HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD COVER SHEET

Name of Site: Lower Neponset River

EPA ID No. MAN000102204

Contact Persons

Site Investigation:	Weston Solutions, Inc. (WESTON)/ Superfund Technical Assessment and Response Team V (START) 101 Billerica Avenue, Building 5, Suite 103 North Billerica, MA 01862 (Mr. John F. Kelly and Ms. Bonnie Mace)	(978) 552-2100
Documentation Record:	U.S. Environmental Protection Agency (EPA) Region I 5 Post Office Square, Suite 100 Boston, MA 02109 (Ms. Mandy Liao and Ms. Martha Bosworth)	(617) 918-1036

Pathways, Components, or Threats Not Scored

The surface water migration pathway human food chain threat and the environmental threat were scored and produced an overall score above the minimum required for the site to qualify for the National Priorities List based on a Level II fishery and Level II wetland contamination. Other sensitive environments and potential wetlands were not scored since an overall score above the minimum required for the site to qualify for the National Priorities List has been reached.

Surface Water: The Surface Water Overland/Flood Migration Pathway Drinking Water Threat was not scored. Water from the Neponset River is not used for drinking water purposes [58, p. 1; 59, pp. 1-4; 60, p. 1]. The Groundwater to Surface Water Migration Component for the Surface Water Pathway was not scored.

Groundwater: The Groundwater Migration Pathway is not scored because there is not sufficient documentation to score the Groundwater Pathway, nor would the pathway contribute significantly to the site score based on the available data.

Soil Exposure and Subsurface Intrusion: The Soil Exposure and Subsurface Intrusion pathway was not scored. Although the proposed site consists of a contaminated sediment plume, there are numerous residential properties along the banks of the Neponset River [7, p. 143]. During flooding events, the contaminated sediment from the Neponset River might have contributed to soil contamination. In addition, the Massachusetts Department of Environmental Protection (MassDEP) identified that, in 1962, the Neponset River was dredged from the Baker Dam

to the T&H Dam [15, p. 4; 92, p. 1]. In 1964, the Neponset River was dredged from the T&H Dam to the Neponset Valley Parkway (Paul's Bridge) [15, p. 4; 92, p. 1]. The dredge spoils were distributed in low-lying areas along the banks of the Neponset River in 14 discrete areas [15, p. 4; 92, p. 1]. In eight of the 14 locations, the dredge spoils were deposited near parks and residential areas which are accessible to the general public [15, p. 4; 92, p. 1]. Due to a concern over the presence of polychlorinated biphenyls (PCBs) in the dredge spoils, MassDEP completed a sampling program within the eight dredge spoils areas of concern [15, p. 4; 92, p. 1]. The only dredge spoil area where PCBs have been identified is in the back yards of eight residential properties located along Riverside Square in Hyde Park [15, p. 4; 92, p. 1]. However, soil contamination was not considered in scoring the site at this time because there is not sufficient documentation to score the Soil Exposure and Subsurface Intrusion Pathway; regardless, the Soil Exposure and Subsurface Intrusion pathway score based on the available data would not affect the listing decision.

Air: No samples were collected to characterize the Air Migration Pathway; there is no documentation of an observed release or of potential contamination. The Air Migration Pathway would not contribute to the site score based on available data.

The Groundwater Migration, Soil Exposure and Subsurface Intrusion, and Air Migration Pathways might be evaluated further during future investigations since evaluation of those pathways might lead to identification of contributing sources of sediment contamination.

HAZARD RANKING SYSTEM (HRS) DOCUMENTATION RECORD

Name of Site: Lower Neponset River Date Prepared: September 2021

EPA ID No.: MAN000102204

EPA Region: 1

Street Address of Site*: Neponset River downstream of Mother Brook (Upstream of Dana Avenue, Hyde Park, MA) to the Walter Baker Dam (Upstream of Adams Street, Dorchester/Milton, MA)

City, County, State, Zip Code: Boston/Milton, Suffolk/Norfolk Counties, Massachusetts; 02136, 02126, 02186

General Location in the State: The Lower Neponset River site is currently identified as contaminated sediments of unknown origin, encompassing a 3.49-mile segment of the Neponset River from a documented contaminated sediment sample location downstream of the confluence of Mother Brook, a tributary of the Neponset River located upstream of Dana Avenue, in the Hyde Park section of Boston, Massachusetts (MA) (Upstream release sample location LCA-C3 coordinates 42.252299, -71.12028), extending downstream to a documented contaminated sediment sample location upstream of the Walter Baker Dam, located upstream of Adams Street, in the Dorchester section of Boston/Milton, MA (Downstream release sample location WBD-C5 coordinates 42.27070, -71.06958) based on documented 2018 sediment analytical results. The site is comprised of the riverbed channel forming a portion of the border between the City of Boston and Town of Milton located in the eastern portion of Massachusetts.

Topographic Map: Boston, Mass-RI-Conn [3]

Latitude: Upstream release sample LCA-C3 coordinates 42.252299º North

Longitude: Upstream release sample LCA-C3 coordinates -71.12028º West

Ref: [3-5]

The site consists of a zone of sediment contamination with no single identified source. Therefore, the reference point for the street address and site latitude/longitude coordinates is the most upstream sample location (LCA-C3 (D)/SD-11) meeting observed release criteria located just downstream of the Mother Brook/Lower Neponset River confluence [5, p. 1; Figure 2].

*The street address, coordinates, and contaminant locations presented in this HRS documentation record identify the general area the site is located. They represent one or more locations EPA considers to be part of the site based on the analytical information EPA used to evaluate the site for NPL listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, disposed, or placed, or has otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Scores

Air Pathway	Not Scored
Ground water[1] Pathway	Not Scored
Soil Exposure and Subsurface Intrusion Pathway	Not Scored
Surface Water Pathway	100.00
HRS SITE SCORE	**50.00**

1 "Ground water" and "groundwater" are synonymous; the spelling is different due to "ground water" being codified as part of the HRS, while "groundwater" is the modern spelling.

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S	S^2
1. Ground water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	Not Scored	
2a. Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100.0	10,000.00
2b. Ground water to Surface Water Migration Component (from Table 4-25, line 28)	Not Scored	
2c. Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100.00	10,000.00
3a. Soil Exposure Component Score (S_{se}) (from Table 5-1, line 22)	Not Scored	
3b. Subsurface Intrusion Component Score (S_{ssi}) (from Table 5-11, line 12)	Not Scored	
3c. Soil Exposure and Subsurface Intrusion Pathway Score (S_{sessi}) (from Table 5-11, line 13)	Not Scored	
4. Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	Not Scored	
5. Total of $S_{gw}^2 + S_{sw}^2 + S_{sessi}^2 + S_a^2$	10,000.00	
6. **HRS Site Score** Divide the value on line 5 by 4 and take the square root	50.00	

HRS TABLE 4-1 -Surface Water Overland/Flood Migration Component Scoresheet

Factor Categories and Factors: Lower Neponset River	Maximum Value	Value Assigned
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	550
2. Potential to Release by Overland Flow:		
2a. Containment	10	Not scored
2b. Runoff	25	Not scored
2c. Distance to Surface Water	25	Not scored
2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	Not scored
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	Not scored
3b. Flood Frequency	50	Not scored
3c. Potential to Release by Flood (lines 3a x 3b)	500	Not scored
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	Not scored
5. Likelihood of Release (higher of lines 1 and 4)	550	550
Waste Characteristics:		
6. Toxicity/Persistence	(a)	Not scored
7. Hazardous Waste Quantity	(a)	Not scored
8. Waste Characteristics	100	Not scored
Targets:		
9. Nearest Intake	50	Not scored
10. Population:		
10a. Level I Concentrations	(b)	Not scored
10b. Level II Concentrations	(b)	Not scored
10c. Potential Contamination	(b)	Not scored
10d. Population (lines 10a + 10b + 10c)	(b)	Not scored
11. Resources	5	Not scored
12. Targets (lines 9 + 10d + 11)	(b)	Not scored
Drinking Water Threat Score:		
13. Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	Not scored
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	550
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	5.00E+08
16. Hazardous Waste Quantity	(a)	10,000
17. Waste Characteristics	1,000	1,000

Factor Categories and Factors	Maximum Value	Value Assigned
Targets:		
18. Food Chain Individual	50	45
19. Population:		
19a. Level I Concentrations	(b)	0
19b. Level II Concentrations	(b)	0.03
19c. Potential Human Food Chain Contamination	(b)	Not Scored
19d. Population (lines 19a + 19b + 19c)	(b)	0.03
20. Targets (lines 18 + 19d)	(b)	45.03
Human Food Chain Threat Score:		
21. Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	100
Environmental Threat		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	550
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	5.00E+08
24. Hazardous Waste Quantity	(a)	10,000
25. Waste Characteristics	1,000	1,000
Targets:		
26. Sensitive Environments:		
26a. Level I Concentrations	(b)	0
26b. Level II Concentrations	(b)	150
26c. Potential Contamination	(b)	Not scored
26d. Sensitive Environments (lines 26a + 26b + 26c)	(b)	150
27. Targets (value from 26d)	(b)	150
Environmental Threat Score:		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	60
Surface Water Overland/Flood Migration Component Score For A Watershed		
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a maximum of 100)	100	100
Surface Water Overland/Flood Migration Component Score		
30. Component Score (S_{of})[c], (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	100

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

ACRONYMS

>	Greater than
≥	Greater than or equal to
%	Percent
A&CEM	Allis & Chalmers Electrical Manufacturing
A&CMF	Allis & Chalmers Manufacturing Facility
AUL	Activity Use & Limitation
AMEC	AMEC Environment & Infrastructure, Inc.
BMP	Best Management Practices
BRCPS	Boston Renaissance Charter Public School
CBC	Chlorinated Biphenyl Congener
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generators
CLP	Contract Laboratory Program
CRQL	Contract Required Quantitation Limit
DAS	Delivery of Analytical Services
DCR	Department of Conservation & Recreation
DEQE	Department of Environmental Quality Engineering
DPH	Department of Public Health
EPA	U.S. Environmental Protection Agency
ft^2	Square feet
LQG	Large Quantity Generator
MA	Massachusetts
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MassDEP	Massachusetts Department of Environmental Protection
mg/Kg	Milligrams per Kilogram
µg/Kg	Micrograms Per Kilogram
MWRA	Massachusetts Water Resource Authority
ng/kg	Nanograms per kilogram
NLR	No Longer Regulated
No.	Number
NOR	Notice of Responsibility
NPL	National Priorities List
NSR	No Significant Risk
OHM	Oil or Hazardous Material
PCB	Polychlorinated Biphenyls
PCB #77	Polychlorinated biphenyls #77 = 3,3',4,4'-Tetrachlorobiphenyl = 3,3',4,4'-TCB = CBC #77 = chlorinated biphenyls #77 = Congener Compound #77
PCB #81	Polychlorinated biphenyls #81 = 3,4,4',5-Tetrachlorobiphenyl = 3,4,4',5-TeCB = CBC #81 = chlorinated biphenyls #81 = Congener Compound #81

ACRONYMS

PCB #118	Polychlorinated biphenyls #118 = 2,3',4,4',5-Pentachlorobiphenyl = 2,3',4,4',5-PeCB = CBC #118 = chlorinated biphenyls #118 = Congener Compound #118
PCB #126	Polychlorinated biphenyls #126 = 3,3',4,4',5-Pentachlorobiphenyl = 3,3',4,4',5-PeCB = CBC #126 = chlorinated biphenyls #126 = Congener Compound #126
PPE	Probable Point of Entry
R&D	Research and Development
RAM	Release Abatement Measure
RAO	Response Action Outcome
RTN	Release Tracking Number
SDG	Sample Delivery Group
SEMS	Superfund Enterprise Management System
SQL	Sample Quantitation Limit
START	Superfund Technical Assessment and Response Team
SWP	Surface Water Pathway
T&BC	Thomas and Betts Corporation
T&H	Tileston & Hollingsworth
TOC	Total Organic Carbon
TSCA	Toxic Substances Control Act
TDL	Target Distance Limit
US ACOE	United States Army Corps of Engineers
USGS	United States Geologic Survey
VOC	Volatile Organic Compound
WHO	World Health Organization

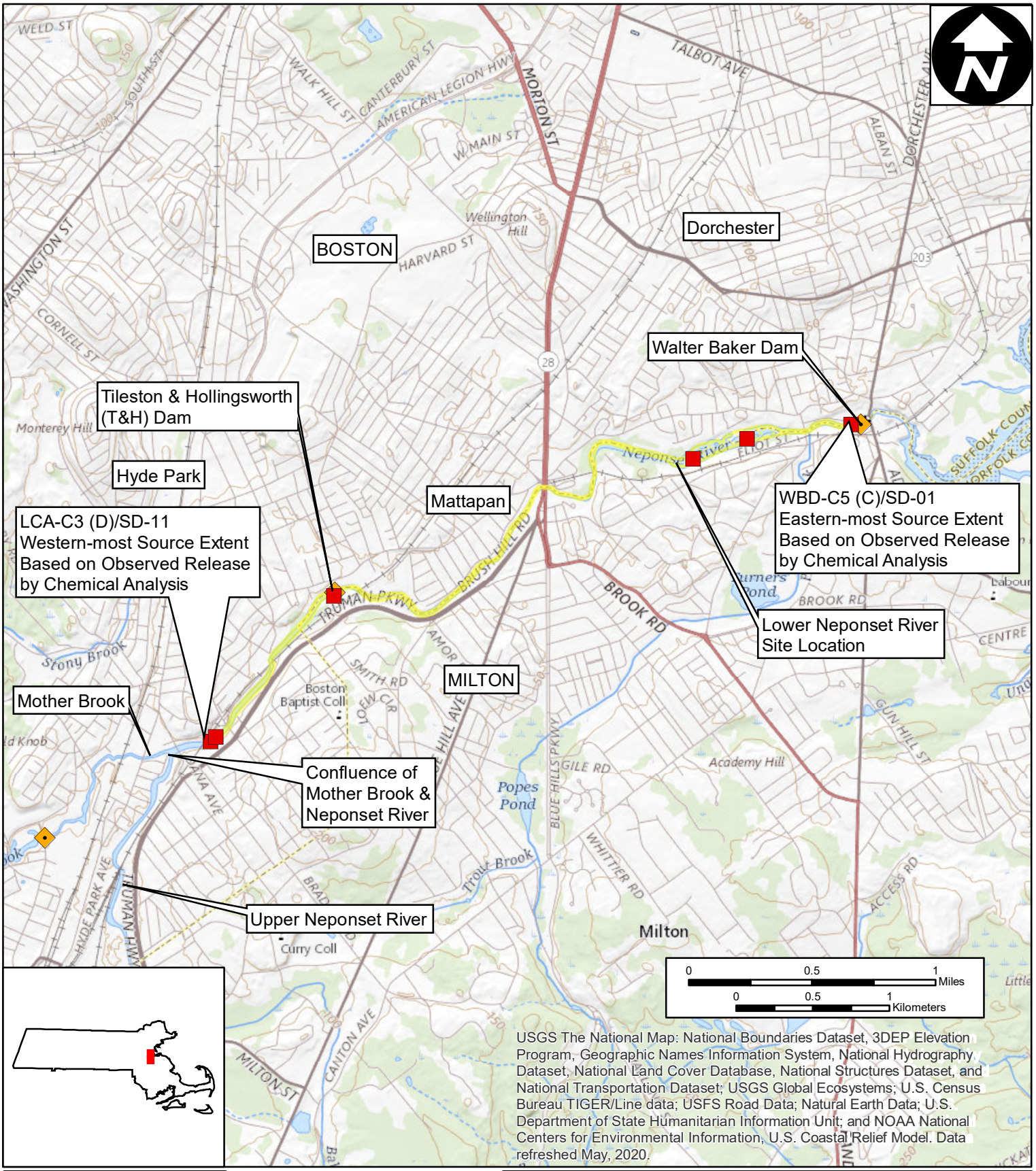

Figure 1

Site Location Map

Lower Neponset River
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	23 January 2020
Modified by:	B. Mace
Modified on:	9 July 2021

Sources:
1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. U.S. Environmental Protection Agency (EPA). Superfund Information Systems, Superfund Enterprise Management System (SEMS) Database, Lower Neponset River: Site Information. Downloaded from https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0102204 on 4 December 2019.
3. Mace, B. Weston Solutions, Inc., Superfund Technical Assistance and Response Team V (START). 2020. Project Note, Lower Neponset River PCBs. Latitude and Longitude Calculations for the site. TDD: TOFP-010-20-10-0009. 15 December.
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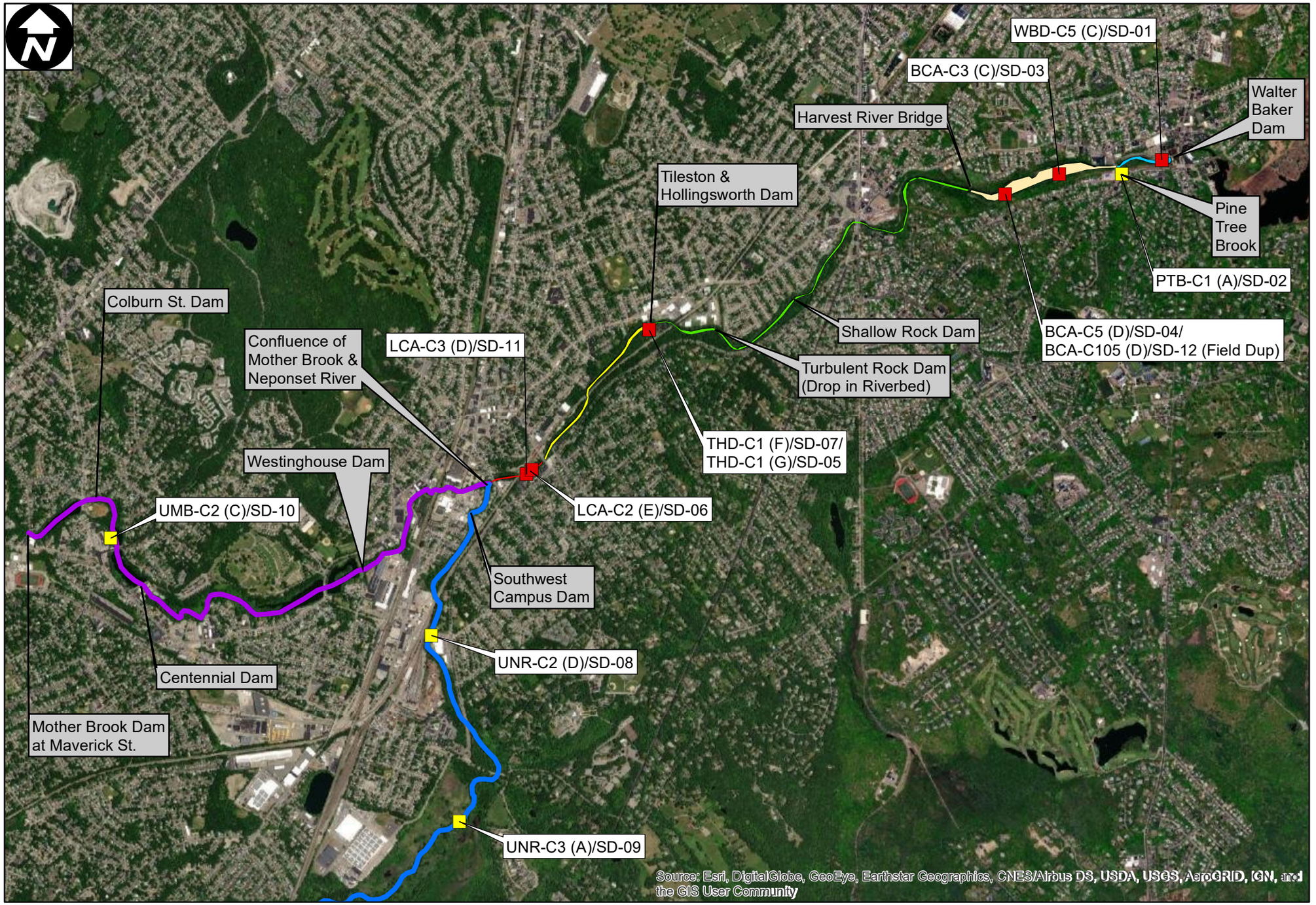

