FIFTH FIVE-YEAR REVIEW REPORT FOR BARKHAMSTED-NEW HARTFORD LANDFILL SUPERFUND SITE LITCHFIELD COUNTY, CONNECTICUT

Prepared by

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Region 1
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SEMS Doc ID 100026871

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LIST OF ABBREVIATIONS & ACRONYMS

ALM	Adult Lead Model
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BLL	Blood Lead Level
BCL	Below Cleanup Level
BRL	Below Reporting Level
BTAG	Biological Technical Assistance Group
CASRN	Chemical Abstracts Service Registry Number
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTDEP	Connecticut Department of Environmental Protection
CT DOH	Connecticut Department of Health
CT DPH	Connecticut Department of Public Health
DCE	Dichloroethylene
ELUR	Environmental Land Use Restriction
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ESV	Ecological Screening Value
FS	Feasibility Study
FYR	Five-Year Review
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid (Gen-X)
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICs	Institutional Controls
IRIS	Integrated Risk Information System
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MNA	Monitored Natural Attenuation
MRL	Minimal Risk Level
µg/dL	Micrograms per Deciliter
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/kg-day	Milligrams per Kilogram per Day
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per Liter
NA	Not Analyzed
NE	Not Established
NS	Not Sampled
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
NT	Not Tested
NTCRA	Non-Time Critical Removal Action
O&M	Operation and Maintenance
OHHRRAF	OLEM's Human Health Regional Risk Assessment Forum
OLEM	Office of Land and Emergency Management
OU	Operable Unit
PFAS	Per- and Polyfluoroalkyl Substances

PFBA	Perfluorobutanoic Acid
PFBS	Perfluorobutane Sulfonic Acid
PFDA	Perfluorodecanoic Acid
PFHpA	Perfluoroheptanoic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PFPeA	Perfluoropentanoic Acid
PPRTV	Provisional Peer Reviewed Toxicity Value
ppb	Parts per Billion
ppm	Parts per Million
ppt	Parts per Trillion
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RRDD #1	Regional Refuse Disposal District No. 1
RSL	Regional Screening Level
RSR	Remediation Standard Regulations
SL	Screening Level
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unlimited Exposure
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the fifth FYR for the Barkhamsted-New Hartford Landfill Superfund site (Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU). OU1 includes the Site's groundwater remedy. This FYR Report addresses OU1.

EPA remedial project manager (RPM) Almerinda Silva led the FYR. Participants included EPA legal counsel Michelle Lauterback, EPA risk assessors Courtney Carroll and TaChalla Gibeau, EPA community involvement coordinator Aaron Shaheen, Connecticut Department of Energy and Environmental Protection (CTDEEP) project manager Sheila Gleason, and Jill Billus and Claire Marcussen from EPA support contractor Skeo. The Regional Refuse Disposal District No. 1 (RRDD #1), a responsible party, was notified of the initiation of the FYR. The review began on February 6, 2023.

Appendix A lists the documents reviewed for this FYR. Appendix B provides the Site's chronology of events.

Site Background

The 97.8-acre Site is in the north central part of Connecticut, about 20 miles northwest of Hartford along the western side of Route 44 (New Hartford Road). The Site is located on the northern slope of a hill within the Farmington River Valley and straddles the municipal borders of Barkhamsted and New Hartford in Litchfield County, Connecticut (Figure 1). Between 1974 and 1993, RRDD #1 owned and operated a portion of the Site for landfilling municipal solid waste, industrial waste and non-processable waste. Subsequent investigations found that groundwater beneath the landfill was contaminated with volatile organics and metals, and leachate from the landfill was discharging to an adjacent stream.

Currently the Site consists of the 13-acre capped landfill and associated features, which are surrounded by a chain-link fence. The remaining site area is either undeveloped woodlands or occupied by RRDD #1's transfer station and recycling center, which includes an area for bulky materials, an office and a maintenance building. The Site also has a 1.5-megawatt solar array and cellular phone tower, both of which are outside the landfill capped area. The Barkhamsted Town Garage facility is immediately northeast of the Site. Developed and undeveloped private properties border the Site in all other directions. This includes residential properties to the east and southeast that use private wells for potable water. No changes are anticipated to the current land use on or near the Site.

One surface water body, the Unnamed Brook, originates south of the Site. It flows north along the west side of the landfill area, flows under Route 44 and eventually flows into the Farmington River, which is a quarter mile northeast of the Site.

Groundwater at the Site is present in two zones, the overburden and bedrock. The overburden is unconfined from the bedrock groundwater. Groundwater contamination is present in both groundwater zones where contaminant migration is predominantly to the north and northeast of the landfill. The aquifer underlying the Site is currently

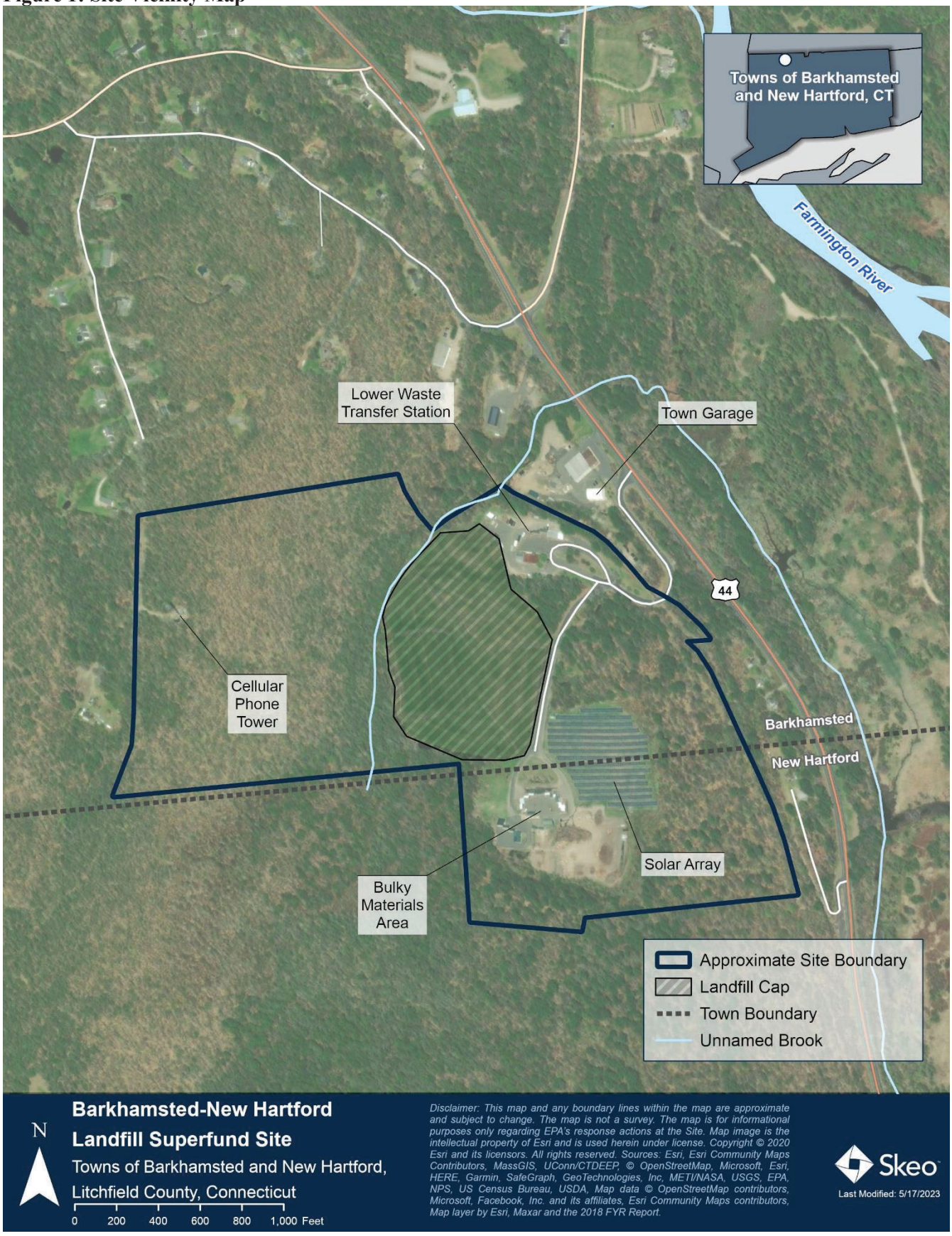
used as a drinking water source. Nearby commercial and residential properties (including a well installed in late 2012 to supply the RRDD #1 facility and Town Garage) use both the overburden and bedrock aquifer as a potable water supply. RRDD #1 samples the private wells annually; results have shown contaminant concentrations below drinking water standards, where available. Recent results are discussed in the Data Review section of this FYR Report.

Affected groundwater flows from beneath the northeastern side of the landfill with some discharging to the Unnamed Brook, while the remainder migrates in a northeasterly direction beyond Route 44 and into the floodplain of the Farmington River.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Barkhamsted-New Hartford Landfill		
EPA ID: CTD980732333		
Region: 1	**State:** CT	**City/County:** Barkhamsted & New Hartford/Litchfield County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Almerinda Silva		
Author affiliation: EPA		
Review period: 2/6/2023 – 9/13/2023		
Date of site inspection: 4/5/2023		
Type of review: Statutory		
Review number: 5		
Triggering action date: 9/20/2018		
Due date *(five years after triggering action date)*: 9/20/2023		

Figure 1: Site Vicinity Map



II. RESPONSE ACTION SUMMARY

Basis for Taking Action and Response Actions

Pre-Record of Decision (ROD) Actions
EPA, the Connecticut Department of Environmental Protection (CTDEP, now the CTDEEP) and the local health department conducted various inspections and assessments at the Site between 1980 and 1987. The assessments found volatile organics in on-site groundwater and leachate from the landfill discharging to the Unnamed Brook. In addition, heavy metals were found in oily metal grindings that were disposed of in the landfill. EPA proposed the Site for inclusion on the National Priorities List (NPL) in June 1988 and subsequently listed it on the NPL in October 1989.

In 1990, CTDEP issued an Administrative Order of Consent (AOC) that required RRDD #1 to investigate the waste materials and disposal activities on site, determine potential impacts on human health, delineate the extent of contamination and determine if drinking water supplies were affected. EPA negotiated a CERCLA AOC to several potentially responsible parties (PRPs) in 1991, requiring them to conduct a remedial investigation (RI) and feasibility study (FS). The PRPs completed the RI in 1996.

In April 1994, the PRPs prepared an Engineering Evaluation and Cost Analysis to implement a non-time critical removal action (NTCRA) to cap the landfill. EPA issued an Action Memorandum in 1996 to document approval of the decision to conduct a NTCRA. EPA and CTDEP executed an enforcement agreement in 1996, so that CTDEP could oversee the NTCRA. CTDEP and RRDD #1 subsequently entered into a Consent Order (#SRD072) that required RRDD #1, as a PRP, to implement the NTCRA. RRDD #1 completed the NTCRA in 1998, which included the following major actions:

- Excavation of sediments from about a 70-foot-length reach of the Unnamed Brook.
- Relocation of about a 340-foot-length reach of the Unnamed Brook on the west side of the landfill with the former section of the brook being covered with soil.
- Relocation of contaminated soil, sediment and refuse to within the limits of the area to be capped.
- Installation of a leachate collection system, including installation of a double-walled underground leachate storage tank and associated appurtenances.
- Capping of the landfill with a low-permeability Resource Conservation and Recovery Act (RCRA) Subtitle C cap system.
- Construction of a passive gas venting system.
- Vertical extension of active groundwater monitoring wells located within the limits of the capped area, and abandonment of monitoring wells no longer being used.
- Site restoration.
- Installation of perimeter security fencing.
- Institutional controls for protection of the landfill cap and remedial systems and to limit site access.

Following the NTCRA, RRDD #1 completed the Site's FS in 2001.

Basis for Action
EPA completed a baseline human health risk assessment (HHRA) in November 1995 and updated it in April 2000. The April 2000 HHRA evaluated risks remaining on site after completion of the NTCRA (capping the landfill) in 1998.

The 2000 HHRA evaluated potential human health effects associated with exposure to contaminants of concern (COCs) detected in soils along Route 44 near the Site, peripheral soil outside of the capped area, groundwater, seep water, and the Unnamed Brook surface water and sediment. Soil exposure pathways included ingestion and dermal exposures of site visitors and future residential adults and children to soils in the periphery of the landfill. Residential adult and child exposure to soil in residential areas along Route 44 near the Site were also evaluated. Adolescent visitors were evaluated for potential dermal and ingestion exposure to surface water and sediment in

the Unnamed Brook. The 2000 HHRA identified that only unacceptable risk was to groundwater if it were used for consumption; the corresponding cancer risk was 5×10^{-4} which was primarily driven by the presence of arsenic. In addition, noncancer hazard indices (HI) greater than 1 were calculated for several groundwater COCs. Lead in groundwater also exceeded its action level.

An ecological risk assessment (ERA) was completed in 1996 to evaluate ecological receptors exposed to COCs in surface soils, surface water, leachate seeps and sediments. The 1996 ERA (prior to capping) identified unacceptable risks to aquatic/benthic macroinvertebrate communities in surface water of the Unnamed Brook. The 1996 ERA also identified risks to mink and semi-aquatic animals and small terrestrial mammals consuming prey living in contaminated sediment. EPA updated the ERA in 2000 after the completion of the NTCRA. The 2000 ERA demonstrated that surface water data did not exceed surface water benchmarks in the Unnamed Brook. The seep data generally did not exceed surface water benchmarks except for 2,4-dimethylphenol; however, this COC was below detection in the Unnamed Brook. The post-NTCRA seep soil data were evaluated and showed that the risk of seep soil to mice was negligible. In addition, the post-NTCRA sediment data showed that most COCs did not exceed the ecological benchmarks except for barium and manganese, concluding there may be some level of risk still for benthic invertebrates in the Unnamed Brook. Results of this assessment suggested that the NTCRA had mitigated many of the pre-NTCRA ecological risks and any remaining (residual) unacceptable risk would be mitigated in the future. The assessment suggested long-term monitoring of leachate seeps and sediment during the FYR would assist in determining whether ecological risks continue to decrease.

Based on the results of the HHRA and ERA, the only exposure pathways that potentially pose an unacceptable risk is ingestion of groundwater as drinking water and residual risk to benthic invertebrates in the Unnamed Brook. Table 1 presents the Site's COCs in groundwater.

Table 1: Groundwater COCs

Volatile Organic Compounds (VOCs)	Semi-Volatile Organic Compounds (SVOCs)	Metals
1,2-Dichloroethane 1,2-Dichloropropane 1,4-Dichlorobenzene 4-Methyl-2-pentanone Acetone Benzene Chloroethane Chloroform Chloromethane Dibromochloromethane Methyl ethyl ketone (2-butanone) Methylene chloride Toluene Trichloroethene (TCE) Vinyl chloride	Bis(2-ethylhexyl) phthalate 2,4-Dimethylphenol 4-Methylphenol	Arsenic Total chromium Lead Manganese
Source: Table 1 of the Site's 2001 ROD.		

Long-Term Response Actions

EPA selected a long-term cleanup plan in a September 2001 ROD. The ROD identified the remedial action objectives (RAOs) for the remedy to mitigate and prevent post-NTCRA residual ecological risk in sediment of the Unnamed Brook and future potential human health risks from groundwater exposure. EPA determined that the NTCRA previously addressed source materials and principal threat wastes. Therefore, the selected remedy addresses the remaining low-level threat wastes in groundwater and sediment in the Unnamed Brook by monitoring the wastes via naturally occurring, in-situ processes to achieve cleanup levels.

Table 2 summarizes the Site's RAOs and selected remedial components from the 2001 ROD.

Table 2: Summary of RAOs and Long-Term Remedy Components

Media	RAOs	Remedial Components
Groundwater	• Prevent ingestion of or dermal contact with groundwater having constituent concentrations exceeding EPA Safe Drinking Water Act maximum contaminant levels (MCLs), or in their absence, the more stringent of an excess cancer risk of 1 x 10^{-6} for each carcinogen or a hazard quotient (HQ) of 1 for each non-carcinogenic substance. • Restore groundwater beyond the compliance boundary (limits of the landfill) to MCLs or any more stringent Connecticut Remediation Standards (background concentrations), or in their absence, the more stringent of an excess cancer risk of 1 x 10^{-6} for each carcinogen or a HQ of 1 for each non-carcinogenic substance.	• Use of monitored natural attenuation to remediate groundwater contaminants to meet applicable standards (up to 15.6 years in the overburden and 6 years in the bedrock aquifer). • Installation of groundwater monitoring wells in the downgradient part of the plume. • Implementation of institutional controls to prevent residential use of the Site, prevent extraction of contaminated groundwater for use, and prevent disturbance of the landfill cap installed under the NTCRA. It also required environmental land use restrictions of downgradient properties to prohibit installation of any wells and the use of groundwater for any purpose. • Implementation of a public education program involving informational meetings and/or mailings to discuss potential site hazards. • Long-term monitoring of groundwater to evaluate changes over time and to evaluate the success of the remedial action.
Surface water and sediment	• Protect benthic invertebrates and mammals from ingesting contaminated prey from direct contact with, or ingestion of, sediment having constituent concentrations exceeding an HI of 1. • Prevent releases of constituents from sediments that would result in surface water levels exceeding federal ambient water quality criteria, Connecticut water quality standards, or in their absence, an HQ of 1.	• Long-term monitoring of surface water and sediment to evaluate changes over time and to evaluate the success of the remedial action.
Source: 2001 ROD, Section L. Selected Remedy.		

