FIFTH FIVE-YEAR REVIEW FOR BEACON HEIGHTS LANDFILL SUPERFUND SITE BEACON FALLS, CONNECTICUT

September 2013

Prepared by:

U.S. Environmental Protection Agency
Region 1
Boston, Massachusetts

James T. Owens, III

James T. Owens, III, Director
Office of Site Remediation and Restoration
U.S. EPA, New England

9/26/13

Date

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LIST OF ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
BCEE	bis(2-chloroethyl)ether
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BF POTW	Beacon Falls Publicly Owned Wastewater Treatment Works
BHC	Beacon Heights Coalition
BHI	Beacon Heights, Inc.
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CTDEEP	Connecticut Department of Energy and Environmental Protection
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FSP	Field Sampling Plan
GPC	Groundwater Protection Criteria
gpm	gallons per minute
LCS	Leachate Collection System
LTMP	Long-Term Monitoring Plan
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
ppb	parts per billion
PRP	Potentially Responsible Party(ies)
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RCPs	Reasonable Confidence Protocols
RCRA	Resource Conservation and Recovery Act

RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
sROD	Supplemental Record of Decision
SVOC	Semi-Volatile Organic Compound
µg/L	micrograms per liter
VOC	Volatile Organic Compound
WQS	Water Quality Standards

EXECUTIVE SUMMARY

Summary

This is the Fifth Five-Year Review for the Beacon Heights Landfill Superfund Site (the Site) located in the town of Beacon Falls, Connecticut (Town). The review was conducted from May through September, 2013 in accordance with the *Comprehensive Five-Year Review Guidance,* (OSWER No. 9355.7-03B-P), with supplemental information provided in OSWER Document Nos. 9355.7-21, 9355.7-18, and 9200.2-111. This report documents the results of this review and presents the results in accordance with the EPA OSWER Guidance, as well as previous review reports. This statutory Five-Year Review is required because hazardous contamination remains at the Site above levels that allow for unlimited use and unrestricted exposure. The triggering action for this statutory Five-Year Review is based on the completion of the last Five-Year Review in September 2008.

The Record of Decision (ROD) for the Site was signed on September 23, 1985. The major components of the remedy as outlined in the ROD included: excavation of satellite areas of contamination for consolidation with the main landfill prior to closure, construction of a cap in accordance with the Resource Conservation and Recovery Act (RCRA) over the consolidated wastes including gas venting and storm water management controls, installation of a perimeter leachate collection system, extension of a public water supply line along Skokorat Road and Blackberry Hill Road to provide water service to residences identified at the time of the ROD, enclosure of the Site with security fencing, installation of a groundwater monitoring system, and implementation of Institutional Controls (ICs) on groundwater use in the affected area. Currently, the ICs have not yet been implemented.

A Supplemental ROD (sROD) was signed for the Site on September 28, 1990. The sROD was prepared to address the following issues: selection of the manner and location of leachate treatment (on site or off site), determination of the extent of excavation of contaminated soils, and the need for air pollution controls on the landfill gas vents. Certain components of the response action, as constructed, varied from the selected remedial action described in the ROD and as amended in the sROD. An Explanation of Significant Differences (ESD) was prepared for the Site, describing the changes from the ROD and sROD and the reason these changes

occurred. The changes described in the ESD include the change of the selected location for leachate treatment, the modifications to the RCRA landfill cap design, and the requirement for construction of compensatory wetlands. The ESD was completed on September 9, 1998.

The components of the remedy have achieved some of the Remedial Actions Objectives specified in the ROD. Progress is being made to achieve the remaining objectives. Periodic site inspections indicate that the landfill components are in good condition and functioning as intended in the ROD. Ongoing operations and maintenance of the landfill and the leachate collection system and long-term monitoring are helping to maintain the protectiveness of the remedy. While there have been changes to the ARARs cited in the ROD, updates in toxicity factors and chemical characteristics, and updated risk assessment methods, the remedy is still effective because capping and provision of a waterline prevent potential exposure to contaminated landfill materials and ingestion of groundwater contaminants.

However, this Five-Year Review has one issue which may bear on future protectiveness:

- Institutional Controls have not yet been implemented at the Site. The Beacon Heights Coalition (BHC) submitted an Institutional Control (ICP) Plan to the United States Environmental Protection Agency (EPA), which was approved in January 2012. The BHC submitted subordination waiver requests and the Environmental Land Use Restriction forms to EPA for two BHC-owned properties (Beacon Falls lots 22 and 23A). No further progress concerning the BHC owned properties has been made. The BHC has contacted Beacon Heights, Inc. (BHI) and Blackberry Grove, LLC, which own properties that include the Site and abutting parcels, to discuss implementation of deed restrictions. At this time, the BHC is awaiting responses from BHI and Blackberry Grove, LLC.

The next Five-Year Review is scheduled for completion in September 2018.

<u>Five-Year Review Protectiveness Statement:</u>

The remedy at the Site currently protects human health and the environment in the short-term because: the cap is effective in preventing direct contact exposures to landfill contaminants and minimizes contaminant migration, the leachate collection system is containing the majority of

groundwater contaminants on the Site, and the waterline installed along Blackberry Hill Road and Skokorat Road helps to ensure that most nearby residents are not exposed to contaminants that may remain in the groundwater. In order to make a long-term protectiveness determination for the Site, Institutional Controls need to be finalized.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Beacon Heights Landfill Superfund Site		
EPA ID: CTD072122062		
Region: 1	**State:** CT	**City/County:** Beacon Falls/New Haven
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Leslie McVickar		
Author affiliation: Remedial Project Manager		
Review period: 05/2013 – 09/30/2013		
Date of site inspection: May 15, 2013		
Type of review: Post-SARA		
Review number: 5		
Triggering action date: 09/30/2008		
Due date *(five-years after triggering action date)*: 09/30/2018		

ISSUES/RECOMMENDATIONS
There is only one issue at the Site which needs to be addressed.
Issues and Recommendations Identified in the Five-Year Review:

Site	Issue Category: Institutional Controls			
	Issue: Institutional Controls for the Site and abutting parcels have not been finalized.			
	Recommendation: Implement Institutional Controls at the Site to establish all necessary groundwater and land use restrictions.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/31/2015

Five-Year Review Summary Form (cont.)

Five Year Review Site wide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	*September 2013*
Protectiveness Statement: The remedy is currently protective of human health and the environment because: (1) the cap is preventing direct contact exposures to landfill contaminants and minimizes contaminant migration; (2) the leachate collection system is containing the majority of groundwater contaminants on-Site; and (3) the waterline installed along Blackberry Hill Road and Skokorat Road helps to ensure that most nearby residents are not exposed to potential Site groundwater contamination. To make a long-term protectiveness determination, Institutional Controls must be implemented.	

1.0 INTRODUCTION

As required by CERCLA provisions, the United States Environmental Protection Agency (EPA) conducted a Five-Year Review of the remedial actions selected for the Beacon Heights Landfill, in Beacon Falls, Connecticut. The purpose of the Five-Year Review is to determine whether the remedy being implemented at the Site remains protective of human health and the environment. The methods, findings, and conclusions of the Five-Year Review are documented in this Five-Year Review Report. In addition, this report presents issues identified during the review and provides recommendations to address them.

This Five-Year Review Report was prepared pursuant to CERCLA §121 and the National Contingency Plan. CERCLA §121 states:

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

The Agency interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR § 300.430 (f)(4)(ii) states:

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

This is the Fifth Five-Year Review for the Site. The triggering action for this statutory review is the completion of the last Five-Year Review in 2008. The Five-Year Review is required because contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

Table 2-1
Chronology of Site Events
Beacon Heights Landfill Superfund Site
Beacon Falls, Connecticut

DATE	EVENT
1920s 1979	Site operated as active landfill.
9/8/83	Site added to the National Priorities List.
3/84	Remedial Investigation/Feasibility Study initiated.
4/85	Remedial Investigation report completed.
8/85	Feasibility Study completed.
9/23/85	EPA issued a Record of Decision (ROD) for the Site.
9/14/87	32 potentially responsible parties (PRPs), organized as the Beacon Heights Coalition (BHC), entered into a Consent Decree with the U.S. Government.
12/89	The public water supply line is completed.
9/28/90	EPA issued a supplemental ROD for the Site.
3/31/92	Remedial Design (RD) completed.
12/92	First Five-Year Review completed.
3/93	Construction of the remedial action (i.e. landfill cap, leachate collection and transfer systems) initiated.
5/93	Sewer system rehabilitation work completed.
7/93	Discharge of leachate to Beacon Falls POTW commences.
1/98	Leachate Discharge Permit obtained.
7/24/98	Construction activities specified in the ROD are complete.
9/9/98	EPA issued the Second Five-Year Review Report.
6/00	Discovery and subsequent addition of the “Rabbit Area” seep to the sampling plan.
9/30/03	EPA issued Third Five-Year Review Report.
5/04	Groundwater sampling activities changed from triennial to semi-annual events and implementation of low-flow groundwater sampling methodology.
1/06	Renewed Leachate Discharge Permit.
2/07	Discussions for institutional controls between EPA and BHC were initiated.
9/08	EPA issued the Forth Five-Year Review.
3/09	BHC conducted a potable well survey.
10/11	General Permit for the Discharge of Stormwater Associated with Industrial Activity obtained.
1/12	EPA approves Institutional Controls Plan submitted by BHC. BHC prepares draft deed restriction documentation for two parcels.
5/13	Fifth Five-Year Review for the Site initiated.
9/13	Fifth Five-Year Review completed.

3.0 BACKGROUND

The Beacon Heights Landfill Superfund Site (the Site) is located in Beacon Falls, Connecticut, approximately 10 miles south of Waterbury and 2 miles east of the intersection of Connecticut Routes 8 and 42. The actual landfill area covers approximately 34 acres of an original 82-acre property. A map depicting the location of the Site is presented in Figure 1 (Appendix A).

3.1 Site Location and Physical Description

A map depicting the Site features is presented in Figure 2 (Appendix A). The Beacon Heights Landfill sits atop a ridge southeast of the intersection of Skokorat and Blackberry Hill Roads. Chain-link fencing surrounds the perimeter of the capped landfill area. The landfill cap consists of a multi-barrier cover system with a vegetative grass cover as the top layer. The Leachate Collection System (LCS) consisting of perforated pipe and drainage media surrounds the landfill cap. Nineteen (8 bedrock and 11 overburden) monitoring wells are located on the Site. Areas outside the landfill cap, but within the perimeter of the fence, are generally vegetated with bushes and trees. Low-density residential areas border the Site to the north along Blackberry Hill Road, to the southwest on Kaleas Way and Morning Wood Drive, and further to the west along Skokorat Road. A 98-acre parcel is currently being developed to the east of the Site, which is hydrogeologically upgradient of the Site. Construction of this parcel began in 2011 for a 17-lot residential development. Approximately 8 houses have been built and are currently occupied. Construction of an additional 5-lot subdivision was completed in 2012 and all 5 homes are currently occupied. Both developments are connected to the public water system.

The Site is located within the Hockanum Brook drainage area. Hockanum Brook, a tributary of the Naugatuck River, is located about 0.5 miles northwest of the Site (Figure 1). Bedrock outcrops appear in many areas around the Site. The bedrock surface is fractured and dips from the south/southeast of the Site towards the north/northwest, parallel to surface water drainage. Groundwater in the vicinity of the Site occurs in both the unconsolidated deposits and in the bedrock and generally flows to the north/northwest. Figures 3 and 4 (Appendix A) depict the groundwater elevations in the bedrock and overburden aquifer units, respectively.

3.2 Land and Resource Use

From the 1920s until 1979 the Site was used as an active landfill. The Site is currently a closed landfill and will likely remain as such because of the need to protect the integrity of the landfill cap and because the Site is privately owned. Adjacent land uses include farming, forested areas, gravel excavation operations, and residential development. Hockanum Brook is presently classified as recreational use water (Class C/B) with a goal of becoming a potential drinking water source (Class B/A). The Naugatuck River, located west of the Site, is classified as restricted recreational use water with a goal of becoming recreational use water. Many of the surrounding properties replaced their private water supplies with public water when the public water supply system was extended along Skokorat and Blackberry Hill Roads as part of the cleanup in 1989. However, groundwater in the area continues to be used as a drinking water supply. During a 2009 potable well survey, it was determined that four residences were not connected to the public water system. Property owners have declined a connection to the public water supply. An additional residence was identified to be using public water as the primary source of drinking water; however, the owner does have a private supply well on the property. All five private wells were tested in April 2009, and no volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs) exceedences were detected.

3.3 History of Contamination

From the 1920s until 1970 a small portion of what is now known as the Beacon Heights Landfill Superfund Site was known as “Betkoski‘s Dump” and consisted of approximately 6 acres of active dumping and open burning in the northwestern corner of the existing Site. The dump accepted a variety of waste including municipal refuse, rubber, plastics, and industrial chemical and sludges. During this period of operation, there were general complaints and concerns due to fumes, smoke and blowing litter. The Site was not regulated by the State until 1970.

In 1970, Beacon Heights, Incorporated (BHI) purchased the Site, which included the Betkoski Dump area. BHI and its owner, Harold Murtha, owned and operated the Site as Beacon Heights Landfill and expanded the landfill area to approximately 34 acres.

From 1970 until its closure in July 1979, the Site was used for the disposal of various waste materials including: rubber, plastics, oils, hydrocarbons, chemical liquids and sludges, and solvents. In 1977, the Connecticut Department of Environmental Protection (now known as the

Connecticut Department of Energy and Environmental Protection, hereinafter “CTDEEP”) approved the spreading of wastewater sludge from the Naugatuck municipal/industrial wastewater treatment facility over covered areas of the landfill. These activities continued until the summer of 1984.