Figure 2

Site and Sediment Sample Location Map

Lower Neponset River
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	23 January 2020
Modified by:	B. Mace
Modified on:	2 July 2021

LEGEND

- Upper Neponset River
- Mother Brook to Charles River

River Segments/Areas

- Walter Baker Dam Area
- Braided Channel Area
- Blue Hills Avenue Area
- Tileston & Hollingsworth Dam Area
- Fairmount/Mother Brook Area

2018 Sediment Samples

- Background Sample Location
- Release Sample Location

0 0.25 0.5
Miles

Sources:

1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. Weston Solutions, Inc. Superfund Technical Assistance and Response Team IV (START). 2019. Final Report for Lower Neponset River PCBs Site Inspection, Boston/Milton, Massachusetts. April.
3. MassGIS Data: Dams. February 2012. Accessed at https://www.mass.gov/info-details/massgis-data-dams

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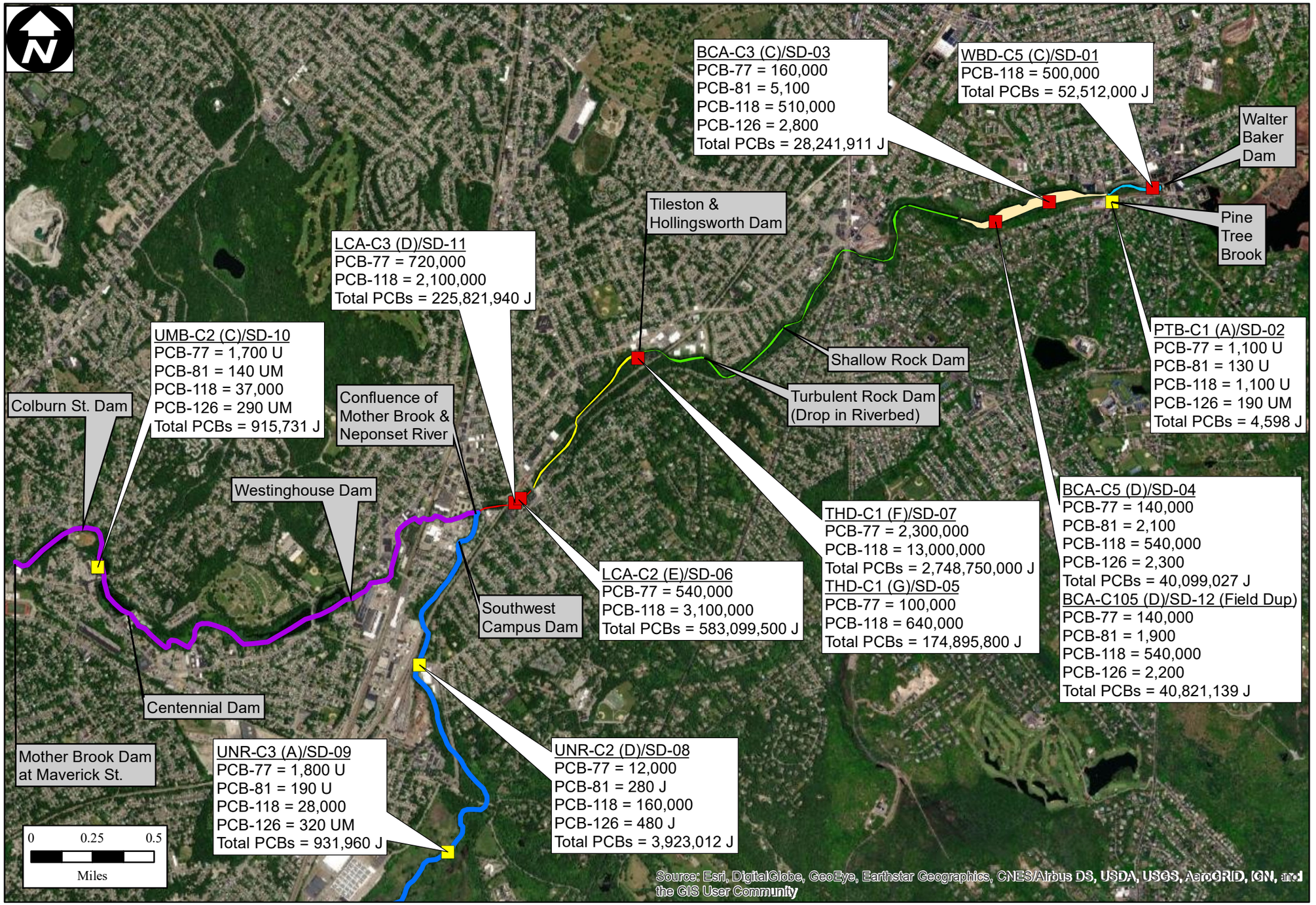

Figure 3

Sediment Sample Results Map

Lower Neponset River
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	23 January 2020
Modified by:	B. Mace
Modified on:	9 July 2021

LEGEND

- Upper Neponset River
- Mother Brook to Charles River

River Segments/Areas

- Walter Baker Dam Area
- Braided Channel Area
- Blue Hills Avenue Area
- Tileston & Hollingsworth Dam Area
- Fairmount/Mother Brook Area

PCB CBCs Results

- Background Sample Location
- Release Sample Location

Sources:
1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. Weston Solutions, Inc. Superfund Technical Assistance and Response Team IV (START). 2019. Final Report for Lower Neponset River PCBs Site Inspection, Boston/Milton, Massachusetts. April.
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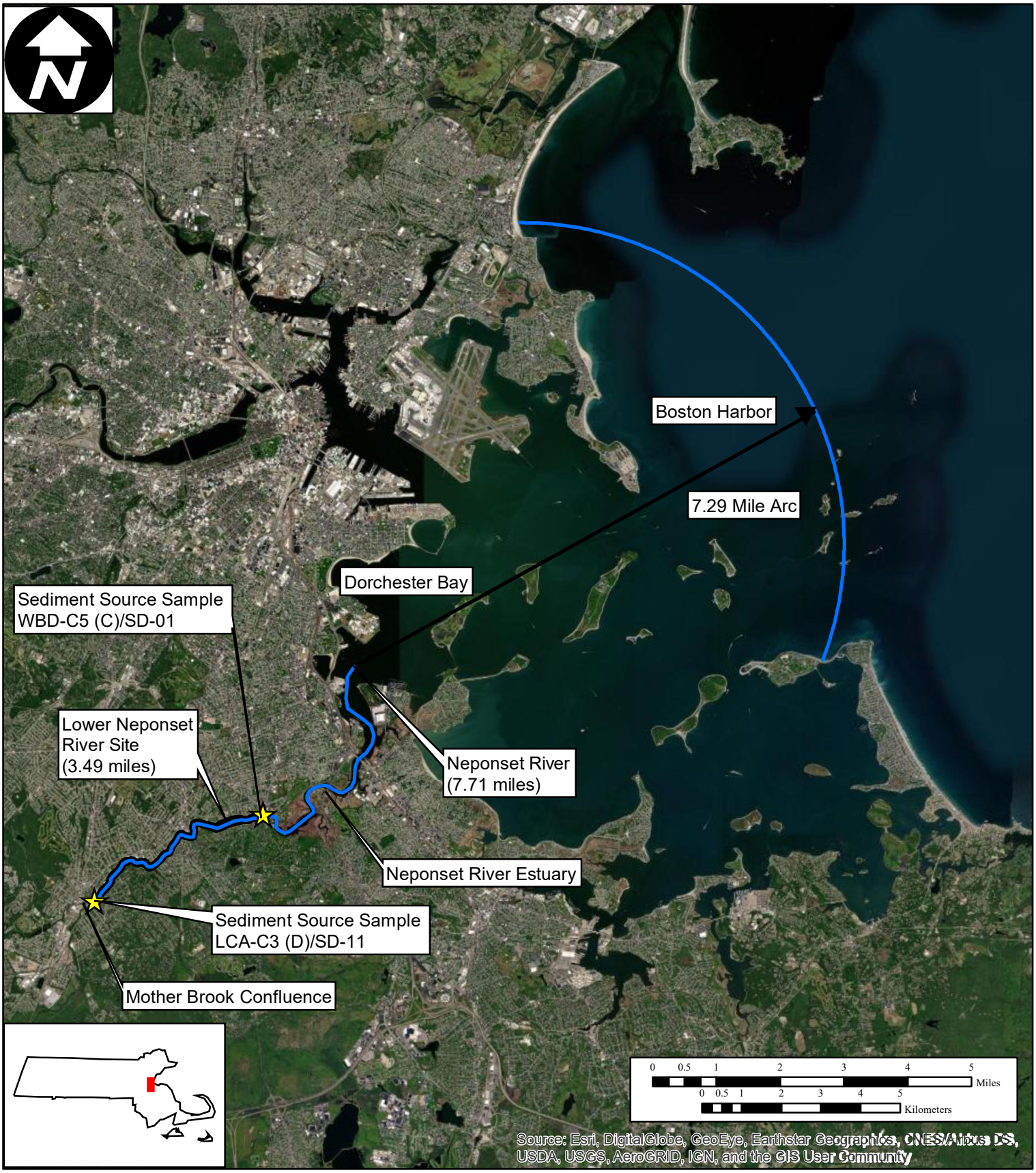

Figure 4

Surface Water Pathway

Lower Neponset River
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	23 January 2020
Modified by:	B. Mace
Modified on:	2 July 2021

Sources:

1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. Mace, B. Weston Solutions, Inc., Superfund Technical Assistance and Response Team IV (START). 2017. Project Note, Lower Neponset River PCBs. Surface Water Flow Rate Calculations. TDD: TOFP-01-20-10-0009. 12 September; Revised – 25 June 2020; 14 December 2020.
3. Weston Solutions, Inc. Superfund Technical Assistance and Response Team IV (START). 2019. Final Report for Lower Neponset River PCBs Site Inspection, Boston/Milton, Massachusetts. April.

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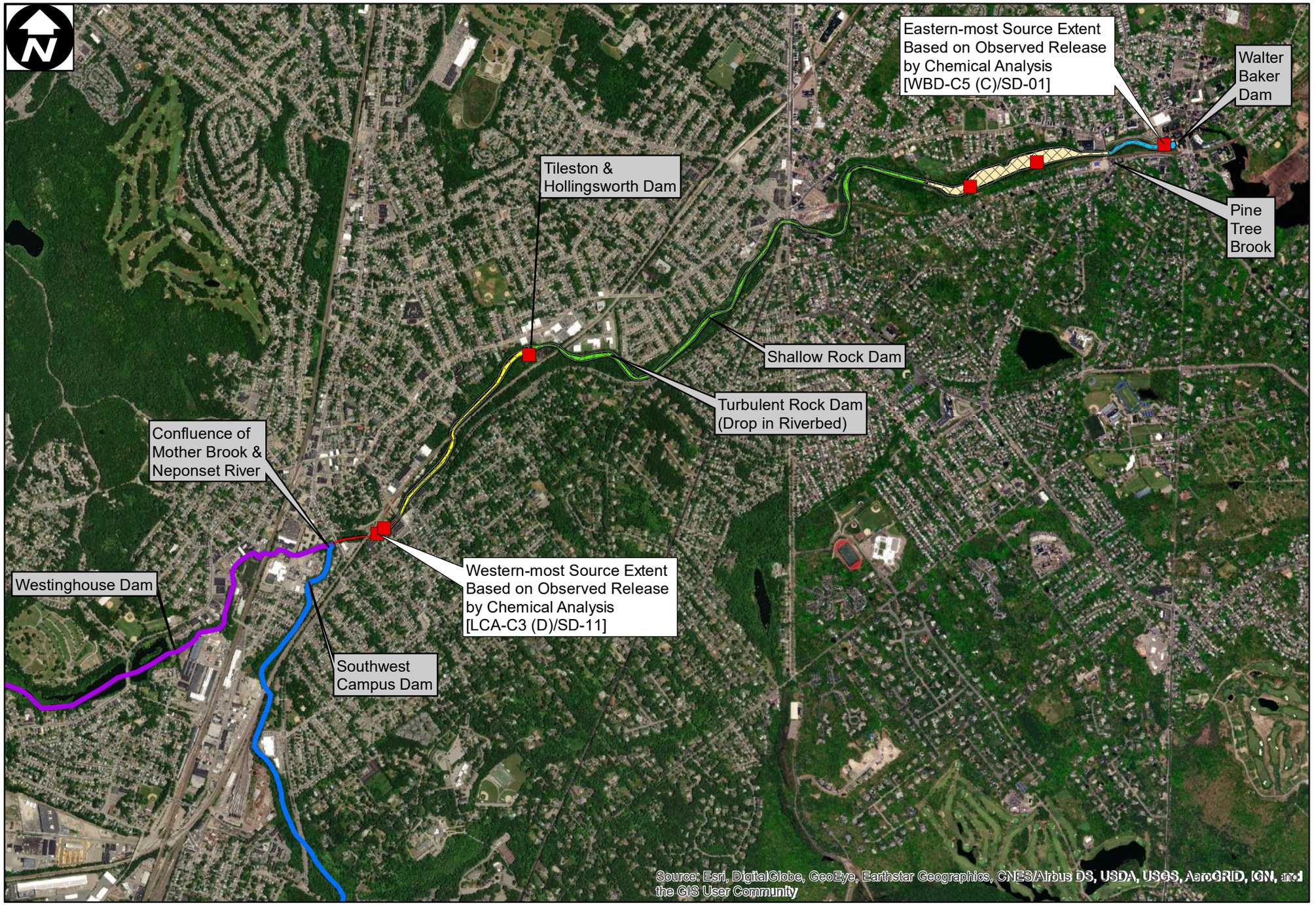

Figure 5

Source Area Map

Lower Neponset River
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	23 January 2020
Modified by:	B. Mace
Modified on:	9 July 2021

LEGEND

- Approx. Site Boundary
- Source Area
- Upper Neponset River
- Mother Brook to Charles River

River Segments/Areas

- Walter Baker Dam Area
- Braided Channel Area
- Blue Hills Avenue Area
- Tileston & Hollingsworth Dam Area
- Fairmount/Mother Brook Area

PCB CBCs Results

- Release Sample Location

0 0.25 0.5
Miles

Sources:

1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. Weston Solutions, Inc. Superfund Technical Assistance and Response Team IV (START). 2019. Final Report for Lower Neponset River PCBs Site Inspection, Boston/Milton, Massachusetts. April.
3. MassGIS Data: Dams. February 2012. Accessed at https://www.mass.gov/info-details/massgis-data-dams

WESTON SOLUTIONS

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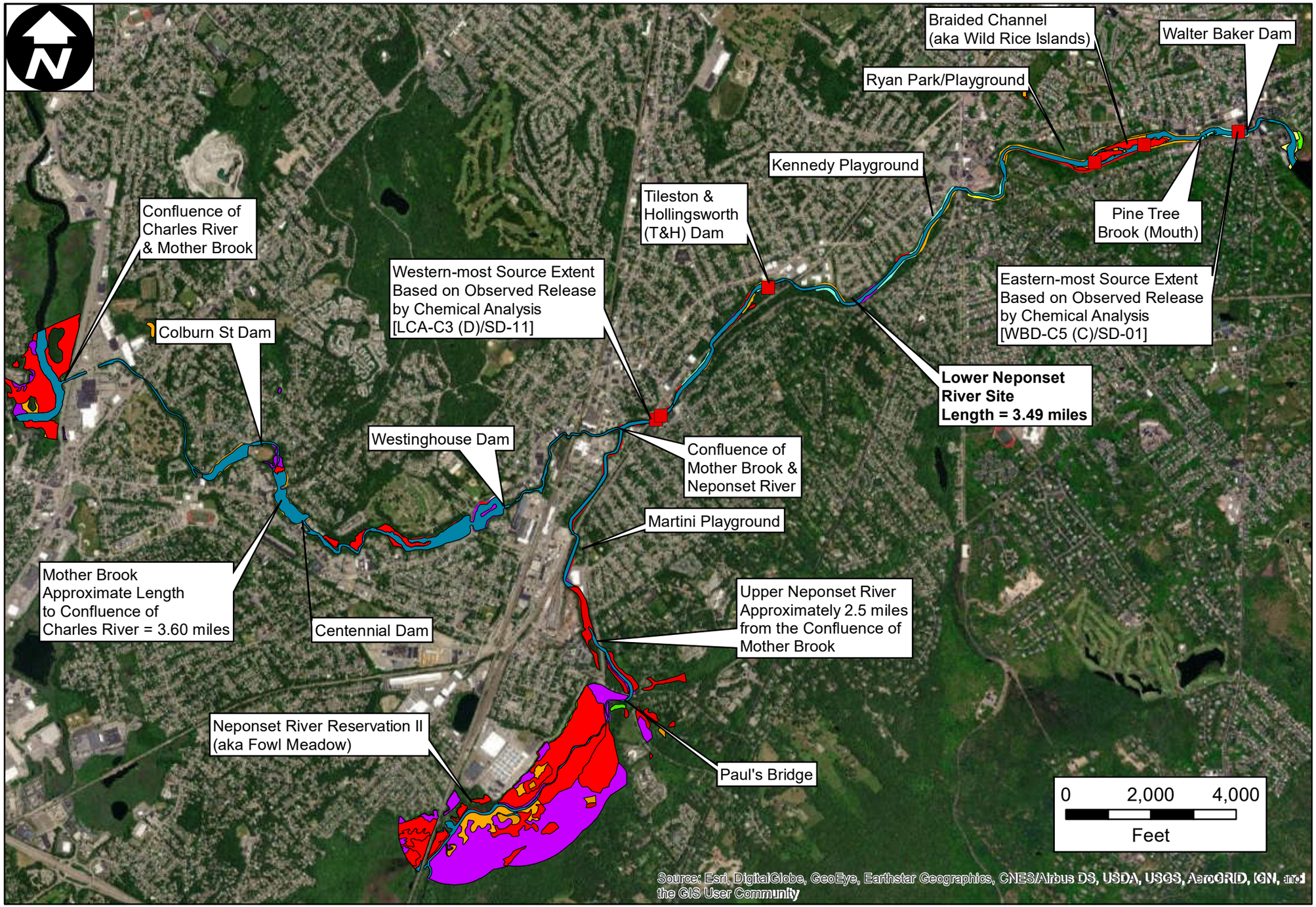

Figure 6

EPA Mapped Wetlands Overview

Lower Neponset River PCBs
Boston, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) V
Contract No. 68HE0120D0001

AD Number:	TOFP-01-20-10-0009
Created by:	B. Mace
Created on:	3 April 2017
Modified by:	B. Mace
Modified on:	9 July 2021

LEGEND

EPA Mapped Wetlands
- Palustrine Emergent (PEM)
- Palustrine Forested (PFO)
- Palustrine Scrub-Shrub (PSS)
- PEM/PFO
- PEM/PSS
- PSS/PFO
- Release Sample Location

NWI Wetlands
- PEM Wetlands
- PSS1 Wetlands
- PFO1 Wetlands
- Other Wetlands

MassDEP Wetlands
- Open Water
- Shallow Marsh Meadow
- Shrub Swamp
- Wooded Swamp Deciduous
- Deep Marsh
- Salt Marsh
- Tidal Flat

Sources:

1. The source of this map image is Esri, used by the EPA with Esri's permission.
2. Weston Solutions, Inc. Superfund Technical Assistance and Response Team IV (START). 2019. Final Report for Lower Neponset River PCBs Site Inspection, Boston/Milton, Massachusetts. April.
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4.	U.S. Environmental Protection Agency (EPA). Superfund Enterprise Management System (SEMS) Database, Lower Neponset River: Site Information. Downloaded from https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0102204 on 4 December 2019. [1 page]
5.	Mace, B. Weston Solutions, Inc., Superfund Technical Assistance and Response Team V (START). 2020. Project Note, Lower Neponset River PCBs. Latitude and Longitude Calculations for the site. TDD: TOFP-01-20-10-0009. 15 December. [2 pages]
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13. AMEC Environment & Infrastructure, Inc. 2014. 2013 Sediment Sampling Results Transmittal Letter to Mr. Chris Pyott, MassDEP, Neponset River Dredge Spoils Site, Hyde Park, Boston, Massachusetts, including Attachments: Tables, Figure 1, Appendix A – Sediment Coring Logs, and Appendix B – Laboratory Reports. 5 February. [147 pages]

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SITE SUMMARY

The Lower Neponset River site (EPA ID No. MAN000102204) is located in Boston/Milton (Suffolk/Norfolk Counties), Massachusetts, and includes of a 3.49-mile riverbed segment of polychlorinated biphenyl (PCB) contaminated sediments (Figure 1). Based on documented location of contaminated samples, the site is comprised of the riverbed channel along the lower segment of the Neponset River, from slightly downstream the confluence of the Neponset River and Mother Brook (located upstream of Dana Avenue, Hyde Park; Confluence coordinates 42.251785, -71.123205) downstream to slightly upstream of the Baker Dam (upstream of Adams Street, Dorchester/Milton; Dam coordinates 42.270765, -71.068818) (Figure 2) [3, p. 1; 4, p. 1; 5, pp. 1-2; 7, p. 126; 18, p. 8]. The PCB contaminated sediments in the Lower Neponset River evaluated in this HRS documentation record extend from sediment samples LCA-C3 (D)/SD-11 to WBD-C5 (C)/SD-01 (See section 4.1 and Figure 3 of this HRS documentation record). The zone of contamination includes a fishery and wetlands in the Lower Neponset River (See sections 4.1.3.3 and 4.1.4.3).

