Global Operations, Environment, Health & Safety

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Via Electronic Mail

January 29, 2024

Mr. Richard Fisher
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region I
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Re: GE-Pittsfield/Housatonic River Site
Rest of River (GECD850) – Upland Disposal Facility
Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area

Dear Mr. Fisher:

In accordance with EPA's November 16, 2023 conditional approval letter for a prior version of this report, enclosed for EPA's review and approval is GE's *Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area*. Due to the size of this report, the text, tables, and figures are being provided directly by email and a link to a SharePoint site is also provided for the entire document, including the appendices.

Please let me know if you have any questions about this revised report.

Very truly yours,

Matthew Calacone/csc

Matthew Calacone
Senior Project Manager – Environmental Remediation

Enclosure

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General Electric Company

Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area

GE-Pittsfield/Housatonic River Site

January 2024

Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area

GE-Pittsfield/Housatonic River Site

January 2024

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Appendices

Abbreviations

APE	Area of Potential Effects
Arcadis	Arcadis U.S., Inc.
ASTM	ASTM International
bgs	below ground surface
CD	Consent Decree for GE-Pittsfield/Housatonic River Site
CRA	cultural resource assessment
EPA	U.S. Environmental Protection Agency
Eversource	Eversource Energy
FEMA	Federal Emergency Management Agency
Final Revised OSS	Final Revised Overall Strategy and Schedule for Implementation of the Corrective Measures
Final Revised SOW	Final Revised Rest of River Statement of Work
Final PDI Summary	Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area (August 2023)
FSP/QAPP	Field Sampling Plan/Quality Assurance Project Plan
GE	General Electric Company
HSG	Hydrologic Soil Group
Interim PDI Data Summary	Interim Pre-Design Investigation Data Summary Report
IPaC	Information for Planning and Consultation
Lane	The Lane Construction Corporation
MACRIS	Massachusetts Cultural Resource Information System
MassDEP	Massachusetts Department of Environmental Protection
MCP	Massachusetts Contingency Plan
MHC	Massachusetts Historical Commission
MNHESP	Massachusetts Natural Heritage and Endangered Species Program
MWPA	Massachusetts Wetlands Protection Act
NGVD 29	National Geodetic Vertical Datum of 1929
NRCS	Natural Resources Conservation Service
OW	observation well
PCB	polychlorinated biphenyl
PDI	pre-design investigation
PDI Work Plan	Pre-Design Investigation Work Plan

PFAS	per- and polyfluoroalkyl substances
Phase 1A CRA Report	Phase 1A Cultural Resources Assessment Report for Upland Disposal Facility Area
RCRA	Resource Conservation and Recovery Act
Revised Final PDI Summary	Revised Final Pre-Design Investigation Summary Report for Upland Disposal Facility Area
Revised Permit	Revised Final Permit Modification to GE's Resource Conservation and Recovery Act Corrective Action Permit (December 2020)
ROR	Rest of River
SOW	Statement of Work
SPT	standard penetration test
STP	shovel test pit
SVOC	semi-volatile organic compound
TEQ	Toxicity Equivalency Quotient
UDF	Upland Disposal Facility
USCS	Unified Soil Classification System
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound

1 Introduction

This Revised Final Pre-Design Investigation Summary Report (Revised Final PDI Summary) for the Upland Disposal Facility Area has been prepared on behalf of the General Electric Company (GE). This Revised Final PDI Summary presents the data obtained through November 2023 during the pre-design investigation (PDI) of the area that will contain the Upland Disposal Facility (UDF) and UDF support areas associated with the Rest of River (ROR) Remedial Action. This investigation was conducted in accordance with GE's Pre-Design Investigation Work Plan for the UDF (PDI Work Plan; Arcadis U.S., Inc. [Arcadis] and AECOM 2021), which was conditionally approved by the U.S. Environmental Protection Agency (EPA) on February 25, 2022. The PDI field activities commenced in March 2022 and continued through November 2023 (and, for one monitoring well, December 2023). On December 6, 2022, GE submitted an Interim PDI Data Summary Report (interim PDI Data Summary) covering PDI activities through November 2022 (Arcadis and AECOM 2022); and EPA issued a conditional approval letter for that report on April 18, 2023, requiring that the conditions therein be addressed in the Final PDI Data Summary. On August 7, 2023, GE submitted the Final PDI Summary Report (Final PDI Summary) covering PDI activities through June 2023 (Arcadis and AECOM 2022); and EPA issued a conditional approval letter for that report on November 16, 2023, requiring that the conditions therein be addressed in a Revised Final PDI Summary Report. This document constitutes that Revised Final PDI Summary. It both addresses the conditions in EPA's conditional approval letter and covers the PDI activities conducted through November 2023 (and, for one well, December 2023).

The UDF will be constructed on a 75-acre property that was formerly part of an active sand and gravel quarry and that GE acquired from The Lane Construction Corporation (Lane) in April 2021. Figure 1 shows the extent of the property acquired by GE (referred to herein as the GE Parcel). That figure also shows the anticipated limits of consolidated material for the UDF (the consolidation area) and the associated operational area surrounding and encompassing the limits of the consolidated material (jointly referred to herein as the UDF area). In addition, the GE Parcel will contain areas designated for support of UDF operations. These support areas will include access points to the operational area, material and equipment staging areas, and areas for contractor use. These UDF support areas will be described and defined in the Final Design Plan for the UDF. Other UDF support areas may be needed for UDF operations associated with hydraulic dredging and pumping if performed, such as sediment conveyance, dewatering, and water treatment facilities; such additional UDF support areas will be described in later design submittals associated with hydraulic dredging and pumping activities (i.e., design work plans for Reach 6).

1.1 Background

On December 16, 2020, pursuant to the 2000 Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site, EPA issued a Revised Final Permit Modification to GE's Resource Conservation and Recovery Act (RCRA) Corrective Action Permit (Revised Permit) specifying a Remedial Action for the ROR (EPA 2020). The ROR consists of the portion of the Housatonic River and its backwaters and floodplain (excluding portions of certain residential properties) downstream of the confluence of the East and West Branches of the Housatonic River (the Confluence), which is located approximately two miles downstream from GE's former manufacturing facility in Pittsfield, Massachusetts. The selected ROR Remedial Action includes a provision for GE to construct and utilize a UDF at the former Lane site for the disposal of certain of the sediments and soils to be removed as part of the Remedial Action.

In accordance with the requirements of the Revised Permit, GE submitted to EPA a Rest of River Statement of Work (SOW) specifying the deliverables and activities that GE will conduct to design and implement the ROR

Remedial Action. After receipt of EPA comments, GE submitted a Final Revised Rest of River SOW on September 14, 2021 (Final Revised SOW; Anchor QEA et al. 2021). That SOW included pre-design and design requirements for the UDF and UDF support area. On September 16, 2021, EPA issued an approval letter for the Final Revised SOW.

The PDI Work Plan for the UDF was submitted on November 24, 2021, in accordance with the Final Revised SOW. It included descriptions for conducting desktop, field, and laboratory-based activities necessary to acquire information for design of the UDF component of the ROR Remedial Action. Additional requirements for the PDI were stated in EPA's February 25, 2022, conditional approval letter for the PDI Work Plan, and additional requirements for the summary report on the PDI were specified in EPA's April 18, 2023 conditional approval letter for the Interim PDI Data Summary and its November 16, 2023 conditional approval letter for the Final PDI Summary. This Revised Final PDI Summary builds on the Interim and Final PDI Summaries and presents the data and information obtained during implementation of the PDI activities through November 2023 (and, for one well, December 2023).

A Conceptual Design Plan for the UDF was submitted on December 6, 2022, concurrently with the Interim PDI Data Summary. It was conditionally approved by EPA in a separate letter dated April 18, 2023, which stated that the conditions therein should be addressed in the UDF Final Design Plan. The UDF Final Design Plan will be submitted to EPA by the end of February 2024.

1.2 Purpose and Objectives

This Revised Final PDI Summary describes the investigations conducted through November 2023, both prior to and during the PDI, and the acquired data that are necessary to support engineering evaluations and detailed planning and design of the UDF. The results of activities and investigations conducted previously and those performed as part of the PDI are being used to develop the design for the construction, operation, monitoring, and maintenance of the UDF and associated facilities and for the final cover and closure of the UDF.

1.3 PDI Work Plan Organization

The remainder of this Revised Final PDI Summary is organized into the following sections:

- Section 2 presents a description of the GE Parcel, including the UDF area, and pertinent site background and historical site data, including a summary of information available prior to implementation of the PDI to support the design.
- Section 3 describes the desktop, field, and laboratory-based activities and investigations performed during the PDI to address current data needs for design of the UDF and associated areas, and summarizes the data and information obtained during implementation of the PDI and the evaluations performed based on the acquired PDI data and information. In general, the PDI activities and investigations included the following:
  - Baseline assessment of the habitat at the GE Parcel;
  - Survey of existing site features and topography;
  - Subsurface drilling for geotechnical data and sample acquisition;
  - Installation and monitoring of temporary piezometers for baseline groundwater elevation monitoring;

  - Installation and monitoring of temporary and permanent monitoring wells for baseline groundwater elevation monitoring and soil and groundwater environmental quality evaluation;
  - Estimation of the seasonal high groundwater elevation at the GE Parcel;
  - Slug testing to determine hydraulic conductivity of the soils within the GE Parcel;
  - Infiltration testing to determine hydraulic conductivity of the soils within the GE Parcel;
  - Weather monitoring for use in evaluating and developing baseline air monitoring requirements and UDF design parameters, as well as for operational considerations; and
  - Initial Phase IA cultural resource assessment (CRA) of the GE Parcel and a supplemental, Phase 1B intensive archaeological survey of selected areas within the GE Parcel.
- Section 4 presents the references for the documents cited in this Revised Final PDI Summary.

2 Site Background and Historical Site Data Summary

This section presents background information on the UDF site, including a summary of site information that was available prior to the PDI. Much of this information was already presented in the PDI Work Plan for the UDF and the Interim PDI Data Summary but is repeated in this section for completeness.

2.1 Site Description

As previously noted, Figure 1 shows the extent of the GE Parcel, the anticipated limits of consolidated material for the UDF and the UDF operational area. (As noted above, the UDF support areas will be described and defined in the UDF Final Design Plan.) The GE Parcel generally consists of previously disturbed and barren ground areas void of vegetation, open grassed and wooded areas, and ponds that were created as part of the prior quarry operations. The east-central portion of the parcel was determined to have wetland conditions consisting primarily of a forested red maple swamp, with smaller areas of shrub swamp and a potential vernal pool at the northern edge of the wetland. Additionally, there is an existing Eversource Energy (Eversource) utility easement containing overhead electric utility lines on the western side of the GE Parcel. The bordering site features are Valley Street to the north, Woodland Road to the east, the Lee Municipal Landfill to the south, and the remaining former Lane property (now Northeast Paving, a Division of Eurovia Atlantic Coast, LLC) to the west, which is located off Willow Hill Road.

2.2 Pre-Existing Site Information

The following subsections present a summary of site information that was available prior to the PDI pertaining to the GE Parcel. This information was used in identifying the need for additional data collection in the PDI. That prior information, together with the information collected during implementation of the PDI, is also being used in developing the UDF design.

2.2.1 Habitat

During the preparation of the PDI Work Plan, background information was reviewed to develop a preliminary understanding of potential habitat conditions on and in proximity to the GE Parcel. Much of the background/existing site information was generated from MassGIS Data Layers (MassGIS 2021, including MassMapper). Other information reviewed included existing sources such as the *Ecological Characterization of the Housatonic Rive*r (Woodlot Alternatives 2002) and the designation of the Upper Housatonic River as an Area of Critical Environmental Concern (Mass EOEEA 2009).

Preliminary information on habitat characteristics of the GE Parcel, including natural community types, the potential presence of federally listed threatened or endangered species and state-listed rare species, potential wetlands and vernal pools, and invasive species was derived from several existing sources. These included on-line sources, such as the MassGIS Data Layers (MassGIS 2021, including MassMapper), the U.S. Fish & Wildlife Service (USFWS) National Wetlands Inventory Mapping, and the Information for Planning and Consultation (IPaC), as well as aerial photograph reviews. Other available source data from MassGIS included information on potential habitat cover types (e.g., from 2021 aerial photography), state wetland and surface waters (e.g., Massachusetts Department of Environmental Protection [MassDEP] wetlands and potential vernal

pool mapping and floodplain status), state-listed rare species habitat mapping, and soils and geology. These pre-PDI information sources indicated the following regarding habitat conditions on the GE Parcel.

