Hydrogeologic Evaluation

Alta at River's Edge

490 Boston Post Road
Wayland, MA

Prepared by
GeoHydroCycle, Inc.

Prepared for:
Onsite Engineering, Inc.

September 19, 2019

GeoHydroCycle, Inc.

Wastewater Disposal
Water Supply

Assessment
Analyses
Permitting
Modeling
Software

September 19, 2019

Mr. Kevin Brander
MassDEP Northeast Regional Office
205B Lowell Street
Wilmington, MA 01887

re: Hydrogeologic Evaluation and Groundwater Mounding Analyses
Alta at River's Edge
490 Boston Post Road
Wayland, Massachusetts 01776
Transmittal No. X284361
GHC #18008

Dear Mr. Brander:

GeoHydroCycle, Inc. (GHC) is pleased to present the results of our Hydrogeologic Evaluation and Groundwater Mounding Analyses in accordance with our Scope of Work dated 1/2/19 for the proposed discharge of treated wastewater at River's Edge, 490 Boston Post Road, Wayland, Massachusetts 01776 (the Site), see Figure 1 in Enclosure 1 for Site location. This Hydrogeologic Evaluation was done in support of a Groundwater Discharge Permit Application (GWDPA) for the Site. As part of the investigation, GHC completed a groundwater model to conduct a Groundwater Mounding Analyses.

1.0 Introduction

GHC's Scope of Work for the Hydrogeologic Evaluation and Groundwater Mounding included: 1) a review of the available hydrogeologic data including: USGS topographic and hydrogeologic maps; and hydrogeologic work conducted by others; 2) a site reconnaissance; 3) observation of selected soil borings and the installation of monitoring wells conducted by others at the Site; 4) performance of single well aquifer tests in three monitoring wells to estimate aquifer hydraulic conductivity; 5) a groundwater mounding analyses to estimate the increase in groundwater due to the discharge of 37,380 gallons per day of treated wastewater into a 100 foot x 159 foot leach field with a disposal area footprint of 15,900 square feet; 6) preparation of a Groundwater Monitoring Plan; and 7) preparation of this report.

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2.0 Site Description

The proposed Alta at River's Edge project is planned to be located at 490 Boston Post Road in Wayland, Massachusetts, see Figures 1 and 2. Alta at River's Edge is a proposed multi-family residential community planned for the site. The total parcel area to be included in the development is approximately 8.25 Acres. The project will be comprised of two buildings, a leasing office, an onsite wastewater treatment facility, underground resident parking garages, and other site amenities such as a pool and gym. The project will consist of 216 units, of which, 99 will be one bedroom and 117 will be two bedrooms. In total, there will be 333 bedrooms at the site plus a small leasing office with three full time staff. This corresponds to an anticipated Title 5 wastewater flow of 37,380 gallons per day.

The project is a proposed redevelopment of the old Wayland town septage treatment facility parcel on Boston Road (Route 20) along the Wayland/Sudbury Town line. The current uses of the site include the abandoned septage treatment facility and open sand beds, school bus storage, a sand and gravel pit and a police shooting/firing range. The Town has an agreement in place with the applicant, WP East Acquisitions, LLC of 91 Hartwell Avenue, Lexington for them to purchase the site from the Town and develop it in accordance with the Town's master planning for this area. As part of the redevelopment, the applicant will remove the existing infrastructure and materials and dispose of it according to applicable regulations.

3.0 Site Reconnaissance

On January 15, 2019 site reconnaissance, GHC conducted a limited reconnaissance of the Site. At the time of GHC's reconnaissance most of the area of the proposed leach field was covered by fill which had little to no vegetative cover, which prevented observation of existing conditions. Some fill was removed before Haley & Aldrich conducted a boring/well installation program in and around the leach field area.

4.0 Test Pits

During our January 15, 2019 visit, GHC was also able to observe test pit excavations being conducted by Onsite Engineering, Inc., see Figure 3. The test pits were also being observed by Joseph Cerutti and Tenzin Lama of the Massachusetts DEP. For the Town of Wayland the test pits were observed by Darren MacCaughey and Julia Junghanns. Onsite Engineering also conducted a second round of test pitting on May 17, 2019 when they excavated three additional test pits and one percolation test. One soil boring was also completed at that time to confirm soil depth. These test pits were not observed by GHC, but were observed by Joseph Cerutti and Tenzin Lama of the Massachusetts DEP. For the Town of Wayland the test pits were observed by Julia Junghanns.

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Based on the test pit logs obtained from Onsite Engineering, Inc., the excavations encountered between 4 and 6 feet of fill in test pits TP-1 through TP-5. In TP-6 12 feet of fill was observed. Below the fill the excavations encountered sands and sands and gravels down to depths between 10 and 13 feet. Two percolation tests both revealed rates of less than 2 minutes per inch. Test pit data are presented in Enclosure 2.

5.0 Soil Boring and Well Installation

GHC did not conduct any soil borings or monitoring well installations at the Site but relied upon data collected by Haley & Aldrich and Vertex. Also, GHC was provided access to the H&A and Vertex monitoring wells to obtain groundwater levels and to conduct slug tests. H&A and Vertex borings and well logs are presented in Enclosure 3.

GHC reviewed the H&A borings and well logs for the three monitoring wells in the vicinity of the proposed leach field, HA19-1, HA19-13 and HA19-14. These logs showed that H&A encountered primarily sands and sand and gravels consistent with what was found in the test pits.

Environmental drilling logs prepared by H&A and Vertex describing the soil samples, the drilling process, and the construction of the wells are included in Enclosure 3. Based on the logs, GHC prepared Figure 4 showing a schematic profile of the H&A and Vertex monitoring wells.

6.0 Local Hydrogeology

The River's Edge property is located on the eastern slopes of a sand hill that grades down to the Sudbury River, located approximately 1,700 feet to the east of the proposed leach field, see Figure 1. Figure 5 shows a surficial geology map obtained from MassGIS digital survey. This map depicts the surficial geology beneath River's Edge as being sands and gravels. This description of the geology is consistent with GHC's review of the H&A and Vertex well logs.

The surficial geology beneath River's edge consist of sands that readily allow groundwater movement. Other significant hydrologic features in the area are wetlands that almost surround the project and serve as surface water expressions of the local water table acting as groundwater discharge areas.

GHC personnel were at the Site on 8/1/19 to obtain groundwater depth measurements in the Site monitoring wells. Using the surveyed top of well (TOC) elevations provided by the site civil engineer, Allen & Major, GHC converted the 8/1/19 groundwater depth measurements to water table elevations, see Table 6.0.1.

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Table 6.0.1. Subsurface Evaluation Data.

Well	Measuring Point Elevation (feet, MSL)	Depth to Groundwater from TOC, 8/1/19 (feet, MSL)	Groundwater Elevation, 8/1/19 (feet, MSL)
V-101	130.74	14.45	116.29
V-104	148.81	32.03	116.78
V-106	151.83	34.65	117.18
HA19-1	134.92	18.57	116.35
HA19-13	138.53	21.95	116.58
HA19-14	138.76	22.40	116.36

Based on the groundwater elevation data presented in Table 6.0.1, GHC has prepared Figure 6. As this figure illustrates, groundwater flows in an easterly direction toward the Sudbury River and adjoining wetlands at a gradient of 0.00129 feet per foot (1.3 feet in 1,000 feet). This relatively flat gradient indicates that little force is needed to move groundwater beneath the Site due to an aquifer with a high aquifer transmissivity.

7.0 Seasonal High Groundwater

Because test pits completed did not encounter soil mottling, as a basis to determine seasonal high groundwater elevation (SHGW), GHC used the Frimpter Method[1]. The following Table 7.0.1 presents the Frimpter parameters and results.

Table 7.0.1. Frimpter Method.

Parameter	Depths (feet)	Notes
Measured Depth to Groundwater (Sc)	13.80	V-101 on 4/18/19
Range in GW levels in similar topography (Sr)	10.50	Hillside - 10%
Measured depth to GW at similar time (OWc)	4.83	USGS 4/18/19
Measured depth of max GW level (OWmax)	1.19	
Maximum GW range (OWr)	10.18	
Predicted depth to SHGW (Sh)	10.05	
Difference between measured and predicted	3.75	Frimpter Adjustment

GHC estimated Seasonal High Groundwater by adding the Frimpter Adjustment of 3.75 feet to the groundwater elevations for the six monitoring wells, and the results are presented in Table 7.02

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[1] *Frimpter, M.H., 1981. Probable High Groundwater Levels in Massachusetts. USGS, WRI 80-1205.*

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Table 7.0.2. Estimated SHGW in Monitoring Wells.

Well	Groundwater Elevations 8/1/19 (feet, MSL)	Estimated SHGW Elevation (feet, MSL)
V-101	116.29	120.04
V-104	116.78	120.53
V-106	117.18	120.93
HA19-1	116.35	120.10
HA19-13	116.58	120.33
HA19-14	116.36	120.11

GHC prepared a groundwater contour map for SHGW using the elevations calculated in Table 7.0.2, see Figure 7.

8.0 Saturated Thickness

The saturated thickness for the aquifer was determined by subtracting the bottom elevation of the Haley & Aldrich borings from the SHGW elevations and averaging the results. Table 8.0.1 below demonstrates these calculations.

Table 8.0.1. Saturated Thickness.

Well	SHGW Elevation (feet, MSL)	Bottom Elevation (feet, MSL)	Saturated Thickness (feet)
HA19-1	120.1	106.8	13.3
HA19-13	120.3	108.0	12.3
HA19-14	120.1	103.7	16.4
		Average:	14.0

The resulting average saturated thickness that was used in the groundwater mounding model was 14.0 feet.

9.0 Aquifer Testing

To estimate aquifer hydraulic conductivity, GHC conducted slug tests in the three Haley & Aldrich monitoring wells at the property on 8/5/19. GHC used both rising and falling head tests for each well.

The falling head/rising head slug test protocol involved: 1) measuring the depths to groundwater in the well; 2) installing a pressure transducer in the well to be tested; 3) connecting the transducer cable to the data storage unit; 4) recording the static depth of the transducer as the initial reference level; 5) inserting a solid slug into the well and electronically recording a falling head test; 6) allowing the water level to recover to at least 95 percent of pretest level; 7) beginning the rising head test by removing the solid slug from the well and electronically recording the data.

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10.0 Aquifer Testing Results

To determine a representative value of hydraulic conductivity for the outwash sands beneath the Site, GHC used a statistical method published by the Connecticut DEP[2]. The method calculates the statistics of the hydraulic conductivity data and determines whether the results are within confidence limits and eliminates statistical outliers. Using this analysis resulted in a geometric mean hydraulic conductivity of 209 feet per day for the outwash sands. This value is within the range of expected hydraulic conductivity for outwash sands. A table presenting the hydraulic conductivity analyses and statistics is shown in Enclosure 4.

11.0 Groundwater Model Development and Simulation

GHC accomplished the groundwater mounding analyses for the Site with the widely used and accepted numeric groundwater model, MODFLOW. Input parameters to the model were obtained from GHC's environmental drilling logs, field observations and testing data, and the grain size curves.

Information concerning the design of the SAS was obtained from Onsite Engineering, Inc. and included: 1) the wastewater application rate of 37,380 gallons per day, and 2) the location and layout of the 15,900 square foot (footprint) leach field.

11.1 Conceptual Model

In developing the groundwater model to predict the mounding height beneath the proposed leach field, GHC prepared a conceptual model of the aquifer. Features of the conceptual model include:

1. The aquifer is unconfined with the water table as the upper surface;
2. Seasonal high groundwater can be estimated by adding to contours an adjustment calculated using the Frimpter Method;
3. The aquifer lower surface is not known, but can be estimated using the difference between seasonal high groundwater and the depth of monitoring wells in the vicinity of the leach field;
4. Aquifer hydraulic conductivity can be estimated using single well tests (slug tests);
5. A geometric mean hydraulic conductivity can be used in the model to be representative of the aquifer; and

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[2] Connecticut DEP. *2006. Guidance for the Design of Large Scale On-Site Wastewater Renovation Systems, Appendix C - Selecting Hydraulic Conductivity Values for Design.*

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6. The simulation can be achieved by modeling the proposed leach field on a flat water table with the resulting groundwater mound superimposed onto the seasonal high groundwater.

11.2 MODFLOW Setup

The following paragraphs describe the MODFLOW model input parameters. Figures 8a and 8b shows the MODFLOW features

11.2.1 Grid Definition

The MODFLOW model was designed to represent the overburden aquifer as described above using a 4,096 foot by 4096 foot grid and one unconfined layer. In plan view, the aquifer was gridded using a variable node spacing consisting of 64 by 64 feet at the edges of the model and telescoping to 8 by 8 feet in the area of the leach field. The smaller grid spacing was used in the area directly around the leach field where discharge to groundwater causes steeper gradients. Higher resolution allows for a more accurate model prediction of groundwater flow around SAS areas.

11.2.2 Wastewater Recharge

To simulate the application of 37,380 gallons per day of treated septic wastewater into the 15,900 square foot leach field, GHC designated 241 nodes in the model to simulate the wastewater recharge into the leach field. This results in a SAS area in the model of 15,424 square feet which is smaller than the design leach field. To account for the difference in areas, values of the simulated recharge to these nodes were increased by the ratio of the design area divided by the modeled area. The result was that the model accurately simulated the proposed wastewater discharge. Also, as allowed by DEP guidelines[3], the applications rate was reduced to 80% of the daily rate.

11.3 MODFLOW Simulation

To predict the groundwater mounding beneath the proposed soil absorption system, GHC ran a steady-state MODFLOW simulation. Table 11.3.1 summarizes the parameters used in the model.

Table 11.3.1. MODFLOW Model Input Parameters.

Parameter	Value	Unit
Disposal Rate (100%):	37,380	gallons per day
Model Soil Absorption Area :	15,424	square feet
Model Recharge Rate (80%):	0.259197	cubic feet per day per square ft
Hydraulic Conductivity:	209	feet per day
Saturated Thickness:	14.0	feet
Mounding Time	90	days

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[3] *Massachusetts DEP. November 2014. Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal.*

12.0 MODFLOW Mounding Results

Results of the MODFLOW groundwater mounding simulation indicated that the increase in groundwater elevations due to the application of treated wastewater into the 15,900 square foot leach field would be 0.80 feet, see Figure 9. Superimposing the mound onto Seasonal High Groundwater yields simulated groundwater elevations beneath the proposed leach field, see Figure 10. This figure demonstrates that the predicted mounded groundwater elevation at the Site beneath the SAS will be 121.2 feet, MSL beneath the proposed leach field.

Figure 10A presents a cross-section showing the separation distance between mounded seasonal high groundwater and the proposed bottom of the leach field. As the figure shows the design elevation of the leach field bottom at a minimum elevation of 133 allows for at least 11.9 feet of separation above the mounded groundwater, which more than meets the state requirement of 4 feet.

13.0 Sensitive Receptors and Natural Resource Protection

GHC's review of the Priority Resources Map from MassGIS, see Figure 11A and 11B, show the following Priority Resources within one mile of the proposed leach fields:

Table 13.0.1. Priority Resources Within One Mile of the Proposed Leach Field.

Resource	Compass Direction	Distance (ft)
Wetlands	N, E, S	Nearest 230 ft N
PWS 3315000-06G	NE	4,840
Baldwin Pond Wells (2.27 MGD)		
NHESP Potential Vernal Pool	NNW	2,400
NHESP Potential Vernal Pool	ENE	3,700
NHESP Potential Vernal Pool	ESE	3,480
NHESP Potential Vernal Pool	SE	2,520
NHESP Potential Vernal Pool	SSW	2,630
NHESP Potential Vernal Pool	WSW	2,590

Groundwater flow under mounded conditions beneath the proposed leach field is to the east toward the Sudbury River and Associated wetlands. Under these flow conditions and moderate amounts, it is unlikely that any of the above resource areas will be adversely impacted by the proposed wastewater discharge.

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14.0 Groundwater Monitoring Plan

In accordance with 314 CMR 5.00, long-term groundwater monitoring activities are required for groundwater discharges with design flows greater than or equal to 10,000 gallons per day.

The objective of the long-term groundwater monitoring plan (GWMP) is to establish background water quality for the new discharge, and to establish long-term groundwater quality at points near sensitive receptors and/or downgradient property boundaries. To accomplish this objective GHC proposes: 1) three groundwater monitoring wells, 2) monitoring well construction details, 3) groundwater quality sampling parameters, and 4) groundwater sampling frequency.

14.1 Compliance Monitoring Well Locations

Proposed compliance monitoring well locations are based on Groundwater Discharge Permit guidelines, and from our hydrogeologic evaluation and groundwater modeling at Alta at River's Edge in Wayland, MA such that one well will monitor groundwater quality upgradient and two wells downgradient of the leach field.

Unstressed groundwater in the vicinity of the proposed leach fields will flow to the east, see Figure 6. The objective of an upgradient compliance monitoring well is to monitor groundwater quality outside of the influence of the proposed discharge. Based on GHCs hydrogeologic evaluation and mounding analysis of the Site, discharge of treated groundwater from the leach fields creates a groundwater flow field as shown in Figure 10. To monitor groundwater quality upgradient of the fields, GHC proposes compliance monitoring well CMW-1, and to monitor groundwater quality downgradient of the discharge, compliance wells CMW-2, and CMW-3, see Figure 12.

Massachusetts DEP may require additional compliance monitoring wells depending upon the Site's hydrogeologic complexity and the type, number, and proximity of sensitive receptors. These locations will be revised as necessary.

14.2 Monitoring Well Construction

Compliance monitoring wells installed at the Site have been constructed in accordance with the MADEP's Standard Reference for Monitoring Wells[4].

14.3 Groundwater Quality Sampling

The following parameters will be sampled in upgradient and down gradient compliance monitoring wells on the following schedule:

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[4] *The Massachusetts Department of Environmental Protection, Standard Reference for Monitoring Wells, DEP Publication # WSC-310-91, January 1991.*

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Table 14.3.1. Compliance Sampling.

Parameter	Schedule
static water level	monthly
pH	monthly
specific conductance	monthly
nitrate nitrogen	quarterly
total nitrogen (nitrate, nitrite, TKN)	quarterly
total phosphorus	quarterly
orthophosphate	quarterly
volatile organic compounds (Method 624)	annually

To establish background water quality, all compliance monitoring wells will be sampled for the parameters of concern before the startup of the wastewater discharge. Monthly results of water quality sampling will be reported to the MADEP Northeast Regional Office.

If you have any questions, please call me.

Sincerely,
GeoHydroCycle, Inc.

Stephen W. Smith, P.E., P.HGW.

Enclosures: 1 - Figures
2 - Test Pit Logs
3 - Environmental Drilling Logs
4 - Slug Test Analyses Summaries
5 - Transmittal Form X284361 and BRP WP 83

cc: Mr. David Formato, Onsite Engineering, Inc.

Alta at Rivers Edge HER.lwp

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Enclosure 1 - Figures

0 2,000

Scale in feet

Figure 1. Site Locus.

Base Map: MassGIS Web Site.

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Project No. GHC #18018

Drafted SWS

Date 9/16/19 Rev

Alta at River's Edge
490 Boston Post Road
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Property Line

Edge of Wetland

132.18

130.74

147.62

151.83

146.20

142.38

148.81

Proposed Leach Field

BOSTON POST ROAD

Alta at River's Edge
490 Boston Post Road
Wayland, MA

Figure 2 Site Features.

0 60

Scale in feet

Project No. GHC#18004
Drafted SWS Checked
Date 9/6/19 Rev
Base Map: CAD File provided by Onsite Engineering, Inc.

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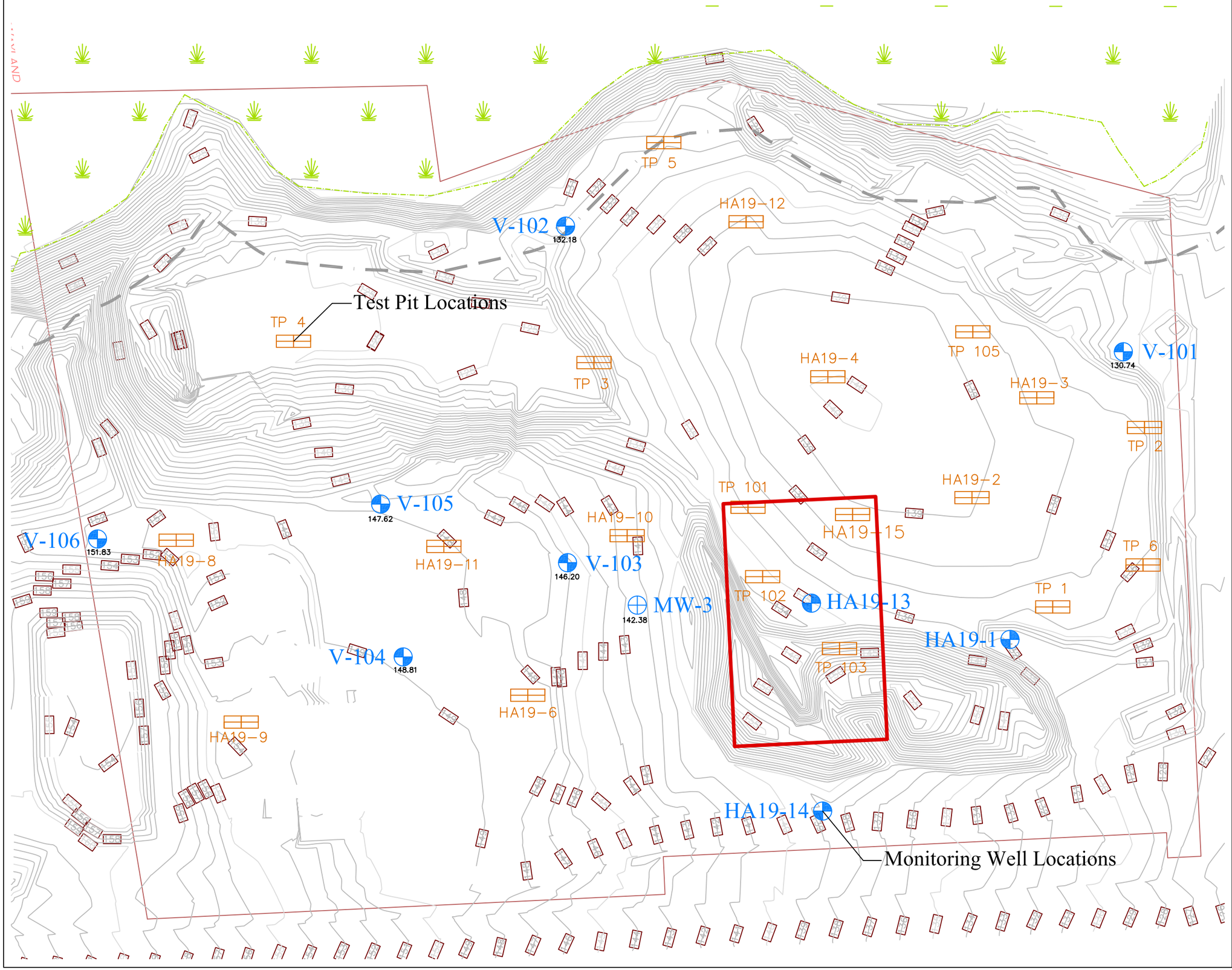

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Scale in feet

Project No. GHC#18004
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Base Map: CAD File provided by Onsite Engineering, Inc.