The Lower Neponset River channel ranges from approximately 40 feet to 300 feet wide and comprises an estimated 40 acres within or bordering the City of Boston (Hyde Park, Mattapan, and Dorchester sections) and the Town of Milton, MA. The site is bordered by residential, commercial, industrial, and public parcels of land, including the Neponset River Greenway [a.k.a., the Neponset River Trail and Walkway] [7, p. 6; 18, p. 8].

The site includes five general areas of concern: the Baker Dam Impoundment area (from the Baker Dam, upstream to Central Avenue); the Braided Channel area (from Central Avenue, upstream to the Harvest River Bridge); the Blue Hill Avenue area (upstream of the Harvest River Bridge and Braided Channel area, to the T&H Dam); the T&H Dam Impoundment area (from the T&H Dam, upstream to Fairmount Avenue); and the Fairmount/Mother Brook confluence area (from Fairmount Avenue, upstream to the confluence of Mother Brook with the Neponset River) (Figure 2) [7, pp. 6, 8; 18, p. 8].

The Lower Neponset River site is located in the Neponset River Watershed [8, p. 1; 16, p. 1; 70, p. 1]. The Neponset River receives flow from the adjacent Charles River Basin through Mother Brook. Water and sediment flow into the site via a stream channel from Mother Brook and the upper segment of the Neponset River, upstream of the confluence of Mother Brook with the Neponset River. Water flowing through the site (along the Neponset River channel) discharges at the Baker Dam, the downstream-most portion of the site, and continues to flow downstream along the Neponset River through the Neponset River Marsh/Estuary, to Dorchester Bay, and Boston Harbor [7, p. 154; 8, p. 1; 9, p. 1; 10, p. 1; 18, pp. 8-10].

Water also enters the site via Pine Tree Brook, a small tributary which discharges to the site (riverbed) near the Baker Dam Impoundment; overland flow directly into the river; and various discharge pipes along the river banks (Figure 2). Several former facility discharge pipes and City of Boston and Town of Milton storm drain pipes have been observed along the site and presumably have discharged to the site riverbed at various points in the past [7, pp. 154; 18, p. 9].

According to the U.S. Geological Survey (USGS) and Weston START observations, water depths along the Lower Neponset River Site ranges from less than 1 foot in portions of the Braided Channel area to a maximum depth of 15 feet within the T&H Dam Impoundment area [7, pp. 7, 36-38, 151; 11, p. 13; 18, p. 9].

The Neponset River, like most urban rivers in the Northeast, has a long industrial history. Industrialization and subsequent urbanization began in the Neponset River Basin as early as the 1630s. By the mid-1700s, the Neponset River drained one of the most heavily industrialized drainage basins in the Nation, draining parts of, and areas

adjacent to, the city of Boston. From the 1930s through the 1960s, several industries using PCBs were located in the Neponset River Basin [6, p. 20; 11, p. 10; 18, pp. 10, 11].

Previous sampling activities indicated that the sediment contamination plume contains elevated levels of PCB mixtures known as Aroclors, these commercial mixtures of PCB compounds including Aroclor-1242, Aroclor-1254, and Aroclor-1260 by the USGS [18, pp 7, 12; 06, p. 41; 11, p. 30; 86, p. 1]. PCBs are a family of 209 structurally related compounds (congeners) consisting of two benzene rings and 1 to 10 chlorine atoms (85, p 1). At the current time, elevated levels of PCB contamination have been documented via PCB congener analysis of sediment samples from the Walter Baker Dam Impoundment area ("Baker Dam Impoundment"), the Braided Channel area (also known as ("aka") Rice Islands), as well as the Tileston and Hollingsworth Dam Impoundment area ("T&H Dam Impoundment") [18, pg. 7; 11, pp. 30, 31, 52; 12, pp. 54-61; 87, p. 48]. Due to their inert nature, PCBs are very persistent in the environment and their natural attenuation is a very slow process [85, p. 1].

Sediments contaminated with elevated levels of PCBs have been documented within the lower segment of the Neponset River and Lower Neponset River site area. The original location of the release or releases of PCBs which have resulted in the contaminated sediment is unknown. However, there are several facilities or areas within the river basin which have been identified by previous investigations as having formerly used, stored, or had releases of PCBs and are likely to have contributed to the sediment contamination plume; numerous other facilities or areas which may have used, stored, or had releases of PCBs within the river basin and may have contributed PCB contamination to the sediment contamination plume; and still other potential facilities or areas, sources, and/or releases, which have not yet been identified, but based on the long, complex, urban and industrial history of the area along the Neponset River and within the river basin, are likely to exist and potentially have contributed to the PCB-contaminated sediment. Therefore, the PCB-contaminated sediments have accumulated from both suspected and unknown sources and/or releases of PCBs, which have accumulated to form a plume of PCB-contaminated sediment of unknown origins, which constitutes the Lower Neponset River PCBs site [See section 4.1.2.1; 11, pp. 7, 10-12; 18, p, 49].

Historical Sediment Sampling

There are no specific details regarding the operational and regulatory history for the Lower Neponset River site. However, previous investigations of the Neponset River, including portions of the Lower Neponset River, have included sediment and water investigations conducted by the U.S. Army Corps of Engineers (US ACOE), USGS, Massachusetts Department of Environmental Protection (MassDEP), and others. Results of these investigations indicate that the bottom sediments contain elevated concentrations of PCBs, raising concerns about sediment, water, and biota quality of the Neponset River [6, pp. 14, 46, 58, 59, 70, 71; 11, pp. 7, 51-52; 12, pp. 5, 8; 14, pp. 1-2; 15, pp. 1-5; 18, pp. 10, 11; 92, p. 1].

The USGS collected sediment samples between 2002-2003 and 2004-2006 from Mother Brook and the Neponset River [6, pp. 1, 13; 11, p. 11-12; 12, p. 8].

The initial investigation in 2002-2003 focused on the Neponset River. Sediment samples were collected at 51 sampling stations along the lower Neponset River by sediment-grab samplers (20 locations) and sediment-core samplers (31 locations). Sample locations BGY-100 through BGY-104 are located on the Upper Neponset River, upstream of the Mother Brook confluence; sample locations BGY-105 through BGY-107 are located on the Lower Neponset River downstream of the Mother Brook confluence; sample locations BGY-108 through BGY-111, BGY-113, BGY-114, and M2Y-001 and M2Y-002 are located in the T&H Impoundment area; sample locations BGY-112, BGY-115 through BGY-119, BGY-121, BGY-124, and M2Y-003 and M2Y-004 are located on the Lower Neponset River between the T&H Dam and the Braided Channel; sample locations BGY-120, BGY-122, BGY-

123, BGY-125 through BGY-129, and M2Y-005 through M2Y-011 are located in the Braided Channel; sample location M2Y-012 is located between the Braided Channel and the Baker Dam; and sample locations BGY-130 through BGY-138 are located in the Baker Dam Impoundment area. The samples were analyzed for concentrations of elements, PAHs, toxicity characteristic leaching procedure (TCLP) metals, PCBs, organochlorine pesticides, and also for grain-size distribution [11, pp. 8-9, 12, 18, 51; 12, pp. 1, 6-9; 18, p. 26].

In October 2002, sediment-grab samples were collected from 20 randomly selected locations between Fowl Meadow and the Baker Dam (consisting of 23 grab-samples for PCB analysis). An Eckman dredge, stainless-steel scoop, and stainless-steel spoon were used to collect sediment-grab samples, depending on the water depth. The top 4 inches (if available) of the sample was either removed from the dredge or scooped from the sediment surface, homogenized, screened through a 6-mm sieve, and placed in pre-cleaned containers. The one exception was that downstream sediment-grab sample BGY-139 was not sieved. The sediment grab samples were analyzed for a suite of elements and organic compounds including PCBs. Between December 2002 and February 2003, 31 sediment-core samples were collected. Sediment-core sampling locations were limited to areas of sediment deposition just upstream of the Baker and T&H Dams and within the Braided Channel. Like the grab samples, a random-sampling design was used to collect the 31 sediment cores. A hand corer with a disposable 2.5-inch inside-diameter core barrel was used to collect the sediment cores. The core barrel was pushed or hammered into the sediment until it could be driven no further. Core samples were homogenized, and placed in pre-cleaned containers; however, sediment core samples were not sieved. The sediment core samples were analyzed for a suite of elements and organic compounds including PCBs [11, pp. 13-14, 16, 18; 12, pp. 8-9, 39; 18, pp. 26-27].

PCBs were detected in all but six grab samples (BGY-100, BGY-102, BGY-103, BGY-118, BGY-119, and BGY-133). Of the nine PCB Aroclors tested for, only three Aroclors were detected (Aroclors -1242, -1254, and -1260) [11, p. 30; 18, pp. 27, 69-70].

Three PCB Aroclors were detected in the 17 sediment-grab samples (including duplicates) collected from the Lower Neponset River and include the following (maximum concentration and sample location in parentheses): Aroclor-1242 [7,100 µg/Kg in M2Y-003]; Aroclor-1254 (3,400 µg/Kg in BGY-105); and Aroclor-1260 (970 µg/Kg in BGY-112) [12, pp. 23, 24, 39; 18, pp. 27, 69-70].

Three PCB Aroclors were detected in the 30 sediment-core samples (including duplicates) collected from the Lower Neponset River and include the following (maximum concentration and sample location in parentheses): Aroclor-1242 (208,000 µg/Kg in M2Y-002); Aroclor-1254 (17,000 µg/Kg in BGY-113/BGY-113D, M2Y-002, and BGY-128/BGY-128D); and Aroclor-1260 (5,800 µg/Kg in BGY-113D) [12 pp. 30-35; 18, pp. 27, 69-70].

The 2004-2006 USGS study investigated concentrations, loads, and sources of PCBs by collection and analysis of bottom-sediment grab samples, water samples, fish tissue samples, and PISCES samples. Bottom-sediment samples were collected from the river and farther downstream in the estuary to supplement bottom-sediment data collected as part of the 2002-2003 USGS study. Specifically, riverine bottom-sediment samples were collected in and around areas near assumed sources of PCB contamination [6, pp. 6, 13, 18, 25; 18, pp. 27].

The initial investigation in 2002-2003 focused on the Neponset River. Sediment samples were collected at 51 sampling stations along the lower Neponset River by sediment-grab samples (20 locations) and sediment-core samplers (31 locations). Sample locations BGY-100 through BGY-104 are located on the Upper Neponset River, upstream of the Mother Brook confluence; sample locations BGY-105 through BGY-107 are located on the Lower Neponset River downstream of the Mother Brook confluence; sample locations BGY-108 through BGY-111, BGY-113, BGY-114, and M2Y-001 and M2Y-002 are located in the T&H Impoundment area; sample locations BGY-112, BGY-115 through BGY-119, BGY-121, BGY-124, and M2Y-003 and M2Y-004 are located on the Lower

Neponset River between the T&H Dam and the Braided Channel; sample locations BGY-120, BGY-122, BGY-123, BGY-125 through BGY-129, and M2Y-005 through M2Y-011 are located in the Braided Channel; sample location M2Y-012 is located between the Braided Channel and the Baker Dam; and sample locations BGY-130 through BGY-138 are located in the Baker Dam Impoundment area. The samples were analyzed for concentrations of elements, PAHs, toxicity characteristic leaching procedure (TCLP) metals, PCBs, organochlorine pesticides, and also for grain-size distribution [6, p. 14; 11, pp. 8, 9, 12, 14, 18, 51; 12, pp. 1, 6-9; 18, p. 26].

According to USGS, total PCB concentrations measured as part of both studies in the top layers (4 in.) of Neponset River bottom sediment varied by about a factor of about 1,000, with a minimum concentration of 28 µg/Kg in a sample from the Neponset River (behind Star Market) upstream of the Mother Brook confluence; and a maximum concentration of 24,900 µg/Kg in a sample from within Mother Brook at sample location BGY-141. Concentrations in sediment grabs in Mother Brook averaged about 60 times less (270 µg/Kg) upstream of BGY-141 than downstream of this location (15,400 µg/Kg). PCB concentrations in Neponset River sediments downstream of Mother Brook averaged about 11,400 µg/Kg and about 900 µg/Kg in estuarine mud samples. The USGS noted that PCB concentrations generally declined with distance away from the river mouth into the estuary [6, pp. 21, 33, 46, 58; 18, pp. 27-28].

According to the 2014 USGS report, the reach of the Neponset River, known locally as the Braided Channel (aka Rice Islands), which formed as a result of catastrophic dam failure and subsequent morphological processes, is heavily contaminated with PCBs, but is likely stable. The PCBs in this part of the river appear to be trapped in semi-permanent stable islands, around which the river water flows. Although PCB-contaminated sediments in the Braided Channel have been exposed to a wide range of environmental conditions during the past 50 years, changing conditions in the future may cause sediment and contamination to move downstream [6, pp. 46, 58; 18, p. 28].

In 2007 and 2008, MassDEP requested that AMEC Environment & Infrastructure, Inc. (AMEC) conduct sediment sampling at four canoe launches. These sediment samples were collected from the area where people would be wading into the water prior to getting into or exiting their canoe or kayak [18, p. 28].

In 2013, AMEC, at the request of MassDEP, conducted additional sediment core sampling to further evaluate PCBs in Neponset River sediments. MassDEP requested that AMEC conduct core sediment sampling at four areas along the Neponset River. The four areas are approximately 3,000 feet (ft.) downstream and 1,000, 3,000 and 4,000 ft. upstream of the confluence of the Neponset River and Mother Brook. At each of the four sediment core locations, AMEC collected samples from three depth intervals [0-1 ft. (-0001), 1-2 ft. (-0102), and 2-3 ft. (-0203], resulting in a total of 12 sediment core samples (SD-US4K-01 through SD-US4K-03, SD-US3K-04 through SD-US3K-06, SD-US1K-07 through SD-US1K-09, and SD-DS3K-10 through SD-DS3K-12). One cluster of samples (SD-DS3K-10 through SD-DS3K-12) were collected within the Lower Neponset River site. PCB Aroclor results ranged from non-detectable concentrations up to 45,000 µg/Kg in the downstream sample SD-DS3K-10-0102. The analytical results indicated that PCB concentrations were highest downstream of the Mother Brook/Neponset River confluence [13, pp. 1-3, 5, 6, 20; 18, pp. 28].

According to MassDEP and USGS documents, the PCB-contaminated sediments are mostly trapped behind the two rebuilt dams (the Tileston and Hollingsworth Dam and the Walter Baker Dam), and within the former Jenkins Dam impoundment, where sediments form the Braided Channel section of the river [6, pp. 13, 26; 14, p. 2; 15, p. 2; 18, 28; 92, p. 1]. Maximum calculated total PCB concentrations within the lower Neponset River range up to 229,300 µg/Kg, while Mother Brook concentrations have ranged up to 104,000 µg/Kg [12, p. 30; 6, p. 20; 18, p. 28]. Following the 2009 excavation of the lower portion of Mother Brook to the confluence of the Neponset River, the maximum PCB concentration detected in post-excavation samples in Mother Brook was below the remedial action goal set forth in the May 27, 2007 Confirmation of Agreement Letter from MassDEP [18, p. 28; 24, p. 24]. This

goal was accomplished by excavation and off-site disposal of contaminated soil and sediment (approximately 2,500 tons) adjacent to and from within Mother Brook, and by construction of a subsurface vertical barrier wall to prevent the migration of contaminants from source areas to the brook. Closure sediment samples collected between 0 and 2 feet bsg during excavation activities indicated the concentration of PCBs remaining in the brook following excavation had an average concentration of 1,670 µg/Kg (maximum concentration of 2,700 µg/Kg), which was consistent with background [18, p. 28; 24, p. 10].

In 2014, USGS concluded that the major sources of the PCB contamination are located along lower Mother Brook, but no specific sources were mentioned by name [6, pp. 34, 46; 14, pp. 1, 2; 15, pp. 2, 3; 92, p. 1]. MassDEP noted that the data suggest that widespread PCB contamination of the lower Neponset River originated from Mother Brook starting sometime around the early 1950s [15, p. 2; 18, p. 13; 92, p. 1]. In 1955, catastrophic dam failure caused by flooding likely released PCB-contaminated sediment downstream and into the Neponset River Estuary [6, p. 13; 15, pp. 1, 2, 4; 18, pp. 13, 28, 29; 92, p. 1]. PCBs from this source area likely continued to be released after the flood and during subsequent rebuilding of downstream dams, which was not completed for over a decade [6, p. 13; 11; 12; 18, pp. 13, 28, 29]. According to MassDEP correspondences in 2015, PCBs are mostly trapped behind the two rebuilt dams (the T&H Dam and the Baker Dam), and within the former Jenkins Dam impoundment, where sediments form the Braided Channel section of the river [15, pp. 1, 2, 4; 18, pp. 28, 29; 92, p. 1]. However, some PCBs either diffuse or are entrained back into the water column and are transported downstream by river water into the estuary or volatilize into the atmosphere [6, p. 13; 15, p. 2; 18, pp. 28, 29; 92, p. 1].