3.4 Initial Response

On June 20, 1979, BHI signed a Consent Order to close the Site by July 1, 1979. This Consent Order was entered as a final order of the Connecticut Commissioner of Environmental Protection on July 24, 1979. The closure requirements of the Order, which included the placement of a final cover and implementation of a groundwater monitoring system, were never implemented. However, on December 4, 1979, the CTDEEP inspected the Site and reported that landfill operations had ceased.

3.5 Basis for Taking Action

The Remedial Investigation (RI) concluded that leachate from the landfill was migrating off-Site and contaminating nearby residential drinking water wells and surface water bodies (i.e., the tributary of Hockanum Brook). The leachate was generated because of precipitation percolating through the landfill wastes and causing various chemical contaminants to be mobilized, which then migrated into the water table. On-site soils were also contaminated by leachate; however, direct releases of waste materials to the ground surface also contributed as a major source of soil contamination.

Based on the results of sampling conducted as part of the RI, ingestion of groundwater represented the most significant risk to human health. Benzene, chlorobenzene, chloroethanes, bis(2-chloroethyl) ether, xylenes and other Site-related hazardous compounds, were detected in groundwater at concentrations well above levels considered to be protective. Moreover, as long as precipitation was allowed to percolate through the landfill wastes and soils contaminated by that waste, the potential existed for further degradation of groundwater quality to levels that would endanger public health, if consumed.

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The objectives of the remedial action described in the 1985 ROD are to:

- Reduce the generation of contaminated leachate and thereby mitigate future groundwater and surface water contamination;
- Minimize off-site migration of contaminants via surface runoff;
- Minimize direct human contact with on-site contaminated soils; and
- Assure a safe drinking water supply for area residents.

These objectives would be achieved by source control actions supplemented by off-Site actions. To meet these broad objectives, the landfill wastes would be isolated to minimize contact with groundwater and surface water, and to prevent human and animal exposure.

The initial recommendations in the ROD consisted of the following:

Source Control Remedy:

- Excavation of satellite areas of contamination for consolidation with the main landfill prior to closure.

- RCRA capping of the consolidated wastes, including gas venting and stormwater management controls.

- Installation of a perimeter leachate collection system.

- Enclosure of the Site with security fencing.

- Installation of an extensive groundwater monitoring system.

- Collection of landfill leachate and transportation to a licensed wastewater treatment facility or an on-site treatment facility followed by discharge to a tributary of Hockanum Brook.

- Preparation of further studies and a supplemental ROD (sROD) to select the manner and location of leachate treatment (on-Site or off-Site), the extent of excavation of contaminated soils, and the need for air pollution controls on the landfill gas vents.

Off-Site Remedy:

- Extension of a public water supply line along Skokorat Road and Blackberry Hill Road to provide water service to current residences.

- Long-term monitoring of groundwater contaminant migration.

- Implementation of Institutional Controls on groundwater use in impacted area.

The sROD was completed in September 1990, which used information developed in a Pre-Design Study, prepared by the Potentially Responsible Parties (PRPs), to evaluate on-Site and off-Site treatment alternatives. The major components of the sROD included:

- Contaminated leachate from the Site would be transported and subsequently treated at the Naugatuck, Connecticut wastewater treatment facility (the Naugatuck facility).

- Contaminated soils, located outside the main landfill, would be excavated to chemical concentrations specified within the sROD and placed under the cap.

- Landfill cap gas vents would be constructed such that they could be augmented with air pollution mitigating devices in the event that future air monitoring should require such action. In addition, post-construction air quality monitoring would be conducted at the Site, specifically at, but not limited to, the location of each gas vent.

Certain components of the response action, as constructed, varied from the selected remedial action described in the ROD and as amended in the sROD. An Explanation of Significant Differences (ESD) was prepared for the Site, describing the changes from the ROD and sROD and the reason these changes occurred. These changes include: a change to the selected location for leachate treatment; modification to the RCRA cap design; and a requirement for the construction of compensatory wetlands. The ESD was completed in September 1998.

4.2 Remedy Implementation

In a Consent Decree (CD) signed with EPA on September 14, 1987, the Beacon Heights Coalition (BHC), consisting of the 32 PRPs, agreed to perform the remedial design/remedial action (RD/RA) specified in the 1985 ROD. However, because of the uncertainty associated with: (1) the method of leachate treatment; (2) the extent of excavation of contaminated soils; and (3) the need for air pollution controls on the landfill gas vents, the RD for the Site did not commence until after the sROD was completed in September 1990. Prior to this date, the PRPs extended the existing public water supply waterline along Skokorat and Blackberry Hill Roads so that by the end of 1989, a permanent safe drinking water supply was provided to most of the homes affected by the Site.

Of the initial 57 offers to connect to the waterline, 49 residents accepted the offer in 1989. At the request of the regulatory agencies in 1994, the BHC extended a final offer, resulting in the total of 52 connections (51 single connections and one multiple connection). The old private wells were decommissioned. In the Spring of 2000, the BHC sampled seven homes along Skokrat and Blackberry Hill Roads where the property owners had refused BHC's offer to connect to the waterline. These sampling results did not show water quality issues related to the Site. Additionally, in March 2009, the BHC conducted a potable well receptor survey and determined that four residences along Blackberry Hill Road were not connected to the public water supply system. A fifth residence was connected to the public water system, but had a private well, which is only used for irrigation. In April 2009, the BHC sampled these five properties along Blackberry Hill Road for VOCs and SVOCs. No VOCs and SVOCs were detected.

The Remedial Design (RD) was completed in January 1992, and was conditionally approved by EPA on March 31, 1993. Construction of the Remedial Action (RA) began on the Site in March 1993.

The BHC reached an agreement with the Town of Beacon Falls to treat the leachate at the Town's Publicly Owned Treatment Works (POTW), rather than constructing a leachate transportation pipeline to the Naugatuck Wastewater Treatment Facility, as called for in the sROD. This agreement allowed the BHC to connect the transportation pipeline directly to the Beacon Falls sewer system. Leachate collection and conveyance systems construction was completed and discharge of leachate to the POTW began in July 1993. As part of the agreement with Beacon Falls, the BHC contributed to an upgrade of the Beacon Falls treatment facility. This upgrade was completed and operational in June 1995.

The completion of the landfill cap was delayed by more than 24 months as the result of several construction problems including slope failure in a portion of the landfill, which damaged abutting wetlands. However, all construction problems were subsequently addressed by the BHC and the landfill cap was determined to be substantially complete by December 1995. In 1996 and 1997, the BHC performed the following activities at the Site: (1) wetlands mitigation; (2) operation and maintenance; (3) groundwater, surface water, sediment and seep monitoring; and (4) repair and improvement of portions of the landfill cap and the leachate collection and conveyance systems. On July 24, 1998, EPA performed a final inspection of the Site and determined that the RA activities were completed according to the requirements of the ROD, sROD, and all associated work plans.

The Site achieved Construction Completion status when the Preliminary Closeout Report was signed on September 9, 1998.

4.3 Operation and Maintenance

The BHC conducts long-term monitoring (LTM) and routine maintenance activities in accordance with the Operation and Maintenance (O&M) plan that was approved by EPA on January 22, 1999. Long-term monitoring of groundwater, surface water, and seep is conducted in accordance with the Long-term Monitoring Plan (LTMP) that was approved by EPA on

November 25, 1998, and the Revised Field Sampling Plan, approved by EPA in 2006. The primary activities associated with O&M and long-term monitoring include:

- Monthly inspections of the landfill cap, leachate collection and transportation systems, and other components of the remedy;
- Semi-annual groundwater sampling events; and
- Documentation of O&M and LTM activities on a semi-annual and annual basis.

Since the last Five-Year Review, modifications to the long-term monitoring program were requested by the PRPs, which were subsequently approved by EPA:

- In 2008, the BHC changed the VOC analytical method from EPA Method 8260 to EPA Method 524.2.

- In 2008, Total Kjeldahl Nitrogen was eliminated from the long-term monitoring program as these data were not used to support the discharge permit.

- The Stormwater General Permit was not renewed in 2009. There were no exceedences of monitoring criteria listed in Section 5(C)(1)(E) in the Stormwater General Permit Regulations, therefore, the Site no longer required stormwater monitoring.

- Monitoring wells MW-5, MW-8, MW-10, MW-14, MW-16, MW-17, and MW-18 are currently only sampled in the first semi-annual event as of the 2009 monitoring program, based on reduction in groundwater contaminants detected at these locations, with EPA approval.

- An updated leachate discharge permit form was obtained on March 25, 2010.

- In 2011, the Site received the General Permit for Discharge of Stormwater Associated with Industrial Activity. This permit requires monthly inspections and semi-annual inspections. It also requires stormwater samples to be collected from outfall location (DSN001).

4.4 Institutional Controls (ICs)

The 1985 Record of Decision (ROD) included Institutional Controls to prohibit the use of groundwater. Implementation of Institutional Controls has not been completed, but is in progress. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with Institutional Controls is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure. Institutional Controls are required at the Site to ensure the protectiveness of the remedy.

The BHC has made progress in establishing the Institutional Controls. The BHC prepared and submitted an Institutional Control (IC) Plan, which was approved by the EPA on January 4, 2012. For two parcels (Beacon Falls lot 11 and 23A) owned by the BHC, subordination waiver requests and executed Environmental Land Use Restriction forms were prepared and submitted to EPA. An A-2 survey of the parcels was finalized during July 2012 by a licensed surveying firm. The BHC initiated contact with the Beacon Heights, Inc and Blackberry Grove, LLC, which owns the properties that include the Site and abutting parcels, regarding the imposition of restrictions. However the BHC is still awaiting a response from Beacon Heights, Inc. and Blackberry Grove, LLC.

5.0 PROGRESS SINCE LAST REVIEW

This is the Fifth Five-Year Review for the Site. The last Five-Year Review was completed in September 2008, which identified several issues. Some issues identified in that review have been addressed, and the status of each issue is provided as follows:

- As identified in the previous Five-Year Review, construction of residential developments upgradient to the Site was noted as a potential issue, should private wells be installed. The Fourth Five-Year Review recommended that the BHC ensure the public waterline is used at the residential developments, and that private supply wells are not installed in new developments. Construction of a 5-lot subdivision began in 2007 and has been completed. All houses are currently occupied at this 5-lot subdivision. In 2009, the BHC conducted a potable well receptor survey which identified only one of these 5 properties as being connected to the waterline; however this one home continues to have a private well for landscaping purposes. The private supply wells at these properties were tested

for VOCs and SVOCs and no contamination was identified. A second upgradient 17-lot subdivision was started in 2011 and construction is ongoing. Approximately 8 of the houses built are currently occupied and are connected to the public water system.

- In the Fourth Five-Year Review, off-Site migration of contaminated bedrock groundwater affecting residences not connected to a public water line was identified as a potential issue. A potable well survey was completed in March 2009 to identify private water wells within 1,000 feet of the Site. From this well survey, four properties with private water wells were identified that were not connected to the public water system. A fifth residence found to be connected to the public water supply as the main source of drinking water; however, it continues to use a private well for irrigation. All private wells were identified to be within 500 feet of the Site. The BHC sampled these private wells for VOCs and SVOCs in April 2009. No VOCs or SVOCs were identified in any well.

- Another issue identified in the Fourth Five-Year Review was the potential vapor intrusion pathway concerns at new and existing residences. The vapor intrusion pathway was not originally evaluated in the public health and environmental assessment. During this Five-Year Review, the recent groundwater data from both the overburden and bedrock wells were compared to the Connecticut Remediation Standard Regulations (RSR) Residential Volatilization Criteria (VC) and the EPA 2012 Vapor Intrusion Screening Levels (VISLs). No VC or VISL exceedences were detected, other than the presence of benzene in monitoring well TH-10, which is located in the center of the landfill. Vapor intrusion does not appear to pose a threat to human health.

  Figures 5 and 6 (Appendix A) depict contaminants in bedrock and overburden wells, respectively, that exceed regulatory standards including the RSR Groundwater Protection Criteria (GWPC), VC, and Surface Water Protection Criteria (SWPC), and the Safe Drinking Water Act Maximum Contaminant Levels (MCLs).

- As identified in the Fourth Five-Year Review, contaminated groundwater may be discharging to Wetland Mitigation Area and Orchard Pond. During this Five-Year Review, recent groundwater data from both the overburden and bedrock wells were compared with the SWPC. There were several isolated exceedences of the SWPC in monitoring wells near the Wetland Mitigation Area and Orchard Pond, specifically MW-

21, MW-22, MW-14, and MW-12 (see Figure 5 and 6 (Appendix A)). These results indicate that the groundwater may be discharging into the Wetland Mitigation Area and Orchard Pond. Section 6.4 provides more information on groundwater monitoring results. While exceedances of SWPC have occurred, they are sporadic and are not anticipated to represent potential threats to off-Site surface water.

- The Fourth Five-Year Review identified the lack of Institutional Controls as an issue. Progress has been made by the BHC in developing the Institutional Controls; however, they have not been finalized. Refer to Section 4.4 of this report for more details.

- In the previous Five-Year Review, several private residences had previously declined to be connected to the public water supply. After the 2009 potable well survey (as discussed in Section 4.2) was complete, the BHC sent certified mail to the residences of the private water supply wells. These letters discussed the opportunity for these residents to connect to the public waterline. Only one resident opted to discuss this option to connect; however, no residents indicated that they want the connection to the public water supply.

Significant activities completed since the last Five-Year Review included:

- In December 20, 2010, a trench was installed to prevent flooding on the main roadway (Skokorat Road) due to beaver activity in the wetland area.

- In 2010, new leachate sampling forms were developed to comply with the Leachate Discharge Permit. The forms were submitted and approved by the CTDEEP.

- Significant repair work was completed on the landfill to address issues caused by the 2011 storms. Please refer to Section 6.5 for more details.

