TOWN OF LEE, BOARD OF HEALTH

GE-Pittsfield/Housatonic River Site
Rest of River (GECD850)
Pre-Design Investigation Work Plan for Upland Disposal Facility

SATURDAY NOVEMBER 19, 2022

EXHIBIT-5

Andrew T. Silfer
Leader, Pittsfield/Housatonic River

General Electric Company
Global Operations – Environment, Health & Safety
1 Plastics Avenue
Pittsfield, MA 01201
T 518-937-7257 and 413-553-6602
andrew.silfer@ge.com

Via Electronic Mail

November 24, 2021

Mr. Dean Tagliaferro
EPA Project Coordinator
U.S. Environmental Protection Agency
c/o HDR, Inc.
10 Lyman Street, Suite 2
Pittsfield, MA 01201

Re: GE-Pittsfield/Housatonic River Site
Rest of River (GECD850)
Pre-Design Investigation Work Plan for Upland Disposal Facility

Dear Mr. Tagliaferro:

In accordance with the approved Final Revised Rest of River Statement of Work, enclosed for EPA's review and approval is GE's Pre-Design Investigation Work Plan for the Upland Disposal Facility.

Please let me know if you have any questions about this Work Plan.

Very truly yours,

Andrew T. Silfer/csc

Andrew T. Silfer, P.E.
GE Project Coordinator

Enclosure

Cc: (via electronic mail)

Richard Fisher, EPA
Tim Conway, EPA
John Kilborn, EPA
Christopher Ferry, ASRC Primus
Thomas Czelusniak, HDR Inc.
Scott Campbell, Taconic Ridge Environmental
Izabella Zapisek, Taconic Ridge Environmental
Michael Gorski, MassDEP
Elizabeth Stinehart, MassDEP
John Ziegler, MassDEP
Ben Guidi, MassDEP
Michelle Craddock, MassDEP
Jeffrey Mickelson, MassDEP
Mark Tisa, MassDFW
Jonathan Regosin, MassDFW
Betsy Harper, MA AG
Traci Iott, CT DEEP
Susan Peterson, CT DEEP
Graham Stevens, CT DEEP
Lori DiBella, CT AG
Molly Sperduto, USFWS
Field Supervisor, USFWS
Mark Barash, US DOI
Ken Finkelstein, NOAA
James McGrath, City of Pittsfield
Michael Coakley, PEDA
Melissa Provencher, BRPC
Christopher Ketchen, Town of Lenox
Town Administrator, Lee
Town Manager, Great Barrington
Town Administrator, Stockbridge
Town Administrator, Sheffield
Andrew Thomas, GE
Kevin Mooney, GE
Matthew Calacone, GE
Mark Gravelding and Phil Batten, Arcadis
Dennis Lowry, AECOM
James Bieke, Sidley Austin
Michael Werth, Anchor QEA
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GE Internal Repository

General Electric Company

Pre-Design Investigation Work Plan for Upland Disposal Facility

November 2021

Pre-Design Investigation Work Plan for Upland Disposal Facility

November 2021

Prepared By:
Arcadis U.S., Inc.
One Lincoln Center, 110 West Fayette Street, Suite 300
Syracuse, New York 13202
Phone: 315 446 9120
Fax: 315 449 0017

And

AECOM
500 Enterprise Drive
Rocky Hill, Connecticut 06067
Phone: 860 263 5810

Prepared For:
General Electric Company
1 Plastics Avenue
Pittsfield, Massachusetts 01201

Our Ref:
30103563

Contents

Tables

Figures

Appendices

Abbreviations

amsl	above mean sea level
APE	Area of Potential Effects
Arcadis	Arcadis US, Inc.
ASTM	ASTM International
bgs	below ground surface
CD	Consent Decree for GE-Pittsfield/Housatonic River Site
cm/s	centimeter per second
CRA	Cultural Resource Assessment
EPA	US Environmental Protection Agency
Eversource	Eversource Energy
Final Revised SOW	Final Revised Rest of River Statement of Work (September 2021)
FSP/QAPP	Field Sampling Plan/Quality Assurance Project Plan
ft	feet
GE	General Electric Company
IPaC	Information for Planning and Consultation (USFWS)
Lane	The Lane Construction Corporation
MACRIS	Massachusetts Cultural Resource Information System
MassDEP	Massachusetts Department of Environmental Protection
MHC	Massachusetts Historical Commission
mil	one thousandth (0.001) of an inch
MNHESP	Massachusetts Natural Heritage Endangered Species Program
NGVD 29	National Geodetic Vertical Datum of 1929
NRHP	National Register of Historic Places
OLIVER	MassGIS On-line Data Viewer application
PCB	polychlorinated biphenyl
PDI	pre-design investigation
PDI Work Plan	Pre-Design Investigation Work Plan

Revised Permit	Final Revised Modification of GE's Resource Conservation and Recovery Act Corrective Action Permit (December 2020)
ROR	Rest of River
SPT	standard penetration test
SRHP	State Register of Historic Places
UDF	Upland Disposal Facility
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

1 Introduction

This Pre-Design Investigation Work Plan (PDI Work Plan) has been prepared on behalf of the General Electric Company (GE) to present the proposed pre-design investigation (PDI) activities for the Upland Disposal Facility (UDF) and UDF support area associated with the Rest of River (ROR) Remedial Action. This section provides an overview of the site background and describes the purpose, objectives, and organization of this PDI Work Plan.

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 maximum limits of consolidated material for the UDF and the associated operational area surrounding and encompassing the limits of the consolidated material (jointly referred to herein as the UDF area). Finally, the figure shows the potential UDF support area, which is currently undefined but may include temporary facilities such as sediment dewatering and material handling areas (referred to herein as UDF support area).

1.1 Background

On December 16, 2020, pursuant to the 2000 Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site, the U.S. Environmental Protection Agency (EPA) issued a final revised modification of GE's Resource Conservation and Recovery Act (RCRA) Corrective Action Permit (Revised Permit) specifying a Remedial Action for the ROR area (EPA 2020). The ROR area 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 (Anchor QEA et al. 2021).[1] That SOW included pre-design and design requirements for the UDF and UDF support area, including a requirement for GE to submit a PDI Work Plan for the UDF. On September 16, 2021, EPA issued an approval letter for the Final Revised SOW.

This PDI Work Plan has been prepared in accordance with the Final Revised SOW and includes descriptions for conducting desktop, field, and laboratory-based activities necessary to acquire information for design of the UDF component of the ROR Remedial Action.

[1] Although the Revised Permit is currently being appealed by other parties to the EPA Environmental Appeals Board, GE agreed in a February 10, 2020, Settlement Agreement to submit the SOW and, subject to approval by EPA, to perform the investigation and design work specified in the SOW as contractual obligations under that agreement, unless and until EPA issues a further revised permit that is not substantially similar to the current Revised Permit.

1.2 Purpose and Objectives

This PDI Work Plan describes the proposed investigations necessary to support engineering evaluations and detailed planning and design of the UDF. The results of activities and investigations conducted previously, as well as those performed as part of the PDI, will be 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. If the findings or results of the UDF PDI activities indicate that additional investigations are necessary to facilitate the design for the UDF and/or UDF support area, a supplemental PDI work plan or an addendum to this PDI Work Plan will be submitted to EPA for review and approval prior to implementing such supplemental investigations. Further, given that the UDF support area requirements and related facilities are not known at this time, any additional investigations deemed necessary based on design requirements for the UDF support area components will be proposed and conducted within the UDF support area as part of the design process, as will be outlined in the Conceptual Design Plan for the UDF.

1.3 PDI Work Plan Organization

The remainder of this PDI Work Plan is organized into the following six sections:

- Section 2 presents a summary of the Performance Standards for the UDF, as described in Section II.B.5.a of the Revised Permit.
- Section 3 presents a description of the GE Parcel, including the UDF area and UDF support area, and pertinent site background and historical site data, including a summary of information currently available to support design activities.
- Section 4 presents a summary of the anticipated UDF design and site layout.
- Section 5 presents the PDI program objectives and a description of proposed desktop, field, and laboratory-based activities and investigations to address current data needs for design of the UDF and UDF support area (incorporating existing data determined to be of sufficient quality to be usable), including the following:
    - Baseline assessment of the habitat at the UDF area and UDF support area;
    - Survey of existing site features and topography;
    - Subsurface drilling for geotechnical data and sample acquisition;
    - Installation of temporary piezometers and permanent monitoring wells for baseline groundwater elevation and chemical groundwater quality monitoring; and
    - Initial Phase IA cultural resource assessment (CRA) of the UDF area and UDF support area.
- Section 6 presents a summary of data and information that will be obtained during field-based activities and the evaluations to be performed based on the acquired PDI data and information, along with a description of PDI reporting requirements.
- Section 7 presents the anticipated schedule for performing the PDI activities.

2 Performance Standards for UDF

Section II.B.5.a of the Revised Permit sets forth the Performance Standards for the UDF. In summary, those Performance Standards require that the UDF meet the following construction and design requirements:

- Be constructed at the location shown in Figure 6 of the Revised Permit (also depicted on Figure 1 herein).
- Provide a maximum design waste capacity of 1.3 million cubic yards.
- Have a consolidation area (defined as the waste-containing portion of the UDF) with a maximum footprint of 20 acres and a maximum elevation of 1,099 feet (ft) above mean sea level (amsl). If the seasonally high groundwater elevation is determined to be higher than 950 ft amsl, the maximum elevation of the consolidation area may be increased by the number of feet between the seasonally high groundwater and 950 ft amsl in order to achieve the maximum waste capacity of 1.3 million cubic yards.
- Include a double bottom liner, separated by a drainage layer, and incorporate primary and secondary leachate collection systems.
- Have the bottom liner a minimum of 15 ft above a conservative estimate of the seasonally high groundwater elevation. The seasonally high groundwater elevation will be projected using site-specific groundwater elevation data collected in the location of the UDF and modified to account for historical groundwater level fluctuations at similarly sited off-site long-term monitoring wells in Massachusetts. This estimation will be performed pursuant to a methodology reviewed and approved by EPA.
- Cover the consolidation area with a low-permeability cap to include liners, drainage layers, and vegetation.
- Ensure that the liners for both the bottom of the UDF and the cap have a permeability equal to or less than $1x10^{-7}$ centimeter per second (cm/s) and a minimum thickness of 30 thousands of an inch (mil) and are chemically compatible with polychlorinated biphenyls (PCBs).
- Include a stormwater management system to control surface runoff and minimize the potential for surface erosion or stormwater contribution to leachate generation.
- Include a groundwater monitoring network around the UDF to monitor for PCBs and other constituents identified in the groundwater monitoring plan as approved or modified by EPA.

Section II.B.5.a of the Revised Permit provides further that:

- GE must identify any current non-community and private water supply wells within 500 feet of the UDF consolidation area. If any such wells are identified, GE must pay the installation costs for those users to be connected to a public water supply (unless they do not consent); and if such a well owner consents at a later date or any new water users are identified within 500 feet of the UDF consolidation area, GE must pay the installation cost of a connection to a public water supply.
- GE will utilize the UDF for disposal only of sediments and soils that were generated as part of the ROR Remedial Action, and only of those sediments and soils that meet certain acceptance criteria specified in Attachment E to the Revised Permit.

- GE will be responsible for the proper functioning of the UDF during operations, for closure of the UDF (including installation of the low-permeability cap with a vegetative cover) when the UDF is full or the ROR excavation and dredging activities have been completed, and for proper operation, maintenance, and monitoring of the closed UDF thereafter.
- No material from the ROR Remedial Action may be disposed of at any other location in Berkshire County, and no material from any portion of the GE-Pittsfield/Housatonic River Site other than the ROR or from other response actions under the CD may be disposed of at the UDF.

3 Site Background and Historical Site Data Summary

This section presents background information on the UDF site, including a summary of existing site information.