EPA Sediment Sampling

Between 4 and 6 September 2018, EPA/START collected sediment/source samples from the Lower Neponset River segment, within five general areas of concern: The Baker Dam Impoundment area; the Braided Channel area; the Blue Hill Avenue area; the T&H Dam Impoundment area; and the Fairmount/Mother Brook Confluence area (Figure 2) [18, pp. 29, 42]. In addition, sediment reference samples were collected in upstream locations along the upper Neponset River and Mother Brook, upstream of the confluence of the Neponset River and Mother Brook, to determine background conditions for comparison to the Lower Neponset River sediment samples. Reference samples were also collected from along Pine Tree Brook, a small tributary flowing into the Lower Neponset River near the Central Avenue Bridge, to determine background conditions for comparison to the Lower Neponset River sediment samples (Figure 2) [18, p. 42]. The sediment/source samples along with the reference/background sediment samples were submitted for PCB field screening via the EPA Mobile Laboratory [18, p. 29]. START also submitted 20 sediment/source samples, including upstream background locations and one field duplicate, to the EPA NERL for confirmatory PCB analysis [18, p. 29]. In addition, 12 sediment samples, including upstream reference/background samples and quality control samples, were submitted for PCB Congener, Percent Solids, and TOC analyses through the EPA Contract Laboratory Program (CLP) and Delivery of Analytical Services (DAS) laboratories [7, pp. 91-154; 18, p. 29]. Analytical results of the 2018 EPA/START sampling event provide documentation of contamination and observed release in the river sediments [7, pp. 96-143; 18, pp. 43-45, 195-209; 52, pp. 73, 119, 173, 222, 271, 322, 369, 437, 487, 536, 588, 635; 53, pp.1-4; see section 4.1.2.1.1 of this HRS documentation record].

2.2 SOURCE CHARACTERIZATION

2.2.1 SOURCE IDENTIFICATION

Number of source: Source No. 1

Name of source: Lower Neponset River contaminated sediments

Source Type: Other (contaminated sediments with no identified source)

Source 1 consists of contaminated sediments in the Lower Neponset River. The hazardous substances affecting the river sediments are PCBs [see Sections 2.2.2 and 4.1.2.1.1 of this HRS documentation record]. The origin source of these hazardous substances in the contaminated sediments cannot be specifically defined or identified due to the presence of multiple possible sources for the PCB substance [see Section 4.1.2.1.1]. As a result, the source(s) of the PCB contaminated sediment in any particular location in the river cannot be determined, resulting in the source being considered as "contaminated surface water sediments with no identified source"
[see Section 4.1.2.1.1 of this HRS documentation record; 1, Section 1.1].

The upland areas adjacent to this source have been heavily industrialized since the mid-1700s [6, p. 20]. Historical or current industrial activities along and within the river have included numerous types of manufacturing and mill facilities [63, p. 1; 64, pp. 1-3; 65, p. 1; 66, p. 2; 67, pp. 2-3; 68, pp. 1-5; 69, pp. 1-5; 70, p. 1]. From the 1930s through the 1970s, several industries using PCBs were located in the Neponset River Basin, including research and development (R&D) for electrical equipment, manufacturing, and assembling of electrical equipment [15, pp. 2-3; 26, p. 7; 92, p. 1]. Other facilities along or within the river basin have documented releases of PCBs at their facilities and/or to the surface water [24, pp. 7-11; 26, pp. 7-10; 30, pp. 6-8; 32, p. 2; 34, p. 13; 35, p. 8; 38, p. 6; 40, pp. 10, 13; 41, pp. 4-5; 42, p. 3; 45, pp. 4, 7-9; 48, pp. 14-17; 49, pp. 9-10]. The USGS reports note that the data suggest that widespread PCB contamination of the Lower Neponset River originated from Mother Brook, a Neponset River tributary, starting sometime around the early 1950s or earlier. In 1955, catastrophic dam failure caused by flooding likely allowed PCB-contaminated sediment to be transported downstream and into the lower segments of the Neponset River and its estuary. These area(s) were likely to have continued to release PCB-contaminated sediment after the flood and during subsequent rebuilding of downstream dams [6, pp. 13, 58; 11, pp. 7, 10, 51-2]. USGS noted that some PCBs have diffused or been entrained back into the water column and are being transported downstream by river water into the Neponset River estuary. In addition to the continuing release of PCBs from historically contaminated bottom sediment, USGS suggests that PCBs were still (as of 2003) originating from source areas along Mother and Meadow Brook, as well as other sources along the river [6, p. 58; 11, pp. 51-52]. In addition, the Lower Neponset River is the receiving water body for storm water from the surrounding neighborhoods and had been for the combined sewer overflow (CSO) discharges until 2000 when they were closed [71, pp. 1-3, 6].

Numerous past investigations with varying scopes have been conducted within and around Lower Neponset River, with most of the focus on specific properties or specific segments of the Neponset [6, pp. 13, 58; 11, pp. 7, 10, 51-2; 12, pp. 5, 8; 24, pp. 7-11; 26, pp. 7-10; 30, pp. 6-8; 32, p. 2; 34, p. 13; 35, p. 8; 38, pp. 6-7; 40, pp. 10, 13; 41, pp. 4-5; 42, p. 3; 45, pp. 7-9; 48, pp. 15-17; 49, pp. 9-10]. Some of these studies have shown the presence of various contaminants at elevated levels in the Lower Neponset River sediments [6, pp. 1, 13, 14; 11, p. 11]. Historical USGS sediment sampling data indicate high concentrations of PCBs in sediment grab and core samples [6, pp. 13, 58; 11, pp. 7, 11, 51-2; 12, pp. 5, 8]. Sediment sampling by USGS in 2002-2003 indicated that detected concentrations of

PCB Aroclors in the sediment grab samples ranged from 160 to 7,100 micrograms per kilogram (µg/Kg) and in sediment core samples from 300 to 208,000 µg/Kg [12, pp. 23-24, 30-31]. Total PCB concentrations calculated for the USGS in 2002-2003 sediment data for the EPA 2019 Site Inspection indicated that concentrations of total PCB Aroclors in the sediment grab samples ranged from 160 to 10,580 micrograms per kilogram (µg/Kg) and in sediment core samples from 1,140 to 229,300 µg/Kg [18, pp. 12-13, 69-70]. Sediment sampling by USGS in 2004-2006 indicated that elevated concentrations of total PCB Aroclors were detected in the bottom-sediment samples collected in and around areas near assumed sources of PCB contamination [6, pp. 13, 58]. Fifteen bottom-grab samples were collected from 10 locations within the study area. USGS noted that PCB concentrations in Neponset River sediments downstream of Mother Brook averaged about 11,400 ng/Kg [6, p. 33]. In 2013, AMEC Environment and Infrastructure, Inc. (AMEC), at the request of MassDEP, conducted sediment core sampling to further evaluate PCBs in Neponset River sediments at four areas along the Neponset River [13, pp. 1-2]. The four areas are approximately 3,000 feet (ft.) downstream and 1,000, 3,000, and 4,000 ft. upstream of the confluence of the Neponset River and Mother Brook [13, pp. 1-2]. PCB Aroclor results ranged from non-detectable concentrations up to 45,000 µg/Kg [13, p. 3]. The analytical results indicated that PCB concentrations were highest downstream of the confluence of Mother Brook and the Neponset River [13, p. 3].

Between 4 and 6 September 2018, EPA collected sediment samples from the lower Neponset River and project-specific background samples from upstream locations along the Neponset River and two nearby tributaries, Mother Brook and Pine Tree Brook [7 pp. 96-143; 18, p. 41]. A total of 103 sediment/source samples, including quality assurance samples, were collected from the Lower Neponset River, Mother Brook, Pine Tree Brook, as well as a section of the upper segment of the Neponset River, for EPA PCB Aroclor field screening [7, pp. 96-153; 18, p. 41]. EPA sediment samples were collected using hand augers with one exception (location WBD-C4) at various depths, ranging from surface of the sediment/water interface (0 feet) to 7 feet below the sediment/water interface [7, pp. 96-141, 145-153; 18, p. 41]. Sample WBD-C4, a grab sediment sample, was collected using a percussion corer [7, pp. 98]. Twelve sediment samples were submitted for PCB Congener, Percent Solids, and total organic carbon (TOC) analyses [7, pp. 145-153; 18, p. 41]. The analytical results indicate that several PCB congeners (including PCB #126, PCB #77, PCB # 81, and PCB #118) and total PCBs are present in the Lower Neponset River sediments at concentrations that meet the criteria for observed release [see Section 2.4.1]. Many of these toxic PCB congeners have toxic equivalency factor assigned by the World Health Organization (WHO) [78, pp. 66, 90-91; 81, pp. 6-7]. PCB contaminants may have entered the Lower Neponset River via several transport pathways or mechanisms, including spillage, direct disposal or discharge, contaminated groundwater discharge, or storm water runoff [6, pp. 14, 43; 11, p. 11]. The distribution of contaminants suggest that the sediment contamination originated at a variety of sources (see Tables 1 and 2, and Figures 2 and 3) [18, pp. 81, 88, 191-221, 226-227; 52, pp. 73, 119, 173, 222, 271, 322, 369, 437, 487, 536, 588, 635; 53, p. 5-62; see Section 2.4.1]. Therefore, the source under evaluation for the site is considered to be contaminated sediments with no identified source [1, Sections 1.1, 4.1.1.1].

Location of Source (with reference to a map of the site):

The EPA sampling results using observed release criteria show that contaminated sediments are located throughout the 3.49-mile segment of the Lower Neponset River downstream from the confluence with Mother Brook (sample LCA- C3), near the former Lewis Chemical Facility, to the Walter Baker Dam (sample WBD-C5) (Figure 5). The sample locations are shown in Figure 3.

Containment

Release to surface water via overland migration and/or flood:

The presence of contaminated sediments provides evidence that hazardous substances (PCB #77, PCB # 81, PCB #118, PCB # 126, and Total PCBs) have migrated into the surface water body (Lower Neponset River) from multiple sources [see Section 4.1.2.1.1]. Sediment core logs indicate that neither of the following is present: (1) maintained engineer cover, or (2) functioning and maintained run-on control system and runoff management system [7, p. 142]. Therefore, a surface water containment factor value of 10 is assigned for this source [1, Table 4-2].

2.2.2 HAZARDOUS SUBSTANCES ASSOCIATED WITH THE SOURCE

The following four background sediment samples are used to document background concentrations of PCBs: PA41R4 / 13887002/SD-02; PA41S2 / 13887010/SD-10; PA41S0 / 13887008/SD-08; PA41S1 / 13887009/SD-09. (See section 4.1.2.1.1 and Tables 1 and 2 of this HRS documentation record for more information about these background samples).

- Background Concentrations:
Note: For each hazardous substance, the sample that showed the maximum concentration is listed in Table 2 (See section 4.1.2.1.1 and Table 2 of this HRS documentation record for more information about these background samples). The maximum concentration is used as the background level for evaluating an observed release by chemical analysis.

- Source Samples:
The following eight sediment samples documented an observed release of PCBs: LCA-C3 D/ PA41S3/SD-11; LCA-C2 E/ PA41R8/SD-06; THD-C1 G/PA41R7/SD-05; THD-C1 F/PA41R9/SD-07; BCA-C105 D / PA41S4/SD-12; BCA-C5 D/ PA41R6/SD-04; BCA-C3 C/PA41R5/SD-03; WBD-C5 C /PA41R3 /SD-01. (See section 4.1.2.1.1 and Tables 1 and 2 of this HRS documentation record for more information on these observed release samples).

List of Hazardous Substances Associated with Source:
PCB Congener PCB #77, PCB # 81, PCB #118, PCB # 126, and Total PCBs

2.2.3 HAZARDOUS SUBSTANCES AVAILABLE TO A PATHWAY

Containment Description	Containment Factor Value	References
Release via overland migration and/or flood:	10	Ref 1, Section 4.1.2.1.2.1.1, Table 4-2; 7. pp. 142, 154.

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1. Hazardous Constituent Quantity

The hazardous constituent quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances in the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.1). There are insufficient historical and current data (Manifests, PRP records, State records, Permits, Waste concentration data, etc.) available to adequately calculate the total mass of all CERCLA hazardous substances in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous constituent quantity for Source No. 1 with reasonable confidence.

Hazardous Constituent Quantity (C) Value: NS

2.4.2.1.2. Hazardous Wastestream Quantity

The hazardous wastestream quantity for Source No. 1 could not be adequately determined according to the HRS requirements; that is, the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants in the source is not known and cannot be estimated with reasonable confidence (Ref. 1, Section 2.4.2.1.2). There are insufficient historical and current data (Manifests, PRP records, State records, permits, etc.) available to adequately calculate the total mass of all hazardous wastestreams and CERCLA pollutants and contaminants in the source and the associated releases from the source. Therefore, there is insufficient information to evaluate the associated releases from the source to calculate the hazardous wastestream quantity for Source No. 1 with reasonable confidence.

Hazardous Wastestream Quantity (W) Value: NS

2.4.2.1.3. Volume

Analytical results for the 2002-2003 and 2004-2006 USGS sampling events indicated that contaminated sediments are located throughout the lower Neponset River, a length of approximately 3.7 miles (see Sections 2.2.1, 2.4.1, and 4.1.2.1.1). A length of 3.49 miles of contaminated sediments was estimated based on the most upstream and downstream samples documenting an observed release in this HRS documentation record (See Figures 2 and 3 and Section 4.1.2.1). The EPA/START sampling event in September 2018 indicated elevated concentrations of PCB #77, PCB #81, PCB #118, PCB 126, and Total PCBs with maximum concentrations as high as 2,300,000, 5,100, 13,000,000, 2,800, and 2,748,750,000 parts per trillion, respectively [See section 4.1.2.1.1 of this HRS documentation record; 53, pp. 45, 56, 57, 58].

In 2002 USGS conducted sediment thickness [11, p. 12]. A steel rod, manually pushed into the bottom sediment, was used to collect sediment-thickness data [11, p. 12]. These manual sediment-thickness measurements were made at over 200 locations and positional data recorded with a global positioning system (GPS) [11, p. 12]. A combination of the data model and topogrid functions of ARC/INFO geographic information systems (GIS) software) were used to map channel morphology and bottom-sediment thickness from sediment-thickness data [11, p.13]. The data model of ARC/INFO was used to determine sediment volumes [11, pp. 13, 15-17]. Where measured, sediment thickness averaged from about 1.1 to 1.4 ft. Maximum measurements of sediment thickness were 5.8, 7.6, and 9.7

ft in the braided channel, and Walter Baker, and Tileston and Hollingsworth impoundments, respectively [11, pp. 13, 15-17]. The braided-channel area of the Neponset River contains about 49 percent (or about 790,000 cubic feet equivalent to about 29,260 cubic yards) of the total bottom-sediment volume measured, the Tileston and Hollingsworth impoundment contains about 38 percent (or about 620,000 cubic feet equivalent to about 22,960 cubic yards), and the Walter Baker impoundment contains about 13 percent (less than 210,000 cubic feet equivalent to about 7,780 cubic yards) [11, p. 13; 18, p. 29]. These three areas contain an estimated 60,000 cubic yards of sediment (29,260 cubic yards + 22,960 cubic yards +7,780 cubic yards) [11, p. 13; 18, p. 29].

Based on a review of the USGS bottom sediment volume data and conservative (i.e., low bias) assumptions, a partial estimate of the volume of contaminated sediments in the lower Neponset River is approximately 30,000 cubic yards [11, p. 13; 14, p. 2; 18, pp. 24, 29; 92, p. 1]. The estimate of the volume of contaminated sediments, considers that the Tileston and Hollingsworth impoundment and braided-channel area are within the zone of contamination at this site and the majority of Walter Baker impoundments is within the zone of contamination; volume calculations presented above yield an estimated 60,000 cubic yards of bottom sediment (not accounting for any other areas of sediment contamination within the zone of contamination); to be conservative, the volume of contaminated sediment was halved yielding a conservative estimate of 30,000 cubic yards of contaminated sediments. The source type is 'Other', so the volume value is divided by 2.5 to obtain the assigned value, as shown below [1, Section 2.4.2.1.3, Table 2-5].
Dimension of source (yd^3): 30,000

Volume (V) Assigned Value: 30,000/2.5 = 12,000

2.4.2.1.4. Area

Tier D is not evaluated for source type "Other" [1, Table 2-5, Section 2.4.2.1.4].
Area of source (ft^2): N/A

Area (A) Assigned Value: 0

2.4.2.1.5. Source Hazardous Waste Quantity Value

The source hazardous waste quantity value for Source 1 is 12,000 for Tier C - Volume [1, Section 2.4.2.1.5].

Source Hazardous Waste Quantity Value: 12,000

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Haz. Waste Quantity Value	Source Hazardous Constituent Quantity Complete? (Y/N)	Containment Factor Value by Pathway				
			Ground water (GW) (Ref. 1, Table 3-2)	Surface Water (SW)		Air	
				Overland/flood (Ref. 1, Table 4-2)	GW to SW (Ref. 1, Table 3-2)	Gas (Ref. 1, Table 6-3)	Particulate (Ref. 1, Table 6-9)
1	12,000	No	NS	10*	NS	NS	NS

NS = Not Scored

* The overland flow containment factor is 10 for the source.

4.0 SURFACE WATER MIGRATION PATHWAY

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

4.1.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

The Neponset River drains approximately 117 square miles of land south and west of Boston and flows northeast for approximately 28 miles from its headwaters in Foxboro, MA into the Neponset River Estuary, east of Dorchester Avenue/Adams Street, Boston (Dorchester), MA, to the mouth of the Neponset River at Commercial Point in South Dorchester (see Figure 4) [3; 6, p. 18; 16, p. 1; 17, pp. 1, 10-11]. The small gradient of the river results in slow currents and several wetlands along the Neponset River (Figure 6) [17, pp. 10-11]. The Neponset River flows east along 7 miles of natural, meandering banks through Hyde Park, and along Mattapan and South Dorchester [17, p. 11]. This section of the River is bordered by the Neponset River Reservation, which includes a large tidal wetland in South Dorchester [17, p. 11]. The lower 4 miles of the river from Dorchester Bay to the Walter Baker Dam (also known as the Lower Mills Dam) in South Dorchester is tidal [17, pp. 10-11; 89, p. 13].

The Neponset River receives flow from the adjacent Charles River Basin through Mother Brook [6, p. 18; 17, p. 12]. Mother Brook is a flood-diversion structure that was built in the 1600s [6, p. 18; 17, p. 12]. As much as one-third of flood flows in the Charles River are commonly diverted through Mother Brook to prevent flooding in downtown Boston [6, p. 18; 17, p. 12].

Stream flow in the Neponset River Drainage Basin has been affected by the construction of dams, which have fragmented the Neponset River and changed low flows, high flows, and other hydrologic characteristics [6, p. 18]. In 2007, 51 dams impounded the waters of the Neponset River and its tributaries, including two downstream dams on the Lower Neponset River: the Walter Baker Dam and the Tileston and Hollingsworth Dam (T&H) (Figure 1) [6, pp. 14 and 18]. These dams have also changed sediment regimes by trapping sediment in the impoundments behind most of the dams [6, p. 18]. Two hurricanes impacted the Northeast and destroyed many of the dams along the Neponset River in 1955, releasing sediments trapped behind the dams [6, p. 18].

An observed release by chemical analysis is documented through the Lower Neponset River site from EPA sediment upstream sample location LCA-C3/SD-11 to downstream sediment sample location WBD-C5/SD-01 [see Section 2.2]. The hazardous substance documented in the release is PCBs [see Section 2.2 and 4.1.2.1.1].