EPA established groundwater cleanup levels based on federal applicable or relevant and appropriate (ARARs) criteria and more stringent Connecticut Remediation Standard Regulations (RSRs) as available, or other suitable criteria described in Table 3. Because the aquifer at and beyond the compliance boundary for the landfill is a Class IIB aquifer (GA), a potential source of drinking water, maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) established under the Safe Drinking Water Act and more stringent state standards are ARARs. A compliance boundary has been established at the wells around the perimeter of the landfill.

Table 3: 2001 ROD Groundwater Cleanup Levels

COC	Cleanup Level[a] (µg/L)
VOCs	
1,2-Dichloroethane	<0.5
1,2-Dichloropropane	<0.5
1,4-Dichlorobenzene	<10.0
4-Methyl-2-pentanone	<5.0
Methyl ethyl ketone (2-butanone)	<10.0
Acetone	<10.0
Benzene	<0.5
Chloroethane	<1.0
Chloroform	<0.5
Chloromethane	<1.0

COC	Cleanup Level[a] (µg/L)
Dibromochloromethane	<0.5
Methylene chloride	<2.0
Toluene	<0.5
Trichloroethene	<0.5
Vinyl chloride	<1.0
SVOCs	
2,4-Dimethylphenol	<10.0
4-Methylphenol	<10.0
Bis(2-ethylhexyl)phthalate	<2.0
Metals	
Arsenic	5.0
Total chromium	50.0
Lead	3.0
Manganese	50.0

Notes:

a. The cleanup level established for each chemical is the background concentration, per Connecticut RSRs, Section 22a-133k-3(a). The ROD states that during the remedial action phase, EPA in consultation with CTDEP (now CTDEEP) will determine whether these concentrations represent background for this Site and will change these values, if necessary, through an Explanation of Significant Differences.

µg/L = micrograms per liter

Source: Table 11 of the 2001 ROD.

Status of Implementation

In 2003, EPA and the state of Connecticut settled with certain PRPs, referred to as Settling Defendants, under a Consent Decree. The Consent Decree required that the Settling Defendants prepare a Remedial Action Work Plan and a long-term monitoring plan in addition to other required submittals. RRDD #1, as the site owner and operator, is the Performing Settling Defendant at the Site.

In spring 2003, RRDD #1 began the long-term monitoring program at the Site. Although the ROD required installation of groundwater monitoring wells in the downgradient part of the plume, the existing monitoring network at the Site was found to be sufficient. Long-term monitoring initially included quarterly groundwater, surface water and sediment monitoring in support of an ongoing assessment of the monitored natural attenuation (MNA) remedy. Sampling frequency was reduced to semiannual after two years and annual in 2017. Sediment sampling frequency was reduced to once every five years in 2009. Drinking water samples have been collected as part of the long-term monitoring program from nearby potable supply wells. The results of these samples are submitted to the residents as part of the remedy's public education requirement.

In 2016, RRDD #1's contractor prepared the Revised Monitored Natural Attenuation Timeframe to Cleanup Assessment Technical Memorandum. The memorandum summarized results from a revised MNA timeframe to cleanup levels evaluation, and summarized evidence that the MNA process is ongoing at the Site, although at a rate slower than anticipated in the ROD, primarily for inorganic constituents.

In October 2017, RRDD #1's contractor prepared a technical memorandum entitled Monitoring Program for Compliance with Groundwater Remedial Action Objectives and Proposed Monitoring Plan Revision (2017 Technical Memorandum). It included a proposal to expand the Site's compliance boundary and update the long-term sampling program at the Site. The Site's RAO defines the compliance boundary as the limits of the landfill. Beyond this area, groundwater must be restored to cleanup levels. RRDD #1's contractor proposed to expand the compliance boundary to an area further downgradient where residual reducing conditions extend beyond the edge of the landfill. In 2019, EPA approved a reduction in sampling frequency to annual but did not approve the RRDD #1's request to remove SVOC analysis from some wells. EPA and CTDEEP also did not approve a change in the compliance boundary.

Institutional Controls

The 1996 Action Memorandum required institutional controls to protect the landfill cap and associated remedial infrastructure. The 2001 ROD required institutional controls to prevent residential use of the Site, prevent extraction of contaminated groundwater for use, and prevent disturbance of the landfill cap installed under the NTCRA. It also required environmental land use restrictions of downgradient properties to prohibit installation of any new drinking water wells and the use of groundwater for any purpose.

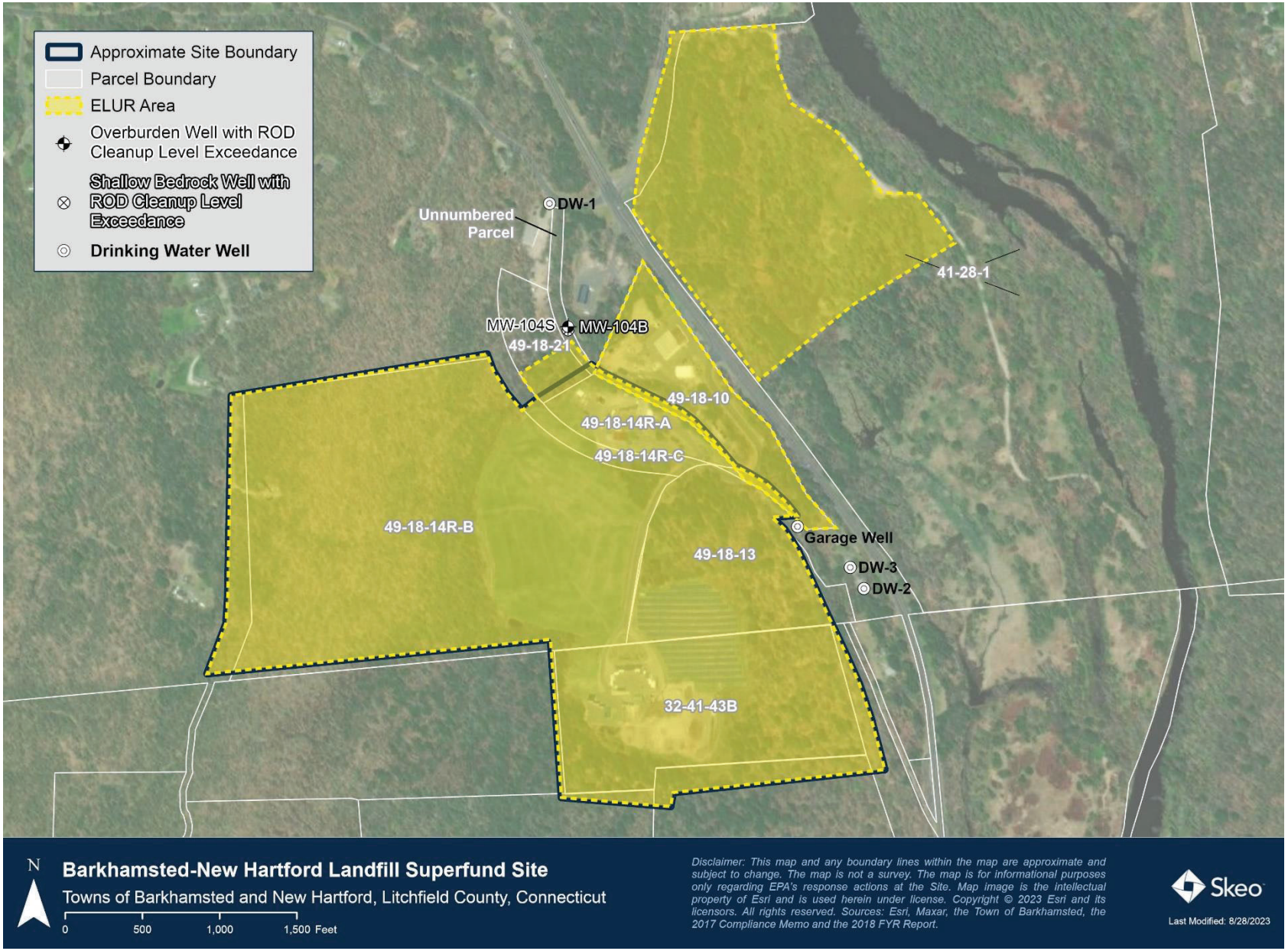
Institutional controls have been implemented for the landfill property and three downgradient properties (parcels 49-18-10 and portions of parcels 41-28-1 and 49-18-21) in the form of Declarations of Environmental Land Use Restriction and Grants of Easement (ELURs). RRDD #1 recorded the ELURs in the Barkhamsted or New Hartford Land Records, as applicable, in 2003 and 2004. Table 4 summarizes the implemented institutional controls and their objectives. Figure 2 shows the areas covered by the ELURs. Based on data collected in 2019 and 2022, manganese concentrations in monitoring wells MW-104S and MW-104B exceeded the ROD cleanup level of 50 micrograms per liter (µg/L) at concentrations up to 110 µg/L. Both wells are outside the areas subject to an ELUR (Figure 2). The parcel on which the wells are located (shown as the Unnumbered Parcel on Figure 2) is currently not in use (i.e., it is vacant).

Table 4: Summary of Implemented Institutional Controls (ICs)

Media and Engineered Controls That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Recorded Date
Landfill cap system, groundwater (RRDD #1 landfill property)	Yes	Yes	Parcels 49-18-14R (A, B and C), 49-18-13 and 32-41-43B	• Prevent residential use. • Prevent groundwater use as drinking water. • Prevent disturbance of the engineered control (landfill). • Prevent construction within the engineered control (landfill).	ELURs Barkhamsted – Volume 124, Page 140, New Hartford – Volume 217, Page 1019 (August 2003)
Groundwater (properties adjacent to the RRDD #1 landfill property)	Yes	Yes	Parcel 49-18-10	• Prevent groundwater use as drinking water.	ELUR Barkhamsted – Volume 126, Page 347 (January 2004)
			Part of Parcel 49-18-21		ELUR Barkhamsted – Volume 126, Page 689 (February 2004)
			Part of Parcel 41-28-1[a]		ELUR Barkhamsted – Volume 126, Page 357 (January 2004)

Notes:
a. Identified as Parcels 1 and 2 in Volume 35, Page 229 of the Barkhamsted Land Records.
Source: IC documents obtained at the Site's Superfund profile page, Site Documents & Data, accessed 3/29/2023 at: www.epa.gov/superfund/barkhamsted.

Figure 2: Institutional Control Boundary Map



Systems Operations/Operation & Maintenance (O&M)

Long-term monitoring of the selected remedy (i.e., MNA) is coupled with that of the completed NTCRA (landfill closure). The Site's 2001 O&M Plan describes the O&M requirements for the Site. RRDD #1 is responsible for the O&M activities, which include:

- Routine inspections and maintenance of constructed features, including the landfill cap, gas venting system, leachate collection and storage system, surface water runoff facilities, the in-stream sedimentation basin, access roads, groundwater monitoring system and physical site security.
- Performance of a groundwater, surface water and sediment monitoring program.
- Coordination of removal of leachate from the storage tank and arranging for proper disposal.
- Evaluation of operating, maintenance and monitoring activities and identification of proposed changes to the O&M Plan or site procedures/policies.
- Record keeping.

RRDD #1 conducts visual inspections of the landfill, conducts routine repairs of the fence, mows the landfill cap, monitors leachate levels and coordinates leachate removal, as needed. RRDD #1 indicated during the FYR site inspection, that leachate removal takes place approximately annually. The most recent leachate removal event (about 5,500 gallons of leachate/water) took place in spring 2023. However, RRDD #1 has not provided documentation of these activities to EPA or CTDEEP during this FYR period. The 2001 O&M Plan specifies the record keeping and reporting requirements include filling out the inspection checklist provided in Table 2-1 of the O&M Plan and providing the documentation to CTDEEP monthly, or at a different frequency approved by CTDEEP. In addition, the 2003 Consent Decree requires submission of monthly progress reports to EPA and CTDEEP describing actions taken during the previous month toward achieving compliance with the Consent Decree, among other requirements. EPA and CTDEEP have not received progress reports from RRDD #1 during this FYR period, partly due to a reduction in field inspection work during the Covid-19 global pandemic.

RRDD #1 implements the Site's long-term monitoring program in general accordance with a 2001 Long-Term Monitoring Program, included as Appendix E of the 2001 O&M Plan, and its updates. RRDD #1 conducted long-term monitoring of groundwater, landfill seeps and surface water semiannually through 2016. Sampling was reduced to annually in 2017, and generally followed the proposed schedule in the 2017 Technical Memorandum. In 2019, EPA approved the reduction in sampling frequency. During this FYR period, sampling took place in 2018, 2019 and 2022. Sampling did not occur in 2020 and 2021 due to the Covid-19 global pandemic.

RRDD #1 also monitors sediment every five years to support the FYR effort. The most recent sediment sampling event took place in 2022.

III. PROGRESS SINCE THE PREVIOUS REVIEW

Table 5 includes the protectiveness determinations and statements from the 2018 FYR Report. Table 6 includes the recommendations from the 2018 FYR Report and the current status of those recommendations.

Table 5: Protectiveness Determinations/Statements from the 2018 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy at the Barkhamsted-New Hartford Landfill Site is protective in the short term because it currently protects human health and the environment because there are no current exposures to contaminated groundwater originating from the Site; the landfill cap and leachate management system continue to be an effective remedy; a long-term monitoring and operation and maintenance program is in place; and institutional controls have been recorded. However, in order for the remedy to be protective in the long term, the following actions need to be taken: fill in animal burrows and repair soft and wet areas on the cap; select analytical methods to ensure laboratory reporting limits meet all COC cleanup goals for groundwater and ecological benchmarks for surface water and sediment; perform quarterly monitoring for one year for metal analysis in drinking water wells to assess if lead and copper are consistently present and their source; and collect groundwater/drinking water samples for 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS).
Sitewide	Short-term Protective	The Sitewide remedy currently protects human health and the environment because there are no current exposures to contaminated groundwater originating from the Site; the landfill cap and leachate management system continue to be an effective remedy; a long-term monitoring and operation and maintenance program is in place; and institutional controls have been recorded. However, in order for the remedy to be protective in the long term, the following actions need to be taken: fill in animal burrows and repair soft and wet areas on the cap; select analytical methods to ensure laboratory reporting limits meet all COC cleanup goals for groundwater and ecological benchmarks for surface water and sediment; perform quarterly monitoring for one year for metal analysis in drinking water wells to assess if lead and copper are consistently present and their source; and collect groundwater/drinking water samples for 1,4-dioxane and PFAS to ensure the remedy remains protective.