3.1 Site Description

As previously noted, Figure 1 shows the extent of the GE Parcel, the anticipated limits of consolidated material for the UDF, the UDF operational area, and the UDF support area. The GE Parcel generally consists of previously disturbed and barren ground areas void of vegetation, open grassed and wooded areas, and man-made ponds which are associated with the prior quarry operations. Additionally, there is an existing Eversource Energy (Eversource) utility easement containing overhead electric 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 on Golden Hill Road.

3.2 Existing Site Information

Presented in the following subsections is a summary of existing information pertaining to the GE Parcel, including the UDF area and UDF support area. This information has been used in identifying the need for additional data collection, as described in this PDI Work Plan, and in developing the preliminary conceptual UDF design described herein. That information together with the supplemental information collected during implementation of this PDI Work Plan will be used in the detailed design for the UDF and associated areas.

3.2.1 Topography

Topography of the entire former Lane property, including the GE Parcel, was surveyed by SK Design Group, Inc. and presented on a drawing dated June 4, 2010.[2] Existing topography across the GE Parcel is variable and features several localized high and low points (including pond areas) likely attributable to the site's history as a sand and gravel operation. 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 lays entirely outside of the mapped 500-year floodplain for the Housatonic River to the north and west (Federal Emergency Management Administration [FEMA] 1982a) and Washington Mountain Brook to the south (FEMA 1982b).

3.2.2 Habitat

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, is available from a number of existing sources. These include on-line sources, such as the MassGIS On-line Data Viewer (OLIVER), the U.S. Fish and Wildlife Service

[2] As discussed in Section 5.2.2, the topography of the GE Parcel will be re-surveyed as part of PDI activities.

(USFWS) National Wetlands Inventory (NWI) Mapping, and the Information for Planning and Consultation (IPaC), as well as aerial photograph reviews. This existing information indicates the following:

The general habitat of the GE Parcel ranges from denuded and excavated areas lacking discernible habitat (comprising the majority of the UDF area) to open areas dominated by grass and forbs to forested areas in differing stages of succession (in the northern part of the GE Parcel).

On-line mapping tools that gauge the potential habitat of areas within Massachusetts can be found through the MassGIS OLIVER. The OLIVER interactive map, available data layers, and active data layers specific to potential and documented habitats reveal that the GE Parcel does not contain any Massachusetts Natural Heritage Endangered Species Program (MNHESP) Estimated Habitats of rare wildlife or Priority Habitats of rare species, nor does it contain any MNHESP-certified or other identified 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 over 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 (a threatened species) and monarch butterfly (a candidate for listing) in the general area. Several migratory birds were also identified within the general site area, including the bald eagle, bobolink, Canada warbler, prairie warbler, and wood thrush. Given the disturbed nature of the UDF area, the forgoing species would not be expected to inhabit that specific area.

A potential wetland area has been identified on the GE Parcel consisting of an isolated palustrine, scrub/shrub, broad-leaved deciduous, seasonally flooded area off of Woodland Road (which will not be affected by the consolidation area).[3] In addition, the parcel contains a number of 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 indicate that the former quarry area possesses a paucity of habitat that would be considered ecologically significant to supporting plant and animal species diversity within the immediate and surrounding geography. The northern portion of the GE Parcel supports an area of natural forested cover type which will be further investigated as described in Section 5 of this PDI Work Plan.

3.2.3 Cultural Resources Assessment

Existing databases have been reviewed to determine whether any cultural resources have been previously identified within the GE Parcel.[4] Based on review of the National Register of Historic Places (NRHP), the Massachusetts State Register of Historic Places (SRHP), and the Massachusetts Cultural Resources Information System (MACRIS), no cultural resources listed in those sources are present within the GE Parcel.

[3] As discussed in Section 5.2.1, this area will be evaluated further during PDI activities to determine whether it in fact constitutes a wetland.

[4] In 2008, GE submitted to EPA a report on an *Initial Phase IA Cultural Resources Assessment (CRA) for the Housatonic Rest of River Project* (URS 2008). That Initial Phase IA CRA was conducted to assess the potential for archaeological and historical resources to exist in the portions of the Housatonic River and its floodplain that could potentially be affected by implementation of remediation activities selected by EPA – namely, Reaches 5 through 8. That Initial Phase 1 CRA did not address the Lane property that is currently the GE Parcel.

3.2.4 Utilities

There are no known underground utilities 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. Additional underground site utility locations are unknown at this time but are not anticipated within the limits of the UDF area and UDF support area. Dig Safe was called in fall 2019 for a groundwater probe investigation conducted near the anticipated UDF location, and no utilities were identified. Another utility location survey will be conducted prior to field investigation activities to ensure that no utilities were added in the area since the earlier utility search.

3.2.5 Soils

Soils within the GE Parcel are expected to consist of some gravel and medium to fine sand. Based on publicly available web soil surveys (Natural Resources Conservation Service [NRCS] 2021), the soils originally present at the UDF site are reported to be composed of Copake fine sandy loam, Hero loam, Groton and Hinckley soils, and gravel. Despite the web soil survey indicating a larger proportion of gravel than other materials in the aforementioned composition, there is reason to believe, based on visual field operations and communication from the prior landowner (Lane), that a larger portion of finer textured material is present at the GE Parcel.

3.2.6 Groundwater Elevations

In fall 2019, a preliminary investigation was conducted at the GE Parcel to evaluate subsurface conditions. This investigation included geoprobes in the locations depicted on Figure 5 (discussed in Section 5.2.5). From this effort, groundwater was encountered between elevation 947 ft and 949 ft relative to National Geodetic Vertical Datum of 1929 (NGVD 29). The elevation of the water edge in the adjacent ponds was approximately 950 ft NGVD 29 at the time of the June 2010 aerial survey. Because of the granular nature of the site soils, the pond water surface elevations are likely coincident with groundwater. The nearest U.S. Geological Survey 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 in this region.

A review of Massachusetts Department of Environmental Protection (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. The Lee Municipal Landfill is located due south of the GE Parcel on the adjacent parcel. The report indicates that groundwater elevations in two wells (MW-84-1 and MW-94-1) along the eastern edge of the Lee Municipal Landfill (also approximately in line with the eastern edge of the GE Parcel) ranged from 955.40 ft to 959.91 ft (NGVD 29), depending on the well and gauging date. The report also indicates that groundwater elevations in three wells (MW-84-2, MW-94-2, and the MW-94-7 cluster) along the western edge of that landfill (also approximately in line with the western edge of the GE Parcel) ranged from 948.85 ft to 952.59 ft, depending on well and gauging date. These data indicate an east-to-west slope in the groundwater table.

3.2.7 Groundwater Quality

There are no known data on groundwater quality within the GE Parcel. There is historical information available on bordering property; however, this information is relatively outdated.

The aforementioned Evaluation Opinion Transmittal Report includes information on groundwater quality at the Lee Municipal Landfill relative to Massachusetts groundwater standards. The report states 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. Because of the proximity of the Lee Municipal Landfill to the southwest of the GE Parcel, an elevated concentration of manganese in groundwater could be possible in the area between the Lee Municipal Landfill and the GE Parcel.

There are 12 U.S. Geological Survey historical groundwater wells on the southern edge of Woods Pond. There is also one groundwater well on the opposite side of Valley Street from Woods Pond and within the current mining operation property. These wells have data detailing groundwater quality; however, these data are from the early 1980s or earlier and may not be representative of current conditions.

4 Preliminary Conceptual UDF Design Summary

This section provides a summary of the conceptual UDF design developed to date.

4.1 Site Layout

As noted above, the UDF site consists of land acquired by GE from Lane that was previously part of an active sand and gravel quarry. The site will be developed to include the UDF area and UDF support area. Figure 1 depicts the boundaries of the GE Parcel, the existing features, and the conceptual design limits of the UDF area and UDF support area. It is noted that the UDF support area requirements and related facilities are not known at this time, and therefore further description of its components is not provided below. The UDF support area components and their design will be determined at a later time as part of design activities.

4.2 Anticipated UDF Design

The UDF will be an engineered disposal facility that will include features designed and operated to contain soils and sediments from the ROR Remedial Action, along with associated leachate, and to allow long-term monitoring following completion of filling and capping. The perimeter of the UDF will include a berm, likely constructed from on-site soil that is excavated from within the UDF limit of consolidated material. The perimeter berm will provide control of run-on from outside of the UDF limit of consolidated material and leachate from consolidated material placed within the UDF.

A double baseliner system will be installed within, and extending up against, the inside slope of the perimeter berm. The baseliner system will include primary and secondary low-permeability liners, each having maximum permeabilities of $1x10^{-7}$ cm/s and minimum thicknesses of 30 mils. A primary leachate collection system will be constructed on top of the primary liner and will drain to a sump, which will be the lowest point on the floor of the UDF. A secondary leachate collection system will be constructed between the primary and secondary liners to provide redundancy to the primary leachate collection system. The secondary leachate collection system will drain to the same sump depression as the primary system, but will be separated by the primary liner. Liquids that accumulate in the primary and secondary sumps will be removed using submersible pumps and will be stored on site in above-ground tanks prior to being taken to the GE Pittsfield Facility for treatment.

Following placement of consolidated material into the UDF, a final cover will be constructed across the limit of placement. The final cover will include a low-permeability liner with a maximum permeability of $1x10^{-7}$ cm/s and a minimum thickness of 30 mils, a drainage layer, and cover soils suitable for the establishment of vegetation. Stormwater runoff from the UDF will be managed by a system of diversion features, downchutes, culverts, and basins.

5 Pre-Design Investigation

Based on existing information presented in Section 3, data gaps remain in the body of knowledge needed to design, construct, and operate the UDF in accordance with the Revised Permit and current state of practice. This section describes the PDI activities that are proposed to supplement existing site information so as to support of the UDF design.

5.1 Data Collection Objectives

The data proposed for collection in this section will supplement data that have already been collected or are available and that are deemed applicable and of sufficient accuracy for use in the detailed design of the UDF. The activities discussed in this section will be implemented to address the data gaps or to confirm the current understanding of site conditions. Standard operating procedures to be used in the performance of PDI activities are summarized in Section 5.3.

5.2 Site Data Collection

The following PDI activities are proposed to address the known data gaps and are described in greater detail in the following subsections:

- Baseline habitat assessment, including a wetland survey as needed
- Topographic field survey
- Soil geotechnical investigation
- Soil environmental quality investigation
- Groundwater depth investigation
- Groundwater environmental quality investigation
- Cultural resources assessment

5.2.1 Baseline Habitat Assessment

A baseline habitat assessment will be conducted to form a detailed baseline ecological inventory and assessment of existing conditions and serve as the foundation for developing the Final Cover/Closure Plan for the UDF area and UDF support area, including potential re-use of the UDF area and restoration of the UDF support area. The baseline habitat assessment of the approximately 75-acre GE Parcel will include the following components:

- The presence, location, and species composition of terrestrial and aquatic habitats will be identified initially through on-line database reviews and aerial photograph interpretation. This process will include producing cover type mapping using the community type classification mapping that was used in the Ecological Characterization of the Housatonic River (Woodlot Alternatives 2002). This mapping currently extends from the Confluence to the south end of Woods Pond, and it will be extended from that point south through the GE Parcel. The mapping will be done with the aid of aerial photographs, and these preliminary delineations will be

transferred onto the updated topographic mapping described below. Field investigations will then be conducted over the entire GE Parcel to review and verify or adjust the habitat cover type delineations.