The surface water migration pathway (SWP) for the Lower Neponset River site begins approximately 850 feet downstream of the confluence of the Neponset River and Mother Brook (upstream of Dana Avenue, Hyde Park, MA) at the EPA sediment sample location LCA-C3/SD-11, the most upstream sample documenting an observed release in the Lower Neponset River (Figure 4) [16, pp. 1-2 and Section 4.1.2.1.1]. The SWP continues to flow downstream along the Lower Neponset River, under the Fairmont Street Bridge and a Massachusetts Bay Transportation Authority (MBTA) railroad bridge, to the Tileston and Hollingsworth (T&H) Dam, where stream flow is restricted, and a surface water impoundment is formed upstream for the dam [3; 6, pp. 18; 16, pp. 1-2]. Surface water flow continues downstream past the T&H Dam, under two additional MBTA railroad bridges, under the Blue Hills Avenue Bridge, and under the Harvest River Walking Bridge to the Braided Channel Area, also known as the Rice Islands (Figure 2) [3; 16, pp. 1-2]. This area was once impounded by the Jenkins Dam, which was destroyed by flooding caused by two successive hurricanes in 1955 [6, pp. 18]. Some of the sediment deposits that accumulated behind the dam remain and have been incised to form channels and islands within the river [6, pp. 18]. SWP flow continues downstream under the Central Avenue Bridge, where Pine Tree Brook converges with the Lower Neponset River [16, pp. 1-2]. Flow continues downstream under a Neponset Riverwalk bridge to the

Walter Baker Chocolate Dam (Baker Dam) area (upstream of Adams Street, Dorchester, MA) and the location of EPA sediment sample WBD-C5 (C)/SD-01 (Figure 2) [16, pp. 1-2]. This sample is located within the surface water impoundment for the Baker Dam, approximately 210 feet upstream of the dam [16, pp. 1-2]. Sediment sample WBD-C5/SD-01 is the most distal downstream documented observed release sample (Figures 2 and 3) [16, pp. 1-2]. The SWP continues from sediment sample WBD-C5/SD-01 4.22 miles to the east, past the Baker Dam, under Adam Street to the Lower Mills Dam, and continues downstream along the Neponset River and Estuary to Dorchester Bay at Commercial Point in southern Dorchester, located 7.71 miles downstream of sediment sample location LCA-C3/SD-11 (Figure 4) [3; 16, pp. 1-2; 17, pp 10; 54, p. 2]. The SWP continues into Dorchester Bay and the Boston Harbor to the SWP Terminus, which is formed by a 7.29-mile arc extending from the mouth of the Neponset River at Dorchester Bay to Crescent Beach in Revere to the north and to Stony Beach in Hull to the south [16, pp. 1-2, 4]. The total length of the SWP is 15 miles [16, pp.1-2]. The Neponset River and Estuary, Dorchester Bay, and Boston Harbor are all tidally influenced downstream of the Baker Dam [16, pp. 1-2; 17, pp. 10-11].

4.1.2.1 Likelihood of Release

4.1.2.1.1 Observed Release

Chemical Analysis

An observed release by chemical analysis is documented in the Lower Neponset River between sample location LCA-C3/SD-11, the farthest upstream location, adjacent to the former Lewis Chemical facility, and sample location WBD-C5/SD-01, the most distal sample located in the Walter Baker Dam impoundment (see Section 2.2).

Sample locations are shown on Figure 3.

Analytical results for four PCB congeners, PCB # 77, PCB # 81, PCB #118, PCB # 126, and total PCBs in the four background samples and eight release samples were evaluated to determine if the individual congeners were biased and required adjustment in accordance with EPA Guidance, *"Using Qualified Data to Document an Observed Release and Observed Contamination"* [53, pp. 1-5; Tables 1 and 2 of this HRS documentation record]. If application of the adjustment factor was appropriate, individual congeners, homologues and Total PCBs values were recalculated [53, pp. 1-5, 29-64].

Evaluation of the analytical data for the four background samples determined that individual congeners were found to be either bias high or with no bias [53, pp. 29-40]. In accordance with the EPA guidance, no adjustment was required for the background samples and therefore (PCB #77, PCB # 81, PCB #118, PCB # 126, and Total PCBs were reported as noted in the Data Validation memorandum [53, pp. 29-40]. The Adjusted Analytical Result for homologue and total PCB sums have not been rounded to two significant figures as was conducted in the Data Validation Memorandum and therefore vary slightly from the result report in the Data Validation memorandum [53, Table 3, pp. 29-40].

Evaluation of the analytical data for the eight release samples determined that individual congeners contained were found to be either bias high, bias low, unknown bias, or with no bias [53, pp. 41-64]. In accordance with the EPA guidance, release samples with a high bias or unknown bias require adjustment and the concentration is divided by the adjustment factor. Adjustment factors were applied to the release sampling individual congener concentration and Homologues and Total PCBs value recalculated using the adjusted congener concentrations [53, pp. 41-64]. Result for homologue and total PCB sums have not been rounded to two significant figures as was conducted in the Data Validation Memorandum and therefore results vary slightly from the result report in the Data Validation Memorandum [53, Table 4, pp. 41-64].

Sampling and analysis by EPA and its contractors in September 2018 indicated the presence of PCBs (toxic congener PCB #77. PCB #81, PCB #118, PCB 126, and Total PCBs) at concentrations significantly above background concentrations. Table 1 presents description information for the samples that document background concentrations and observed release. Table 2 presents the analytical results for PCBs that meet observed release criteria. Tables 2 presents the validated analytical results for PCB analysis and sample adjusted CRQL or raised value due to dilution factors. These CRQLs are substance-specific levels that a CLP laboratory must be able to routinely and reliably detect in specific sample matrices. Sample adjusted CRQLs may or may not be equal to the sample quantitation limit, the quantity of a substance that can be reasonably quantified given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation. The PCB analytical data presented on Table 2 were validated by the Region 1 Environmental Services Assistance Team (ESAT) at a Tier II level according to the Region 1 EPA New England Environmental Data Review Program Guidance, June 2018,

using first the criteria in the Quality Assurance Project Plan Addendum for Source and Sediment Sampling, Lower Neponset River PCB, Preliminary Assessment/Site Inspection, Boston/Milton, Massachusetts, July 26, 2018, then the Region 1 EPA New England Environmental Data Review Supplement, June 2018, and the US EPA CLP National Functional Guidelines for High Resolution Superfund Methods Data Review, April 2016, and the EPA Region l ESAT High Resolution Data Review SOP ESAT-01-0007 (10/23/17). The Adjusted CRQL data presented on Table 2 is therefore of sufficiently known and documented quality and may be used is establishing an observed release and observed contamination to support site proposal to the NPL [1, *HRS Section 1.1, Definitions*; 53, pp. 1, 3-4].

Notes on Sample Similarity:

The background samples from the lower Neponset River and its tributaries and the contaminated release samples from the lower Neponset River were handled the same procedurally and were generally similar physically, as follows:

Physical Setting: All background and release samples were collected from the Neponset River or (for certain background samples) from tributaries upstream of the Lower Neponset River segment [Figure 2]. All background and release samples were collected from river sediments located within an urban environment [7, p. 143]. The Neponset River and its tributaries are considered part of the Neponset River Watershed [8, p. 1; 16, p. 1]. Available flow data for the Neponset River and Mother Brook indicate that the water body type (i.e., moderate to large stream) is maintained throughout the sample locations [1, Table 4-13; 16, pp. 1-2; 53, p. 1; 54, p. 1; 89, p. 14]. In addition, all background and release samples were collected from areas where water was overlying the sediment at the time of sampling or surface water flows over the sediment material at these locations during periods of moderate to high flow storm events, as observed and documented in the braided channel area on 13 August 2018 [7, pp. 7, 8, 155; 88].

Sampling Depth: Background and source/release samples were collected at various depth intervals between 0 and 6.5 feet below the sediment/water interface [Table 1; 18, pp. 153-166; 7, pp. 101-140]. Sample depths ranged at various locations based on sediment thickness and stream bed characteristics. All background and source/release samples were collected from depositional environments [7, pp. 100, 106, 110, 122-123, 128-129].

Sample Description: Visual descriptors from core logs show that background and release samples within Mother Brook and the Neponset River consist predominately of silt with varying amounts of sand as a secondary component. The background sample from Pine tree Brook consist of predominately of sand, with some gravel [7, pp. 96-154; 18, pp. 153-166].

Sampling Methods: The background and release sediment samples were all collected using the same type of coring device. In September 2018, sediment coring was performed along Mother Brook, Pine Tree Brook, and the upper and lower portions of the Neponset River using hand auger samplers [7, pp. 100-101, 105, 110, 122-123, 128-129, 137; 18, p. 41, 152, 154, 156-157, 159, 161,163-166].

Handling Procedures: The background and release sediment samples were all handled, stored, and transported in the same manner [7, pp. 96-154].

Analytical Procedures: The background and release samples were all analyzed for 209 CBCs by Cape Fear Analytical, LLC of Wilmington, North Carolina [52, p. 1]. The chemical analysis was coordinated through the Contract Laboratory Program (CLP). The analytical data were validated by the Region 1 Environmental Services Assistance Team (ESAT) at a Tier II level according to the Region 1 EPA New England Environmental Data Review Program Guidance, June 2018, using first the criteria in the Quality Assurance Project Plan Addendum for Source and Sediment Sampling, Lower Neponset River PCBs, Preliminary Assessment/Site Inspection, Boston/Milton, Massachusetts, July 26, 2018, then the Region 1 EPA New England Environmental Data Review Supplement, June 2018, and the US EPA CLP National Functional Guidelines for High Resolution Superfund

Methods Data Review, April 2016, and the EPA Region l ESAT High Resolution Data Review SOP ESAT-01-0007 (10/23/17) [18; pp. 195-216; 52; 53, p. 1]. The samples were also analyzed for total organic carbon (TOC) according to EPA method SW-846 9060/Lloyd Kahn by Test America of Pittsburgh, Pennsylvania, a Delivery of Analytical Services (DAS) laboratory [18, pp. 222-223; 55, pp. 1-7].
Percent Solids: The percent solids in the background samples ranged from 41% to 88%, while the percent solids in the release samples ranged from 38.7% to 69.3% [52, pp. 11, 67, 113, 167, 216, 265, 316, 363, 431, 481, 530, 582, 630; 55, pp. 8-19; 61, pp. 5, 6; 18, pp. 195-216].
Total Organic Carbon: The analytical results indicate that the ranges of background TOC levels and release TOC levels overlap [Table 1].

Due to the similarities (i.e., same time frame, same sampling and analytical methods, same laboratories, similar physical setting and sampling depths, overlapping ranges of percent moisture values, and similar sediment descriptions) among the upstream background samples from the Neponset River and Mother Brook and release samples from the Lower Neponset River, the background and release analytical results are considered to be comparable. EPA compared observed release concentrations for PCB #77, PCB #81, PCB #118, PCB #126, and Total PCBs to the highest maximum background concentration for PCB #77, PCB #81, PCB #118, PCB #126, and Total PCBs within the data set, background sample UNR-C2 (D) (PA41S0/ SD-08).

The following criteria from the HRS were used to evaluate significance above background (i.e., observed release):

If the maximum background concentration is not detected or is less than the detection limit, an observed release is established when the sample measurement equals or exceeds the Sample Quantitation Limit (SQL) [1, Table 2-3].
If the maximum background concentration equals or exceeds the detection limit, an observed release is established when the sample measurement equals or exceeds the SQL and is three times or more above the background concentration [1, Table 2-3].

Total PCB concentration results are equal to the total of the sum of the adjusted CBC homologues [52; 53].
Numerous individual CBC results are qualified as estimated ("J") with no direction of bias specified [52; 53]. For the J-flagged background results, EPA used adjustment factors presented in the Fact Sheet "Using Qualified Data to Document an Observed Release and Observed Contamination" to complete the background-release comparison, thereby compensating for probable uncertainty in the analyses [62, pp. 1-18].

TABLE 1
BACKGROUND AND RELEASE SAMPLE INFORMATION
START 2018 SEDIMENT SAMPLING
LOWER NEPONSET RIVER

Station Location	Field Sample ID	Sample Date/Time	Sample Depth* (feet)	Sample Description (visual)	DAS Sample No./ CLP Sample No.	Analysis	DAS Lab ID/ CLP Lab ID	Solids (%)	TOC (mg/kg)	References
BACKGROUND										
PTB-C1 A	SD-02	9/4/2018 11:35	0-1	Orange-brown medium -to-coarse SAND, some fine-to-medium gravel, little fine-to- medium sand, trace silts, debris (glass, metal), and organics.	D35476/ PA41R4	TOC 209 CBCs	180-81717-2/ 13887002	88 89.4	2,100 J/ NA	18, pp. 155, 195-198, 215, 222; 52, pp. 1, 113; 55, p. 9; 61, p. 5
UMB-C2 C	SD-10	9/6/2018 11:02	2-3	Black organic rich SILT, some fine-to-coarse sand, little clay, trace fine-to-coarse gravel.	D35484/ PA41S2	TOC 209 CBCs	180-81717-10/ 13887010	51.5 55	55,000 J/ NA	18, pp. 163, 205-209, 216, 223; 52, pp. 11, 530; 55, p. 17; 61, p. 6
UNR-C2 D	SD-08	9/6/2018 14:03	3-4	Dark brown SILT, little fine-to-medium sand, little clay, trace organics.	D35482/ PA41S0	TOC 209 CBCs	180-81717-8/ 13887008	49.5 59.2	100,000 J/ NA	18, pp. 164, 200-204, 216, 223; 52, pp. 11, 431; 55, p. 15; 61, p. 6
UNR-C3 A	SD-09	9/6/2018 15:15	0-1	Brown-to-dark brown SILT, little clay, trace clay and fine-to-medium sand.	D35483/ PA41S1	TOC 209 CBCs	180-81717-9/ 13887009	41 53.1	77,000 J/ NA	18, pp. 165, 205-209, 216, 223; 52, pp. 11, 481; 55, p. 16; 61, p. 6
RELEASE										
WBD-C5 C	SD-01	9/4/2018 10:45	2-3	Brown SILT, trace fine-to-coarse sand, fine-to-medium gravel, and debris (metal), saturated.	D35475/ PA41R3	TOC 209 CBCs	180-81717-1/ 13887001	57 52.9	26,000 J/ NA	18, pp. 154, 195-198, 215; 52, pp. 11, 67; 55, p. 8; 61, p. 5
BCA-C3 C	SD-03	9/4/2018 16:00	1.8-2.2	SILT and SAND, wet.	D35477/ PA41R5	TOC 209 CBCs	180-81717-3/ 13887003	61.6 63.1	31,000 J/ NA	18, pp. 156, 195-198, 215; 52, pp. 11, 167; 55, p. 10; 61, p. 5
BCA-C5 D	SD-04	9/4/2018 17:40	2.5-4	Dark brown SILT and fine SAND, trace organics, wet.	D35478/ PA41R6	TOC 209 CBCs	180-81717-4/ 13887004	52.8 51.9	45,000 J/ NA	18, pp. 157, 195-198, 215; 52, pp. 11, 216; 55, p. 11; 61, p. 5
BCA-C105 D	SD-12	9/4/2018 17:40	2.5-4	Field duplicate of BCA-C5 C, see BCA-C5 D.	D35486/ PA41S4	TOC 209 CBCs	180-81717-12/ 13887012	52.8 51.9	47,000 J/ NA	18, pp. 166, 205-209, 216; 52, pp. 11, 629; 55, p. 19; 61, p. 6
THD-C1 F	SD-07	9/5/2018 13:10	5-6	Brown SILT, trace fine-to-coarse sand, fine-to-medium gravel, organics, clay, saturated.	D35481/ PA41R9	TOC 209 CBCs	180-81717-7/ 13887007	39.4 38.7	61,000 J/ NA	18, pp. 159, 200-204, 216; 52, pp. 11, 363; 55, p. 14; 61, p. 6

TABLE 1
BACKGROUND AND RELEASE SAMPLE INFORMATION
START 2018 SEDIMENT SAMPLING
LOWER NEPONSET RIVER

Station Location	Field Sample ID	Sample Date/Time	Sample Depth* (feet)	Sample Description (visual)	DAS Sample No./ CLP Sample No.	Analysis	DAS Lab ID/ CLP Lab ID	Solids (%)	TOC (mg/kg)	References
RELEASE										
THD-C1 G	SD-05	9/5/2018 13:15	6-6.5	Brown SILT, little clay, organics.	D35479/ PA41R7	TOC 209 CBCs	180-81717-5/ 13887005	44.2 42.9	66,000 J/ NA	18, pp. 159, 200-204, 215; 52, pp. 11, 265; 55, p. 12; 61, p. 5
LCA-C2 E	SD-06	9/5/2018 16:28	4-5	Brown-to-dark brown SILT, trace fine-to-medium sand and gravel and clay.	D35480/ PA41R8	TOC 209 CBCs	180-81717-6/ 13887006	53.1 55.5	61,000 J/ NA	18, pp. 161, 200-204, 215; 52, pp. 11, 316; 55, p. 13; 61, p. 5
LCA-C3 D	SD-11	9/5/2018 16:24	3-4	Brown SILT and fine-to-medium SAND, trace coarse sand, fine gravel, clay, and organics.	D35485/ PA41S3	TOC 209 CBCs	180-81717-11/ 13887011	63.9 69.3	19,000 J/ NA	18, pp. 161, 205-209, 216; 52, pp. 11, 582; 55, p. 18; 61, p. 6

NOTES:

* = Below the sediment/water interface.
TOC = Total Organic Carbon (SW-846 9060/Lloyd Kahn)
209 CBCs = Contract Laboratory Program (CLP) 209 Chlorinated Biphenyl Congeners (HRSM01.2 for PCB Congeners) (Ref. 53, pp. 1, 2, 4, 161, 166-170)
No. = Number
% = percent
mg/kg = milligrams per kilogram
J = Result is estimated due to exceedance of laboratory duplicate RPD criteria.
NA = Not applicable.
DAS = Delivery of Analytical Services
CLP = Contract Laboratory Program