- A statistical analysis of groundwater data was performed by the BHC in 2012, as required in the Consent Decree. The statistical analysis evaluated chemical concentration trends and comparisons of chemical concentrations in upgradient ("background") and downgradient monitoring wells to assess whether groundwater

contamination is significantly decreasing. Results of the evaluation are described in Section 6.4.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

EPA, the lead agency for this Five-Year Review, notified CTDEEP and the BHC in early 2013 that the Five-Year Review would be completed. The Five-Year Review team was led by Ms. Leslie McVickar of EPA, Remedial Project Manager for the Beacon Heights Landfill Superfund Site, and included staff from Nobis Engineering, Inc., EPA's technical support contractor, and Ms. Sheila Gleason, the CTDEEP Site Manager.

From May 2013, the review team established the review schedule whose review components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection and Observations;
- Local Interviews; and
- Five-Year Review Report Development and Review.

The review was completed during September 2013.

6.2 Community Involvement

EPA issued a public release notice of the start of the Five-Year Review on December 28, 2012. There are currently no appreciable community concerns regarding the Site.

6.3 Document Review

This Five-Year Review consisted of a review of relevant documents, including decision documents, O&M records, and monitoring reports. The documents reviewed are listed in Appendix B.

6.4 Data Review

As part of the review, the data collected by the BHC were evaluated to assess whether contaminants within the landfill are being contained by the cap and the leachate collection system, and whether the contaminant concentrations have achieved the ROD cleanup goals. A summary of the data review is provided below.

6.4.1 Groundwater Monitoring Data

Groundwater monitoring is performed to assess whether contaminated leachate continues to migrate from the landfill, whether concentrations of detected constituents are increasing or decreasing, and whether hydraulic containment is being achieved. Monitoring wells are gauged to assess the groundwater leachate level and whether the water table has been lowered below the landfill material. Groundwater from the overburden and bedrock are sampled and analyzed semi-annually to assess whether contaminant concentrations are increasing or decreasing. In 2012, groundwater samples were analyzed for the following parameters using the methods listed: VOCs by EPA Method 8260, Total Priority Pollutant List (PPL) of 13 Metals by EPA Methods 6020 and 245.1 (mercury), total iron and manganese by EPA Method 6020, and Total Kjeldahl Nitrogen by Method 4500-N (organic)B. In 2010 and 2011, groundwater was analyzed using the following methods: VOCs by EPA Method 8260, Total Priority Pollutant List of 13 Metals by EPA Methods 200.8 and 245.2 (mercury), total iron and manganese by EPA Method 200.8, and Total Kjeldahl Nitrogen by EPA Method 351.2. In 2009, groundwater was analyzed using the following methods: VOCs by EPA Method 8260, Total Priority Pollutant List of 13 Metals by EPA methods 200.7, 7474 (mercury), and 6010 (zinc), Total iron and manganese by EPA Method 6010, and Total Kjeldahl Nitrogen by Method SM420A

Evaluations of groundwater data are presented in the following narrative:

a) Leachate Level – Monitoring well TH-10 is gauged semi-annually to evaluate the leachate in the landfill. The leachate level has decreased by more than 18.5 feet (since the well was first gauged in 1997). However, the leachate level decline appears to be stabilizing. The depth to groundwater, as of the October 12, 2012 water elevation survey, was 62.6 feet. Depth to bedrock (granite gneiss) at TH-10 is 45 feet. On the boring log, weathered bedrock was noted at 43 feet. Because the depth of waste is

estimated to be near the top of bedrock, the water level at this location in the landfill is below the waste.

b) Chemical Trends – As part of the Five-Year Review, EPA evaluated groundwater data collected from 2009 through 2012 to evaluate the effectiveness of the remedy. Historically, the primary VOC and SVOC contaminants of concern consisted of benzene, chlorobenzene, chloroethane, tetrahydofuran, bis(2-chloroethyl)ether [BCEE] and bis(2-ethylhexyl)phthalate [BEHP]. Figures 5 and 6 (Appendix A) depict qualitatively the chemicals that were detected in groundwater samples collected between 2009 through 2012, and exceedances of the standards (RSRs and MCL).

Metals detected in overburden and bedrock wells and VOCs and SVOCs detected in only bedrock wells all situated downgradient of the capped landfill indicate that the ROD cleanup goals have not yet been attained and that contaminants are continuing to migrate from the landfill, but primarily within the Site.

VOCs and SVOCs: During this evaluation period, no VOCs or SVOCs were observed to exceed regulatory standards in any of the overburden monitoring wells. The data indicated only sporadic detections of VOCs and SVOCs in bedrock monitoring wells MW-11 and MW-21.

- Benzene: In landfill monitoring well TH-10, benzene was detected at concentrations exceeding the MCL or the GWPC in 2010 and 2011. In downgradient bedrock monitoring wells MW-11 and MW-21, benzene concentrations sporadically exceeded the GWPC in 2009 or 2010.

- Bis(2-chloroethly)ether: This SVOC was detected at a concentration exceeding the GWPC in MW-21 only in 2009.

- Additional SVOCs: Several polycyclic aromatic hydrocarbons (PAHs) including benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and dibenz(a,h)anthracene were detected during the 2011 and 2012 monitoring events. Phenanthrene was also detected in TH-10 in 2011. Severe precipitation events occurred at the Site in 2011 including three major rain

storm events and one snow storm event. Because of higher than normal precipitation events, groundwater elevations underlying the Site were raised temporarily, likely saturating more landfill waste materials and mobilizing PAHs, as evidenced by elevated PAHs presence in TH-10 (landfill bedrock well) during 2011 and 2012. Bedrock monitoring well MW-21, situated downgradient of the landfill, had only elevated PAH concentrations in 2012, which is likely the result of a time lag for contaminated groundwater to migrate from the landfill.

Metals: The groundwater monitoring data indicates that metals were detected in both overburden (MW-12, MW-19, MW-8, MW-10, and MW-14) and bedrock monitoring wells (MW-11, MW-20, MW-22, MW-9, MW-21, and TH-10) at concentrations exceeding regulatory standards:

- Zinc: Zinc exceeded the SWPC in MW-12 (2011) and MW-22 (2009, 2010, and 2011); both wells are located downgradient of the landfill and the wetland mitigation area.

- Arsenic: Arsenic exceeded the SWPC in MW-19 and MW-14 only during 2010, and was also detected in the landfill monitoring well TH-10 in 2010 and 2011.

- Iron and Manganese: During period from 2009 through 2012, iron and manganese were detected in the landfill monitoring well TH-10 and in downgradient overburden and bedrock wells exceeding the MCLGs (Figures 5 and 6). Iron and manganese are monitored, as they are indicators of anaerobic degradation of landfill contents where oxidation-reduction reactions result in the mobilization of these and other metals. As the landfill ages, anaerobic degradation of contents will occur in different portions of the landfill resulting in continuing dissolution and mobilization of metals. Therefore, the continued monitoring of these metals will provide indications of degradation of landfill materials and whether other metals may be subject to mobilization.

Zinc and arsenic have only been detected sporadically in downgradient monitoring wells exceeding the SWPC. These metals are unlikely to represent a significant threat to the wetlands.

c) Hydraulic Containment – Previously, the BHC completed several investigations to assess the infiltration of groundwater into the landfill and the discharge of groundwater into the leachate collection system and various seeps occurring on the landfill's surface. Investigation results indicated that precipitation infiltrated into the landfill through the overburden unit from the upgradient direction while groundwater migrated into the landfill through high angle fractures. Contaminants mobilized by the infiltration migrated out beyond the landfill through bedrock fractures during periods of vertical hydraulic gradients. While pumping tests were performed to assess potential containment and capture of contaminated groundwater, it was concluded that pumping might not provide an appreciable reduction in leachate generation.

Based on 2009 through 2012 data, the chemical data for the downgradient monitoring wells indicate that contaminants sporadically migrate beyond the limits of the leachate collection system. Detections of benzene (in 2009 and 2010) in MW-11, BCEE (in 2009) and PAHs (in 2012) in MW-21 exceeding the GA GWPC, SWPC, or MCL indicate some VOCs and SVOCs migration in bedrock groundwater (Figure 5) beyond the capped landfill limit. In overburden groundwater, limited arsenic exceedances of the SWPC were identified in MW-19 (2010) and MW-14 (2010). Overall, only sporadic exceedances of standards were noted in the overburden and bedrock groundwater downgradient of the landfill limits, likely the result of responses to precipitation events.

The leachate collection system is able to capture the majority of contaminated groundwater occurring in the landfill and is meeting the ROD objective of minimizing contaminant migration.

d) Statistical Analysis - A statistical analysis of the analytical data was performed using the ChemStat version 2.0. This statistical analysis indicated that there were no discernible trends for benzene and benzo(a)pyrene data in monitoring wells with MCL exceedences. Additionally, there was an upward trend for iron in TH-10 but no trends for manganese.

6.4.2 Surface Water Monitoring

Surface water monitoring is performed to evaluate potential contamination from seeps and the runoff ultimately discharged to Hockanum Brook, which is used for recreational purposes. Since 2004, samples have been collected from three surface water stations (SW-1, SW-2, and SW-3) located in the northern portion of the Site. The VOCs, SVOCs, and metals results are compared with the CTDEEP Water Quality Standard (WQS) and National Recommended Water Quality Criteria (NRWQC). During this review period no metals, VOCs or SVOCs were detected at concentrations that exceeded the WQS or NRWQC. There were no problems associated with the surface water quality at the Site during this evaluation period.

6.4.3 Leachate Seep Monitoring

During the Remedial Action construction, several seeps were observed in proximity of the landfill and a seep monitoring program was established. The Rabbit Area Seep has been monitored periodically at the Site since its discovery in 2000. Other known seeps have been adequately characterized and are no longer sampled. The leachate seep analytical data were compared to applicable NRWQC and WQS criteria. One “Stream” sample is collected from below the effluent of the drainage pipe that extends beneath the road to determine whether the seep is affecting this surface water body.

Review of the seep data from 2009 through 2012 indicated that only metals (manganese and iron) exceeded the WQS and NRWQC criteria (Figure 6):

- Rabbit Seep: Iron exceeded the NRWQC in 2009, 2010, 2011, and 2012 while manganese exceeded the NRWQC in 2009 and 2010.
- Stream: Iron exceeded the NRWQC in 2011, while manganese exceeded its NRWQC in 2009 and 2010. Lead exceeded the WQS only in 2009.

The reducing conditions within the landfill, resulting from anaerobic microbial activities, likely cause the mobilization of iron and manganese from the capped wastes or from naturally occurring soil minerals, which then leak to the Rabbit Seep. These results indicate that, while iron and manganese are temporarily mobilized and are evident in the Rabbit Seep, exposure to ambient air likely result in the oxidation and precipitation of the two metals. Iron and manganese will then precipitate out from solution, as evidenced by only limited exceedance of

manganese in the Stream samples. These seep and stream analytical results indicate that leachate emanating from the Rabbit Seep is not significantly affecting the onsite stream quality.

6.4.4 Stormwater Monitoring

In 2009, BHC did not renew the Stormwater General Permit. The Site was in compliance with the regulations because there were no exceedences of parameters listed in the permit in 2008; therefore, no additional stormwater monitoring was required. However, new stormwater permit requirements were enacted and the Site was required to register for the *General Permit for the Discharge of Stormwater Associated with Industrial Activity.* On October 1, 2011, the permit became effective and stormwater monitoring resumed at the Site. Stormwater was sampled in October 2011, March 2012, May 2012, July 2012, and December 2012. There were no exceedences of parameters listed in the permit in 2011 or 2012. The landfill does not appear to represent a threat to stormwater runoff quality.

6.4.5 Air Monitoring

Air sampling is required every 5 years to evaluate whether air pollution control devices are required to mitigate landfill gas emissions from the gas vents. Connecticut Air Pollution Regulations, RCSA Section 22a-174-3a(a)(1)(D and E), state that a permit is required for stationary sources that emit, or have the potential to emit, 15 tons/year or more of any individual air pollutant, and for any modification to an existing source which increases potential emissions of any individual pollutant by 15 tons/year or more. Based on mass loading calculations, approximately 46 tons/year of methane may be emitted for a single gas vent (GV-6). However, because the landfill was constructed prior to 1972, it can be “grandfathered” from the permit requirement or requirement to install pollution control devices, unless there are alterations or modifications.

In 2013, the BHC will collect another round of landfill gas samples. Once the 2013 data are available, they will be evaluated and compared with applicable air regulations.

6.5 Site Inspection

The BHC performed monthly Site visits and semi-annual inspections. A Site-specific checklist was used to document the observations during these inspections. EPA also performed an

inspection in May 2013. A summary of the observations made between 2009 and 2013 is provided below. A Site Inspection Checklist is included as Appendix D.

- **Landfill Surface –** The landfill was generally in good condition during non-major storm events. Small areas of stressed vegetation, holes, and erosion were observed on the Site. There were also stressed areas that are related to the presence of deer or turkey. Deer and turkey have been identified at the Site. It is recommended the area be monitored and reseeded if damaged areas are observed.

  Beavers posed a major issue at the Site during this evaluation period. Several steps were taken to relieve the wetland overflow caused by beaver dams in the wetland. The BHC installed a pond leveling system in June 2011 and September 2011 that regulates the water level in the wetland to prevent future overflows that could affect adjoining properties. The BHC is continuing the maintenance of the beaver dam area.

  There were several major storm events during this review period, which caused several disturbances at the Site. A major issue included washouts on the access road to the Site. Due to this condition, the BHC recommended that an overflow culvert be installed in the access road to prevent washouts. A 24-inch culvert was added in 2011. Additional major storm issues included:

  - On May 19, 2011, the access road was washed out near MH-5. This washout was repaired on May 30, 2011. Additional washouts were observed on July 5, 2011 and August 11, 2011, which were repaired prior to September 2, 2011.