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Alta at River's Edge
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Figure 3 Subsurface Explorations.

Alta at River's Edge
490 Boston Post Road
Wayland, MA

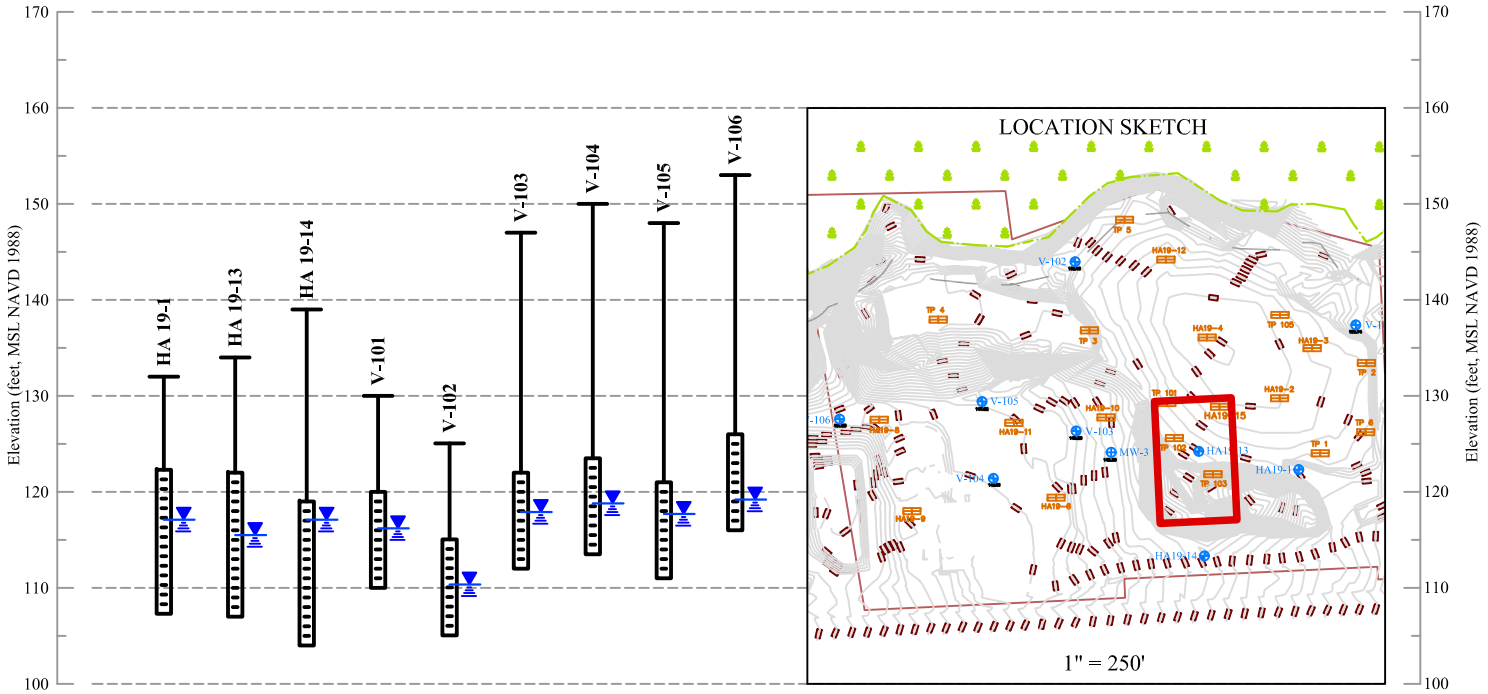
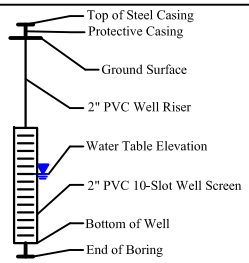


Figure 4. Monitoring Well Schematic.

SCALES AS SHOWN.

LEGEND:



NOTES:

1. Monitoring wells installed by Drilex.
2. Depth to groundwater measurements were recorded on 8/1/19, and are approximate.
3. Elevations are based on surveying conducted by others.

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Base Map: Sketch from boring and well logs obtained from Haley & Aldrich and Vertex reports.

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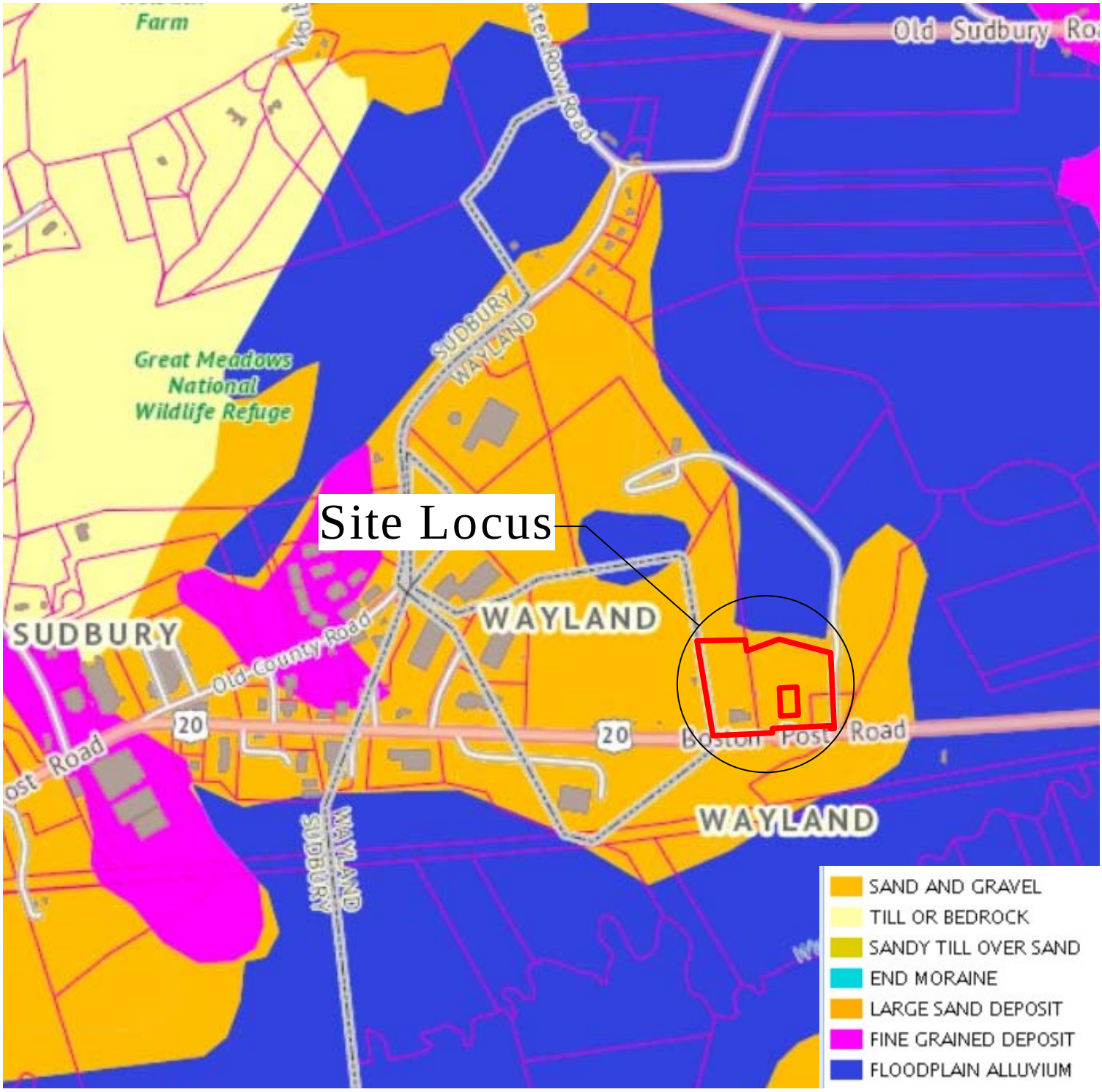

0 800

Scale in feet

Base Map: MassGIS Topographic Maps.

Figure 5. Surficial Geology.

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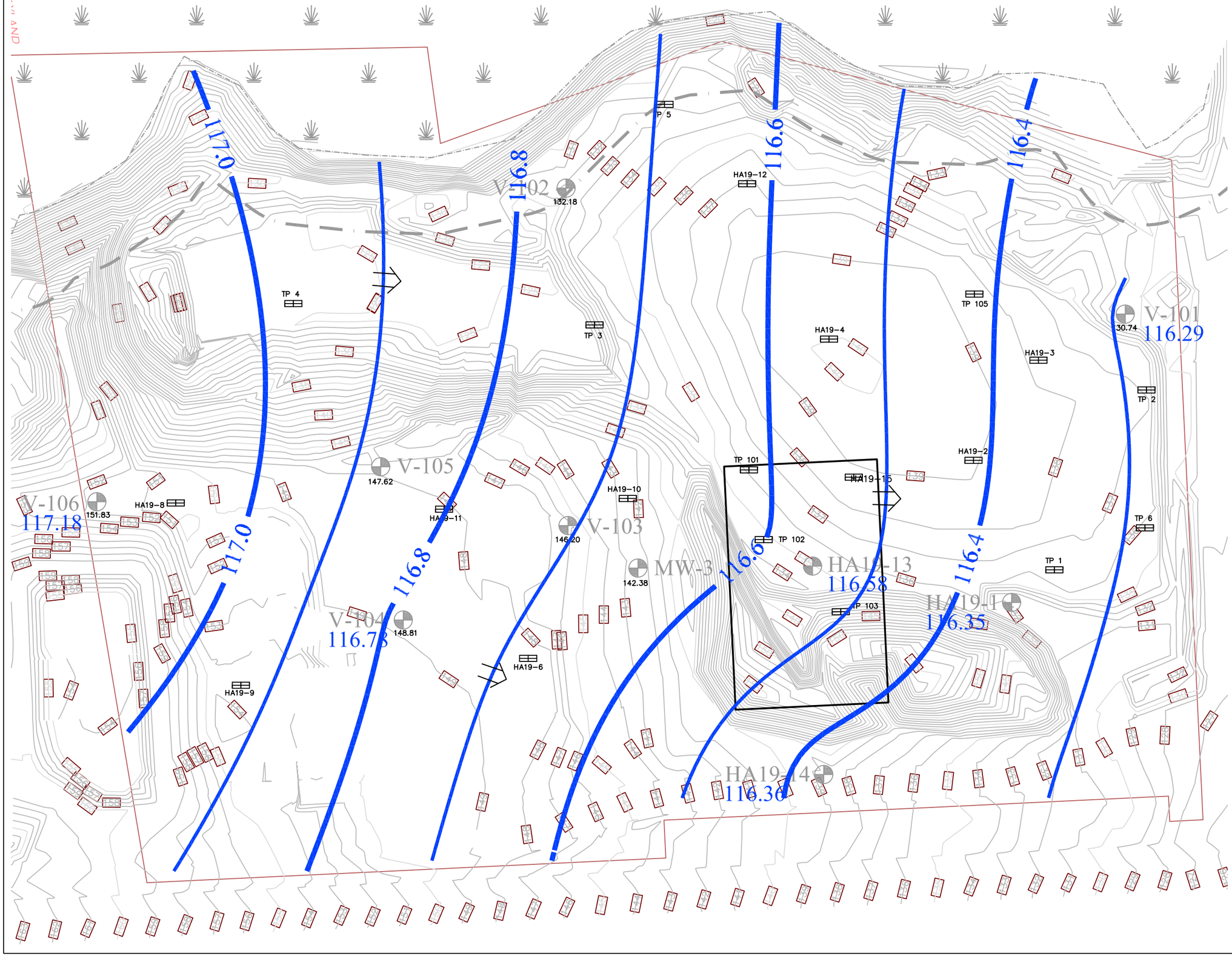
Figure 6. Groundwater Elevation Contours, 8/1/19.



LEGEND:

306 Groundwater Elevation Contours. Interval = 0.1 foot.

Inferred Groundwater Flow Direction.

Groundwater Monitoring Well Locations.

NOTES:

1. Groundwater contour data are calculated and interpreted as described in the text.
2. Groundwater contours are based on widely spaced well locations and may not reflect actual groundwater elevations.
3. Groundwater contours are presented for the purposes of this report only.

0 60

Scale in feet

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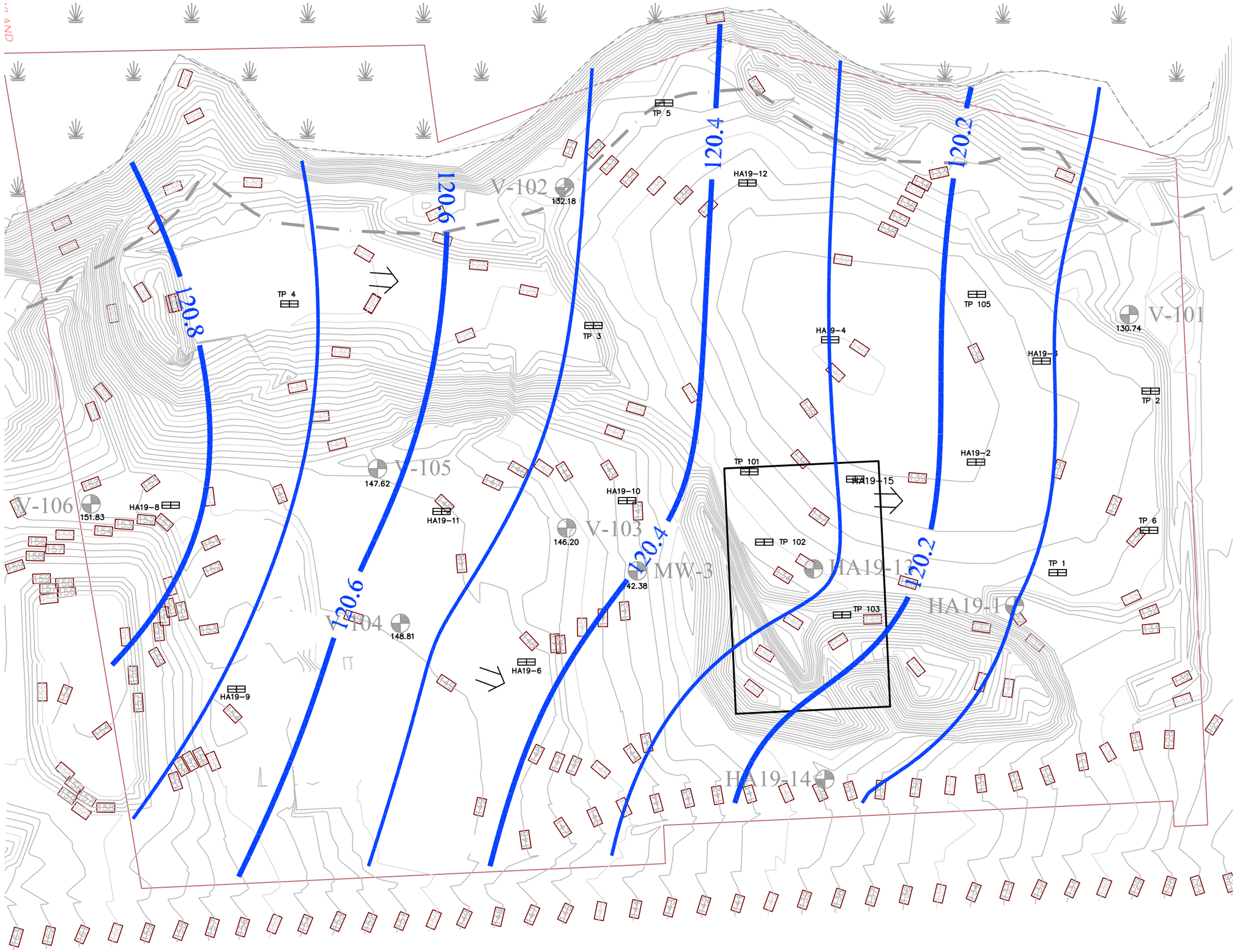
Figure 7. Estimated Seasonal High Groundwater Elevation Contours.



LEGEND:

306 Groundwater Elevation Contours. Interval = 0.1 foot.

Inferred Groundwater Flow Direction.

Groundwater Monitoring Well Locations.

NOTES:

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0 60

Scale in feet

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Base Map: CAD File provided by Onsite Engineering, Inc.

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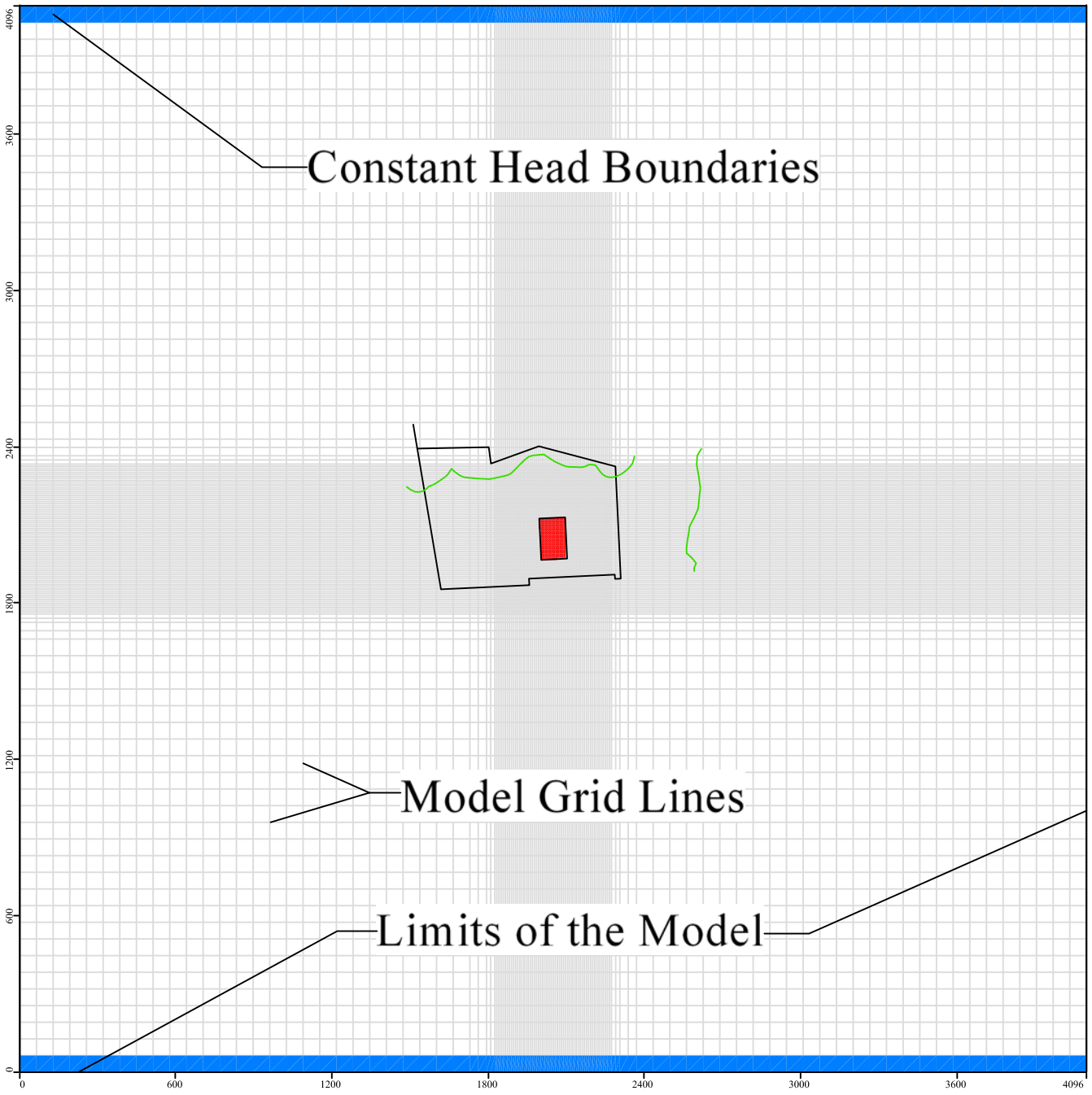

Alta at River's Edge
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Figure 8A. MODFLOW Layout.