Table 6: Status of Recommendations from the 2018 FYR Report

Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Small animal burrows noted in the northern portion of the landfill cap, wet/soft area possibly resulting from settlement noted along benched area in the western portion of the cap.	Make minor repairs to the landfill cap.	Completed	RRDD #1 conducts landfill repairs as needed. EPA did not observe wet/soft areas on the landfill cap or animal burrows on the northern part of the cap during the FYR site inspection in 2023. One small animal burrow was observed on the southern part of the landfill cap during the inspection. RRDD #1 will make repairs as needed.	4/5/2023
Consistent inability to attain reporting limits low enough to demonstrate achievement of ROD cleanup goals (groundwater/drinking water) or screening benchmark (surface water/sediment).	Evaluate selected analytical methods to ensure that the laboratory reporting limits meet the groundwater cleanup goals.	Ongoing	Elevated laboratory reporting limits above groundwater cleanup levels is an ongoing issue. However, the laboratory reporting limits for the 2019 and 2022 samples were generally lower than reporting limits in the 2018 samples, demonstrating that some improvements have been made.	Not applicable

Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sporadic elevated concentrations of metals (i.e., lead and copper) at several drinking water locations. The source of these sporadic detections is not known. It could be due to plumbing or other sources.	For a period of one full year, collect quarterly samples from each of the drinking water monitoring locations for metals analysis. Evaluate and present the results to EPA and CTDEEP and provide recommendations as necessary.	Ongoing	RRDD #1 has not yet submitted results from four quarterly sampling events at the drinking water monitoring locations to EPA and CTDEEP. However, RRDD #1 did collect drinking water samples for metals analysis in December 2018, November 2019 and July 2022 with results submitted to EPA and CTDEEP. The Data Review section of this FYR Report presents the results of this sampling. An October 2019 Memorandum, Re: Summary of Call with EPA on Sampling Changes, prepared by RRDD #1's contractor, noted that drinking water samples were also collected in April/May 2019 and August 2019. However, due to the absence of results from RRDD#1, EPA is requiring quarterly sampling be completed as requested during the previous FYR.	Not applicable
Emerging contaminants 1,4-dioxane, PFAS (including perfluorooctane sulfonate [PFOS]/ perfluorooctanoic acid [PFOA] and perfluorobutane sulfonic acid [PFBS]), may be associated with past waste disposal at the landfill. No sampling has yet been done to identify the presence/absence of these emerging contaminant.	Include 1,4-dioxane and PFAS analyses in the groundwater and drinking water monitoring program to determine if these contaminants are associated with the site.	Completed	Drinking water samples were analyzed for 1,4-dioxane and PFAS in 2019 and 2022. Groundwater samples were analyzed for 1,4-dioxane in 2019 and 2022. Groundwater samples were analyzed for PFAS in 2022. Both 1,4-dioxane and PFAS have been detected in site groundwater. The Data Review section of this FYR Report presents the results of the sampling.	07/07/2022

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

EPA issued an online news release on January 18, 2023, to announce that the FYR was underway. A copy of the news release is included in Appendix C. The results of the review and the completed FYR Report will be made available on EPA's site profile page: www.epa.gov/superfund/barkhamsted.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted with the CTDEEP project manager, the town of Barkhamsted First Selectman and the Chairman of the Board for the RRDD #1. The results of these interviews are summarized below. Appendix D includes the completed interview forms.

The CTDEEP project manager has a positive impression of the Site, including its cleanup, maintenance and reuse activities, and notes that the performance of the remedy is excellent. She was not aware of complaints or inquiries about the Site, any changes in state laws that might affect the remedy, or changes in projected land use. CTDEEP is comfortable with the status of institutional controls at the Site.

The town of Barkhamsted First Selectman is aware of the Site but is not familiar with the remedial progress at the Site. He does not receive communications from EPA regarding the Site. He is not aware of vandalism or other problems at the Site. He is not aware of any changes in local laws that might affect the remedy.

The Chairman of the Board for the RRDD #1 noted that currently, the only remedial activity at the Site is periodic monitoring. The chairman noted that, given the existence of the landfill cap and the generally favorable monitoring results over the past few years, he believes that the landfill remedy has proven effective and further monitoring should be substantially curtailed. He noted that the yearly monitoring costs have been a major strain on the finances of the landfill's member towns. He also noted that the Site's compliance boundary should be adjusted.

A resident on New Hartford Road near the Site is aware of the Site and its cleanup activities. They have yearly water testing on their private well and asked when it would be tested again. They noted that the best way for EPA to provide site-related information is notification by mail.

Data Review

The Site's long-term monitoring program consists of annual groundwater, seep and surface water monitoring. Sediment monitoring occurs every five years with the most recent event taking place in 2022. This FYR evaluates monitoring results for 2018, 2019 and 2022 and in context with historical data from the 2018 FYR Report. Due to the Covid-19 pandemic, annual monitoring did not take place in 2020 and 2021. The 2019 Annual Technical Report and the 2022 Sampling Report, prepared by RRDD #1's environmental contractor, were sources of information for this review. Laboratory analytical reports for 2018, 2019 and 2022 were also reviewed.

General findings of this review are:

- COC concentrations were generally consistent with or lower than concentrations reported in the 2018 FYR Report, demonstrating that natural attenuation is occurring.
- COCs exceeding ROD groundwater cleanup levels in 2019 and 2022 include arsenic, toluene, manganese, benzene and 2,4-dimethylphenol in overburden groundwater and benzene, manganese and toluene in bedrock groundwater. Manganese is detected most often above its cleanup level (50 µg/L, site background) and at the highest concentrations (e.g., 3,900 µg/L manganese in overburden groundwater in 2022).
- COC concentrations above ROD cleanup levels in 2019 and 2022 remain within the boundaries of the ELURs where groundwater use is restricted, except for manganese in MW-104S and MW-104B. These wells are located outside the ELUR area (Figure 2). Most COC concentrations above cleanup levels are immediately downgradient of the landfill, except for manganese.
- Toluene was detected in background well MW-113B at a concentration of 1,600 µg/L in 2022, compared to the ROD cleanup level of <0.5 µg/L. Toluene was not detected in MW-113B in 2019. Further evaluation is needed to confirm the increase in toluene concentrations in the background well. If confirmed, further evaluation is needed to determine if toluene in MW-113B is related to the Site or an off-site source.
- Laboratory reporting limits for many COCs in groundwater samples were above the ROD cleanup levels. Therefore, compliance with cleanup levels cannot be assessed for many COCs, primarily volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Laboratory reporting limits for the 2019 and 2022 samples were generally lower than reporting limits in the 2018 samples but there were still reporting limits that could not meet the ROD cleanup levels. Reporting limits for COCs in the potable well samples generally met or were lower than ROD cleanup levels.

- 1,4-Dioxane in groundwater, although not a ROD COC, exceeded 46 µg/L, or 10^{-4} cancer risk, in a site monitoring well (MW-101S) but did not exceed the cancer risk range in other wells. 1,4-Dioxane was also detected in surface water samples but the detected concentrations of 1,4-dioxane fall within EPA's risk management range, although reporting limits for 1,4-dioxane exceeded the RSLs in 2019.
- Per- and polyfluoroalkyl substances (PFAS) in groundwater, although not a ROD COC, exceeded EPA RSLs in groundwater monitoring wells across the Site (Table E-1, Appendix E). PFAS was also detected in seep and surface water samples. The extent of PFAS contamination is not fully delineated.
- Sediment sampling results from 2022 do not suggest site-related impacts above ecological screening criteria.
- Except for lead, site COCs were not detected above ROD cleanup levels in private drinking water well samples. The detected lead concentrations (3.7 µg/L to 8.3 µg/L) in the private well samples were below the current drinking water standard (MCL) of 15 µg/L but exceed the site background of 3 µg/L, which is the site cleanup goal. Perfluorooctane sulfonate (PFOS) exceeded the EPA RSL based on noncancer hazard quotient (HQ) of 0.1 but was below the RSL based on an HQ of 1 in two drinking water well samples.

More information on the data review is below.

Groundwater

The previous FYR determined that the interpreted overburden and bedrock groundwater flow direction is north and northeast, toward the Farmington River. Updated potentiometric surface maps were not available for this FYR, as they were not included in the 2019 or 2022 sampling reports. RRDD #1 samples groundwater from overburden and bedrock monitoring wells annually (Table 7). Figure 3 and Figure E-1 in Appendix E show the well locations.

Table 7: Summary of Monitoring Wells for Long-Term Monitoring

Well Location	Overburden	Shallow Bedrock	Intermediate Bedrock
Within landfill	MW-1S		
Northern edge of landfill	MW-106S		
Immediately downgradient of landfill	MW-101S	MW-101B	
	MW-4S	MW-4R	
	S-3		
Downgradient of landfill	MW-5S	MW-5B	
	MW-102S	MW-102B	
	MW-103S	MW-103B	
	MW-104S	MW-104B	
Further downgradient of landfill (West of Hartford Road)	MW-108S		
	MW-120S	MW-120B	
Furthest downgradient of landfill (East of Hartford Road)	MW-111S	MW-111B	MW-111I
Background well (south of landfill)	MW-113S	MW-113B	
Side-gradient of landfill (east)	MW-115S		
Source: Monitoring Program for Compliance with Groundwater Remedial Action Objectives and Proposed Monitoring Plan Revision. Prepared by Arcadis. Table 2. October 2017.			

Most well samples were analyzed for select inorganic compounds, VOCs, SVOCs, ammonia, alkalinity, total dissolved solids, pH and hardness with several exceptions. In 2022, EPA also provided sampling containers to collect samples from 10 wells for PFAS analysis at an EPA laboratory.

Based on a comparison of the 2017 updated monitoring schedule and the data included in the 2022 Sampling Report, there were several deviations from the proposed sampling program. For example, the 2017 updated monitoring schedule included SVOC analysis for well MW-4S, but the 2022 Sampling Report does not present the results for SVOC analysis for this well (as noted previously, EPA did not approve removal of SVOCs from

the sampling program). In addition, total metals analysis was part of the 2017 sampling schedule for many wells, but the 2019 and 2022 samples were analyzed for only select inorganics (e.g., arsenic, manganese). The 2022 Sampling Report does not discuss the deviations from the sampling program. In addition, this data review also found several reporting errors in the summary tables of the 2022 Sampling Report when compared to the data in the associated laboratory reports. For example, Table 1 of the 2022 Sampling Report notes that, in 2019, manganese was detected in background well MW-113S at a concentration of 6.6 milligrams per liter (6,600 µg/L), which would exceed the ROD cleanup level (50 µg/L). However, the laboratory analytical report indicates that the manganese result was 6.6 µg/L, which is below the ROD cleanup level. Therefore, this FYR focused on the data in the laboratory reports.

A cursory review of the 2018 data shows that many analytes were below detection with high reporting limits that exceed the ROD cleanup levels. For example, reporting limits for VOCs ranged from <1 µg/L to <25 µg/L while reporting limits for SVOCs ranged from <25 µg/L to <750 µg/L. Laboratory reporting limits for the 2019 and 2022 sampling were much lower overall. Thus, the focus of this review is on the 2019 and 2022 data.

Overburden Groundwater

A review of the 2019 and 2022 data shows that five site COCs (arsenic, toluene, manganese, benzene and 2,4-dimethylphenol) were detected above the ROD cleanup levels in overburden groundwater (Table 8). Except for manganese, all the exceedances occurred in wells within or immediately downgradient of the landfill. Detected concentrations were similar to, or lower than, the maximum concentrations reported in Table 4-2 of the 2018 FYR Report. The 2017 maximum manganese concentration reported in the 2018 FYR Report was 4,400 µg/L (S-3) compared to the 2022 maximum concentration of 3,900 µg/L (MW-5S). Overall, most VOCs and SVOCs were not detected, or were detected sporadically at low concentrations (<2.0 µg/L), in the overburden groundwater samples. Based on the decreasing concentrations since the 2018 FYR, natural attenuation appears to be occurring.

Laboratory reporting limits for several COCs (primarily SVOCs and VOCs) exceeded the Site's cleanup levels in some samples in 2019 and 2022. For example, bis(2-ethylhexyl)phthalate was not detected at a reporting limit of 9.8 µg/L, but the cleanup level for bis(2-ethylhexyl)phthalate is <2 µg/L. Other COCs with reporting limits above the cleanup levels included, but are not limited to, acetone, benzene, dibromochloromethane, chloroform, chloromethane, 1,2-dichloroethane, 1,2-dichloropropane, toluene and trichloroethylene (TCE). Therefore, it is difficult to determine contaminant trends over time and compliance with ROD cleanup levels for these constituents.

For those COCs detected, concentrations remain relatively low with the only significant exceedances observed for manganese; detected manganese concentrations were two orders of magnitude greater than the cleanup level of 50 µg/L in some samples (Table 8). Except for manganese in MW-104S, COCs with concentrations above ROD cleanup levels are within the areas subject to ELURs where groundwater use is prohibited (Figure 2 and Figure E-1, Appendix E).

Table 8: ROD Cleanup Level Exceedances for COCs in Overburden Groundwater, 2019 and 2022

Well Location	Overburden Well	COCs Detected Above ROD Cleanup levels			
		COC	Cleanup Level (µg/L)	2019	2022
Within landfill	MW-1S[a]	Arsenic	5	6.6	BRL/BCL
		Toluene	<0.5	0.77	<1
		Manganese	50	62	70
Immediately downgradient of landfill	MW-101S	Benzene	<0.5	2	<1.0
		Toluene	<0.5	2.0	<2.0
		2,4-Dimethylphenol	<10	64	BRL/BCL
		Arsenic	5	8.8	5.8
		Manganese	50	140	160
	MW-4S	Benzene	<0.5	1.1	0.98
		Arsenic	5	NT	8.4
		Manganese	50	NT	1,900
	S-3	Benzene	<0.5	0.58	3.0
		Manganese	50	2,900	3,200
Downgradient of landfill	MW-5S	Manganese	50	370	3,900
	MW-102S	Manganese	50	NT	360
	MW-103S	Manganese	50	1,000	490
	MW-104S	Manganese	50	BRL/BCL	110
Further downgradient of landfill (West of Hartford Road)	MW-120S	Manganese	50	85	170
Side-gradient of landfill	MW-115S	Manganese	50	130	BRL/BCL

Notes:
a. MW-1S is located within the limits of the landfill and is therefore not required to meet the ROD cleanup levels.
BRL/BCL = below reporting limit or below cleanup level
NT = not tested
Sources: Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report and Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

Although not a ROD COC, EPA also analyzed select overburden groundwater samples for PFAS in 2022. A number of PFAS were detected including: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorobutanoic acid (PFBA), perfluorobutanesulfonic acid (PFBS), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonate (PFHxS). PFOA had the highest detections and both PFOA and PFOS exceeded RSLs. Table E-1 in Appendix E summarizes the 2022 PFAS data for groundwater. The highest PFOA concentration was observed in the well within the landfill (MW-1S) with a concentration of 270 nanograms per liter (ng/L), which exceeds the EPA RSL of 6 ng/L (based on an HQ of 0.1). The concentrations of PFOA decreased with distance downgradient of the landfill. The next highest concentration downgradient of MW-1S is in well MW-101S, which had a PFOA concentration of 230 ng/L. The furthest downgradient well east of New Hartford Road (MW-111S) had a concentration of 23 ng/L, which still exceeds the RSL for PFOA. The extent of PFAS contamination in this area is not delineated. An ELUR restricting use of groundwater is in place for the landfill property and the property east of New Hartford Road.

Several overburden groundwater samples were also analyzed for 1,4-dioxane in 2022, based on a recommendation in the 2018 FYR Report. The highest concentration of 71 µg/L was observed in MW-101S, which is immediately downgradient of the landfill. The detected concentration in MW-101S was higher than the concentration within the landfill at MW-1S (29 µg/L). The furthest downgradient well (MW-111S) had a much lower 1,4-dioxane concentration (2 µg/L). The highest concentration on site exceeds the RSL of 46 µg/L, which is equivalent to EPA's upper bound of the risk management range (10^{-4} cancer risk). However, 1,4-dioxane concentrations further downgradient of the landfill are within the cancer risk range of 10^{-6} to 10^{-4} of 0.46 µg/L to 46 µg/L, respectively.

Bedrock Groundwater

A review of the 2019 and 2022 data shows that three site COCs (benzene, manganese and toluene) were detected above the ROD cleanup levels in bedrock groundwater (Table 9). Except for toluene, the detected concentrations were similar to, or lower than, the maximum concentrations reported in Table 4-3 of the 2018 FYR Report. Toluene was detected in background well MW-113B at a concentration of 1,600 µg/L in 2022, compared to the ROD cleanup level of <0.5 µg/L. Toluene was not detected in MW-113B in 2019. Further evaluation is needed to confirm the toluene concentration and if confirmed, determine if the increase in toluene concentrations in background well MW-113B is related to the Site or an off-site source. MW-113B is located near the bulk material storage area for the recycling center (Figure E-1, Appendix E). Toluene was not detected in the overburden well at this location (MW-113S) in 2019 and 2022 (reporting limits of 1 µg/L).

Similar to the overburden groundwater samples, laboratory reporting limits for several COCs (primarily SVOCs and VOCs) exceeded the Site's cleanup levels. Therefore, it is difficult to determine contaminant trends over time and compliance with Site's cleanup levels for some COCs. Except for manganese in MW-104B, COCs with concentrations above cleanup levels are within the areas subject to ELURs where groundwater use is prohibited.