The general habitat of the GE Parcel includes non-vegetated and previously excavated areas lacking mature/undisturbed habitat (comprising much of the UDF area), open areas dominated by grass and forbs, and forested areas in differing stages of succession (in the northern and eastern parts of the GE Parcel). A potential isolated wetland was indicated in the east-central portion of the site along Woodland Road.

The MassMapper interactive map, available data layers, and active data layers specific to potential and documented habitats indicated that the GE Parcel does not contain any Massachusetts Natural Heritage and Endangered Species Program (MNHESP) Estimated Habitats of rare wildlife or Priority Habitats of rare species, nor did it indicate any MNHESP-certified or other identified potential vernal pools. While several habitats were identified in the surrounding geography within five miles of the GE Parcel, the nearest Priority Habitat of rare species was located 0.15 mile to the north, and the nearest MNHESP-certified vernal pool was located more than one mile to the southeast.

A review of the USFWS IPaC on-line mapping tool (USFWS 2021) for the GE Parcel revealed potential habitat for northern long-eared bat (*Myotis septentrionalis*) (which was then a federally listed threatened species but has recently been listed as endangered and is also a state-listed endangered species) and monarch butterfly (*Danaus plexippus*) (a candidate for federal listing) in the general area. Several migratory birds were also identified within the general site area, including the bald eagle (*Haliaeetus leucocephalus*), bobolink *(Dolichonyx oryzivorus*), Canada warbler (*Cardellina canadensis*), prairie warbler (*Setophaga discolor*), and wood thrush (*Hylocichla mustelina*).

As noted above, a potential wetland area was indicated in this existing information in the east-central portion of the GE Parcel, potentially consisting of an isolated palustrine, scrub/shrub, broad-leaved deciduous, seasonally flooded area off Woodland Road.[1] In addition, the source information indicated that the parcel contains several man-made or modified permanently flooded areas, which are associated with the prior quarry operations.

Overall, the data gathered from reviews of readily available on-line databases, aerial photographs, and mapping provided a suitable baseline from which to design further field surveys to more fully investigate ecological habitat conditions as part of the PDI. Those field surveys of the habitat within the GE Parcel and their findings are described in Section 3.1.

2.2.2 Topography

A topographic survey that included the GE Parcel was completed in 2010 using aerial methods, and the results are provided in Appendix A. The 2010 survey was limited by its age and in detail due to the aerial survey methods. Additionally, the survey did not provide bathymetric information on the ponds. To support the design, updated topographic and bathymetric data were collected as part of the PDI as described in Section 3.2.

2.2.3 Utilities

No known underground utilities were identified within the GE Parcel. There is an existing overhead electric utility line and associated easement that are owned and operated by Eversource on the western edge of the site. Dig Safe was called in the fall 2019 for a groundwater probe investigation conducted near the anticipated UDF

[1] As discussed in Section 3.1, this area was evaluated during PDI activities and was determined to constitute a wetland under federal and state criteria.

location, and no utilities were identified. Further utility location surveys were conducted prior to PDI field activities, as discussed in Section 3.3.

2.2.4 Soils

Based on publicly available soil surveys reviewed prior to the PDI (Natural Resources Conservation Service [NRCS] 2021), the surficial soils originally present at the UDF site were reported to be composed of the following (using soil map unit names): Copake fine sandy loam, Hero loam, Groton and Hinckley soils, and gravel. These soil types are generally described as comprising loamy fine sand to very course gavel (NRCS 2021). A large portion of the UDF site was identified by the NRCS as containing pits and gravel. (Historical imagery and site observations during PDI activities confirmed that a large portion of the UDF site was subject to gravel pit operations.) The Hydrologic Soil Group (HSG) for the soil types noted above are indicated as largely HSG A, with a lesser amount (Hero loam unit) as HSG B. A web soil survey map of the UDF site showing the map unit names and extents is included in Appendix B.

The pre-PDI information indicated the following regarding the geology of the GE Parcel: The overburden deposits at the GE Parcel consist of unconsolidated sediments of glacial origin that have been deposited in a broad bedrock valley occupied by the Housatonic River. The overburden consists of unconsolidated glacial outwash sediments deposited by running water from the melting ice of a retreating glacier. The glacial outwash consists primarily of fine to medium sand and contains varying amounts of silt and fine gravel. The glacial outwash deposits vary laterally across the GE Parcel, and with depth, in terms of density, stratification, and heterogeneity. The overburden unit is underlaid by competent bedrock consisting of gray dolomite marble. The bedrock beneath the GE Parcel is part of the Stockbridge Group, carbonate rocks of Cambrian and Ordovician Age, which consist of limestone, dolomite, and marble.

Additional information for design regarding soil types and geotechnical characteristics, as well as baseline environmental quality, was obtained as part of the PDI, as discussed in Sections 3.3 and 3.4.

2.2.5 Groundwater Elevations

In September 2019, a preliminary investigation was conducted at the GE Parcel to evaluate groundwater elevations. This investigation included geoprobes at five locations. At the time of the 2019 investigation, groundwater was encountered within the GE Parcel at between elevation 947 feet and 949 feet relative to National Geodetic Vertical Datum of 1929 (NGVD 29). The elevation of the water edge in the adjacent ponds was approximately 947 feet NGVD 29 (on the October 1, 2019, survey date). The results of this 2019 groundwater elevation investigation are documented in Table 1.

Because of the granular nature of the site soils, the pond water surface elevations are likely coincident with groundwater elevations in the vicinity of the ponds. The nearest U.S. Geological Survey (USGS) groundwater monitoring well location is approximately 1.2 miles to the northwest of the GE Parcel at latitude 42°21'04.76" and longitude 73°15'28.75". Although historical data are available for this location, they are not considered representative of site conditions for the GE Parcel, considering the distance from the site and significant topographic variability of the area.

As stated in the PDI Work Plan, 12 other USGS historical groundwater wells were reportedly located on the southern edge of Woods Pond. Based on information available through the USGS well inventory database, construction details associated with these groundwater wells are limited to what is shown on the website summary, which include coordinate location, well depth, and a general description of the aquifer type that the well was completed in. However, the database identifies the same coordinates for all 12 wells, which makes the

information questionable. The USGS was contacted to attempt to see if it could provide additional information, but it was determined that there was none available. A limited field reconnaissance was then performed along the southern boundary of Woods Pond, and no wells were observed. As such, it was concluded that these reported USGS wells are no longer present and, therefore, not available for water level measurements.

A 2021 review of MassDEP files uncovered an Evaluation Opinion Transmittal Report (Anonymous undated), which contains a summary of groundwater elevation data collected from monitoring wells located around the nearby Schweitzer-Mauduit and Lee Municipal Landfills. As shown on Figure 1, the Lee Municipal Landfill is located due south of the GE Parcel on the adjacent parcel. The report indicates that groundwater elevations in an upgradient well (MW-84-1) located along the eastern side of the Lee Municipal Landfill ranged from 955.40 feet to 959.91 feet NGVD 29 between October 1984 and December 1988. The report also indicates that groundwater elevation in a downgradient well (MW 84-2) along the western side of the Lee Municipal Landfill ranged from 948.85 feet to 952.59 feet NGVD 29 over the same timeframe. These data indicate an east-to-west downward slope in the groundwater table. This east-to-west groundwater slope direction is also seen in other groundwater well data included in the report, as well as in the Lee Sanitary Landfill Final Comprehensive Site Assessment report (Final CSA; CDM 1995).

As part of the PDI, additional data on groundwater elevations at the GE Parcel, as well as at the Lee Municipal Landfill, and surface water levels in the Housatonic River have been collected to better understand the range of groundwater elevations at the site, as discussed in Section 3.6.

2.2.6 Groundwater Quality

Prior to the PDI, there were no known data on groundwater quality within the GE Parcel. There was historical information available on a bordering property, the Lee Municipal Landfill, but that information is relatively outdated. Specifically, the aforementioned Evaluation Opinion Transmittal Report included information on groundwater quality at the Lee Municipal Landfill relative to Massachusetts groundwater standards. The report stated that there is no record of oil or hazardous material being landfilled and, at the time the report was generated, the only consistent reportable concentration exceedance shown was for manganese. More recent groundwater quality data for the Lee Municipal Landfill have been collected as part of annual post-closure monitoring activities performed by the Town of Lee (Tighe & Bond 2021). These data indicate that certain constituent concentrations, including those for manganese, are elevated in certain, but not all, of the landfill monitoring wells.

For reference purposes, the monitoring wells closest to the GE Parcel that are included in the Lee Municipal Landfill annual post-closure monitoring are shown on Figure 1. Of the four wells indicated on that figure at the Lee Municipal Landfill, only three are sampled for groundwater quality (MW-84-1, MW-94-1 and MW-94-2), According to the 2021 annual monitoring report, well MW-84-2 is not sampled due to a vertical alignment restriction in the well pipe. Monitoring wells MW-84-1 and MW-94-1 are approximately seven feet apart and located roughly 570 feet south of the GE Parcel boundary. Monitoring wells MW-84-2 and MW-94-2 are approximately four feet apart and located roughly 320 feet south of the GE Parcel boundary. Results given in the 2021 annual report indicated that wells MW-94-1 and MW-94-2 had elevated levels of manganese.

2.2.7 Cultural Resources Assessment

As stated in the PDI Work Plan, existing databases were reviewed prior to the PDI to determine whether any cultural resources were previously identified within the GE Parcel. Based on this review, which included the National Register of Historic Places, the Massachusetts State Register of Historic Places, and the Massachusetts Cultural Resource Information System (MACRIS), no cultural resources listed in those sources

were identified within the GE Parcel. Given the results of this review, it was determined that a Phase IA CRA should be performed. That assessment was performed for the entire GE Parcel, as discussed in Section 3.10.

3 Pre-Design Investigation and Data Summary and Evaluation

Based on site information available prior to the PDI (summarized in Section 2), data gaps remained in the body of knowledge needed to design, construct, and operate the UDF in accordance with the Revised Permit and current state of practice. As a result of these data gaps, the PDI Work Plan proposed the acquisition of additional information needed to support the design of the UDF and support areas. This section describes the PDI field activities that were performed to supplement existing site information to support the UDF design. It also presents the data and information obtained from those PDI activities through November 2023 (and, for one well, December 2023) and an evaluation of the data to the extent practicable. The PDI sampling and analysis activities were performed in accordance with GE's then-current and approved Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP; Arcadis 2013), as applicable.

3.1 Baseline Habitat Assessment

A baseline habitat assessment of the GE Parcel was conducted by AECOM on GE's behalf to form a detailed baseline ecological characterization and assessment of existing conditions and to serve as the foundation for developing the Final Cover/Closure Plan for the UDF area and UDF support area.

The baseline habitat assessment of the 75-acre GE Parcel consisted of both desktop evaluations, including database reviews and aerial photograph interpretation, and field investigations under EPA oversight. Detailed field investigations were conducted on four days between April 11 and July 6, 2022, by a team of ecologists (with oversight by EPA representatives) to inventory, assess, and document ecological habitat conditions on the GE Parcel. Additional field surveys were subsequently conducted in the spring of 2023 on a potential vernal pool identified on the GE Parcel during the 2022 investigations. A detailed description of the baseline habitat assessment is provided in a separate report prepared by AECOM, entitled *Second Revised Baseline Ecological Characterization and Habitat Assessment Report for Upland Disposal Facility Area*, which has been revised from earlier versions of that report in response to conditions in EPA's April 18, 2023 and November 16, 2023 conditional approval letters and which is provided as Appendix C. A summary of the findings generated during that assessment is provided below.

A total of 11 habitat cover types were mapped on the GE Parcel following the DeGraaf and Yamasaki (2001) habitat classification system.[2] This system separates habitat cover types into two broad categories: forested matrix and non-forested matrix, which represent both terrestrial and wetland habitats. Based on relationships between habitat cover types and the wildlife species that are typically associated with them, a list of potential wildlife species can be generated for the GE Parcel.

Terrestrial cover types observed on the GE Parcel include aspen/birch late successional habitats, Eastern white pine forests, northern hardwoods, and upland fields. Subcategories in the upland field cover type include areas dominated by forbs, grasses, and early successional shrub/old field habitats. Palustrine wetland cover types include swamp hardwoods-red maple, shrub swamp, shallow marsh, and pond. In addition, several areas associated with the former gravel mining operations and gravel access roads to the overhead electric utility line

[2] This system is similar to the community type classification mapping used in the *Ecological Characterization of the Housatonic River* (Woodlot Alternatives 2002) but provides for a greater differentiation of some habitat cover types, particularly in upland areas.

right-of-way were classified as non-vegetated. The mapped plant communities within the GE Parcel are listed in Table 2 below and shown on Figure 2.