0 600

Scale in feet

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Base Map: Visual MODFLOW.

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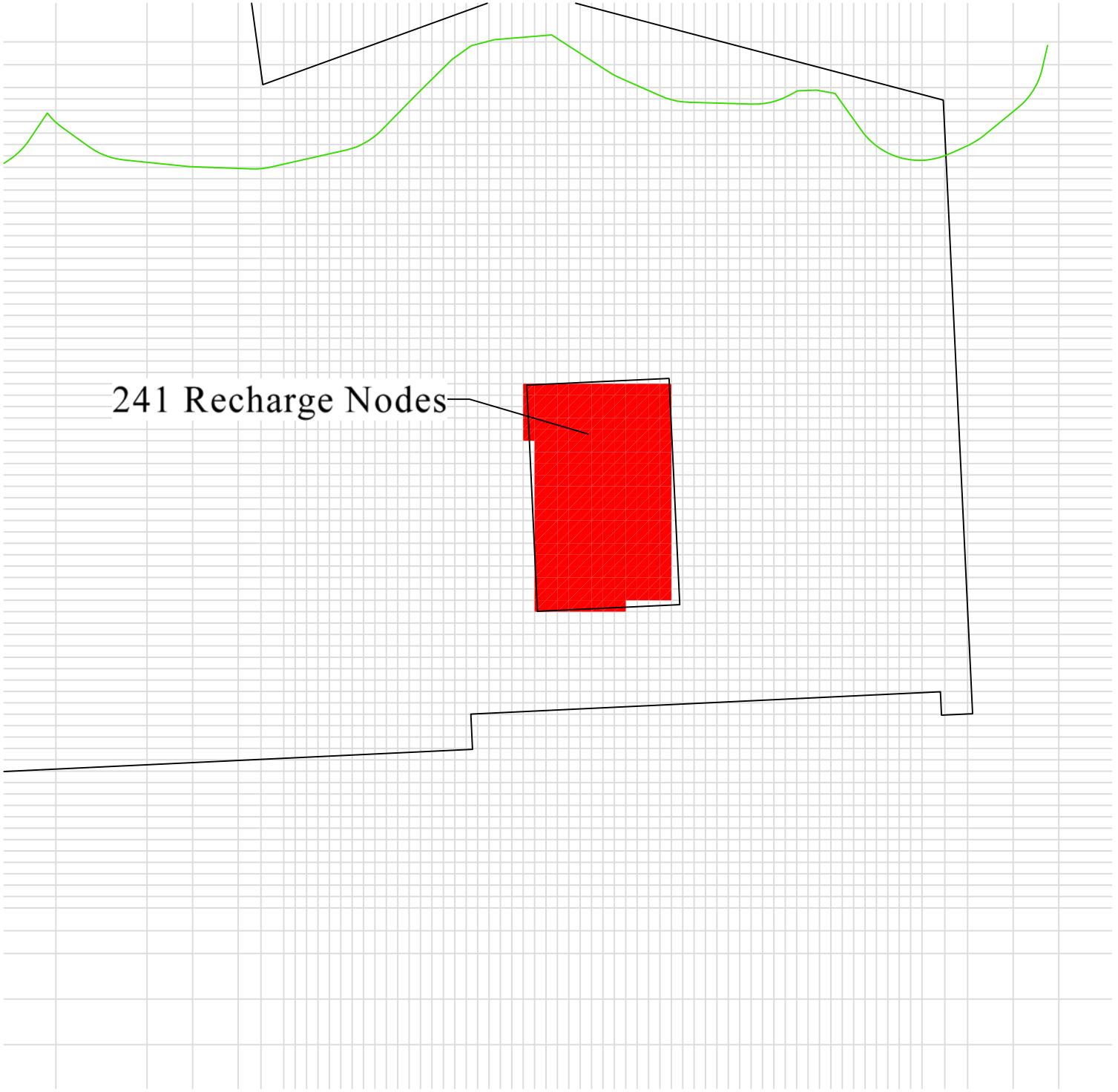

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Figure 8B. Model Recharge.

0 100

Scale in feet

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Base Map: Visual MODFLOW.

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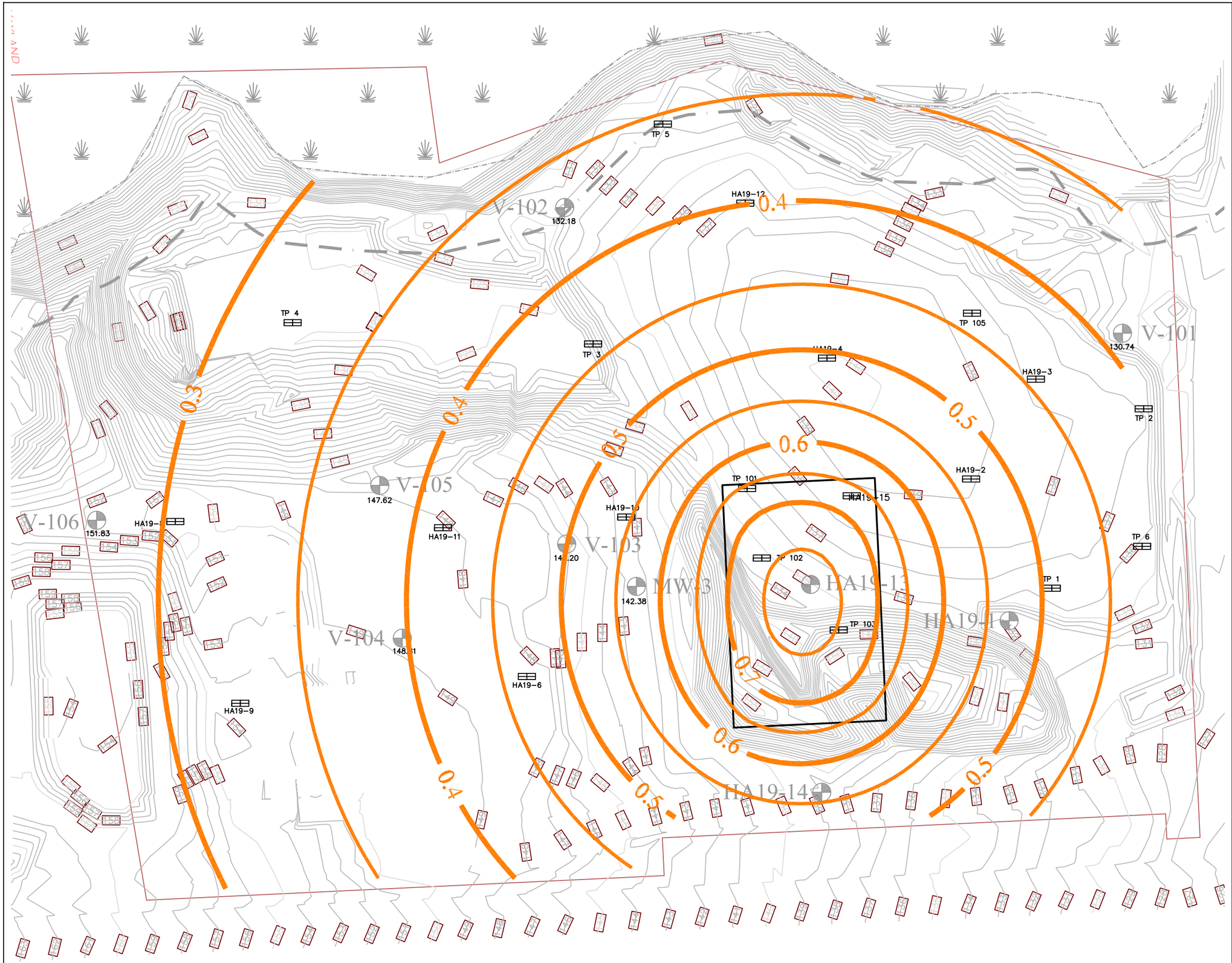
Figure 9. Simulated Groundwater Mound Height, 80% of 37,380 GPD Discharge.



LEGEND:

- 1.0 — Groundwater Elevation Contours. Interval = 0.05 foot.
- Inferred Groundwater Flow Direction.
- Groundwater Monitoring Well Locations.

NOTES:

1. Groundwater contour data are calculated and interpreted as described in the text.
2. Treated wastewater discharge = 37,380 gallons per day.
3. Total Leach Field footprint = 15,900 square feet.

0 60

Scale in feet

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Date 9/4/19 Rev 9/18/19
Base Map: CAD File provided by Onsite Engineering, Inc.

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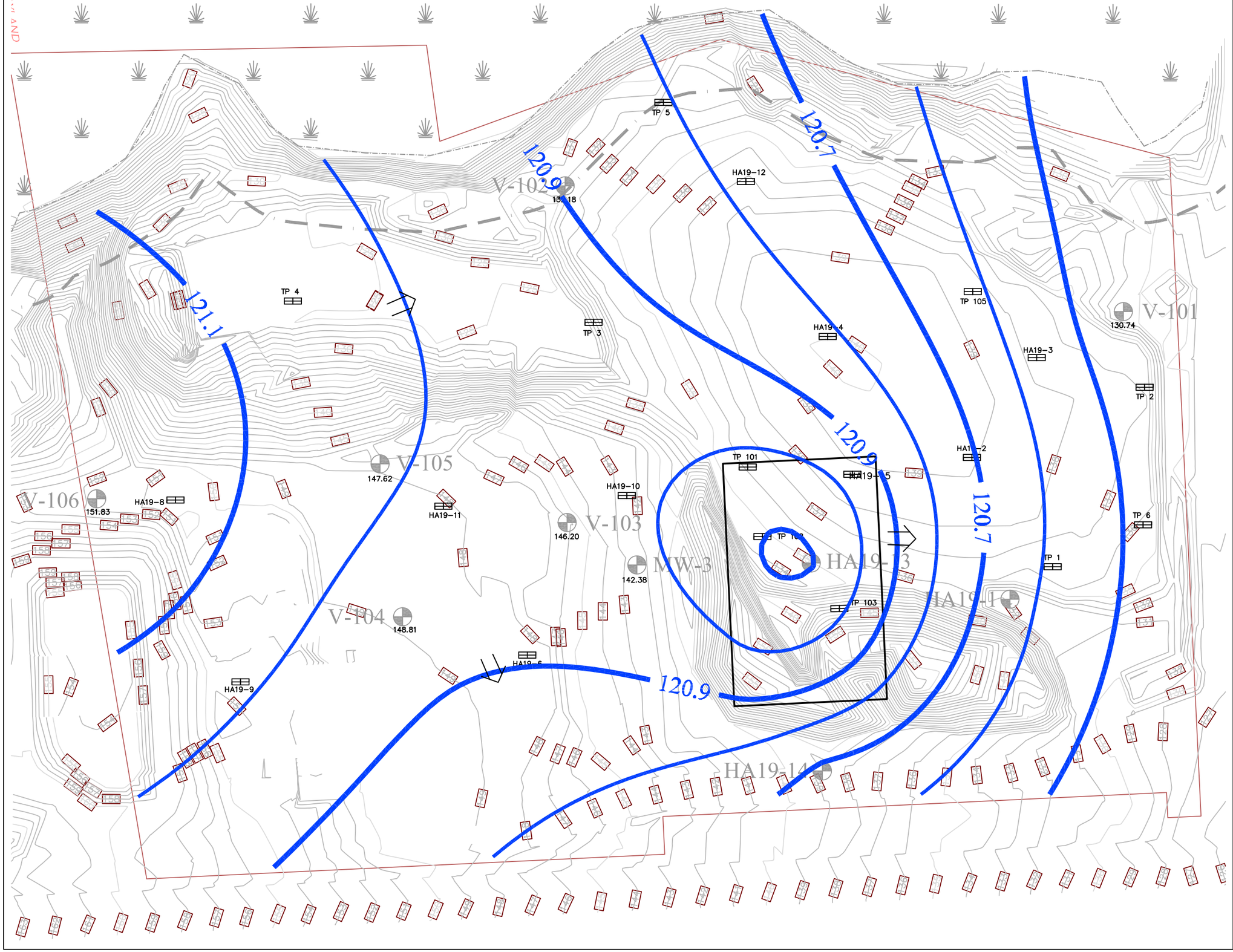
Figure 10. Simulated Mounded Seasonal High Groundwater Elevations, 80% of 37,380 GPD Discharge.



LEGEND:

- 306 — Groundwater Elevation Contours. Interval = 0.1 foot.
- Inferred Groundwater Flow Direction.
- Groundwater Monitoring Well Locations.

NOTES:

1. Groundwater contour data are calculated and interpreted as described in the text.
2. Treated wastewater discharge = 37,380 gallons per day.
3. Total SAS footprint = 15,900 square feet.
4. Groundwater contours are presented for the purposes of this report only.

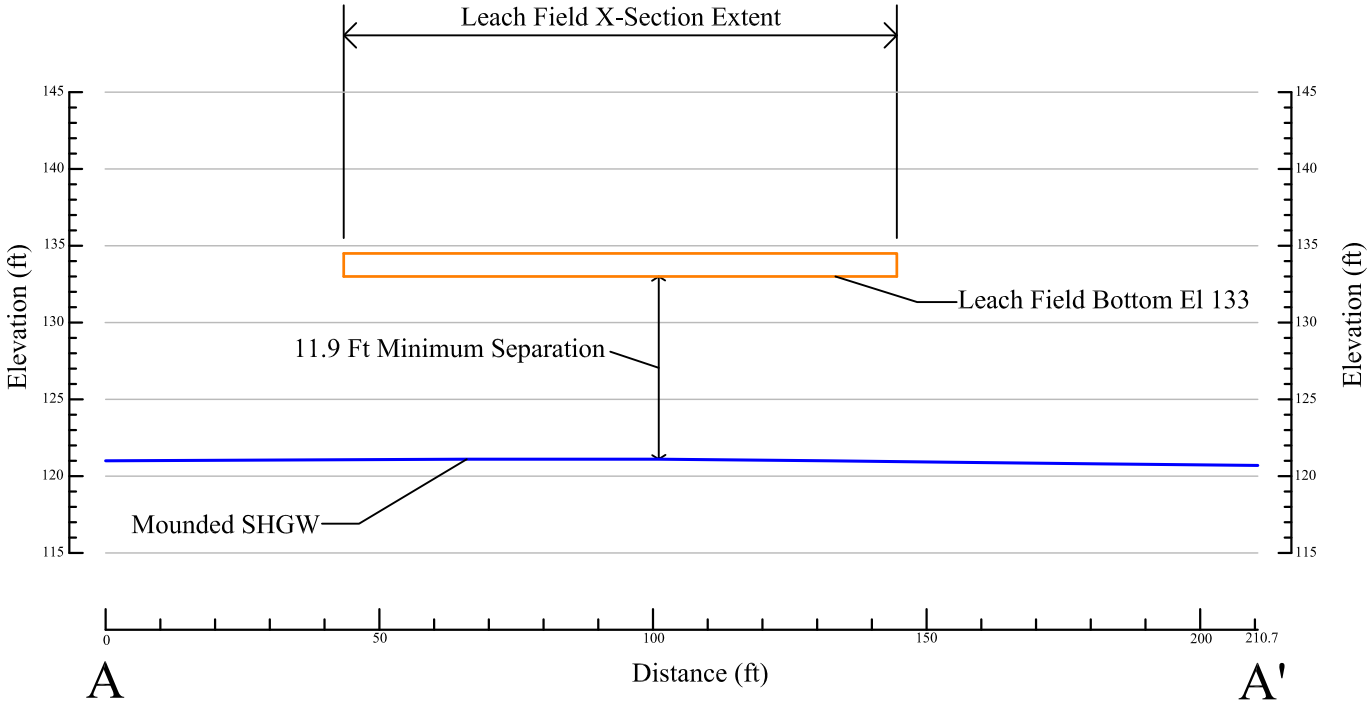
0 60

Scale in feet

Project No. GHC#18004
Drafted SWS Checked
Date 9/4/19 Rev 9/18/19
Base Map: CAD File provided by Onsite Engineering, Inc.

GeoHydroCycle, Inc.

NOT FOR CONSTRUCTION



Scales as Shown

Alta at River's Edge
490 Boston Post Road
Wayland, MA

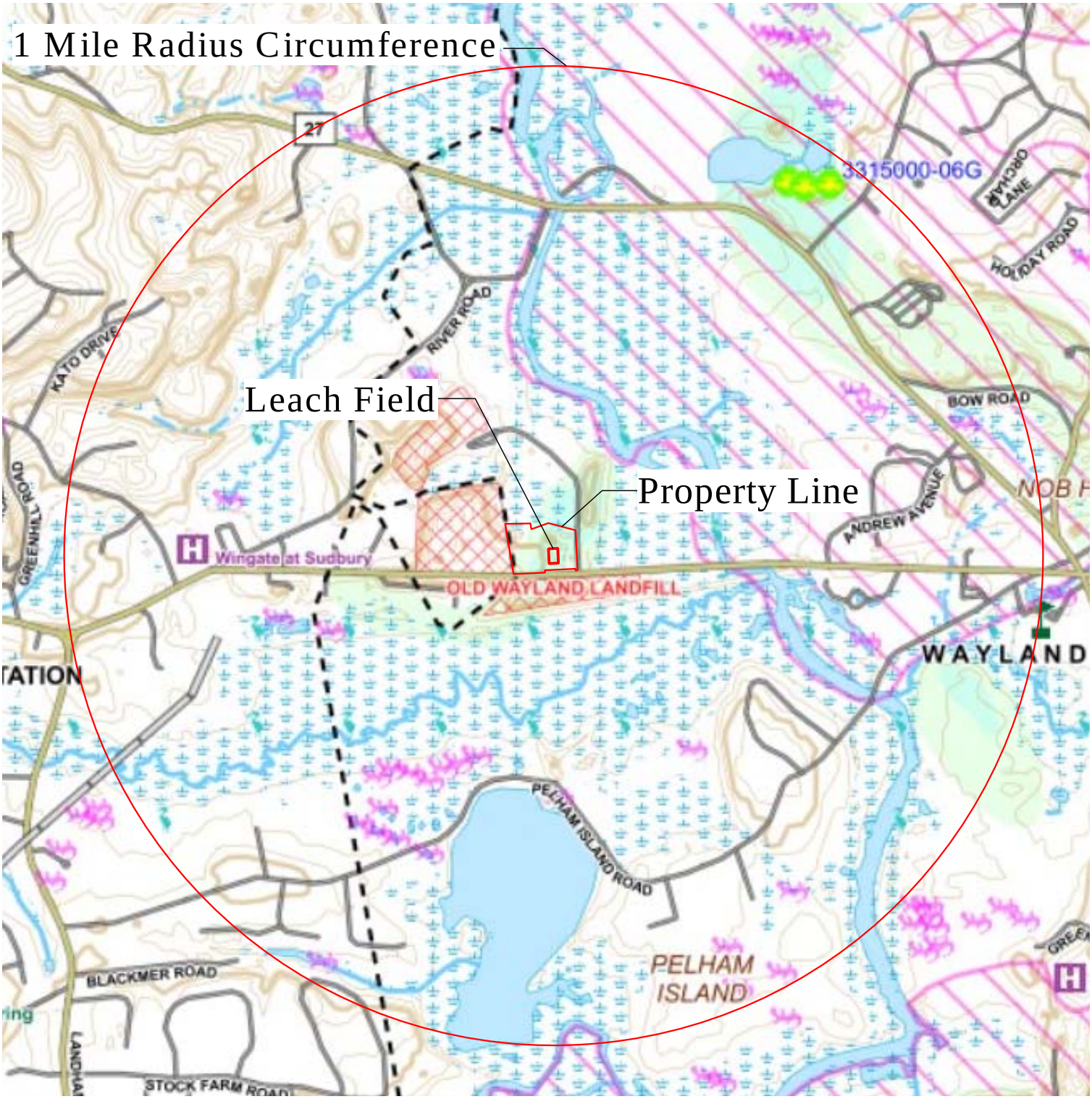
Figure 10A.
Cross-Section A-A'.

NOTES

1. See Figure 12 for Cross-Section location.
2. Mounded seasonal high groundwater derived from Figure 10, representing 80% of 37,380 GPD.
3. Leach field design details obtained from Onsite Engineering, Inc.

Project No. GHC#18018
Drafted SWS Checked
Date 9/18/19
Base Map: None.

GeoHydroCycle, Inc.



0 1,500

Scale in feet

Figure 11A. Priority Resources Map.

Base Map: MassGIS Online Download.