TABLE 2
BACKGROUND AND OBSERVED RELEASE SAMPLE CONCENTRATIONS
START 2018 SEDIMENT SAMPLING
LOWER NEPONSET RIVER

Station Location	Sample Date/Time	Field Sample ID	CLP Sample No./ CLP Lab ID	Substance	Analytical Result (ng/kg)	Qualifier	Bias	Adjustment Factor**	Adjusted Analytical Result (ng/kg)	Qualifier	Adjusted CRQL	Conc. X > Bkgrd	References
Background Samples													
PTB-C1 A	9/4/2018 11:35	SD-02	PA41R4/ 13887002	Total PCBs*	4,600	J	High Bias or No Bias	No adjustment	4,598 (Removed rounding)**	J	6,700		18, pp. 155, 195-198, 215; 52, pp. 1-4, 11, 13, 113-119; 53, pp. 7-10, 23-25, 29-31, 65-67
				PCB #126	190	UM	No Bias	No adjustment	190	UM	1,100		
				PCB #77	1,100	U	No Bias	No adjustment	1,100	U	1,100		
				PCB #81	130	U	No Bias	No adjustment	130	U	1,100		
				PCB #118	1,100	U	No Bias	No adjustment	1,100	U	1,100		
UNR-C2 D	9/6/2018 14:03	SD-08	PA41S0/ 13887008	Total PCBs*	3,900,000	J	High Bias or No Bias	No adjustment	**3,923,012** (Removed rounding)**	J	9,700		18, pp. 164, 200-204, 216; 52, pp. 1-4, 11, 13, 431-438; 53, pp. 11-14, 23-25, 32-34, 65-67
				PCB #126	480	J	No Bias	No adjustment	**480**	J	1,600		
				PCB #77	12,000		No Bias	No adjustment	**12,000**		1,600		
				PCB #81	280	J	No Bias	No adjustment	**280**	J	1,600		
				PCB #118	160,000		No Bias	No adjustment	**160,000**		1,600		
UNR-C3 A	9/6/2018 15:15	SD-09	PA41S1/ 13887009	Total PCBs*	930,000	J	High Bias or No Bias	No adjustment	931,960 (Removed rounding)**	J	11,000		18, pp. 165, 205-209, 216; 52, pp. 1-4, 11, 14, 481-488; 53, pp. 15-18, 26-28, 35-37, 65-67
				PCB #126	320	UM	No Bias	No adjustment	320	UM	1,800		
				PCB #77	1,800	U	No Bias	No adjustment	1,800	U	1,800		
				PCB #81	190	U	No Bias	No adjustment	190	U	1,800		
				PCB #118	28,000		No Bias	No adjustment	28,000		1,800		
UMB-C2 C	9/6/2018 11:02	SD-10	PA41S2/ 13887010	Total PCBs*	920,000	J	High Bias or No Bias	No adjustment	915,731 (Removed rounding)**	J	10,200		18, pp. 163, 205-209, 216; 52, pp. 1-4, 11, 14, 530-537; 53, pp. 15-18, 26-28, 38-40, 65-67
				PCB #126	290	UM	No Bias	No adjustment	290	UM	1,700		
				PCB #77	1,700	U	No Bias	No adjustment	1,700	U	1,700		
				PCB #81	140	UM	No Bias	No adjustment	140	UM	1,700		
				PCB #118	37,000		No Bias	No adjustment	37,000		1,700		
Release Samples													
WBD-C5 C	9/4/2018 10:45	SD-01	PA41R3/ 13887001	Total PCBs*	70,000,000	J	High Bias or No Bias	10/17.79	52,512,000 (Removed rounding)**	J	220,000	13.4	18, pp. 154, 195-199, 215; 52, pp. 1-4, 11, 13, 67-74; 53, pp. 7-10, 23-25, 41-43
				PCB #118	500,000		No Bias	No adjustment	500,000		37,000	3.1	

TABLE 2
BACKGROUND AND OBSERVED RELEASE SAMPLE CONCENTRATIONS
START 2018 SEDIMENT SAMPLING
LOWER NEPONSET RIVER

Station Location	Sample Date/Time	Field Sample ID	CLP Sample No./ CLP Lab ID	Substance	Analytical Result (ng/kg)	Qualifier	Bias	Adjustment Factor**	Adjusted Analytical Result (ng/kg)	Qualifier	Adjusted CRQL	Conc. X > Bkgrd	References
BCA-C3 C	9/4/2018 16:00	SD-03	PA41R5/ 13887003	Total PCBs*	33,000,000	J	High Bias or No Bias	10/17.79	28,241,911 (Removed rounding)**	J	9,300	7.2	18, pp. 156, 195-199, 215; 52, pp. 1-4, 11, 13, 167-174; 53, pp. 7-10, 23-25, 44-46, 65-67
				PCB #126	2,800		No Bias	No adjustment	2,800		1,600	5.8	
				PCB #77	160,000		No Bias	No adjustment	160,000		1,600	13.3	
				PCB #81	5,100		No Bias	No adjustment	5,100		1,600	18.2	
				PCB #118	510,000		No Bias	No adjustment	510,000		1,600	3.2	
BCA-C5 D	9/4/2018 17:40	SD-04	PA41R6/ 13887004	Total PCBs*	46,000,000	J	High Bias or No Bias	10/17.79	40,099,027 (Removed rounding)**	J	11,000	10.2	18, pp. 157, 195-199, 215; 52, pp. 1-4, 11, 13, 216-223; 53, pp. 7-10, 23-25, 47-49, 65-67
				PCB #126	2,300		No Bias	No adjustment	2,300		1,900	4.8	
				PCB #77	140,000		No Bias	No adjustment	140,000		1,900	11.7	
				PCB #81	2,100		No Bias	No adjustment	2,100		1,900	7.5	
				PCB #118	540,000		No Bias	No adjustment	540,000		1,900	3.4	
BCA-C105 D	9/4/2018 17:40	SD-12	PA41S4/ 13887012	Total PCBs*	47,000,000	J	High Bias or No Bias	10/17.79	40,821,139 (Removed rounding)**	J	11,000	10.4	18, pp. 166, 205-209, 216; 52, pp. 1-4, 11, 14, 629-636; 53, pp. 15-18, 26-28, 62-64, 65-67
				PCB #126	2,200		No Bias	No adjustment	2,200		1,900	4.6	
				PCB #77	140,000		No Bias	No adjustment	140,000		1,900	11.7	
				PCB #81	1,900		No Bias	No adjustment	1,900		1,900	6.8	
				PCB #118	540,000		No Bias	No adjustment	540,000		1,900	3.4	
THD-C1 F	9/5/2018 13:10	SD-07	PA41R9/ 13887007	Total PCBs*	11,000,000,000	J	High Bias or No Bias	10/17.79	2,748,750,000 (Removed rounding)**	J	290,000	700.7	18, pp. 159, 200-204, 216; 52, pp. 1-4, 11, 13, 363-370; 53, pp. 11-14, 23-25, 56-58, 65-67
				PCB #77	2,300,000		No Bias	No adjustment	2,300,000		48,000	191.7	
				PCB #118	13,000,000		No Bias	No adjustment	13,000,000		48,000	81.3	
THD-C1 G	9/5/2018 13:15	SD-05	PA41R7/ 13887005	Total PCBs*	270,000,000	J	High Bias or No Bias	10/17.79	174,895,800 (Removed rounding)**	J	270,000	44.6	18, pp. 159, 200-204, 215; 52, pp. 1-4, 11, 265-272; 53, pp. 3, 11-14, 23-25, 50-52, 65-67
				PCB #77	100,000		No Bias	No adjustment	100,000		45,000	8.3	
				PCB #118	640,000		No Bias	No adjustment	640,000		45,000	4.0	

TABLE 2
BACKGROUND AND OBSERVED RELEASE SAMPLE CONCENTRATIONS
START 2018 SEDIMENT SAMPLING
LOWER NEPONSET RIVER

Station Location	Sample Date/Time	Field Sample ID	CLP Sample No./ CLP Lab ID	Substance	Analytical Result (ng/kg)	Qualifier	Bias	Adjustment Factor	Adjusted Analytical Result (ng/kg)	Qualifier	Sample Quantitation Limit	Conc. X > Bkgrd	References
LCA-C2 E	9/5/2018 16:28	SD-06	PA41R8/ 13887006	Total PCBs*	1,100,000,000	J	High Bias or No Bias	10/17.79	583,099,500 (Removed rounding)**	J	220,000	148.6	18, pp. 161, 200-204, 215; 52, pp. 1-4, 11, 13, 306-313; 53, pp. 11-14, 23-25, 53-55, 65-67
				PCB #77	540,000		No Bias	No adjustment	540,000		36,000	45.0	
				PCB #118	3,100,000		No Bias	No adjustment	3,100,000		36,000	19.4	
LCA-C3 D	9/5/2018 16:24	SD-11	PA41S3/ 13887011	Total PCBs*	280,000,000	J	High Bias or No Bias	10/17.79	225,821,940 (Removed rounding)**	J	167,000	57.6	18, pp. 161, 205-209, 216; 52, pp. 1-4, 11, 14, 572-579; 53, pp. 15-18, 26-28, 59-61, 65-67
				PCB #77	720,000		No Bias	No adjustment	720,000		28,000	60.0	
				PCB #118	2,100,000		No Bias	No adjustment	2,100,000		28,000	13.1	

NOTES:
Total PCBs = Total Polychlorinated Biphenyls.
PCB #126 = polychlorinated biphenyls #126 = 3,3',4,4',5-Pentachlorobiphenyl = 3,3',4,4',5-PeCB = CBC #126 = chlorinated biphenyls #126 = Congener Compound #126 [53, p. 67].
PCB #77 = polychlorinated biphenyls #77 = 3,3',4,4'-Tetrachlorobiphenyl = 3,3',4,4'-TCB = CBC #77 = chlorinated biphenyls #77 = Congener Compound #77 [53, p. 67].
PCB #81 = polychlorinated biphenyls #81 = 3,4,4',5-Tetrachlorobiphenyl = 3,4,4',5-TeCB = CBC #81 = chlorinated biphenyls #81 = Congener Compound #81 [53, p. 67].
PCB #118 = polychlorinated biphenyls #118 = 2,3',4,4',5-Pentachlorobiphenyl = 2,3',4,4',5-PeCB = CBC #118 = chlorinated biphenyls #118 = Congener Compound #118 [53, p. 67].
CBCs = Chlorinated Biphenyl Congeners [53, pp. 1, 2].
CLP = Environmental Protection Agency (EPA) Contract Laboratory Program.
No. = Number.
ID = Identification.
ng/kg = nanograms per kilogram
Bkgrd = Background
Conc. X > Bkgrd = Concentration times greater than background; Equal to the number of times the analytical concentration is greater than the background concentration value [53, pp. 65-67].
CRQL = Contract Required Quantitation Limit [53, p. 67].
The adjusted CRQL is listed for individual CBCs [53, pp. 3, 64, 67]. No CRQL is listed for Total PCBS. For total PCBs, the highest adjusted CRQL in that sample is used [Ref. 53, pp. 3, 4, 23-64].
N/A = Not Applicable.
* = Total PCBs is calculated from the sum of 209 CBCs [53, p. 67].
** = Adjustment Factor is the adjustment factor for each of the individual 209 CBCs requiring adjustment [53, pp. 4, 5, 180, 189].
Bold values indicate selected background level for comparison to release samples.

QUALIFIERS:
J = The analytical result is estimated [53, p. 67].
U = Values not detected above the MDL are reported at the sample adjusted CRQL with a "U" flag, per the contract laboratory program (CLP) Statement of Work [53, p. 67].
UM = The analyte was not detected and the calculated estimated detection limit is less than the adjusted method detection limit; therefore the method detection limit is reported [53, p. 67].

Attribution

Sediments in the Lower Neponset River are contaminated with PCBs for a length of 3.49 miles (see Section 2.2). The origin of the PCBs causing the significant increase in PCBs in the contaminated Lower Neponset River sediments has not been identified due to the presence of too many past and present possible sources contributing to the contamination. As a result, the source(s) of all the contamination in any particular location in the Neponset River cannot be determined. The contaminants detected in the river sediments can come from a wide variety of industrial and other anthropogenic activities [24, pp. 7-11; 26, pp. 7-10; 30, pp. 6-8; 32, p. 2; 34, p. 13; 35, p. 8; 38, p. 6; 40, pp. 10-11; 41, pp. 4-5; 42, p. 3; 45, pp. 7-9; 48, pp. 15-17; 49, pp. 9-10]. Contamination can enter the water body and underlying sediments through numerous ways, including waste disposal and discharge, inadvertent spills, urban/storm water runoff, sanitary sewers, and/or atmospheric deposition [11, p. 11]. EPA considers any upland properties contributing to the sediment contamination observed in the Lower Neponset River as a "possible source". After several USGS, MassDEP, and EPA investigations, the specific sources of contaminants in the Lower Neponset River have not been defined [6, pp. 20-21; 14, p. 2; 15, pp. 2-3; 18, pp. 24-25, 29-30; 92, p. 1]. Furthermore, there are no known sources of PCBs in the natural environment [6, pp. 24; 80, p. 1]. PCBs are man-made organic chemicals manufactured within the United States from 1929 until manufacturing was banned in 1979 [84, pp. 2]. Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban [84, p. 2]. These products include (but are not limited to) transformers and capacitors, electrical equipment (voltage switches, re-closers, bushings, and electromagnets), oils used on motors and hydraulic systems, old electrical devices or appliances containing PCB capacitors, fluorescent light ballasts, cable insulators, thermal insulation materials (including fiberglass, felt, foam, and cork), adhesives and tapes, oil-based paints, caulking, plastics, carbonless copy paper, and floor finish [83, p. 27; 84, p. 2].

A historical environmental records/database review was provided by Environmental Data Resources, Inc. (EDR) to aid START in determining potential sources of attribution to the site and SWP. The database review lists facilities and areas with environmental concerns found within a specified radius of the subject area of concern or parcel. EDR completed the data search of facilities and areas with environmental concerns found within 1-mile of the Lower Neponset River site vicinity, defined as the lower Neponset River channel from the confluence of Mother Brook with the Neponset River, downstream to the Baker Dam. The review also identified "orphan sites" which may be located within 1-radial mile of the site based on the available information but whose specific locations cannot be mapped due to poor or inadequate address information. The EDR assessment revealed the following key points:

- EDR identified 83 facilities and areas available for mapping within 1 radial mile of the site vicinity (based on addresses or coordinates) and another 119 orphan sites that are potentially located with 1 radial mile of the site, whose locations could not be confirmed. Some EDR locations identified have multiple federal or state facilities and areas listed for that map location. These may be locations where multiple facilities and areas have occupied the same location throughout the years, map locations which may overlap with other facilities or areas, or those which have the same address or map identified coordinates.
- Three of the facilities or areas identified within 1 radial mile of the site vicinity are EPA Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Enterprise Management System (CERCLA/SEMS) facilities or areas, and three additional identified facilities or areas are EPA CERCLA/SEMS-Archive sites [19, pp. 4-5, 2461].
- EDR identified 71 current or former Resource Conservation and Recovery Act (RCRA) facilities within 1 radial mile of the site vicinity. These consist of two RCRA Large Quantity Generator (LQG) facilities, six RCRA-Small Quantity Generator (SQG) facilities, 21 RCRA-Conditionally Exempt Small Quantity Generator (CESQG) facilities, and 42 RCRA – Non-Generator/No Longer Regulated (Non-Gen/NLR) sites located within 1 radial mile of the site vicinity. Non-Gen/NLR facilities include former RCRA facilities that are no longer operating at this location or that have changed processes and are no longer using RCRA regulated substances [19, pp. 5-7, 2461; 90, pp. 1-4].

- EDR also identified 14 mapped locations of PCB-related occurrences or releases within 1 radial mile of the site vicinity. Some of these facilities and areas are within the EPA and/or State data systems, and in some cases multiple PCB releases are listed as having occurred at one mapped location [19; pp. 5-8, 255, 870, 1064, 1089, 1091, 1144, 1292, 1300, 1438, 1492, 1563, 1602, 1888, 1895, 2461; 90, p.5].

MassDEP has completed a file review of PCB waste facilities and areas within the Neponset River Basin [14, p. 2; 15, pp. 2-3; 20; 92, pp. 1-2]. A total of 34 facilities and areas have been identified that had or have PCBs as a contaminant of concern and are located in the vicinity of the Neponset River or one of its tributaries [15, p. 2; 92, p. 1]. MassDEP also concluded that the major sources of the PCB contamination to the lower Neponset River are located along Lower Mother Brook [14, p. 2; 92, p. 1]. Overall, MassDEP identified 10 properties, including the north and south bank areas of Mother Brook, that could be sources of PCBs to the Neponset River either directly or through one of its tributaries [15, p. 2; 20; 92, pp. 1-2]. Two of these facilities and/or areas are located on the Neponset River, upstream of the confluence of Mother Brook and the Neponset River, six facilities and/or areas are located along the lower sections of Mother Brook, and two facilities and/or areas are located downstream of the Mother Brook confluence on the Lower Neponset River [14, p. 2; 15, pp. 2-3; 20; 92, pp. 1-2].

The two facilities and/or areas located upstream of the confluence of Mother Brook and the Neponset River include the Canton Airport Site [Release Tracking Numbers (RTNs) 4-3000941, 4-3020140, and 4-0022292], which is located along Neponset Street in Canton approximately 6 miles upstream of the Mother Brook confluence, and the Norwood PCB site (RTN 4-3000403), which is located along Meadow Brook in Norwood and approximately 7.5 miles upstream of the confluence of Mother Brook and the Neponset River [15, p. 2; 20, pp. 11, 12; 42, p. 2; 75, p. 5; 92, p. 1]. The six facilities and/or areas located along Lower Mother Brook include: (1) the former L.E. Mason Facility at 98 Business Street (RTN 3-0730); (2) the former Allis & Chalmers Manufacturing Facility at 1377 Hyde Park Avenue (RTN 3-27067); (3) the Former American Tool and Machine at 1415 Hyde Park Avenue (RTNs 3-27790, 3-27791, 3-28336 & 3-28835); (4) the former Allis & Chalmers Electrical Manufacturing facility at 1344 Hyde Park (3-32581); (5) the former location of a Junkyard/Paint Manufacturing Facility at 56R Business Street (RTN 3-23869); and (6) North and South Banks of Mother Brook (RTN 3-27168) [15, p. 2-3; 20; 92, pp. 1-2]. The two facilities and/or areas located downstream of the confluence of Mother Brook and the Neponset River include the former Lewis Chemical Facility at 16 Fairmount Court (RTNs 3-1616), which includes a parcel of State land owned by the DCR between the former Lewis Chemical property the river (3-0031548 and 3-0031697) and the former Bay State Paper at 892 River Street (RTNs 3-25435 and 3-0027201) [15, p. 3; 19, pp. 7, 16, 18, 946, 996, 2461; 45, pp. 4-5; 92, p. 1].

Former L.E. Mason Facility (RTN 3-0730)

The Former L.E. Mason Facility is located at 98 Business Street in the southwestern portion of the Hyde Park section of the city of Boston [21, p. 16]. The facility abuts the northwestern banks of Mother Brook, a tributary of the Neponset River [21, p. 16]. The facility is situated in a mixed residential and industrial area, which is zoned for both light industrial and residential use [21, p. 16]. The facility has been used for various manufacturing purposes for over 130 years (since before 1891) [21, p. 17; 22, p. 16]. Between 1945 and 2002, the facility was occupied by L.E. Mason, a producer of cast zinc and aluminum electrical supplies [21, p. 17; 23, p. 2]. In 1999, L.E. Mason was acquired by Thomas and Betts Corporation (T&BC) [51, p. 1]. The operations performed on the facility included zinc and aluminum die-casting, painting, assembly and packaging of the finished products, and shipping and receiving [22, p. 14; 23, p. 2; 24, p. 7]. Since 2002, those operations are no longer conducted at the facility and it is instead used as office and storage space for a moving company, and a small shipping company [23, p. 2; 24, p. 7].

In November 1986, a subsurface investigation was conducted at the facility, in which oil and/or hazardous materials (OHM) contamination in soil and groundwater was documented [24, p. 7]. MassDEP assigned RTN 3-0730 to the entire facility in 1987 [24, p. 7]. On 3 January 1996, the facility was classified as a Tier IB Transition-site (Permit No. 104178) and a Tier IB Extension was approved by MassDEP extending the permit through 21 March 2007 [24, p. 7]. Additional permit extensions were granted by MassDEP through 3 April 2011 [24, p. 7].

Several assessment and remedial actions have occurred at the facility [24, pp. 7-8]. The results of past investigations concluded that soil, groundwater, and indoor air on the property and sediment in the adjacent Mother Brook have been impacted by releases of OHM to the environment [24, p. 7]. OHM identified at the facility included chlorinated and non-chlorinated volatile organic compounds (VOCs), PAHs, petroleum hydrocarbons, heavy metals, and PCBs [24, p. 7].