Table 2. Mapped Plant Communities within the GE Parcel

Cover Type	Acres	Percent
Forest Matrix		
Aspen/birch	1.4	1.8
Eastern white pine	10.3	13.6
Northern hardwoods	15.4	20.4
Palustrine – swamp hardwoods-red maple	3.9	5.1
Non-Forested Matrix		
Palustrine – pond	3.5	4.6
Palustrine – shallow marsh	0.6	0.8
Palustrine – shrub swamp	0.8	1.1
Upland field – forbs	9.1	12.1
Upland field – grass	1.7	2.2
Upland field – grass/forbs	9.5	12.5
Upland field – shrub/old field	8.9	11.8
Non-vegetated	10.6	14.0

The total GE Parcel evaluated for this assessment is approximately 75.7 acres. Approximately 10.6 acres (14% of the total GE Parcel) consist of areas of diminished habitat value because they are non-vegetated areas associated with former gravel mining operations, stockpiled construction debris consisting primarily of broken fragments of concrete slabs, and gravel access roads associated with the dumping/stockpiling activities and the existing overhead electric utility line right-of-way. Another approximately 29.2 acres (39%) situated within the former gravel mining operation areas have since been revegetated and are classified as upland field habitats dominated by a mixture of forbs, upland grasses, shrubs, and small sapling trees. Approximately 27.1 acres (36%) of the GE Parcel are forested, and 8.8 acres (11%) consist of palustrine wetlands. Lastly, contained within the broader swamp hardwoods-red maple cover type is an approximately 0.2-acre seasonally flooded area that appears to function as vernal pool breeding habitat, as discussed below.

In response to a condition in EPA's February 25, 2022, conditional approval letter, the habitat assessment has also broken out specifically the habitat cover types in the waste consolidation area, as distinguished from the rest of the GE Parcel. That information is presented in a separate table in Appendix C. As shown there, the consolidation area consists of approximately 15.5 acres in total area, roughly 92% of which were previously subject to past earth work and are currently either in a non-vegetated condition (2.66 acres or 17%) or composed of recently established grassland with some scattered woody shrubs and forbs (11.58 acres or 75%). Only 1.22 acres of the consolidation area (7.9%) consist of forested cover.

During the field surveys, each discrete cover type unit was subject to a detailed inventory using a habitat inventory form included in the PDI Work Plan. This form was used to record a broad range of habitat

parameters to characterize structural, physical, hydrologic, and biological conditions within each habitat cover unit.

A total of 28 vegetation plots were evaluated in detail to quantitatively describe the plant communities and mapped habitat cover types within the GE Parcel. Percent cover of trees, woody shrubs, and vines was estimated within five- by five-meter plots, and a nested one-square meter was used for estimating herbaceous plant cover. Six of the survey plots were located within the consolidation area to provide data specific to that area separately from the overall GE Parcel. A total of 94 plant species were observed within the site-wide vegetation plots, and a total of 131 plant species were observed across the entire GE Parcel. The plant species observed across the entire parcel consisted of 25 trees, 16 woody shrubs, four woody vines, and 86 herbaceous plant species. The number of species observed per plot ranged from two to 17 species, with an average of 9.1 ± 0.6 standard error species per plot.

The most frequently occurring native species observed in the forested habitats included sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), white pine (*Pinus strobus*), and black cherry (*Prunus serotina*). Plants typical of upland field habitat included yarrow (*Achillea millefolium*), switchgrass (*Panicum virgatum*), little bluestem (*Schizachyrium scoparium*), bladder campion (*Silene latifolia*), and black-eyed Susan (*Rudbeckia hirta*). Palustrine wetlands were dominated by red maple (*Acer rubrum*), silky dogwood (*Cornus amomum*), speckled alder (*Alnus incana*), marsh fern (*Thelypteris palustris*), and sensitive fern (*Onoclea sensibilis*). No federally listed or state-listed plants were identified on the GE Parcel.

Of the 94 plant species observed within the vegetation plots, five plant species are listed as invasive and two are listed as likely invasive by the Massachusetts Invasive Plants Advisory Group (MIPAG).[3] These include two herbaceous plants, one woody vine, and four shrub species that were observed in 22 out of the 28 vegetation plots. The most frequently occurring invasive species was Morrow's honeysuckle (*Lonicera morrowii*), followed by Asiatic bittersweet (*Celastrus orbiculatus*). Relative percent cover of invasive species per plot ranged from minimal to very high.

A detailed assessment, inventory, and delineation of wetland conditions on the GE Parcel were conducted. The east-central part of the parcel was determined to have wetland conditions consisting primarily of a forested red maple swamp, with smaller areas of shrub swamp and a potential vernal pool at the northern edge of the wetland. An intermittent stream discharges into this wetland under Woodland Road,[4] traverses the wetland from east to west, and conveys flow into another shrub wetland area under the overhead electric utility line; all stream flow was observed to infiltrate into the ground at this western edge. The limits of the wetland were delineated in the field based upon state and federal criteria, and the limits were located using an Arrow 100® global positioning system instrument capable of sub-meter accuracy. This wetland appears to meet the federal criteria for a wetland (as part of waters of the U.S.) and the classification of two resource areas as defined in the Massachusetts Wetland Protection Act (MWPA) regulations: a Bordering Vegetated Wetland with the Bank of an intermittent stream.

In addition to the above-described wetland, the man-made gravel-pit ponded areas on the GE Parcel provide aquatic conditions. These areas were also delineated and inventoried. These three ponds are not believed to

[3] Information obtained from https://www.massnrc.org/mipag/invasive.htm and https://www.massnrc.org/mipag/linvasive.htm for the invasive and likely invasive species, respectively. The U.S. Army Corps of Engineers New England District's list of invasive plan species was also checked, but that list does not include any species that are not listed as invasive or likely invasive by MIPAG.

[4] There are five culverts that cross Woodland Road onto the GE Parcel, which are shown on the topographic survey maps in Appendix D.

constitute federally regulated waters of the U.S. since they were created in upland settings for the purpose of treating water as part of the gravel pit wash-water system. Further, since the two westerly ponds remain in active use as part of the gravel pit operation ongoing in the land abutting the west side of the GE Parcel, they are also not regulated wetlands under the MWPA regulations.[5] As currently understood, the southeastern pond has been inactive as part of the gravel pit operations for at least five or more consecutive years and, therefore, would be considered a regulated pond under the MWPA regulations, containing both Land Under a Waterbody and Bank resource areas.[6]

During the field investigation in mid- to late April and early May, three seasonally flooded areas identified during the desktop analysis were inspected for the presence of obligate vernal pool breeding amphibians (e.g., wood frogs [*Lithobates sylvatica*] and spotted salamanders [*Ambystoma maculatum*]) to determine whether they may function as vernal pool amphibian breeding habitat. Only the small seasonally flooded depression located within the larger palustrine forested wetland along the northeastern portion of the GE Parcel adjacent to Woodland Road contained evidence of breeding by obligate vernal pool species. On April 11, 2022, two wood frog egg masses were found within this pool. During both the April 27 and May 19, 2022, inspections, wood frog tadpoles were observed swimming in shallow water areas along the eastern pool edge and in deeper pockets located in the southern portion of the pool. Water levels were very low during the last two inspections, and the pool was completely dry by early July. Based upon these findings, this pool was determined to meet the MNHESP criteria for vernal pool certification. In late April and May 2023, this pool was surveyed again. Those surveys identified wood frog larvae in early May, but by mid-May water levels had dropped and no tadpoles or additional wood frog larvae were found. Based on the observations of this pool in 2022 and 2023, it appears that the pool fills reliably early in the spring to provide suitable conditions for egg deposition and larvae development, but that the pool is subject to inadequate hydroperiods for sustained larvae metamorphosis to adult wood frog stage. It thus appears likely that, in this pool, only wetter years with sustained precipitation in the April to early July period would support full development of wood frog larvae to adult emigration.[7]

During the field visits, wildlife biologists identified a total of 43 species from four taxonomic groups on the GE Parcel, including nine invertebrates, six amphibians and reptiles, 22 birds, and six mammals. Most identifications were obtained through direct observations; however, some were obtained through documentation of auditory songs and calls of birds, tracks and scat of mammals, and egg fragments of a predated/exhumed turtle nest (snapping turtle [*Chelydra serpentina*]). In addition, a total of 107 wildlife species have been identified as potentially occurring on the GE Parcel based upon habitat conditions (according to the associations described by DeGraaf and Yamasaki 2001).

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[5] Those regulations exclude from the definition of a regulated pond under the MWPA any "individual gravel pits . . . excavated from upland areas unless inactive for five or more consecutive years" (310 CMR 10.04: definition of Pond). The evidence for active use of these two ponds consists of direct (site-based) observations over the past couple of years. Those observations include direct observations of activities in and around the ponds that are associated with the sand and gravel operation, as well as observations of the greenish color of the pond water, which reflects the suspended silts and clays consistent with the use of the pond for settling as part of that operation.

[6] As indicated in the revised habitat assessment report in Appendix C, the impacts on the identified resource areas from the construction and operation of the UDF and UDF support facilities will be evaluated further and, to the extent that mitigation for the loss of resource areas is required, mitigation options will be addressed in the UDF Final Design Plan, along with any additional data collection necessary for such mitigation. These will include potential mitigation options relating to the vernal pool discussed in the next paragraph.

[7] As discussed in the revised habitat assessment report in Appendix C, in accordance with a condition in EPA's November 16, 2023 conditional approval letter, given the abnormally low precipitation levels in 2022 and 2023, GE will evaluate the three low-lying areas at the GE Parcel again in the spring of 2024 for potential vernal pool conditions and species in an effort to observe conditions during a season of more normal or above-normal precipitation.

No federally listed or state-listed rare wildlife species have been identified or recorded on the GE Parcel, and the MNHESP has confirmed by email that it has no records of state-listed species occurrences on the GE Parcel. Habitat conditions may potentially be suitable for some use by the northern long-eared bat (also discussed in Section 2.2.1). In addition, a monarch butterfly was observed feeding within a patch of milkweed on the GE Parcel during the field surveys. It is possible that some incidental use of this area by monarch butterflies could occur late in the summer as migration commences; however, no significant use of the GE Parcel by this species is anticipated based upon the habitat conditions.

3.2 Topographic and Bathymetric Field Survey

Topographic surveys of the GE Parcel were conducted by Hill Engineers, Architects, and Planners, Inc., in 2022 and 2023 as part of the PDI field activities. These surveys included surveying features for the PDI such as soil borings, monitoring wells, and piezometers. Other site features, including overhead electric utility lines, concrete debris piles and gravel piles, access roads, tree lines, and water edges, were also surveyed. The topographic field surveys were combined with bathymetric surveys of the water-filled depressions to yield a continuous top-of-existing-ground-surface model. The areas surveyed are shown on Figure 3, and the topographic and pond bathymetric survey mapping is provided as Appendix D.

The survey mapping shows that existing topography across the GE Parcel is variable and comprises several localized high and low points, including pond areas likely attributable to the parcel's history as a sand and gravel quarry. In the UDF area, grades indicate that drainage generally pitches internally towards the localized low points. There are limited areas of the GE Parcel that drain off site to the east along Woodland Road and to the former Lane property to the west. Based on available flood insurance rate maps, the GE Parcel is entirely outside of the mapped 500-year floodplain for the Housatonic River to the north and west (Federal Emergency Management Agency [FEMA] 1982a) and for the Washington Mountain Brook to the south (FEMA 1982b).

Visual assessment of the concrete debris and gravel piles shown on the 2022-2023 topographic survey maps (Appendix D) was conducted as part of the PDI to identify the general composition of the pile materials. The concrete debris piles were observed to consist primarily of broken and crushed concrete with embedded rebar and, to a lesser extent, brick and cement block. The debris pieces range in size from as small as a few inches to several feet. The gravel piles vary in both composition and mixture and include a variety of coarse- and fine-grained soils, soil and stone mixtures, and crushed and uncrushed stone.

The 2022-2023 topographic and bathymetric field survey results have been and will continue to be used in preparing engineering evaluations and designs for the UDF, including the development of various figures and site plans and estimation of construction earthwork quantities.