  - On May 31, 2011, a small topsoil slide area on the Eastern portion of the landfill was observed between the top bench and the lowest bench. This area was repaired on June 30, 2011 by adding topsoil and grading the area.

- **Benches (berms) –** The length of each horizontal slope bench was inspected during the Site inspections. The benches were in good condition with no signs of sedimentation, breaching, or bypass.

- **Letdown Channels (downchutes) –** The riprap lined downchute channels on the north and east sides of the landfill were inspected for settlement, material degradation, erosion, undercutting, obstructions or vegetative growth. The East and North Downchutes appeared to be in good condition.

- **Cover penetrations -** Cover penetrations through the landfill cover system include 12 leachate collection system manholes and 17 passive gas vent structures. The aboveground portions of the manholes appear to be vertical or nearly vertical and in good condition with no obvious signs of damage. The gas vents all appeared to be vertical or nearly vertical at the time of the inspection. Wire mesh bird screens were secured to the openings of all of the gas vents during the 2013 inspection. There were emergency flushes of MH-11 on October 29, 2011 and November 3, 2009. Additionally, MH-5 was found to be clogged and required an emergency flush on November 1, 2012.

- **Cover drainage layer –** No issues were identified for the riprap outlet of the drainage layer at the perimeter of the cover system.

- **Retaining wall –** The retaining wall at the north end of the landfill appeared to be in good condition at the time of the inspection. In April 20, 2010, in the portion of the capped landfill designated as the "Florida Area", the seep pipe was inspected and it appeared to be tight. On June 27, 2012, the drain line was inspected and it was determined that the junction of the drain line and the manhole shifted; however this did not cause any leaks. The drain line was readjusted and the gasket replaced.

- **Leachate collection system -** The above ground portions of the system appeared to be in good overall condition. No issues were identified.

- **Seeps –** No issues concerning the seeps were identified.

- **Perimeter ditches and off-Site discharge -** The perimeter ditches were in good condition during non-storm events. Due to the severity of the storms in 2011, the wetland areas would overflow, damaging the roads, therefore a new culvert was installed (as discussed in previous paragraphs). More erosion issues may occur during significant rainfall events.

- **Fencing and roads -** The fence that surrounds the landfill cap and the gravel roads were adequate during the Site inspections. Many trees needed to be removed from the fence and roads during this Five-Year Review period. Some areas of vegetation needed to be cleared from the fences. As discussed in previous sections, there were multiple road washouts during significant rain events. One of these resulted in the installation of a new culvert and a leveling system in the wetland areas due to a beaver issue. The wetland roads were also cleared back 5 feet in September 2011.

Recommendations for corrective actions based on the Site inspections included the following:

- Continue the existing O&M programs;
- Continue monitoring for cap settlement;
- Continue monitoring of the Rabbit Area leachate seep and document changes in the seep characteristics;
- Continue monitoring of the leachate collection system components to ensure proper operation;
- Continue to monitor the beaver wetland area for signs of flooding;
- Monitor the vegetative cover for areas of brambles and stressed vegetation, and reseed as needed to stabilize erosion; and
- Closely monitor landfill cap for signs of stress or sloughing, specifically during significant weather events.

6.6 Interviews

As part of the preparation of this Five-Year Review Report, interviews were conducted with local town officials and persons with knowledge of the Site. Refer to Appendix C for an Interview List of the individuals contacted.

Mr. Russ Dirienzo, the Principal Geologist at Arcadis, the BHC‘s Remedial Action Coordinator, was interviewed on June 11, 2013, to identify any current issues at the Site. Mr. Dirienzo indicated that the Site is stable and protective of human health and the environment.

Mr. Dirienzo discussed several issues/comments concerning the Site, including the following:

- There is no major leachate flow reduction. Leachate flow was supposed to decrease to zero over a 20- to 30-year period, but this hasn't been the trend, and is likely due to springs that exist under the landfill cap. However, leachate elevation levels within the landfill are dropping slowly, which shows that the cap is reducing infiltration.

- There have been some complaints from the Beacon Falls POTW. The POTW recently upgraded their disinfection system to an ultraviolet system. The POTW was worried about the potential impacts of the leachate on the system. The BHC conducted a study of the effect of the leachate on the ultraviolet system, and no concerns were identified.

- A new flow meter was installed in September 2012, which replaced a 16-year old flow meter.

- Five residences currently have private wells on their property. Four of the properties are currently using their private well as potable water. The fifth resident is connected to the waterline as drinking water, and is using their private well for landscaping purposes. The wells were tested and no contamination from the Site was detected.

- The BHC is currently working with the EPA to get the Institutional Controls in place. The BHC owns two abutting properties to the Site.

- A 98-acre vacant parcel on the east side of the Site is currently being developed. This parcel will eventually be a 17-lot subdivision. A 5-lot subdivision was completed in 2012. Both properties are upgradient to the Site and are using the public waterline.

- New manhole covers were installed.

- In 2011, there were several major storm events that caused some damage on the Site, including sloughing. A 60-foot by 40-foot topsoil area moved 10 feet forward. To repair the damage, the topsoil was pulled back and replaced.

Ms. Sheila Gleason, Project Manager at the CTDEEP, was interviewed in August 2013 and has no significant concerns at this time.

On June 12, 2013, Mr. Walter Opuszynski, Superintendent of the Beacon Falls POTW, was interviewed regarding the Site. Mr. Opuszynski did have many concerns, specifically concerning the POTW, which are as follows:

- There are issues concerning the drainage system pipe. The pipe is too small, which necessitates frequent maintenance. During pipe cleaning activities, the wastewater treatment plant detects higher levels of iron and manganese.

- Excess iron and manganese is reducing the effectiveness of the ultraviolet system, used for disinfection. The treatment plant is currently overdosing the ultraviolet system to meet permit requirements.

- A new phosphorus removal requirement at the POTW is currently being discussed. Mr. Opuszynski is concerned that the addition of leachate to the system will not allow the POTW to meet the phosphorus requirements.

- A future (National Pollutant Discharge Elimination System) NPDES permit for the wastewater treatment plant is planned. The cost to make the requirements set forth in the permit might be high, since more treatment will be needed due to the leachate.

- A phosphorus and nitrogen upgrade is scheduled for the plant.

- The POTW received a permit violation in 2012, which could be due to the disinfection system not working optimally (due to the leachate).

- Leachate flow has not been reduced.

Ms. Sheila Gleason, the CT DEEP site manager, was interviewed on August 13, 2013 to discuss conditions at the Site with respect to the Five-Year Review. Ms. Gleason indicated that the Site was in the operations and maintenance phase. She indicated that there have been issues with the groundwater collection system, and that the lines required periodic flushing. She suggested that the O&M activities could be refined. She indicated that the remedy was functioning as expected. When asked about changes at the Site or at surrounding properties,

she indicated that she was unsure about the large parcel abutting the Site, which was previously proposed for development. She stated that while there have been minor revisions to the CT RSRs, these changes will not affect the Site as the remedy is already in place.

7.0 TECHNICAL ASSESMENT

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Yes. Review of documents, evaluation of compiled data, and the inspection results indicate that the remedy is generally functioning as intended in the ROD. The various components of the landfill cover system and leachate collection system are working as designed. The cap and the leachate collection system have reduced the release or migration of contaminants to other environmental media, and have prevented direct contact with or ingestion of contaminants.

The multi-layer cap has achieved the objective for reducing leachate generation by minimizing precipitation infiltration. The cap and leachate collection system together have helped to lower the liquid level within the capped area. Capping has also achieved the objectives to minimize surface runoff and potential direct contact threats. The leachate collection system appears to be functioning as designed by intercepting overburden groundwater migrating from the landfill. However, because of recharge through the bedrock, contaminants continue to be leached from the landfill wastes, which may migrate out of the landfill through the overburden unit and through bedrock fractures underlying the Site. This was apparent in 2011, where the liquid level within the capped area increased due to major storm events at the Site. This increase in the water table mobilized certain contaminants in the capped area, which were identified in the 2011 and 2012 sampling program. It appears that the severity of a storm has a direct correlation with an increase in saturated waste in the landfill, therefore increased contaminant mobilization. A waterline was installed and a safe drinking water supply was provided to local area residents during the Remedial Action (1989 and 1994). While five residences were identified to still have private wells on their property, well testing show there are no exceedences of protective standards

The BHC has been performing O&M, environmental monitoring, and routine Site inspections as required by the remedy. The results of these activities have been submitted to and reviewed by EPA and its technical consultant. Review of the records and Site observations indicate that the

cap and leachate collection system have been well-maintained and required repairs are made in a timely manner. Issues identified during the routine Site inspections have been corrected or are continuing to be monitored.

Review of the available data indicates that the hydrogeological setting of the landfill precludes eliminating all leachate generation in the long-term. Upgradient groundwater enters the Site along the landfill's eastern perimeter through both the overburden and through the bedrock fractures underlying the landfill when the vertical gradient is upwards. Contaminants are leached periodically from the landfill waste materials and there is limited migration away from the landfill through bedrock fractures during downward vertical gradient conditions. Contaminated groundwater is also migrating to a limited extent out of the overburden, as indicated by the presences of VOCs and SVOCs downgradient to the Site. The water table has been lowered approximately 18.5 feet, since monitoring in TH-10 began in 1997. Past hydrogeologic studies have indicated that extracting (pumping) groundwater from the shallow and deep bedrock has limited effect on leachate capture. However, the ROD objective to minimize leachate generation has been met.

During this review, evaluation of the landfill cap and the leachate collection system did not identify any substantive opportunities for system optimization. The landfill cap and leachate collection system continue to function as designed.

The maintenance program should be continued as designed, including monitoring the leachate seeps and surrounding leachate collection system components to ensure proper leachate system operation and to document and changes in the seep characteristics.

Current Institutional Controls include the public supply of water to nearby residents as well as Site fencing to prevent unauthorized access. Institutional Controls to restrict groundwater use for areas affected by Site contamination in an effort to protect human health have not yet been implemented. While all data indicate the remedy is protective in the short-term these controls must be finalized in order to make a long-term protectiveness determination.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

Yes. As described in this section, the exposure assumptions, toxicity data, cleanup levels and Remedial Action Objectives used at the time of the remedy selection are still valid because changes do not impact remedy protectiveness.

The 1990 ROD established soil clean-up goals protective of the aquifer based on the MCLs or in the absence of an MCL, toxicity values or practical quantitation limits. Although some of these values have been revised, changes to MCLs and toxicity values do not affect the protectiveness of the remedy because the remedy relies on providing an alternate safe drinking water source, Institutional Controls, and prevention of direct contact with soil. The RAOs used at the time of the remedy selection are still valid.

The migration of VOCs from groundwater to indoor air (vapor intrusion) was not evaluated prior to the ROD. Consideration of this pathway is discussed below.

Institutional Controls prohibiting groundwater use as drinking water at neighboring properties are not in place. Some neighboring property owners (upgradient and cross gradient of the Site) have not connected to the public water supply system and sporadic groundwater concentrations at some locations along the perimeter of the Site slightly exceed drinking water standards.

<u>Changes in Standards or To Be Considered Standards TBCs</u>

The 1985 ROD identifies the following laws, regulations and guidance as applicable to the remedy. Changes in standards since the 1985 ROD do not change the protectiveness of the remedy.

- Resource Conservation and Recovery Act (RCRA) Part 264. The landfill cap and all subsequent repairs and modifications to the cap were designed in accordance with applicable RCRA requirements. EPA approved the cap on September 9, 1998, and the BHC continues to perform O&M as necessary. Groundwater monitoring is performed in

accordance with the RCRA Groundwater Protection Standard specified in 40 CFR 264.97.

- Clean Water Act. Leachate from the landfill is conveyed by pipe to the Town of Beacon Falls Publicly Owned Treatment Works (POTW) where it is commingled with other wastes, then treated in accordance with regulatory criteria.

- Clean Air Act. Air pollution regulatory authority has been delegated to the State. Landfill gas emissions at the Site, while estimated to exceed allowable State air standards, are exempted from air pollution controls due to the age of the landfill.

- Safe Drinking Water Act; EPA Groundwater Protection Strategy. New applicable or relevant and appropriate requirements (ARARs) promulgated since the 1985 ROD and 1990 sROD include Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs). The 1985 ROD specified groundwater clean-up levels based on MCLs, background, or alternate concentration levels. The MCLs, listed in the 1990 sROD for establishing soil clean-up goals (based on leaching calculations) protective of the aquifer, continue to be valid, with the exception of the MCLG for toluene, which has been reduced from 2,000 µg/L to 1,000 µg/L. At the time of the 1990 sROD, there were no MCLs for BEHP, acetone, 2-butanone, 4-methyl 2-pentanone, or bis-2-chloroethylether. Therefore, soil clean-up values for BEHP were based on 3 microgram per liter (µg/L), which was considered to represent a cancer risk level of 10^{-6}; clean-up levels for acetone, 2-butanone, or 4-methyl 2-pentanone were set based on their non-cancer toxicity values; and clean-up levels for bis-2-chloroethylether were set based on its practical quantitation limit (PQL). Currently, the MCL for BEHP is 6 µg/L. There are still no MCLs for acetone, 2-butanone, 4-methyl 2-pentanone, or bis-2-chloroethylether; however, EPA Regional Screening Levels (RSLs) for tapwater based on 10^{-6} cancer risk levels or the current non-cancer toxicity values are available. These changes in MCLs and toxicity values do not affect the protectiveness of the remedy because the remedy relies on providing an alternate safe drinking water source, institutional controls, and prevention of direct contact with soil. Although some neighboring property owners have not connected to the public water supply system, because current concentrations of toluene, acetone, 2-butanone, 4-methyl 2-pentanone, and bis-2-chloroethylether in groundwater at the Site are below the current MCL and

RSLs, indicating that these chemicals are not leaching from soils into groundwater at unacceptable concentrations, the protectiveness of the remedy is not affected by the changes in MCL and toxicity values.