Between 1997 and 2000, several assessment activities occurred [23, pp. 2-7; 24, pp. 7-8]. Contamination was found to be up to 50 feet below grade around the property, within the property boundaries [22, p. 29; 23, p. 4]. Later, sediment samples were collected upstream and downstream of the facility [23, p. 4]. The upstream sample results had a maximum of 520 µg/Kg total PCBs, while downstream sample results had a maximum of 2,183,300 µg/Kg total PCBs [23, p. 4]. Subsequent remedial activities included excavation of 2,024 tons of PCB-impacted soil/sediment and post-excavation confirmation sampling [23, p. 5].

Through the 1999 acquisition of L.E. Mason, T&BC became the responsible party of record for the response actions at the Former L.E. Mason facility [18, p. 15; 25, p. 1]. Response actions included the dredging and remediation of portions of Mother Brook that are upstream of, adjacent to, and downstream of the Former L.E. Mason property [18, p. 15; 24, p. 23; 25, p. 1].

Remediation actions included major excavation activities on property and within Mother Brook to remove contaminated sediments, which extended downstream to the confluence of the Neponset River and Mother Brook [24, p. 23]. PCB-contaminated sediment was completely excavated downstream to the Neponset River (1,400 feet) [24, p. 27]. Depth of excavation extended to more than 20 feet in Upper Mother Brook to 1.5 to 4 feet in Lower Mother Brook [24, p. 28; 24, p. 31]. Other remediation actions included groundwater treatment and the construction of a barrier wall, and subsequent restoration of the downstream section of Mother Brook [24, pp. 10, 14, 31-32].

Former Allis & Chalmers Manufacturing Facility (RTN 3-27067)

The Former Allis & Chalmers Manufacturing Facility (A&CMF) is located at 1377 Hyde Park Avenue in the Hyde Park section of Boston, Massachusetts [26, pp. 6-7]. Currently, the property consists of a Shaw's Supermarket building, which also includes an OSCO drug store, a bank, and associated parking [26, p. 6]. The facility is situated in a mixed industrial, commercial, and residential area [26, p. 6]. Mother Brook, located immediately adjacent to the facility behind the building, flows eastwardly and discharges to the Neponset River [26, p. 6].

Between 1930 and 1973, the facility was a research and development (R&D) facility for electrical equipment for Condit Electrical Manufacturing Company (and was later owned by Allis & Chalmers Corporation) [26, p. 7].

From 2007 through 2010, response actions were conducted for the Former L.E. Mason facility, consisting of dredging and remediation of portions of Mother Brook that are upstream of, adjacent to, and downstream of the A&CMF property [27, p. 11; 28, p. 3]. During this dredging and remediation, T&BC used a portion of the supermarket's property to stockpile excavated sediments from Mother Brook [27, p.11]. During the stockpiling activities, T&BC identified two discharge pipes along the embankment behind the supermarket building and collected soil and sediment samples at the end of each of the pipes, directly surrounding the pipes, and along the embankment [27, p. 11]. Analytical results of the samples collected indicated the presence of PCBs at concentrations ranging from 0.3 to 3,400 µg/Kg. With the exception of one sample, only Aroclor 1248 was detected in the samples; other Aroclors were not detected [27, p. 11].

On 6 September 2007, following the detection of PCBs in the soil and sediment, MassDEP issued a Notice of Responsibility (NOR) and issued RTN 3-27067 [27, p. 11]. In October 2007, MassDEP directed that going forward, RTN 3-27067 was to be used to track work on the upland areas of the 1377 Hyde Park Ave property [27,

p. 12]. MassDEP directed that RTN 3-27168 was associated with the on-going Immediate Response Action (IRA) work to remediate and stabilize the 1377 Hyde Park Ave stream bank (as well as the PCB-contaminated stream bank on the far side of Mother Brook) and was to be conducted jointly by T&BC and Shaw's Supermarket [27, p. 12].

A Phase I, Phase II, and Method 3 Risk Characterization (M3RC) were conducted to characterize the facility [27, pp. 59, 63; 28, p. 15; 26, p. 69]. In addition, a Class B-2 Response Action Outcome (RAO) Statement was submitted to MassDEP [26, p. 2]. The RAO Statement concluded that the PCBs in soil did not constitute PCB remediation waste and were not subject to regulation under the Toxic Substances Control Act (TSCA) and the PCB MegaRule, and that No Significant Risk of Harm to Human Health exists for commercial use, however Significant Risk of Harm does not exist for if used for residential purposes [26, pp. 11-12].

In October 2007, MassDEP significantly modified its prior directions for the response action in connection with RTN 3-27067 [26, p. 8]. This included directing that on-going IRA work to remediate and stabilize the 1377 Hyde Park Avenue stream bank was to be conducted by both T&BC and New Albertsons, the parent company of Shaw's Supermarkets, Inc. [26, pp. 6-8]. T&BC is the responsible party for response actions at the Former L. E. Mason facility, located west and upstream of the A&CMF [25, p. 1; 26, p. 8]. In 1999, L.E. Mason was acquired by T&BC [18, p. 15; 25, p. 1]. Response actions included the dredging and remediation of portions of Mother Brook that are upstream of, adjacent to, and downstream of the A&CMF [18, p. 16; 27, p.11].

Former American Tool and Machine (RTN 3-028835)

The Former American Tool and Machine facility is located at 1415 Hyde Park Avenue in the Hyde Park section of Boston, Massachusetts [18, pp. 15, 17, 72; 30, pp. 2, 6, 9]. The facility was occupied by a former tool and machine manufacturing mill structure (three-story brick former mill and one-story warehouse) which was renovated to relocate the Boston Renaissance Charter Public School (BRCPS) [30, pp. 2, 6, 9]. The mill building was constructed prior to 1917, and the warehouse building was constructed in the mid-1970s [30, p. 2]. The facility is bounded by the Mother Brook and commercial property to the north, an MBTA right of way to the west, Dacy Street and multi-unit residential property to the south, and Hyde Park Avenue and commercial property to the east [30, p. 2].

T&BC is the responsible party for response actions at the Former L.E. Mason facility, located west and upstream of the BRCPS [25, p. 1; 30, p. 7]. These response actions included the dredging and remediation of portions of Mother Brook that are upstream of, adjacent to, and downstream of the BRCPS [30, p. 7]. An agreement between the parties conducting response actions on the Mother Brook project and the BRCPS provided access to the BRCPS property for the purpose of facilitating the on-going remediation activities along Mother Brook [30, p. 7]. Specifically, BRCPS agreed to provide access to the subject property for the purpose of constructing a temporary stockpile pad that was to be located on the northern end of the BRCPS facility, for use in temporary stockpiling of excavated soil from the Mother Brook, equipment access to the brook, and for conducting remedial activities on the brook's bank [30, p. 7]. Analytical results of samples collected prior to the preparation of a stockpile pad on the BRCPS property indicated elevated levels of PCBs (specifically Aroclor-1254) ranging from 49,000 µg/Kg to 640,000 µg/Kg [30, p. 7]. Additional investigations confirmed the extent of PCB contamination [30, pp. 7-8]. BRCPS prepared a Modified Release Abatement Measure (RAM) Plan and excavated and removed for off-site disposal 8,720 tons of TSCA (≥50,000 µg/Kg) characterized waste and 5,563 tons of Non-TSCA (<50,000 µg/Kg) characterized waste from the property [30, pp. 24-25; 31, p. 2].

Former Allis & Chalmers Electrical Manufacturing (RTN 3-032581)

The Former Allis & Chalmers Electrical Manufacturing (A&CEM) facility is located at 1344 Hyde Park Avenue in the Hyde Park section of Boston, Massachusetts [32, pp. 6, 7, 9]. The facility is bounded by the Mother Brook to the south, Hyde Park Avenue to the west, and residential and commercial properties to the north and east. Margin Street is located to the south, on the opposite side of Mother Brook [32, p. 6].

The facility was occupied by the Robert Bleakie & Co. Woolen Mill by 1891 [32, p. 7]. By 1917, the facility was occupied by the American Felt Co., Manufacturing Woven Felts [32, p. 7]. Between 1930 and 1974, the Condit Electrical Manufacturing Co. (and later Allis & Chalmers Electrical Manufacturing) occupied the property, until a fire in 1974 [32, pp. 7-8; 33, p. 1; 92, p. 2]. Historical records show that a major fire occurred at the facility on 17 April 1974 [33, p. 1; 92, p. 2]. The A&CEM facility property is currently occupied by a three-story multi-unit residential brick building (Blake Estates I and II) constructed in 1980 [32, pp. 6, 8, 330]. The Blake Estates I and II apartment buildings house 263 residents [32, Appendix G, p. 330].

The L.E. Mason excavation of Mother Brook included the stretch of the river immediately abutting the A&CEM property [32, p. 8]. During remediation of Mother Brook by Former L.E. Mason, five separate drainage pipes were identified extending from the property and discharging into Mother Brook [32, p. 8]. Sediment samples collected from inside the drainage pipes showed elevated concentrations of PCBs in four of the five [32, p. 8]. Sampling of sediments at the outfall pipes of the A&CEM facility indicated maximum PCBs of 42,000 µg/Kg [32, p. 8].

In 2013, EPA/Weston Solutions, Inc. Superfund Technical Assessment and Response Team III (START III), conducted soil sampling and identified a source area on the property [34, pp. 18, 38]. The maximum Aroclor concentrations were Aroclor-1248 (6,700 µg/Kg), Aroclor-1254 (7,600 µg/Kg), and Aroclor-1260 (2,500 µg/Kg) [34, p. 19]. In December 2015, a Permanent Solution Statement was submitted to MassDEP [32, pp. 22-24]. The statement concluded that a release of PCBs was identified in soil on the subject property, but a Method 3 Risk Assessment indicated that contamination concentrations in facility soils were present at a level of No Significant Risk at the subject facility [32, pp. 22-24; Appendix G, p. 353]. It also determined that an Activity and Use Limitation (AUL) was not necessary to maintain a condition of No Significant Risk [32, pp. 22-24]. The Method 3 Risk Characterization noted that produce expected to be grown on the site should follow Best Management Practices (BMPs) for gardening in urban areas [32, p. 24; Appendix G, p. 353]. Therefore, it was recommended that gardening BMPs be employed on the facility. A Permanent Solution with Conditions is applicable for the facility [32, p. 24; Appendix G, p. 353].

<u>Former Junkyard/Paint Manufacturing Facility (RTN 3-23869)</u>

The Former Junkyard/Paint Manufacturing Facility consists of three vacant parcels of a six-parcel property known as 54-64A Business Street that is currently owned by The Village at Cleary Square, LLC and has been redeveloped as a residential condominium community [35, pp. 7-8]. Portions of the property were operated as a gristmill, a sash and blind factory, and a coal company before 1891; and from the 1930s to the 1960s, the Dampney Paint Co., a paint formulation company, occupied the northern portion of the Facility that abuts the railroad tracks [35, pp. 7-8]. According to historical records, the property was primarily operated by Hyde Park Auto Replacement Parts, Inc., as an auto salvage business between 1934 and 2004 [35, p. 7].

A limited subsurface investigation was conducted between June 2002 and October 2003 as part of preacquisition due diligence for a condominium complex prior to redevelopment [35, pp. 8, 9; 36, p. 12]. Test-pitting activities uncovered stained soils and car and building debris [36, pp. 31-36]. Soil samples were collected across the property, and several analytes were detected, including PCBs above the RCS-1 Reportable Concentrations and the Method 1 S-1 GW-2 and GW-3 standards [36. p. 41]. In 2004, a RAM Plan was submitted to MassDEP [35, p. 10]. The RAM was performed between May 2004 and January 2005 and resulted in the excavation and off-site disposal of a total of 10,862 tons of impacted soil [35, p. 8]. In 2005, a RAM Completion and Class A-3 RAO Statement was submitted to MassDEP [35, pp. 2, 7, 8]. Based on the results of the RAM and a Method 3 Risk Characterization, a level of No Significant Risk (NSR) to human health, safety, welfare, and the environment had been achieved, with the implementation of a Notice of Activity and Use Limitation (AUL) to restrict future use of a portion of the Facility [35, p. 8]. An AUL was recorded for a portion of the property on 4 April 2005 [35, pp. 8, 26, Appendix F, p. 664].

North and South Banks of Mother Brook (RTN 3-27168)

The North and South Banks of Mother Brook have been defined as encompassing the North and South Banks along a stretch of approximately 400 feet of Mother Brook between the easterly (downstream) side of the MBTA/Amtrak railroad bridge (upstream limit) and the westerly (upstream) side of the Hyde Park Avenue bridge (downstream limit) [37, pp. 8, 9]. The boundaries extend from the top of the stream bank to the toe of the stream bank on both the north and south sides of Mother Brook between the two bridges [37, p. 8]. The North Bank of Mother Brook site includes the bank of Mother Brook immediately south of the Former Allis & Chalmers Manufacturing Research and Development facility (now a Shaw's Supermarket) [37, p. 9]. The South Bank of Mother Brook site includes the bank of Mother Brook immediately north of the Former American Tool and Machine Company (now the Boston Renaissance Charter Public School) [38, pp. 6-7; 39, p. 7]. PCBs on the North Bank were discovered during the remediation of the Former L.E. Mason property and the downstream portion of Mother Brook [37, p. 9]. A subsequent IRA of both the North and South banks indicated elevated PCBs within surface soils [37, p. 8; 38, p. 6]. Excavation extended approximately 6 feet horizontally into the banks [37, p. 10; 38, p. 8]. Additional excavation was completed as required for reconstruction purposes and based on confirmatory soil samples [38, p. 8]. Both banks were covered in July 2010 [37, p. 13; 38, p. 8; 39, p. 8]. A direct contact barrier was constructed on the North Bank to contain any remaining PCB contamination, and to prevent migration of PCB-contaminated soil and/or sediment into Mother Brook, while gravel, crushed stone, and rip rap installed on the South Bank served to stabilize the bank [38, pp. 8-9; 39, p. 9]. Following stabilization of the South Bank, woody vegetation on the bank was restored [37, p. 13-14]. Permanent fencing restricts access to both banks [38, p. 9; 39, p. 17].

In November 2010, a Response Action Outcome Partial Statement (RAO-P) for a Class A-3 Permanent Solution was submitted for the North Bank [38, pp. 1, 6]. A Method 3 Risk Characterization was performed to evaluate the risk posed by the northern bank portion of the site [38, pp. 12, 15]. The results of the Risk Characterization indicated that a condition of No Significant Risk exists for current and foreseeable future land uses on the northern bank of Mother Brook, based on the placement of an AUL on 1377 Hyde Park Avenue and the appropriately restricted uses of the Amtrak Parcel portion of the site consistent with its status as a rail right-of-way for which no AUL is required [38, pp. 11-12, 15, 17-22, 30].

Former Norwood PCB Superfund Site (RTN 4-3000403)

The Norwood PCB Superfund Site is approximately 26 acres of an industrial/commercial area in Norwood, Massachusetts [40, p. 10]. The site includes several commercial, industrial, residential, parking areas, and fields [40, p. 10]. A portion of the property is referred to as the Hurley property, which was formerly occupied by the Grant Gear building and was used to manufacture electronic equipment and gears [40, p. 10; 41, p. 4]. The Hurley property is now owned by MonkeySports Capital MA, LLC [41, p. 4]. The site is bordered to the north by Meadow Brook, to the east by the heavily commercial U.S. Route 1 and the Dean Street access road, to the south by Dean Street, and to the west by the residential Pellana Road [40, p. 10].

Contamination at the Norwood PCB Site originated from disposal practices of the parties who previously owned/operated businesses on the Hurley property [40, p. 10]. The building was constructed in 1942 by Bendix Aviation Corporation, which produced navigational control systems and conducted other electronic research in the building for the U.S. Navy [40, p. 10]. In October 1947, the land was purchased by Tobe Deutschman Corporation, which manufactured electrical equipment at the Site, including capacitors and transformers [40, p. 10]. The property was purchased in October 1956 by Cornell-Dubilier Electronics, Inc., which also manufactured electrical equipment at the facility [40, p. 10]. In January 1960, the property was briefly owned by Maryvale Corporation, and then purchased by the Friedland Brothers [40, p. 10]. The Friedland Brothers leased the property to Federal Pacific Electric Company, which held the lease on the property until October 1979 [40, p. 10]. During the period from 1960 to 1979, Federal Pacific Electric operated a business at the site, and sublet portions of the facility to Cornell-Dubilier Electronics, Inc. and to Arrow Hart Corporation, which also manufactured electrical equipment at the facility [40, p. 10].

In April 1983, Massachusetts Department of Environmental Quality Engineering (DEQE), now known as MassDEP, began sampling at the property and identified PCB soil contamination [40, p. 13]. Beginning in June 1983, EPA began removing contaminated soils from the site [40, p. 13]. A total of 518 tons of contaminated soils were excavated and removed from the site [40, p. 13].

Several investigations between 1983 and 1996 indicated elevated levels of PCBs in on-property surface and subsurface soils, off-property sediments, adjacent to Meadow Brook, and in portions of the Grant Gear building [41, pp. 4-5, 16]. Analytical results indicated PCBs up to 26,000,000 µg/Kg in soils [40, pp. 176, 177, 180]. The deepest occurrence where PCBs were found were over 20 feet deep in some locations [40, p. 19]. Sediment samples indicated PCBs as high as 1,100,000 µg/Kg, and dredge soil piles indicated PCBs as high as 3,850,000 µg/Kg [40, p. 22]. Remedial activities began at the property in late 1996 and included building demolition, soil/brook remediation including excavation of Meadow Brook sediments, and excavation of PCB-impacted soils [41, pp. 5-6]. In May 2008, construction began for retail development on the property and was substantially completed in 2009 [41, p. 6].

Former Canton Airport (RTNs 4-3000941, 4-3020140, and 4-0022292)

The Former Canton Airport facility is a former local airport located on Neponset Street, east of Interstate 95 in Canton, MA [18, p. 20; 42, pp. 2, 3, 10; 75, p. 5]. The Canton Airport operated from the 1930s until it was closed in the mid-1950s [42, p. 3]. From the 1950s until the 1980s, several tenants occupied the property and buildings, including a helicopter repair company, a scrap metal dealer, and a truck repair shop [42, p. 3]. The property currently consists of wetlands and wooded areas [42, p. 3]. PCBs were initially detected in surface soil samples around the facility buildings in 1984 as part of a due diligence investigation for a potential buyer [42, p. 39; 43, p. 6]. The facility was originally placed on the MassDEP site list in January 1990 due to PCBs in soils [42, p. 3]. An IRA was approved by MassDEP in 2001 [42, p. 3]. Surface soil sampling during the IRA indicated PCBs as high as 18,000,000 µg/Kg [42, p. 15]. Fencing was placed around the areas with the highest PCB levels in soil [42, p. 3]. Excavation of soils outside of the fenced area was completed [42, p. 3]. Between 2005 and 2006, the three vacant on-site buildings were demolished, and the debris was removed [42, p. 3].

A Phase IV Remedy Implementation Plan was submitted to the Massachusetts Department of Conservation and Recreation in December 2010 which reviewed the nature and extent of contamination, the remedial action plan, and outlined the future use of the facility as a DCR recreational park [75, pp. 1-13]. The identified contamination at the facility chiefly consists of PCBs and metals in sediment and soil, which are mainly present in the upper 1-3 feet [75, pp. 5, 8]. Low concentrations of PCBs have also been detected in groundwater samples [75, p. 5]. The remedial action plan includes excavation and off-site disposal of soil with PCB concentrations greater than 300 mg/kg, excavation and consolidation of the remaining PCBs and lead contaminated soil to the future soil re-use area located in the upland portion of the Hanger Area, debris removal and disposal from the Hanger Area and former runways, installation of sub-surface components of the planned park entrance facilities, a geotextile marking layer, a clean soil cap over the contaminated soil in the Hanger Area, construction of a permanent MWRA access roadway to their sewer easement, and construction of park facilities [75, p. 6]. The remedial work described above is mostly complete, however, additional time is needed for construction of the 3-foot cap [76, p. 4].