3.3 Soil Geotechnical Investigation

Soil investigations are required to support the evaluations and design of the UDF. The soil investigation program for the UDF area was developed to accomplish the following objectives:

- Characterize the variability, depth, and engineering properties of site soils;
- Collect soil data through field and laboratory testing to support and identify geotechnical design considerations, such as settlement and stability, to be addressed in the engineering design of the UDF; and
- Characterize site soils for use in construction of the UDF and operational area facilities and identification of the intended use of soils excavated for construction of the UDF and operational area facilities.

3.3.1 Soil Boring Program

The locations of the soil borings completed in the UDF areas during implementation of the PDI are shown on Figure 4 and summarized in Table 3A. A total of 22 borings were completed and are positioned within and outside of the anticipated UDF area limits. The boring logs are included in Appendix E. As indicated in Table 3A, all 22 borings were utilized for geotechnical testing purposes. Additionally, 16 of the 22 borings were utilized for soil quality testing purposes. Six of the 22 borings were also utilized for the installation of temporary piezometers within and outside of the UDF footprint, as discussed in Section 3.5.1. Nine of the 22 borings were utilized for the installation of monitoring wells outside of the UDF footprint, as discussed in Section 3.5.2. The locations were chosen based on the anticipated limits of the UDF, likely groundwater flow direction, and spatial distribution of data points across portions of the GE Parcel.

Prior to site mobilization for soil boring drilling activities, each soil boring location, as shown in the PDI Work Plan, was located by field survey. A field-based evaluation was then performed for each surveyed boring location to assess drill rig and support equipment accessibility and to assess proximity of the borings to existing site features, including overhead electric utility lines and associated equipment. The soil boring locations were then adjusted where necessary to accommodate site conditions. Following this evaluation and any subsequent location adjustments, the boring locations were inspected to assess the possibility for cultural resources in areas where ground disturbance could be expected. No cultural resources were identified during inspection of the soil boring locations. Further discussion regarding these CRA activities is provided in Section 3.10 and the associated appendices. Finally, an underground utility clearance investigation was conducted at each soil boring location, and underground utilities were not identified.

For geotechnical purposes, the borings were advanced to a target elevation of 935 feet or lower.[8] For borings that coincided with monitoring wells and temporary piezometers, the depth to groundwater also required a minimum target depth. The deeper of the two criteria was used when determining the minimum boring depth. Table 3A identifies the completed depth below ground surface (bgs) for each boring.

Drilling was completed between March 22 and June 16, 2022, by Cascade Drilling Inc., of Schenectady, New York. Borings were advanced using hollow-stem augers as subsurface conditions permitted. Mud rotary methods were also used for control of flowing sands and was ultimately the main method used for advancing the borings to the required depths. The drilling method used for each soil boring is indicated on the boring logs in Appendix E.

3.3.2 Soil Testing for Engineering Properties

The following types of soil testing were performed through both field and laboratory means to determine the engineering properties of the site soils:

- Standard Penetration Testing: Standard penetration test (SPT) sampling was conducted during the advancement of each geotechnical soil boring. SPT sampling was performed using a standard two-inch-outside-diameter split-spoon sampler, 24 inches long, and driven by a 140-pound automatic hammer with a 30-inch drop in accordance with ASTM International (ASTM) standard ASTM D1586. The SPT blow count (or "N-value" term) for each sample was recorded and represents the number of blows required for one-foot penetration into the soil after the initial six-inch seating drive depth. The N-values will be used during the design of the UDF to estimate the engineering properties of the site soils.

[8] Six soil boring were unable to reach the target elevation of 935 feet due to drilling conditions that included encountering bedrock, negligible drilling progress, and drilling advancement refusal (see Table 3A).

- Soil Classification: Each sample collected from the geotechnical soil borings was classified in the field through visual-manual procedures that conform to ASTM D2488 and the Arcadis Field Guide for Unified Soil Classification System (USCS) Soil Classification, which is provided in Appendix F. In addition, selected samples from the boring were submitted for laboratory classification using the USCS, which is based on the soil index property tests described below, and for quality control of the field classifications. The samples chosen for laboratory testing generally focused on depths and locations within each soil layer to confirm the observed stratigraphy noted in the boring logs, within zones of loose or soft soils, and at depths below the groundwater table. Soil descriptions in the boring logs were updated where needed to conform to the laboratory-determined soil classifications.
- Soil Index Properties: Soil samples from the split spoons (or from a combination of split spoons) were provided to the geotechnical laboratory for analyses that included grain size (ASTM D6913), moisture content (ASTM D2216), Atterberg limits (ASTM D4318), organic content, and specific gravity (ASTM D854). One sample from each soil boring was targeted for collection at an interval of approximately two feet below the estimated groundwater depth. Sampling at this interval was generally achieved except where the collected sample volume was used for environmental quality testing rather than for geotechnical testing or where poor sample recovery occurred, in which case the next lower sample was used if possible. The analyses for these parameters were conducted in accordance with the corresponding ASTM standards. The results were used for quality control of the field soil classifications and determination of site stratigraphy. The results will also be used for development of engineering parameters, such as shear strength and soil elastic modulus, to support the stability and settlement evaluations, as well as for determining re-use criteria of excavated materials during construction of the UDF and for estimation of the permeability of the site soils. The use of these results for such purposes will be described in detail in the UDF Final Design Plan, along with supporting assumptions and rationale for how the soil data were selected and used to estimate the engineering parameters.

3.3.3 Soil Testing Results

The following summary is based upon a preliminary review of the 22 borings completed at the UDF area, the SPT data collected, and supporting laboratory testing results of the geotechnical soil samples.

Subsurface data collected during the geotechnical investigation indicate that the soils at the UDF area are consistent with the characteristics and stratification of a glacial outwash deposit. The general stratigraphy consists of unconsolidated deposits overlying marble bedrock. The unconsolidated deposits consist predominantly of fine-grained silts, sands, and gravels. These deposits vary laterally across the UDF area, and with depth, in terms of density, stratification, and heterogeneity.

Based upon an initial review of the visual field-based sample descriptions and results of the laboratory testing, the glacial outwash deposits are categorized into two main soil units: a fine sand and silt unit and a mixed sand, gravel, and silt unit. While these soil units are present at each boring location, the depths and thicknesses for each unit vary among boring locations.

Soils representative of the fine sand and silt unit generally consist of alternating layers of light brown silty sand and sandy silt. This unit of the glacial outwash is generally finer-grained soils with most of the gradation between silt and fine sand. Soil samples were typically described as light brown silty fine sand to sandy silt. Stringers of coarse sand and gravel were observed and are discontinuous across the unit. Discontinuous silt and clay lenses were present that may be restrictive to localized groundwater flow, likely primarily in the vertical direction due to the inferred geometry (thin lenses) and depositional setting (glacial outwash). No extensive

unconsolidated confining units were encountered. Recorded N-values and visual observations of the split-spoon samples indicate that consistency of this unit is generally medium dense to dense.

The soil unit of mixed sand, gravel, and silt is typically coarser than the fine sand and silt unit. It is composed of heterogeneous silty fine to coarse sand and fine to medium gravel. Layers of gravel and cobble-sized materials were noted in the boring logs and were generally found to be rock fragments in split-spoon samples. Recorded N-values and visual observations of the split-spoon samples indicate the consistency of the mixed sand, gravels, and silt is generally loose to dense. N-values greater than 50 were recorded where fractured rock was noted in the sample and at the bedrock interface.

Bedrock surface was confirmed at three boring locations during the geotechnical investigation program (monitoring wells MW 2022-2, MW 2022-3, and MW 2022-1). From rock cores completed at these borings, the bedrock was classified as marble. Review of the core sample indicates that the marble is hard and competent with slight weathering. Groundwater within the bedrock is therefore likely partially confined from the overburden, which is supported by the difference in hydrologic heads between these units (discussed in Section 3.6.1). Top of bedrock varied from approximately elevation 909.5 feet at monitoring well MW 2022-3 to approximately elevation 957.5 feet at monitoring well MW 2022-1. While three datapoints are insufficient to construct a detailed contour-based interpretation, they are sufficient to indicate that the bedrock surface generally slopes downward in a northwestern direction away from October Mountain and toward the Housatonic River/Woods Pond. This dip direction is generally consistent with the conclusions of prior investigations at the nearby former Lee landfill, which indicated that the bedrock surface elevation in that area was also highest to the east and decreased to the west/south away from October Mountain.

Soil classifications were typically found to have USCS symbols of SM (silty sand) to ML (sandy silt, silt). A number of samples tested were found to have a greater gravel content and were classified as GM (silty gravel) to GP-GM (gravel with silt and sand). With exception of one sample, the soils tested for Atterberg limits were found to be non-plastic. The PDI Work Plan stated that undisturbed soil samples would be collected if cohesive soil was encountered. However, cohesive soils were not encountered during the geotechnical investigations; therefore, soil samples were not collected for evaluation involving shear strength testing (e.g., triaxial shear test).

A summary of the laboratory geotechnical lab results is provided in Table 3B.

3.3.4 Soil Infiltration Testing Results

In-situ soil infiltration testing was performed in areas of the GE Parcel where stormwater infiltration basins are proposed as part of the UDF design. The need for these soil tests was determined subsequent to submission of the PDI Work Plan and based on advancement of the UDF design presented in the Conceptual Design Plan. Figure 4 shows the locations where the soil infiltration tests were performed as well as where optional test locations were identified but ultimately not used. These optional test locations were intended for use in the event certain test locations were deemed inaccessible at the time of test implementation.

A total of eight soil infiltration tests were conducted between June 13 and June 23, 2023. As shown on Figure 4, six tests were conducted in the northern UDF area and two were conducted in the southern UDF area. The soil infiltration tests were conducted in soil borings that were drilled using a track-mounted rig with three-inch diameter steel casing advanced by percussion method. The borings were advanced to predetermined depths coinciding with conceptual stormwater basin design elevations which ranged from approximately seven to 26 feet in the northern area and approximately seven feet in the southern area. In addition to the eight infiltration test soil borings, two additional soil borings (one in the northern UDF area and one in the southern UDF area)

were drilled to a depth of between 28 to 30 feet for soils classification purposes. Soil samples were collected from each boring at various interval depths for the following geotechnical analysis:

- Atterberg Limits (ASTM D4318);
- USCS Classification (ASTM D2487);
- Grain Size (ASTM D6913); and
- Moisture Content (ASTM D2216).

The soil infiltration tests were performed within the drill casing using a constant head test method to measure the rate of water loss (infiltration) into the soil at the bottom of the boring. The procedures employed create a field-saturated condition of the formation soils, which are tested based on methodology provided within ASTM D5126 - Standard Guide for Comparison of Field Methods for Determining Hydraulic Conductivity in Vadose Zone (active version 16e1 updated December 27, 2016).

In general, the soil infiltration test results are similar for the northern and southern UDF areas ranging between 0.74 to 0.98 inches/hour. Two locations in the northern UDF area had test results measuring 35.11 and 78.61 inches/hour, which are considerably higher than the other results, likely due to coarser gained formation soils. A summary of the soil infiltration test results is provided in Table 3C. Soil test boring information is summarized in Table 3D. Test logs for the soil infiltration tests are provided in Appendix G. Geotechnical test results are included in Appendix E.

3.4 Soil Testing for Environmental Quality

Soil testing for environmental quality was performed at each soil boring associated with the monitoring wells (MW-2022-1 through MW-2022-9), at the piezometers (PZ-2022-1 through PZ-2022-3, PZ-2022-5, and PZ-2022-8), and at two of the six additional soil borings installed for sampling purposes only (B-2022-1 and B-2022-2). Figure 5 shows the 16 soil borings that were sampled for environmental quality of the soil. The field work to collect soil samples for environmental quality testing was performed between March 22 and June 15, 2022.

The soils testing for environmental quality was conducted to determine the presence and concentration of chemical constituents (if any) in the existing soil that will allow the establishment of baseline chemical conditions for comparative evaluations during UDF operations and post-closure monitoring of the UDF. The choice of borings for environmental quality testing was based on the future use of the groundwater monitoring wells to document long-term environmental quality before, during, and after construction of the UDF. Sampling for environmental quality of soil from the piezometer borings and the two additional (sample only) borings was performed to further document the general environmental quality of the soil in the UDF area.

At each boring location, samples were collected from the top foot and from two-foot intervals spaced approximately every 15 feet thereafter, down to a depth of 60 feet bgs or to the groundwater depth, whichever was higher. A final sample was collected from each boring at the groundwater depth interface.

