concrete, etc.)	<input checked="" type="checkbox"/> N/A	
Remarks _____			
7.	Bulges	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident
Areal extent _____		Height _____	
Remarks _____			



8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____ _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____ <input type="checkbox"/> Location shown on site map Areal extent _____
9.	Slope Instability <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____ _____	
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	Flows Bypass Bench <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____	
2.	Bench Breached <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____	
3.	Bench Overtopped <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay Remarks _____ _____	
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement Areal extent _____ Depth _____ Remarks _____ _____	
2.	Material Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation Material type _____ Areal extent _____ Remarks _____ _____	
3.	Erosion <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion Areal extent _____ Depth _____ Remarks _____ _____	



4.	Undercutting <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting Areal extent _____ Depth _____ Remarks _____ _____
5.	Obstructions Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____ _____
6.	Excessive Vegetative Growth Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____ _____
D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
2.	Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
3.	Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
4.	Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
5.	Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____ _____



E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
2.	Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
F. Cover Drainage Layer <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____		
2.	Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____		
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____ _____		
2.	Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____ _____		
3.	Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____		
4.	Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____		



H. Retaining Walls <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Deformations <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____
2.	Degradation <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks _____ _____
I. Perimeter Ditches/Off-Site Discharge <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Siltation <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Siltation not evident Areal extent _____ Depth _____ Remarks _____ _____
2.	Vegetative Growth <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Vegetation does not impede flow Areal extent ~2,500 square feet Type Reeds and cat tails Remarks <u>Minor vegetation in the southeastern drainage swales. Vegetation was trimmed to near ground surface in September 2017, and is awaiting herbicide treatment by MassDCR to remove roots.</u> <u>Staining similar to iron oxidation is present on the southeastern part of the ditch system, with high water marks suggesting seasonal and/or storm-related ponding occurs. Ponding could be exacerbated by debris clogging the drainage grate.</u>
3.	Erosion <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____
4.	Discharge Structure <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks <u>Minor debris covering the inlet catch basin.</u>
VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Settlement <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ _____
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ _____



IX. GROUNDWATER/SURFACE WATER REMEDIES <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ _____
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____
B. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____
C. Treatment System <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____ _____
2.	Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____



3.	Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____
4.	Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
5.	Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
D. Monitoring Data	
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
E. Monitored Natural Attenuation	
1.	Monitoring Wells (natural attenuation remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. <u>No other remedies are implemented at this site.</u>	



XI. OVERALL OBSERVATIONS	
A. Implementation of the Remedy	<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><u>The Remedial Action Objectives for the Site is to reduce human health and ecological risks associated with exposure to polychlorinated biphenyls, dioxins, and metals in the PCB impacted area's soils. The soil cover does not show signs of settlement. The filter fabric does not appear to be penetrated by burrowing rodents, for the burrow spoils contain no filter fabric debris and the burrow depths are less than the designed filter fabric depth. The burrows are scheduled to be filled in 2018. Trees and brush are not present on the soil cover.</u></p> <p><u>The compensatory wetland is establishing itself.</u></p>
B. Adequacy of O&M	<p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>The Operation and Maintenance Plan inspection requirements adequately address all facets of soil cover and compensatory wetlands maintenance and monitoring. Identified issues (e.g., burrows, invasive plant species, need for replacement plantings, drainage swale vegetation), were or are being addressed by MassDCR and USACE.</u></p> <p><u>Observations noted in the inspection checklists are not plotted on the maps as required by the O&M Plan, so trends over time cannot be assessed. Google Earth images are not updated to match the site conditions near the inspection date.</u></p>
C. Early Indicators of Potential Remedy Problems	<p>Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>USACE OM&M costs have not exceeded the estimated \$50,000/year cost presented in the decision document.</u></p> <p><u>Armor stone in the drainage swale parallel to Greenough Boulevard contains an iron oxidation coating not present in any other part of the swale system. The oxidation's color is most intense on the swale system's northeast corner, and suggests groundwater from underneath the soil cover may seasonally be entering the swale system.</u></p>
D. Opportunities for Optimization	<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>Use a common smart phone application or the Dam and Levee Safety Program's field laptop-based programs to quickly map and document features noted during each inspection. Plot results onto a map with a scale and north arrow so trends over time can be assessed by others.</u></p>



APPENDIX D - Five-Year Review Interviews



INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews

Dave Fabiano	Assistant Director Boston Region	MassDCR	8 Nov 2017
Name	Title/Position	Organization	Date
Joanne Dearden	Project Manager, Federal Facilities Program	MassDEP	13 Nov 2017
Name	Title/Position	Organization	Date
Rick Corsi	Regional Planner	MassDCR	4 Dec 2017
Name	Title/Position	Organization	Date
Steve Magoon	Director	Watertown Community Development & Planning Department	8 Dec 2017
Name	Title/Position	Organization	Date
Name	Title/Position	Organization	Date
Name	Title/Position	Organization	Date