Table 9: ROD Cleanup Level Exceedances for COCs in Bedrock Groundwater, 2019 and 2020

Well Location	Bedrock Well	COCs Above ROD Cleanup Levels			
		COC	Cleanup Level (µg/L)	2019	2022
Immediately downgradient of landfill	MW-101B	Manganese	50	2,900	2,100
	MW-4R	Benzene	<0.5	1.6	1.6
		Manganese	50	NT	1,900
Downgradient of landfill	MW-5B	Manganese	50	2,400	2,000
	MW-102B	Manganese	50	BRL/BCL	220
	MW-103B	Manganese	50	1,000	270
	MW-104B	Manganese	50	68	BRL/BCL
Further downgradient of landfill (West of Hartford Road)	MW-120B	Manganese	50	400	370
Background well	MW-113B	Toluene	<0.5	<1.0	1,600

Notes:
BRL/BCL = below reporting limit or below cleanup level
NT = not tested
Sources: Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report and Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

EPA also analyzed bedrock groundwater samples for PFAS in 2022. A number of PFAS, including PFBA, perfluoropentanoic acid (PFPeA), PFBS, PFHxA, PFHpA, PFHxS, PFNA, PFOA and PFOS, were detected in bedrock groundwater with PFOA having the highest detections. The highest PFOA concentration was observed in the well located immediately downgradient of the landfill (MW-4R) with a concentration of 210 ng/L and then 160 ng/L further downgradient in MW-5B. These PFOA concentrations exceed the PFOA RSL of 6 ng/L. The concentrations of PFOA decreased further downgradient of the landfill. The furthest downgradient wells east of New Hartford Road (MW-111B and MW-111I) showed PFOA concentrations of 110 ng/L and 130 ng/L, respectively, which both exceed the EPA RSL. Table E-1 in Appendix E presents the 2022 PFAS sampling results.

Several bedrock groundwater samples were also analyzed for 1,4-dioxane in 2022. The highest concentration of 27 µg/L was observed in MW-4R. The furthest downgradient wells, MW-111B and MW-111I, have lower concentrations of 15 µg/L and 17 µg/L, respectively. The detected concentrations in the bedrock groundwater are within EPA's RSLs associated with a risk management range of 10^{-6} to 10^{-4} of 0.46 µg/L to 46 µg/L, respectively.

Seeps

Three seep samples were collected at seep locations S1, S3 and S6 (Figure E-1, Appendix E). In 2019, a sample was not collected from the S1 seep location because the sampling location was dry, which is consistent with previous sampling conditions. Samples were collected from all seeps in 2022. Manganese, arsenic, or both, exceeded the ROD cleanup levels in the three seep samples (Table 10). Similar to the groundwater sampling results, 1,4-dioxane and PFAS were also detected in the seep samples above screening criteria (or reporting limits were above the screening criteria).

Table 10: COCs, 1,4-Dioxane and PFAS Detected in Seeps Above ROD Cleanup Levels or Screening Criteria, 2019 and 2022

Analyte	Units	ROD Cleanup Level or EPA RSL[a]	Adjacent to Landfill (S6)		Downgradient to Landfill (S3)		Further Downgradient to Landfill (S1)	
			2019	2022	2019	2022	2019	2022
Arsenic	µg/L	5	BRL/BCL	BRL/BCL	15	NA	NS	BRL/BCL
Manganese	µg/L	50	17	480	1,300	NA	NS	6,500
1,4-Dioxane	µg/L	0.46 – 46[a] (10^{-6} to 10^{-4} risk) (RSL)	<50	NA	<50	NA	NS	NA
PFOA	ng/L	6[a] (RSL)	NA	BRL/BCL	20	20	NS	20
PFOS	ng/L	4[a] (RSL)	NA	BRL/BCL	4.7	4.7	NS	BRL/BCL

Notes:
a. EPA's RSLs based on a noncancer HQ of 0.1 or EPA's risk management range.
BRL/BCL = below reporting limit or below cleanup level/screening criteria
NA = sample not analyzed for the specific parameter
NS = not sampled
Sources: Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report and Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

Surface Water

RRDD #1 collects three surface water samples if water is present from locations SW-3, SW-9 and SW-16 (Figure 3 and Figure E-1, Appendix E). In 2022, due to a drought, the Unnamed Brook was not consistently flowing, so sample SW-16 was collected in pooled water with minimal flow and no sample was available from SW-3. No cleanup levels for surface water were included in the ROD. To evaluate compliance with the ROD RAO for surface water, surface water results are compared to the National Recommended Water Quality Criteria (NRWQC). Because the baseline human health risk assessment did not identify any risks associated with exposure to surface water and sediment, the focus for monitoring was to ensure site-related contamination is protective of aquatic life.

There were no detections of VOCs or SVOCs in surface water samples in 2022. The only COCs detected were inorganic compounds. Non-COCs PFAS and 1,4-dioxane were also detected in the 2022 samples with all concentrations below ecological screening values for chronic exposure. Manganese exceeded its NRWQC for human health and also the chronic aquatic life screening level established by EPA Region 4. The highest concentrations in 2022 were observed in the surface water samples immediately adjacent to the landfill and slightly downgradient. These results are likely overestimated as the samples were collected at drought conditions where SW-3 was dry (no sample) and SW-16 was collected in pooled water with minimal flow. The 1996 ecological risk assessment noted that the average and maximum manganese surface water concentration was 522 µg/L and 2,485 µg/L, respectively. According to the 1996 ecological risk assessment, no screening levels were available for manganese; however, manganese was identified as a COC because it was detected in 20 or more samples at significant concentrations. The maximum manganese surface water concentration during this FYR period was 1,500 µg/L, which is lower than the maximum concentrations observed in the 1996 ecological risk assessment. Ongoing monitoring will determine if contaminant trends continue to decline or whether additional response action is warranted.

Human health screening value comparisons show that manganese concentrations exceeded its NRWQC for human health in samples adjacent to and downgradient of the landfill. Non-COC 1,4-dioxane was detected at

concentrations within EPA's risk management range, although reporting limits for 1,4-dioxane exceeded the RSLs in 2019. Also, the non-COCs PFOA and PFOS exceeded the human health screening levels (Table 11). The human health surface water screening levels assume the surface water is used as a drinking water source which is currently an incomplete exposure pathway at the Site for manganese and PFAS.

Table 11: Detected COCs, 1,4-Dioxane and PFAS in Surface Water Samples, 2019 and 2022

Analyte	Units	NRWQC[a]		Upgradient SW-3		Adjacent to Landfill SW-16		Downstream SW-9	
		Human Health	Aquatic Life (chronic)	2019	2022	2019	2022	2019	2022
Arsenic	µg/L	0.018-1.8 (10^{-6} to 10^{-4} risk)	150	<0.8	NS	<0.8	1.2	<1.0	<1.0
Chromium	µg/L	100 (MCL)[b]	74/11[d]	1.5	NS	0.8	1.7	1.2	<1.0
Lead	µg/L	15 (MCL)[b]	2.5	0.39	NS	<0.5	1.4	0.091	<0.5
Manganese	µg/L	50	93[e]	18	NS	**240**	**1,500**	**180**	**1,200**
1,4-Dioxane	µg/L	0.46 – 46[c] (10^{-6} to 10^{-4} risk)	22,000[e]	<50	NS	<50	41	<50	29
PFOA	ng/L	6[c]	307,000[f]	NA	NS	NA	420	NA	200
PFOS	ng/L	4[c]	22,000[f]	NA	NS	NA	11	NA	8.5

Notes:

a. Human health and aquatic values (freshwater) obtained from EPA's NRWQC located at: https://www.epa.gov/wqc (accessed April 24, 2023).
b. In the absence of a NRWQC, EPA's MCL was used for health-based screening purposes.
c. EPA's RSLs based on a noncancer HQ of 0.1 or EPA's risk management range.
d. Values presented for chromium III and chromium VI.
e. Ecological screening levels from EPA Region 4's March 2018 Update to Region 4 Ecological Risk Assessment Supplemental Guidance (https://www.epa.gov/sites/default/files/2018-03/documents/era_regional_supplemental_guidance_report-march-2018_update.pdf).
f. Ecological screening levels for freshwater aquatic life obtained from Table ES-3 in Derivation of PFAS Ecological Screening Values. M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel. Environmental Science Division, Argonne National Laboratory. September 2021.

NS – no sample collected.
NA – sample not analyzed for the specific parameter.
NE – not established.
Bold result indicates the concentration exceeds the aquatic life screening value.
Underlined result indicates the concentration or detection limit exceeds the human health screening value (at the upper end of the risk range).
Sources: Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report and Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

Sediment

RRDD #1 contractors collect three sediment samples in the same locations as the surface water samples. No cleanup levels for sediment were included in the ROD. To evaluate the compliance with the ROD RAOs, a comparison of the 2022 sediment analytical results was performed against EPA Region III's 2006 Biological Technical Assistance Group (BTAG) freshwater sediment screening benchmarks. None of the site COCs exceeded the benchmark criteria except for arsenic, manganese and lead in the upgradient sample, which suggests sediments do not currently represent an exposure medium of concern (Table 12). The sediment samples were not analyzed for PFAS or 1,4-dioxane.

Table 12: Detected COCs and 1,4-Dioxane and PFAS in Sediment Samples, 2022

Analyte	Units	BTAG Value Freshwater Sediment[a]	COC Concentration (2022)		
			Upgradient SW-3	Adjacent SW-16	Downstream SW-9
Arsenic	mg/kg	9.8	**13**	9.5	5.9
Chromium	mg/kg	43.4	29	16	14
Lead	mg/kg	35.8	**43**	6.8	9.3
Manganese	mg/kg	460	**3,200**	250	320

Notes:

a. EPA Region 3, 2006 BTAG values obtained at: https://www.epa.gov/sites/default/files/2015-09/documents/r3_btag_fw_sediment_benchmarks_8-06.pdf. BTAG values listed are the same as the Region 4 ecological screening levels in EPA Region 4's March 2018 Update to Region 4 Ecological Risk Assessment Supplemental Guidance (https://www.epa.gov/sites/default/files/2018-03/documents/era_regional_supplemental_guidance_report-march-2018_update.pdf).

mg/kg – milligrams per kilogram

Bold result indicates the concentration exceeds the screening criterion.

Source: Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

Drinking Water Wells

RRDD #1 contractors sampled drinking water from up to four private wells (DW-001, DW-002, DW-003 and DW-004 [also identified as the Garage Well]) near the Site in December 2018, November 2019 and July 2022 (Figure 2 shows the well locations). Samples collected in 2018 were analyzed for VOCs, SVOCs, metals and general chemistry parameters. Samples collected in 2019 and 2022 were analyzed for metals, 1,4-dioxane, drinking water organics and PFAS. The metals analysis in 2022 was limited to arsenic, manganese and mercury. All drinking water sample results were compared to both the ROD cleanup levels as well as federal MCLs. PFAS and 1,4-dioxane results were compared to EPA tap water RSLs since MCLs have not been established for these constituents.

VOCs, most SVOCs, drinking water organics and 1,4-dioxane were not detected above laboratory reporting limits in any of the drinking water samples. Reporting limits were generally lower than ROD cleanup levels. Some metals were detected in all drinking water samples in 2018 and 2019. Lead exceeded the ROD cleanup level of 3 µg/L, which is the site background concentration, in DW-001 and DW-002 at concentrations ranging from 3.7 µg/L to 8.3 µg/L. However, all detected lead concentrations are below the current MCL of 15 µg/L established under EPA's Safe Drinking Water Act. Samples were not analyzed for lead during the 2022 sampling event. Due to the exceedance of the background lead level, lead should be included for sample analysis to determine concentration trends and to determine if concentrations remain below the MCL.

No other metals were detected above the ROD cleanup levels or MCLs where established. The 2018 FYR Report previously noted that copper was detected historically above the MCL of 1,300 µg/L in drinking water samples. However, copper concentrations detected during the current FYR period were below the MCL.

Three PFAS constituents (perfluoroheptanoic acid (PFHpA), PFHxS and PFOS) were detected in three of the four drinking water wells (Table 13). There are no state or federal drinking water standards for PFAS. For screening purposes, PFAS detections were compared to the EPA tap water RSLs and the Connecticut Department of Health (CT DOH) action levels. PFOS was detected above the RSL and CT DOH action level in DW-001 in 2019 but it was not detected at the same location in 2022. PFOS was detected above the RSL in DW-003 in 2022. PFHxS was detected in DW-001 in 2019 below screening criteria. There are no screening values for PFHpA. All other PFAS constituents were below reporting limits (4 ng/L or lower) (Table E-3, Appendix E).

Table 13: Detected PFAS in Drinking Water Samples above RSLs, 2019 and 2022

PFAS	CT DPH Action Level[a] (ng/L)	EPA Tap Water RSL[b] (ng/L)	Garage Well		DW-001		DW-002		DW-003	
			2019	2022	2019	2022	2019	2022	2019	2022
PFHpA	NE	NE	<2.1	5.3	<2.0	<4.0	<2.1	<4.0	<2.0	8.9 B
PFHxS	49	40	<2.1	<4.0	8.9	<4.0	<2.1	<4.0	<2.0	<4.0
PFOS	10	4	<2.1	<4.0	***16***	<4.0	<2.1	<4.0	<2.0	**7.7**

Notes:

a. CT DPH action levels are from https://portal.ct.gov/DPH/Drinking-Water/DWS/Per--and-Polyfluoroalkyl-Substances (accessed 4/19/2023). The action levels are a not enforceable standards and would not be considered as an ARAR for the site.

b. EPA tap water RSLs, based on a target HQ of 0.1, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables (accessed 4/19/2023).

Bold result indicates the concentration exceeds the RSL.

Italics result indicates the concentration exceeds the CT DOH action level.

NE = RSL or action level not established.

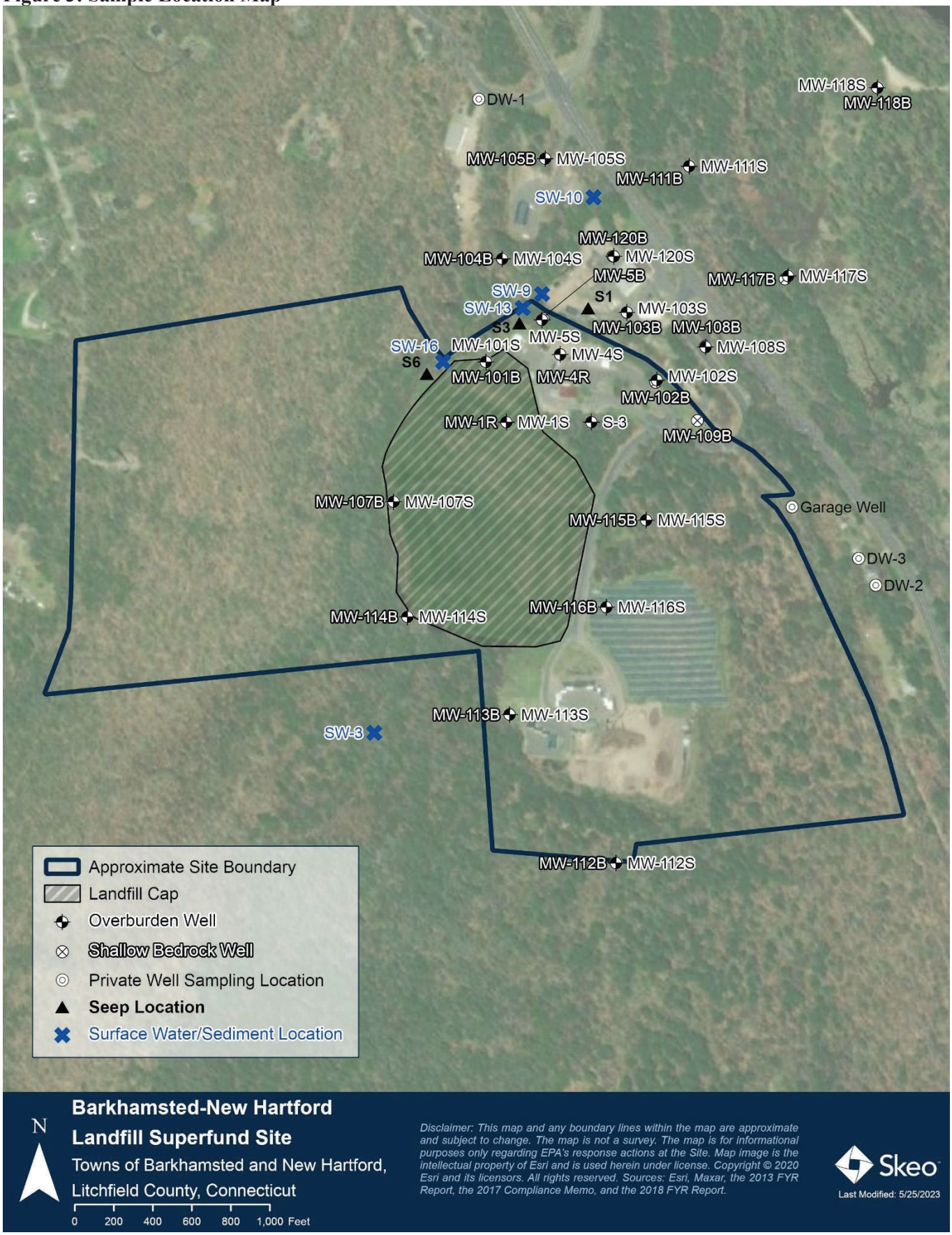
B = estimated value; PFHpA is associated with field reagent blank and/or lab blank. A low level of PFHpA was found in the field reagent blank and lab blanks.