Apart from two exceptions, soil samples were analyzed for the following chemical constituents: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyl (PCBs), herbicides, organophosphorus pesticides, dioxins/furans, and metals. The two exceptions were due to time limitations experienced between field sampling and laboratory testing that did not allow sufficient time for analysis of the following:

- VOCs were not analyzed for the 26- to 30-foot interval at monitoring well MW-2022-6; and
- VOCs were not analyzed for the 0- to 1-foot interval at monitoring well MW-2022-7.

The PDI soil test data for environmental quality serve to document the condition of site soils in the UDF area prior to the construction and operation of the UDF.

The results of GE's PDI soil testing for environmental quality are provided in Table 4A. The data validation reports for this testing are provided in Appendix H. These data indicate no detected PCBs. Regarding these results, it is noted that the listed quantitation limits for PCBs were elevated by about an order of magnitude in relation to those specified in GE's FSP/QAPP due to the subsample size selected by the laboratory (approximately three grams). However, those quantitation limits are well below the Massachusetts Contingency Plan (MCP) Method 1 S-1/GW-1 soil standard for PCBs, which is 1 mg/kg.[9] Thus, the sampling results demonstrate that the GE Parcel does not contain PCBs at concentrations exceeding or even close to that level.[10] The GE sampling results show further that there were only a few detections of individual VOCs, SVOCs, pesticides, and herbicides at relatively low concentrations. While the data indicate more detections of dioxins/furans, concentrations are also relatively low. Inorganics were detected in all samples and at concentrations generally consistent with what would be expected in background or reference samples collected in the Eastern United States.

Split samples were collected by EPA and analyzed by EPA for PCBs, VOCs, and inorganic constituents. EPA's analytical results associated with these split samples are presented in Table 4B, along with GE's analytical results for the same constituents. As shown therein, for the constituents analyzed by EPA, the data from EPA's split samples are generally similar to the results from GE's samples.

As directed by EPA in its April 18, 2023 conditional approval letter, the soil analytical results obtained by GE have been compared with the EPA Region 9 Preliminary Remediation Goals (PRGs) for soil and the MCP Method 1 S-1/GW-1 soil standards to evaluate the soils for potential on-site reuse. These comparisons are included in Table 4A (showing both the residential and industrial Region 9 PRGs). These comparisons indicate that arsenic concentrations in these samples are above the EPA Region 9 PRGs, but are significantly lower than the MCP Method 1 S-1/GW-1 soil standard. Given that these detections for arsenic are relatively consistent in the soil sampling, they may be indicative of regional background levels for arsenic. The comparisons also indicate that nickel detections in two samples from separate borings (MW-2022-1 and PZ-2022-1) are slightly above the MCP Method 1 soil standard but considerably lower than the Region 9 PRGs.

The initial characterization of the debris piles indicated that the debris materials consist primarily of crushed concrete, concrete slabs, pavement millings, and brick and rubble. These materials will be further characterized and evaluated for possible on-site reuse or off-site disposal with the results to be presented in the Supplemental Information Package for the UDF, which will be prepared and submitted to EPA for review prior to construction.

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[9] It should also be noted that, for PCB mixtures other than Aroclors 1254 and 1260, the method detection limits were below those specified in the FSP/QAPP and no detections above the method detection limits were reported. Detections between the reporting/quantitation limit and method detection limit, if present, would have been flagged as estimated values.

[10] In the future, reporting/quantitation and method detection limits for PCB analyses of soil samples from the GE Parcel are expected to be equal to or lower than the limits specified in GE's applicable FSP/QAPP, as GE will instruct the laboratory to analyze a larger subsample.

3.5 Piezometer and Monitoring Well Installation

Six temporary piezometers and 11 monitoring wells, including two deep-shallow monitoring well pairs, were installed within the GE Parcel.[11] Collectively, these piezometers and monitoring wells have been and are continuing to be used to collect groundwater elevation data across the GE Parcel. The monitoring wells may also be used for long-term monitoring of site groundwater during construction, operation, and post-closure of the UDF. Further discussions on the installation of the piezometers and monitoring wells are provided below. A summary of the installed conditions for the piezometers and monitoring wells is provided in Table 5.

3.5.1 Piezometer Installation

Six piezometers were installed within the UDF area, as shown on Figure 6. Although the PDI Work Plan proposed a total of eight piezometers, two of them (formerly PZ-2022-4 and PZ-2022-6) were converted to monitoring wells (MW-2022-8 and MW-2022-9) in accordance with EPA's February 25, 2022, conditional approval letter. The reference identification of the completed piezometers are as follows:

- PZ-2022-1;
- PZ-2022-2;
- PZ-2022-3;
- PZ-2022-5;
- PZ-2022-7; and
- PZ-2022-8.

Except for piezometers PZ-2022-1, PZ-2022-7, and PZ-2022-8, separate geotechnical borings were completed in advance of drilling the well construction borings to allow for visual assessment of soil conditions and for estimation of depth to groundwater, which was used to establish the well screen depth. Piezometers PZ-2022-1, PZ-2022-7, and PZ-2022-8 were constructed in the same borings used for geotechnical purposes and were completed using a hollow-stem augur drill rig. The remaining piezometers were installed in separate borings using a sonic drill rig, which was determined to be a more effective drilling method for installation of the wells given the soil conditions encountered. Installation of piezometer PZ-2022-1 required the use of a hollow-stem auger drill rig due to access limitations encountered by the sonic drill rig.

For piezometers PZ-2022-1, PZ-2002-7, and PZ-2022-8, the completed soil boring depths exceeded the depths needed for well installation purposes due to geotechnical sampling requirements. Prior to the piezometer installation, the excess boring depth was backfilled with cement-bentonite grout to approximately one foot below the bottom of the well screen. The remainder of the boring was then backfilled with sand pack material to the bottom of the piezometer screen depth.

The piezometers consist of one-inch-diameter polyvinyl chloride well screen and riser pipe and were installed to facilitate groundwater elevation monitoring. Because the piezometers are located within the UDF development footprint, the piezometers are temporary and will be abandoned in place prior to construction of the UDF.

[11] The temporary piezometers were installed for gauging groundwater elevations during the PDI period and will be removed during UDF construction. The monitoring wells were installed for groundwater elevation gauging and sampling during the PDI period and may remain for long-term use. The monitoring wells include MW-2022-1S, which was subsequently decommissioned in November 2023 and replaced by monitoring well MW-2023-1SR at EPA's request, as described further below.

Construction logs for the completed piezometers are provided in Appendix I.

3.5.2 Monitoring Well Installation

Eleven monitoring wells were installed at the perimeter and within the UDF area, as shown on Figure 6. These 11 monitoring wells included six wells proposed in the PDI Work Plan, four wells added in accordance with EPA's February 25, 2022 conditional approval letter, and one well location (MW-2022-1S/MW-2023-1SR) added at EPA's request during PDI implementation based on field conditions. The reference identification of the completed monitoring wells and the basis for their installation are provided below:[12]

- MW-2022-1S subsequently decommissioned in November 2023 and replaced by MW-2023-1SR: per EPA request during implementation;
- MW-2022-1D: per the PDI Work Plan;
- MW-2022-2: per the PDI Work Plan;
- MW-2022-3: per the PDI Work Plan;
- MW-2022-4S: per the PDI Work Plan;
- MW-2022-4D: per EPA's conditional approval letter;
- MW-2022-5: per the PDI Work Plan, with the location adjusted per EPA's conditional approval letter;
- MW-2022-6: per EPA's conditional approval letter;
- MW-2022-7: per the PDI Work Plan (formerly MW-6 location in the PDI Work Plan);
- MW-2022-8: per EPA's conditional approval letter, formerly PZ-2022-4 in the PDI Work Plan; and
- MW-2022-9: per EPA's conditional approval letter, formerly PZ-2022-6 in the PDI Work Plan.

Except for monitoring well MW-2022-9, separate geotechnical borings were completed in advance of drilling the well construction borings to allow for visual assessment of soil conditions and for estimation of depth to groundwater, which was used to establish the well screen depth. Monitoring well MW-2022-9 was constructed in the same boring used for geotechnical purposes and was completed using a hollow-stem augur drill rig. Following installation of monitoring well MW-2022-9, all other monitoring wells were installed in separate borings using a sonic drill rig, which was determined to be a more effective drilling method for installation of the wells given the soil conditions encountered.

The monitoring well at location MW-2022-1 was initially installed to a depth at which the screen was submerged and was thus not appropriate to best determine groundwater elevations. To facilitate groundwater elevation gauging within the well screen, a second well was installed adjacent to the initial well and was screened across (within) the groundwater table at the time of its installation. The initial (deeper) monitoring well is identified as MW-2022-1(D) and the second (shallower) well as MW-2022-1(S). Monitoring wells MW-2022-8 and MW-2022-9 were initially proposed as piezometers in the PDI Work Plan but were converted to monitoring wells in accordance with EPA's February 25, 2022, conditional approval letter.

A summary table and construction logs for the completed monitoring wells are provided in Appendix I.

[12] Wells designated with "S" are shallow wells and those designated with "D" are deep wells at the same locations.

For monitoring well MW-2022-9, the completed soil boring depth exceeded the depth needed for well installation purposes due to geotechnical sampling requirements. Prior to the well installation, the excess boring depth was backfilled with cement-bentonite grout to approximately one foot below the bottom of the well screen. The remainder of the boring was then backfilled with sand pack material to the bottom of the well screen depth.

The monitoring wells consist of two-inch-diameter polyvinyl chloride well screen and riser pipe and were installed to facilitate groundwater quality sampling and groundwater elevation monitoring. Because monitoring wells MW-2022-8 and MW-2022-9 are located within the footprint of the UDF consolidation area, these wells are temporary and will be abandoned in place prior to construction of the UDF.

The remaining nine wells surround the UDF consolidation area and provide monitoring at and below the water table, with the majority of wells providing shallow monitoring. The monitoring well network provides sufficient data points to monitor head conditions across the UDF operational area. Head data are sufficient to construct potentiometric surface contour figures and thus to infer groundwater flow directions and assess gradients now and following construction activities. The wells are situated to monitor groundwater quality upgradient of the UDF consolidation area (e.g., the current MW-2022-1 cluster), cross-gradient (e.g., MW-2022-2, MW-2022-3, and MW-2022-7) and downgradient (e.g., MW-2022-4 cluster, MW-2022-5, and MW-2022-6) and were constructed to allow for hydraulic conductivity testing. The distribution of wells provides an overall understanding of the GE Parcel hydrogeology and emphasizes monitoring downgradient of that parcel. If additional monitoring is required due to changing site or off-site conditions, the monitoring network can be expanded.

3.6 Groundwater Elevation Monitoring

3.6.1 Description of Monitoring

Groundwater elevation monitoring was conducted within and outside of the GE Parcel utilizing the six piezometers and 11 monitoring wells installed within the GE Parcel, two pre-existing monitoring wells located outside of the GE Parcel at the Lee Municipal Landfill, and two surface water monitoring points located on an artificial pond within the GE Parcel (referenced as MP-1) and on the Housatonic River at the Schweitzer Bridge (referenced as MP-2). Monitoring well (MW-2022-1S) was decommissioned and replaced by MW-2023-1SR on November 13-15, 2023. MW-2023-1SR provides a longer screened interval than the well it replaced, with the screened zone encompassing the range in expected water table elevations informed by monitoring conducted pr eviously. An additional surface water monitoring point (referenced as MP-3) was installed in May 2023 on an arti ficial pond adjacent to surface water monitoring point MP-1. Surface water monitoring point MP-3 was installed at EPA's request to facilitate measurement of the full range surface water elevations within the artificial pond. These groundwater and surface water monitoring locations are shown on Figure 6.[13] Additional information pertaining to the Lee Municipal Landfill groundwater wells is included in Appendix I.

Groundwater elevation monitoring data for the piezometers and monitoring wells were collected by manual measurement (gauging) on a monthly basis and using transducers that record groundwater elevations on an hourly basis. A transducer was also installed at the artificial pond monitoring point locations (MP-1 and MP-3) to collect measurements of the pond surface water elevation when pond water depths are sufficiently high enough

[13] Arcadis also investigated the availability of water surface elevation data for the Housatonic River as part of river stage monitoring by the USGS at its Lenoxdale, MA gaging station (active since September 2022). To date, however, these data have not been available and so they are not provided.

to contact the transducer. Before the installation of MP-3, when pond water levels dropped below the transducer depth, the pond surface water elevation was measured manually using a survey rod or tape measure. MP-3 is able to measure lower pond surface water elevations than MP-1. It is noted that data collected on the surface water elevations of the pond will constitute only an approximate estimate of adjacent subsurface groundwater elevations since the pond surface elevation can fluctuate more rapidly than groundwater due to loss through evaporation and gain from stormwater inflow. In addition to these water elevation measurements, the Housatonic River surface water elevation at the Schweitzer Bridge (MP-2) is monitored manually using a survey rod or tape measure.