- During the field surveys, each discrete cover type unit will be subject to a detailed inventory using the UDF/GE Parcel Habitat Inventory Form attached as Appendix A. This form will record a broad range of habitat parameters to characterize structural, physical, hydrologic, and biological conditions within each habitat cover unit. The characterization will include measurements of substrate/soil characteristics, plant species composition, a broad range of habitat features, and habitat degradation. In addition, based on the information collected, the ecological functions and values of the affected habitats will be identified and qualified.
- Aquatic resources (such as streams or potential wetlands) identified within the GE Parcel, excluding the man-made ponded areas, will be subject to field verification using current federal wetland delineation criteria. This will include completing, for those features, the U.S. Army Corps of Engineers (USACE) Wetland Determination Data Form for the Northeast Region, which is attached as Appendix B. In particular, the potential isolated scrub-shrub wetland located off Woodland Road will be evaluated using that form to determine whether it in fact constitutes a wetland.
- An evaluation will be conducted as to the presence of vernal pools at the GE Parcel through on-line aerial photography review and MNHESP database review confirmed via field verifications.
- The presence, location, and abundance of federal or state-listed threatened or endangered species or other state-listed species and their habitats will be identified through review of the USFWS on-line IPaC and review of the MNHESP records on state-listed species. In addition, GE will consult with the USFWS and MNHESP to determine whether they have any information on the existence of such species or their Priority Habitat in or near the GE Parcel. To the extent appropriate and practicable, the results of these reviews will be confirmed via field verifications. This field verification will consist of evaluating the habitat requirements of any potential state or federally listed species relative to the identified habitat characteristics on the GE Parcel.
- The presence, location, abundance, and condition of invasive species as listed by the USACE New England District or the Massachusetts Invasive Plant Advisory Group will be identified through base mapping and aerial photograph reviews in combination with field verification.

5.2.2 Topographic Field Survey

The latest topographic survey covering the GE Parcel was completed using aerial methods in 2010. Given limitations with the method used and the age of the survey, a new topographic survey will be conducted to accurately document existing conditions at the GE Parcel and support the detailed design of the UDF and UDF support area. Additionally, the GE Parcel includes several low areas that contain water (either groundwater or surface water or a combination of the two), for which no bottom data were collected in 2010. Consequently, the new survey will also include bathymetry across these water-containing depressions so that a continuous surface model can be created for the purposes of quantifying earthwork volumes that extend into the water-containing depressions.

The areas to be surveyed in the new topographic and bathymetric surveys are shown on Figure 2 and will encompass the portion of the GE Parcel to be developed for the UDF area and UDF support area, including peripheral areas planned to contain roads, drainage features, and utilities. The new topographic survey is anticipated to consist of either a traditional field survey, an aerial survey using Light Detention and Ranging

(LiDAR) technology, or a combination of these methods. In the event that traditional surveying methods are used, topographic shots will be collected at the following locations:

- Top and toe of slopes;
- Changes in slope gradient;
- Linear features such as fence lines, if any;
- Utilities;
- Edges of water;
- Edges of road;
- Tree lines;
- Other structures; and
- Intermediate ground shots.

Bathymetric shots will be collected on an approximately 50-foot grid and will be referenced to the same vertical datum as the land-based topographic survey. All surveying work will be performed by or under the supervision of a Professional Land Surveyor registered in the Commonwealth of Massachusetts.

5.2.3 Soil Geotechnical Investigation

Soil investigations are required to support the evaluations and design of the UDF. The soil investigation program for the UDF will 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, which will be addressed in the engineering design of the UDF.
- 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.

The following sections provide further details regarding the proposed boring locations and depths, soil sampling, and field and laboratory testing. This investigation program has been developed assuming that site soils are granular and are composed of sands and silty sands, which is consistent with the findings of the 2019 geoprobe investigation at the site and available subsurface information from the nearby Lee Municipal Landfill. As indicated above, requirements and facilities pertaining to the UDF support area are not known at this time, Accordingly, soil investigations for the UDF support area are not included as part of this PDI Work Plan. If deemed necessary based on design requirements for the UDF support area components, soil investigations will be proposed and conducted within the UDF support area at a later time, as outlined in the Conceptual Design Plan for the UDF.

5.2.3.1 Soil Boring Program

The proposed locations of the geotechnical borings are shown on Figure 3 and summarized in Table 1. A total of 18 borings are planned, and the borings are positioned within and outside of the anticipated UDF limits. Table 1

identifies the anticipated usage of the proposed borings. As indicated in that table, all 18 borings will be utilized for geotechnical testing purposes. Additionally, 11 of the 18 borings will also be utilized for soil quality testing purposes. Eight of the 18 borings will be utilized for the installation of temporary piezometers within and outside of the UDF footprint, as discussed in Section 5.2.5.1. Six of the 18 borings will be utilized for the installation of monitoring wells outside of the UDF footprint, as discussed in Section 5.2.5.2. The locations are based on the anticipated limits of the UDF, likely groundwater flow direction, and spatial distribution of data points across the site.

For geotechnical purposes, the borings will be advanced to a target elevation of 935 ft or lower. Where the borings will also serve as monitoring wells and temporary piezometers, the depth to groundwater also requires a minimum target depth. The deeper of the two criteria will be used when determining the minimum boring depth. Table 1 identifies the minimum depth below ground surface (bgs) for each proposed boring.

Data collected from the proposed borings will support the settlement evaluation of the UDF, the review of the liquefaction potential of the UDF foundation soils, the completion of a liquefaction analysis if required, and the stability evaluations for the final UDF buildout and any other critical interim construction phases.

Ten geotechnical borings are planned along the perimeter of the UDF. These borings will support stability evaluations of temporary excavation conditions during construction of the UDF and of the proposed UDF grading design. The perimeter borings will be spaced approximately 500 ft apart and will be located based on groundwater quality monitoring and depth-to-groundwater data needs.

It is assumed that the geotechnical borings will be completed using a drill rig mounted on an all-terrain vehicle and equipped with a 4.25-inch inner diameter hollow-stem auger. Continuous soil sampling will be performed through the first 30 ft of each boring followed by a five-foot sample interval to the boring depth. All sampling will be completed using a two-inch-diameter split-spoon sampler, with standard penetration tests (SPTs) following ASTM International (ASTM) D1586, which will be conducted for each sample collected. Soil recovered from each sample interval will be visually characterized for color, texture, and moisture content and field screened with a photoionization detector. The presence of visible staining, sheen, product, and obvious odors encountered in the soil, if any, will be noted.

Between six and eight split spoon samples from each boring will be submitted for laboratory analysis of grain size, moisture content, Atterberg limits, and specific gravity. The SPT data, field descriptions, and laboratory data will be used in the geotechnical evaluations for design of the UDF.

Arcadis U.S. Inc. (Arcadis) will supervise drilling and direct the drillers to perform SPT sampling, record blow counts on the split-spoon sampler, log the borehole, record groundwater elevations, and document details related to the advancement and sampling of each boring.

Soil cuttings will be staged on site in an appropriate waste container (e.g., roll-off, drum, lined area). Soil cuttings will be field screened for the presence of volatile organic vapors using a photoionization detector. Soil cuttings (and other investigation-derived waste) will be managed and disposed of in an appropriate manner (either on site or off site) based on the field screening results and in accordance with applicable rules and regulations.

5.2.3.2 Soil Testing for Engineering Properties

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

- Standard Penetration Testing: As discussed above, SPT sampling will be conducted during the advancement of each geotechnical boring. SPT sampling will be 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 per ASTM D1586. The SPT blow count (or "N-value" term) for each sample will be recorded and will represent 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.
- Soil Classification: Each sample collected from the geotechnical borings will be classified in the field through visual-manual procedures that conform to ASTM D2488 and the Arcadis Field Guide for USCS Soil Classification (Appendix C). In addition, selected samples from each boring will be submitted for laboratory classification using the Unified Soil Classification System, 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 will generally focus 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 will be updated where needed to conform to the laboratory-determined soil classifications.
- Soil Index Properties: Soil index properties will be developed from the testing of grain size (ASTM D6913), moisture content (ASTM D2216), Atterberg limits (ASTM D4318), and specific gravity (ASTM D854). Sufficient soil from the split spoons (or from a combination of split spoons) will be provided to the selected geotechnical laboratory for completing the index property testing in accordance with the corresponding ASTM standard. The results will be used for quality control of the field soil classifications, determination of site stratigraphy, and development of engineering parameters, such as shear strength and soil elastic modulus, to support the stability and settlement evaluations. These data will also be beneficial for determining re-use criteria of excavated materials during construction of the UDF and for estimation of the permeability of the site soils.

5.2.4 Soil Quality Testing

Soil testing for environmental quality will be performed at each soil boring associated with a permanent monitoring well (six total) plus one soil boring associated with a temporary piezometer internal to the UDF footprint. The proposed soil borings are described in Section 5.2.3.1. Figure 4 identifies the 11 specific soil borings proposed for environmental testing. The choice of borings for environmental testing was based on the use of the monitoring wells to document long-term environmental quality before, during, and after construction of the UDF. Sampling of soil from two temporary piezometers within the UDF footprint is proposed to further document environmental quality. The environmental testing of the soils from the borings will be used to determine the presence (if any) and concentration of chemical constituents in the existing soil to establish baseline chemical conditions for comparative evaluations during UDF operations and post-closure monitoring.

At each boring location, samples will be collected at the following approximate depth intervals:

- Ground surface to a depth of 1 ft bgs, with this first depth interval obtained by manually digging at the boring location prior to commencing boring operations with the drill rig;
- 13 to 15 ft bgs;
- 28 to 30 ft bgs;

- 43 to 45 ft bgs;
- 58 to 60 ft bgs; and
- At groundwater table interface.

The actual sample depth interval and the need for additional testing at each location will be determined based on photoionization detector readings and visual observations at the time of the in-field soil investigation.

All samples will be submitted for analysis of PCBs and the full list of analytes presented in Table 2 of GE's 2013 Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP; Arcadis 2013). Although the full analyte list is recommended for establishing baseline chemical conditions, the analyte list to be used during UDF operations or long-term monitoring may be modified based on initial sampling results or the nature of the materials being disposed of.

5.2.5 Piezometer and Groundwater Well Installation

A system of temporary piezometers and permanent monitoring wells will be installed in the soil borings to be advanced on the GE Parcel. The proposed soil borings are described in Section 5.3.3.1, and the specific borings to be used for piezometers (identified with a prefix of "PZ") and monitoring wells (identified with a prefix of "MW") are presented on Figure 5. Collectively, both types of features will provide groundwater data that will be used in the design of the UDF. The permanent monitoring wells may also be used for long-term monitoring of site groundwater during construction, operation, and post-closure of the UDF. As indicated above, requirements and facilities pertaining to the UDF support area are not known at this time, Accordingly, groundwater investigations for the UDF support area are not included as part of the PDI Work Plan. If deemed necessary based on design requirements for the UDF support area components, groundwater investigations will be proposed and conducted within the UDF support area at a later time, as outlined in the Conceptual Design Plan for the UDF.

5.2.5.1 Temporary Piezometer Well Installation

Eight temporary piezometers will be located within the limits of consolidated material and around the perimeter of the UDF for the purpose of gauging groundwater elevations over a limited period of time prior to the commencement of UDF construction. The temporary piezometers will supplement the permanent monitoring wells (described below) to provide a more complete and spatially disperse understanding of groundwater elevations that will be used in the design of the UDF. The proposed piezometer locations are depicted on Figure 5 and preliminary construction details are presented in Table 2. It should be noted that the preliminary information in that table is subject to change based on field conditions as observed and documented by the hydrogeologist overseeing the soil borings and piezometer/monitoring well installation. Because of their anticipated use for groundwater elevation gauging only, the piezometers will consist of one-inch-diameter casing, rather than the two-inch-diameter casing used for monitoring well construction. Following installation, the location, ground surface elevation, and top of casing elevation will be surveyed by a Professional Land Surveyor registered in the Commonwealth of Massachusetts.

5.2.5.2 Permanent Monitoring Well Installation at UDF Perimeter

Six permanent monitoring wells will be installed in selected soil borings at the perimeter of the GE Parcel, as shown on Figure 5. Preliminary construction details are presented in Table 3. It should be noted that the

preliminary information in that table is subject to change based on field conditions as observed and documented by the hydrogeologist overseeing the soil borings and piezometer/monitoring well installation. As discussed in Section 3.5, historical gauging of monitoring wells associated with the Lee Municipal Landfill to the south of the UDF indicates a generally east-to-west groundwater flow gradient. The monitoring wells are therefore positioned such that three wells (MW 2022-3, MW 2022-4, and MW 2022-5) are located along the western edge and downgradient of the UDF, one well (MW 2022-1) is located to the east and upgradient of the UDF, and two wells (MW 2022-2 and MW 2022-6) are located to the northwest and southwest and sidegradient of the UDF. The latter two wells also provide some contingency in the event groundwater flow direction has a northerly or southerly component. Finally, MW 2022-6 is positioned between the Lee Municipal Landfill and the UDF and can serve to indicate changes in groundwater quality at that location relative to the upgradient MW 2022-1 well.