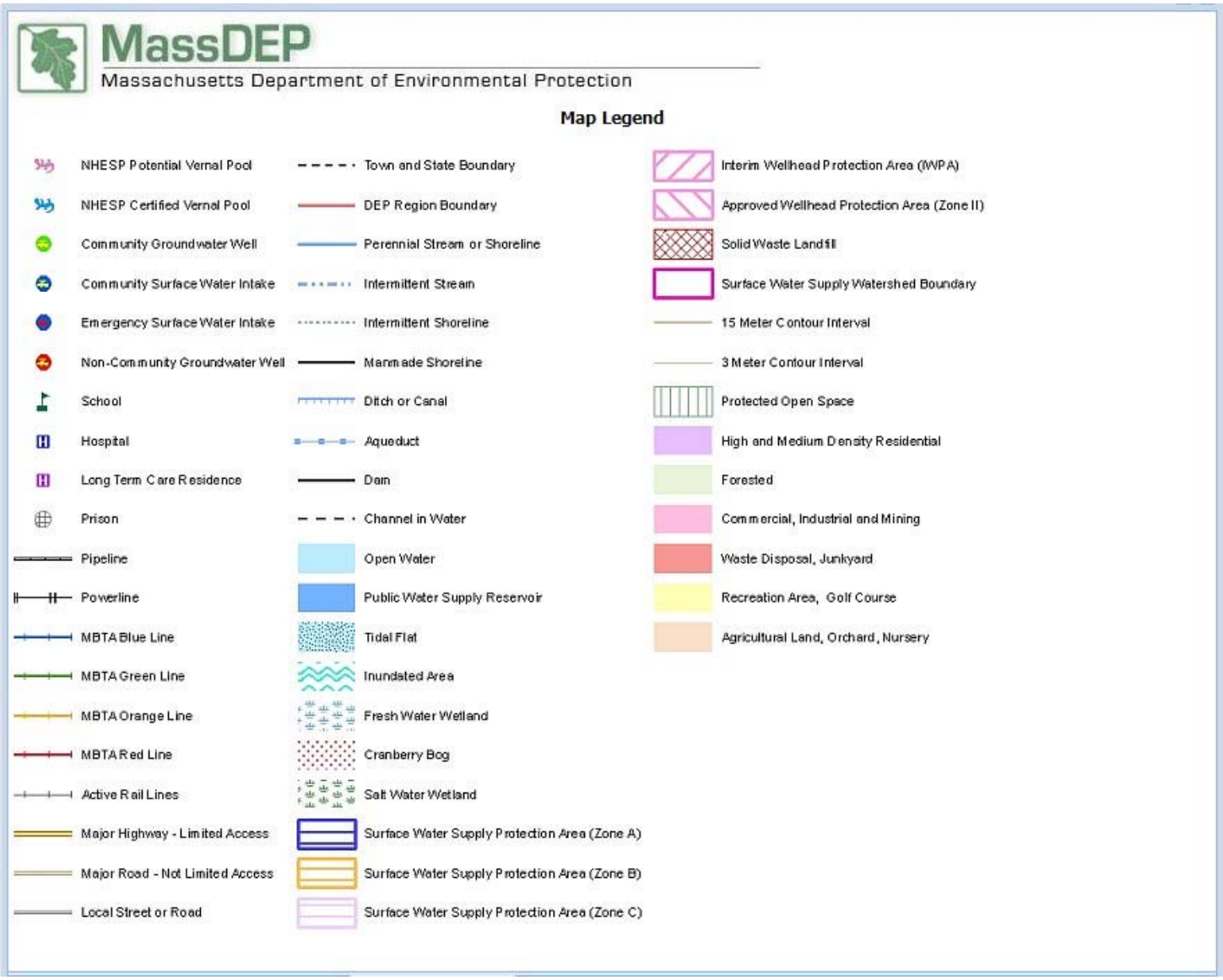
GeoHydroCycle, Inc.

Project No. GHC #18018

Drafted SWS

Date 9/16/19 Rev

Alta at River's Edge
490 Boston Post Road
Wayland, MA 01778



No Scale

Base Map: MassGIS Online Mapping.

GeoHydroCycle, Inc.

Figure 11B. Priority Resources Map Legend.

Project No. GHC #18018

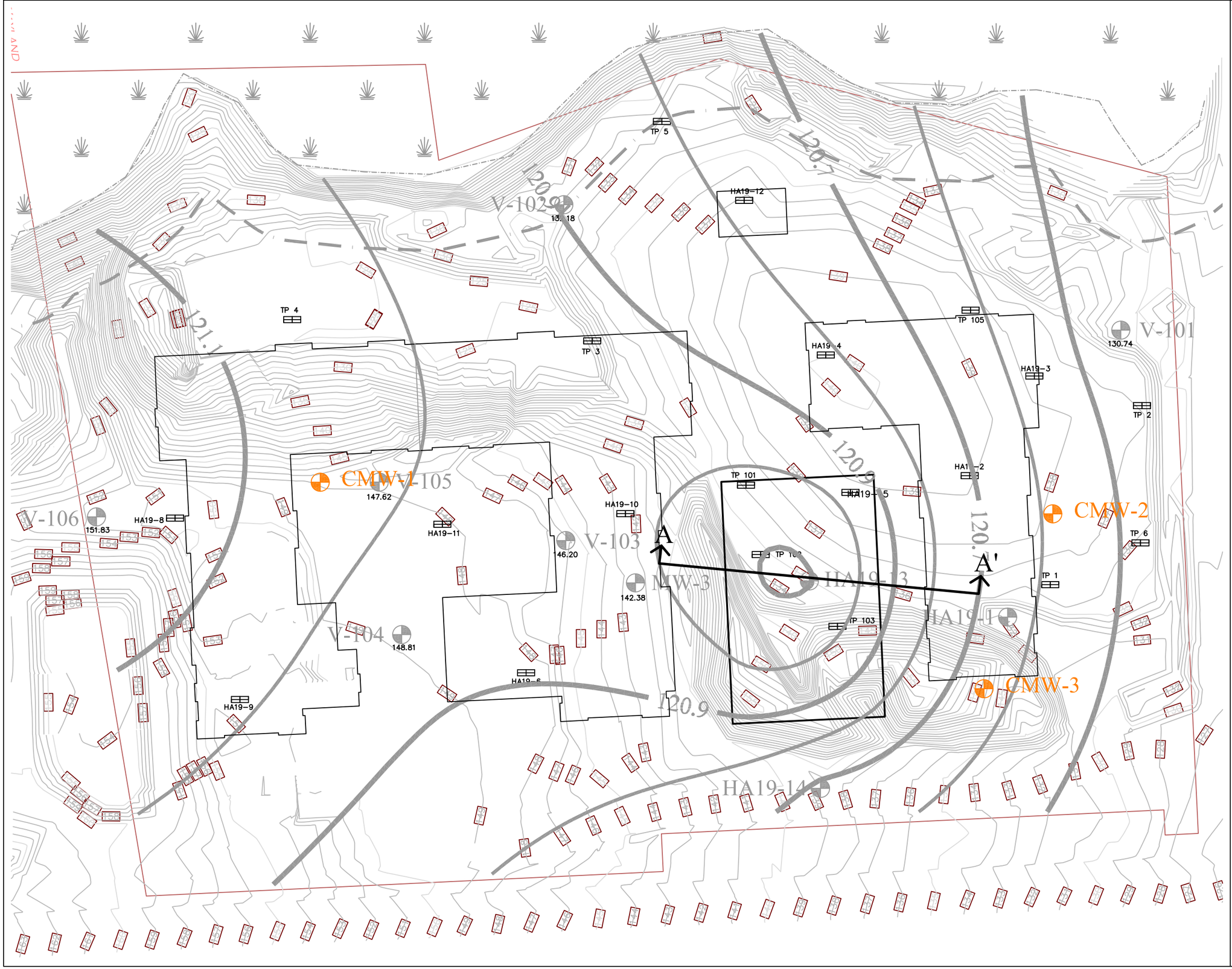
Drafted SWS

Date 9/16/19 Rev

Alta at River's Edge
490 Boston Post Road
Wayland, MA 01778

Alta at River's Edge
490 Boston Post Road
Wayland, MA

Figure 12. Proposed Compliance Monitoring Well Locations.



LEGEND:

- 306 — Groundwater Elevation Contours. Interval = 0.01 foot.
- Inferred Groundwater Flow Direction.
- Proposed Compliance Monitoring Well Locations.
- A A' Cross-Section A-A', Figure 10A.

NOTES:

1. Groundwater contour data are calculated and interpreted as described in the text.
2. Groundwater contours represent mounded seasonal high groundwater, see Figure10.
3. Groundwater contours are presented for the purposes of this report only.

0 60

Scale in feet

Project No. GHC#18004
Drafted SWS Checked
Date 9/4/19 Rev 9/18/19
Base Map: CAD File provided by Onsite Engineering, Inc.

GeoHydroCycle, Inc.

Enclosure 2 - Test Pit Logs

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Wayland
Owner Name

484 Boston Post Road
Street Address

22-6
Map/Lot #

Wayland
City

MA
State

01778
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes:

MassGIS
Source

Soil Map Unit

Udorthents
Soil Name

N/A
Soil Limitations

Proglacial Outwash
Soil Parent material

Outwash Plain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes:

Year Published/Source

Map Unit

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer:

Wetland Type

7. Current Water Resource Conditions (USGS): January 2019
Month/Day/ Year
Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-1 (Hole #) | 1/15/2019 (Date) | AM (Time) | 20's Clear (Weather) | 42d 21' 49" (Latitude) | 71d 22' 53" (Longitude)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Bottom of slope, flat area (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet | Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-59	Fill										
59-120	C1	Coarse Sand & Gravel	2.5 Y 5/4				> 10%		Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-2 (Hole #) | 1/15/2019 (Date) | AM (Time) | 20's Clear (Weather) | 42d 21' 49" (Latitude) | 71d 22' 53" (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Bottom of slope, flat area (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet
Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit 150" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-59	Fill										
59-156	c1	Stratified Sand & Gravel	2.5 Y 5/4				> 5%		Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-3 (Hole #) | 1/15/2019 (Date) | PM (Time) | 20's Clear (Weather) | 42d 21' 49" (Latitude) | 71d 22' 53" (Longitude)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Bottom of slope, flat area (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet | Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-72	Fill										
72-156	C1	Coarse Sand & Gravel/ ~~Medium Sand~~	2.5 Y 6/4				> 10		Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-4 (Hole #) 1/15/2019 (Date) PM (Time) 20's Clear (Weather) 42d 21' 49" (Latitude) 71d 22' 53" (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | None (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Bottom of slope, flat area (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet
Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: _____ Depth Weeping from Pit 156" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-60	Fill										
60-162	C1	Medium-Coarse Sand	2.5 Y 6/4				> 10%		Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # OSE-TP-4	Obs. Hole # OSE-TP-2
☒ Depth observed standing water in observation hole	156 inches	150 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)?	Upper boundary:	59 inches	Lower boundary:	162 inches
c. If no, at what depth was impervious material observed?	Upper boundary:	_____ inches	Lower boundary:	_____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	2/4/2019 Date
Raymond Willis/SE 2612 Typed or Printed Name of Soil Evaluator / License #	6/30/2019 Expiration Date of License
Joseph Cerutti, Tenzin Lama, Darren MacCaughey, Jullia Junghanns Name of Approving Authority Witness	MassDEP/Town of Wayland Approving Authority

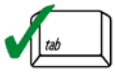
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Wayland
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

Town of Wayland
Owner Name

484 Boston Post Road
Street Address or Lot #

Wayland	MA	01778
City/Town	State	Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	1/15/2019 Date	PM Time	Date	Time
Observation Hole #	OSE-TP-2			
Depth of Perc	61"-79"			
Start Pre-Soak	12:27 PM			
End Pre-Soak	12:42 PM			
Time at 12”	12:42 PM			
Time at 9”	12:44 PM			
Time at 6”	12:47 PM			
Time (9”-6”)	3 minutes			
Rate (Min./Inch)	< 2 min/inch			
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☐ Test Failed: ☐	

Raymond Willis
Test Performed By:

Joseph Cerutti, Tenzin Lama, Darren MacCaughey, Julia Junghanns
Board of Health Witness

Comments:

Commonwealth of Massachusetts
City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Town of Wayland
Owner Name

484 Boston Post Road
Street Address

22-6
Map/Lot #

Wayland
City

MA
State

01778
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: MassGIS (Source) ____ (Soil Map Unit)

Udorthents
Soil Name

N/A
Soil Limitations

Proglacial Outwash
Soil Parent material

Outwash Plain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: ____ (Year Published/Source) ____ (Map Unit)

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: ____ (Wetland Type)

7. Current Water Resource Conditions (USGS): May 2019 (Month/Day/ Year) Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-5 (Hole #) | 5/17/2019 (Date) | AM (Time) | 50's Rain (Weather) | 42d 21' 49" (Latitude) | 71d 22' 53" (Longitude)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | Light Underbrush (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Front of site near access drive (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet | Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	Fill										
48-96	C1	Sand	2.5 Y 6/3				< 10%		Single Grain	Loose	Caving
96-158	C2	Sand	2.5 Y 6/6						Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-5P (Hole #) 5/17/2019 (Date) AM (Time) 50's Rain (Weather) 42d 21' 49" (Latitude) 71d 22' 53" (Longitude:)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) Light Underbrush (Vegetation) (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash Outwash Plain (Landform) Front of site near access drive (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body > 100 feet Drainage Way > 50 feet Wetlands > 100 feet
Property Line > 10 feet Drinking Water Well > 100 feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap										
9-120	C1	Sand	2.5 Y 6/3				< 10%		Single Grain	Loose	Caving

Additional Notes:

Commonwealth of Massachusetts
City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: OSE-TP-6 (Hole #) | 5/17/2019 (Date) | AM (Time) | 50's Rain (Weather) | 42d 21' 49" (Latitude) | 71d 22' 53" (Longitude)

1. Land Use: Vacant Lot (e.g., woodland, agricultural field, vacant lot, etc.) | Light Underbrush (Vegetation) | (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: Vacant Lot

2. Soil Parent Material: Proglacial Outwash | Outwash Plain (Landform) | Front of site along access drive (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body > 100 feet | Drainage Way > 50 feet | Wetlands > 100 feet | Property Line > 10 feet | Drinking Water Well > 100 feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-144	Fill										
144-216	C1	Medium Sand	2.5 Y 6/6				< 10%		Single Grain	Loose	Caving

Additional Notes:

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	Obs. Hole #	Obs. Hole #
☐ Depth observed standing water in observation hole	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☐ Depth to soil redoximorphic features (mottles)	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number

_____ Reading Date

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: > 216 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

Depth of material varies by hole, greater than 48 inches was observed in each test pit.

b. If yes, at what depth was it observed (exclude A and O Horizons)? TP 6 Upper boundary: 144 inches Lower boundary: 216 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Wayland

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	5/20/2019 Date
Raymond Willis/SE 2612 Typed or Printed Name of Soil Evaluator / License #	6/30/2019 Expiration Date of License
Joseph Cerutti, Tenzin Lama, Jullia Junghanns Name of Approving Authority Witness	MassDEP/Town of Wayland Approving Authority

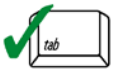
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Wayland
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

Town of Wayland
Owner Name

484 Boston Post Road
Street Address or Lot #

Wayland	MA	01778
City/Town	State	Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	5/17/2019 (Date)	PM (Time)	Date	Time
Observation Hole #	OSE-TP-5P			
Depth of Perc	32"-50"			
Start Pre-Soak				
End Pre-Soak				
Time at 12”				
Time at 9”				
Time at 6”				
Time (9”-6”)				
Rate (Min./Inch)	< 2 min/inch			
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☐ Test Failed: ☐	

Raymond Willis
Test Performed By:

Joseph Cerutti, Tenzin Lama, Julia Junghanns
Board of Health Witness

Comments:

24 gallons passed without attaining 12" in hole - < 2 min/inch

Enclosure 3 - Environmental Drilling Logs

HALEY ALDRICH

TEST BORING REPORT

Boring No. HA19-1(OW)

Project	River's Edge, 484-490 Boston Post Road, Wayland, MA 01778
Client	WP East Aquisition, LLC
Contractor	NEW ENGLAND BORING CONTRACTORS

File No. 129915-002
Sheet No. 1 of 2
Start 16 April 2019
Finish 16 April 2019
Driller B. Cross
H&A Rep. S. Shay
Elevation 131.5
Datum NAVD 88
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	--	Rig Make & Model: Mobile Drill B53, ATV
Inside Diameter (in.)	4	1 3/8	--	Bit Type: Roller Bit
Hammer Weight (lb)	300	140	-	Drill Mud: None
Hammer Fall (in.)	24	30	-	Casing: HW Drive to 29.0 ft
				Hoist/Hammer: Cat-Head Safety Hammer
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	88 15 12 30	S1 13	0.0 2.0			SM	Medium dense dark gray brown silty SAND with gravel (SM), mps 2.6 cm., no structure, no odor, moist	5	10	15	20	35	15				
5	50 54 54 46	S2 19	4.0 6.0			SM	Similar to above except very dense -FILL-	5	10	15	20	35	15				
					123.5 8.0		Note: Difficult to determine top of natural soils										
10	11 12 13 15	S3 6	9.0 11.0			SW	Medium dense brown well graded SAND (SW), mps 3.4 cm., a single piece of coarse gravel lodged in spoon tip	5		35	30	30					
15	24 11 7 6	S4 8	14.0 16.0			SW	Medium dense olive brown well graded SAND with gravel (SW), mps 3.2 cm., single grain structure, no odor, wet from drilling -GLACIOFLUVIAL DEPOSITS-	5	15	25	30	25					
20	8 7	S5 1	19.0 21.0				Medium dense, a single piece of coarse gravel	100									

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
4/16/2019	1123	0.1	24.0	26.0	15.0

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 31.5
Rock Cored (ft) -
Samples S7

Boring No. HA19-1(OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA19-1(OW)
File No. 129915-002
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	4 2						-GLACIOFLUVIAL DEPOSITS-										
					107.5		Note: Massive water loss at 24 ft										
	12 4 2 1	S6 6	24.0 26.0		24.0	GW	No recovery 1st attempt. Recovered 6 in. of soil using 3 in. diameter split spoon at same interval, mps 7 cm., loose well graded GRAVEL with sand	40	40	20							
25					104.5												
					27.0		Note: 6 in. cobble at 29 ft -GLACIOFLUVIAL DEPOSITS-										
	9 7 12 13	S7 12	29.5 31.5			SP	Medium dense olive brown poorly graded SAND (SP), mps 4 mm., stratified, no odor, wet			5	20	70	5				
30					100.0 31.5		-BOTTOM OF EXPLORATION AT 31.5-										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA19-1(OW)

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. HA19-1(OW)

Project River's Edge
Location 484-490 Boston Post Road, Wayland, MA 01778
Client WP East Aquisition, LLC
Contractor NEW ENGLAND BORING CONTRACTORS
Driller B. Cross

Initial Water Level (depth bgs) 15.0 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 129915-002
Date Installed 16 Apr 2019
H&A Rep. S. Shay
Location See Plan

Ground El. 131.5
Datum NAVD 88

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	131.5
FILL	0			1.0	130.5
	5			6.0	125.5
	8.0			8.0	123.5
	10				
	15				
	20				
	25			24.7	106.8
GLACIOFLUVIAL DEPOSITS	30				
	31.5			31.5	100.0

WELL CONSTRUCTION DETAILS

Type of protective cover: Padlock #3376
Height of Steel Guard Pipe above ground surface: 3.3 ft
Height of top of riser above ground surface: 3.0 ft
Type of protective casing: Steel Guard Pipe
Length: 5.0 ft
Inside diameter: 4.0 in.
Depth of bottom of Steel Guard Pipe: 1.7 ft
Type of riser pipe: Schedule 40 PVC
Inside diameter of riser pipe: 2.0 in.
Depth of bottom of riser pipe: 9.7 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Bentonite	6.0	2.0
	-	-
	-	-

Diameter of borehole: 4.5 in.
Depth to top of well screen: 9.7 ft
Type of screen: Machine slotted Sch 40 PVC
Screen gauge or size of openings: 0.010 in.
Diameter of screen: 2.0 in.
Type of Backfill around Screen: Filter Sand
Depth to bottom of well screen: 24.7 ft
Bottom of silt trap: N/A
Depth of bottom of well: 24.7 ft
Depth of bottom of borehole: 31.5 ft

COMMENTS:

HALEY ALDRICH

TEST BORING REPORT

Boring No.HA19-13(OW)

Project	River's Edge, 484-490 Boston Post Road, Wayland, MA 01778
Client	WP East Aquisition, LLC
Contractor	NEW ENGLAND BORING CONTRACTORS

File No. 129915-002
Sheet No. 1 of 3
Start 9 April 2019
Finish 9 April 2019
Driller B. Cross
H&A Rep. S. Shay
Elevation 134.1
Datum NAVD 88
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	--	Rig Make & Model: Mobile Drill B53, Track
Inside Diameter (in.)	4	1 3/8	--	Bit Type: Roller Bit
Hammer Weight (lb)	300	140	-	Drill Mud: None
Hammer Fall (in.)	24	30	-	Casing: HW Drive to 49.0 ft
				Hoist/Hammer: Cat-Head Safety Hammer
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	2 5 5 4	S1 6	0.0 2.0			SP-SM	Loose dark brown poorly graded SAND with silt and gravel (SP-SM), mps 3 cm., no structure, no odor, moist	5	10	20	20	35	10				
					131.1 3.0												
5	10 10 4 15	S2 8	4.0 6.0			SM	Medium dense dark brown to black silty SAND with gravel (SM), mps 2.5 cm., no structure, no odor, wet from drilling, trace ash, trace asphalt coarse sand sized -FILL-	5	10	15	15	40	15				
					126.6 7.5												
10	53 78 40	S3 16	9.0 10.5			SP-SM	Very dense dark brown to black poorly graded SAND with silt and gravel (SP-SM), mps 2.8 cm., friable top 8 in., no odor, wet Note: Extra jar sample collected	5	10	20	25	30	10				
					121.1 13.0		Note: Wash water color change at 13.0 ft.										
15	22 24 15 11	S4 12	14.0 16.0			SP	Dense olive brown poorly graded SAND (SP), mps 3 cm., weakly stratified, no odor, moist, 10-15% orange brown, mottling bottom 3 in. -GLACIOFLUVIAL DEPOSITS-	5	5	20	30	40					
20	11 11	S5 9	19.0 21.0			SP	Medium dense olive brown poorly graded SAND (SP), mps 3 cm., weakly stratified, no odor, wet	5	5	15	15	55	5				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
4/9/2019	1400	0.1	49.0	51.0	15.0
0710	0710	16	49.0	51.0	17.5

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (ft) 51.0
Rock Cored (ft) -
Samples S11