Newly Promulgated Standards

- Connecticut Remediation Standard Regulations (RSRs) (Section 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies). The RSRs were promulgated in 1996 (amended June 27, 2013) and contain numeric and narrative standards for soil and groundwater remediation, and take into consideration factors that include land use, groundwater classification, and proximity to sensitive receptors. The Groundwater Protection Criteria (GWPC) of the RSRs identifies the numeric chemical concentrations to be attained for groundwater plume remediation in GA and GB aquifers. Bedrock groundwater is sampled, analyzed, and evaluated against the RSR GWPC under the Site's long-term monitoring program.

  For a groundwater plume that discharges to a surface water body, the numerical limits established under the SWPC or the RSRs must be attained. Because groundwater discharges to the Wetland Mitigation Area and Orchard Pond in the vicinity of the landfill, it is possible that some groundwater contaminants could migrate into this surface water body. Evaluation of the 2011 and 2012 groundwater data with respect to the SWPC indicates the presence of zinc at MW-12 and MW-22 at concentrations in excess of the SWPC in the vicinity of the groundwater discharge. In addition, concentrations of PAHs in excess of the SWPCs are reported at MW-21. However, the occurrence of concentrations of PAHs exceeding the SWPC is sporadic, indicating that they are unlikely to represent a significant threat to the wetlands.

  Groundwater containing VOCs within 15 feet of the ground surface or an occupied industrial or residential structure need to comply with the vapor criteria (VC). However, no VOCs were observed to exceed the RSR VC during this Five-Year Review. If contaminated overburden groundwater is determined to be migrating off-Site and may be affecting downgradient residences, then these regulations will be applicable.

In addition to the ARARs noted in the ROD, current EPA guidance was reviewed for changes that may impact the protectiveness of the remedy. Of particular note is the issuance of the EPA Vapor Intrusion Guidance (EPA, 2002) and the follow-up *Vapor Intrusion Screening Level (VISL) Calculator* (EPA, 2012). The vapor intrusion pathway was not considered at the time of the remedy. Further consideration of this pathway is discussed below.

Changes in Exposure Pathways

The exposure pathways considered in the public health and environmental analysis performed during the 1985 RI/FS included: residential use of groundwater; direct contact with leachate; inhalation of contaminants from soil, groundwater, surface water, and leachate by workers; and consumption of fish. Completion of the landfill cap, leachate collection system, absence of occupied buildings on-Site, and security fence have addressed these pathways, with the exception of on-Site groundwater ingestion. This pathway will be address through the implementation of Institutional Controls. Indoor inhalation of VOCs resulting from a vapor intrusion pathway was not evaluated in the 1985 RI/FS.

Current and past analytical data indicate the presence of VOCs in bedrock groundwater along the northwestern portion of the landfill perimeter. However, comparison of recent groundwater data from both overburden and bedrock wells to EPA 2012 VISLs based on protection of indoor air, indicate no VOCs present at levels of concern for the vapor intrusion pathway; except for the presence of benzene at TH-10 in the center of the landfill, far from nearby occupied buildings. Of minor consideration is the observation that detection limits for vinyl chloride slightly exceed the screening level of 0.14 µg/L for residential exposures via the vapor intrusion pathway. A lower detection limit would provide assurance that vinyl chloride is not present at concentrations of potential concern. However, since all residences are located outside the zone of impacted groundwater, efforts to achieve lower detection limits are not recommended. Continued monitoring of shallow groundwater data with comparison of data to EPA VISLs is recommended to assure the protectiveness of the remedy in regard to the vapor intrusion pathway.

In summary, the evaluation indicates that outstanding risk pathways associated with potential off-Site migration of contaminated groundwater are not believed to be a current or future potential concern at the Site.

Changes in Toxicity and Other Contaminant Characteristics

Since development of the original 1985 RI/FS public health and environmental assessment, EPA has re-examined and updated toxicity factors for each of the contaminants evaluated. In addition, since the 1985 ROD and the 1990 sROD, toxicity factors used in developing MCLs, MCLGs, and risk-based groundwater concentrations, which were the basis for the soil clean-up goals, have been updated for several of the contaminants. Changes in these toxicity factors do not affect the remedy because of its reliance on an alternate safe drinking water source, and prevention of direct contact with soil, which minimizes the impacts of updated toxicity factors.

Changes in Risk Assessment Methods

Since development of the original 1985 RI/FS public health and environmental risk assessment and the 1985 ROD, changes have occurred in the methodology used to calculate risks from exposures to soil and groundwater (including the additional pathways of dermal contact and inhalation discussed above) and the methods for evaluating the vapor intrusion pathway. However, changes in risk assessment methods do not affect the remedy because of its reliance on an alternate safe drinking water source, Institutional Controls, and prevention of direct contact with soil which significantly minimizes the effects due to updated risk assessment methods.

New Contaminants and/or Contaminant Sources

One new contaminant of potential concern has been identified: 1,4-dioxane has been identified at many other sites where chlorinated solvents have been disposed of. 1,4-dioxane was commonly used as a chlorinated solvent stabilizer to prevent product degradation. BHC has agreed to sample select monitoring wells and analyze for 1,4-dioxane in 2013. EPA and the CT DEEP will evaluate the results to determine what future measures are necessary, as appropriate. While 1,4-dioxane has not been evaluated at the Site, even if present, is unlikely to pose any additional threat to human health due to the use of municipal water.

No other new contaminants or contaminant sources have been identified since startup of the remedy. The contaminants detected at highest concentrations in groundwater samples are

those identified in the ROD as contaminants of concern. No toxic byproducts of the remedy were identified during the review.

Expected Progress Towards Meeting RAOs

The remedy is progressing and the RAOs are generally being attained. The landfill cap and leachate collection system have reduced the release of contaminants from the landfill to groundwater, surface water, sediments, soils, and air. Capping and fencing are preventing potential direct human contact with contaminated soils in the source area. The provision of the public water distribution system to nearby homes along Blackberry Hill Road and Skokorat Road has reduced exposures to groundwater as the primary drinking water source at the majority of homes in the area identified during the time of the 1985 ROD. New homes built in the vicinity of the Site and those planned or still under construction are connected to the public water distribution system.

Groundwater concentrations exceeding drinking water standards at monitoring wells MW-10, MW-11, MW-14, MW-19, and MW-21 indicate that contaminants are bypassing the perimeter leachate collection system and continuing to be present downgradient from the Site. There are five private residential supply wells located upgradient or cross gradient of the Site, however they are all located outside of the zone of contaminated groundwater and are not considered reasonable receptors. Additionally, well testing at these residences show no exceedences of any cleanup standards. Groundwater Monitoring results from samples collected at perimeter wells will continue to be evaluated to confirm that the contaminated plume has not migrated off-Site, as well as to compare to CT RSR VC and the EPA VISL's to address any potential vapor intrusion concerns.

7.3 Question C: Has Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

Yes. Construction of a 17-unit development to the northeast of the Site is ongoing to the East of the Site (Figure 3, Appendix A). Currently, 8 houses have been built and are in use within this development. In 2012, located to the north of the Site, a 5-lot subdivision was completed and is in use (Figure 3, Appendix A). These residential developments could potentially affect the

protectiveness of the remedy. No private water supply wells or passive vapor foundations were installed in either residential development. There are currently no off-Site monitoring wells between the Site and the residential development; however, no vapor intrusion issues were identified at the perimeter of the Site based on groundwater data. Since the 1985 ROD and the 1990 sROD, more residential structures have been built along Blackberry Hill Road and Skokorat Road. While many residential units are connected to a public water supply, information obtained from the Aquarion Water Company indicates that there are homes in the vicinity of the Site that are not customers. In 2009, the BHC conducted a potable well receptor survey, which identified the five residential properties using private supply wells. Of these five residential properties, one is connected to the waterline, but continues to have a private well for landscaping purposes. The private supply wells at these five properties were tested for VOCs and SVOCs and no contamination was identified.

Continued development of parcels adjacent to the Site has the potential to affect the local groundwater flow regime. Potential effects of local development include: an increase in the amount of water discharged to the subsurface through septic discharge if there is no sewerage; the elimination of trees and other vegetated areas allow for more complete infiltration of precipitation (eliminating uptake); and the regrading of these parcels, which could potentially alter the physical behavior as well as the geochemistry of the flow systems. These concerns will be addressed through continued groundwater monitoring evaluation of activities surrounding the Site. As these residences are upgradient and outside of the Site's IC area, no current or long-term protectiveness issues have been identified. Regardless, BHC should continue to monitor the activities surrounding the Site and complete a well receptor survey as a part of each future Five-Year Review.

7.4 Technical Assessment Summary

Based on the data reviewed, Site inspections and stakeholder interviews, the remedy is currently functioning as intended by the ROD. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. While there have been changes to the ARARs cited in the ROD, updates in toxicity factors and chemical characteristics, and updated risk assessment methods, the remedy is still effective because capping and provision of the waterline prevent potential exposure to contaminated landfill materials and ingestion of groundwater contaminants by the majority of potentially impacted

individuals. Those residences not connected to the public water supply system are not impacted (or anticipated to be) by Site groundwater contamination due to the effective implementation and operation of the remedy which largely limits plume migration.

Most of the contaminated overburden groundwater migrating from the landfill is being captured by the perimeter leachate collection system. While contaminated groundwater appears to periodically still migrate downwards into the fractured bedrock and downgradient beyond the influence of leachate collection system, data show that there are no off-site exceedences of cleanup standards and no indication that periodic migration of low-level COCs could affect bedrock drinking water wells beyond the IC zone. The vapor intrusion pathway has been evaluated during this Five-Year Review and has been determined not to be an issue of concern.

8.0 ISSUES

Based on the activities conducted during this Five-Year Review, the issue identified in Table 8-1 has been noted.

Table 8-1
Issues
Beacon Heights Landfill Superfund Site
Beacon Falls, Connecticut

Issues	Affects Current Protectiveness	Affects Future Protectiveness
Institutional Controls to restrict land and groundwater use at the Site have not been implemented.	No	Yes

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issue noted above, it is recommended that the action listed in Table 9-1 be taken:

Table 9-1
Recommendations and Follow-up Actions
Beacon Heights Landfill Superfund Site
Beacon Falls, Connecticut

Issue	Recommendation and Follow-up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Institutional Controls have not not implemented.	Implement all necessary Institutional Controls.	PRP (BHC)	EPA & CT DEEP	12/31/2015	No	Yes

10.0 PROTECTIVENESS STATEMENT(S)

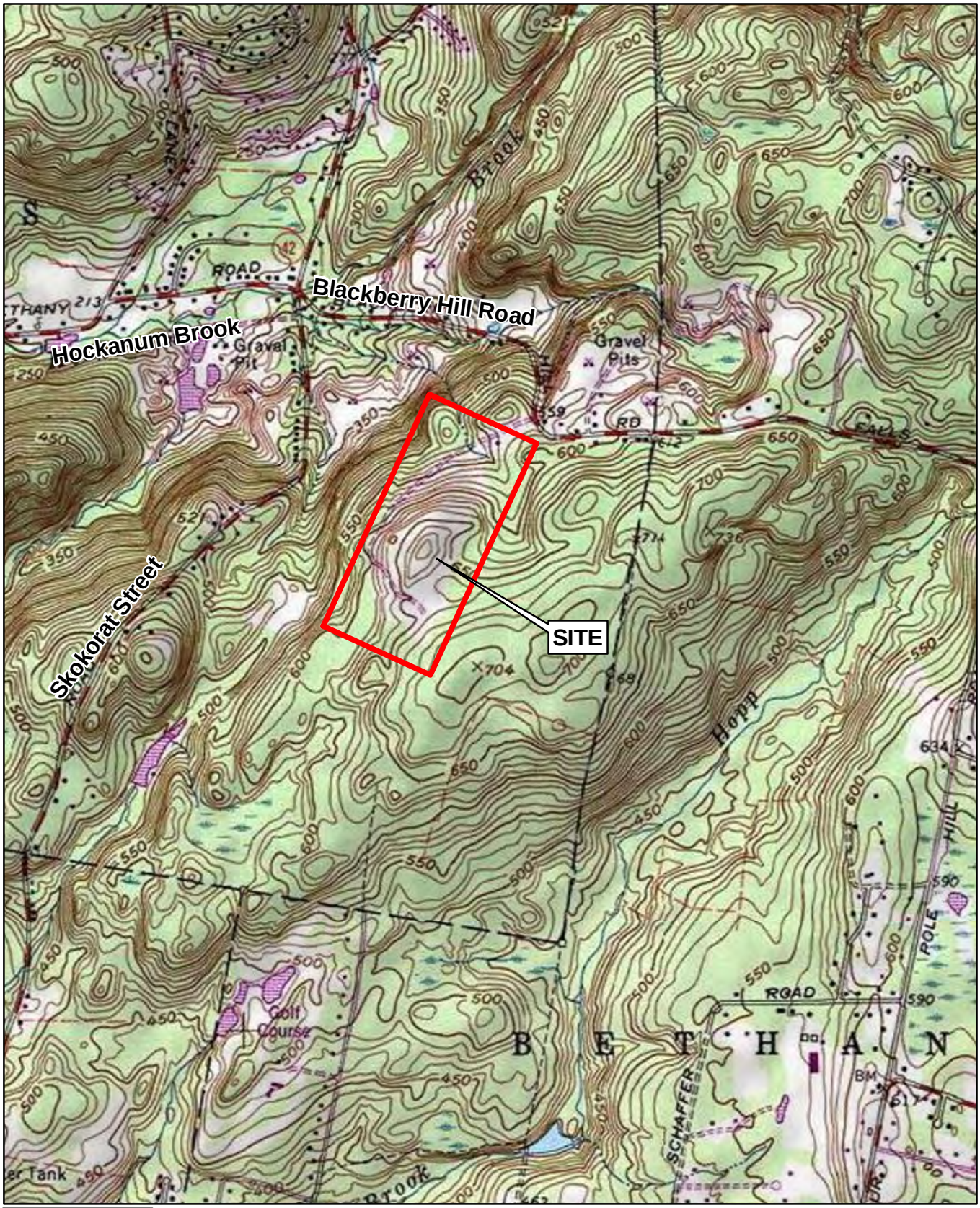
The remedy is currently protective of human health and the environment because: (1) the cap is preventing direct contact exposures to landfill contaminants and minimizes contaminant migration; (2) the leachate collection system is containing the majority of groundwater contaminants on-Site; and (3) the waterline installed along Blackberry Hill Road and Skokorat Road helps to ensure that most nearby residents are not exposed to potential Site groundwater contamination. To make a long-term protectiveness determination Institutional Controls must be implemented.