Sources: Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report and Attachment C, Laboratory Analytical Reports, of the 2022 Sampling Report.

Site Inspection

The site inspection was conducted on 4/5/2023. In attendance were EPA RPM Almerinda Silva, Sheila Gleason from the CTDEEP, Hans Anderson and Rick Hazen from RRDD #1, and Jill Billus from EPA contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix F and Appendix G include the completed site inspection checklist and photographs from the site inspection, respectively. Site inspection participants observed the capped landfill and drainage features, the landfill perimeter fence, the gas vents, the location of the subsurface leachate collection tank, the Unnamed Brook and monitoring wells. The landfill cap has well-established grassy vegetation and was in good condition overall. No signs of significant erosion, settlement or slope instability were observed. Drainage features were mostly clear, with minor brush observed in the western drainage channel. One small burrow hole was observed on the southern slope of the landfill. The perimeter fence was in good condition. Several site monitoring wells (MW-101 cluster, MW-108S, MW-102S, MW-108 cluster) were found unsecured or in need of repairs. Iron staining was also observed in the downgradient part of the Unnamed Brook. The RRDD #1 representatives noted that the leachate tank is pumped about once a year. The most recent event occurred in March 2023, when about 5,500 gallons of leachate/water were transported off site for disposal.

Figure 3: Sample Location Map



V. TECHNICAL ASSESSMENT

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

Question A Summary:
Yes. The remedy is generally functioning as intended by the decision documents. The Site's long-term remedy selected in the 2001 ROD includes MNA, institutional controls and public education. The remedy was selected to address groundwater contamination remaining on site after the 1998 NTCRA addressed source material by capping the landfill and constructing a leachate collection system. Long-term monitoring began in 2003. Institutional controls in the form of ELURs were placed on several parcels on and downgradient of the landfill property in 2003 and 2004.

Remedial Action Performance
Natural attenuation of groundwater COCs is occurring but not as rapidly as anticipated in the 2001 ROD. The ROD originally anticipated meeting groundwater cleanup levels in overburden groundwater in 15.6 years and in bedrock groundwater in 6 years. The original time estimate in the ROD for groundwater concentrations to reach applicable cleanup levels was based only on two COCs (4-methylphenol and 2-butanone). These COCs have achieved applicable cleanup levels; however, it has become evident that attenuation rates for these COCs are not necessarily applicable to other COCs remaining in groundwater. The 2013 FYR identified an issue that achievement of the groundwater cleanup levels is not likely within the timeframe stated in the ROD. The 2013 FYR Report recommended that the MNA process be evaluated to ensure it remains ongoing and develop a revised estimate of time required to achieve cleanup levels. The 2018 FYR addressed this issue based on an MNA analysis completed by the contractor for RRDD #1 in 2016. The MNA analysis determined that attainment of groundwater cleanup levels, for some COCs (primarily inorganic and frequently naturally occurring metals) may take 100 years or more for some COCs until the organic contaminant mass in the landfill has been exhausted, and groundwater geochemistry becomes more oxidative.

COCs detected above ROD groundwater cleanup levels during this FYR period include arsenic, toluene, manganese, 2,4-dimethylphenol and benzene. Except for manganese in multiple wells and a 2022 detection of toluene in a background well, all exceedances occurred in wells within or immediately downgradient of the landfill. Manganese is detected most often above its cleanup level and at the highest concentrations. However, COC concentrations are generally consistent with, or lower than, detected concentrations reported in the 2018 FYR Report. Manganese has also been detected in surface water of the Unnamed Brook above the human health based NRWQC, although exposures are not expected to occur due to limited access to the Unnamed Brook and the brook is not a source of drinking water. Laboratory reporting limits for some COCs, mostly VOCs and SVOCs, exceeded the groundwater cleanup levels established in the 2001 ROD, which are based on background concentrations per Connecticut RSRs.

In response to a recommendation in the 2018 FYR Report, groundwater, seep and surface water samples were analyzed for 1,4-dioxane and PFAS during this FYR period to determine if these emerging contaminants are associated with the Site. 1,4-Dioxane and two PFASs (PFOA and PFOS) were detected in samples from overburden and bedrock monitoring wells at concentrations above EPA RSLs. Concentrations generally decrease with distance from the landfill. PFOA and PFOS were also detected in seep and surface water samples at concentrations above human health-based screening levels but below ecological screening values (ESVs) for aquatic life. Surface water at the Site is not currently used as a drinking water source. The primary concern in surface water is protection of aquatic life.

RRDD #1 contractors collected samples from four nearby drinking water wells in 2018, 2019 and 2022 (Figure 2). Lead exceeded the ROD cleanup level of 3 µg/L in two wells. The maximum detected lead concentration (8.3 µg/L) is below the current MCL of 15 µg/L. No other constituents were detected above the ROD cleanup levels or MCLs, where established. Three PFAS constituents (PFHpA, PFHxS and PFOS) were detected in three of the four drinking water wells in 2022 (Table 13). PFOS, which does not have an MCL, was detected above its EPA RSL based on an HQ of 0.1 (4 ng/L) but below the EPA RSL based on an HQ of 1 (40 ng/L) in DW-003 in 2022. There are no screening values for PFHpA. The detected concentration of PFHxS was below the EPA RSL. All

other PFAS constituents were below laboratory reporting limits (4 ng/L or lower) in the drinking water samples. Monitoring of the drinking water wells for Site COCs and PFAS should continue.

System Operations/O&M

RRDD #1 is responsible for O&M and long-term monitoring activities at the Site. The Site's 2001 O&M Plan required routine inspections and maintenance of the landfill, leachate removal, and performance of a groundwater and surface water monitoring program. Although RRDD #1 has been performing O&M activities for the landfill, they have not been submitting records of the activities performed to CTDEEP, as required by the Site's 2001 O&M Plan. RRDD #1 also has not been submitting monthly progress reports to EPA and CTDEEP, as required by the 2003 Consent Decree. In addition, there appear to be multiple deviations from the long-term monitoring approach outlined in the October 2017 Monitoring Program for Compliance with Groundwater Remedial Action Objectives and Proposed Monitoring Plan Revision and the sampling program that was implemented between 2018 to 2022. Multiple reporting errors were also found in the 2022 Sampling Report's summary tables when compared to the original data in the laboratory analytical reports. In addition, laboratory reporting limits for some COCs continue to exceed groundwater cleanup levels.

Implementation of Institutional Controls and Other Measures

Institutional controls in the form of ELURs were implemented at the Site and downgradient properties in 2003 and 2004. The ELURs are effective at limiting human exposure to affected groundwater, soil, sediment and waste at the landfill property and downgradient properties. Manganese concentrations in monitoring wells MW-104S and MW-104B exceeded the manganese cleanup level based on site background. Both wells are outside the area subject to the ELURs (Figure 2). Additional institutional controls may be needed to restrict groundwater use in the affected areas.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Question B Summary:

No. There have been changes to exposure assumptions, toxicity values and methods of evaluating risk since the Site's 2001 ROD was issued, as discussed below. Since remedy selection, emerging contaminants 1,4-dioxane and PFAS have been detected in groundwater at the Site above EPA's RSLs. The changes described below are not expected to alter the current protectiveness of the remedy because groundwater at the Site is not in use, and institutional controls are in place and prevent future exposures to contaminated groundwater at the Site effectively. Nearby private wells were tested for 1,4-dioxane and it was not detected. PFOS was detected in two private wells above the RSL based on an HQ of 0.1 (4 ng/L) but below the RSL based on an HQ of 1 (40 ng/L). The private wells should be sampled quarterly for PFAS. More evaluation of 1,4-dioxane and PFAS in other site media will also be considered.

Changes in Standards and To Be Considered Criteria (TBCs)

New standards (federal or state statutes and/or regulations), as well as new TBC guidance, should be considered during the FYR process as part of the protectiveness determination. Under the NCP, if a new federal or state statute and/or regulation is promulgated or a new TBC guidance is issued after the ROD is signed, and, as part of the FYR process it is determined that the standard needs to be attained or new guidance procedures followed to ensure that the remedy is protective of human health and the environment, then the FYR should recommend that a future decision document be issued that adds the new standard as an ARAR or guidance as a TBC to the remedy.

EPA guidance states:

> "Subsequent to the initiation of the remedial action new standards based on new scientific information or awareness may be developed and these standards may differ from the cleanup standards on which the remedy was based. These new…[standards] should be considered as part of the review conducted at least every five years under CERCLA §121(c) for sites where hazardous substances remain on-site. The review requires EPA to assure that human health and the environment are being protected by the remedial action. Therefore, the remedy should be examined in light of any new standards that would be applicable or relevant and appropriate

> to the circumstances at the site or pertinent new [standards], in order to ensure that the remedy is still protective. In certain situations, new standards or the information on which they are based may indicate that the site presents a significant threat to health or environment. If such information comes to light at times other than at the five-year reviews, the necessity of acting to modify the remedy should be considered at such times." (See CERCLA Compliance with Other Laws Manual: Interim Final (Part 1) EPA/540/G-89/006 August 1988, pp. 1-56.)

The Site's groundwater cleanup levels presented in the 2001 ROD remain valid. The ROD established background concentrations as groundwater cleanup levels for the Site, per Connecticut RSRs, Section 22a-133k-3(a). The Site's ARARs also include the Safe Drinking Water Act MCLs and non-zero MCLGs, Connecticut Water Quality Standards and Connecticut Standards for Quality and Adequacy of Public Drinking Water. Each of the background concentrations selected as groundwater cleanup levels is less than or equal to the MCLs/MCLGs (Table H-1, Appendix H). Use of background concentrations below both risk-based goals and analytical reporting limits is a conservative approach and may not be achievable.

Per- and Polyfluoroalkyl Substances (PFAS) (Federal)
In May 2022, EPA issued updated noncancer reference dose (RfD) values for several PFAS compounds, which result in the following RSLs at HQ target 0.1:

- PFOA: 6 ng/L (equivalent to parts per trillion [ppt])
- PFOS: 4 ng/L
- PFNA: 6 ng/L
- PFHxS: 40 ng/L
- Hexafluoropropylene oxide dimer acid (HFPO-DA) (Gen-X): 6 ng/L

The RfD values for PFOA, PFOS, PFNA and PFHxS are based on Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) for ingestion exposure.

The RfD value for HFPO-DA (Gen-X) is based on a chronic oral RfD from EPA Office of Water, which is 3E-06.

In May 2021, EPA issued an updated noncancer RfD for PFBS. PFBS has a chronic oral RfD of 3E-04. The RSL for PFBS is 600 ng/L.

In December 2022, EPA released a new oral RfD of 1.0E-03 milligrams per kilogram per day (mg/kg-day) for PFBA based on a new Integrated Risk Information System (IRIS) value. Previously, no RfD was available for PFBA. The RSL for PFBA is 1,800 ng/L.

In April 2023, EPA released a new oral RfD of 5.0E-04 mg/kg-day for PFHxA based on a new IRIS value. Previously no RfD was available for PFHxA. The RSL for PFHxA is 990 ng/L.

PFAS (State)
Connecticut has not promulgated drinking water or groundwater standards for PFAS. In June 2022, Connecticut Department of Public Health (CT DPH) updated its guidances on drinking water action levels for four PFAS compounds: PFOA (16 ppt), PFOS (10 ppt), PFNA (12 ppt) and PFHxS (49 ppt).

PFAS (Summary)
For purposes of this FYR, EPA has evaluated the PFAS data collected against EPA's RSLs for PFAS. As shown in the Data Review section of this FYR Report, PFOA and PFOS were detected in groundwater above EPA's RSLs in 2022. The maximum detected concentration of PFOA in groundwater was 270 ng/L (MW-1S) and the maximum detected concentration of PFOS in groundwater was 12 ng/L (MW-1S). PFOS was also detected above the EPA RSL (4 ng/L) at two drinking water wells (DW-001 and DW-003) at concentrations of 16 ng/L and 7.7 ng/L during this FYR period. Although the detected concentrations in the drinking water wells exceed EPA's RSL based on HQ of 0.1 (4 ng/L), they do not exceed EPA's RSL based on a HQ of 1 (40 ng/L). PFOA and PFOS

were also detected in surface water and seep samples above EPA's human health RSLs but below ESVs protective of aquatic life.

Several PFAS compounds were detected in groundwater to include PFOA, PFOS, PFNA, PFBA, PFBS, PFHxA, PFHxS. Two of the detected PFAS, PFOA and PFOS, exceeded health-based screening levels. The remedy remains protective because groundwater at the Site is not in use, and institutional controls are in place and prevent future exposures to contaminated groundwater at the Site effectively. Nearby private wells were tested for PFAS. PFOS was detected in two private wells above the RSL based on an HQ of 0.1 (4 ng/L) but below the RSL based on HQ of 1 (40 ng/L). The private wells should be sampled yearly for PFAS. More evaluation of 1,4-dioxane and PFAS in other site media should also be considered.

1,4-Dioxane (Federal)
Using 2013 updated IRIS toxicity information and the standard Superfund risk assessment approach, EPA's carcinogenic risk range of 10^{-6} to 10^{-4} for 1,4-dioxane equates to a concentration range of 0.46 µg/L to 46 µg/L (parts per billion, or ppb).

1,4-Dioxane (State)
Connecticut has not promulgated drinking water or groundwater standards for 1,4-dioxane. In 2011, CT DPH issued a drinking water action level of 3 µg/L for 1,4-dioxane.

1,4-Dioxane (Summary)
As shown in the Data Review section of this FYR Report, 1,4-dioxane was detected in site groundwater. The maximum detected 1,4-dioxane concentration in 2022 was 71 µg/L in MW-101S, which exceeds the upper bound of the carcinogenic risk range at 46 µg/L.

Although there are exceedances of 1,4-dioxane in groundwater, the remedy remains protective because 1,4-dioxane was not detected in nearby drinking water well samples (laboratory reporting limit of 0.2 µg/L) and institutional controls are in place to restrict use of groundwater at the Site and downgradient properties.

Changes in Toxicity and Other Contaminant Characteristics

2023 PFHxA Noncancer Toxicity Value
In April 2023, EPA released a new oral RfD of 5.0E-04 mg/kg-day for PFHxA based on a new IRIS value. Previously no RfD was available for PFHxA.

PFHxA has been detected in site groundwater at concentrations up to 53 ng/L (MW-101S and MW-1S), which are below the RSL of 990 ng/L. However, it is not expected to affect protectiveness of the remedy because groundwater at the Site is not in use, and institutional controls are in place and effectively prevent future exposures to contaminated groundwater at the Site. In addition, PFHxA was not detected in nearby drinking water wells (reporting limits 2 ng/L to 4 ng/L).

2022 cis-1,2-Dichloroethylene (cis-1,2-DCE) Noncancer Toxicity Value
In October 2022, EPA released a noncancer reference concentration (RfC) of 4.00E-02 milligrams per cubic meter (mg/m^3) for cis-1,2-DCE, based on a provisional peer reviewed toxicity value (PPRTV) screening value. Previously, no RfC was available for cis-1,2-DCE.

Cis-1,2-DCE has been detected in site groundwater at a concentration of 0.6 µg/L in 2022 (MW-111B), which is below the EPA RSL of 25 µg/L (HQ of 1) and MCL of 70 µg/L. Therefore, the detection of cis-1,2-DCE does not affect protectiveness of the remedy.

2022 PFBA Noncancer Toxicity Value
In December 2022, EPA released a new oral RfD of 1.0E-03 mg/kg-day for PFBA based on a new IRIS value. Previously, no RfD was available for PFBA.

PFBA has been detected in site groundwater at concentrations up to 33 ng/L (MW-33 in 2022). Although PFBA was detected in groundwater, concentrations are below the RSL of 1,800 ng/L. Additionally, the remedy remains protective because groundwater at the Site is not in use, and institutional controls are in place and effectively prevent future exposures to contaminated groundwater at the Site. In addition, PFBA was not detected in four nearby drinking water wells.

2022 PFOA Noncancer Toxicity Value
In May 2022, EPA released an updated oral RfD of 3E-06 mg/kg-day for PFOA, based on the ATSDR MRL. The new value indicates that PFOA is more toxic from noncancer health effects and would result in an increased noncancer risk.

PFOA has been detected in site groundwater at concentrations up to 270 ng/L (MW-1S), which exceeds EPA's RSL of 6 ng/L. Although PFOA was detected in groundwater, the remedy remains protective because groundwater at the Site is not in use, and institutional controls are in place and effectively prevent future exposures to contaminated groundwater at the Site. In addition, PFOA was not detected in four nearby drinking water wells (reporting limits ranged from 2 ng/L to 4 ng/L).