Boring No. HA19-13(OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

TEST BORING REPORT

Boring No. HA19-13(OW)
File No. 129915-002
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	11 12																
					110.6 23.5												
	18 34 25 16	S6 3	24.0 26.0			GP	Very dense brown poorly graded GRAVEL with sand (GP), mps 3 cm., no structure, no odor, wet Note: Low recovery, difficult to fully characterize	15	50	10	10	15					
25							Note: Common gravel 30 ft indicated by drilling effort										
	16 13 12 12	S7 6	29.0 31.0			SW	Medium dense brown well graded SAND with gravel (SW), mps 3 cm., single grain structure, no odor, wet	10	30	20	20	20					
30							-GLACIOFLUVIAL DEPOSITS-										
					101.6 32.5												
	16 19 27 19	S8 4	34.0 36.0			GW	Dense multicolored from various well graded GRAVEL (GW), mps 3 cm., no structure, no odor, wet, trace orange brown coloring in soil present, low recovery	50	40	10							
35							-GLACIOFLUVIAL DEPOSITS-										
					96.6 37.5												
	15 13 13 13	S9 12	39.0 41.0			SP	Medium dense gray poorly graded SAND (SP), mps 3 mm., stratified, single grain structure, no odor, wet			5	20	70	5				
40							Note: Borehole collapsed at 42.0 ft										
	7 9 26 11	S10 8	44.0 46.0			SP	Similar to above, except dense				20	75	5				
45							-GLACIOFLUVIAL DEPOSITS-										
	9	S11	49.0			SP	Similar to above, medium dense				5	90	5				

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA19-13(OW)

HALEY ALDRICH

TEST BORING REPORT

Boring No. HA19-13(OW)
File No. 129915-002
Sheet No. 3 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
50	11 12 14	13	51.0														
					83.1 51.0		-BOTTOM OF EXPLORATION AT 51.0 FT-										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA19-13(OW)

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. HA19-13(OW)

Project River's Edge
Location 484-490 Boston Post Road, Wayland, MA 01778
Client WP East Aquisition, LLC
Contractor NEW ENGLAND BORING CONTRACTORS
Driller B. Cross

Initial Water Level (depth bgs) 15.0 ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 129915-002
Date Installed 9 Apr 2019
H&A Rep. S. Shay
Location See Plan

Ground El. 134.1
Datum NAVD 88

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	134.1
				1.0	133.1
				8.5	125.6
FILL				11.0	123.1
	13.0				
				27.0	107.1
GLACIOFLUVIAL DEPOSITS				42.0	92.1
	51.0				

WELL CONSTRUCTION DETAILS

Type of protective cover: Padlock
Height of Steel above ground surface: 3.2 ft
Height of top of riser above ground surface: 2.7 ft
Type of protective casing: Steel
Length: 5.0 ft
Inside diameter: 4.0 in.
Depth of bottom of Steel: 1.8 ft
Type of riser pipe: Schedule 40 PVC
Inside diameter of riser pipe: 2.0 in.
Depth of bottom of riser pipe: 12.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	1.0
Bentonite	8.5	2.5
	-	-
	-	-

Diameter of borehole: 4.5 in.
Depth to top of well screen: 12.0 ft
Type of screen: Machine slotted Sch 40 PVC
Screen gauge or size of openings: 0.010 in.
Diameter of screen: 2.0 in.
Type of Backfill around Screen: Filter Sand
Depth to bottom of well screen: 27.0 ft
Bottom of silt trap: N/A
Depth of bottom of well: 27.0 ft
Depth of bottom of borehole: 51.0 ft

COMMENTS:

HALEY ALDRICH

TEST BORING REPORT

Boring No. HA19-14(OW)

Project	River's Edge, 484-490 Boston Post Road, Wayland, MA 01778
Client	WP East Aquisition, LLC
Contractor	NEW ENGLAND BORING CONTRACTORS

File No. 129915-002
Sheet No. 1 of 2
Start 15 April 2019
Finish 15 April 2019
Driller B. Cross
H&A Rep. S. Shay
Elevation 138.9
Datum NAVD 88
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	--	Rig Make & Model: Mobile Drill B53, ATV
Inside Diameter (in.)	4	1 3/8	--	Bit Type: Roller Bit
Hammer Weight (lb)	300	140	-	Drill Mud: None
Hammer Fall (in.)	24	30	-	Casing: HW Drive to 24.0 ft
				Hoist/Hammer: Cat-Head Safety Hammer
				PID Make & Model: NA

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					138.5		-ASPHALT-										
	4 8 9 7	S1 14	0.5 2.5		0.4 137.9	SP	0.4-1.0 - Dark brown sandy GRAVEL road base										
					1.0 137.4	SP	1.0-1.5 - 100% fill SAND layer										
					1.5	SP	Medium dense olive brown poorly graded SAND (SP), mps 1 cm, no structure, no odor, wet		10	15	15	60					
					135.9 3.0		-FILL-										
	11 17 12 10	S2 9	4.0 6.0			SP	Medium dense olive brown poorly graded SAND (SP), mps 3.2 cm., a single piece of coarse gravel, single grain structure, no odor, moist	5		10	25	60					
5					131.4 7.5												
	5 7 5 10	S3 8	9.0 11.0			SW	Medium dense olive brown well graded SAND (SW), mps 4 mm., single grain structure, no odor, wet from drilling			30	35	35					
10																	
	8 9 9 13	S4 10	14.0 16.0			SW	Similar to above, mps 2.8 cm., a single piece of coarse gravel			30	35	35					
15							-GLACIOFLUVIAL DEPOSITS-										
	12 11	S5 10	19.0 21.0			SW	Similar to above, mps 1 cm., a single piece of fine gravel			35	35	30					
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
4/16/2019	0653				*

*Read in completed well

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Overburden (ft) 36.0
Rock Cored (ft) -
Samples S8

Boring No. HA19-14(OW)

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

†**Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY ALDRICH

TEST BORING REPORT

Boring No. HA19-14(OW)
File No. 129915-002
Sheet No. 2 of 2

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size†, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20	12 12																
	10 11 13 15	S6 2	24.0 26.0			SW	Similar to above, mps 3.2 cm., as coarse gravel lodged in spoon tip, poor recovery	50				50					
25							-GLACIOFLUVIAL DEPOSITS-										
	14 12 12 11	S7 6	29.0 31.0			SW	Medium dense olive brown well graded SAND (SW), mps 3.2 cm., single grain structure, no odor, wet	5		30	35	30					
30																	
					106.4 32.5												
	13 18 18 24	S8 18	34.0 36.0				Dense olive brown poorly graded SAND (SP), mps 2.8 cm., single grain structure with interbedded silty fine sand lenses and occasional well defined gray clay seams, no odor, wet	5	5	20	30	35	5				
35					102.9 36.0		-BOTTOM OF EXPLORATION AT 36.0 FT-										

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA19-14(OW)

GROUNDWATER OBSERVATION WELL INSTALLATION REPORT

HALEY ALDRICH

Well No. HA19-14(OW)

Project River's Edge
Location 484-490 Boston Post Road, Wayland, MA 01778
Client WP East Aquisition, LLC
Contractor NEW ENGLAND BORING CONTRACTORS
Driller B. Cross

Initial Water Level (depth bgs) * ft

Well Diagram
- Riser Pipe
- Screen
- Filter Sand
- Cuttings
- Grout
- Concrete
- Bentonite Seal

File No. 129915-002
Date Installed 15 Apr 2019
H&A Rep. S. Shay
Location See Plan

Ground El. 138.9
Datum NAVD 88

SOIL/ROCK CONDITIONS	DEPTH (ft.)	GRAPHIC	WELL DETAILS	DEPTH (ft.)	ELEVATION (ft.)
				0.0	138.9
ASPHALT	0.4			0.5	138.4
FILL	3.0				
				12.5	126.4
				14.0	124.9
				17.5	121.4
GLACIOFLUVIAL DEPOSITS	36.0			35.0	103.9
				36.0	102.9

WELL CONSTRUCTION DETAILS

Type of protective cover: Compression - pent. bolt
Depth of Roadway Box below ground surface: 0.0 ft
Height of top of riser above ground surface: 0.3 ft
Type of protective casing: Roadway Box
- Length: 0.9 ft
- Inside diameter: 6.0 in.
- Depth of bottom of Roadway Box: 0.9 ft

Type of riser pipe: Schedule 40 PVC
- Inside diameter of riser pipe: 2.0 in.
- Depth of bottom of riser pipe: 20.0 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Concrete	0.0	0.5
Bentonite	14.0	3.5
	-	-
	-	-

Diameter of borehole: 4.5 in.
Depth to top of well screen: 20.0 ft
- Type of screen: Machine slotted Sch 40 PVC
- Screen gauge or size of openings: 0.010 in.
- Diameter of screen: 2.0 in.
- Type of Backfill around Screen: Filter Sand
- Depth to bottom of well screen: 20.0 ft

Bottom of silt trap: N/A
Depth of bottom of well: 35.0 ft
Depth of bottom of borehole: 36.0 ft

COMMENTS:

LEGEND:

V-103 (MW) Monitoring Well

V-113 Soil Boring

0 75 150 225

SCALE: 1" = 75'-0"
(WHEN PRINTED AT 11x17)

DRAFT - SITE SCHEMATIC

RIVER'S EDGE

484 BOSTON POST ROAD
WAYLAND, MA

File No.:	DRAFT
Date:	3/29/19
Drawn:	KS
Checked:	FC
Job No.:	46047

FIGURE 1

REVISIONS

VERTEX®
100 N WASHINGTON ST, STE 302
BOSTON, MA 02114
617.275.5407
VERTEXENG.COM

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-101(MW)

VERTEX®

BORING INFORMATION

Start Date:	03/26/2019
Completion Date:	03/26/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	20.0
Boring Depth (ft):	20.0
Well Diameter (in):	2.00
Screen Length (ft):	'10-20
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3640
Long:	-71.3811
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	50		Sand and Silt	Dark brown and black fine SAND and SILT, some medium to coarse sand and f-c gravel, trace debris (brick, concrete).	0 feet	Dry		0.1
			Coarse to Fine Sand	Tan f-c SAND.		Damp		
5	32			Tan f-c SAND, some f-c gravel, trace silt.		Damp		0.1
10	29			Tan f-c SAND, some f-c gravel.		Damp		0.1
				Tan f-c SAND, some f-c gravel.		Wet		
15	46			Tan f-c SAND, some f-c gravel, trace silt.		Wet		0.0
20								

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-102(MW)

VERTEX®

BORING INFORMATION

Start Date:	03/26/2019
Completion Date:	03/26/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	20.0
Boring Depth (ft):	20.0
Well Diameter (in):	2.00
Screen Length (ft):	'10-20
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3642
Long:	-71.3824
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	24		Medium to Fine Sand	Dark brown fine to medium SAND, some silt, trace organics (roots).	0 feet	Damp		0.1
5	28		Sand and Silt	Dark brown fine SAND and SILT, some organics (wood and roots).		Damp		0.1
			Coarse to Fine Sand	Tan fine to coarse SAND, layer of crushed stong at 8 feet bgs.		Dry		
10	30		Sand and Gravel	Tan f-c SAND and f-c GRAVEL, trace silt.		Dry		0.0
15	60			Tan f-c SAND and f-c GRAVEL, trace silt.		Wet		0.0
20								

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-103(MW)

VERTEX®

BORING INFORMATION

Start Date:	03/27/2019
Completion Date:	03/27/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	35.0
Boring Depth (ft):	35.0
Well Diameter (in):	2.00
Screen Length (ft):	'25-35
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3636
Long:	-71.3825
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	42		Fine Sands	TOPSOIL - Brown fine sand and silt, some organics (roots).	0 feet	Dry		44.3
			Sand and Silt	Light brown fine to medium SAND and SILT, trace coarse gravel.		Dry		
			Sand and Gravel	Brown f-c SAND and coarse GRAVEL, some crushed stone.		Dry		
5	43		Coarse to Fine Sand	Tan f-c SAND.		Damp		2.0
10	29			Tan f-c SAND, little coarse gravels and silt.		Damp		6.3
15	60							6.2
20	55					Damp		2.2

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-103(MW)

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	55		Coarse to Fine Sand	Tan f-c SAND, little coarse gravel.		Damp		2.2
25	60			Tan f-c SAND, little coarse gravel.		Damp		0.6
30	60		Medium to Fine Sand	Tan fine to medium SAND, little coarse sand.		Wet		0.1
35								
40								
45								

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-104(MW)

VERTEX

BORING INFORMATION

Start Date:	03/26/2019
Completion Date:	03/26/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	36.5
Boring Depth (ft):	36.5
Well Diameter (in):	2.00
Screen Length (ft):	'26.5-36.5
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3635
Long:	-71.3828
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	42		Sand and Silt	Grey fine SAND and SILT, trace f-c gravel.	0 feet			46.1
			Medium to Fine Sand	Tan and orange fine to medium SAND, trace f-c gravel and debris (asphalt).				
			Gravel	Crushed STONE.				
			Sand and Silt	Grey fine SAND and SILT, trace debris (asphalt).				
5	20							5.2
				Tan and orange fine to medium SAND and SILT, trace f-c gravel and debris (asphalt).				
10	30		Coarse to Fine Sand	Tan and grey f-c SAND.		Damp		12.6
15	15			Tan f-c SAND, some f-c gravel.		Dry		7.8
			Gravel	Crushed STONE.		Dry		
20	15					Dry		0.5

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-104(MW)

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	15		Sand and Gravel	Tan and grey f-c SAND and f-c GRAVEL.		Dry		0.5
25	60		Coarse to Fine Sand	Tan and grey f-c SAND, trace f-c gravel and silt.		Dry		0.5
30	60		Sand and Gravel	Tan and grey f-c SAND and f-c GRAVEL.		Dry		0.1
			Coarse to Fine Sand	Tan f-c SAND.		Wet		
35								
40								
45								

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-105(MW)

VERTEX®

BORING INFORMATION

Start Date:	03/27/2019
Completion Date:	03/27/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	37.0
Boring Depth (ft):	37.0
Well Diameter (in):	2.00
Screen Length (ft):	'27-37
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3637
Long:	-71.3829
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	32		Fine Sands	TOPSOIL - Brown fine SAND and SILT, trace organics (roots).	0 feet	Damp		0.4
			Coarse to Fine Sand	Light brown f-c SAND, some silt, trace f-c gravel.		Damp		
5	28			Light brown fine to medium SAND grading to f-c SAND, trace f-c gravel and silt.		Dry		0.4
10	48			Tan f-c SAND.		Dry		0.3
15	60							0.3
20	60					Dry		0.1

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-105(MW)

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	60		Coarse to Fine Sand	Tan f-c SAND, trace f-c gravel.		Dry		0.1
25	60			Tan f-c SAND, trace f-c gravel.		Dry		0.1
			Sand and Silt	Tan fine SAND and SILT.				
			Gravel	Crushed STONE.		Dry		
			Medium to Fine Sand	Tan fine to medium SAND, some silt, trace coarse gravel.		Dry		
30	49			Tan fine to medium SAND, some silt and coarse sand.		Dry		0.0
			Coarse to Fine Sand	Tan f-c SAND, little f-c gravel, trace fine gravel.		Wet		
35								
40								
45								

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-106(MW)

VERTEX

BORING INFORMATION

Start Date:	03/27/2019
Completion Date:	03/28/2019
Personnel:	Kristen Sarson
Drilling Co.:	Geosearch
Method:	Geoprobe
Refusal (Y/N):	N

WELL CONSTRUCTION DETAILS

Well Depth (ft):	37.0
Boring Depth (ft):	37.0
Well Diameter (in):	2.00
Screen Length (ft):	'27-37
Slot Size (in):	0.010
Completion Type:	Roadbox
Casing Diameter (in):	2.0

LOCATION

Lat:	42.3637
Long:	-71.3836
TOC (ft):	
GS Elev (ft):	

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	43		Asphalt	ASPHALT.	0 feet	Dry		0.0
			Medium to Fine Sand	Tan fine to medium SAND, trace coarse sand.		Damp		
			Gravel	Crushed STONE.		Dry		
			Coarse to Medium Sand	Tan medium to coarse SAND, trace fine sand.		Damp		
5	33			Tan medium to coarse SAND, trace fine sand.		Damp		0.7
10	60		Coarse to Fine Sand	Tan f-c SAND.		Damp		1.3
15	49			Tan f-c SAND, some coarse gravel.		Damp		0.1
20	50					Dry		0.1

05/50/2019

SOIL BORING/MONITORING WELL CONSTRUCTION LOGS

Project: Rivers Edge Wayland City: Wayland State: MA

V-106(MW)

Depth (ft)	Penetration (in) Recovered (in/sleeve in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Well Construction	Moisture	Odor	PID (ppm)
	50		Coarse to Fine Sand	Tan f-c SAND, trace fine gravel.		Dry		0.1
25	52		Medium to Fine Sand	Orange fine to medium SAND.		Damp		
				Orange fine to medium SAND, little coarse sand.		Damp		0.0
30	60							0.0
				Orange fine to medium SAND, little coarse sand.		Wet		
35								
40								
45								

05/50/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-107

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38259100
Long: 42.36362300
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		25		Coarse to Fine Sand	Light brown f-c SAND, some f-c gravel, trace silt.	Damp		0.6
5		20		Sand and Gravel	Light brown f-c SAND and f-c GRAVEL.	Damp		2.6
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-108

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38275400
Long: 42.36333100
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		38		Medium to Fine Sand	Tan and orange fine to medium SAND, some coarse sand and coarse gravel.	Dry		2.3
5		41						1.5
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-109

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38290300
Long: 42.36342700
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		20		Asphalt	ASPHALT.	Damp		1.7
				Medium to Fine Sand	Tan and orange fine to medium SAND, some coarse sand, trace coarse gravel.			
5		50						2.1
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-110

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38295900
Long: 42.36345700
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		60		Asphalt	ASPHALT.	Dry		0.6
				Medium to Fine Sand	Tan and orange fine to medium SAND, some coarse sand, trace coarse gravel.			
5		20						1.2
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-111

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38289600
Long: 42.36350500
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		43		Asphalt	ASPHALT.	Dry		1.2
				Medium to Fine Sand	Light brown fine to medium SAND, some coarse sand and coarse gravel.			
5		12						1.1
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-112

VERTEX

BORING INFORMATION

Start Date: 03/27/2019
Completion Date: 03/27/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38305600
Long: 42.36358200
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		30		Medium to Fine Sand	Brown fine to medium SAND, trace coarse sand, coarse gravel, and silt.	Damp		0.8
5		60						0.7
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-113

VERTEX

BORING INFORMATION

Start Date: 03/28/2019
Completion Date: 03/28/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38351400
Long: 42.36347400
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
		25		Sand and Silt	TOPSOIL- Brown fine SAND and SILT, some organics (roots).			0.0
				Medium to Fine Sand	Tan fine to medium SAND, some coarse sand, trace coarse gravel.	Damp		
5		30		Coarse to Fine Sand	Tan f-c SAND, some fine gravel.	Dry		0.1
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-114

VERTEX

BORING INFORMATION

Start Date: 03/28/2019
Completion Date: 03/28/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38347300
Long: 42.36323300
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
		28		Silt	TOPSOIL- Dark brown SILT and organics (roots).			0.5
				Coarse to Medium Sand	Light brown and orange medium to coarse SAND, little f-c gravel and fine sand.	Damp		
5		24						0.3
				Gravel	Grey coarse GRAVEL.	Dry		
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-115

VERTEX

BORING INFORMATION

Start Date: 03/28/2019
Completion Date: 03/28/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38305800
Long: 42.36312000
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		20		Medium to Fine Sand	Tan fine to medium SAND, trace silt and fine gravel.			0.3
5		12						0.1
10								
15								
20								

04/05/2019

SOIL BORING

Project: Rivers Edge Wayland City: Wayland State: MA

V-116

VERTEX

BORING INFORMATION

Start Date: 03/28/2019
Completion Date: 03/28/2019
Personnel: Kristen Sarson
Drilling Co.: Geosearch
Method: Geoprobe
Refusal (Y/N): N
Boring Depth (ft): 10.0

LOCATION

Lat: -71.38294100
Long: 42.36315900
GS Elev (ft): 0.0

NOTES

1. Soil are visually classified in general accordance with the Modified Burmister Soil Classification System

2. The soil was screened in the field using an photoionization detector (PID) with a 10.6 electron volt lamp calibrated to a 100 parts per million by volume (ppmv) isobutylene standard to report total organic volatiles (TOVs) as isobutylene equivalents with a response factor of 1. The PID has a detection limit of 0.1 ppmv, <1 readings are indicative of readings of 0.1 ppmv TVOCs or less.

Depth (ft)	Penetration (in)	Recovered (in)	Blow Count (6 in) (1,2,3,4)	Strata	Soil Description	Moisture	Odor	PID (ppm)
0		40		Medium to Fine Sand	Tan fine to medium SAND, trace coarse sand and coarse gravel.	Dry		0.0
				Gravel	Grey coarse GRAVEL and crushed stone.	Dry		
5		21		Medium to Fine Sand	Tan fine to medium SAND, trace coarse sand and coarse gravel.	Dry		0.0
10								
15								
20								

04/05/2019

Enclosure 4 - Slug Test Analyses Summaries

Statistics for Hydrauic Conductvity Values

K (ft/day)	Ln K
276	5.62040
93.7	4.54010
376	5.92959
155	5.04343
191	5.25227
154	5.03695
161	5.08140
111	4.70953
249	5.51745
368	5.90808
102	4.62497
118	4.77068
287	5.65948
500	6.21461
247	5.50939
194	5.26786
372	5.91889
257	5.54908
189	5.24175
203	5.31321
352	5.86363
216	5.37528
200	5.29832
146	4.98361

5.34292	Average	Mean of LNs = Geomean	209
5.30576	Median	Median of LNs	201
0.44729	Stnd Deviation	Std Dev of Geomean = s	1.6
24	Count	Number of K Values	
5.04181	1st quartile		155
5.30576	2nd quartile		201
5.63017	3rd quartile		279

Confidence Interval for Geomean

24	Count
4.90	Sq Root of Count

2.069	Student's t for 95% Confidence and N-1 Degrees of Freedom
209.1	Mid value of interval, which is Geometric Mean
252.6	High end of the 95% interval
173.1	Low end of the 95% interval

Does the Geometric Mean lie between the Low and High intervals?