Groundwater elevation monitoring commenced on June 6, 2022, and the data for a one-year period (through June 2023) were summarized and reported in the August 2023 Final PDI Summary in accordance with the PDI Work Plan. Additional water level elevation monitoring was conducted through December 2023 (ending with data from the monitoring of replacement well MW-2023-1SR that was installed in November). Site-based measurements and retrieval of transducer data were performed on a monthly basis through the final synoptic gauging event in June 2023, with an additional synoptic gauging performed in October 2023. The monthly and additional groundwater elevation monitoring results are provided in Table 6A, and the hourly transducer groundwater elevation monitoring results to date are provided in Appendix I. Data collected during the gauging of replacement well MW-2023-1SR on December 23, 2023 are also included in Table 6A and Appendix I. Monitoring of the Housatonic River surface water elevation was required and was conducted until installation of a USGS gauging station in the vicinity of Woods Pond Dam. The latter USGS gauging station was installed downstream of the Schweitzer Bridge, and data collection at this gauging station began on September 14, 2022. However, elevation data are not available for the USGS gauge, which provides only gauge height and discharge data. In any case, GE continued monthly monitoring at the Schweitzer Bridge through November 2023, and the results are included in Table 6A. As mentioned previously, prior to UDF construction, the piezometers will be abandoned in place. However, the monitoring wells may remain in service for continued monitoring.

The recorded elevation gauging data for the piezometers and monitoring wells during the period from the start of groundwater elevation monitoring in June 2022 through November 2023 show an overall seasonal fluctuation- in groundwater elevations across the GE Parcel, with generally peak elevations observed in mid-spring and the lowest elevations observed in mid to late fall. Based on the monthly manual measurements, this fluctuation ranged from approximately 2.5 feet (MP-1) to 9.8 feet (unchanged since the August 2023 Final PDI Summary). In monitoring well MW-2022-2, which is located close to a low-lying area in the northern portion of the GE Parcel, groundwater elevations have fluctuated more significantly than in other gauging points. This is likely due to the well's proximity to a low area where surface water runoff following precipitation events and subsequent infiltration of the soil may be higher than in other areas of the parcel and have a greater and more immediate effect on the groundwater elevations in this area.

In general, the monitoring wells and piezometers within the GE Parcel showed groundwater elevations in the range of 946 to 967 feet in November 2022 and in the higher range of 949 to 973 feet in April-May 2023. Monitoring wells and piezometers within the area anticipated for the consolidation footprint (MW-2022-8, MW-2022-9, PZ-2202-2, PZ-2022-3, and PZ-2022-5) showed groundwater elevations in the range of 948 to 958 feet in November 2022 and in the higher range of 952 to 964 feet in April-May 2023. The groundwater elevation data collected to date indicate a generally east-southeast to west-northwest groundwater elevation gradient and flow direction with localized variation. The variation includes relatively elevated water table elevations along a topographic high near wells MW-2022-5 and MW-2022-8 and PZ 2022-5 that slopes steeply downward in several directions – south toward well MW-2022-9, west toward a ravine west of that area, and north to the

artificial pond, resulting in groundwater flow directions more northerly and southerly in these areas.[14] Furthermore, a thin clay lens and a silty interval are present in the upper screened zone of MW-2022-5, which may slightly raise the head in this well due to the potential influence of perched water and/or higher heads in deeper unconsolidated materials, as discussed below.

It is noted that certain transducer data graphs shown in Appendix I identify periodic measurement anomalies (e.g., plot traces with gaps). These anomalies can result, for example, when the transducer unit is removed and redeployed for data recovery purposes or when there is a momentary interruption in connectivity. In a number of wells, groundwater levels may have dropped below the transducer unit sensor. This condition can be seen in monitoring wells MW-2022-1S, MW-2022-6, MW-2022-7, MW-2022-8, MW-2022-9, PZ-2022-1, PZ-2022-5, PZ-2022-7, and PZ-2022-8. For monitoring well MW-2022-8, there was sufficient water column depth in the well to allow for redeployment of the transducer to a lower well depth (as can be seen in the graph by the flat trace followed by a sharp drop with corresponding manual measurements). While this redeployment did allow for monitoring at greater well depths, a continued fall in groundwater level in that well resulted in the transducer being positioned above the groundwater level for a period of time. In other wells, such as monitoring well MW-2022-7, redeployment of the transducer to a lower well depth may not be possible if there is insufficient water column depth in the well or if groundwater is absent. In one well at the Lee Municipal Landfill (MW-84-2), the transducer initially installed became inoperable and was replaced in September 2022. Transducer data for this well from June through August 2022 were not recoverable; however, the well has been gauged manually on a monthly basis since the start of groundwater elevation monitoring in June 2022. Additionally, due to equipment failure, transducer data from March through April 2023 for MW-2022-1S, and from June through July 2023 for MW-2022-1S, MW-2023-4D, and MW-2022-7 were not recoverable. It is noted that removal of accumulated sediment from wells MW-2022-6, MW-2022-7, MW-2022-8, and MW-2022-9 was performed in December 2022. The position of the transducers in these wells was lowered to the extent possible. Monitoring of potential sediment accumulation in these, and in the other monitoring wells located on the GE Parcel, shows little, if any, continued sediment accumulation.

Each of the monitoring well pairs MW-2022-1S/1SR/MW-2022-1D and MW-2022-4S/MW-2022-4D contains adjacent wells screened at different depths within the saturated overburden. The vertical groundwater gradients observed for these well pairs are all upward, except for the measurements in May 2023 for the MW-2022-1S/D cluster. Combined plots of the transducer data from each of these wells are presented in Appendix I. The average vertical gradient from June 2022 to November 2023 based on manual measurements for both well pairs is approximately 0.04 feet/foot upward, with the exception of the May 2023 data when the spring shallow groundwater elevations rose above the deeper groundwater for MW-2022-1S/D. This pattern is the same as described in the August 2023 Final PDI Summary.

The groundwater elevation data collected at the Lee Municipal Landfill as part of the UDF PDI field activities do not allow for interpolation of vertical groundwater gradients since only the shallow wells (MW 84-1 and MW 84-2) were monitored. However, the Lee Sanitary Landfill Final CSA report (CDM 1995) describes the vertical groundwater gradients interpreted from the bedrock and overburden monitoring well pairs as flowing generally in an upward direction, particularly in the southwestern corner of the landfill area. That report also described a single instance where a downward gradient was reported, which could not be explained and may have been the result of inaccuracies in water level readings.

Geologic cross-sections depicting existing geology, select piezometers and monitoring wells screen intervals, and the range of measured groundwater elevations reported during the PDI period, are shown on Figures 7 and

[14] At EPA's request, GE has confirmed the integrity and data for well MW-2022-5 to verify the accuracy of this groundwater "mound."

8. Groundwater elevation maps for each of the months of groundwater elevation gauging during the PDI period are shown on Figures 9 through 21.[15]

3.6.2 Estimate of Seasonal High Groundwater Elevation

As requested by the EPA, an evaluation of the groundwater elevation gauging data collected during the initial one-year PDI monitoring period (June 2022 through June 2023) at the GE Parcel was performed to provide a conservative estimate of the seasonal high groundwater elevation at the GE Parcel. This conservative estimate of the high groundwater elevation will be used in the design of the UDF to establish a separation distance between the bottom of the lowest baseliner system elevation and the estimated seasonal high groundwater elevation. A summary of the evaluation conducted to estimate the seasonal high groundwater elevation is provided below.

The determination of the seasonal high groundwater elevation for the GE Parcel was performed using the Frimpter method for calculating such elevations in Massachusetts (Michael H. Frimpter 1981). This method utilizes Massachusetts-based groundwater elevation monitoring data covering decades of recording. The Frimpter method calculates probable high groundwater elevations for a given site using actual groundwater elevation measurements at that site (such as those collected during UDF PDI at the GE Parcel) and historical groundwater elevation measurements collected at an observation well (OW) site. The calculation considers other parameters including terrain setting, which for the GE Parcel is considered to a combination of "valley-flat" and "terrace", and geologic environment, which for the GE Parcel is classified as stratified drift (sands and gravels). For the Frimpter calculation, it is important to utilize an OW with parameters (i.e., terrain setting and geologic environment) that are comparable to the site being evaluated. It is noted that the GE Parcel includes both valley-flat and terrace terrain settings but was evaluated as a terrace, which is more conservative (yields higher groundwater elevation estimates). The results of the Frimpter calculations are provided in Tables 6B and 6C. Additional Frimpter calculation details, including OW_c, OW_{max}, and OW_r parameter values, are provided in Tables 6C.1 through 6C.13.

The estimate of the seasonal high groundwater elevation for a specific site is made based on the assumption that the water level fluctuations within an OW site are comparable to the groundwater elevation fluctuations occurring at the subject site. The formula used in the Frimpter calculation compares two ratios: (1) the ratio of the measured groundwater fluctuation at the selected site and at the OW; and (2) the ratio between the standard Frimpter range of groundwater fluctuation and the recorded upper limit of the range of groundwater fluctuation at the OW. Through this comparison, the seasonal high groundwater elevation for the site is estimated based on the recorded groundwater elevation fluctuations at the OW.

A review of OW data available on the USGS website identified USGS OW "MA-PTW 51 Pittsfield, MA – 422475073112001," located in Pittsfield, MA (off Hubbard Avenue), as being the closest OW to the GE Parcel. Based on the extensive work completed at the GE Parcel during the PDI and information available for OW MA PTW-51 on the USGS website, the GE Parcel and OW MA-PTW 51 terrain settings and geologic environments are comparable (i.e., valley-flat/terrace and stratified drift/sands and gravels, respectively). It is also noted that both the GE Parcel and the OW locations are near stream and river waterways, and adjacent to elevated (hilly) topography. Groundwater elevation data available for the Pittsfield OW (well MA-PTW 5 include data collected from 1985 to 2022 (37 years). The range of groundwater elevation fluctuation at the Pittsfield OW is 5.2 feet in comparison to 5.0 feet at the GE Parcel. This 5.0-foot fluctuation range value is based on transducer

[15] Monitoring well MW-2023-1SR was installed after the PDI groundwater elevation gauging period and is therefore not shown on the groundwater elevation maps.

measurements and represents an average for the entire measurement period calculated by (1) determining the maximum groundwater elevation during each month for each gauging point, (2) determining the range of groundwater elevations (highest-lowest) for the monthly maximums for each gauging point, and (3) calculating the average range of groundwater fluctuation using the monthly ranges determined at each gauging point.

Table 6C shows the maximum measurement for each monitoring well at the GE Parcel during each month of transducer gauging. Adjacent to the maximum measured values for each month are the calculated high groundwater elevations for both the "valley" and "terrace" terrain settings, as calculated by the Frimpter method using the Pittsfield OW data. The single highest calculated groundwater elevation for each monitoring well during the gauging period was selected as the maximum adjusted groundwater elevation value for that monitoring well. Results from the Frimpter calculations show increases at the PDI gauging points on the GE Parcel ranging from 1.8 to 4.7 feet above the groundwater elevations measurements recorded during the PDI. The values in this range represent the estimated maximum groundwater elevation that could be anticipated at the gauging points.

For comparative purposes, an additional Frimpter calculation was performed using a different OW (MA-DWF 44R Deerfield, MA – 423311072355801), which is located Deerfield, MA and includes data collection from 1965 to 2023. The terrain setting and geologic environment for OW MA-DWF 44R are identified on the USGS website as valley-flat and stratified drift (sands and gravels), respectively, which are comparable to those at both the GE Parcel and the MA-PTW 51 OW. This additional Frimpter calculation showed similar results to those using OW MA-PTW 51, with the calculated increases at the PDI gauging points ranging from 1.9 to 4.7 feet above the groundwater elevations measurements recorded during the PDI. These results are nearly the same as those using the Pittsfield OW. Also of note is that the calculated average high groundwater elevation using the Deerfield OW is only slightly higher (by about 0.1 foot) than that using the Pittsfield OW. Given these close results, and the fact that the Pittsfield OW is less than nine miles from the GE Parcel, the use of the OW MW-PTW 51 is appropriate for use in the Frimpter calculations.