2022 PFOS Noncancer Toxicity Value
In May 2022, EPA released an updated oral RfD of 2E-06 mg/kg-day for PFOS, based on the ATSDR MRL. The new value indicates that PFOS is more toxic from noncancer health effects and would result in an increased noncancer risk.

PFOS has been detected in site groundwater at concentrations up to 12 ng/L (MW-1S), which exceeds EPA's RSL of 4 ng/L. PFOS was also detected in two drinking water wells at concentrations of 16 ng/L and 7.7 ng/L. Although PFOS was detected in groundwater and drinking water, the remedy remains protective because groundwater at the Site is not in use, and institutional controls are in place and effectively prevent future exposures to contaminated groundwater at the Site. Although the detected concentrations in the drinking water wells exceed EPA's RSL based on HQ of 0.1 (4 ng/L), they do not exceed EPA's RSL based on a HQ of 1 (40 ng/L).

2022 PFNA Noncancer Toxicity Value
In May 2022, EPA released an oral RfD of 3E-06 mg/kg-day for PFNA, based on the ATSDR MRL. Previously, no RfD was available for PFNA.

PFNA has been detected in site groundwater at a concentration of 5.1 ng/L (MW-120B), which is below EPA's RSL of 6 ng/L. Therefore, the remedy remains protective with respect to PFNA.

2022 PFHxS Noncancer Toxicity Value
In May 2022, EPA released an oral RfD of 2.0E-05 mg/kg-day for PFHxS, based on the ATSDR MRL. Previously, no RfD was available for PFHxS.

PFHxS has been detected in site groundwater a concentration up to 25 ng/L (MW-1S), which is below the EPA RSL of 40 ng/L. It was also detected in drinking water well DW-001 in 2019 at a concentration of 8.9 ng/L, below the RSL. Therefore, the remedy remains protective with respect to PFHxS.

2021 PFBS Noncancer Toxicity Value
In May 2021, EPA released an oral RfD of 3E-04 mg/kg-day, based on an EPA PPRTV (USEPA, 2021a). The new value indicates that PFBS is more toxic from noncancer health effects and would result in an increased noncancer risk.

PFBS has been detected in site groundwater at a concentration up to 6.9 ng/L (MW-5S), which is below the EPA RSL of 600 ng/L. Therefore, the remedy remains protective with respect to PFBS.

2020 Trans-1,2-Dichloroethylene (Trans-1,2-DCE) Noncancer Toxicity Value
In November 2020, EPA finalized a new RfC for trans-1,2-DCE based on a new PPRTV. There previously was no RfC for trans-1,2-DCE.

In 2019 and 2022, groundwater samples were analyzed for trans-1,2-DCE, which was not detected (reporting limits were typically 2 µg/L or lower).

Lead in Soil Cleanups
EPA continues to examine the science around lead exposure. Updated scientific information indicates that adverse health effects are associated with blood lead levels (BLLs) at less than 10 micrograms per deciliter (µg/dL). Several studies have observed "clear evidence of cognitive function decrements in young children with mean or group BLLs between 2 and 8 µg/dL."

Based on this updated scientific information, EPA is including an evaluation of potential lead risks with a goal to limit exposure to residential and commercial soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have an estimated risk of no more than 5% of the population exceeding a 5 µg/dL BLL. This is based on evidence indicating cognitive impacts at BLLs below 10 µg/dL. A target BLL of 5 µg/dL reflects current scientific literature on lead toxicology and epidemiology that provides evidence that the adverse health effects of lead exposure do not have a threshold.

EPA's 2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56) provides updates on the default baseline blood lead concentration and default geometric standard deviation input parameters for the Adult Lead Methodology (ALM). These updates are based on the analysis of the National Health and Nutrition Examination Survey 2009-2014 data, with recommended updated values for baseline blood lead concentration being 0.6 µg/dL and geometric standard deviation being 1.8.

Using updated default Integrated Exposure Uptake Biokinetic Model and ALM parameters at a target BLL of 5 µg/dL, site-specific lead soil screening levels (SLs) of 200 parts per million (ppm) and 1,000 ppm are developed for residential and commercial/industrial exposures, respectively.

Given the ongoing review of information, the above SLs are considered in this FYR for informational purposes.

The baseline HHRA completed in 1995 indicated that the average lead concentration in soil at the Site prior to the NTCRA was 32 milligrams per kilogram (mg/kg); the maximum lead concentration was 144 mg/kg (Table 7.1 of the HHRA). Lead has not been detected at the Site at concentrations exceeding the SLs for residential and commercial/industrial exposures. In addition, there is an ELUR in place for the Site, which prevents future residential use of the Site. The update in the lead SLs does not affect protectiveness of the remedy.

Changes in Risk Assessment Methods
Changes in risk assessment methods have not changed since the previous FYR in a manner that would affect the protectiveness of the remedy.

Changes in Exposure Pathways
The human health exposure pathways considered in the 1995 HHRA performed during the RI included: (1) ingestion and dermal contact with soil and (2) ingestion and dermal contact with groundwater as drinking water.

Under a NTCRA, contaminated soils (landfill waste) located at the Site were identified as the primary source of contaminants. The NTCRA responded to the limits of waste as demonstrated visually in test pits/borings and the limits of the waste were capped. With the completion of the NTCRA cap and leachate collection system, all human health risks from soil were addressed. Potential inhalation of dust was not evaluated previously in the RI. The presence of the properly maintained cap precludes this exposure pathway.

The HHRA identified cancer risks and non-cancer health hazards at levels exceeding EPA and state risk management criteria based on residential exposures to groundwater as drinking water on site. Potential inhalation of volatiles during household water use was not evaluated previously in the RI. No one on site is currently exposed to contaminated groundwater. Nearby commercial and residential areas that use off-site wells for potable water are being monitored. VOCs have not been detected in the off-site potable wells.

2021 Development of the Ecological Screening Values (ESVs) for PFAS

ESVs have been developed to support screening-level ecological risk assessments sites where PFAS have been detected in soils and surface waters. The ESVs, developed for eight PFAS, represent PFAS concentrations in soil and surface water at or below which chronically exposed biota are not expected to be adversely affected and ecological risks or other impacts are unlikely.

The ESVs support the screening-level steps (steps 1 and 2 of eight steps) of EPA's Ecological Risk Assessment Guidance for Superfund and may be applied at sites undergoing investigation for the historic release or disposal of PFAS, to identify whether PFAS levels pose potential unacceptable ecological risks. Sites that have concentrations of PFAS that exceed ESVs may require further investigation in a baseline ecological risk assessment, which in turn may support risk-management decisions and actions to reduce risks. These ESVs are solely for use in conducting screening-level ecological risk assessments and are not recommended or intended for use as default cleanup values.

The ESVs were developed for the following media and receptors:

- Soils for invertebrates.
- Soils for plants.
- Soils for avian and mammalian wildlife.
- Surface water for freshwater and marine aquatic biota.
- Surface water for aquatic-dependent avian and mammalian wildlife.

The ESVs can be found in *Derivation of PFAS Ecological Screening Values* (M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel, Environmental Science Division, Argonne National Laboratory, September 2021). PFAS constituents have been detected in surface water samples collected from the Unnamed Brook. The highest detected concentration (PFOA at 420 ng/L in SW-16) is significantly below the PFOA ESV for aquatic receptors (307,000 ng/L). The PFOA ESV represents a Tier 1 value based on PFOA-specific final acute and chronic toxicity values from eight or more families of aquatic animals (e.g., fish, aquatic invertebrates such as insects, plankton, crustaceans). These values are then used to derive ESVs that represent maximum and continuous screening levels for the PFOA.

Vapor Intrusion

The vapor intrusion pathway was not evaluated in the HHRA. No occupied buildings currently exist on the landfill itself. Institutional controls are in place preventing construction of new buildings on the landfill cap area and future residential use of the landfill area as well as the surrounding RRDD #1-owned property. The only enclosed structures located on RRDD #1-owned property or downgradient of the landfill are the on-site office building of the recycling area and the Town Garage office. The nearest homes are cross-gradient from the Site. The 2008 FYR Report, 2013 FYR Report and the 2018 FYR Report evaluated the potential for vapor intrusion and concluded that the vapor intrusion pathway was not a concern. This FYR re-evaluates the potential for vapor intrusion to the on-site office building (commercial use scenario with institutional controls in place) and the downgradient Town Garage office (residential use scenario because no institutional controls restrict use of the property). Based on the evaluation of data from nearby overburden monitoring wells, vapor intrusion is not a concern at the Site at this time (Appendix I). However, if conditions change, the potential for vapor intrusion should be re-evaluated.

2018 EPA Vapor Intrusion Screening Level (VISL) Calculator
In February 2018, EPA launched an online VISL calculator, which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas and indoor air. The VISL calculator uses the same database as the RSLs for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. The User's Guide provides further details on how to use the VISL calculator: https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

As noted above, the potential for vapor intrusion was evaluated and found not to be a concern at this time (Appendix I).

Expected Progress Towards Meeting RAOs
The removal and remedial actions at this Site address the Site's RAOs through the landfill cap and leachate collection system, which when combined with ELURs, prevent contact with contaminated soil and groundwater and prevent migration of contamination.

As noted in Question A, although natural attenuation is reducing COC concentrations, the time to reach the cleanup levels along the compliance boundary (limits of the landfill) is longer than expected at the time of the ROD. The inorganic constituents, arsenic and manganese, will likely continue to remain above cleanup levels until the organic contaminant mass in the landfill has been exhausted, and groundwater geochemistry becomes more oxidative. The presence of emerging contaminants 1,4-dioxane and PFAS may affect the timeframe for cleanup, if it is determined these constituents are site related and there is an unacceptable risk.

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

The expected impacts of climate change in New England pose increasing risks to contaminated sites. Increases in air and water temperature, precipitation, flooding and periods of drought may result in altered fate and transport pathways and exposure assumptions, impaired aquatic habitats, dispersal of contaminants, damage to remediation related structures and ultimately, ineffective remedies. Increased frequency of extreme weather events may cause damage or releases at sites, impairing remedial efforts where remedies have not been adequately designed to protect against these risks.

The risks posed by climate change in New England are not expected to alter the protectiveness of the remedy at the Barkhamsted-New Hartford Landfill site because the Site is not in a 100-year or 500-year floodplain. Thus, there is a low risk of flooding, and the cap is robustly designed and constructed.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues and Recommendations Identified in the FYR:
None.

Issues and Recommendations Identified in the FYR:

OU(s): OU1	Issue Category: Operations and Maintenance			
	Issue: Although O&M of the landfill and leachate collection system are taking place, RRDD #1 has not been submitting required documentation of these activities to EPA and CTDEEP. In addition, progress reports required by the 2003 Consent Decree are not being submitted.			
	Recommendation: Submit O&M and progress reports to EPA and CTDEEP at the frequencies required by the 2001 O&M Plan and 2003 Consent Decree, or at a frequency as agreed to by EPA and CTDEEP.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	5/31/2024

OU(s): OU1	Issue Category: Monitoring			
	Issue: PFOS has been detected in two drinking water wells at concentrations that exceed RSLs based on a HQ of 0.1 but below RSLs based on a HQ of 1.			
	Recommendation: Continue to **s**ample active drinking water wells annually for PFAS to ensure concentrations do not result in an unacceptable human health risk.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	3/23/2024

OU(s): OU1	Issue Category: Monitoring			
	Issue: Laboratory reporting limits exceed groundwater cleanup levels for some COCs.			
	Recommendation: Evaluate selected analytical methods to ensure that the laboratory reporting limits meet the groundwater cleanup levels (i.e., background).			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2025

OU(s): OU1	Issue Category: Monitoring

	Issue: The 2018 FYR Report recommended that, for a period of one full year, the PRP collect quarterly samples from each of the drinking water wells for metals analysis. Only two rounds of quarterly data have been provided to EPA. Data from these events show that lead was detected above the ROD cleanup goal based on site background but below the MCL.			
	Recommendation: If one full year of quarterly data from the private wells are available, provide the data to EPA for evaluation. Alternatively, collect quarterly samples from the private wells for one full year for metals analysis, including lead, and submit the results to EPA.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	3/23/2024

Other Findings

In addition, the following are recommendations that were identified during the FYR but do not affect current or future protectiveness:

- Toluene concentrations increased significantly in a background well (MW-113B) between 2019 (<1.0 µg/L) and 2022 (1,600 µg/L). The concentration exceeds the ROD cleanup level for toluene (<0.5 µg/L). Continue monitoring MW-113B for toluene to confirm the detection and determine if the increase in toluene concentrations in the background well is site related or if a background evaluation needs to be performed.
- Several site monitoring wells (MW-101 cluster, MW-108S, MW-102S, MW-108 cluster) were found unsecured or in need of repairs during the FYR site inspection. Repair the wells as needed and ensure they are properly secured.
- Based on data collected in 2019 and 2022, manganese concentrations in monitoring wells MW-104S and MW-104B exceeded the ROD cleanup level of 50 µg/L. MW-104S and MW-104B are outside the areas subject to an ELUR (Figure 2). An evaluation should be done to determine whether this represents an unacceptable risk to these receptors and/or whether additional institutional controls may be needed to restrict groundwater use in the affected areas.
- The data presented in the summary tables of the 2022 Sampling Report included multiple errors when compared to the data presented in the analytical laboratory reports. Ensure all data are accurately presented in summary tables submitted to the agencies for review.
- Consider optimizing the long-term monitoring program at the Site, including reducing sampling frequency/required analyses at those well locations where it can be demonstrated that COC concentrations have met ROD cleanup levels for at least three consecutive years, as required by the ROD.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The Site's remedy currently protects human health and the environment because there are no current exposures to contaminated groundwater above risk-based levels of concern. The landfill cap prevents exposure to contaminated soil and sediment and limits generation of leachate. Long-term monitoring and O&M programs are in place. Institutional controls are in place and effective at preventing future exposures. For the remedy to be protective over the long term, the following actions need to be taken: • Submit O&M and progress reports to EPA and CTDEEP at the frequencies required by the 2001 O&M Plan and 2003 Consent Decree, or at a frequency as agreed to by EPA and CTDEEP. • Continue to **s**ample active drinking water wells annually for PFAS to ensure concentrations do not result in an unacceptable human health risk. • Evaluate selected analytical methods to ensure that the laboratory reporting limits meet the groundwater cleanup levels. • If one full year of quarterly data from the private wells are available, provide the data to EPA for evaluation. Alternatively, collect quarterly samples from the private wells for one full year for metals analysis, including lead, and submit the results to EPA.

VIII. NEXT REVIEW

The next FYR for the Barkhamsted New Hartford Landfill Superfund site is required five years from the completion date of this review.

APPENDIX A – REFERENCES

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APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
RRDD #1 received CTDEP soil waste permit #005-2L RRDD #1 purchased the site property from the town of Barkhamsted	1972
RRDD #1 began landfill operations at the Site	1974
CTDEP inspected the Site	1980
EPA conducted a preliminary assessment for the Site	1981
EPA listed the Site on the NPL	October 1989
CTDEP issued an order to RRDD #1 to investigate waste materials and determine extent of impact	1990
EPA issued an AOC to the PRPs to conduct an RI/FS	October 1991
RRDD #1 stopped accepting waste at the landfill	October 1993
PRPs completed an Engineering Evaluation/Cost Analysis for a NTCRA	April 1994
EPA entered into an enforcement agreement with CTDEP; CTDEP entered into a Consent Order with RRDD #1 requiring them to design and implement the NTCRA	September 1994
EPA prepared an Action Memorandum to document approval of the NTCRA	January 1996
PRPs completed the RI	February 1996
EPA and CTDEP executed an enforcement agreement to allow CTDEP to oversee the NTCRA; CTDEP and RRDD #1 subsequently entered into a Consent Order requiring RRDD #1 to design and implement the NTCRA	August 1996
PRPs completed the NTCRA	1998
PRPs completed the FS	June 2001
EPA issued the Site's ROD	September 2001
Contractors prepared the Site's O&M Plan, which includes a long-term monitoring plan	October 2001
RRDD #1 began long-term groundwater monitoring and residential well sampling	April/May 2003
EPA, CTDEEP and the PRPs entered into a Consent Decree requiring the PRPs to implement the remedial action	May 2003
RRDD #1 began long-term surface water and sediment sampling	June 2003
EPA issued the Site's first FYR Report	September 2003
Institutional controls as ELURs recorded for four properties	2003 to 2004
EPA issued the Site's second FYR Report	September 2008
The Site achieved the Sitewide Ready for Anticipated Reuse performance measure	March 22, 2010
EPA issued the Site's third FYR Report	September 2013
EPA issued the Site's fourth FYR Report	September 2018

News Releases: Region 01 <https://epa.gov/newsreleases/search/press_office/region-01-226161>

CONTACT US <https://epa.gov/newsreleases/forms/contact-us>

EPA to Review Cleanups at Four Connecticut Superfund Sites this Year

January 18, 2023

Contact Information
Mikayla Rumph (rumph.mikayla@epa.gov)
(617) 918-1016

BOSTON (Jan. 18, 2023) – The U.S. Environmental Protection Agency (EPA) will conduct comprehensive reviews of completed cleanup work at four National Priority List (NPL) Superfund sites in Connecticut this year.