INTERVIEW RECORD		
Site Name: Former GSA Property, FUDS #D01MA001902		EPA ID No.: N/A
Subject: Watertown Arsenal – Former GSA Property, First Five-Year Review		Time: 1315 Date: 8 Nov 17
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit: Watertown Arsenal – Former GSA Property		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing
Contact Made By:		
Name: Drew Clemens	Title: Lead Author	Organization: USACE NAE
Individual Contacted:		
Name: Dave Fabiano	Title: Assistant Director, Boston Region	Organization: MassDCR
Telephone No:		Street Address: 251 Causeway St., Suite 900
Fax No: (857) 270-8697		City, State, Zip: Boston, MA 02114
E-Mail Address: david.fabiano@state.ma.us		
Summary Of Conversation		
<p>Q1: What is your overall impression of the project and site? A1: Looks good.</p> <p>Q2: Are you aware of any issues the five-year review should focus on? A2: Rodent burrows within the cover, storm water drainage along Greenough Boulevard.</p> <p>Q3: Who should USACE speak to in the community to solicit local input? A3: Contact representatives from the nearby condominium complexes.</p> <p>Q4: Is the remedy functioning as expected? A4: Yes.</p> <p>Q6: Is the Town actively involved in the site or do they show an active interest? A6: Do not believe so, but has only been in the current position less than 3 months.</p> <p>Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned? A8: Cannot assess changes in the last five years due to being in the current position less than 3 months. Future use plan should follow what is discussed in the decision document, but should verify with Rob Lowell or Rich Corsi at MassDCR.</p>		



INTERVIEW RECORD		
Site Name: Former GSA Property, FUDS #D01MA001902		EPA ID No.: N/A
Subject: Watertown Arsenal – Former GSA Property, First Five-Year Review		Time: 1415 Date: 13 Nov 17
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit: Office		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing
Contact Made By:		
Name: Drew Clemens	Title: Lead Author	Organization: USACE NAE
Individual Contacted:		
Name: Joanne Dearden	Title: Project Manager, Federal Facilities Program	Organization: MassDEP Bureau of Waste Site Cleanup
Telephone No: (617) 292-5788 Fax No: (617) 292-5530 E-Mail Address: Joanne.Dearden@MassMail.State.MA.US		Street Address: 1 Winter Street - 6th Floor City, State, Zip: Boston, Massachusetts 02108
Summary Of Conversation		
<p>Q1: What is your overall impression of the project and site? A1: Remedy is going well. Compensatory wetlands, drainage, and soil cover are functioning fine.</p> <p>Q2: Are you aware of any issues the five-year review should focus on? A2: Do not know of any issues. MassDCR's maintenance contractor is now picking up cuttings.</p> <p>Q3: Who should USACE speak to in the community to solicit local input? A3: See three highlighted names in the former RAB and Proposed Plan public meetings.</p> <p>Q4: Is the remedy functioning as expected? A4: Yes.</p> <p>Q6: Is the Town actively involved in the site or do they show an active interest? A6: Not since remedy construction completed. May show renewed interest during park planning.</p> <p>Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned? A8: None since remedy construction completed. MassDCR will address future plans. Much more commercial and retail development since remedy construction completed.</p>		



INTERVIEW RECORD

Q9: Does MassDEP have any questions about post 2018 compensatory wetland or soil cover monitoring?

A9: None as long as all abide by the Decision Document and O&M Plan.