The borehole depths for five of the monitoring wells are based on intercepting the estimated groundwater table at an elevation of approximately 950 ft. However, the borehole for MW 2022-4 will be advanced to a depth that is below the estimated bed elevation of the Housatonic River. Based on available on-line data, the river water surface elevation is approximately 935 ft. Because the depth of the River is unknown and possibly variable, the bottom of the borehole will be advanced to an elevation of 910 ft or lower to be conservative.

Following installation, the location, ground surface elevation, and top of casing elevation will be surveyed by a Professional Land Surveyor registered in the Commonwealth of Massachusetts.

5.2.6 Groundwater Depth Monitoring

Once installed, both the temporary piezometers and monitoring wells will be gauged on a quarterly basis for a minimum of one year (a total of four events minimum) to provide a seasonal range of groundwater elevations. Prior to UDF construction, the temporary piezometers will be abandoned in place. However, the monitoring wells will remain in service for continued gauging and sampling, as discussed in Section 5.2.7.

5.2.7 Groundwater Testing for Environmental Quality

Groundwater testing for environmental quality will be performed at the six permanent groundwater monitoring wells described in Section 5.2.5.2 to determine existing (baseline) groundwater chemical quality conditions for comparative evaluations during UDF operations and post-closure monitoring. Figure 6 identifies the location of the monitoring wells to be used for chemical quality testing. It should be noted that, because of their temporary nature and smaller casing diameter, none of the piezometers will be used for chemical quality testing.

Samples will be collected semi-annually for a period of two years. Samples will be submitted for analysis of the full list of analytes presented in Table 2 of the 2013 FSP/QAPP. Although the full analyte list is recommended for establishing baseline chemical conditions, the analyte list to be used during UDF operations or long-term monitoring may be modified based on initial sampling results or the nature of the materials being disposed of. Each monitoring well will also be gauged immediately prior to sampling for each event.

5.2.8 Phase 1A Cultural Resources Assessment

As noted in Sections 4.2.1.7 and 4.2.2 of the Final Revised SOW, an initial Phase IA CRA of the UDF are and UDF support area will be conducted separately from the CRA for the remediation areas and their associated

support areas. The initial Phase 1A CRA for the UDF area and UDF support area will include the following activities:

- An archaeological Area of Potential Effects (APE) and an historic architectural APE will be defined based on the location and extent of the UDF area and UDF support area.
- Desktop and on-line evaluations will be conducted 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 UDF area or UDF support area contains or could affect cultural resources included in those databases.
- Desktop and on-line evaluations will also be conducted of the local Historic District Commission literature and databases for the same purpose.
- GE will consult with the MHC and Native American Tribal Preservation Officers regarding the locations of cultural resources and traditional cultural properties in the vicinity of the GE Parcel.
- An evaluation will be conducted of the GE Parcel, including the UDF area and UDF support area, for the potential to contain unidentified potentially significant cultural resources (i.e., whether they have no, low, or high potential to contain such resources).[5] This evaluation will be conducted using the approach previously developed for the 2008 Initial Phase IA CRA (URS 2008), mentioned above, which incorporated data layers for soil types, slope, land use, and the location of known archaeological sites within a GIS database. As described in that 2008 report, this approach uses the following key variables to identify the potential for an area to contain pre-contact archaeological resources:
    - **High Potential**
        - water source within 150 meters (m)
        - well drained sandy soils
        - level to fairly level topography (0 – 3%)
        - none to minimal disturbance
        - known sites in the immediate area
    - **Moderate Potential**
        - water source within 150 to 300 m
        - well drained to fairly well drained, sandy to cobbly soils
        - moderate slopes (3 – 8%)
        - minimal to moderate disturbance
        - known sites in the vicinity
    - **Low Potential**
        - water source greater than 300 m
        - poorly drained soils

[5] For purposes of these CRA evaluations, potentially significant cultural resources mean archaeological and/or historical architectural resources that are listed or could potentially meet the criteria for listing on the NRHP, resources that are listed on the Massachusetts SRHP and included on the State Inventory of Historic and Archaeological Assets, and potentially significant scientific, prehistorical, historical, or archaeological data subject to the Archaeological and Historic Preservation Act. Such resources will include properties of traditional religious and cultural importance that fall into any of the foregoing categories.

  - steep slopes (> 8%)
  - moderate to extensive disturbance
  - no known sites in the vicinity

  In addition, for historic-period archaeological sites, areas within 100 m of major historic transportation networks will be added to the high potential zone.

- Evaluation of known or suspected historic structures within the historic architectural APE will be accomplished by starting with existing historic structure inventories compiled by the MHC and local historic organizations. The locations of these structures will be plotted in the project GIS system for systematic comparison with the location of the GE Parcel. Following compilation of the existing inventory data, a reconnaissance-level windshield survey will be conducted by a qualified architectural historian to field verify the current status of each previously recorded resource, and to identify other potential historic structures within the APE.
- To the extent that the foregoing activities identify any known and potentially significant cultural resources within the archaeological APE or any known or suspected historic structures within the historic architectural APE, or indicate that the UDF area or UDF support area has a high potential to contain potentially significant cultural resources (particularly in areas not disturbed by prior operations), GE will develop and submit to EPA a supplemental plan to further evaluate whether such resources are present, including through survey activities as necessary.

5.3 Sampling and Analysis Procedures

The procedures to be followed in conducting the sampling and analysis and related activities described in Section 5.2 will consist of those provided in the 2013 FSP/QAPP, as applicable. Applicable standard operating procedures for field-based activities are found in Volume II of that FSP/QAPP and are listed below:

- Appendix A Soil Sampling Procedures for Analysis of Volatile Organic Chemicals (VOCs)
- Appendix C Soil Boring Installation and Soil Sampling Procedures
- Appendix D Groundwater Purging and Sampling Procedures for Monitoring Wells
- Appendix L Handling, Packing, and Shipping Procedures
- Appendix M Standard Operating Procedures for Shipment of Department of Transportation Hazardous Materials
- Appendix N Photoionization Detector Field Screening Procedures
- Appendix Q Water Level/Oil Thickness Measurement Procedures
- Appendix S Monitoring Well Installation and Development Procedures
- Appendix W Equipment Cleaning Procedures
- Appendix Y Selection of Drilling Method
- Appendix Z Monitoring Well Inventory Procedures
- Appendix GG Monitoring Well Decommissioning Procedures

In the event that the new FSP/QAPP for the ROR is has been submitted to and approved by EPA prior to initiation or during implementation of the PDI field activities for the UDF area and UDF support area, then the remaining PDI activities will be performed in accordance with that ROR FSP/QAPP.

5.4 Health and Safety

The PDI field activities for the UDF area and UDF support area will be performed in accordance with the Health and Safety Plan (HASP) for the ROR (GE 2017). If an updated HASP for the ROR has been submitted to EPA prior to initiation or during implementation of the PDI field activities for the UDF area and UDF support area, the remaining PDI activities will be performed in accordance with that updated HASP.

6 Data Evaluation and PDI Reporting

This section describes the evaluation and reporting of data to be collected as part of the PDI.

6.1 Data Evaluation

Following completion of the PDI field work, laboratory analyses, and receipt of data, an evaluation will be performed of the new data along with existing data. The evaluations to be performed are dependent upon the nature of the data collected. The results of the baseline habitat assessment will be used to determine and quantify ecological conditions and functions within the UDF area and UDF support area, as well as to identify appropriate avoidance and minimization efforts that could be implemented to preserve significant or critical habitat (if any).

The topographic field survey will be combined with bathymetric survey of the water-filled depressions to yield a continuous top-of-existing-ground-surface model. The ground-surface model resulting from the PDI survey will exist digitally and will be used with earthwork modeling software for the design of the UDF area and UDF support area. It will also be used to depict existing conditions on the GE Parcel in UDF design drawings and other report figures.

The geotechnical soil investigation data will be used to derive engineering properties for site soils. These properties will be used in the UDF design to evaluate slope stability, settlement, and other geotechnical performance aspects. The soil classifications will also be used in the design of stormwater infiltration basin(s), although additional field testing may be necessary once the footprint and depth of the basin(s) are established as part of the detailed design phase. Chemical quality data for site soils and groundwater will be used to document the condition of site media prior to construction and operation of the UDF.

Groundwater elevation data will be evaluated following collection of a minimum of four quarterly rounds of monitoring well and piezometer gauging. The seasonally high groundwater elevation will be developed using the groundwater elevation in each well, modified, as appropriate, by a technical method that has been reviewed and approved by EPA using variations reported over time at other existing monitoring wells in Massachusetts. The conservative estimate of the seasonally high groundwater elevation will be used to establish the bottom elevation of the UDF (a minimum of 15 feet above the seasonally high groundwater elevation) and to evaluate slope stability. Each set of quarterly groundwater gauging data, as well as the groundwater elevation data, will also be plotted to create a series of groundwater contour maps to confirm the anticipated east-to-west groundwater gradient.

The results of the initial Phase 1A CRA will be used to assess the next steps in the process. The results of the initial Phase 1A will either result in a determination that the UDF area and UDF support area will not affect any potentially significant cultural resources (thereby satisfying the applicable or relevant and appropriate requirements relating to cultural resources), or else will be used to identify additional information needs that require further investigations, including potentially a Phase 1B archaeological or architectural field survey.

6.2 Reporting

As discussed in the Final Revised SOW, a UDF PDI Summary Report will be prepared following completion of the PDI. That Summary Report will:

- Summarize the activities and investigations conducted previously as well as those performed as part of the PDI;
- Summarize the data obtained from the PDI;
- Summarize the results of the baseline habitat assessment of the UDF area and UDF support area, including an identification of the affected habitats and their functions;
- Summarize the results of the initial Phase 1A CRA of the UDF area and UDF support area, including an identification of the presence or likely presence of any potentially significant cultural resources in those areas and the need for further investigations to evaluate such resources;
- Include the other data evaluations described in Section 6.1;
- Present pertinent documentation prepared during the PDI, such as boring logs, photographs, water level measurements; and
- Present a schedule for submitting a Conceptual Design Plan for the UDF.

7 Schedule

The PDI data collection will be initiated following EPA's approval of this PDI Work Plan. It is noted, however, that the majority of the field work is weather-dependent and thus cannot commence until the onset of warmer weather and melting of snow and ice that may otherwise prevent site entry, obscure the ground surface, and prevent direct observation of growing season conditions.

The PDI data collection (except for the two-year groundwater quality sampling program) is anticipated to take approximately 15 months from approval of this PDI Work Plan, including the water elevation gauging of the eight temporary piezometers and the six monitoring wells for four quarters. Within 60 days after the last of these gauging events, GE will submit the UDF PDI Summary Report described in Section 6.2.

At that time, however, the second year of the two-year semi-annual groundwater quality monitoring program will not have been completed. Accordingly, those final two events will subsequently be completed; and GE will, within 60 days after receipt of the results from the last such event, submit an addendum to the UDF PDI Summary Report to document the results from the second year of groundwater testing.