The sites will undergo a legally required Five-Year Review to ensure that previous remediation efforts at the sites continue to protect public health and the environment.

"Throughout the process of designing and constructing a cleanup at a hazardous waste site, EPA's primary goal is to make sure the remedy will be protective of public health and the environment, especially for communities that have been overburdened by pollution, **said EPA New England Regional Administrator David W. Cash**. "It is important for EPA to regularly check on these sites to ensure the remedy is working properly and Connecticut communities continue to be protected."

The Superfund Sites where EPA will conduct Five-Year Reviews in 2023 are listed below with web links that provide detailed information on site status as well as past assessment and cleanup activity. Once the Five-Year Review is complete, its findings will be posted to the website in a final report.

Five-Year Reviews of Superfund sites in Connecticut to be completed in 2023:

Barkhamsted-New Hartford Landfill, Barkhamsted

Beacon Heights Landfill, Beacon Falls

Laurel Park, Inc., Naugatuck Borough

Yaworski Waste Lagoon, Canterbury

More information:
The Superfund program, a federal program established by Congress in 1980, investigates and cleans up the most complex, uncontrolled, or abandoned hazardous waste sites in the country and EPA endeavors to facilitate activities to return them to productive use. In total, there are 123 Superfund sites across New England.

Superfund and other cleanup sites in New England <https://epa.gov/superfund/search-superfund-sites-where-you-live>

EPA's Superfund program <https://epa.gov/superfund>

Contact Us <https://epa.gov/newsreleases/forms/contact-us> to ask a question, provide feedback, or report a problem.

LAST UPDATED ON JANUARY 18, 2023

APPENDIX D – INTERVIEW FORMS

BARKHAMSTED-NEW HARTFORD LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Barkhamsted-New Hartford Landfill	
EPA ID: CTD980732333	
Interviewer name: J. Billus	**Interviewer affiliation:** Skeo (EPA contractor)
Subject name: Sheila Gleason	**Subject affiliation:** CTDEEP
Subject contact information: sheila.gleason@ct.gov	
Interview date: 3/30/23	**Interview time:** Not applicable
Interview location: Not applicable	
Interview format (identify one): In Person Phone Mail **Email** Other:	
Interview category: State Agency	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   Excellent.

2. What is your assessment of the current performance of the remedy in place at the Site?

   Excellent.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   No.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

   No.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   No.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   Yes.

7. Are you aware of any changes in projected land use(s) at the Site?

   No.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

No.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes.

10. Who else would you recommend that we contact for an interview (i.e., individuals, groups or organizations)?

    None that I can think of.

BARKHAMSTED-NEW HARTFORD LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Barkhamsted-New Hartford Landfill	
EPA ID: CTD980732333	
Interviewer name: Aaron Shaheen	**Interviewer affiliation:** EPA
Subject name: Donald Stein	**Subject affiliation:** Town of Barkhamsted
Subject contact information: dstein@barkhamsted.us	
Interview date: 4/3/2023	**Interview time:** Not applicable
Interview location: Not applicable	
Interview format (identify one): In Person Phone Mail **Email** Other:	
Interview category: Local Government	

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes.

2. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   I am familiar with the activities at the site, but not the remedial progress. I generally hear nothing from the EPA.

3. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

4. Are you aware of any changes to state laws or local regulations that might affect the protectiveness of the Site's remedy?

   No.

5. Are you aware of any changes in projected land use(s) at the Site?

   No. The area that is on the Superfund listing is covered with a membrane and fenced off from the rest of the property.

6. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   I know of no communications regarding the site.

7. Do you have any comments, suggestions or recommendations regarding the project?

The EPA really doesn't do much with the Town. They may be more communicative with RRDD #1, which is a collaboration among 3 towns and whose property straddles two of those towns (Barkhamsted, New Hartford). RRDD #1 is essentially an independent entity whose Board is appointed by the towns.

8. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes.

9. Who else would you recommend that we contact for an interview (i.e., individuals, groups or organizations)?

   Dan Jerram – First Selectman, Town of New Hartford; Josh Kelly, Town Manager, Town of Winchester.

BARKHAMSTED-NEW HARTFORD LANDFILL SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Barkhamsted-New Hartford Landfill	
EPA ID: CTD980732333	
Interviewer name: J. Billus	**Interviewer affiliation:** Skeo (EPA contractor)
Subject name: Hans Andersen	**Subject affiliation:** Chairman
Interview date: April 11, 2023	**Interview time:** Not applicable
Interview location: Not applicable	
Interview format (identify one): In Person Phone Mail **Email** Other:	
Interview category: Potentially Responsible Party (PRP)	

1. What is your overall impression of the remedial activities at the Site?

   The only remedial activity currently being undertaken at the Site is periodic monitoring. Given the existence of the landfill cap and the generally favorable monitoring results over the past few years, I believe that the landfill remedy has proven effective and further monitoring should be substantially curtailed.

2. What have been the effects of this Site on the surrounding community, if any?

   The yearly monitoring costs have been a major strain on the finances of the landfill's member towns.

3. What is your assessment of the current performance of the remedy in place at the Site?

   The remedy has proven to be effective.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   The only complaints that have been heard are those related to the yearly costs associated with the monitoring program.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   Yes, we feel very well informed.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   The yearly monitoring should be substantially curtailed, and the Site's compliance boundary needs to be adjusted.

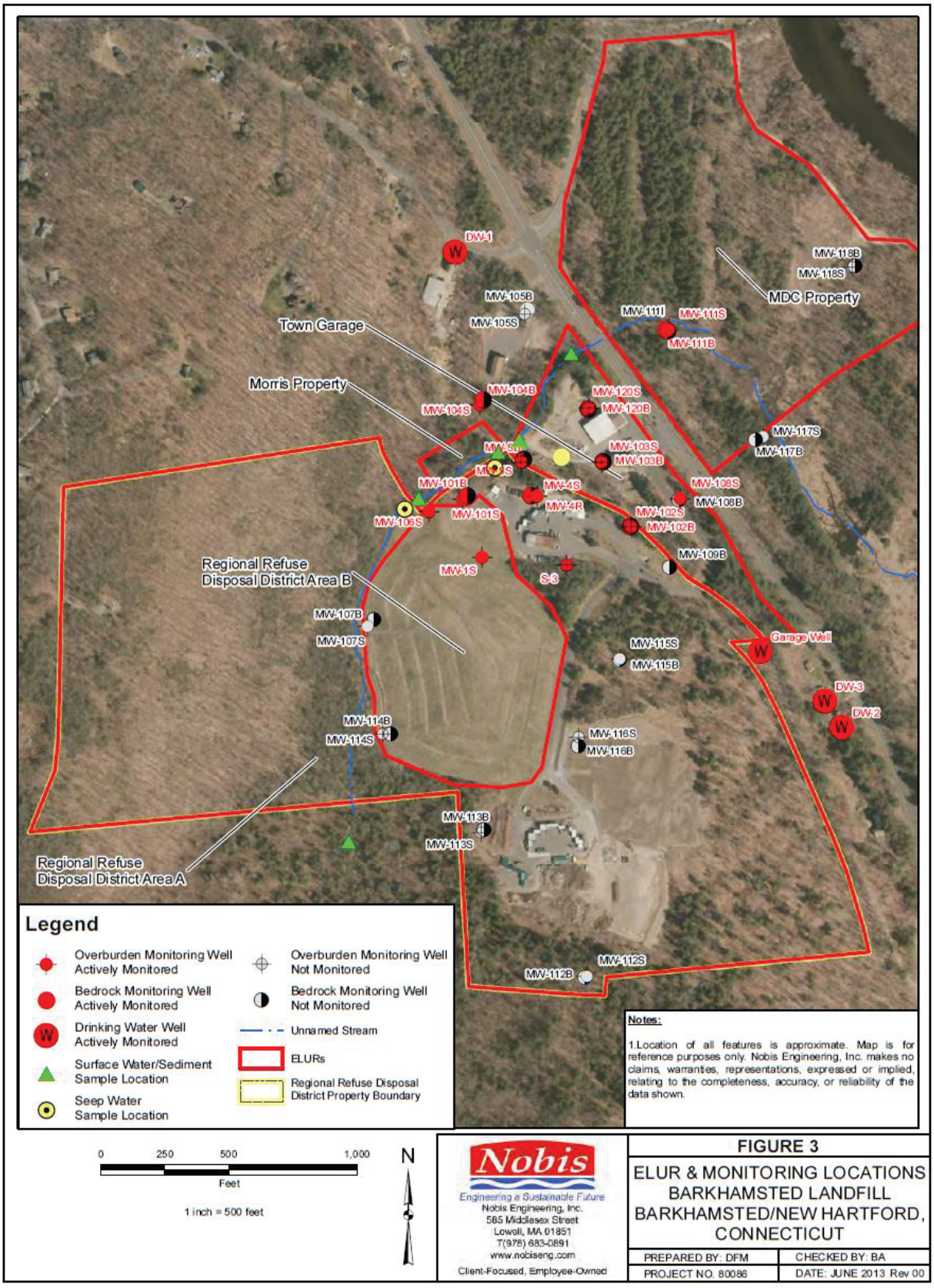
7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

   Yes.

8. Who else would you recommend that we contact for an interview (i.e., individuals, groups or organizations)?

   Not applicable.

Figure E-1: Monitoring Locations



Source: 2018 FYR Report.

Table E-1: Detected PFAS in Groundwater, 2022

PFAS	Units	EPA Tap Water RSL[a]	MW-120B	MW-120S	MW-115S	MW-104S	MW-103S	MW-103B
PFBA	ng/L	1,800	11	<4.0	<4.0	<4.0	9.0	6.8
Perfluoropentanoic acid (PFPeA)	ng/L	--	11	<4.0	<4.0	<4.0	7.1	9.5
PFBS	ng/L	600	<4.0	<4.0	<4.0	<4.0	5.1	4.2
PFHxA	ng/L	990	21	5.4	<4.0	<4.0	5.7	9.1
PFHpA	ng/L	--	12 B	7.7 B	5.5 B	47 B	<4.0	4.7 B
PFHxS	ng/L	40	7.9	<4.0	<4.0	<4.0	4.3	6.1
PFOA	ng/L	6	**46**	**18**	<4.0	<4.0	**7.3**	**15**
PFNA	ng/L	6	5.1	<4.0	<4.0	<4.0	<4.0	<4.0
PFOS	ng/L	4	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Perfluorodecanoic acid (PFDA)	ng/L	--	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0

PFAS	Units	EPA Tap Water RSL[a]	MW-104B	MW-5B	MW-5S	MW-101B	MW-101S	MW-106S
PFBA	ng/L	1,800	5.6	21	4.9	9.9	28 J	<4.0
PFPeA	ng/L	--	7.5	16	4.1	6.9	20 J	<4.0
PFBS	ng/L	600	<4.0	6.9	<4.0	<4.0	6.6	<4.0
PFHxA	ng/L	990	<4.0	42	<4.0	18	53	<4.0
PFHpA	ng/L	--	<4.0	19 B	<4.0	12 B	24 B	<4.0
PFHxS	ng/L	40	<4.0	12	<4.0	4.5	16	<4.0
PFOA	ng/L	6	<4.0	**160**	**6.9**	**61**	**230**	<4.0
PFNA	ng/L	6	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
PFOS	ng/L	4	<4.0	**6.3**	**4.7**	**4.6**	**6.3**	<4.0
PFDA	ng/L	--	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0

Notes:

a. EPA tap water RSLs based on HQ of 0.1 from the May 2023 RSLs, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Bold result or reporting limit exceeds RSL.

B = Estimated value; PFHpA is associated with field reagent blank and/or lab blank. A low level of PFHpA was found in the field reagent blank and lab blanks.

J = Estimated value

-- = RSL not available

Source: EPA Laboratory Services and Applied Sciences Division, Laboratory Report. July 28, 2022.

PFAS	Units	EPA Tap Water RSL[a]	MW-108S	MW-102B	MW-102S	MW-1S	MW-111S	MW-111B
PFBA	ng/L	1,800	<8.0	<8.0	<8.0	33 J	6.7	14
PFPeA	ng/L	--	<8.0	<8.0	<8.0	30 J	<4.0	12
PFBS	ng/L	600	<8.0	<8.0	<8.0	6.3 J	<4.0	<4.0
PFHxA	ng/L	990	<8.0	9.2	<8.0	53	6.6	24
PFHpA	ng/L	--	<8.0	<8.0	<8.0	23 B	27 B	11 B
PFHxS	ng/L	40	<8.0	<8.0	<8.0	25	<4.0	14
PFOA	ng/L	6	**<8.0**	**15**	**<8.0**	**270**	**23**	**110**
PFNA	ng/L	6	**<8.0**	**<8.0**	**<8.0**	**<8.0**	<4.0	<4.0
PFOS	ng/L	4	**<8.0**	**<8.0**	**<8.0**	**12**	<4.0	**5.6**
PFDA	ng/L	--	<8.0	<8.0	<8.0	<8.0	<4.0	<4.0

PFAS	Units	EPA Tap Water RSL[a]	MW-111I	MW-113S	MW-113B	MW-4S	MW-4R
PFBA	ng/L	1,800	16	<4.0	<4.0	15	23 J
PFPeA	ng/L	--	14	<4.0	<4.0	14	21 J
PFBS	ng/L	600	4.2	<4.0	<4.0	<4.0	5.8
PFHxA	ng/L	990	27	<4.0	<4.0	18	39
PFHpA	ng/L	--	16 B	13 B	<4.0	12 B	18 B
PFHxS	ng/L	40	17	<4.0	<4.0	11	19
PFOA	ng/L	6	**130**	<4.0	<4.0	**44**	**210**
PFNA	ng/L	6	<4.0	<4.0	<4.0	<4.0	<4.0
PFOS	ng/L	4	**7.5**	<4.0	<4.0	**6.6**	**8.5**
PFDA	ng/L	--	<4.0	<4.0	<4.0	<4.0	<4.0

Notes:

a. EPA tap water RSLs based on HQ of 0.1 from the May 2023 RSLs, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Bold result or reporting limit exceeds RSL.

B = estimated value; PFHpA is associated with field reagent blank and/or lab blank. A low level of PFHpA was found in the field reagent blank and lab blanks.

J = estimated value

-- = RSL not available

Source: EPA Laboratory Services and Applied Sciences Division, Laboratory Report. July 28, 2022.

Table E-2: Detected PFAS in Surface Water and Seeps, 2022

PFAS	Units	EPA Tap Water RSL[a]	ESV (Aquatic)[b]	Surface Water		Seeps		
				SW-9	SW-16	S1	S3	S6
PFBA	ng/L	1,800	--	23 J	37 J	7.1	8.0	17
PFPeA	ng/L	--	--	18 J	32 J	8.4	7.1	<4.0
PFBS	ng/L	600	400,000	4.8	6.8	<4.0	<4.0	<4.0
PFHxA	ng/L	990	--	39	66	13	11	<4.0
PFHpA	ng/L	--	--	22 B	51 B	8.7 B	10 B	10 B
PFHxS	ng/L	40	65,300	18	34	7.2	7.7	<4.0
PFOA	ng/L	6	307,000	**200**	**420**	20	20	<4.0
PFNA	ng/L	6	16,400	<4.0	<4.0	<4.0	<4.0	<4.0
PFOS	ng/L	4	22,600	**8.5**	**11**	<4.0	**4.7**	<4.0
PFDA	ng/L	--	--	<4.0	<4.0	<4.0	<4.0	<4.0

Notes:

a. EPA tap water RSLs based on HQ of 0.1 from the May 2023 RSLs, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

b. Aquatic ESVs obtained from Table ES-3 in Derivation of PFAS Ecological Screening Values. M. Grippo, J. Hayse, I. Hlohowskyj, and K. Picel. Environmental Science Division, Argonne National Laboratory. September 2021.

Bold result or reporting limit exceeds RSL or ESV

B = estimated value; PFHpA is associated with field reagent blank and/or lab blank. A low level of PFHpA was found in the field reagent blank and lab blanks.