11.0 NEXT REVIEW

The next Five-Year Review will be conducted by September 2018, since hazardous substances, pollutants, or contaminants remain at the Site above levels that are considered protective of human health and the environment.

APPENDIX A

SITE FIGURES



Map Location

USGS Topographic Map
Naugatuck, Conn.
Revised 1984

0 500 1,000 2,000
Feet
1 inch = 2,000 feet

N

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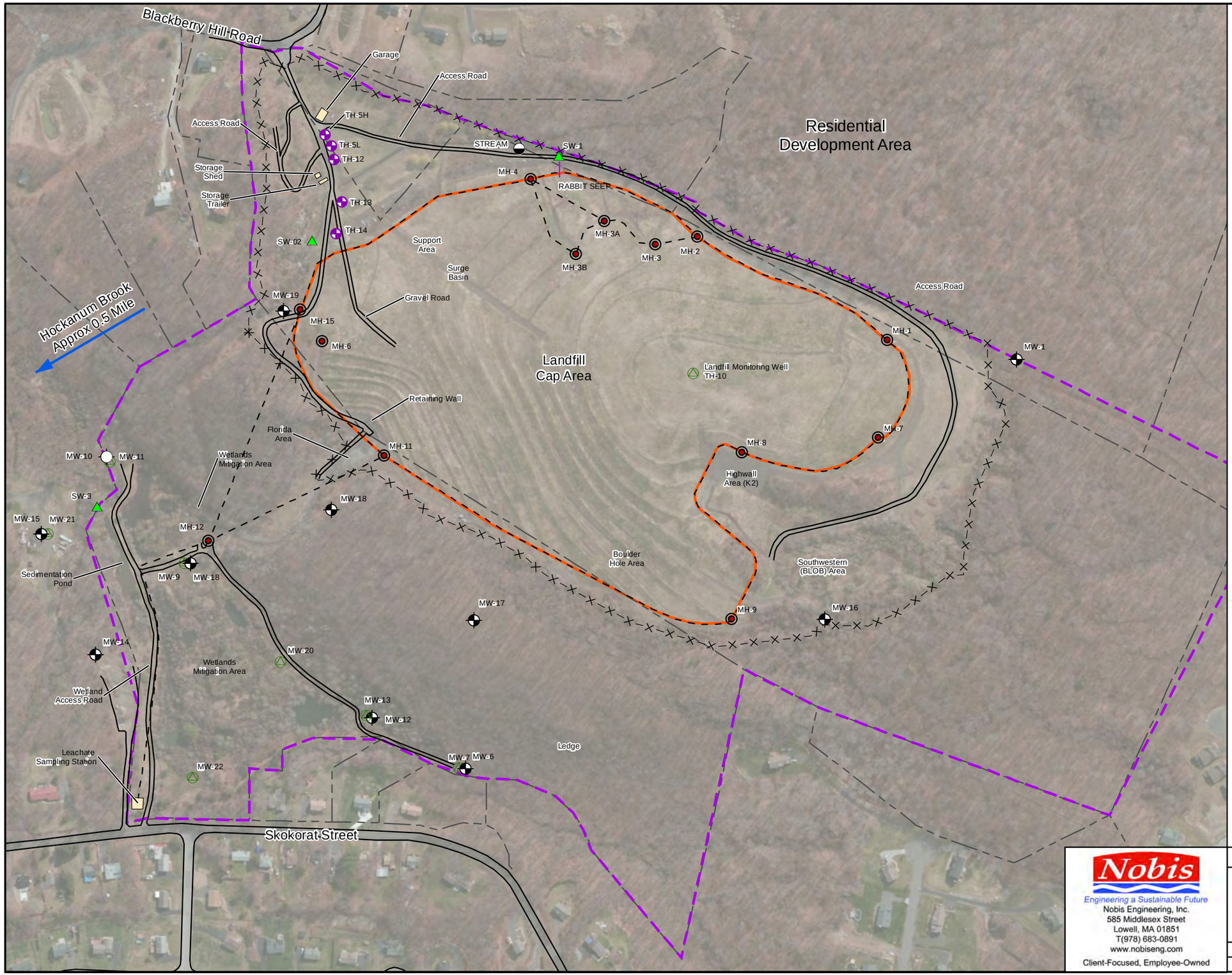
FIGURE 1

SITE LOCUS
BEACON HEIGHTS LANDFILL
HUNTERS MOUNTAIN ROAD
NAUGATUCK, CONNECTICUT

PREPARED BY: JH | CHECKED BY: LC
PROJECT NO. 80087 | DATE: JUNE 2013



Notes:

1. This site plan was developed from a plan by Arcadis.

2. Locations of site features depicted hereon are approximate and given for illustrative purposes only.

Legend

- Manhole
- Bedrock Monitoring Well
- Monitoring Well
- Overburden Monitoring Well
- Seep Monitoring Location
- Stream Sample Location
- Surface Water Monitoring Location
- Landfill Cap Area
- Building
- Boundary of Properties Owned by Beacon Heights Coalition and Beacon Heights, Inc.
- Property Line
- Edge of Pavement
- Approx. Leachate Collection System
- Fence

0 100 200 400

Feet

1 inch = 300 feet

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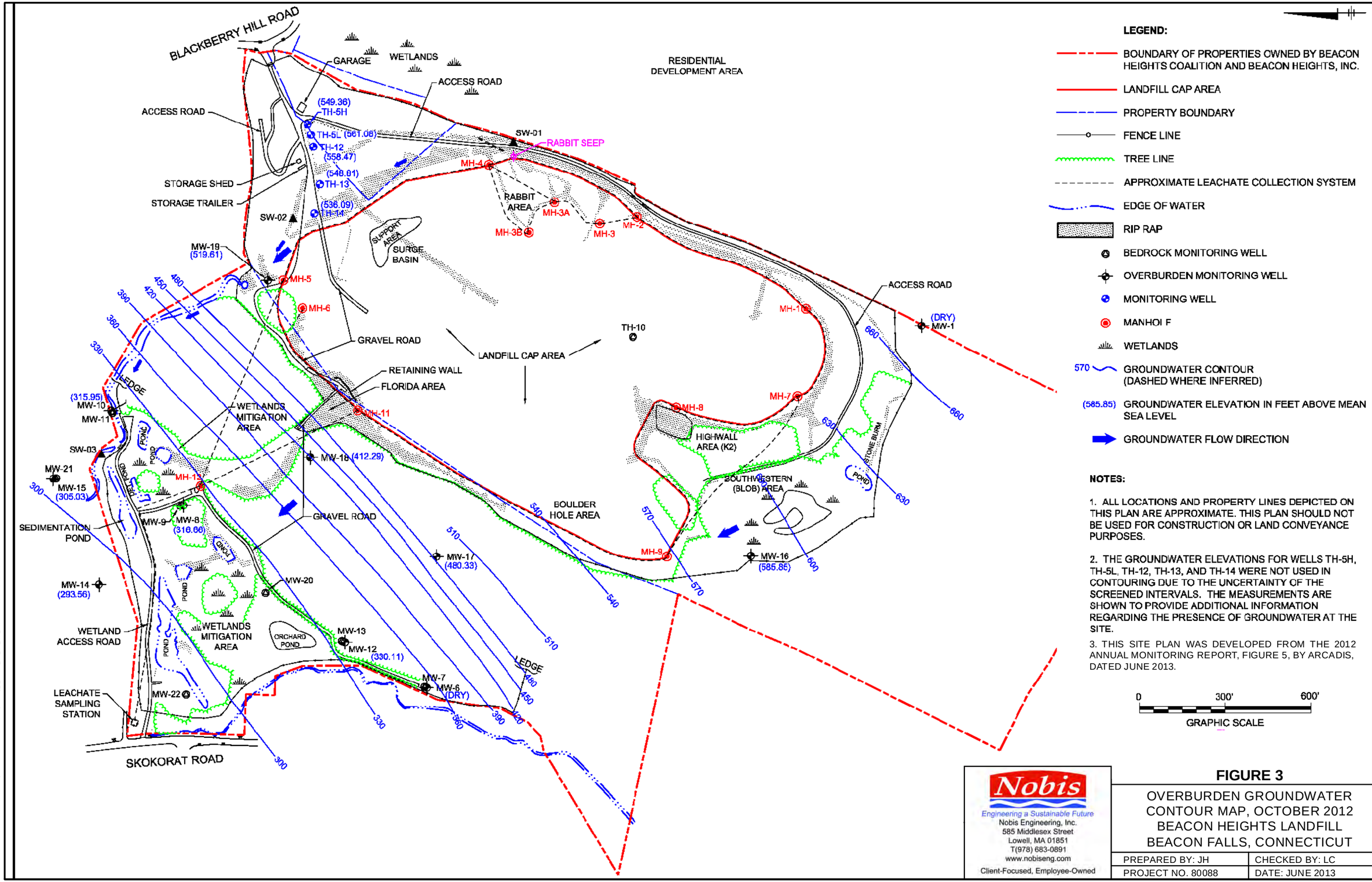
FIGURE 2

SITE PLAN
BEACON HEIGHTS LANDFILL
BEACON FALLS, CONNECTICUT

PREPARED BY: JH	CHECKED BY: LC
PROJECT NO. 80088	DATE: JUNE 2013



LEGEND:

- BOUNDARY OF PROPERTIES OWNED BY BEACON HEIGHTS COALITION AND BEACON HEIGHTS, INC.
- LANDFILL CAP AREA
- PROPERTY BOUNDARY
- FENCE LINE
- TREE LINE
- APPROXIMATE LEACHATE COLLECTION SYSTEM
- EDGE OF WATER
- RIP RAP
- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- MONITORING WELL
- MANHOLE
- WETLANDS
- 570 GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
- (585.85) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL LOCATIONS AND PROPERTY LINES DEPICTED ON THIS PLAN ARE APPROXIMATE. THIS PLAN SHOULD NOT BE USED FOR CONSTRUCTION OR LAND CONVEYANCE PURPOSES.
2. THE GROUNDWATER ELEVATIONS FOR WELLS TH-5H, TH-5L, TH-12, TH-13, AND TH-14 WERE NOT USED IN CONTOURING DUE TO THE UNCERTAINTY OF THE SCREENED INTERVALS. THE MEASUREMENTS ARE SHOWN TO PROVIDE ADDITIONAL INFORMATION REGARDING THE PRESENCE OF GROUNDWATER AT THE SITE.
3. THIS SITE PLAN WAS DEVELOPED FROM THE 2012 ANNUAL MONITORING REPORT, FIGURE 5, BY ARCADIS, DATED JUNE 2013.

0 300' 600'

GRAPHIC SCALE

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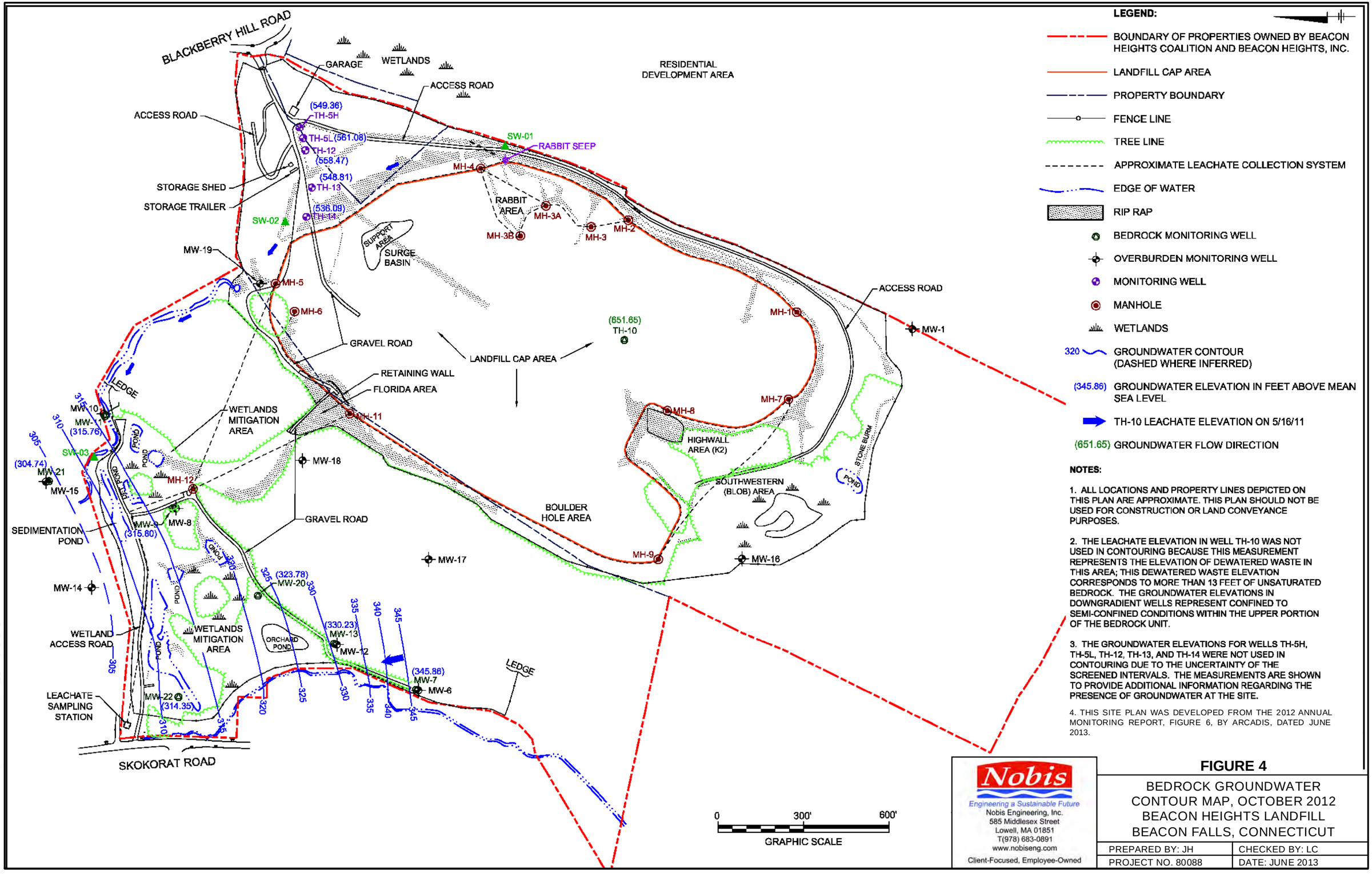
FIGURE 3