Low:	**Yes**
High:	**Yes**

Check for Outliers

6.21461	Max of LNs
0.42440	LN of T statistic for Highest K value
1.53	T statistic for the Highest K value
4.54010	Min of LNs
0.35552	LN of T statistic for Lowest K value
1.43	T statistic for the Lowest K value
2.62	From Figure 2 for N-1 DoF

500	ft/day	**OK, not an outlier**
93.7	ft/day	**OK, not an outlier**

Calculate 95% Percentile Value of K

5.92798	LN of 95% Percentile Value of K
375.4	95% Percentile Value of K

Calculate Coefficient of Variation C_v

-4.89562	LN of Cv
0.01	Coefficeint of Variation Cv

HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-1
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 3.72E+02 ft/day
1.31E-01 cm/sec
Basic Time Lag: 0.30 s
2.3 Times Basic Time Lag: 0.69 s
(Equalization Ratio ÷ 0.90)

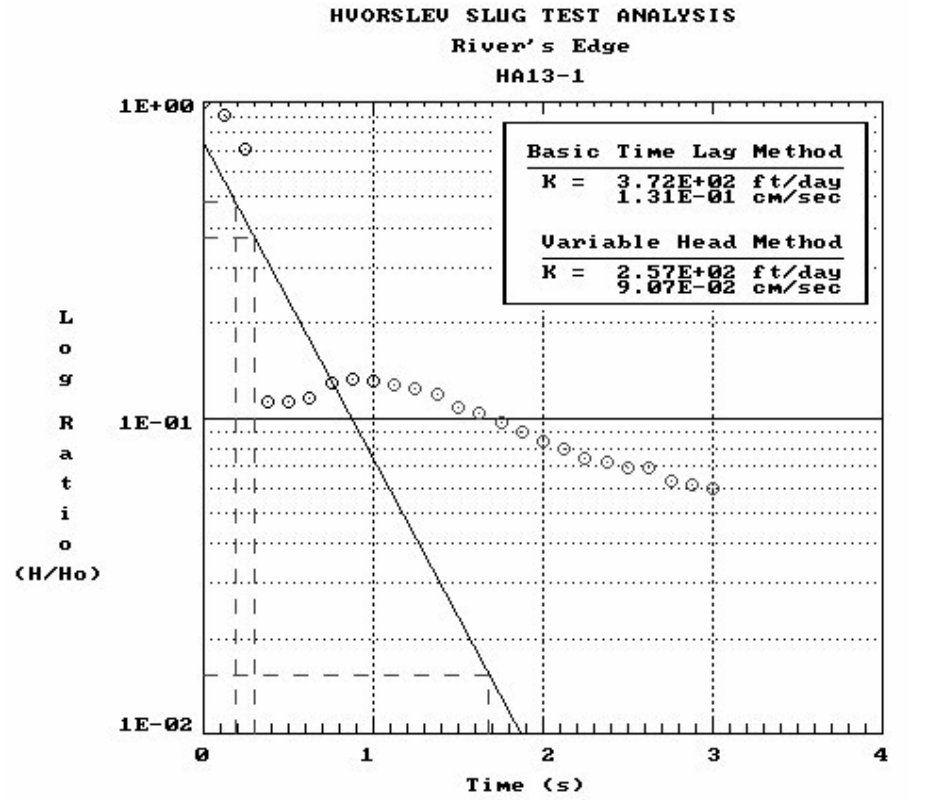
Variable Head-
Hydraulic Conductivity (Kh): 2.57E+02 ft/day
9.07E-02 cm/sec
Time Coordinate T1: 0.2 s
Time Coordinate T2: 1.7 s
Head Ratio Coordinate H1: 48.00E-02
Head Ratio Coordinate H2: 15.37E-03

Well/Aquifer Parameters

Length of well screen: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.903	3	0.2500	0.710
4	0.3750	0.112	5	0.5000	0.112	6	0.6250	0.115
7	0.7500	0.129	8	0.8750	0.133	9	1.0000	0.131
10	1.1250	0.128	11	1.2500	0.125	12	1.3750	0.118
13	1.5000	0.108	14	1.6250	0.104	15	1.7500	0.097
16	1.8750	0.091	17	2.0000	0.084	18	2.1250	0.079
19	2.2500	0.074	20	2.3750	0.073	21	2.5000	0.070
22	2.6250	0.070	23	2.7500	0.063	24	2.8750	0.061
25	3.0000	0.060						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-2
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 1.89E+02 ft/day
6.68E-02 cm/sec
Basic Time Lag: 0.59 s
2.3 Times Basic Time Lag: 1.36 s
(Equalization Ratio ÷ 0.90)

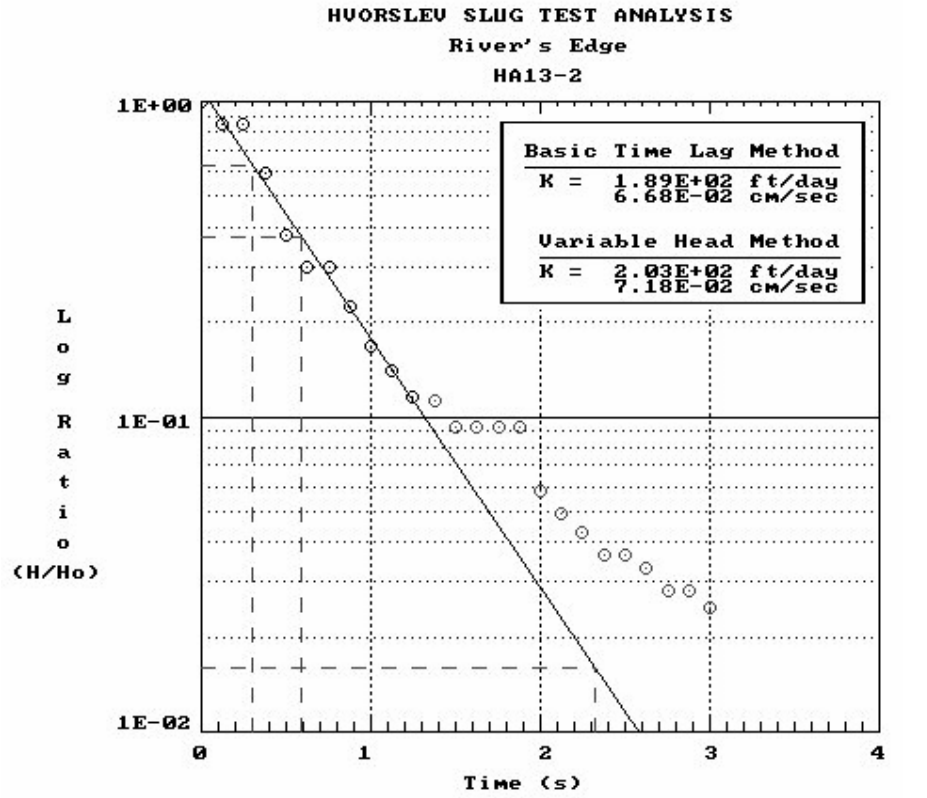
Variable Head-
Hydraulic Conductivity (Kh): 2.03E+02 ft/day
7.18E-02 cm/sec
Time Coordinate T1: 0.3 s
Time Coordinate T2: 2.3 s
Head Ratio Coordinate H1: 63.10E-02
Head Ratio Coordinate H2: 15.85E-03

Well/Aquifer Parameters

Length of well screen: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.850	3	0.2500	0.850
4	0.3750	0.589	5	0.5000	0.378	6	0.6250	0.300
7	0.7500	0.300	8	0.8750	0.223	9	1.0000	0.168
10	1.1250	0.140	11	1.2500	0.116	12	1.3750	0.112
13	1.5000	0.092	14	1.6250	0.092	15	1.7500	0.092
16	1.8750	0.092	17	2.0000	0.058	18	2.1250	0.050
19	2.2500	0.043	20	2.3750	0.036	21	2.5000	0.036
22	2.6250	0.033	23	2.7500	0.028	24	2.8750	0.028
25	3.0000	0.025						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-3
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 3.52E+02 ft/day
1.24E-01 cm/sec
Basic Time Lag: 0.32 s
2.3 Times Basic Time Lag: 0.73 s
(Equalization Ratio ÷ 0.90)

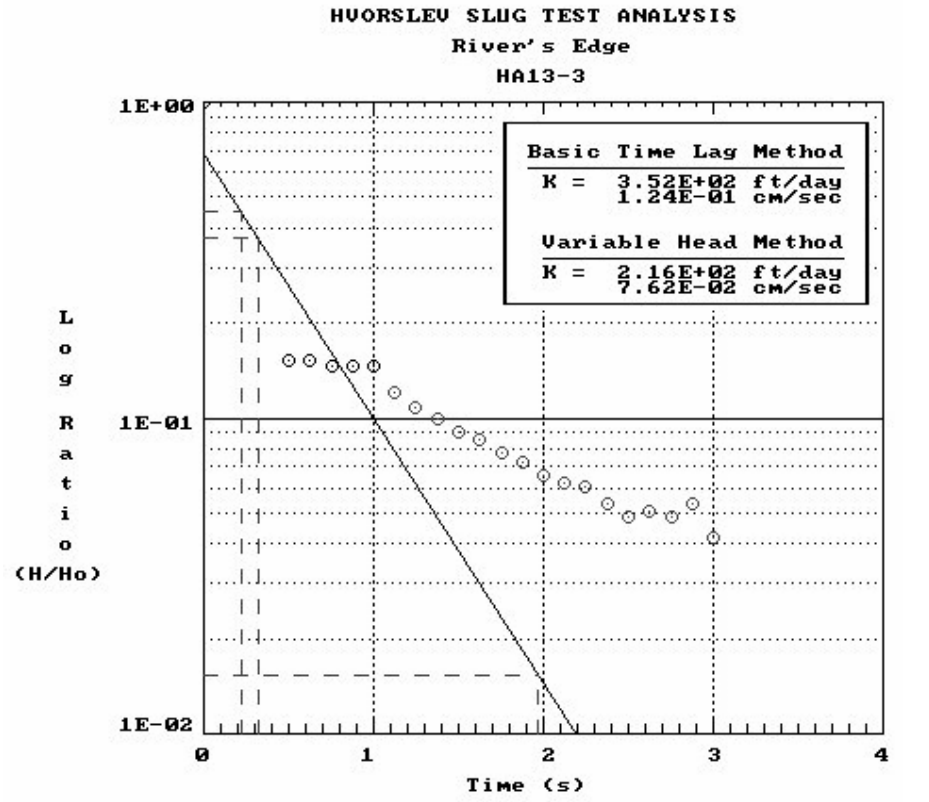
Variable Head-
Hydraulic Conductivity (Kh): 2.16E+02 ft/day
7.62E-02 cm/sec
Time Coordinate T1: 0.2 s
Time Coordinate T2: 2.0 s
Head Ratio Coordinate H1: 44.81E-02
Head Ratio Coordinate H2: 15.26E-03

Well/Aquifer Parameters

Length of well screen: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.5000	0.153	3	0.6250	0.153
4	0.7500	0.146	5	0.8750	0.146	6	1.0000	0.146
7	1.1250	0.121	8	1.2500	0.107	9	1.3750	0.099
10	1.5000	0.091	11	1.6250	0.086	12	1.7500	0.077
13	1.8750	0.072	14	2.0000	0.065	15	2.1250	0.062
16	2.2500	0.060	17	2.3750	0.054	18	2.5000	0.049
19	2.6250	0.050	20	2.7500	0.049	21	2.8750	0.054
22	3.0000	0.042						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-4
GeoHydroCycle, Inc.

Results

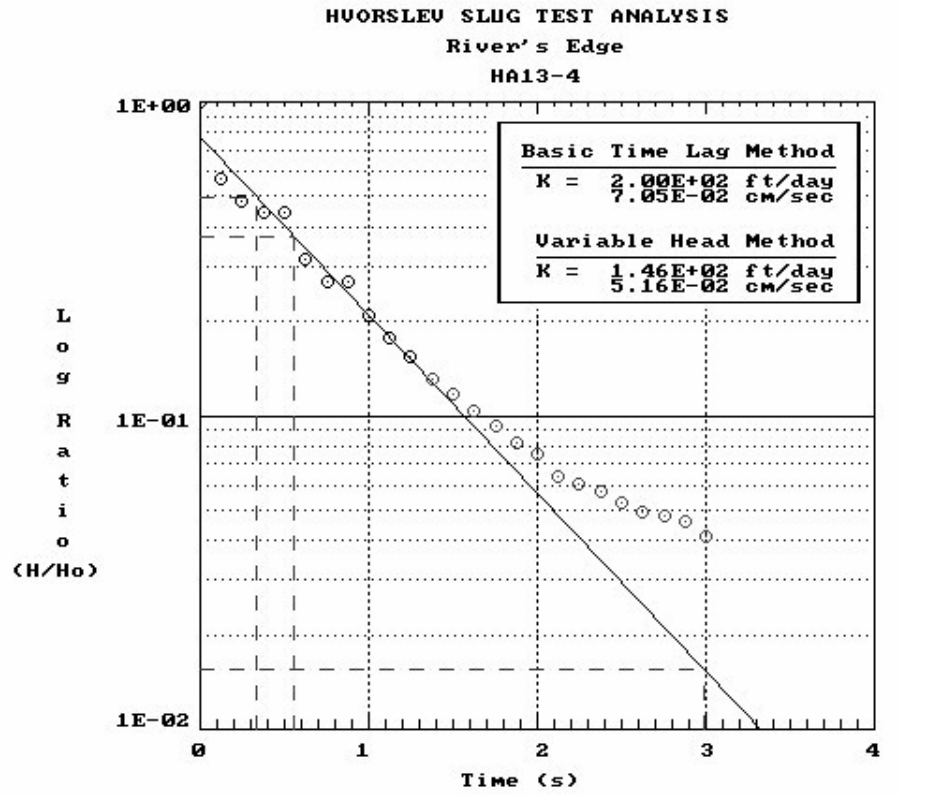
Basic Time Lag-
Hydraulic Conductivity (Kh): 2.00E+02 ft/day
7.05E-02 cm/sec
Basic Time Lag: 0.56 s
2.3 Times Basic Time Lag: 1.29 s
(Equalization Ratio ÷ 0.90)

Variable Head-
Hydraulic Conductivity (Kh): 1.46E+02 ft/day
5.16E-02 cm/sec
Time Coordinate T1: 0.3 s
Time Coordinate T2: 3.0 s
Head Ratio Coordinate H1: 49.83E-02
Head Ratio Coordinate H2: 15.44E-03

Well/Aquifer Parameters
Length of well screen: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.566	3	0.2500	0.480
4	0.3750	0.444	5	0.5000	0.444	6	0.6250	0.316
7	0.7500	0.266	8	0.8750	0.266	9	1.0000	0.209
10	1.1250	0.178	11	1.2500	0.155	12	1.3750	0.132
13	1.5000	0.117	14	1.6250	0.104	15	1.7500	0.092
16	1.8750	0.082	17	2.0000	0.076	18	2.1250	0.064
19	2.2500	0.061	20	2.3750	0.058	21	2.5000	0.053
22	2.6250	0.049	23	2.7500	0.048	24	2.8750	0.046
25	3.0000	0.041						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-1
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 2.49E+02 ft/day
8.80E-02 cm/sec
Basic Time Lag: 0.34 s
2.3 Times Basic Time Lag: 0.78 s
(Equalization Ratio ÷ 0.90)

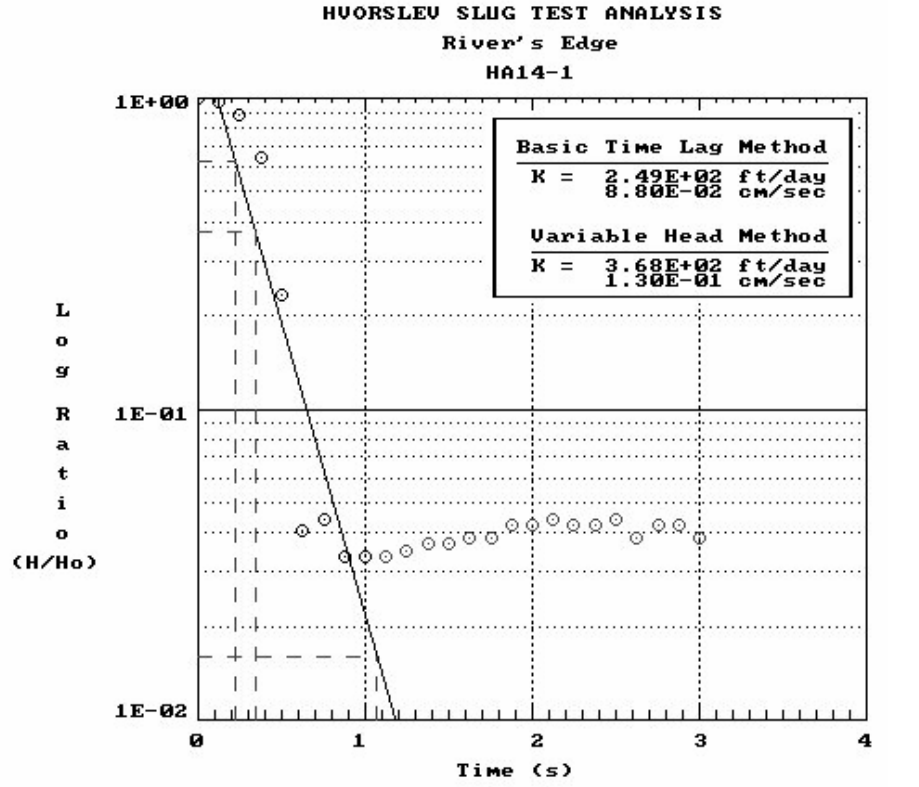
Variable Head-
Hydraulic Conductivity (Kh): 3.68E+02 ft/day
1.30E-01 cm/sec
Time Coordinate T1: 0.2 s
Time Coordinate T2: 1.1 s
Head Ratio Coordinate H1: 63.10E-02
Head Ratio Coordinate H2: 15.85E-03

Well/Aquifer Parameters

Length of well screen: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.972	3	0.2500	0.884
4	0.3750	0.649	5	0.5000	0.234	6	0.6250	0.040
7	0.7500	0.044	8	0.8750	0.033	9	1.0000	0.033
10	1.1250	0.033	11	1.2500	0.035	12	1.3750	0.037
13	1.5000	0.037	14	1.6250	0.039	15	1.7500	0.039
16	1.8750	0.042	17	2.0000	0.042	18	2.1250	0.044
19	2.2500	0.042	20	2.3750	0.042	21	2.5000	0.044
22	2.6250	0.039	23	2.7500	0.042	24	2.8750	0.042
25	3.0000	0.039						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-2
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 1.02E+02 ft/day
3.60E-02 cm/sec
Basic Time Lag: 0.83 s
2.3 Times Basic Time Lag: 1.92 s
(Equalization Ratio ÷ 0.90)

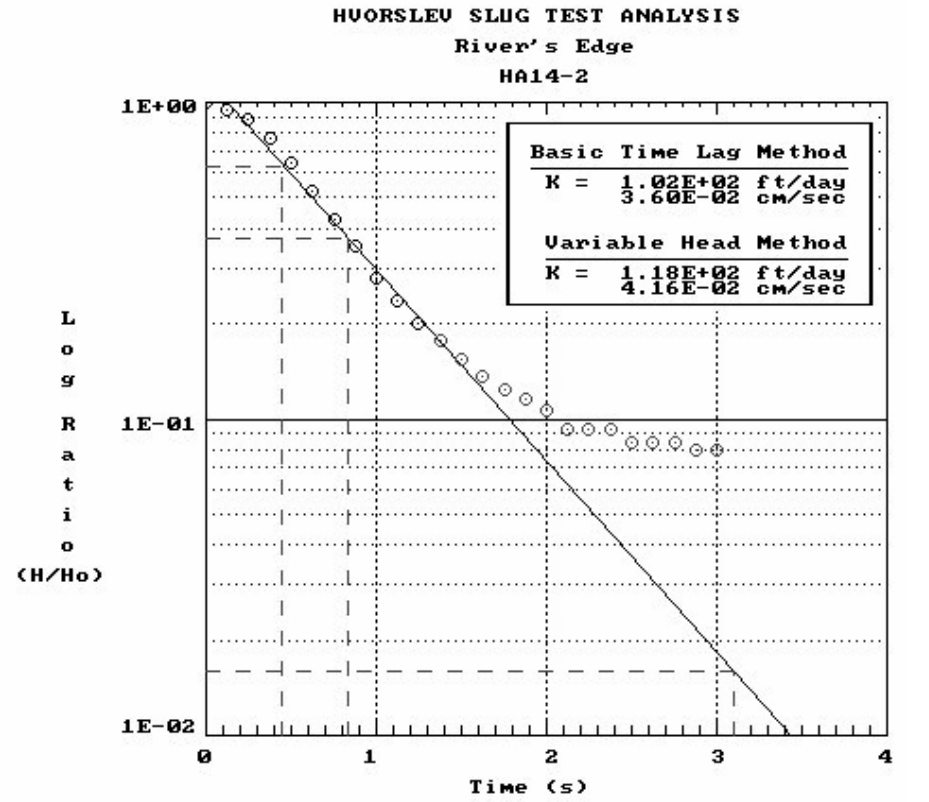
Variable Head-
Hydraulic Conductivity (Kh): 1.18E+02 ft/day
4.16E-02 cm/sec
Time Coordinate T1: 0.4 s
Time Coordinate T2: 3.1 s
Head Ratio Coordinate H1: 63.10E-02
Head Ratio Coordinate H2: 15.85E-03