Former Lewis Chemical (RTNs 3-001616, 3-31548, and 3-31697)

The Former Lewis Chemical Facility is located at 0 and 12-24 Fairmount Court in Hyde Park, Massachusetts (RTN 3-001616) [44, pp. 4-5]. The facility also includes a parcel of State land owned by the DCR (The Neponset River Reservation) located off Fairmount Court, located between the Neponset River and the Former Lewis Chemical facility (RTN 3-31548) [45, pp. 4-5; 46, p. 5]. An additional RTN (3-31697) is associated with the property for a release condition related to total lead in the soil [45, p. 5]. The Former Lewis Chemical property (current 12-24 Fairmount Court) was occupied by several businesses in the late 1800s and early 1900s including the Royal Remedy Co. Laboratory, a mason and picture painting company, a quilted brush factory, a mill stone manufacturer, a carpenter, a dental tool manufacturer, a knitting business, a chemical and dye company, and

residential apartments [46, p. 6]. The property operated as a leather manufacturing company from 1940 to the early 1960s [44, p. 5; 46, p. 6]. Lewis Chemical collected, stored, transported, and processed hazardous waste on the property from 1963 until 1983 [44, p. 5; 46, p. 6]. MassDEP issued a court order to Lewis Chemical to cease operations in 1983 [44, p. 5; 46, p. 6]. The City of Boston gained ownership of the property in October 2000 via tax foreclosure [44, p. 5; 46, p. 6]. The former building was demolished in July 2013 and only the foundation slab remains [45, p. 6; 46, p. 5].

On July 2010, a Release Abatement Measure (RAM) Plan was developed to address elevated VOC concentrations in soil and subsequently reduce soil gas concentrations that were most likely infiltrating into ambient air inside the vacant building [47, pp. 1, 7]. In June 2013, a RAM Completion Report documented the soil vapor extraction (SVE) system installed at the former building and a 2019 Site Inspection documented the subsequent demolition of the building in July 2013 [18, p. 20; 44, pp. 1, 6, 10].

Several remedial activities have been conducted at the DCR portion of the facility [46, p. 10]. A Phase I Site Investigation was conducted at the DCR-owned portion of land between the Neponset River and the Lewis Chemical Facility [46, pp. 1, 4, 5]. A review of previous reports during the Phase I Site Investigation indicated that PCBs were discovered during many investigations, mostly near the former tank farm pad at the former Lewis Chemical property [46, pp. 7-8, 12-14, 17, 19-21, 24]. PCBs were found down to 20 feet [46, p. 19, 21, 24]. Samples collected by Woodard and Curran in 2008 indicated PCBs as high as 300,000 µg/Kg at 0-3 feet [46, p. 13, 19]. Nobis conducted soil boring in 2013 and found PCBs as high as 13,000,000 µg/Kg in soils [46, p. 13-14, 19, 24]. Elevated PCBs have been found in surface soils along the DCR-owned property [45, p. 16-17; 46, p. 14;]. There is no documented use of PCBs at the adjacent former Lewis Chemical [45, p. 13; 46, p. 17]. However, relatively high concentrations of PCBs detected in soils immediately adjacent to the former tank farm pad area, along with the detection of PCBs within drain sludge in that area, strongly suggest Lewis Chemical used, stored, and/or disposed of PCBs at one time [45, p. 13; 46, p. 17].

A final Phase II Comprehensive Site Assessment was submitted for RTN 3-1616 in April 2015, which documented that a level of No Significant Risk has not been attained and additional response actions are required [77, p. 2].

<u>Former Bay State Paper Company (RTNs 3-0025435 and 3-0027201)</u>
The Former Bay State Paper Company is located at 892 River Street in Hyde Park, Boston, Massachusetts [48, p. 14]. The property was used for paper mills dating back to 1773 [48, p. 15]. The Tileston & Hollingsworth Paper Company operated at the location until 1967 [49, p. 6]. The facility was owned by several other companies before Bay State Paper, which operated until 2004 [49, p. 6]. The property is bounded by the Neponset River and the MBTA Railroad to the south; Lefevre Street to the east; River Street to the north; and Veterans of Foreign Wars (VFW) hall to the west [48, p. 14; 49, p. 6].

Releases at the facility have occurred at six separate times [48, p. 15]. The releases, which appear in a cluster on the southeastern portion of the property, were all related to fuel oil deliveries and have been remediated to a condition of No Significant Risk [48, p. 15].

A 2005 Phase II assessment reported a Reportable Concentration of PCBs based on 17 samples collected from throughout the property [48, p. 17]. Soil around the base of two transformers exceeded the 2,000 µg/Kg allowed by the Massachusetts Contingency Plan (MCP) [48, p. 17]. The soils under Transformer T-4 had elevated PCBs up to 1,490,000 µg/Kg and under Transformer TSI-014 had elevated PCBs up to 4,920 µg/Kg [48, p. 22]. In 2008, a RAM plan was submitted for the redevelopment of the property into a retail shopping center [49, p. 9]. The redevelopment involved demolition of a majority of the above-grade portions of the existing brick and masonry paper mill facility, localized remedial excavations, earthwork to raise grades above the existing facility basement level, and construction of a retail shopping center comprised of seven new buildings and a renovated 1902 powerhouse building [49, p. 9; 50, p. 21]. The RAM plan included the phasing out and off-site disposal of

TSCA-regulated soil/media at former Transformers T-4 and TSI-014 [50, pp. 38, 42].

As discussed above, there are a number of possible sources of PCBs in the vicinity of the site. It is not possible to attribute the significant increase in PCBs in the contaminated sediments to a specific origin due to the presence of multiple possible sources for the substance [see Section 4.1.2.1.1].

Hazardous Substances Released

PCB Congener PCB #77, PCB # 81, PCB #118, PCB #126, and Total PCBs

[Table 2 of this HRS documentation record]

Surface Water Observed Release Factor Value: 550

4.1.3.2 Food Chain Threat Waste Characteristics

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

TABLE 3						
Hazardous Substance	**Source No.**	**Toxicity Factor Value**	**Persistence Factor Value***	**Bio-accumulation Value****	**Toxicity/ Persistence/ Bioaccumulation Factor Value (Ref. 1, Table 4-16)**	**References**
PCBs***	1	10,000	1	50,000	5×10^8	2, p. 2

Notes:

* Persistence value for (Rivers)

** Bioaccumulation factor value for (Freshwater)

*** PCBs hazardous substance equal PCB Congener PCB #77, PCB # 81, PCB #118, PCB # 126, and Total PCBs

Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

TABLE 4			
Source No.	**Source Type**	**Source Hazardous Waste Quantity**	**Source Hazardous Constituent Quantity Complete?**
1	Contaminated sediments	12,000	No

Sum of Values: 12,000

Hazardous Waste Quantity Factor Value: 10,000
(1, Table 2-6)

4.1.3.2.3 Waste Characteristics Factor Category Value

PCBs are associated with the contaminated sediments, which has a surface water pathway containment factor greater than 0 for the watershed, corresponds to a Toxicity/Persistence Factor Value of 10,000 and Bioaccumulation Potential Factor Value of 50,000, as shown previously [1, Section 4.1.3.2.1.4; 2, p. 2].

(Toxicity/Persistence Factor Value) x (Hazardous Waste Quantity Factor Value) = 10,000 x 10,000 = 1×10^8

(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x (Bioaccumulation Potential Factor Value) = $(1 \times 10^8) \times (50{,}000) = 5 \times 10^{12}$

The product corresponds to a Waste Characteristics Factor Category Value of 1,000 in Table 2-7 of the HRS [1, Table 2-7].

Hazardous Waste Quantity Factor Value: 10,000

(Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x Bioaccumulation Factor Value: $(1 \times 10^8) \times (50{,}000) = 5 \times 10^{12}$

Waste Characteristics Factor Category Value: 1,000
(Ref. 1, Table 2-7)

4.1.3.3 Human Food Chain Threat Targets

The Neponset River is a fishery. Fish types found in the river include American Eel, Brown Bullhead, and White Sucker. A fish advisory for the Neponset River has been issued by the MA DPH for the consumption of American Eel and White Sucker due to PCBs and DDT [18, pp. 34-35]. Following a habitat survey in 1995, the Massachusetts Division of Fisheries and Wildlife of the Massachusetts Department of Fish and Game within the Riverways Program, began to stock both shad and herring upstream of the two dams in anticipation of fish passage [6; p. 2]. Subsistence fishing has been confirmed on portions of the Lower Neponset River (between the confluence with Mother Brook and the Walter Baker Dam) [82, p. 2]. The fishery encompasses the contaminated portion of the Lower Neponset River located between location of EPA sediment sample LCA-C3/SD-11 and location of EPA Sediment sample WBD-C5/SD-01 (Figure 5) [1, 4.1.3.3; 82, p. 2]. These locations are both within the zone of contamination for the Lower Neponset River (Figures 2 and 5 of this HRS documentation record). Therefore, Actual Contamination is documented, and the target fishery is evaluated for Actual Human Food Chain Contamination. There are no media-specific benchmarks for sediment, so the target fishery is subject to Level II concentrations [1, Section 2.5, Section 4.1.3.3.2.2].

Actual Human Food Chain Contamination

TABLE 5

Sample ID	Sample Medium	Distance from LCA-C3/SD-11 (miles)	Hazardous Substance	Bioaccumulation Factor Value	References
LCA-C3 D/SD-11	Sediment	0	PCB	50,000	91, pp.1-3; 2, p. 2
LCA-C2 E/SD-06	Sediment	0.03	PCB	50,000	91, pp.1-3; 2, p. 2
THD-C1 G/SD-05	Sediment	0.81	PCB	50,000	91, pp.1-3; 2, p. 2
THD-C1 F/SD-07	Sediment	0.81	PCB	50,000	91, pp.1-3; 2, p. 2
BCA-C105 D/SD-12	Sediment	2.79	PCB	50,000	91, pp.1-3; 2, p. 2
BCA-C5 D/SD-04	Sediment	2.79	PCB	50,000	91, pp.1-3; 2, p. 2
BCA-C3 C/SD-03	Sediment	3.02	PCB	50,000	91, pp.1-3; 2, p. 2
WBD-C5 C/SD-01	Sediment	3.49	PCB	50,000	91, pp.1-3; 2, p. 2

Most Distant Level II Sample

Sample ID: WBD-C5 C/SD-01
Distance from the most upstream contaminated sediment sample: 3.49 miles
Reference: 91, pp.1-3

Level II Fisheries

The Lower Neponset River site consists solely of contaminated sediments with no identified source, with a clear direction of flow, therefore the measured distance is directed HRS Section 4.1.1.2. The fishery encompasses the contaminated portion of the Lower Neponset River located between location of EPA sediment sample LCA-C3/SD-11 and location of EPA Sediment sample WBD-C5/SD-01 (Figure 5) [1, Section 4.1.3.3.2.2; 82, p. 2]. These locations are within the 3.49 miles zone of contamination for the Lower Neponset River (Figures 3 and 5 of this HRS documentation record). Therefore, Actual Contamination is documented, and the target fishery is evaluated for Actual Human Food Chain Contamination. There are no media-specific benchmarks for sediment, so the target fishery is subject to Level II concentrations [1, Section 4.1.3.3.2.2].

TABLE 6

Identity of Fishery	Extent of Level II Fishery (Relative to PPE or Level I Fishery)	References
Lower Neponset River Fishery	3.49 miles	[1, Section 4.1.3.3.2.2; 82, p. 2]

4.1.3.3.1 Food Chain Individual

Sample ID: WBD-C5 C/SD-01
Level I/Level II/or Potential: Level II
Hazardous Substance: PCB
Bioaccumulation Potential: 50,000
References: Figure 4 of this HRS documentation record; Ref. 1, Section 4.1.3.2.1.3, Table 4-15; 2, p. 2; 53, Table 5

Food Chain Individual Factor Value: 45

4.1.3.3.2 Population

4.1.3.3.2.1 Level I Concentrations

There are no media-specific benchmarks for sediment. Therefore, there are no fisheries subject to Level I concentrations and the Level I Concentrations Factor Value is 0 [1, Section 2.5, Section 4.1.3.3.2.1].

4.1.3.3.2.2 Level II Concentrations

American Eel, Brown Bullhead, shad, herring, and White Sucker are found in the Lower Neponset River and are available for consumption [6, p. 14; 18, pp. 14, 34]. Subsistence fishing has been confirmed on portions of the Lower Neponset River, between the confluence with Mother Brook and the Walter Baker Dam [82, p. 2]. The fishery encompasses the contaminated portion of the Lower Neponset River located between location of EPA sediment sample LCA-C3/SD-11 and location of EPA Sediment sample WBD-C5/SD-01 (Figure 5) [1, p. 60; 82, p. 2]. These locations are both within the zone of Level II contamination for the Lower Neponset River (Figure 2 of this HRS documentation record). Therefore, Actual Contamination is documented, and the target fishery is evaluated for Actual Human Food Chain Contamination. There are no media-specific benchmarks for sediment, so the target fishery is subject to Level II concentrations [1, Section 4.1.3.3.2.2]. The fish consumption rate for the downstream fishery is not documented, so the fishery is assigned to the category "Greater than 0 to 100 pounds per year", which corresponds to the assigned Human Food Chain Population Value of 0.03 in Table 4-18 of the HRS, which is assigned as the Level II Concentrations Factor Value [1, Table 4-18].

Level II Population Targets

TABLE 7

Identity of Fishery	Annual Production (pounds)	References	Human Food Chain Population Value (Ref. 1, Table 4-18)
Lower Neponset River	>0 pounds	82, p. 2	0.03

Sum of Level II Human Food Chain Population Values: 0.03

Level II Concentrations Factor Value: 0.03

4.1.3.3.2.3 Potential Human Food Chain Contamination

Not Scored.

4.1.4.2 Environmental Threat Waste Characteristics

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

TABLE 8

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value*	Ecosystem Bio-accumulation Value**	Ecosystem Toxicity/ Persistence/ Ecosystem Bioaccumulation Factor Value (Ref. 1, Table 4-21)	References
PCBs	1	10,000	1	50,000	5×10^8	1, Section 4.1.4.2.1.4; 2, p. 2

Notes:

* Persistence value for (Rivers)
** Bioaccumulation factor value for (Freshwater)

PCBs are the hazardous substance associated with the highest ecotoxicity/persistence/ bioaccumulation factor value with a quantity of 5×10^8. PCBs were manufactured as a mixture of various PCB congeners through a chlorination process aimed at achieving a certain percentage of chlorine [84, pp. 4]. Mixtures with higher percentages of chlorine contain higher proportions of the more heavily chlorinated congeners; however, all congeners could be expected to be present at some level in all mixtures [84, pp. 4].

Ecosystem Toxicity/Persistence/Environmental Bioaccumulation Factor Value: 5×10^8

4.1.4.2.2. Hazardous Waste Quantity

TABLE 9

Source No.	Source Type	Source Hazardous Waste Quantity	Source Hazardous Constituent Quantity Complete?
1	Sediment	12,000	No

Sum of Values: 12,000

Hazardous Waste Quantity Factor Value: 10,000
(Ref. 1, Table 2-6)

The sum corresponds to a hazardous waste quantity factor value of 10,000 in Table 2-6 of the HRS [1, Section 2.4.2.2].

4.1.4.2.3 Waste Characteristics Factor Category Value

Hazardous substances (PCBs) associated with the waste source, which has a surface water pathway containment factor of 10 for the watershed, corresponds to an Ecotoxicity/Persistence Factor Value of 10,000 and Bioaccumulation Potential Factor Value of 50,000, as shown previously [1, Table 4-15, 56; 2, p. 2].

Ecosystem Toxicity/Persistence Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 10,000

Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value: 1×10^{8}

(Ecosystem Toxicity/Persistence Factor Value x Hazardous Waste Quantity Factor Value) x Environmental Bioaccumulation Factor Value: 5×10^{12}, subject to a maximum of $1x10^{12}$

Waste Characteristics Factor Category Value: 1,000
(1, Table 2-7)

4.1.4.3 Environmental Threat Targets

There are 41 HRS-eligible Palustrine Emergent (PEM), Palustrine Forested (PFO), and Palustrine Scrub-Shrub (PSS) wetlands with frontage along the contaminated portion of the Lower Neponset River located between location of EPA sediment sample LCA-C3/SD-11 and location of EPA Sediment sample WBD-C5/SD-01 comprising the extend of the zone of contamination for the site (Figure 6) [1, Table 4-24; 56, pp. 1, 7; 57, pp 1-29, 42; 93, pp. 1-2, 5-8]. Therefore, Actual Contamination is documented, and the target sensitive environment (i.e., wetland frontage) is evaluated for Actual Contamination [1, Table 4-24]. There is no media-specific benchmark for sediment, so the target sensitive environment is subject to Level II concentrations [1, Section 2.5, Table 4-22].

Sediment Samples for Observed Release: THD-C1 F
Note: The sample that indicated the maximum PCB concentration is listed; however, all eight observed release samples meet observed release criteria.

Most Distant Level II Sample

Sample ID: WBD-C5 C/SD-01
Distance from sediment sample LCA-C3: 3.49 miles
Reference: 18, pp. 154, 195-199, 215; 52, pp. 11, 13, 67-74; 53, pp. 7-10, 23-25, 41-43; 93, pp.1-3; Figure 6

4.1.4.3.1 Sensitive Environments

4.1.4.3.1.1. Level I Concentrations

There is no media-specific benchmark for sediment. Therefore, there are no sensitive environments subject to Level I concentrations, and the Level I Concentrations Factor Value is 0 [1, Section 2.5, Table 4-22].

Sum of Level I Sensitive Environments Value: 0

4.1.4.3.1.2 Level II Concentrations

Level II Sensitive Environment Targets

The zone of contamination within Lower Neponset River is not known to contain any documented sensitive environments (e.g., endangered species habitats) other than wetlands [1, Table 4-23, Table 4-24, Section 4.1.4.3.1; 18, pp. 36; 57; pp. 1-29, 42; Figures 5 and 6 of this HRS documentation record].

Sum of Level II Sensitive Environments Value: 0

Level II Wetland Frontages

There are 41 HRS-eligible PEM, PFO, and PSS wetlands comprising 6.6 miles of wetland frontage along the 3.49 miles zone of contamination for the Lower Neponset River site located between location of EPA sediment sample

LCA-C3/SD-11 and EPA Sediment sample WBD-C5/SD-01, the most distant Level II contaminated sample [1, 4.1.4.3.1.2; 56, pp. 1, 7; 57, pp. 1-29; 93, pp. 1-8].

TABLE 10

Wetland	Wetland Frontage (miles)	References
HRS- Eligible Wetlands	6.6	57, pp. 1-29, 42; 93, pp. 1-8; Figures 5 and 6 of this HRS documentation record

Sum of Level II Wetland Frontages: > 4.0 and <8.0 miles
Wetlands Value (Ref. 1, Table 4-24): 150

Sum of Level II Sensitive Environments Value + Wetlands Value: 0 + 150 = 150

Level II Concentrations Factor Value: 150

4.1.4.3.1.3 Potential Contamination

Not Scored.