INTERVIEW RECORD		
Site Name: Former GSA Property, FUDS #D01MA001902		EPA ID No.: N/A
Subject: Watertown Arsenal – Former GSA Property, First Five-Year Review		Time: 15:25 Date: Dec 04
Type: <input type="checkbox"/> Telephone <input type="checkbox"/> Visit <input checked="" type="checkbox"/> Other (e-mail) Location of Visit: Offices		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing
Contact Made By:		
Name: Drew Clemens	Title: Lead Author	Organization: USACE NAE
Individual Contacted:		
Name: Rick Corsi	Title: Regional Planner	Organization: MassDCR Bureau of Planning, Design & Resource Protection
Telephone No: 617-626-1431		Street Address: 251 Causeway St., Suite 600
Fax No: (617) 626-1349		City, State, Zip: Boston, MA 02114
E-Mail Address: richard.corsi@state.ma.us		
Summary Of Conversation		
<p>Q1: What is your overall impression of the project and site? A1: The Corps has done a wonderful restoration of the once derelict site. Cooperation among all agencies involved has been great.</p> <p>Q2: Are you aware of any issues the five-year review should focus on? A2: Focus on the integrity of the soil cover and the replicated wetlands.</p> <p>Q3: Who should USACE speak to in the community to solicit local input? A3: I recommend Ernesta Krackiewicz, a Watertown resident (ernestakracz@gmail.com), or Cathy Berkley, Executive Director, Watertown Community Foundation (cberkley@watertownfoundation.org).</p> <p>Q4: Is the remedy functioning as expected? A4: Yes. So far, so good.</p> <p>Q6: Is the Town actively involved in the site or do they show an active interest? A6: The Town, particularly the Watertown Conservation Commission, is interested in working with DCR to develop the park as a passive recreation area. DCR has stated that this property, once returned to the Commonwealth, will become a passive park with stabilized soil pathways, benches, wetlands, meadow, and open areas. The GERE prohibits active recreation and children playgrounds on-site. DCR Engineering and DCR Planning, Design and Resource Protection have stated in public forums that the agency will hold a public listening session/workshop to determine a framework for the site's future use. Integrating the open space into the Arsenal Street/Greenough Boulevard corridor is a goal for the southern portion of the former GSA site.</p>		



INTERVIEW RECORD

Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned?

A8: No.

Q9: Does MassDCR have any questions about post 2018 wetland monitoring and maintenance?

A9: No.



INTERVIEW RECORD		
Site Name: Former GSA Property, FUDS #D01MA001902		EPA ID No.: N/A
Subject: Watertown Arsenal – Former GSA Property, First Five-Year Review		Time: 1430 Date: 8 Dec 17
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit: Offices		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing
Contact Made By:		
Name: Drew Clemens	Title: Lead Author	Organization: USACE NAE
Individual Contacted:		
Name: Steve Magoon	Title: Director	Organization: Watertown Community Development & Planning Department
Telephone No: 617-972-6417 Fax No: N/A E-Mail Address: smagoon@watertown-ma.gov		Street Address: 149 Main St., 3rd Floor City, State, Zip: Watertown, MA 02472
Summary Of Conversation		
<p>Q1: What is your overall impression of the project and site? A1: Cleaned up per the plan and the site is idle.</p> <p>Q2: Are you aware of any issues the five-year review should focus on? A2: No.</p> <p>Q3: Who should USACE speak to in the community to solicit local input? A3: No additional people at this time.</p> <p>Q4: Is the remedy functioning as expected? A4: Yes.</p> <p>Q6: Is the Town actively involved in the site or do they show an active interest? A6: There is active interest in seeing the site become passive recreation space.</p> <p>Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned? A8: Greenough Boulevard layout has changed in the last five years (Charles River side). No anticipated land use changes in the next five years.</p>		



APPENDIX E - 8 NOV 2017 Site Visit Photos



Photo 1. Legacy warning sign on access gate leading to the compensatory wetlands and soil cover (site is no longer owned by the US Government).	3
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Photo 6. Fence and maintenance gate near Greenough Boulevard. Gate is next to surface water runoff drain running under the road to the Charles River. Note brown iron staining and Phragmites stubble (to be treated with herbicide). Greenough Boulevard is in the background).....	5
Photo 7. Upper portion of eastern swale parallel to Greenough Boulevard, showing ponded water, iron staining on the riprap/channel armor, and Phragmites stubble.	6
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Photo 1. Legacy warning sign on access gate leading to the compensatory wetlands and soil cover (site is no longer owned by the US Government).



Photo 2. Fence running parallel to Greenough Avenue. Yellow stickup is part of natural gas utility.



Photo 3. Animal burrow, about 1.5 foot deep.



Photo 4. Animal burrow, about 0.6 foot deep.



Photo 5. Drainage ditch looking northeast/upstream of the surface water discharge grate on the eastern swale (Photo 6 below). Note brown iron staining and Phragmites stubble (to be treated with herbicide). Greenough Boulevard is to the right.



Photo 6. Fence and maintenance gate near Greenough Boulevard. Gate is next to surface water runoff drain running under the road to the Charles River. Note brown iron staining and Phragmites stubble (to be treated with herbicide). Greenough Boulevard is in the background).



Photo 7. Upper portion of eastern swale parallel to Greenough Boulevard, showing ponded water, iron staining on the riprap/channel armor, and Phragmites stubble.



Photo 8. Looking northwest across the soil cover.



Photo 9. Remnant light pole next to Greenough Boulevard.



Photo 10. Disconnected power pole next to access gate.



Photo 11. Soil cover looking northeast.



Photo 12. Compensatory wetland looking northwest.