Well/Aquifer Parameters

Length of well screen: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.942	3	0.2500	0.889
4	0.3750	0.770	5	0.5000	0.642	6	0.6250	0.527
7	0.7500	0.429	8	0.8750	0.350	9	1.0000	0.279
10	1.1250	0.235	11	1.2500	0.199	12	1.3750	0.177
13	1.5000	0.155	14	1.6250	0.137	15	1.7500	0.124
16	1.8750	0.115	17	2.0000	0.106	18	2.1250	0.093
19	2.2500	0.093	20	2.3750	0.093	21	2.5000	0.084
22	2.6250	0.084	23	2.7500	0.084	24	2.8750	0.080
25	3.0000	0.080						



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-3
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 2.87E+02 ft/day
1.01E-01 cm/sec
Basic Time Lag: 0.30 s
2.3 Times Basic Time Lag: 0.68 s
(Equalization Ratio ÷ 0.90)

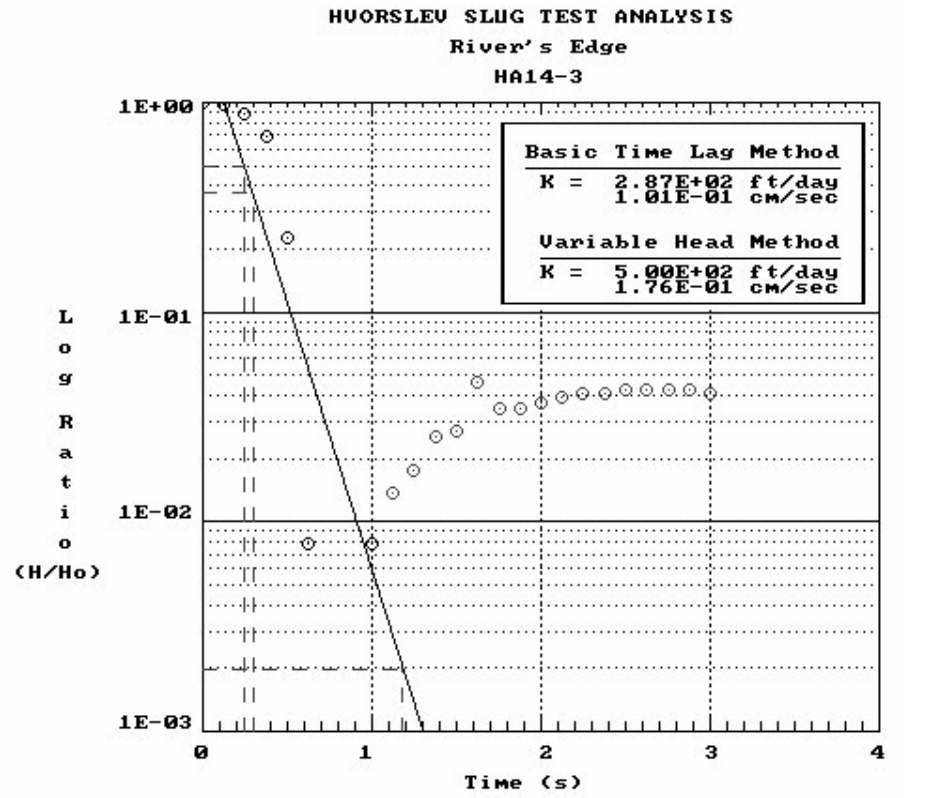
Variable Head-
Hydraulic Conductivity (Kh): 5.00E+02 ft/day
1.76E-01 cm/sec
Time Coordinate T1: 0.2 s
Time Coordinate T2: 1.2 s
Head Ratio Coordinate H1: 50.12E-02
Head Ratio Coordinate H2: 19.95E-04

Well/Aquifer Parameters

Length of well screen: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.977	3	0.2500	0.887
4	0.3750	0.691	5	0.5000	0.226	6	0.6250	0.008
7	1.0000	0.008	8	1.1250	0.014	9	1.2500	0.018
10	1.3750	0.025	11	1.5000	0.027	12	1.6250	0.047
13	1.7500	0.035	14	1.8750	0.035	15	2.0000	0.037
16	2.1250	0.039	17	2.2500	0.041	18	2.3750	0.041
19	2.5000	0.043	20	2.6250	0.043	21	2.7500	0.043
22	2.8750	0.043	23	3.0000	0.041	24	2.8750	0.080



HVORSLEV INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-4
GeoHydroCycle, Inc.

Results

Basic Time Lag-
Hydraulic Conductivity (Kh): 2.47E+02 ft/day
8.70E-02 cm/sec
Basic Time Lag: 0.34 s
2.3 Times Basic Time Lag: 0.79 s
(Equalization Ratio ÷ 0.90)

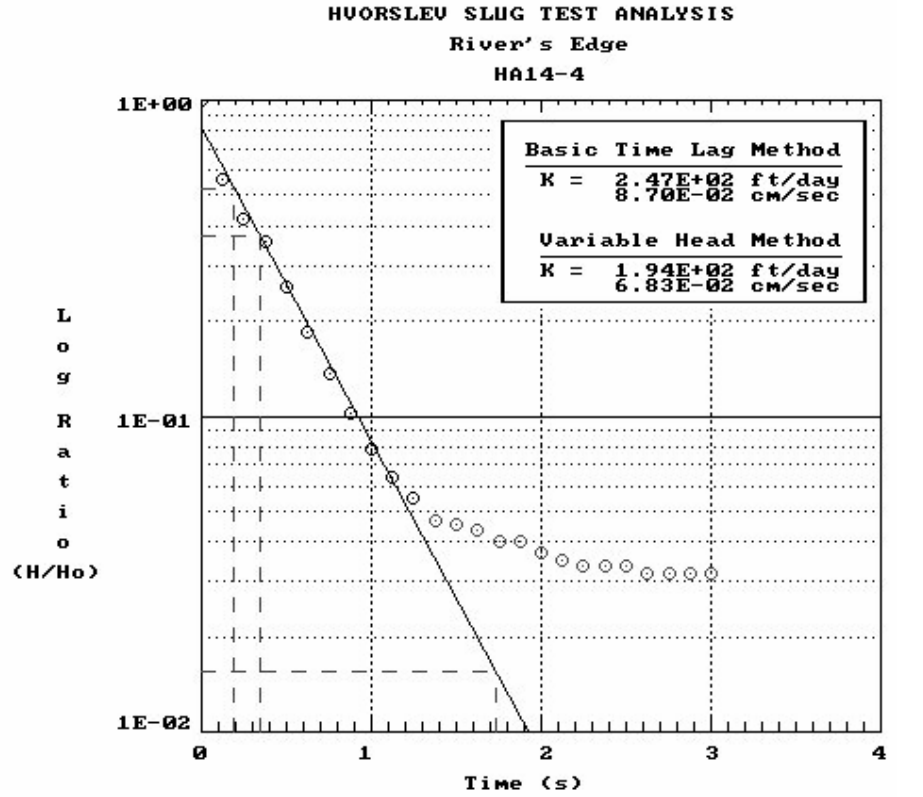
Variable Head-
Hydraulic Conductivity (Kh): 1.94E+02 ft/day
6.83E-02 cm/sec
Time Coordinate T1: 0.2 s
Time Coordinate T2: 1.7 s
Head Ratio Coordinate H1: 52.30E-02
Head Ratio Coordinate H2: 15.52E-03

Well/Aquifer Parameters

Length of well screen: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well bore: 0.708 ft
Kh/Kv ratio: 1.0

Time vs Drawdown Ratio Data

No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)	No.	Time (s)	H/Hmax (ft)
1	0.0000	1.000	2	0.1250	0.564	3	0.2500	0.420
4	0.3750	0.356	5	0.5000	0.258	6	0.6250	0.186
7	0.7500	0.137	8	0.8750	0.102	9	1.0000	0.079
10	1.1250	0.064	11	1.2500	0.055	12	1.3750	0.047
13	1.5000	0.045	14	1.6250	0.043	15	1.7500	0.040
16	1.8750	0.040	17	2.0000	0.037	18	2.1250	0.035
19	2.2500	0.033	20	2.3750	0.033	21	2.5000	0.033
22	2.6250	0.032	23	2.7500	0.032	24	2.8750	0.032
25	3.0000	0.032						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-1
GeoHydroCycle, Inc.

Results

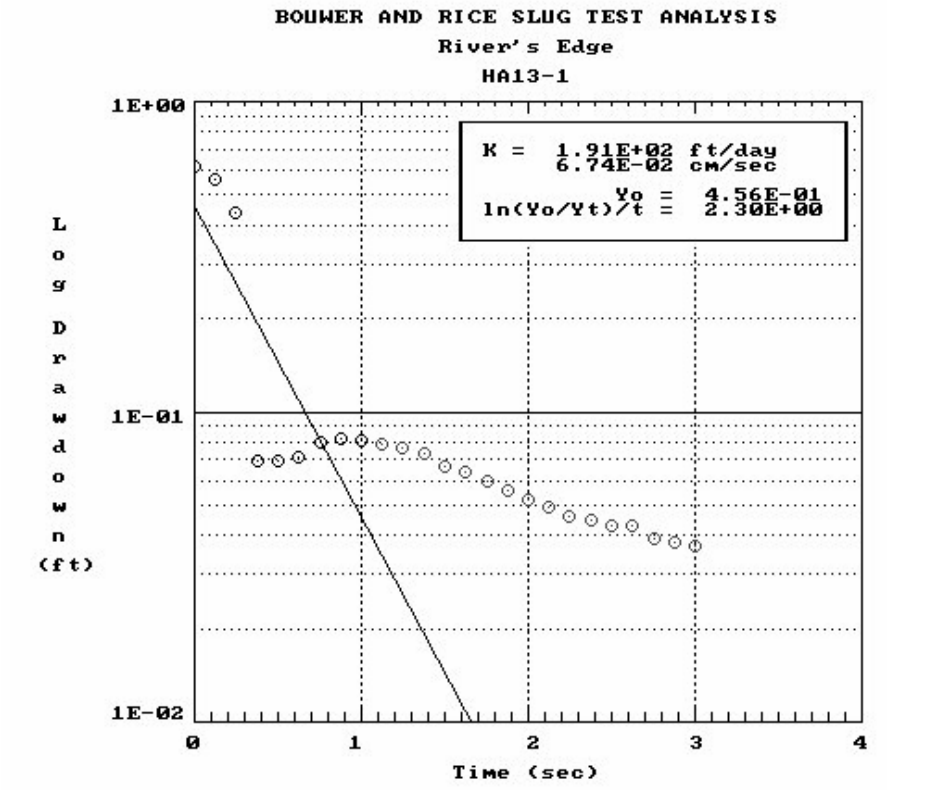
Hydraulic Conductivity: 1.91E+02 ft/day
6.74E-02 cm/sec
Y-Intercept (Yo): 4.56E-01 ft
Well Screen Ratio (Le/rw): 24.3
Dimensionless Parameter C: 1.87
Slope of Line [ln(Yo/Yt)/t]: 2.301E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 4.054E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.372
Effective Radius [Re]: 3.79 ft
Volume Tested [rw<Vol<Re]: 3.86E+02 ft^3

Well/Aquifer Parameters

Depth of well: 8.60 ft
Length of well screen: 8.60 ft
Saturated thickness: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.618	2	0.1250	0.558	3	0.2500	0.439
4	0.3750	0.069	5	0.5000	0.069	6	0.6250	0.071
7	0.7500	0.080	8	0.8750	0.082	9	1.0000	0.081
10	1.1250	0.079	11	1.2500	0.077	12	1.3750	0.073
13	1.5000	0.067	14	1.6250	0.064	15	1.7500	0.060
16	1.8750	0.056	17	2.0000	0.052	18	2.1250	0.049
19	2.2500	0.046	20	2.3750	0.045	21	2.5000	0.043
22	2.6250	0.043	23	2.7500	0.039	24	2.8750	0.038
25	3.0000	0.037						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

==========

River's Edge
HA13-2
GeoHydroCycle, Inc.

Results

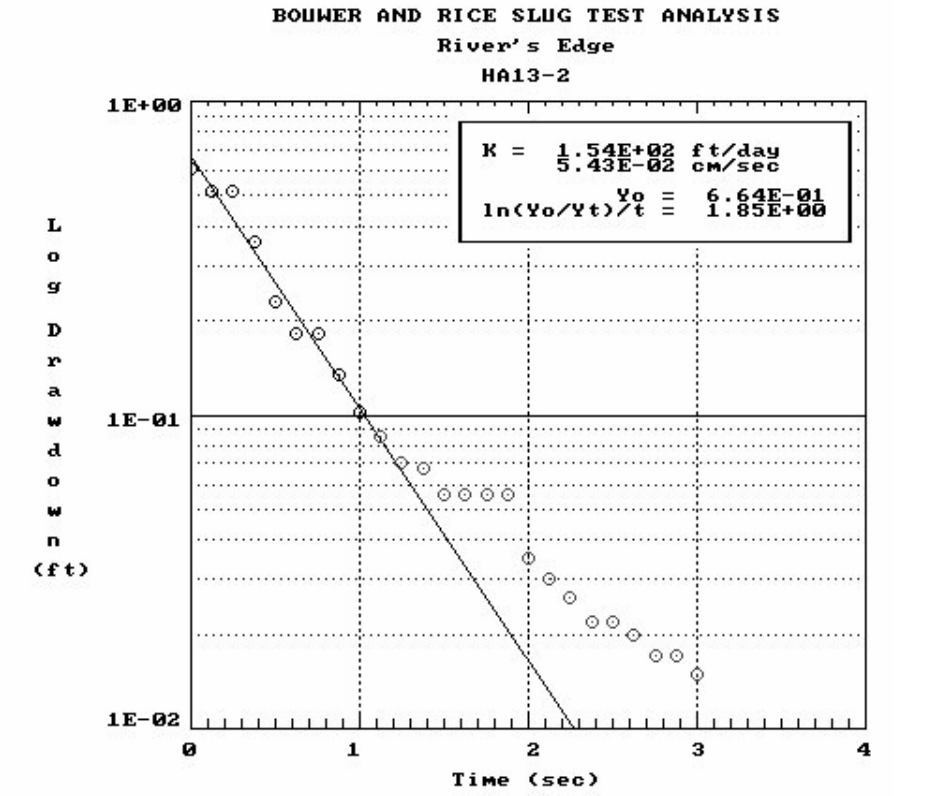
Hydraulic Conductivity: 1.54E+02 ft/day
5.43E-02 cm/sec
Y-Intercept (Yo): 6.64E-01 ft
Well Screen Ratio (Le/rw): 24.3
Dimensionless Parameter C: 1.87
Slope of Line [ln(Yo/Yt)/t]: 1.853E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 4.054E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.372
Effective Radius [Re]: 3.79 ft
Volume Tested [rw<Vol<Re]: 3.86E+02 ft^3

Well/Aquifer Parameters

Depth of well: 8.60 ft
Length of well screen: 8.60 ft
Saturated thickness: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.606	2	0.1250	0.515	3	0.2500	0.515
4	0.3750	0.357	5	0.5000	0.229	6	0.6250	0.182
7	0.7500	0.182	8	0.8750	0.135	9	1.0000	0.102
10	1.1250	0.085	11	1.2500	0.070	12	1.3750	0.068
13	1.5000	0.056	14	1.6250	0.056	15	1.7500	0.056
16	1.8750	0.056	17	2.0000	0.035	18	2.1250	0.030
19	2.2500	0.026	20	2.3750	0.022	21	2.5000	0.022
22	2.6250	0.020	23	2.7500	0.017	24	2.8750	0.017
25	3.0000	0.015						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-3
GeoHydroCycle, Inc.

Results

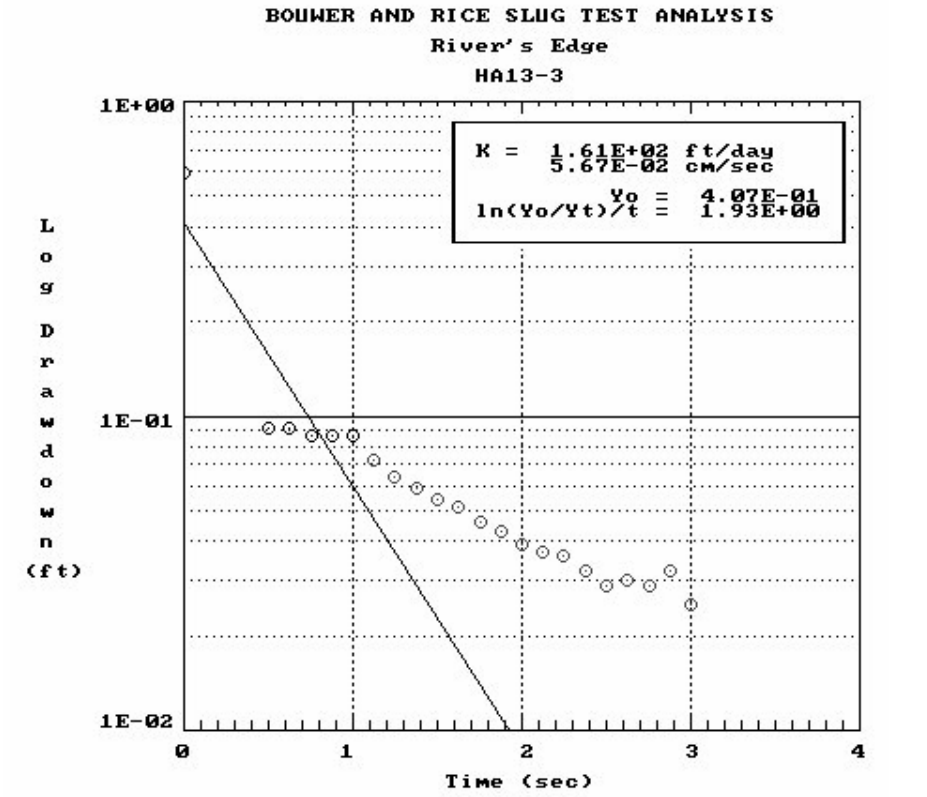
Hydraulic Conductivity: 1.61E+02 ft/day
5.67E-02 cm/sec
Y-Intercept (Yo): 4.07E-01 ft
Well Screen Ratio (Le/rw): 24.3
Dimensionless Parameter C: 1.87
Slope of Line [ln(Yo/Yt)/t]: 1.933E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 4.054E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.372
Effective Radius [Re]: 3.79 ft
Volume Tested [rw<Vol<Re]: 3.86E+02 ft^3

Well/Aquifer Parameters

Depth of well: 8.60 ft
Length of well screen: 8.60 ft
Saturated thickness: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.596	2	0.5000	0.091	3	0.6250	0.091
4	0.7500	0.087	5	0.8750	0.087	6	1.0000	0.087
7	1.1250	0.072	8	1.2500	0.064	9	1.3750	0.059
10	1.5000	0.054	11	1.6250	0.051	12	1.7500	0.046
13	1.8750	0.043	14	2.0000	0.039	15	2.1250	0.037
16	2.2500	0.036	17	2.3750	0.032	18	2.5000	0.029
19	2.6250	0.030	20	2.7500	0.029	21	2.8750	0.032
22	3.0000	0.025						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA13-4
GeoHydroCycle, Inc.

Results

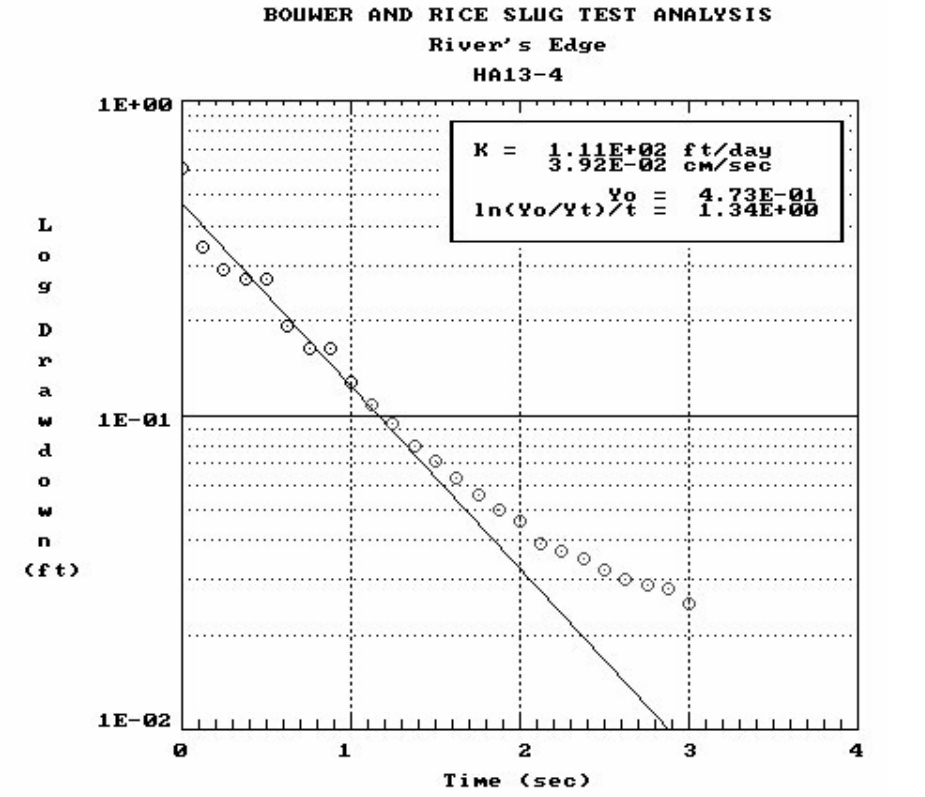
Hydraulic Conductivity: 1.11E+02 ft/day
3.92E-02 cm/sec
Y-Intercept (Yo): 4.73E-01 ft
Well Screen Ratio (Le/rw): 24.3
Dimensionless Parameter C: 1.87
Slope of Line [ln(Yo/Yt)/t]: 1.339E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 4.054E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.372
Effective Radius [Re]: 3.79 ft
Volume Tested [rw<Vol<Re]: 3.86E+02 ft^3

Well/Aquifer Parameters

Depth of well: 8.60 ft
Length of well screen: 8.60 ft
Saturated thickness: 8.60 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.608	2	0.1250	0.344	3	0.2500	0.292
4	0.3750	0.270	5	0.5000	0.270	6	0.6250	0.192
7	0.7500	0.162	8	0.8750	0.162	9	1.0000	0.127
10	1.1250	0.108	11	1.2500	0.094	12	1.3750	0.080
13	1.5000	0.071	14	1.6250	0.063	15	1.7500	0.056
16	1.8750	0.050	17	2.0000	0.046	18	2.1250	0.039
19	2.2500	0.037	20	2.3750	0.035	21	2.5000	0.032
22	2.6250	0.030	23	2.7500	0.029	24	2.8750	0.028
25	3.0000	0.025						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

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River's Edge
HA14-1
GeoHydroCycle, Inc.