OVERBURDEN GROUNDWATER CONTOUR MAP, OCTOBER 2012
BEACON HEIGHTS LANDFILL
BEACON FALLS, CONNECTICUT

PREPARED BY: JH	CHECKED BY: LC
PROJECT NO. 80088	DATE: JUNE 2013



LEGEND:

- BOUNDARY OF PROPERTIES OWNED BY BEACON HEIGHTS COALITION AND BEACON HEIGHTS, INC.
- LANDFILL CAP AREA
- PROPERTY BOUNDARY
- FENCE LINE
- TREE LINE
- APPROXIMATE LEACHATE COLLECTION SYSTEM
- EDGE OF WATER
- RIP RAP
- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- MONITORING WELL
- MANHOLE
- WETLANDS
- 320 GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
- (345.86) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- TH-10 LEACHATE ELEVATION ON 5/16/11
- (651.65) GROUNDWATER FLOW DIRECTION

NOTES:

1. ALL LOCATIONS AND PROPERTY LINES DEPICTED ON THIS PLAN ARE APPROXIMATE. THIS PLAN SHOULD NOT BE USED FOR CONSTRUCTION OR LAND CONVEYANCE PURPOSES.

2. THE LEACHATE ELEVATION IN WELL TH-10 WAS NOT USED IN CONTOURING BECAUSE THIS MEASUREMENT REPRESENTS THE ELEVATION OF DEWATERED WASTE IN THIS AREA; THIS DEWATERED WASTE ELEVATION CORRESPONDS TO MORE THAN 13 FEET OF UNSATURATED BEDROCK. THE GROUNDWATER ELEVATIONS IN DOWNGRADIENT WELLS REPRESENT CONFINED TO SEMI-CONFINED CONDITIONS WITHIN THE UPPER PORTION OF THE BEDROCK UNIT.

3. THE GROUNDWATER ELEVATIONS FOR WELLS TH-5H, TH-5L, TH-12, TH-13, AND TH-14 WERE NOT USED IN CONTOURING DUE TO THE UNCERTAINTY OF THE SCREENED INTERVALS. THE MEASUREMENTS ARE SHOWN TO PROVIDE ADDITIONAL INFORMATION REGARDING THE PRESENCE OF GROUNDWATER AT THE SITE.

4. THIS SITE PLAN WAS DEVELOPED FROM THE 2012 ANNUAL MONITORING REPORT, FIGURE 6, BY ARCADIS, DATED JUNE 2013.

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FIGURE 4

BEDROCK GROUNDWATER CONTOUR MAP, OCTOBER 2012 BEACON HEIGHTS LANDFILL BEACON FALLS, CONNECTICUT

PREPARED BY: JH	CHECKED BY: LC
PROJECT NO. 80088	DATE: JUNE 2013

MW-21				
Date	2009	2010	2011	2012
Bis(2-C)E	•			
Iron(Total)	•	•	•	•
Manganese(Total)		•	•	•
BaA				••
BbF				••
BkF				••
BaP				•••
IndP				•
DahA		Text		•

TH-10				
Date	2009	2010	2011	2012
Arsenic		•	•	
Benzene		•	••	
Iron(Total)	•	•	•	•
Manganese(Total)	•	•	•	•
Phenanthrene			•	
BaA			••	••
BbF			••	••
BkF			•	•
BaP			•••	•••
IndP			•	•
DahA			•	•

MW-11				
Date	2009	2010	2011	2012
Benzene	•	•		
Iron		•		
Manganese(Total)	•	•	•	•

MW-20				
Date	2009	2010	2011	2012
Iron(Total)	•	•	•	•
Manganese(Total)		•		•

MW-22				
Date	2009	2010	2011	2012
Zinc(Total)	•	•	•	
Iron(Total)	•	•	•	•
Manganese(Total)	•	•		

Notes:

1. This site plan was developed from the 2012 Annual Monitoring Report by Arcadis, dated June 2013.

2. Exceedances are based on the maximum concentration detected of the two semiannual sampling events. The screening criteria are indicated below.

3. Location of site features depicted hereon is approximate and given for illustrative purposes only.

Legend

- Manhole
- Bedrock Monitoring Well
- Monitoring Well
- Overburden Monitoring Well
- Seep Monitoring Location
- Stream Sample Location
- Surface Water Monitoring Location
- Landfill Cap Area
- Building
- Boundary of Properties Owned by Beacon Heights Coalition and Beacon Heights, Inc.
- Property Line
- Edge of Pavement
- Approx. Leachate Collection System
- Fence

RSR Exceedances
- GA Groundwater Protection Criteria
- Surface Water Protection Criteria
- Residential Volatization Criteria

National Drinking Water Standard Exceedances
- USEPA Maximum Contaminant Level

0 100 200 400
Feet
1 inch = 300 feet

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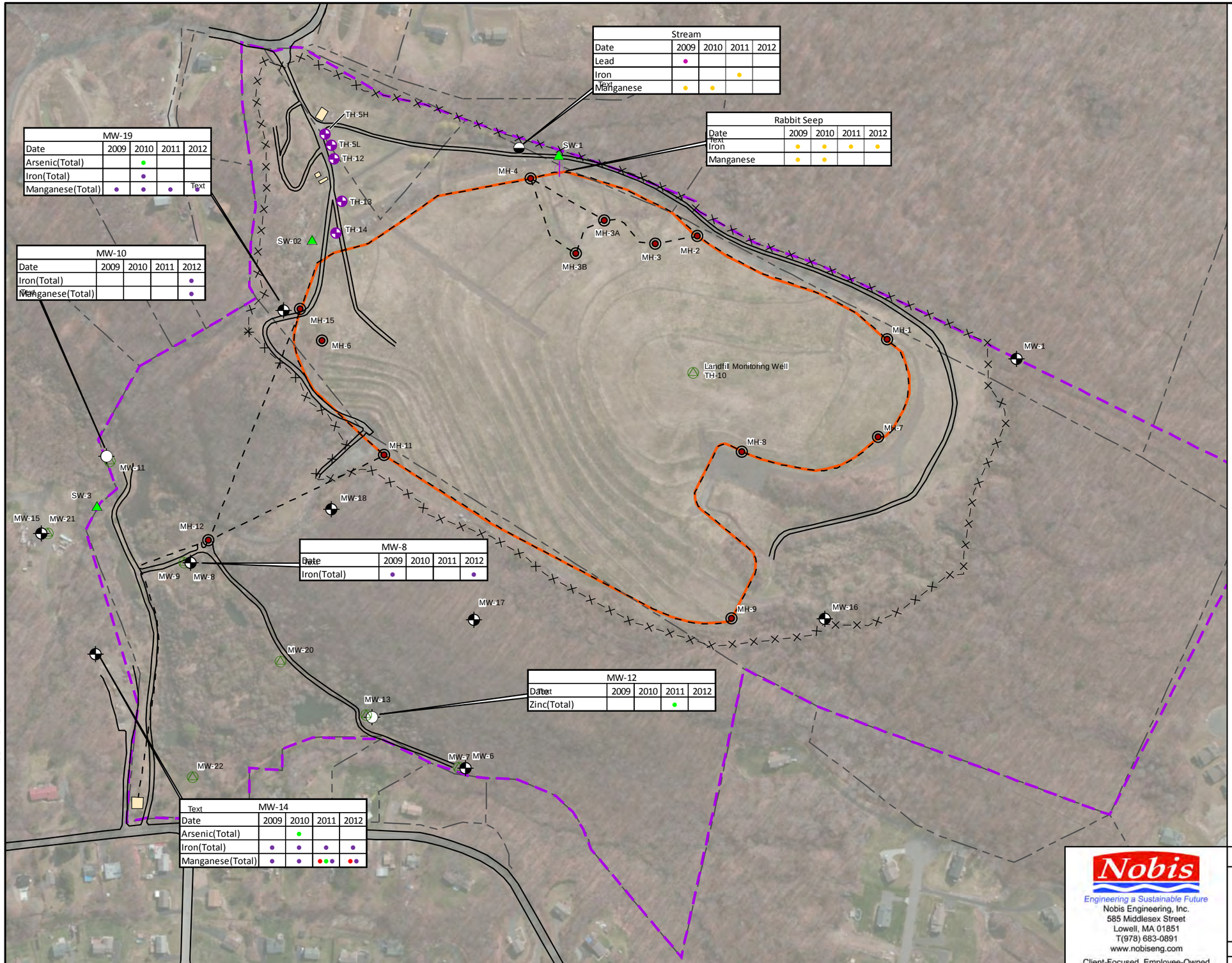
FIGURE 5

BEDROCK GROUNDWATER RESULTS
BEACON HEIGHTS LANDFILL
BEACON FALLS, CONNECTICUT

PREPARED BY: JH	CHECKED BY: LC
PROJECT NO. 80088	DATE: JUNE 2013



Notes:

1. This site plan was developed from the 2012 Annual Monitoring Report by Arcadis, dated June 2013.

2. Exceedances are based on the maximum concentration detected of the two semiannual sampling events. The screening criteria are indicated below.

3. Location of site features depicted hereon is approximate and given for illustrative purposes only.

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- Landfill Cap Area
- Building
- Boundary of Properties Owned by Beacon Heights Coalition and Beacon Heights, Inc.
- Property Line
- Edge of Pavement
- Approx. Leachate Collection System
- Fence

RSR Exceedances
- GA Groundwater Protection Criteria
- Surface Water Protection Criteria
- Residential Volatization Criteria

National Drinking Water Standard Exceedances
- USEPA Maximum Contaminant Level

EPA
- National Recommended Water Quality Criteria (NRWQC)

CT DEEP
- Water Quality Standards for Chronic Freshwater Aquatic Life Criterial (WQS)

0 100 200 400
Feet
1 inch = 300 feet

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FIGURE 6

OVERBURDEN GROUNDWATER RESULTS BEACON HEIGHTS LANDFILL BEACON FALLS, CONNECTICUT

PREPARED BY: JH	CHECKED BY: LC
PROJECT NO. 80088	DATE: JUNE 2013

APPENDIX B

DOCUMENT REVIEW LIST/REFERENCES

DOCUMENTS REVIEWED/REFERENCES CITED

Arcadis, 2010. *Semi-Annual O&M Report – July 1 through December 31, 2009.* Arcadis, March 31, 2010.

Arcadis, 2010. *2009 Annual Monitoring Report.* Arcadis, June, 2010.

Arcadis, 2010. *Semi-Annual O&M Report – First Half 2010.* Arcadis, October 1, 2010.

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Arcadis, 2011. *Semi-Annual O&M Report – First Half 2011.* Arcadis, September 26, 2011.

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Arcadis, 2013. *Semi-Annual O&M Report – Second Half 2012, Appendix D.* Arcadis, 2013.

Arcadis, 2013. *2012 Annual Monitoring Report.* Arcadis, June 14, 2013.

EPA, 1985. EPA Superfund *Record of Decision.* Beacon Heights Landfill, OU 01, Beacon Falls, CT. Environmental Protection Agency. September 23, 1985. (CTD072122062).

EPA, 2001. *Comprehensive Five-Year Review Guidance.* Environmental Protection Agency. June 2001. (EPA 540-R-01-007, OSWER No. 9355.7-03B-P).

EPA, 2008. *Five Year Review Report.* Environmental Protection Agency. September 17, 2008.

LFR, 2009. *2008 Annual Monitoring Report.* Levine Fricke, June 12, 2009.

LFR, 2009. *Semi-Annual O&M Report – January 1 through June 30, 2009.* Levine Fricke, October 1, 2009.

Nobis 2009. *Review of the July 2008 Air Sampling Data*. Nobis, March 11, 2009

APPENDIX C

SITE INSPECTION CHECKLIST AND INTERVIEWS

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Beacon Heights Landfill Superfund Site	**Date of inspection:** 5/15/2013
Location and Region: Beacon Falls, CT – Region 1	**EPA ID:** CTD072122062
Agency, office, or company leading the five-year review: EPA	**Weather/temperature:** N/A

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls
- ☑ 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** Russ Dirienzo, P.G., LEP (Name) Remedial Action Coordinator (Title) 7/2/2008 (Date)
   Interviewed ☐ at site ☐ at office ☑ by phone Phone no. (203) 364-9700
   Problems, suggestions; ☑ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   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, etc.) Fill in all that apply.