8 References

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Tables

Table 1
Proposed Soil Boring Details
Pre-Design Investigation Work Plan
Upland Disposal Facility
General Electric Company - Pittsfield, Massachusetts

Boring ID	Anticipated Use				Coordinates (NAD 83 State Plane, US ft)		Ex. Ground El. (ft, NGVD 29)	Min. Btm. Boring Depth (ft Below Ground Surface)
	Soil Geotechnical Data	Soil Environmental Data	Monitoring Well	Temporary Piezometer	Northing	Easting		
MW 2022-1	X	X	X		2,954,259.2	187,006.6	1,037.1	93.1
MW 2022-2	X	X	X		2,955,026.6	186,248.6	989.9	45.9
MW 2022-3	X	X	X		2,954,723.7	185,960.9	955.0	11.0
MW 2022-4	X	X	X		2,954,209.5	186,347.0	1,028.4	84.4
MW 2022-5	X	X	X		2,953,739.3	186,064.6	1,005.0	61.0
MW 2022-6	X	X	X		2,953,267.3	186,393.2	1,029.8	85.8
PZ 2022-1	X	X		X	2,954,941.5	186,656.6	995.0	51.0
PZ 2022-2	X	X		X	2,954,588.0	186,497.2	998.7	54.7
PZ 2022-3	X	X		X	2,954,622.3	186,844.2	1,035.2	91.2
PZ 2022-4	X	X		X	2,954,209.5	186,347.0	1,022.5	78.5
PZ 2022-5	X			X	2,954,154.1	186,703.0	1,035.0	91.0
PZ 2022-6	X			X	2,953,770.5	186,503.8	990.0	46.0
PZ 2022-7	X			X	2,953,872.7	186,980.9	1,033.9	89.8
PZ 2022-8	X	X		X	2,953,539.2	186,870.2	1,036.6	92.6
B 2022-1	X				2,954,035.2	186,569.6	1,029.0	94.0
B 2022-2	X				2,954,354.1	186,496.2	1,034.2	99.2
B 2022-3	X				2,954,487.0	186,219.7	997.2	62.2
B 2022-4	X				2,954,867.3	186,397.4	989.7	54.7

Notes:
1. Existing ground elevation at each boring location is based on June 2010 survey by SK Design Group, Inc..
2. Following installation, each boring location will be field surveyed to document installed coordinates, ground elevation adjacent to the well casing, and elevation of top of well casing.
3. In general, minimum bottom of boring is based on advancing to at least 1 foot below the bottom of the anticipated screen inverval for borings to be used for temporary piezometers or monitoring wells. Minimum bottom of boring for MW 2022-4 is based on reaching a target elevation of 910 ft or lower, which is anticipated to be below the bed of the downgradient Housatonic River. Minimum bottom of boring for soil geotechnical data purposes only is based on advancing to el. 935 ft or lower.

Table 2
Proposed Temporary Piezometer Construction Details
Pre-Design Investigation Work Plan
Upland Disposal Facility
General Electric Company - Pittsfield, Massachusetts

Piezometer ID	Coordinates (NAD 83 State Plane, US ft)		Elevations (ft, NGVD 29)			Depths (ft Below Ground Surface)	
	Northing	Easting	Ex. Ground	Estimated GW El.	Well Screen Interval	Depth to GW	Min. Btm. Boring
PZ 2022-1	2,954,941.5	186,656.6	995.0	950	945 - 955	45.0	51.0
PZ 2022-2	2,954,588.0	186,497.2	998.7	950	945 - 955	48.7	54.7
PZ 2022-3	2,954,622.3	186,844.2	1,035.2	950	945 - 955	85.2	91.2
PZ 2022-4	2,954,209.5	186,347.0	1,022.5	950	945 - 955	72.5	78.5
PZ 2022-5	2,954,154.1	186,703.0	1,035.0	950	945 - 955	85.0	91.0
PZ 2022-6	2,953,770.5	186,503.8	990.0	950	945 - 955	40.0	46.0
PZ 2022-7	2,953,872.7	186,980.9	1,033.9	950	945 - 955	83.8	89.8
PZ 2022-8	2,953,539.2	186,870.2	1,036.6	950	945 - 955	86.6	92.6

Notes:

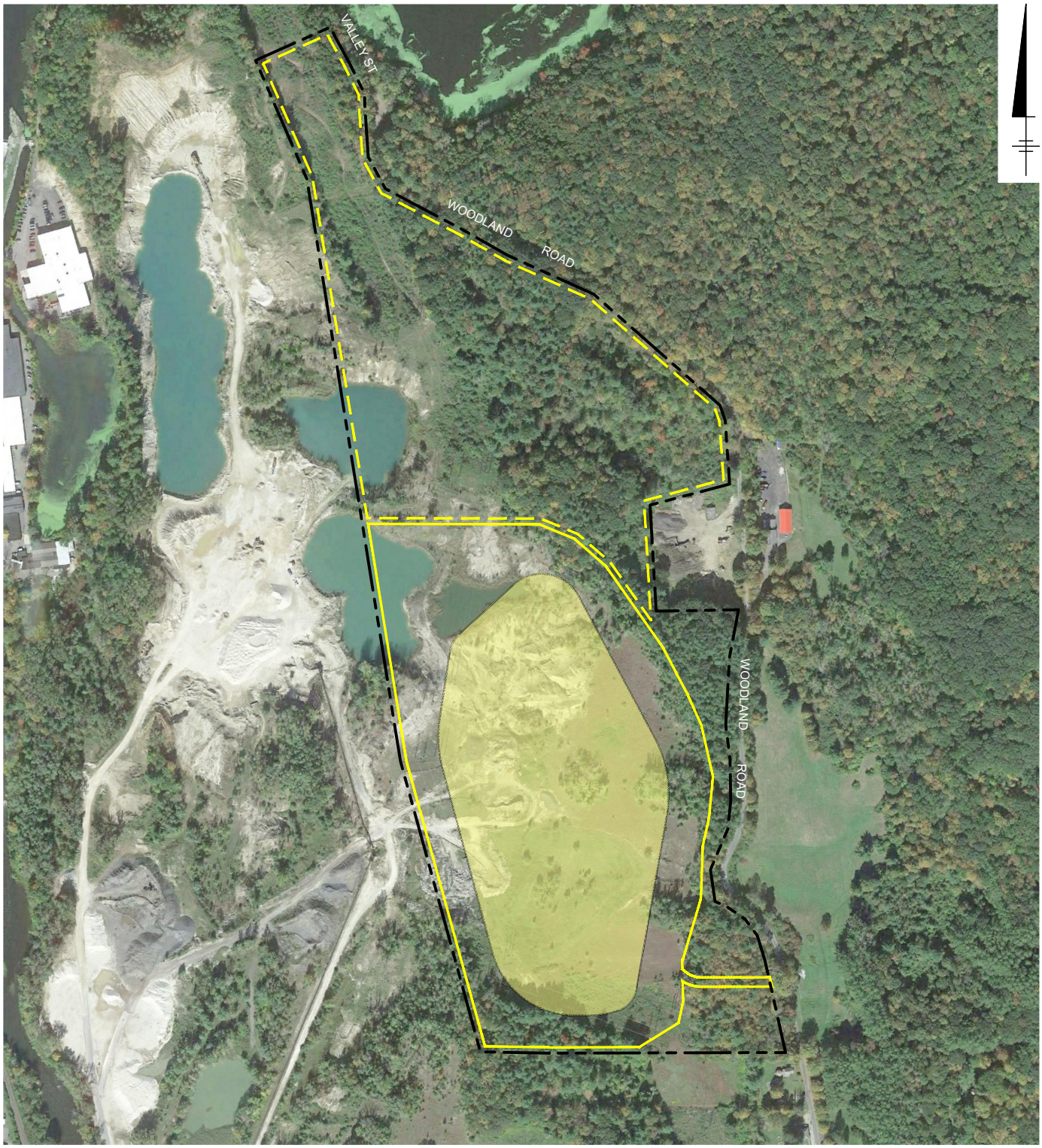
1. Existing ground elevation at each piezometer is based on June 2010 survey by SK Design Group, Inc..
2. Following installation, each piezometer will be field surveyed to document installed coordinates, ground elevation adjacent to the piezometer casing, and elevation of top of piezometer casing.
3. Groundwater elevation listed is estimated based on available information. Indicated screen interval is intended to bracket the groundwater elevation and may be modified based on groundwater elevation at time of piezometer instatllation.
4. Minimum bottom of boring is based on advancing to at least 1 foot below the bottom of the indicated screen inverval.

Table 3
Proposed Monitoring Well Construction Details
Pre-Design Investigation Work Plan
Upland Disposal Facility
General Electric Company - Pittsfield, Massachusetts

Monitoring Well ID	Anticipated Use in Monitoring Program	Coordinates (NAD 83 State Plane, US ft)		Elevations (ft, NGVD 29)			Depths (ft Below Ground Surface)	
		Northing	Easting	Ex. Ground	Estimated GW El.	Well Screen Interval	Depth to GW	Min. Btm. Boring
MW 2022-1	Upgradient (Background)	2,954,259.2	187,006.6	1,037.1	950	945 - 955	87.1	93.1
MW 2022-2	Sidegradient	2,955,026.6	186,248.6	989.9	950	945 - 955	39.9	45.9
MW 2022-3	Downgradient	2,954,723.7	185,960.9	955.0	950	945 - 955	5.0	11.0
MW 2022-4	Downgradient	2,954,335.2	185,913.9	1,028.4	950	945 - 955	78.4	84.4
MW 2022-5	Downgradient	2,953,739.3	186,064.6	1,005.0	950	945 - 955	55.0	61.0
MW 2022-6	Sidegradient	2,953,267.3	186,393.2	1,029.8	950	945 - 955	79.8	85.8

Notes:
1. Existing ground elevation at each well is based on June 2010 survey by SK Design Group, Inc..
2. Following installation, each well will be field surveyed to document installed coordinates, ground elevation adjacent to the well casing, and elevation of top of well casing.
3. Groundwater elevation listed is estimated based on available information. Indicated screen interval is intended to bracket the groundwater elevation and may be modified based on groundwater elevation at time of well instatllation.
4. Minimum bottom of boring is based on advancing to at least 1 foot below the bottom of the indicated screen inverval.

Figures



LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA

0 500' 1000'

GRAPHIC SCALE

NOTES:

1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
3. UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL, OPERATIONAL AREA, AND SUPPORT AREAS SHOWN ARE CONCEPTUAL ONLY.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

SITE PLAN

ARCADIS

FIGURE
1

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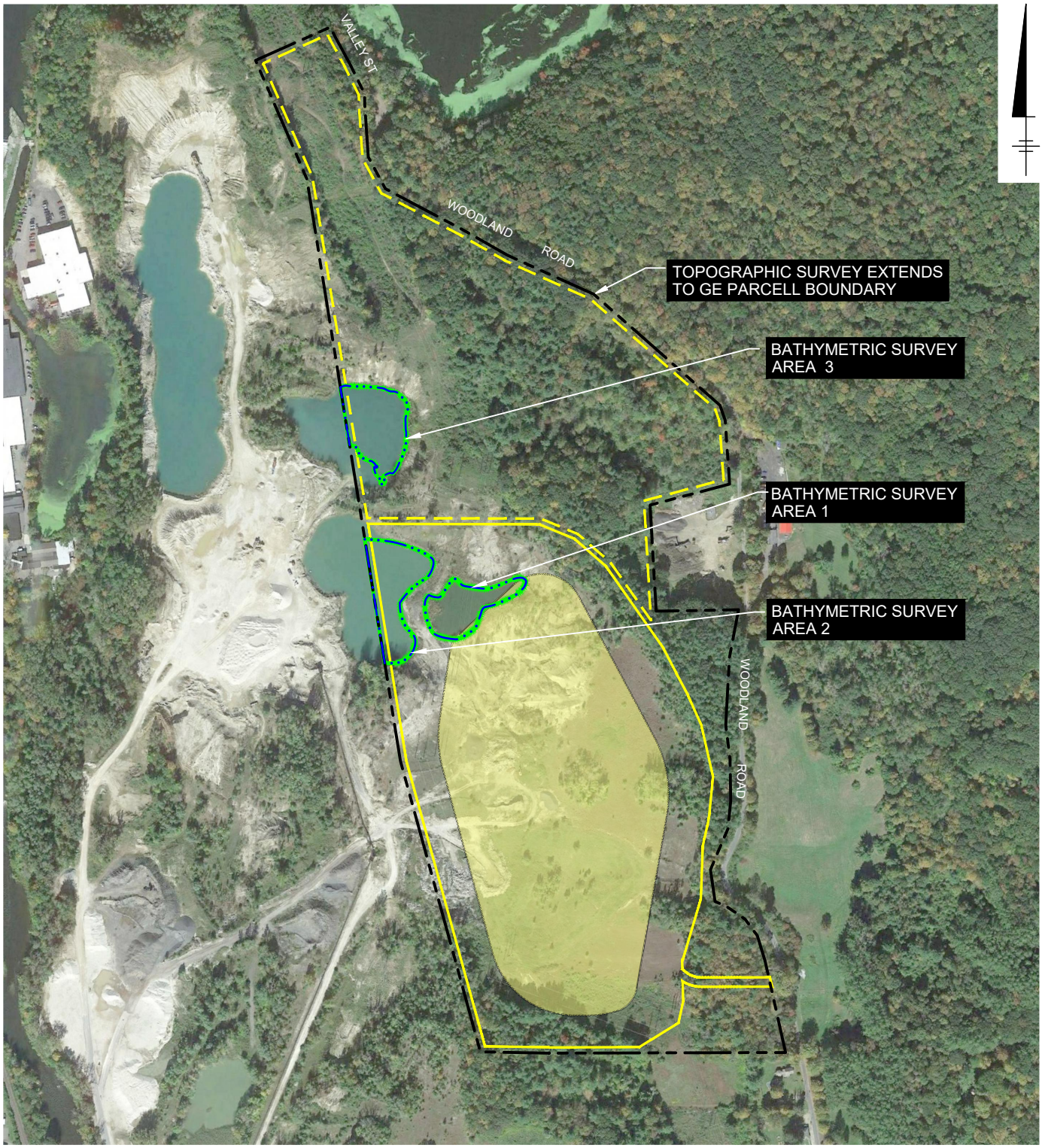

LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA

0 500' 1000'

GRAPHIC SCALE

NOTES:

1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
3. EXTENTS OF BATHYMETRIC SURVEY AREAS ARE APPROXIMATE AND ARE DEPENDENT ON WATER LEVEL AT TIME OF SURVEY.
4. UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL, OPERATIONAL AREA, AND SUPPORT AREAS SHOWN ARE CONCEPTUAL ONLY.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

PROPOSED FIELD SURVEY ACTIVITIES

ARCADIS

FIGURE
2

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IMAGES:
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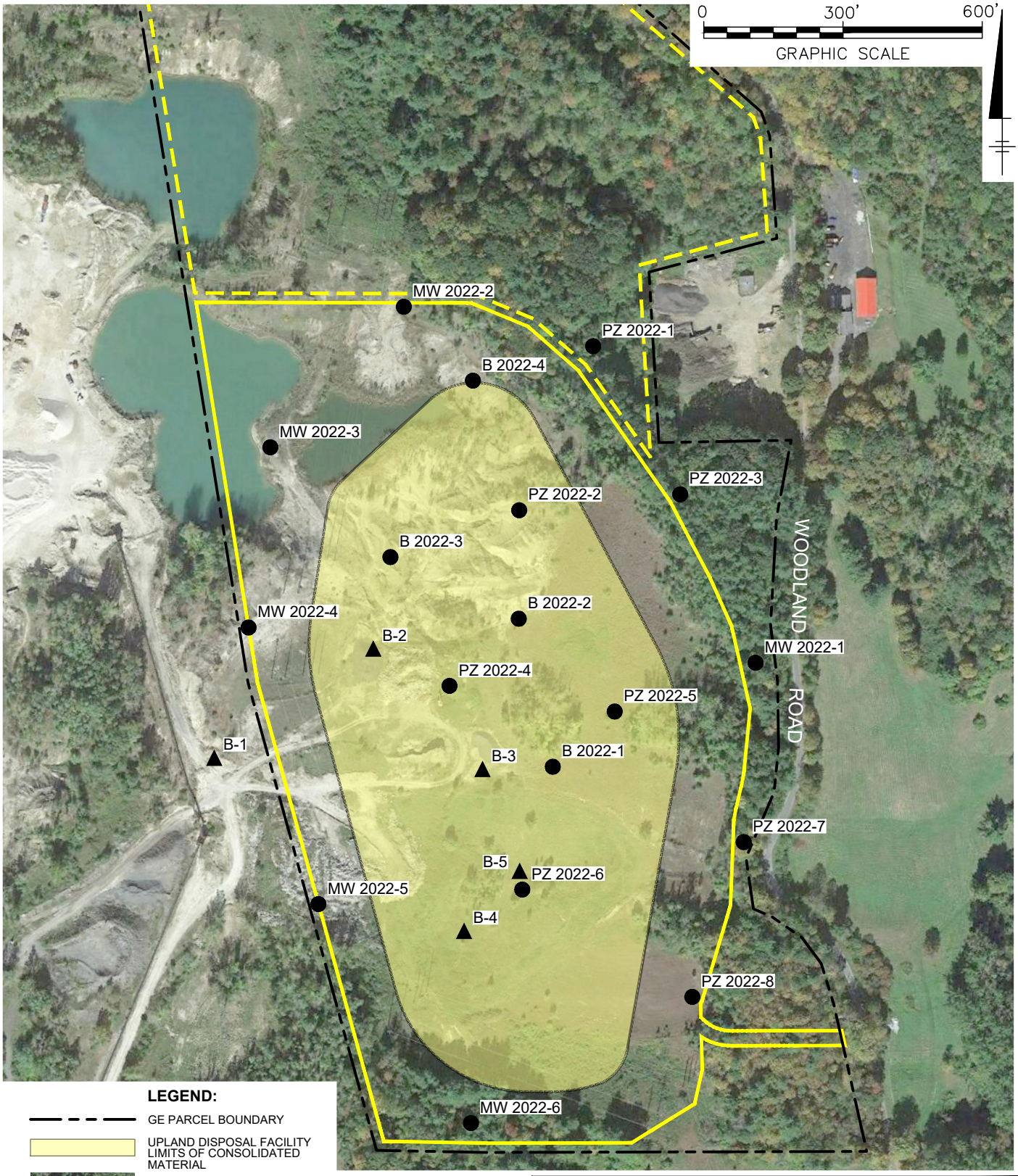

LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA
- HISTORICAL GEOPROBE LOCATIONS
- PROPOSED SOIL BORINGS WITH GEOTECHNICAL SAMPLING

NOTES:

1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
3. UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL, OPERATIONAL AREA, AND SUPPORT AREAS SHOWN ARE CONCEPTUAL ONLY.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

PROPOSED SOIL GEOTECHNICAL INVESTIGATION

ARCADIS

FIGURE
3

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IMAGES:
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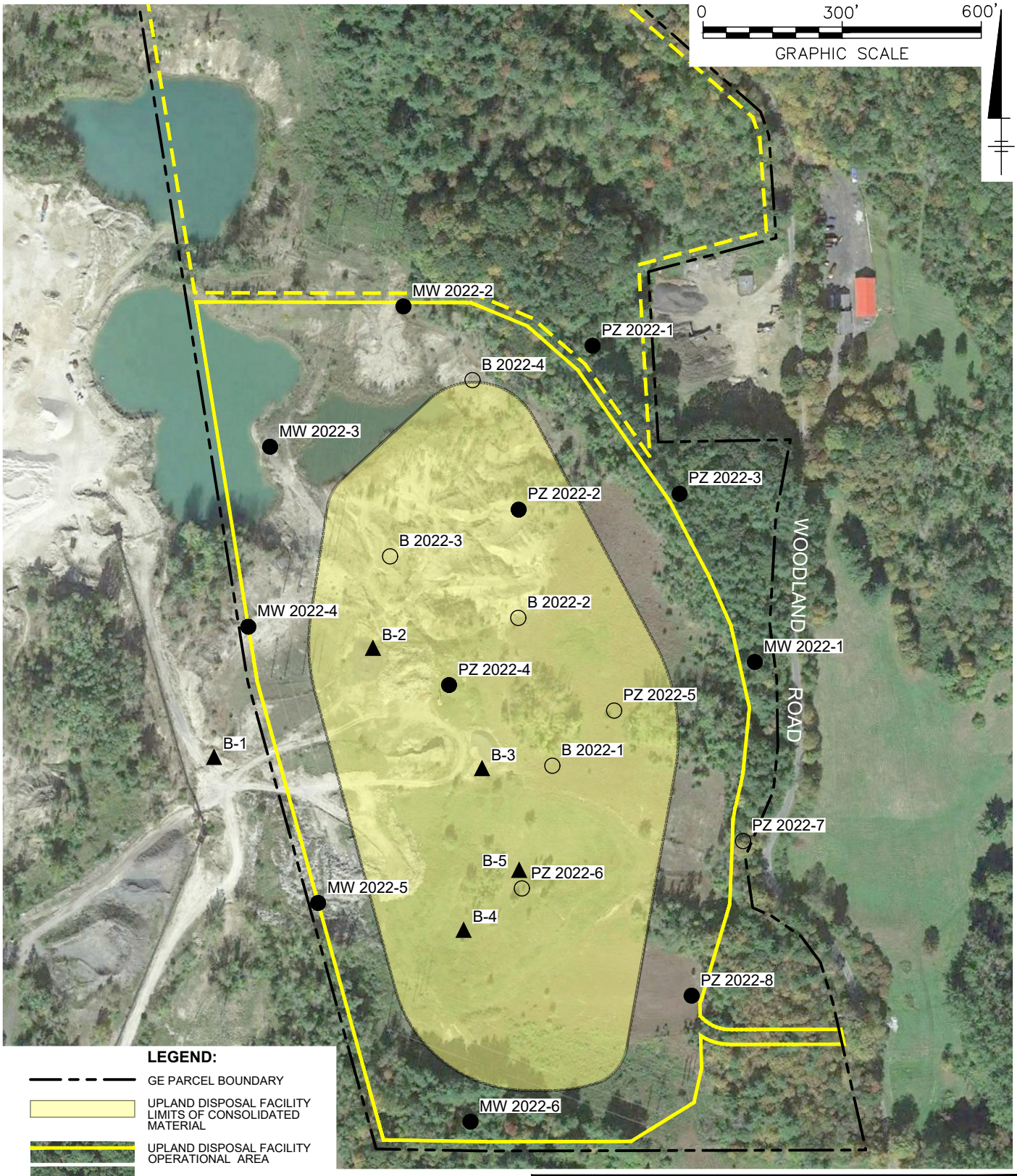

LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA
- ▲ HISTORICAL GEOPROBE LOCATIONS
- ● PROPOSED SOIL BORINGS WITH SOIL QUALITY SAMPLING
- ○ PROPOSED SOIL BORINGS (NO SOIL QUALITY SAMPLING)

NOTES:

1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
3. UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL, OPERATIONAL AREA, AND SUPPORT AREAS SHOWN ARE CONCEPTUAL ONLY.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