Results

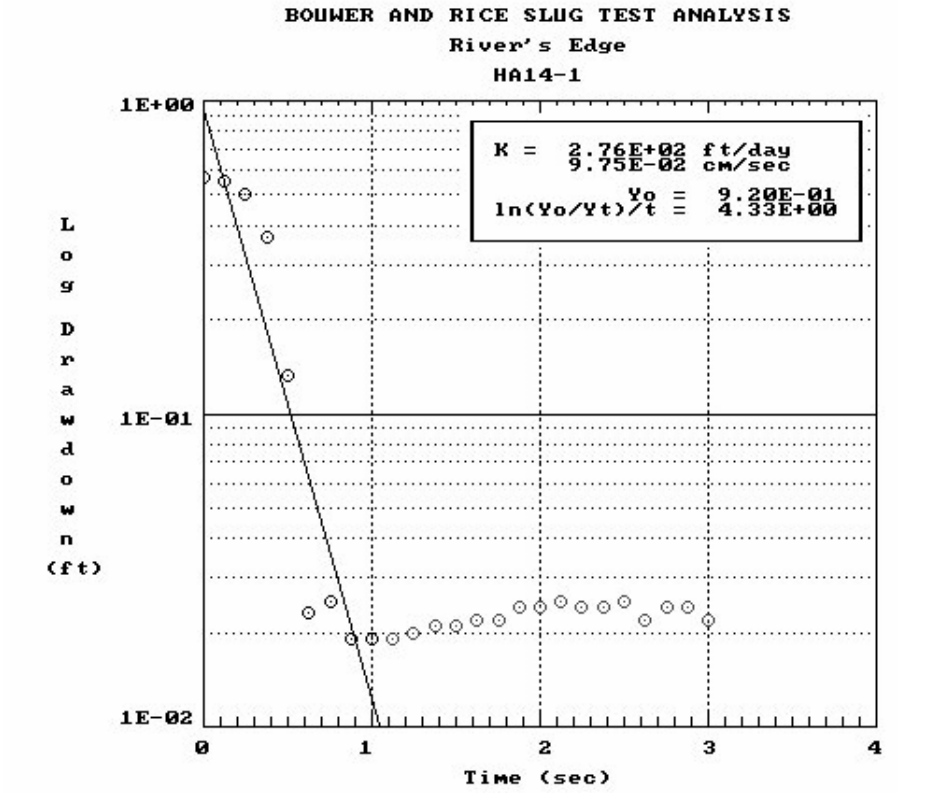
Hydraulic Conductivity: 2.76E+02 ft/day
9.75E-02 cm/sec
Y-Intercept (Yo): 9.20E-01 ft
Well Screen Ratio (Le/rw): 35.9
Dimensionless Parameter C: 2.31
Slope of Line [ln(Yo/Yt)/t]: 4.332E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 2.745E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.691
Effective Radius [Re]: 5.22 ft
Volume Tested [rw<Vol<Re]: 1.08E+03 ft^3

Well/Aquifer Parameters

Depth of well: 12.70 ft
Length of well screen: 12.70 ft
Saturated thickness: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.569	2	0.1250	0.553	3	0.2500	0.503
4	0.3750	0.369	5	0.5000	0.133	6	0.6250	0.023
7	0.7500	0.025	8	0.8750	0.019	9	1.0000	0.019
10	1.1250	0.019	11	1.2500	0.020	12	1.3750	0.021
13	1.5000	0.021	14	1.6250	0.022	15	1.7500	0.022
16	1.8750	0.024	17	2.0000	0.024	18	2.1250	0.025
19	2.2500	0.024	20	2.3750	0.024	21	2.5000	0.025
22	2.6250	0.022	23	2.7500	0.024	24	2.8750	0.024
25	3.0000	0.022						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-2
GeoHydroCycle, Inc.

Results

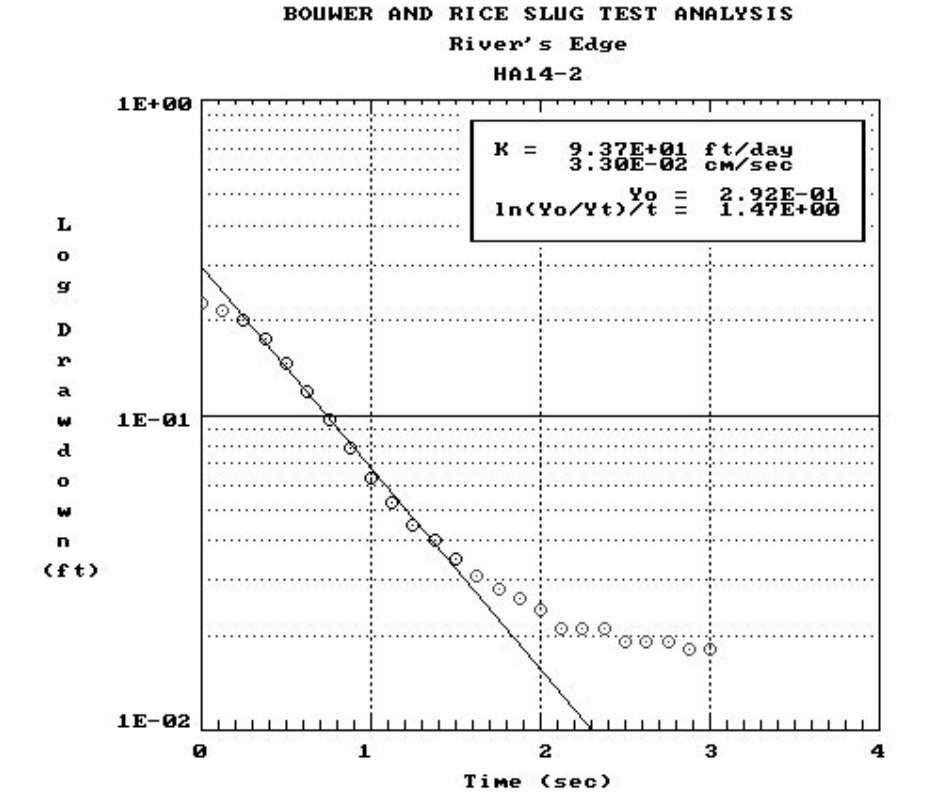
Hydraulic Conductivity: 9.37E+01 ft/day
3.30E-02 cm/sec
Y-Intercept (Yo): 2.92E-01 ft
Well Screen Ratio (Le/rw): 35.9
Dimensionless Parameter C: 2.31
Slope of Line [ln(Yo/Yt)/t]: 1.468E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 2.745E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.691
Effective Radius [Re]: 5.22 ft
Volume Tested [rw<Vol<Re]: 1.08E+03 ft^3

Well/Aquifer Parameters

Depth of well: 12.70 ft
Length of well screen: 12.70 ft
Saturated thickness: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.226	2	0.1250	0.213	3	0.2500	0.201
4	0.3750	0.174	5	0.5000	0.145	6	0.6250	0.119
7	0.7500	0.097	8	0.8750	0.079	9	1.0000	0.063
10	1.1250	0.053	11	1.2500	0.045	12	1.3750	0.040
13	1.5000	0.035	14	1.6250	0.031	15	1.7500	0.028
16	1.8750	0.026	17	2.0000	0.024	18	2.1250	0.021
19	2.2500	0.021	20	2.3750	0.021	21	2.5000	0.019
22	2.6250	0.019	23	2.7500	0.019	24	2.8750	0.018
25	3.0000	0.018						



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-3
GeoHydroCycle, Inc.

Results

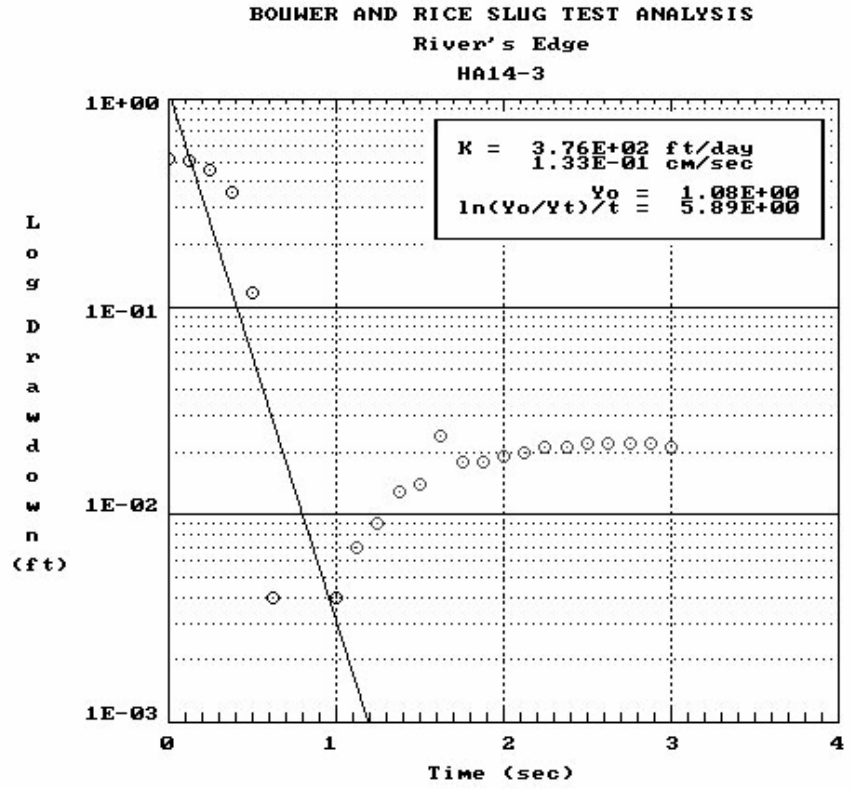
Hydraulic Conductivity: 3.76E+02 ft/day
1.33E-01 cm/sec
Y-Intercept (Yo): 1.08E+00 ft
Well Screen Ratio (Le/rw): 35.9
Dimensionless Parameter C: 2.31
Slope of Line [ln(Yo/Yt)/t]: 5.889E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 2.745E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.691
Effective Radius [Re]: 5.22 ft
Volume Tested [rw<Vol<Re]: 1.08E+03 ft^3

Well/Aquifer Parameters

Depth of well: 12.70 ft
Length of well screen: 12.70 ft
Saturated thickness: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.514	2	0.1250	0.502	3	0.2500	0.456
4	0.3750	0.355	5	0.5000	0.116	6	0.6250	0.004
7	1.0000	0.004	8	1.1250	0.007	9	1.2500	0.009
10	1.3750	0.013	11	1.5000	0.014	12	1.6250	0.024
13	1.7500	0.018	14	1.8750	0.018	15	2.0000	0.019
16	2.1250	0.020	17	2.2500	0.021	18	2.3750	0.021
19	2.5000	0.022	20	2.6250	0.022	21	2.7500	0.022
22	2.8750	0.022	23	3.0000	0.021	24	2.8750	0.018



BOUWER AND RICE INTERACTIVE SLUG TEST ANALYSIS 08-13-2019

River's Edge
HA14-4
GeoHydroCycle, Inc.

Results

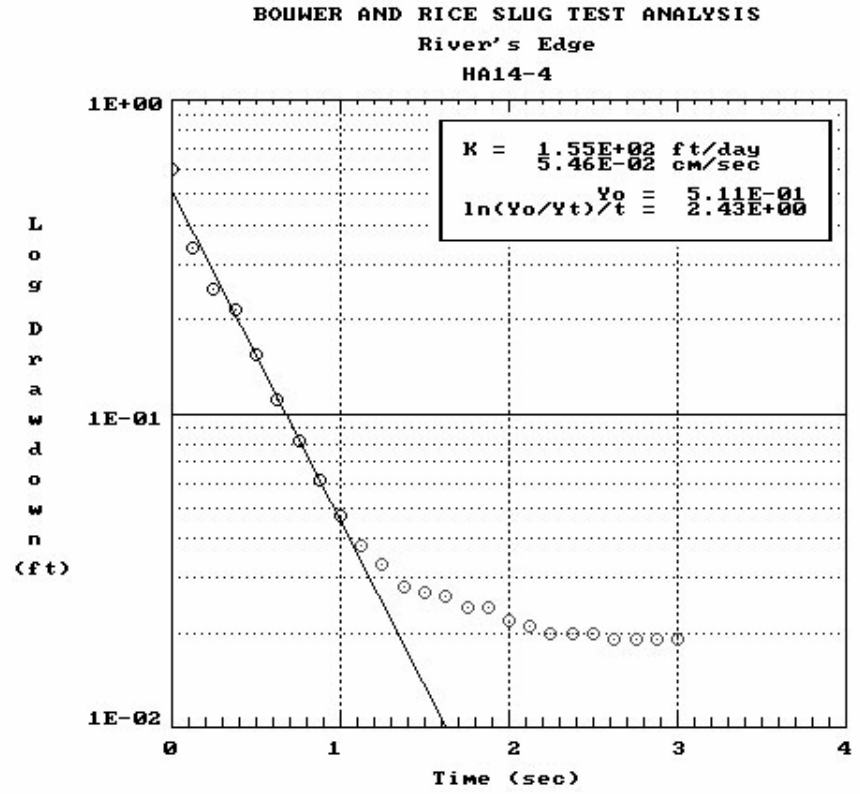
Hydraulic Conductivity: 1.55E+02 ft/day
5.46E-02 cm/sec
Y-Intercept (Yo): 5.11E-01 ft
Well Screen Ratio (Le/rw): 35.9
Dimensionless Parameter C: 2.31
Slope of Line [ln(Yo/Yt)/t]: 2.425E+00 1/sec
Well Parameters (Rc^2 / 2*Le): 2.745E-04 ft
Dimensionless Ratio [ln(Re/rw)]: 2.691
Effective Radius [Re]: 5.22 ft
Volume Tested [rw<Vol<Re]: 1.08E+03 ft^3

Well/Aquifer Parameters

Depth of well: 12.70 ft
Length of well screen: 12.70 ft
Saturated thickness: 12.70 ft
Diameter of the well casing: 0.167 ft
Diameter of the well filter: 0.708 ft

Time vs Drawdown Data

No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)	No.	Time (sec)	Drawdown (ft)
1	0.0000	0.598	2	0.1250	0.337	3	0.2500	0.251
4	0.3750	0.213	5	0.5000	0.154	6	0.6250	0.111
7	0.7500	0.082	8	0.8750	0.061	9	1.0000	0.047
10	1.1250	0.038	11	1.2500	0.033	12	1.3750	0.028
13	1.5000	0.027	14	1.6250	0.026	15	1.7500	0.024
16	1.8750	0.024	17	2.0000	0.022	18	2.1250	0.021
19	2.2500	0.020	20	2.3750	0.020	21	2.5000	0.020
22	2.6250	0.019	23	2.7500	0.019	24	2.8750	0.019
25	3.0000	0.019						



Enclosure 5 - Copies of Transmittal Form X256443 and BRP WP 83

Enter your transmittal number → X284361 (Transmittal Number)

Your unique Transmittal Number can be accessed online:
http://www.mass.gov/eea/agencies/massdep/service/approvals/transmittal-form-for-payment.html

Massachusetts Department of Environmental Protection

Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: MassDEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application. **Copy 2** must accompany your fee payment. **Copy 3** should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

MassDEP
P.O. Box 4062
Boston, MA
02211

*** Note:**
For BWSC Permits, enter the LSP.

A. Permit Information

1. Permit Code: 4 to 7 character code from permit instructions	2. Name of Permit Category
BRP WP 83	Hydrogeologic Evaluation

3. Type of Project or Activity: Groundwater Discharge Permit

B. Applicant Information – Firm or Individual

1. Name of Firm - Or, if party needing this approval is an individual enter name below: WP East Acquisitions, LLC

2. **Last Name** of Individual	3. **First Name** of Individual	4. MI

5. Street Address: 91 Hartwell Avenue

6. City/Town	7. State	8. Zip Code	9. Telephone #	10. Ext. #
Lexington	MA	02421	781-541-5822	

11. Contact Person	12. e-mail address
Jim Lambert	jim.lambert@woodpartners.com

C. Facility, Site or Individual Requiring Approval

1. Name of Facility, Site Or Individual: Alta at Rivers Edge WWTF

2. Street Address: 490 Boston Post Road

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Wayland	MA	01778		

8. DEP Facility Number (if Known)	9. Federal I.D. Number (if Known)	10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

1. Name of Firm Or Individual: GeoHydroCycle, Inc.

2. Address: 321 Walnut Street, #450

3. City/Town	4. State	5. Zip Code	6. Telephone #	7. Ext. #
Newton	MA	02460	(617) 527-8074	

8. Contact Person	9. LSP Number (BWSC Permits only)
Stephen W. Smith, P.E., P.HGW	

E. Permit - Project Coordination

1. Is this project subject to MEPA review? ☐ yes ☒ no
   If yes, enter the project's EOEA file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

EOEA File Number

F. Amount Due

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Special Provisions:

1. ☐ **Fee** Exempt (city, town or municipal housing authority)(state agency if fee is $100 or less).
   There are no fee exemptions for BWSC permits, regardless of applicant status.
2. ☐ Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. ☐ Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. ☐ Homeowner (according to 310 CMR 4.02).

Check Number	Dollar Amount	Date
	$10,005	

Massachusetts Department of Environmental Protection
Bureau of Resource Protection–Groundwater Discharge Permit Program

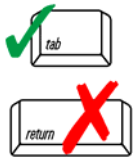
BRP WP 83 Application to Prepare a Hydrogeological Evaluation

X284361
Transmittal Number #

Facility ID/Permit # (if known)

A. General Information

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Applicant Information:

Jim Lambert — Name
WP East Acquisitions, LLC — Company Name (If applicable)
91 Hartwell Avenue — Address
Lexington — City/Town
MA — State
781-541-5822 — Telephone
02421 — Zip Code
jim.lambert@woodpartners.com — Email address

2. Applicant Contact Information (if different from above):

SAME — Contact Name
Company Name (If applicable)
Title
Address
City/Town
State
Telephone
Zip Code
email address

B. Project Information

1. Has a pre-scoping meeting been held with MassDEP personnel?

☒ Yes ☐ No If yes, date of pre-scoping meeting: 1/10/2019

2. Has a public notice been placed in the Environmental Monitor that the scope of work has been prepared and will be submitted to MassDEP in accordance with 314 CMR 5.09(1)(b)?

☒ Yes ☐ No If yes, date of Environmental Monitor: 1/2/2019

3. Is there a discharge presently located on the site?

☐ Yes ☐ No If yes, answer the following:

When did the discharge begin? Date of startup:

Description of discharge:

BRP WP 83 Application to Prepare a Hydrogeological Evaluation

X284361
Transmittal Number #

Facility ID/Permit # (if known)

B. Project Information (cont.)

4. Improvements - Are you required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to; permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ Yes ☐ No

If yes, answer the following:

Description of order or agreement (include enforcement document number, if applicable):

Identification No. of Affected Treatment Facility

Description of Project

Final Compliance Date

C. Site Information

1. GPS Coordinates:

   a) Enter Latitude and Longitude to the nearest whole second for the proposed site.

   Latitude: 42º 21' 49" Longitude: 71º 22' 55"

   b) Provide a narrative description of the site and the feature to be permitted. As an example: "The site is on the west side of Main Street, the third building north of High Street. The disposal field lies 100 feet off the southwest corner of the building."

   c) Attach a site map based on the MassGIS Coordinate Information Tool that clearly indicates the site. The Coordinate Information Tool is available at http://maps.massgis.state.ma.us/images/dep/xyinfo/get_xy.html.

BRP WP 83 Application to Prepare a Hydrogeological Evaluation

X284361
Transmittal Number #

Facility ID/Permit # (if known)

C. Site Information (cont.)

2. Provide a topographic map or maps of the area extending at least to one mile beyond the property boundaries of the site which clearly show the following:

   1) The legal boundaries of the site;
   2) All hazardous waste management facilities;
   3) All springs and surface water bodies in the area, plus all drinking water wells within one mile of the facility which are identified in the public record or otherwise known to you.
   4) All Zone II's or IWPA's.

3. Please list any public or private drinking water supply wells within 2,500 feet of the proposed site:

Well Location	Type of Well (Public/Private)	Status (Active/Inactive)	Safe Yield
SEE REPORT			

D. Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I will be responsible for publication of public notice of the applicable permit proceedings identified under 314 CMR 2.06(1)(a) through (d)."

	Jim Lambert
Signature of Applicant	Printed Name of Applicant
Date Signed	
Stephen W. Smith, P.E., P.HGW	(617) 527-8074
Name of Preparer	Telephone
President, GeoHydroCycle, Inc.	swsmith@geohydrocycle.com
Title of Preparer	email