Agency Town of Beacon Falls
Contact Walter Opuszynski Superintendent of Wastewater Treatment Facility 7/9/2008 860-424-3767
Name Title Date Phone no.
Problems; suggestions; ☑ Report attached

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ 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_____

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
☐ Other_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
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: Barbed wire in some spots to be repaired.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Additional warning signs and posts were added. There was no evidence of vandalism.

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) _____
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
Institutional controls outlined in the Record of Decision (ROD) have not yet been implemented at the Site.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☑ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident
Remarks

2. **Land use changes on site** ☑ N/A
Remarks

3. **Land use changes off site** ☐ N/A
Remarks New houses were identified to the South of the Site.

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 _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☑ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☑ Settlement not evident
Areal 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
Areal extent_____ Depth_____
Remarks _____
_____

4. **Holes** ☐ Location shown on site map ☑ Holes not evident
Areal extent_____ Depth_____
Remarks_____
_____

5. **Vegetative Cover** ☑ Grass ☑ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_ A bare spot was identified near the gas vent. Potentially a deer bedding area. Deer and turkeys were identified at the Site.
_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
Remarks_____
_____

7. **Bulges** ☐ Location shown on site map ☑ Bulges not evident
Areal extent_____ Height_____
Remarks_____
_____

8. **Wet Areas/Water Damage** ☑ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____
_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☑ No evidence of slope instability
Areal 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** ☐ Location shown on site map ☑ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** ☐ Location shown on site map ☑ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☑ No evidence of erosion
Areal extent_____ Depth_____
Remarks:_____
_____

4. **Undercutting** ☐ Location shown on site map ☑ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____
☑ No obstructions
☐ Location shown on site map Areal 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 Areal extent_____
Remarks_____
_____

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. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☑ N/A
Remarks_____
_____

5. **Settlement Monuments** ☑ Located ☐ Routinely surveyed ☑ N/A
Remarks_____
_____

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

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

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 ☑ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal 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
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☑ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** ☑ Functioning ☐ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☑ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   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

Remarks_____

D. 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_____

X. OTHER REMEDIES

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

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 to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is designed to prevent or minimize further release of contaminants in groundwater, surface water, sediments, soil and air. The landfill cover system, leachate collection system, and groundwater extraction system are all in good condition and functioning as designed, therefore accomplished the goal of the remedy.

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.
No issues.

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.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None.

INTERVIEW RECORD

Site Name: Beacon Heights Landfill Superfund Site		**EPA ID No.:**CTD07122062
Subject: Fifth Five-Year Review (2013)		**Time:** 1000 **Date:** 6/11/2013
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☒ Outgoing

Contact Made By:

Name: Michelle Carbonneau	**Title:** Staff Engineer	**Organization:** Nobis Eng., Inc.

Individual Contacted:

Name: Russ Dirienzo, P.G., LEP	**Title:** Principal Geologist; Remedial Action Coordinator	**Organization:** Arcadis
Telephone No: (203) 364-9700 **Fax No:** (203) 364-9800 **E-Mail Address:** russ.dirienzo@arcadis-us.com		**Street Address:** 75 Glen Road, Suite 305 **City, State, Zip:** Sandy Hook, CT 06482

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: The Site is very stable and is protective of human health and the environment. Contamination levels are dropping/stable in downgradient monitoring wells, and have been meeting groundwater quality standards for approximately 2 years. There are groundwater quality standard exceedences in monitoring wells directly within the landfill. Leachate elevation levels within the landfill are dropping slowly, and somewhat stable, which proves that the cap is reducing infiltration. However, there is no reduction in flow from the leachate. There is artesian pressure under the capped landfill, which forces the groundwater to come up into the landfill. During major rain events, the leachate flow drastically increases.

In theory, the landfill was supposed to become dry and produce no more leachate within 20 to 30 years of the cap construction. This lack of flow reduction was originally a problem with the POTW (Publicly Owned Treatment Works). The POTW upgraded their plant to 300,000 gal/day to accept the leachate. The average leachate flow rate is 40,000 gal/day. The landfill rarely produces leachate that exceeds 50,000 gal/day. The highest recorded leachate flow was approximately 70,000 gal/day. The leachate is tested to be in compliance with the discharge permit.

There have been some complaints from the POTW. The POTW recently upgraded their chlorine disinfection system to an ultraviolet system. The POTW was worried about the affects of the leachate on the new system. A study was conducted, which showed that there would be no negative impacts on the ultraviolet system. No further discussions have been had concerning the ultraviolet system.

A new flow meter was installed in September 2012 to replace a 16-year old flow meter. The older flow meter was not recording properly and needed to be replaced. However, during the first few days of the installation, the flow meter wasn't working properly and the original flow meter totalizer was not recorded. This mishap made the Town suspicious that incorrect flows have been reported; therefore a Town meeting occurred where the BHC discussed the issue. The Town accepted this responseThe new meter appears to be more accurate, and a higher flow rate is currently being recorded.

Approximately 12,000,000 gallons of leachate are collected each year.

Q2: Are you aware of any issues the five-year review should focus on?
A2: There are no issues. Since the last Five-Year review, a public well survey was completed. This survey showed that there are no wells within 1000 feet of the property downgradient to the Site. There are 5 properties which are not hooked up to the public water supply. Three properties are upgradient to the Site and are using private water supply wells as potable water. A fourth property is crossgradient to the Site and is using the water for landscaping purposes. The fifth property is using their private supply well for landscaping purposes. These properties have been contacted/offered to be connected to the public water supply, but no property owner has yet switched to the public water suppy. The water at these properties was tested during the last Five-Year Review (2008) and no contamination, related to the Site, was found. 57 properties have been connected to the public water supply.

Q3: Whom should Nobis Engineering, Inc. speak to in the community to solicit local input?
A3: 1st Selectman – Gerry Smith.

Q4: Is the remedy functioning as expected?
A4: The remedy is functioning as expected. Leachate flow rates are not decreasing as predicted. The original concept of decreasing flow rates was a theory. Additionally, institutional controls need to be enacted on the Site. EPA is currently working with BHC to get the institutional controls in place. Harold Murtha owns the Site. The BHC owns two abutting properties, the Nobis and Swan parcel. The Nobis parcel, is 3-acres, which was purchased to give the Site access. The Swan parcel, a 46 acre parcel, is currently being used for wetland mitigation.

Q5: Has there been any significant changes in the O&M activities or a chance to optimize the O&M?
A5: There have been no significant changes. The site is optimizing in the most efficient manner. There is no need to optimize the system.

Q6: Is the Town actively involved in the site?
A6: No, the Town is not actively involved in the Site, however kept aware. The 1st Selectman is notified if there is an incident at the Site. The POTW is notified if the transportation system is going to be flushed.

There are no changes in the sampling plan/monitoring plan. The sampling plan and monitoring plans are fair and reason.

There has been no well redevelopment or decommissioning within the last five-years.

Q7: Do you feel that information related to the site is readily available?
A7: Yes, Site reports are available at the local public library. Every year, Arcadis checks with the library to make sure all files are available. The Reports at the Library include the Semi-Annual reports and the Annual Reports. Site Reports are also sent to the 1st Selectman. There is also a sign on the Site fence that indicates to contact Russ Dirienzo if there are any problems with the Site.

Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned?
A8: Yes, there have been changes in the Site or surrounding property in the last 5 years. A 98-acre vacant parcel on the East side of the Site is currently being developed. This parcel will eventually be a 17 lot subdivision. 8 of the houses are currently complete and are occupied. A 5-lot subdivision was built. All 5 houses are currently occupied. Both developments are upgradient of the Site and hooked up to a public water supply. Currently, in CT, there are regulations that require the use of public water if public water is available. Additionally, there are no vapor intrusion problems at these properties, because there are no CT Remediation Standards (RSRs) exceedences.

There is no ambient air volatilization issues. There are gas vents at the property. Samples are taken at property line and compared to ambient air. Additionally, sample data is compared with past data to see if the trend is decreasing. Currently, the air monitoring suggests that the landfill is well below the permit requirements.

Q9: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2003?
A9: Yes, the CT Remediation Standards (RSRs) are currently going thought revisions. These revisions may lower and increase certain criteria. In all Semi-Annual and Annual Reports, sample data is compared to the lowest standard for a contaminant, whether that be the current, or the proposed standards. The revisions will have no impact on the Site.

Q10: Are you aware of any pending or future water needs or any change in water usage in the area?
A10: There has been no change to the future water needs or any change in water usage in the area. Unsure if more developments can occur due to a lack of area available. The public water line was installed due to the Beacon Heights Landfill.

Q10: Anything else?
A10: There was an upgrade to the Site, which included new manhole covers. Old covers did not have locks, and due to the increase in residential properties surrounding the Site, manholes (10) were replaced with manhole covers which could lock.

In 2011, there were several storm events. These storm events caused some damage to the Site, including slumping. Due to the damage to the storm, the system was upgraded and culverts were added. This 60' x 40' area of topsoil slumped approximately 10' forwards. The topsoil was pulled back and regarded for repair.

INTERVIEW RECORD

Site Name: Beacon Heights Landfill Superfund Site		**EPA ID No.:** CTD07122062
Subject: Fifth Five-Year Review (2013)	**Time:** 1015	**Date:** 6/12/2013
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:**	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: Michelle Carbonneau	**Title:** Staff Engineer	**Organization:** Nobis Eng., Inc.

Individual Contacted:

Name: Walter Opuszynski	**Title:** Superintendent of the Wastewater Treatment Facility	**Organization:** Town of Beacon Falls
Telephone No: (203) 729-2926 **Fax No:** **E-Mail Address:** wpcf@townofbeaconfalls.com	**Street Address:** Town Hall, 10 Maple Ave. **City, State, Zip:** Beacon Falls	

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: The Site looks stable. There are other concerns (which are identified in later questions).

Q2: Are you aware of any issues the five-year review should focus on?
A2: Yes, there many issues that Five-Year Review should focus on.

- There are issues with the drainage system pipe. The pipe is too small (3" or 4") and gets clogged. Due to this, the pipe needs to be flushed (jetted) approximately 4 to 5 times per year. During this pipe cleaning exercise, the wastewater treatment plant sees higher levels of iron and manganese.
- Excessive iron and manganese in the wastewater treatment plan is reducing the effectiveness of the UV system. The waste water treatment plant is consistently overdosing the UV system to meet permit requirements. The UV system is currently running at full (100%) capacity, which is not normal conditions.
- A new phosphorus requirement that the wastewater treatment plant needs to follow is currently being discussed. The leachate may negatively impact the effects of phosphorus removal.
- A future NPDES permit for the wastewater treatment plant is planned. The cost to make the requirements set forth in the permit, due to leachate, will be high.
- There is currently a phosphorus and nitrogen upgrade scheduled for the plant.
- In 2012, the wastewater treatment plant had 1 permit limitation for fecal. This permit violation could be because the UV system isn't working to its full potential.
- Was informed that the leachate flows would eventually decrease. No downward trends (for the leachate) have yet to be observed.

Q3: Whom should Nobis Engineering, Inc. speak to in the community to solicit local input?
A3: The Wetland Board.

Q4: Is the remedy functioning as expected?
A4: Yes, the remedy is functioning as expected. The Site is collecting leachate.

Q5: Has there been any significant changes in the O&M activities or a chance to optimize the O&M?
A5: No. The Site is monitored every day and maintained properly.

Q6: Is the Town actively involved in the site?
A6: The Town is only involved in the Site when something dramatic happens.

Q7: Do you feel that information related to the site is readily available?
A7: Yes. Monthly reports are received.

Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned?
A8: A subdivision is planned on abutting properties. Additionally, there appears to be more activities surrounding the Site.

Q9: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2003?
A9: No.

Q10: Are you aware of any pending or future water needs or any change in water usage in the area?
A10: The only pending future water needs or change in water usage in the area is that there are still residents using wells.

INTERVIEW RECORD

Site Name: Beacon Heights Landfill Superfund Site		**EPA ID No.:**CTD07122062
Subject: Fifth Five-Year Review (2013)		**Time:** 1100 **Date:** 8/13/2013
Type: ☒ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☒ Outgoing

Contact Made By:

Name: Michelle Carbonneau	**Title:** Staff Engineer	**Organization:** Nobis Eng., Inc.

Individual Contacted:

Name: Sheila Gleason	**Title:** Environmental Analyst	**Organization:** CTDEEP
Telephone No: (860) 424-3767 **Fax No:** **E-Mail Address:** Sheila.Gleason@ct.gov	**Street Address:** 79 Elm Street **City, State, Zip:** Hartford, CT 06106	

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: The Site is in its operation and maintenance phase. The Site is moving along in that phase.

Q2: Are you aware of any issues the five-year review should focus on?
A2: No issues.

Q3: Whom should Nobis Engineering, Inc. speak to in the community to solicit local input?
A3: Not aware of anyone in community to solicit local input.

Q4: Is the remedy functioning as expected?
A4: The remedy is believed to be functioning as expected.

Q5: Has there been any significant changes in the O&M activities or a chance to optimize the O&M?
A5: In the past, there have been issues maintaining the groundwater collection system, including pump routinely needing maintenance and lines requiring flushing. This operation and maintenance could possibly be refined.

Q6: Is the Town actively involved in the site?
A6: The Town is not actively involved in the Site.

Q7: Do you feel that information related to the site is readily available?
A7: Yes, information is readily available.

Q8: Have there been any changes in the site or surrounding property in the last 5 years, or are changes planned?
A8: Unsure of the status of a parcel for development near the Site.

Q9: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2003?
A9: Yes. There have been minor revisions to the RSRs, however these changes wouldn't affect the Site because the remedy is already in place.

Q10: Are you aware of any pending or future water needs or any change in water usage in the area?
A10: No.

Q11: Anything else?
A11: No.