PROPOSED SOIL QUALITY INVESTIGATION

ARCADIS

FIGURE
4

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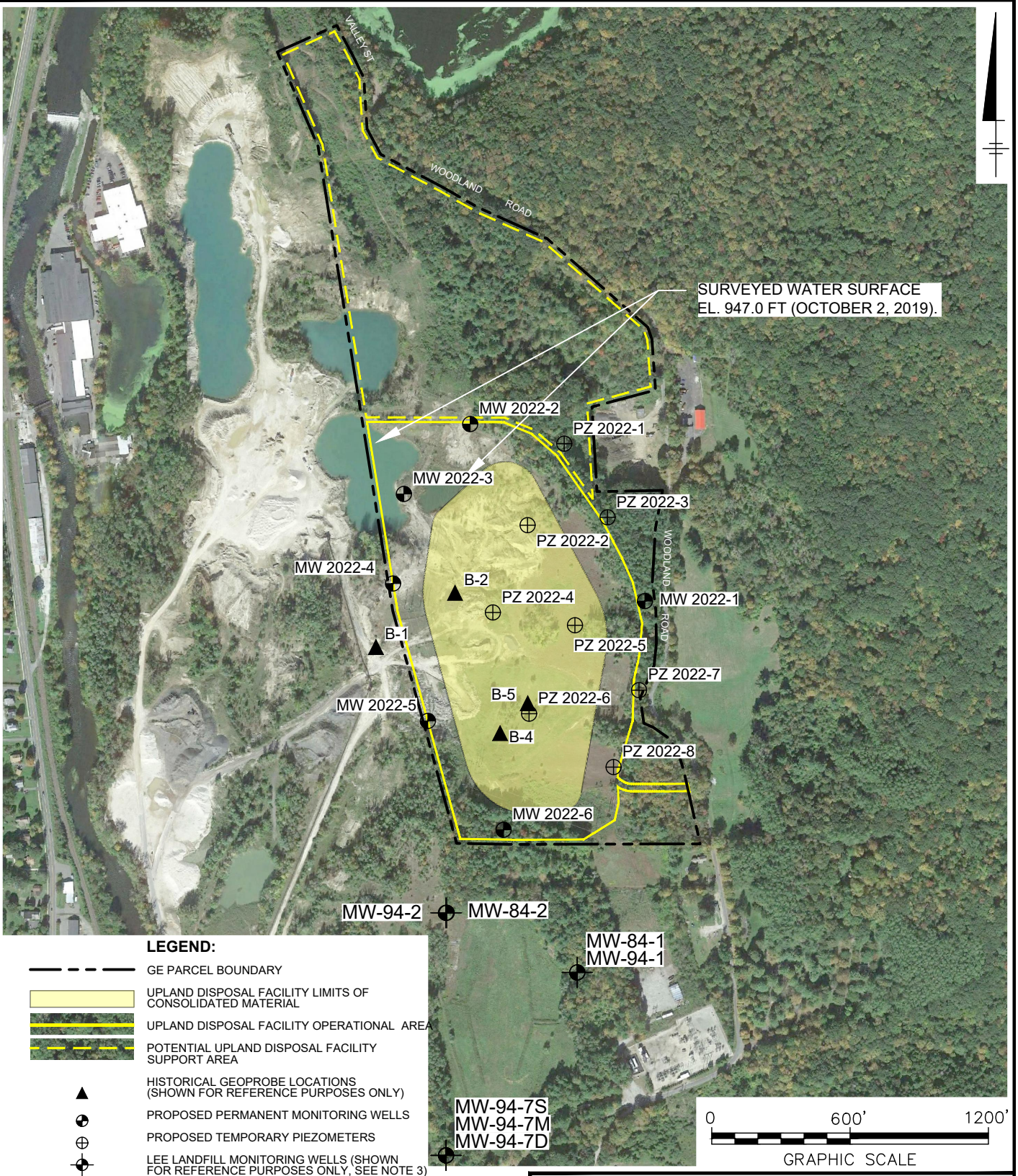
IMAGES:
WPS_GEP_10.04.2018_ZOOM1.jpg



LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA
- HISTORICAL GEOPROBE LOCATIONS (SHOWN FOR REFERENCE PURPOSES ONLY)
- PROPOSED PERMANENT MONITORING WELLS
- PROPOSED TEMPORARY PIEZOMETERS
- LEE LANDFILL MONITORING WELLS (SHOWN FOR REFERENCE PURPOSES ONLY, SEE NOTE 3)

NOTES:

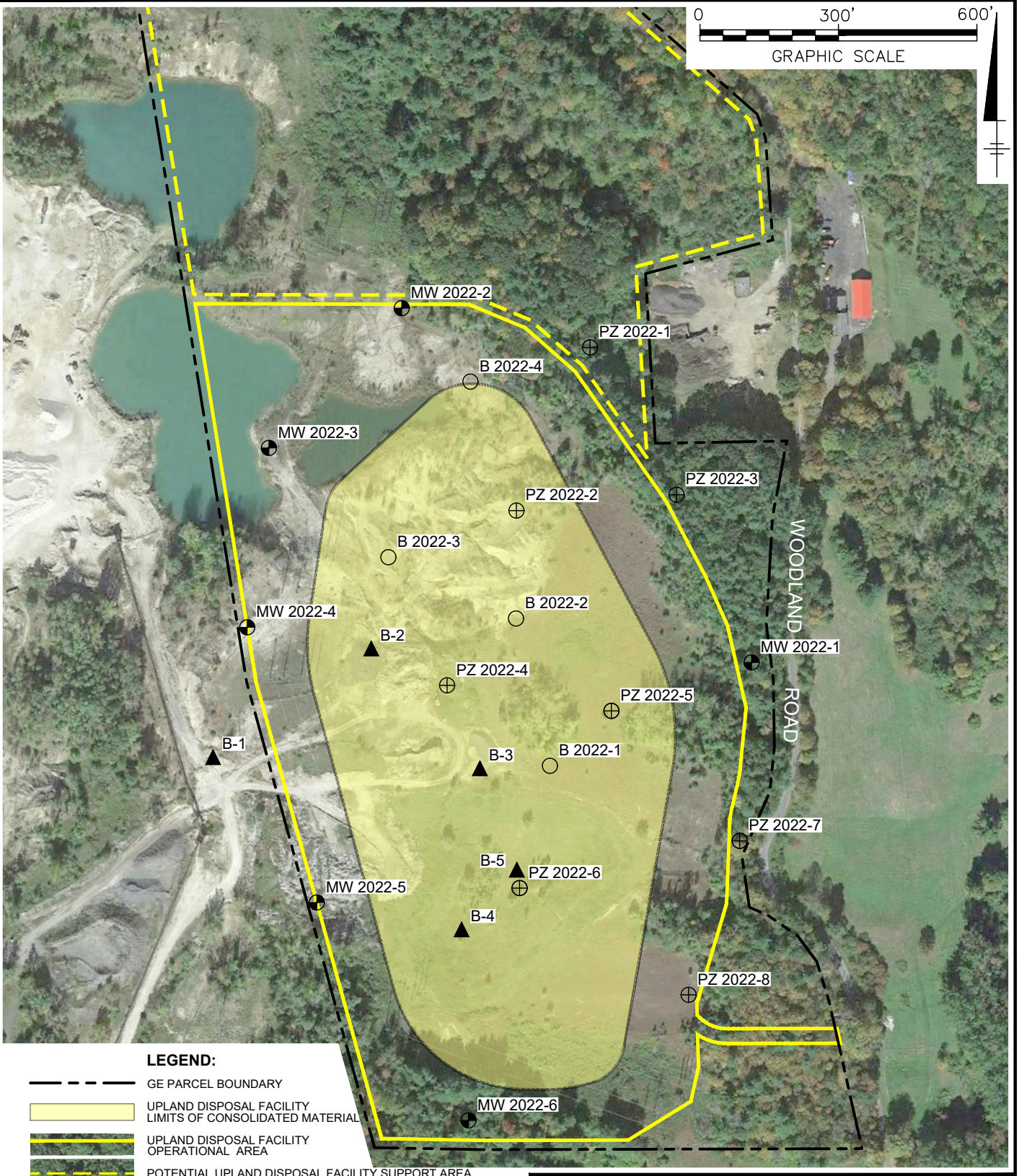
1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
3. MONITORING WELLS AROUND LEE MUNICIPAL LANDFILL ARE APPROXIMATE AND ARE BASED ON LOCATIONS SHOWN ON FIGURE 4A "WATER TABLE AQUIFER GROUNDWATER CONTOUR MAP (19 JUNE 1995)" FROM SUPPLEMENTAL COMPREHENSIVE SITE ASSESSMENT - WILLOW HILL ROAD SANITARY LANDFILL, LEE MASSACHUSETTS (ERM-NEW ENGLAND, INC., JANUARY 19, 1996) AND FIGURE TITLED "BEDROCK AND OVERBURDEN GROUNDWATER CONTOURS JANUARY 30, 1995" FROM LICENSED SITE PROFESSIONAL (LSP) EVALUATION OPINION TRANSMITTAL - LEE LANDFILL, LEE, MASSACHUSETTS (AUGUST 23, 1995).
4. UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL, OPERATIONAL AREA, AND SUPPORT AREAS SHOWN ARE CONCEPTUAL ONLY.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

PROPOSED GROUNDWATER DEPTH INVESTIGATION

ARCADIS

FIGURE
5



LEGEND:

- GE PARCEL BOUNDARY
- UPLAND DISPOSAL FACILITY LIMITS OF CONSOLIDATED MATERIAL
- UPLAND DISPOSAL FACILITY OPERATIONAL AREA
- POTENTIAL UPLAND DISPOSAL FACILITY SUPPORT AREA
- HISTORICAL GEOPROBE LOCATIONS
- PROPOPOSED PERMANENT MONITORING WELLS WITH GROUNDWATER QUALITY SAMPLING
- PROPOSED TEMPORARY PIEZOMETER (NO GROUNDWATER QUALITY SAMPLING)

NOTES:

1. SITE FEATURES OBTAINED FROM DRAWING ENTITLED "PLAN OF LAND SURVEYED FOR THE LANE CONSTRUCTION CORPORATION" PREPARED BY SK DESIGN GROUP, INC., DATED JUNE 4, 2010.
2. AERIAL IMAGERY WAS OBTAINED VIA GOOGLE EARTH DATED 10/04/2018, ACCESSED 09/22/2021.
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GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
HOUSATONIC RIVER

PROPOSED GROUNDWATER QUALITY INVESTIGATION

ARCADIS

FIGURE
6

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WPS_GEP_10.04.2018_ZOOM1.jpg

Appendix A

UDF/GE Parcel Habitat Inventory Form

General Electric Housatonic Rest of River
Upland Disposal Facility and GE Parcel Habitat Inventory Form

I. General Information

Site Name

Location/Physical Description

Date(s) of Site Visit(s) and Data Collection

Weather Conditions During Site Visit

Field Staff Performing Evaluation

Date this form was completed

II. Site Description

A. Hydrology/Water Regime

- ☐ Permanently flooded
- ☐ Intermittently exposed
- ☐ Semi-permanently flooded
- ☐ Seasonally flooded
- ☐ Upland
- ☐ Saturated
- ☐ Temporarily flooded
- ☐ Intermittently flooded
- ☐ Artificially flooded

B. Community Cover Type(s)

Wetland

- ☐ Transitional floodplain forest
- ☐ High terrace floodplain forest
- ☐ Red maple swamp
- ☐ Vernal pool
- ☐ Black ash-red maple-tamarack calcareous seepage swamp
- ☐ Deep emergent marsh
- ☐ Shallow emergent marsh
- ☐ Shrub swamp
- ☐ Wet meadow

Upland

- ☐ Northern Hardwoods-Hemlock-White Pine Forest
- ☐ Rich mesic forest
- ☐ Red Oak-Sugar Maple Transition Forest
- ☐ Agricultural fields
- ☐ Cultural grassland
- ☐ Successional northern hardwoods
- ☐ Spruce-fir-northern hardwood forest
- ☐ Developed/disturbed cover types
- ☐

Bordering Riverine/Aquatic Habitat

- ☐ High-gradient stream
- ☐ Medium-gradient stream
- ☐ Low-gradient stream
- ☐ Moderately alkaline lake/pond

☐ Backwater ☐

C. Inventory (Plant community)

% Cover: _____ Trees (> 20') _____ Shrubs (< 20') _____ Woody vines _____ Mosses _____ Herbaceous

Plant Lists (species that comprise 10% or more of the vegetative cover in each strata; "*" designates a dominant plant species for the strata):

Strata	Plant Species	Strata	Plant Species

D. Inventory (Soils)

_____ Soil Survey Unit _____ Drainage Class

_____ Texture (upper part) _____ Depth

Representative Soil Pit Log

Soil Horizon	Depth (inches)	Color	Soil Texture	Mottling
Notes:				

III. Important Habitat Features

Wildlife Food

Important Wetland/Aquatic Food Plants (smartweeds, pondweeds, wild rice, bulrush, wild celery)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Important Upland/Wetland Food Plants (hard mast and fruit/berry producers)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Shrub thickets or streambeds with abundant earthworms (American woodcock)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Cover/Perches/Basking/Denning/Nesting Habitat

Shrub and/or herbaceous vegetation suitable for veery nesting

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Trees (live or dead) > 30" DBH

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Standing Dead Trees (potential for cavities and perches):

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Tree Cavities in trunks or limbs:

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Small mammal burrows:

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Dense herbaceous cover (voles, small mammals, amphibians & reptiles)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Large woody debris on the ground (small mammals, mink, amphibians & reptiles)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Rocks, crevices, logs, tree roots or hummocks under water's surface (turtles, snakes, frogs)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Rocks, crevices, fallen logs, overhanging branches or hummocks at, or within 1m above the water's surface (turtles, snakes, frogs, wading birds, wood duck, mink, raccoon)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Rock piles, crevices, or hollow logs suitable for:

☐ otter ☐ mink ☐ porcupine ☐ bear ☐ bobcat ☐ turkey vulture

Live or dead standing vegetation overhanging water or offering good visibility of open water (e.g., osprey, kingfisher, flycatchers, cedar waxwings)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Depressions that may serve as seasonal (vernal/autumnal) pools

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Standing water present at least part of the growing season, suitable for use by

☐ Breeding amphibians ☐ Non-breeding amphibians (foraging, re-hydration)

☐ Turtles ☐ Foraging waterfowl

Sphagnum hummucks or mats, moss-covered logs or saturated logs, overhanging or directly adjacent to pools of standing water in spring (four-toed salamander)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Important habitat characteristics

Medium to large (> 6”), flat rocks within a stream (cover for stream salamanders and nesting habitat for spring & two-lined salamanders)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Flat rocks and logs on banks or within exposed portions of streambeds (cover for stream salamanders and nesting habitat for dusky salamanders)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Underwater banks of fine silt and/or clay (beaver, muskrat, otter)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Undercut or overhanging banks (small mammals, mink, weasels)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Vertical sandy banks (bank swallow, kingfisher)

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Areas of ice-free open water in winter

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Mud flats

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Exposed areas of well-drained, sandy soil suitable for turtle nesting

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Wildlife dens/nests (if observed)

Turtle nesting sites

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Bank swallow colony

☐ Abundant ☐ Present ☐ Absent ☐ Not Applicable

Nest(s) present of ☐ Bald Eagle ☐ Osprey ☐ Great Blue Heron

Den(s) present of ☐ Otter ☐ Mink ☐ Beaver

Emergent Wetlands (if Applicaple)

Emergent wetland vegetation at least seasonally flooded during the growing season (wood duck, green heron, black-crowned night heron, king rail, Virginia rail, coot, etc.)

Flooded > 5 cm ☐ Present ☐ Absent

Flooded > 25 cm (pied-billed grebe) ☐ Present ☐ Absent

Persistent emergent wetland vegetation at least seasonally flooded during the growing season (mallard, American bittern, sora, common snipe, red-winged blackbird, swamp sparrow, marsh wren)

Flooded > 5 cm ☐ Present ☐ Absent

Flooded > 25 cm (least bittern, common moorhen) ☐ Present ☐ Absent

Cattail emergent wetland vegetation at least seasonally flooded during the growing season

Flooded > 5 cm (marsh wren) ☐ Present ☐ Absent

Flooded > 25 cm (least bittern, common moorhen) ☐ Present ☐ Absent

Fine-leafed emergent vegetation (grasses and sedges) at least seasonally flooded during the growing season (common snipe, spotted sandpiper, sedge wren)

Flooded > 5 cm ☐ Present ☐ Absent

Flooded > 25 cm (least bittern, common moorhen) ☐ Present ☐ Absent

IV. Habitat Degradation

☐ Evidence of significant levels of dumping

☐ Evidence of significant erosion or sedimentation problems

☐ Significant invasion of exotic plants (e.g., purple loosestrife, *Phragmites*, glossy buckthorn)

☐ Disturbance from roads or highways ☐ Evidence of fire

☐ Evidence of other human disturbance

Appendix B

USACE Wetland Determination Data Form for the Northeast Region

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____

Applicant/Owner: _____ State: _____ Sampling Point: _____

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** _____ If yes, optional Wetland Site ID: _____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: _____

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

Appendix C

Arcadis Field Guide for USCS Soil Classification

FIELD GUIDE FOR USCS SOIL CLASSIFICATION

SEPTEMBER 1, 2020; REV 0

ARCADIS

Color Examples:

- Medium Bluish Gray (5B 5/1)
- Brownish Gray (5YR 4/1)
- Light Olive Brown (5Y 5/6)
- Light Olive (10Y 5/4)
- Grayish Olive (10Y 4/2)
- Grayish Brown (5YR 3/2)
- Pale Red (5R 6/2)
- Dark Reddish-Brown (10R 3/4)
- Light Brown (5YR 6/4)
- Moderate Red (5R 4/6)
- Moderate Reddish-Brown (10R 4/6)
- Pale Yellowish Orange (10YR 8/6)
- Moderate Yellowish Brown (10YR 5/4)
- Moderate Reddish Orange (10R 6/6)
- Grayish Yellow (5Y 8/4)

Colors may vary slightly due to reproduction

Description Format:

1. USCS Group Name (USCS Group Symbol);	5. minor constituents,
2. density/consistency,	6. moisture,
3. color,	7. additional details,
4. major constituents,	8. [geologic origin] (eg fill, alluvium, etc)

* Major/minor constituent descriptions should include particle size range and angularity for granular soils and plasticity for fine-grained soils.

Example Descriptions:

- Lean Clay with Sand (CL); Very stiff, dark gray, medium plasticity fines, coarse, angular sand, trace gravel, moist [levee fill]
- Well-Graded Sand with Silt (SW-SM); Medium dense, brown, subangular sand, low plasticity fines, moist, slightly organic [holocene terrace deposits]

Coarse-Grained Soil Flow Chart

				Group Symbol		Group Name
% gravel > % sand	≤5% fines	Well-graded		GW	<15% sand	well-graded gravel
					≥15% sand	well-graded gravel with sand
		Poorly graded		GP	<15% sand	poorly-graded gravel
					≥15% sand	poorly-graded gravel with sand
	5%-15% fines	Well-graded	silt fines	GW-GM	<15% sand	well-graded gravel with silt
					≥15% sand	well-graded gravel with silt and sand
			clay fines	GW-GC	<15% sand	well-graded gravel with clay
					≥15% sand	well-graded gravel with clay and sand
		Poorly graded	silt fines	GP-GM	<15% sand	poorly-graded gravel with silt
					≥15% sand	poorly-graded gravel with silt and sand
			clay fines	GP-GC	<15% sand	poorly-graded gravel with clay
					≥15% sand	poorly-graded gravel with clay and sand
	≥15% fines	silt fines		GM	<15% sand	silty gravel
					≥15% sand	silty gravel with sand
		clay fines		GC	<15% sand	clayey gravel
					≥15% sand	clayey gravel with sand
% sand > % gravel	≤5% fines	Well-graded		SW	<15% gravel	well-graded sand
					≥15% gravel	well-graded sand with gravel
		Poorly graded		SP	<15% gravel	poorly-graded sand
					≥15% gravel	poorly-graded sand with gravel
	5%-15% fines	Well-graded	silt fines	SW-SM	<15% gravel	well-graded sand with silt
					≥15% gravel	well-graded sand with silt and gravel
			clay fines	SW-SC	<15% gravel	well-graded sand with clay
					≥15% gravel	well-graded sand with clay and gravel
		Poorly graded	silt fines	SP-SM	<15% gravel	poorly-graded sand with silt
					≥15% gravel	poorly-graded sand with silt and gravel
			clay fines	SP-SC	<15% gravel	poorly-graded sand with clay
					≥15% gravel	poorly-graded sand with clay and gravel
	≥15% fines	silt fines		SM	<15% gravel	silty sand
					≥15% gravel	silty sand with gravel
		clay fines		SC	<15% gravel	clayey sand
					≥15% gravel	clayey sand with gravel

Density of Granular Soils

Density	N-value
Very Loose	< 5
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Minor Constituent Descriptors

Term	Percent Present
Trace	< 5 %
Few	5 to 10 %
Little	15 to 25 %
Some	30 to 45 %
Mostly	50 to 100 %

Note: This field guide is intended as a quick-reference guide for basic soil logging information. More detailed information is provided in ASTM D2488.

FIELD GUIDE FOR USCS SOIL CLASSIFICATION

SEPTEMBER 1, 2020; REV 0

ARCADIS

Fine Grained Soil Flow Chart

		Group Symbol				Group Name
LL<50 slightly to moderately sticky when wet	- medium plasticity - none to slow dilatancy - medium to high dry strength	CL	<30% sand & gravel	<15% sand & gravel		lean clay
				15-29% sand & gravel	sand≥gravel	lean clay with sand
					sand<gravel	lean clay with gravel
			≥30% sand & gravel	sand≥gravel	<15% gravel	sandy lean clay
					≥15% gravel	sandy lean clay with gravel
				sand<gravel	<15% sand	gravelly lean clay
					≥15% sand	gravelly lean clay with sand
	- nonplastic to low plasticity - slow to rapid dilatancy - none to low dry strength	ML	<30% sand & gravel	<15% sand & gravel		silt
				15-29% sand & gravel	sand≥gravel	silt with clay
					sand<gravel	silt with gravel
			≥30% sand & gravel	sand≥gravel	<15% gravel	sandy silt
					≥15% gravel	sandy silt with gravel
				sand<gravel	<15% sand	gravelly silt
					≥15% sand	gravelly silt with sand
LL>50 very sticky when wet	- high plasticity - no dilatancy - high to very high dry strength	CH	<30% sand & gravel	<15% sand & gravel		fat clay
				15-29% sand & gravel	sand≥gravel	fat clay with sand
					sand<gravel	fat clay with gravel
			≥30% sand & gravel	sand≥gravel	<15% gravel	sandy fat clay
					≥15% gravel	sandy fat clay with gravel
				sand<gravel	<15% sand	gravelly fat clay
					≥15% sand	gravelly fat clay with sand
	- low to medium plasticity - none to slow dilatancy - low to medium dry strength	MH	Elastic silt soil is uncommon. If encountered, follow group name convention for other fine grained soils. (i.e. elastic silt, elastic silt with sand, elastic silt with gravel, sandy elastic silt, etc.)			

* Record as organic soil (OL/OH) if there is enough organic particles to influence soil properties. Follow group name convention for other fine grained soils.

Plasticity of Cohesive Soils

Nonplastic	A 1⁄8-in. (3-mm) thread cannot be rolled at any water content
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limi

Consistency of Cohesive Soils

Consistency	SPT N-value	Pocket pen (tsf)	Hand Manipulation
Very Soft	<2	<0.25	Easily penetrated >1 in. by thumb
Soft	2 – 4	0.25 - 0.5	Easily penetrated ~1 in. by thumb
Med. Stiff	5 – 8	0.5 - 1.0	Penetrated by thumb with moderate effort
Stiff	9 – 15	1.0 - 2.0	Readily indented by thumb but not penetrated
Very Stiff	16 - 30	2.0 - 4.0	Readily indented but thumbnails, but thumb will not indent
Hard	>30	>4.0	Thumbnail will not indent soil

Note:
Order of priority in determining consistency of cohesive soils:
1. Field Vane Shear Test
2. Torvane
3. Pocket Pen
4. N-value

Particle Size Distribution

Material	Fraction	Sieve Size	Grain Size (mm)	Approximate Scale Size
Boulders		12 in. +	300 +	Basketball
Cobbles		3 - 12 in.	300 - 75	Baseball to basket ball
Gravel	Coarse	3/4 - 3 in.	75 - 19	Thumb to baseball
	Fine	No 4 - 3/4 in.	19 - 4.75	pea to thumb
Sand	Coarse	No 10 - No 4	4.75 - 2	rock salt to pea
	Medium	No 40 - No 10	2 - 0.425	sugar to rock salt
	Fine	No 200 - No 40	0.425 - 0.075	flour to sugar
Fines		Passing No 200	< 0.075	smaller than flour

Moisture Condition of Soils

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

Arcadis U.S., Inc.
One Lincoln Center, 110 West Fayette Street, Suite 300
Syracuse
New York 13202
Phone: 315 446 9120
Fax: 315 449 0017
www.arcadis.com