At EPA's request, as an additional point of comparison, the Frimpter analysis was also run on the PDI monitoring data from the two wells at the Lee Landfill to compare the seasonal high groundwater elevation predicted using the Frimpter method with historical groundwater elevation data available for the Lee Landfill. It is noted, however, that the available historical data for the Lee Landfill, as presented in Table 6D, are limited,[16] particularly as compared to the more robust data set available for the Pittsfield OW. A review of historical groundwater elevations recorded at the Lee Landfill dating back to 1984, including the recent UDF PDI gauging data, shows that the highest recorded groundwater elevations at the Lee Landfill were measured in spring 1984. The spring 1984 elevations for the two Lee Landfill monitoring wells included in the PDI (MW-84-1 and MW-84-2) were compared to the Frimpter calculation results. As seen in the results for well MW-84-1, the maximum Frimpter terrace elevation of 967.15 is approximately 1.4 feet higher than the spring 1984 elevations at the Lee Landfill, except for the June 6, 1984 groundwater measurement. The Final CSA report for the Lee Landfill (CDM 1995) describes the 970.25 elevation measurement at MW-84-1 on June 6, 1984 as possibly due to surface water ponding in a ground depression adjacent to the well that may have resulted in groundwater mounding around the well following three consecutive days rainfall totaling more than seven inches. The CSA report goes on to say that the possibility that this mounding was a cause of the amount of the groundwater level fluctuation at MW-84-1 on June 6, 1984, is supported by the fact that monitoring wells on the downstream and opposite sides of the landfill showed a substantially lower level of fluctuation on that date. With the noted possibility that

[16] Historical groundwater elevation data found for the Lee Landfill were limited to information contained primarily in the CSA report (CDM 1995) and in other sporadic elevation information presented in figures and reports provided by Tighe & Bond Engineers-Environmental Specialists (consultant for the Lee Landfill). See Table 6D for the available groundwater elevation data for the Lee Landfill.

the groundwater elevation at MW-84-1 recorded on June 6, 1984 may be unusually high due to surface grade conditions and excessive rainfall, the Frimpter calculation results for MW-84-1 appear reasonable.

For well MW 84-2, the maximum Frimpter terrace elevation of 957.15 is about 0.6 and 0.8 foot lower than the June 6, 1984 and the July 9, 1984 measured elevations, respectively. A review of the topography from 1995 and cross sections included in the CSA report suggests that surface grades around well MW-84-2 could have allowed for runoff concentration and subsequent ponding that, in similar fashion to MW-84-1, might have resulted in groundwater mounding conditions following significant rainfall events. Except for the June and early July 1984 GW elevation measurements, which may have been influenced by landfill operations during that time, the maximum Frimpter elevation results for MW-84-2 appear reasonable.

In summary, use of the Frimpter method for calculating the seasonal high groundwater elevation at the GE Parcel is considered to be an appropriate and conservative approach since it considers the extensive PDI data available for the GE Parcel (13-month period of groundwater elevation measurements at 13 monitoring locations, a robust soil boring and laboratory test data set for geologic characterization) and uses of an OW for the calculation basis that includes over 37 years of groundwater elevation data, is within nine miles of the GE Parcel, and is equally characterized in terms of terrain and geology. The conservative nature of the Frimpter method and its use in estimating the seasonal high groundwater elevations at the GE Parcel is further supported by comparison of the calculation results with the limited historical groundwater elevations at the Lee Landfill, which, as described above, show the Frimpter-calculated seasonal high groundwater elevations at the two Lee Landfill wells monitored as part of the PDI to be in general agreement with the historical groundwater elevations at the Lee Landfill.

These calculations of the seasonal high groundwater elevation at the GE Parcel, together with the preliminary design information presented in GE's December 6, 2022 Conceptual Design Plan for the UDF, demonstrate that there will be at least 15 feet of separation between the bottom of the UDF consolidation area liner system (as presented in the Conceptual Design Plan) and a conservative estimate of the seasonal high groundwater elevation, as required by the Revised Permit. The design of the UDF liner system and elevations is currently being refined from the conceptual design and, as refined, will be presented in the Final Design Plan for the UDF. That plan will likewise, as required by the Revised Permit, provide a minimum 15-foot separation distance between the bottom of the UDF consolidation area liner system and the conservative estimate of the seasonal high groundwater elevation. And, of course, due to the thickness of the liner system, there will be even more separation between the bottom of the actual waste placed in the consolidation area and the seasonal high groundwater elevation. A groundwater contour map depicting the Frimpter-calculated seasonal high groundwater elevations is provided on Figure 22[17].

3.7 Groundwater Testing for Environmental Quality

Groundwater testing for environmental quality has been performed at the 11 groundwater monitoring wells, including both shallow (identified as "S") and deep (identified as "D") wells at MW-2022-1 and MW-2022-4, described in Section 3.5.2.[18] The locations of the monitoring wells used for groundwater testing for environmental quality are shown on Figure 23.

[17] As noted above, monitoring well MW-2023-1SR, which was installed after the PDI groundwater elevation gauging period, is not shown on the groundwater elevation maps.

[18] These 11 monitoring wells include MW-2022-1S, which, as noted above, was subsequently decommissioned in November 2023 and replaced by monitoring well MW-2023-1SR.

Groundwater testing for environmental quality has been and is being conducted to determine the presence and concentration of chemical constituents (if any) in the groundwater to establish baseline chemical conditions for comparative evaluations during UDF operations and post-closure monitoring of the UDF. The collected groundwater samples have been analyzed for the full list of analytes presented in test result summary tables (described below), which include data for PCBs, VOCs, SVOCs, inorganics, dioxins/furans, pesticides, and herbicides, as well as for per- and polyfluoroalkyl substances (PFAS) in accordance with EPA's February 25, 2022, conditional approval letter.

Four groundwater quality sampling events have been conducted at the GE Parcel to date – in spring 2022, fall 2022, spring 2023, and fall 2023. The results of GE's samples are provided in Tables 7A-1 through 7A-11 for the various wells sampled. The data validation reports for this testing are included in Appendix J. In addition, during all four events, EPA collected and analyzed split samples from selected wells for PCBs, VOCs, and inorganic constituents. The analytical results associated with those EPA split samples are presented in Table 7B, along with the GE results for the same wells and same constituents. Each of these groundwater sampling events is described further in the following paragraphs.

The first PDI groundwater sampling event to test for environmental quality was performed between June 23 and July 6, 2022. The data from this event indicate no detected PCBs and only a few detections of individual VOCs, SVOCs, and herbicides at MW-2022-1S or MW-2022-1D at relatively low concentrations. Similarly, the data indicate few detections of individual pesticides (in only four of the 11 wells sampled) and inorganics (at all 11 wells sampled) at relatively low concentrations. PFAS compounds were detected in eight of the 11 wells sampled, and dioxins/furans were detected in all wells at relatively low concentrations. For the constituents analyzed by EPA, the analytical data from EPA's split samples are generally similar to the results from GE's samples.

The second PDI groundwater sampling event was performed between November 9 and December 19, 2022.[19] The data from the second groundwater sampling event indicate no detected PCBs and only a few detections of individual VOCs, SVOCs, and herbicides at MW-2022-1D and MW-2022-2 at relatively low concentrations. Similarly, the data indicate few detections of individual pesticides (in eight of the 10 wells sampled) and inorganics (at all 10 wells sampled) at relatively low concentrations. PFAS compounds were detected in seven of the 10 wells sampled, and dioxins/furans were detected in all wells at relatively low concentrations. For the constituents analyzed by EPA, the analytical data from EPA's split samples are generally similar to the results from GE's samples.

The third groundwater sampling event was performed between April 25 and May 5, 2023. The data from the third groundwater sampling event indicate no detected PCBs and only a few detections of individual VOCs, SVOCs, and herbicides at MW-2022-2, MW-2022-3, and MW-2022-5 at relatively low concentrations. Similarly, the data indicate few detections of individual pesticides (in five of the 11 wells sampled) and inorganics (at all 11 wells sampled) at relatively low concentrations. PFAS compounds were detected in seven of the 11 wells sampled, and dioxins/furans were detected in all wells at relatively low concentrations. For the constituents analyzed by EPA, the analytical data from EPA's split samples are generally similar to the results from GE's samples.

[19] The extended time period to perform the second PDI groundwater sampling event was due to the presence of accumulated sediment that limited the depth of water and prevented collecting samples. After an initial attempt to collect samples was unsuccessful in certain wells, GE, with EPA approval, performed removal of sediment accumulations in those wells and was able to complete the second round of PDI groundwater sampling within all but well MW-2022-1S. MW-2022-1S was not sampled due to low groundwater levels at the time of sampling, which resulted in a water column length insufficient for sampling.

The fourth groundwater sampling event was performed between October 30 and November 28, 2023. The data from the fourth groundwater sampling event indicate no detected PCBs or sulfide. Two VOCs and one SVOC were detected in a single well at low concentrations. There were a few detections of individual pesticides (low concentrations in six of the 11 wells sampled) and inorganics (detected at all wells except MW-2022-8), with cyanide detected in one well at a low concentration. Dioxins/furans were detected in all wells at relatively low concentrations. PFAS compounds were detected in eight of the 11 wells sampled. For the constituents analyzed by EPA, the analytical data from EPA's split samples are generally similar to the results from GE's samples.

As directed in EPA's April 18, 2023 conditional approval letter, the groundwater analytical results obtained by GE for these four sampling events have been compared to the MCP Method 1 GW-1 and GW-3 groundwater standards. GW-1 standards are based on the potential use of groundwater as drinking water, either currently or in the foreseeable future; and GW-3 standards are based on the potential environmental effects resulting from contaminated groundwater discharging to surface water.[20] These comparisons are included in Tables 7A-1 through 7A-11. These comparisons show 15 concentrations above Method 1 GW-1 standards, and two concentrations above Method 1 GW-3 standards. All of these exceedances but three involve PFAS. Specifically, the concentrations of total PFAS at MW-2022-1S/MW-2023-1SR , MW-2022-1D, and MW-2022-9 during all four events exceeded the Method 1 GW-1 standard for total PFAS.[21] The spring 2023 Toxicity Equivalency Quotient (TEQ) result for dioxins/furans in the parent sample at well MW-2022-9 was greater than the GW-1 standard for such TEQs, but the duplicate result for that well was more than an order of magnitude below the GW-1 standard.[22] This exceedance was a result of the validation process, in which several dioxin compounds were corrected from laboratory-estimated low-level detections to non-detected results and then non-detected TEQ results were incorporated at a value of one half of the reporting limit, which was greater than the laboratory-estimated low-level detections. This resulted in the TEQ result changing from 0.03 ng/L to 0.0301 ng/L, compared to the standard of 0.03 ng/L. The comparisons also show two detected concentrations above GW-3 standards – for cyanide at MW-2022-5 in the spring 2022 event and for lead at MW-2023-1SR in the fall 2023 event – and one detected metal concentration above GW-1 standards – for chromium at MW-2022-5 in the fall 2023 event.

Although there is no formal prohibition on the use of groundwater at the GE Parcel for drinking water, there is no current or reasonably foreseeable future use of groundwater as drinking water at this property and there are no active drinking water wells within 500 feet of the UDF consolidation area. The source of the PFAS is unclear, but it appears that they may be related to an upgradient source. MassDEP is separately investigating nearby drinking water wells for the presence of PFAS. The single dioxin/furan TEQ result greater than the GW-1 standard may be anomalous (since only one result out of four sampling events exceeded the standard, the paired duplicate result from the same well was below the standard, and the exceedance appears to be a result of the use of one half of the reporting limit for non-detected results). With regard to the one exceedance of cyanide above the GW-3 standard at MW-2022-5, the one exceedance of lead above the GW-3 standard at MW-2023-1SR, and the one exceedance of chromium above the GW-1 standard at MW-2022-5, these appear to be isolated instances as each was only detected once. Cyanide, lead, and chromium were not concurrently

[20] GW-2 standards are based on the potential for chemicals in groundwater to volatilize and migrate into indoor air of buildings; they were not considered applicable to the UDF property.

[21] Well MW-2022-1S was sampled during two events (spring 2022 and spring 2023) and well MW-2023-1SR was sampled in one event (fall 2023).

[22] For dioxins/furans, TEQ concentrations were calculated using the Toxicity Equivalency Factors developed by the World Health Organization in 2005 (van den Berg et al. 2006) and set forth in EPA (2010), and representing non-detected compounds as one-half the reporting limit.

detected above the GW-1 or GW-3 standards in nearby wells (or, for that matter, any other wells), and thus there does not appear to be a potential for groundwater exceeding those standards to discharge to surface water.