J = estimated value

-- = screening criteria not available

Source: EPA Laboratory Services and Applied Sciences Division, Laboratory Report. July 28, 2022.

Table E-3: Detected PFAS in Drinking Water Samples, 2019 and 2022

PFAS	Units	CT DPH Action Levels[a]	EPA Tap Water RSL[b]	Garage Well (GW)		DW001		DW002		DW003	
				2019	2022	2019	2022	2019	2022	2019	2022
PFBA	ng/L	--	1,800	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFPeA	ng/L	--	--	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFBS	ng/L	--	600	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFHxA	ng/L	--	990	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFHpA	ng/L	--	--	<2.1	5.3 B	<2.0	<4.0	<2.1	<4.0	<2.0	8.9 B
PFHxS	ng/L	49	40	<2.1	<4.0	8.9	<4.0	<2.1	<4.0	<2.0	<4.0
PFOA	ng/L	16	6	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFNA	ng/L	12	6	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0
PFOS	ng/L	10	4	<2.1	<4.0	**16**	<4.0	<2.1	<4.0	<2.0	**7.7**
PFDA	ng/L	--	--	<2.1	<4.0	<2.0	<4.0	<2.1	<4.0	<2.0	<4.0

Notes:

a. CT DPH action levels from https://portal.ct.gov/DPH/Drinking-Water/DWS/Per--and-Polyfluoroalkyl-Substances.

b. EPA tap water RSLs based on HQ of 0.1 from the May 2023 RSLs, available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.

Bold result or reporting limit exceeds RSL or CT DPH

B = estimated value; PFHpA is associated with field reagent blank and/or lab blank. A low level of PFHpA was found in the field reagent blank and lab blanks.

-- = screening criteria not available

Sources: EPA Laboratory Services and Applied Sciences Division, Laboratory Report, July 28, 2022, and Attachment C, Laboratory Analytical Reports, of the 2019 Annual Technical Report.

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Barkhamsted-New Hartford Landfill	**Date of Inspection:** April 5, 2023
Location and Region: Barkhamsted, CT; Region 1	**EPA ID:** CTD980732333
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Cloudy, 40s

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment (NTCRA)
- ☒ Access controls (NTCRA)
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Rick Hazen, RRDD #1 (Name) Operations Supervisor (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: See Appendix D

2. **O&M Staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

4. **Other Interviews** (optional) ☐ Report attached: See Appendix D

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks: RRDD #1 has not been submitting maintenance logs to EPA and CTDEEP

2. **Site-Specific Health and Safety Plan** — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

3. **O&M and OSHA Training Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits: _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

7. **Groundwater Monitoring Records** — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks: _____

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: _____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☒ N/A

    Remarks: _____

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house — ☐ Contractor for state
   - ☒ PRP in-house — ☒ Contractor for PRP
   - ☐ Federal facility in-house — ☐ Contractor for Federal facility
   - ☐ _____

2. **O&M Cost Records**
   - ☐ Readily available — ☐ Up to date
   - ☒ Funding mechanism/agreement in place — ☐ Unavailable

   Original O&M cost estimate: _____ ☐ Breakdown attached

   Total annual cost by year for review period if available

   From: _____ (Date) To: _____ (Date) _____ (Total cost) ☐ Breakdown attached

   From: _____ (Date) To: _____ (Date) _____ (Total cost) ☐ Breakdown attached

   From: _____ (Date) To: _____ (Date) _____ (Total cost) ☐ Breakdown attached

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

From: _____ To: _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs during Review Period**
Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks: There is a gated entrance to the recycling center. A chainlink fence with locked gates surrounds the landfill.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A
Remarks: Warning signs on the landfill perimeter fence

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A
Type of monitoring (e.g., self-reporting, drive by): self-reporting
Frequency: _____
Responsible party/agency: _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Reporting is up to date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A
Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate* ☐ ICs are inadequate ☐ N/A
Remarks: Additional institutional controls may be needed for the parcel on which MW-104S/MW-104B are located; manganese concentrations exceed the ROD cleanup level in these wells.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks: _____

2. **Land Use Changes On Site** ☐ N/A
Remarks: None since previous FYR; the Site has a capped landfill, recycling center, solar array, cell tower (west of the landfill) and wooded areas

3. **Land Use Changes Off Site** ☐ N/A
Remarks: None since previous FYR

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: _____

B. Other Site Conditions

Remarks: The Unnamed Brook west and north of the Site was observed. It was flowing at the time of the inspection. Iron staining was observed on the downgradient part of the brook, north of the MW-101 well cluster.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
   Lengths: _____ Widths: _____ Depths: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Area extent: _____ Depth: _____
   Remarks: _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Area extent: _____ Depth: _____
   Remarks: small burrow hole observed on the southern part of cap

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established
   ☐ No signs of stress ☐ Trees/shrubs (indicate size and locations on a diagram)
   Remarks: _____

6. **Alternative Cover** (e.g., armored rock, concrete) ☒ N/A
   Remarks: _____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
   Area extent: _____ Height: _____
   Remarks: _____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

   ☐ Wet areas ☐ Location shown on site map Area extent: _____
   ☐ Ponding ☐ Location shown on site map Area extent: _____
   ☐ Seeps ☐ Location shown on site map Area extent: _____
   ☐ Soft subgrade ☐ Location shown on site map Area extent: _____
   Remarks: _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map
   ☒ No evidence of slope instability
   Area extent: _____
   Remarks: _____

B. Benches ☒ Applicable ☐ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☒ N/A or okay
   Remarks: _____

2. **Bench Breached** ☐ Location shown on site map ☒ N/A or okay
   Remarks: _____

3. **Bench Overtopped** ☐ Location shown on site map ☒ N/A or okay
   Remarks: _____

C. Letdown Channels ☒ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ No evidence of settlement
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation
   Material type:_____ Area extent: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ No evidence of erosion
   Area extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☒ No evidence of undercutting
Area extent: _____ Depth: _____
Remarks: _____

5. **Obstructions** Type: _____ ☒ No obstructions
☐ Location shown on site map Area extent: _____
Size: _____
Remarks: _____

6. **Excessive Vegetative Growth** Type: _____
☐ No evidence of excessive growth
☒ Vegetation in channels does not obstruct flow
☐ Location shown on site map Area extent: _____
Remarks: some brush observed in drainage channels

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☒ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☒ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A
Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
Remarks: _____

4. **Extraction Wells Leachate**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A
Remarks: Leachate is directed to a buried tank on the north side of the landfill. Leachate is shipped off site for disposal about once a year.

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

F. Cover Drainage Layer ☒ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☒ N/A
Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☒ N/A
Remarks: _____

G. Detention/Sedimentation Ponds ☒ Applicable (not observed during site inspection) ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A
☐ Siltation not evident
Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____
☐ Erosion not evident
Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks: _____

4. **Dam** ☐ Functioning ☒ N/A
Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement: _____ Vertical displacement: _____
Rotational displacement: _____
Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Area extent: _____ Depth: _____
Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Area extent: _____ Type: _____
Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Area extent: _____ Depth: _____
Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A
Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**
☐ Good condition ☐ Needs maintenance
Remarks: _____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**
☐ Good condition ☐ Needs maintenance
Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**
☐ Good condition ☐ Needs maintenance
Remarks: _____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks: _____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters: _____
☐ Additive (e.g., chelation agent, flocculent): _____
☐ Others: _____
☐ Good condition ☐ Needs maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____
☐ Quantity of surface water treated annually: _____
Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs maintenance
Remarks: _____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance
Remarks: _____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs maintenance
Remarks: _____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs maintenance ☐ N/A
Remarks: _____

D. Monitoring Data

1. **Monitoring Data**
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**
☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☐ Good condition
☐ All required wells located ☒ Needs maintenance ☐ N/A
Remarks: Several monitoring wells (MW-101 cluster, MW-102S, MW-108 cluster) were not secured; some had open locks while others were missing well caps. Damage was also observed at two of the wells in the MW-101 cluster. One of the wells was protruding above the protective casing, preventing the well lid from closing properly.

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).
The ROD selected MNA and institutional controls, public education and long-term monitoring as the Site's final remedy, after capping the landfill under a NTCRA. The landfill is in good condition but RRDD #1 has not been submitting O&M reports to the agencies. Some monitoring wells were not secured; others had missing well caps. Data show that natural attenuation is occurring but at a rate slower than anticipated in the ROD. Most COCs above cleanup levels remain within or immediately downgradient of the landfill, except for manganese. Manganese continues to exceed ROD cleanup levels across the Site. Emerging contaminants 1,4-dioxane and PFAS have also been detected at the Site. Institutional controls are in place and preventing exposures to unacceptable levels of contamination.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

	RRDD #1 has been conducting O&M activities at the landfill but not submitting maintenance records to EPA and CTDEEP.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None at this time.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. EPA, CTDEEP and RRDD #1 should explore optimizing the sampling program for the Site.

Site inspection participants:
Almerinda Silva, EPA
Sheila Gleason, CTDEEP
Hans Anderson, RRDD #1
Rick Hazen, RRDD #1
Jill Billus, Skeo

APPENDIX G – SITE INSPECTION PHOTOS

Entrance to the Site off New Hartford Road


RRDD #1 recycling facility on site

Southern entrance gate to the landfill

Solar array and bulk materials recycling area in the southern part of the Site, outside the landfill

Fence at the southern end of the landfill with a cell tower in the background

Landfill cap, looking north

Landfill gas vent

Landfill cap, looking south

Small animal burrow on the southern slope of the landfill

Riprap drainage channel on the western slope of the landfill

MW-101 well cluster on the northwest side of the landfill

Damaged well lid in the MW-101 well cluster

Protruding well in the MW-101 well cluster

Unnamed Brook

Iron staining in the downgradient area of the Unnamed Brook

Location of the underground storage tank for leachate, on the northern part of the landfill

Unsecured well MW-102S

Well MW-108 missing a well cap

APPENDIX H – REVIEW OF CLEANUP LEVELS

Table H-1: Comparison of ROD Cleanup Levels to Current MCLs

COC	2001 ROD Cleanup Level[a] (µg/L)	Current Federal MCL[b] (µg/L)	Current State Standard[c] (µg/L)
VOCs			
1,2-Dichloroethane	<0.5	5	<0.5
1,2-Dichloropropane	<0.5	5	<0.5
1,4-Dichlorobenzene	<10.0	75	<10.0
4-Methyl-2-pentanone	<5.0	NE	<5.0
Methyl ethyl ketone (2-butanone)	<10.0	NE	<10.0
Acetone	<10.0	NE	<10.0
Benzene	<0.5	5	<0.5
Chloroethane	<1.0	NE	<1.0
Chloroform	<0.5	80[d]	<0.5
Chloromethane	<1.0	NE	<1.0
Dibromochloromethane	<0.5	80[d]	<0.5
Methylene chloride	<2.0	5	<2.0
Toluene	<0.5	1,000	<0.5
Trichloroethene	<0.5	5	<0.5
Vinyl chloride	<1.0	2	<1.0
SVOCs			
2,4-Dimethylphenol	<10.0	NE	<10.0
4-Methylphenol	<10.0	NE	<10.0
Bis(2-ethylhexyl)phthalate	<2.0	6	<2.0
Metals			
Arsenic	5.0	10	5.0
Total chromium	50.0	100	50.0
Lead	3.0	15	3.0
Manganese	50.0	50[e]	50.0

Notes:

a. From Table 11 of the 2001 ROD. The cleanup level established for each chemical is the background concentration, per Connecticut RSRs, Section 22a-133k-3(a).

b. National Primary Drinking Water Standards (MCLs) from https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations (accessed 4/20/2023).

c. The cleanup level established for each chemical is the background concentration, per Connecticut RSRs, Section 22a-133k-3(a). The 2001 ROD specifies that during the remedial action phase, EPA in consultation with CTDEEP will determine whether these concentrations represent background for this Site and will change these values, if necessary, through an Explanation of Significant Differences.

d. MCL is for total trihalomethanes.

e. Secondary MCL, which is a non-enforceable guideline for contaminants that may cause cosmetic effects.

µg/L = micrograms per liter

NE = not established

APPENDIX I – SCREENING-LEVEL VAPOR INTRUSION EVALUATION

Groundwater contaminants at the Site include volatile chemicals. The RRDD #1 office is located on site and downgradient of the landfill. To evaluate the potential for vapor intrusion of volatile contaminants to indoor air of this building, the FYR evaluated data from nearby overburden well S-3 (the closest upgradient well). The most recent 2022 data from well S-3 were selected for a vapor intrusion screening with EPA's VISL calculator. A commercial use scenario was selected for the screening because institutional controls are in place to restrict residential use of the property. VISL screening results indicate that the estimated vapor intrusion cancer risks are below EPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4} and below the noncancer point of departure (HQ of 1). The potential for vapor intrusion to the on-site office building is not a concern at this time. However, if site conditions change or VOC concentrations in groundwater increase, the potential for vapor intrusion should be re-evaluated at that time.

Table I-1: Commercial VISL Evaluation – Well S-3, 2022

Commercial Vapor Intrusion Risk

Chemical	CAS Number	Site Groundwater Concentration C_{gw} (µg/L)	Site Indoor Air Concentration C_{ia} (µg/m³)	VI Carcinogenic Risk CDI (µg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR (ug/m³)⁻¹	IUR Ref
Benzene	71-43-2	3	6.81E-01	5.55E-02	4.33E-07	1.55E-04	5.18E-03	7.80E-06	U
Chlorobenzene	108-90-7	3.5	4.45E-01	3.63E-02	-	1.02E-04	2.03E-03	-	
Cumene	98-82-8	1.3	6.11E-01	4.98E-02	-	1.40E-04	3.49E-04	-	
Dichlorobenzene, 1,2-	95-50-1	0.83	6.52E-02	5.31E-03	-	1.49E-05	7.44E-05	-	
Dichlorobenzene, 1,4-	106-46-7	1.3	1.28E-01	1.04E-02	1.15E-07	2.92E-05	3.66E-05	1.10E-05	U
Dioxane, 1,4-	123-91-1	3.3	6.48E-04	5.28E-05	2.64E-10	1.48E-07	4.93E-06	5.00E-06	U
Ethylbenzene	100-41-4	4	1.29E+00	1.05E-01	2.63E-07	2.94E-04	2.94E-04	2.50E-06	U
Methyl tert-Butyl Ether (MTBE)	1634-04-4	0.84	2.02E-02	1.64E-03	4.27E-10	4.60E-06	1.53E-06	2.60E-07	U
Tetrahydrofuran	109-99-9	18	5.19E-02	4.23E-03	-	1.18E-05	5.92E-06	-	
Trimethylbenzene, 1,2,4-	95-63-6	1.4	3.53E-01	2.87E-02	-	8.05E-05	1.34E-03	-	
Trimethylbenzene, 1,3,5-	108-67-8	0.64	2.29E-01	1.87E-02	-	5.24E-05	8.73E-04	-	
Xylenes	1330-20-7	14	3.79E+00	3.09E-01	-	8.66E-04	8.66E-03	-	
Sum		-	-	-	*8.11E-07*	-	*1.89E-02*	-	

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A second VISL screening was conducted for the area near the Town Garage, located downgradient of the landfill property. The 2022 data from MW-103S and MW-120S were selected for input into EPA's VISL calculator. A conservative residential use scenario was selected for the screening because there are no restrictions on residential land use at this property. The only volatile contaminant detected in either well in 2022 was 1,4-dioxane at a concentration of 3.8 µg/L in MW-120S. VISL screening results indicate that the estimated vapor intrusion cancer risks are below EPA's risk management range of 1 x 10^{-6} to 1 x 10^{-4} and below the noncancer point of departure (HI of 1). The potential for vapor intrusion to the Town Garage building is not a concern at this time. However, if site conditions change or volatile contaminant concentrations in groundwater increase, the potential for vapor intrusion should be re-evaluated at that time.

Table I-2: Residential VISL Evaluation – Well MW-120S, 2022

Resident Vapor Intrusion Risk

Chemical	CAS Number	Site Groundwater Concentration C_{gw} \ (µg/L)	Site Indoor Air Concentration C_{ia} \ (µg/m³)	VI Carcinogenic Risk CDI (µg/m³)	VI Carcinogenic Risk CR	VI Hazard CDI (mg/m³)	VI Hazard HQ	IUR (ug/m³)⁻¹	IUR Ref	Chronic RfC (mg/m³)	RfC Ref	Temperature (°C)\ for Groundwater Vapor Concentration	Mutagen?
Dioxane, 1,4-	123-91-1	3.8	7.46E-04	2.66E-04	1.33E-09	7.15E-07	2.38E-05	5.00E-06	U	3.00E-02	U	25	No
Sum		-	-	-	*1.33E-09*	-	*2.38E-05*	-		-		-	

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