The analyte list to be used for groundwater sampling during UDF operations and/or long-term groundwater sampling may be modified based on the review of the PDI sampling results and/or the nature of the materials being disposed of. Proposed modification(s) will be presented to EPA for review and approval (e.g., in the UDF Operation, Monitoring, and Maintenance Plan and/or the UDF Post-Closure Monitoring and Maintenance Plan).

3.8 Hydraulic Conductivity Evaluation

In accordance with the requirements of EPA's February 25, 2022, conditional approval letter for the PDI Work Plan, slug testing was performed in five monitoring wells within the UDF area (representing half of the wells installed, excluding the two deep monitoring wells) to determine hydraulic conductivity of the parcel soils. Specifically, slug testing was performed at monitoring wells MW-2022-1D, MW-2022-2, MW-2022-5, MW 2022-7, and MW-2022-9 in June 2022, with the result from MW-2022-7 being unusable. Additional slug testing was conducted in July 2023 in monitoring wells MW-2022-1S and MW-2022-4D, as directed in EPA's April 18, 2023 conditional approval letter for the Interim PDI Data Summary, as well as in monitoring well MW-2022-7 given the unusability of the June 2022 result from that well. The results of the slug testing are provided in Table 8.

The slug tests were performed to estimate hydraulic conductivity by introducing a water level displacement and then measuring the water level recovery. The slug tests at all seven wells were performed using a solid slug (1.5 inches in diameter and two feet in length), and water level recoveries were recorded by a pressure transducer. Recovery of water levels during the slug tests at the monitoring wells was variable during test initiation. For each well, the test response with the lesser amount of initial variability was used to analyze hydraulic conductivity. The recovery data were processed and analyzed using the applicable analytical solution with AQTESOLV® following guidance presented in Butler (2019). Additional data from the wells that were utilized for analytical solution included well dimensions, saturated thickness, and effective screen length which accounts for well sedimentation thickness.

At the time of testing, the four wells successfully tested were screened within the water table groundwater zone, and three wells (MW-2022-1S, MW-2022-7, and MW-2022-9) had partially submerged screens or screens/upper filter packs that became partially submerged during the rising head tests. The analytical solutions utilized were the KGS Model (Hyder et al. 1994), the Springer-Gelhar (1991), and the Bouwer and Rice (1976) and Bouwer (1989) solutions. The results indicated an estimated hydraulic conductivity range for all but MW-2022-4D of 0.3 to 38 feet per day, as shown in Table 8. Those hydraulic conductivity estimates are in the range of what would be expected considering the grain size description for the screened intervals of the wells. For MW-2022-4D, the well is screened within bedrock, which likely explains the significantly higher hydraulic conductivity (400 feet per day). The heterogeneous nature of the unconsolidated glacial deposits is reflected in the variability of the results with moderate to high hydraulic conductivity. The analytical solution reports for the slug tests are presented in Appendix K.

3.9 Weather Monitoring

In accordance with the requirements of EPA's February 25, 2022, conditional approval letter, a weather station was installed at the GE Parcel on October 3, 2022, to record weather data, including rainfall, temperature, wind speed and direction, and barometric pressure. The weather station is solar-powered and web-enabled, allowing for telemetric upload of collected data for desktop (dashboard) weather monitoring. It has been collecting data

since early October 2022. The weather station will serve to collect year-round data and is anticipated to remain in place during construction, operation, and closure of the UDF. The collected weather data will be used to refine regional meteorological data for use in evaluating and developing baseline air monitoring requirements and UDF design parameters, as well as for use during UDF operations and closure. A lockable chain-link fence enclosure was installed around the weather station to limit access to the weather station equipment. The location of the weather station and enclosure fencing is shown on Figure 24. Weather data collected through November 2023 are provided in Table 9. A wind rose diagram depicting wind directions recorded at the GE Parcel is provided in Figure 25. The weather station will be relocated elsewhere on the GE Parcel prior to UDF construction activities if such activities will impact its operation.

3.10 Cultural Resources Assessment

In accordance with the PDI Work Plan for the UDF, an initial Phase IA CRA of the GE Parcel was conducted by AECOM on GE's behalf under EPA oversight. That CRA included the following activities:

- Definition of an archaeological Area of Potential Effects (APE) and an historic architectural APE, both of which were coextensive with the GE Parcel;
- Desktop and on-line review of the Massachusetts Historical Commission's (MHC's) report files and databases, including the MACRIS, Massachusetts State Historic Preservation Plan, and MHC State Reconnaissance Survey Reports, to determine whether the GE Parcel contains or could affect cultural resources included in those databases;
- A desktop investigation of the GE Parcel for the potential to contain unidentified potentially significant cultural resources (i.e., whether they have no, low, or high potential to contain such resources), using an approach outlined in the PDI Work Plan;
- A desktop investigation of known or suspected historic structures within the historic architectural APE by examining historic structure inventories compiled by the MHC and local historic organizations and systematically comparing them with the location of the GE Parcel; and
- A field investigation of the locations of planned soil borings at the GE Parcel and a second field investigation of the vegetated margins of the GE Parcel.

Following the completion of these activities, GE prepared and submitted a *Phase IA Cultural Resources Assessment Report for Upland Disposal Facility Area* (Phase IA CRA Report), dated July 8, 2022. A copy of that report is provided as Appendix L. EPA provided conditional approval of that report in a letter dated September 7, 2022.

The Phase IA CRA did not identify any previously recorded or visible cultural resources within the overall APE. However, three locations within portions of the GE Parcel that could potentially be used for UDF support activities, identified as Areas A, B, and C, were identified as having a potential to contain archaeological resources. Accordingly, GE's Phase IA CRA Report included a work plan for supplemental CRA investigations to further assess whether those three areas contain potentially significant cultural resources. Following EPA's approval of the report, those supplemental investigations, termed a Phase IB survey for federal purposes and an intensive archaeological survey in MHC terminology, were conducted in October 2022, with oversight by representatives of EPA and, at times, representatives of certain interested Native American tribes. In addition to background research, these investigations included the following field activities: (a) a systematic visual inspection of Areas A, B, and C to verify current field conditions and refine the field survey strategy as needed;

and (b) excavation of 116 shovel test pits (STPs), spaced on a systematic grid at 10-meter intervals across each of the three areas (79 in Area A, eight in Area B, and 29 in Area C).

As directed in EPA's September 7, 2022 conditional approval letter, a separate report on those supplemental investigations was prepared and initially submitted on December 6, 2022, and has since been revised to address conditions in EPA's April 18, 2023 conditional approval letter. That separate report, entitled *Revised Phase IB Intensive Archaeological Survey Report for Upland Disposal Site Area*, is provided as Appendix M. In accordance with MHC requirements, that report reiterates much of the background information and other research presented in the Phase IA CRA Report; and it then describes in detail the field surveys conducted and STPs excavated in Areas A, B, and C. It notes that the STPs did not identify any cultural artifacts or features in the areas investigated; and it concludes, based on the combined background research and field studies, that the GE Parcel does not contain any significant cultural resources and that no additional CRA studies or mitigation measures are required.

3.11 Non-Community and Private Water Supply Wells

In accordance with Section II.B.5.a.(3) of the Revised Permit, a review of surrounding areas that lie within 500 feet of the UDF consolidation area was conducted to identify the possible existence of non-community and private supply wells. This review began by mapping of the 500-foot offset distance from the UDF consolidation area to identify which areas are included within that zone. The area within that 500-foot limit, as well as groundwater elevation contours developed from the June 2023 gauging, are shown on Figure 26. The following activities were then conducted to determine the possible existence of non-community and private supply wells within that 500-foot area:

- Review of aerial imagery within 500 feet of the UDF consolidation area to determine what locations require investigation for the possible existence of non-community and private supply wells;
- Field reconnaissance of accessible areas requiring investigation by visual observation for evidence of private well features; and
- Discussions with MassDEP regarding the possible existence and location of private water supply wells that MassDEP is aware of.

This review did not identify the existence of any active non-community or private supply wells within 500 feet of the UDF consolidation area. The review did identify three potential nearby wells in the vicinity. However, two of those wells are outside the 500-foot limit. The third, a former private supply well that would have serviced the former residence on the adjacent property at 525 Woodland Road, is within 500 feet of the consolidation area, as shown on Figure 26; but it is no longer in use since the former residence was demolished and the property is now being used for construction equipment and material staging. The current property owner confirmed that this well is no longer in use.

4 References

Anchor QEA. 2022. Final Revised Overall Strategy and Schedule for Implementation of the Corrective Measures. Prepared for General Electric Company, Pittsfield, Massachusetts. July.

Anchor QEA, AECOM, and Arcadis. 2021. Final Revised Rest of River Statement of Work. Prepared for General Electric Company, Pittsfield, Massachusetts. September.

Anonymous. Undated. LSP Evaluation Opinion Lee Landfill. Obtained May 2008 from MassDEP file review.

Arcadis. 2013. Field Sampling Plan/Quality Assurance Project Plan, Revision 5. Prepared for General Electric Company, Pittsfield, Massachusetts. July 2.

Arcadis and AECOM. 2021. Pre-Design Investigation Work Plan for Upland Disposal Facility. Prepared for General Electric Company, Pittsfield, Massachusetts. November. Available online at: https://semspub.epa.gov/work/01/661267.pdf.

Arcadis and AECOM. 2022. Interim Pre-Design Investigation Data Summary Report. Prepared for General Electric Company, Pittsfield, Massachusetts. December 6.

Bouwer, H. 1989. The Bouwer and Rice slug test--an update. Ground Water, vol. 27, no. 3, pp. 304-309.

Bouwer, H., and R.C. Rice. 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resources Research, vol. 12, no. 3, pp. 423-428.

Butler Jr, J.J. 2019. The Design, Performance, and Analysis of Slug Tests, Second Edition. CRC Press.

CDM. 1995. Lee Sanitary Landfill Final Comprehensive Site Assessment. Prepared for Town of Lee, Massachusetts. November

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitats, Natural History, and Distribution. University Press of New England, Hanover, New Hampshire. USA. Terrestrial Plant Ecology, Third Edition.

EPA. 2010. Recommended Toxicity Equivalence Factors for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodebenzo-p-dioxin and Dioxin-like Compounds. EPA/100/R-10/005. December

EPA. 2020. Revised Final Permit Modification to the 2016 Reissued RCRA Permit and Selection of CERCLA Remedial Action and Operation & Maintenance for Rest of River. December 16. Available online at: https://semspub.epa.gov/work/01/650440.pdf.

FEMA. 1982a. Flood Insurance Rate Map, Town of Lee, Massachusetts, Berkshire County Community Panel Number 250028 0003 B. June 1.

FEMA. 1982b. Flood Insurance Rate Map, Town of Lee, Massachusetts, Berkshire County Community Panel Number 250028 0007 B. June 1.

Michael H. Frimpter. 1981. Probable High Ground-Water Levels in Massachusetts, U.S. Geological Survey Water Resources Investigation 80-1205. Prepared for Massachusetts Department of Environmental Quality Engineering.

Hyder, Z, J.J. Butler, Jr., C.D. McElwee, and W. Liu. 1994. Slug tests in partially penetrating wells. Water Resources Research, vol. 30, no. 11, pp. 2945-2957.

Mass EOEEA (Massachusetts Executive Office of Energy and Environmental Affairs). 2009. Designation of the Upper Housatonic River Area of Critical Environmental Concern. March

MassGIS 2021-2022. Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services.

NRCS. 2021. Web Soil Survey. Available online at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed in October 2022.

Tighe & Bond. 2021. 2021 Annual Post-Closure Monitoring Report, Lee Sanitary Landfill, Willow Hill Road, Lee, Massachusetts. July 19.

USFWS. 2021. Information for Planning and Consultation. Available online at: https://ecos.fws.gov/ipac/. Accessed in October 2021.

Van den Berg, M., L.S. Birnbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, H. Hakansson, A. Hanberg, L. Haws, M. Rose, S. Safe, D. Schrenk, C. Tohyama, A. Tritscher, J. Tuomisto, M. Tysklind, N. Walker, and R.E. Peterson. 2006. The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds. Toxicological Sciences, 93(2):223–241. October. https://doi.org/10.1093/toxsci/kfl055. July 7

Woodlot Alternatives, Inc. 2002. Ecological Characterization of the Housatonic River. Prepared for EPA Region 1, September.