



September 3, 2020

Mr. Gerold Noyes  
Vermont Department of Environmental Conservation  
Waste Management Division  
1 National Life Drive – Davis 1  
Montpelier, VT 05620-3704

**RE: Well Abandonment and SMAC Request**  
North Beach Maintenance Facility (SMS Site #2000-2788)  
60 Institute Road, Burlington, VT, 05401

Dear Gerold:

On May 15, 2020, Waite-Heindel Environmental Management (WHEM) personnel oversaw the formal abandonment of all remaining monitoring wells at the North Beach Maintenance Facility site (MW-1, MW-2, MW-2R, and MW-3). This work was done in accordance with WHEM's April 20, 2020 Work Plan, with approval from the VT DEC via e-mail correspondence dated April 23, 2020. All work conducted and described herein is eligible for PCF reimbursement under WPCE #28958. Refer to the attached Site Plan for well locations.

All wells were abandoned by Chris Aldrich, a licensed well driller in Vermont, of Cascade Technical Services ("Cascade"). Oversight and assistance were provided by Christopher Page of WHEM. Burlington DPW's Alec Kaeding was also on-site during the well abandonment and assisted with locating monitoring wells. Even though only one well, MW-2R, has a total depth >20 ft bgs, Cascade completed all the well closures.

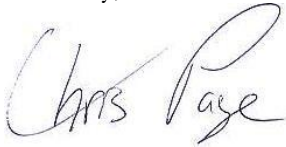
Once each well was located and opened, any dedicated sampling tubing was removed and the well box was pried out of the ground. All well boxes had been grouted into place with about one foot of concrete, which was also removed. Then the PVC pipe of each well was completely removed using chains and a rock-bar as a lever. Well MW-2 was not able to be fully removed. Project notes indicate that this well had previously been "abandoned," though this did not appear to be the case as the well had not been cut, nor had there been there any visible grout. However, the pipe was considerably heavier, indicating that the well had filled in, and the PVC snapped under the weight. Approximately five feet of pipe was removed before the lower portion of the well snapped off and fell back into the annular space. All other monitoring wells were completely removed.

Following removal, all boreholes were grouted with a hydrated bentonite slurry to approximately 2 feet below ground surface. Clean sand was then used to provide additional fill, to about 6 inches below grade. All abandoned monitoring wells were finished with fresh topsoil, then seeded. All materials removed during the abandonment process were properly disposed of. Please see the attached photo log to review well abandonment procedures.

It is WHEM's opinion that this work concludes all site-related activities at the site, making the site eligible for closure. Due to the presence of persisting groundwater and likely soil contamination on and potentially downgradient of the site, site closure will require generating a notice to the land records that meets the requirements of §35-902 of the IRULE (July 2019). WHEM believes a notice to the land records is the most applicable institutional control for the site, as defined by §35-902(b) of the IRULE.

Do not hesitate to contact us if you have any questions about the work conducted. Please contact myself at [cpage@waiteenv.com](mailto:cpage@waiteenv.com) or Miles Waite at [mwaite@waiteenv.com](mailto:mwaite@waiteenv.com).

Sincerely,



Christopher Page  
Project Scientist



Miles E. Waite, Ph.D., P.G.  
Senior Hydrogeologist

CC: Max Madalinski, Burlington Parks & Rec

# **ATTACHMENT**

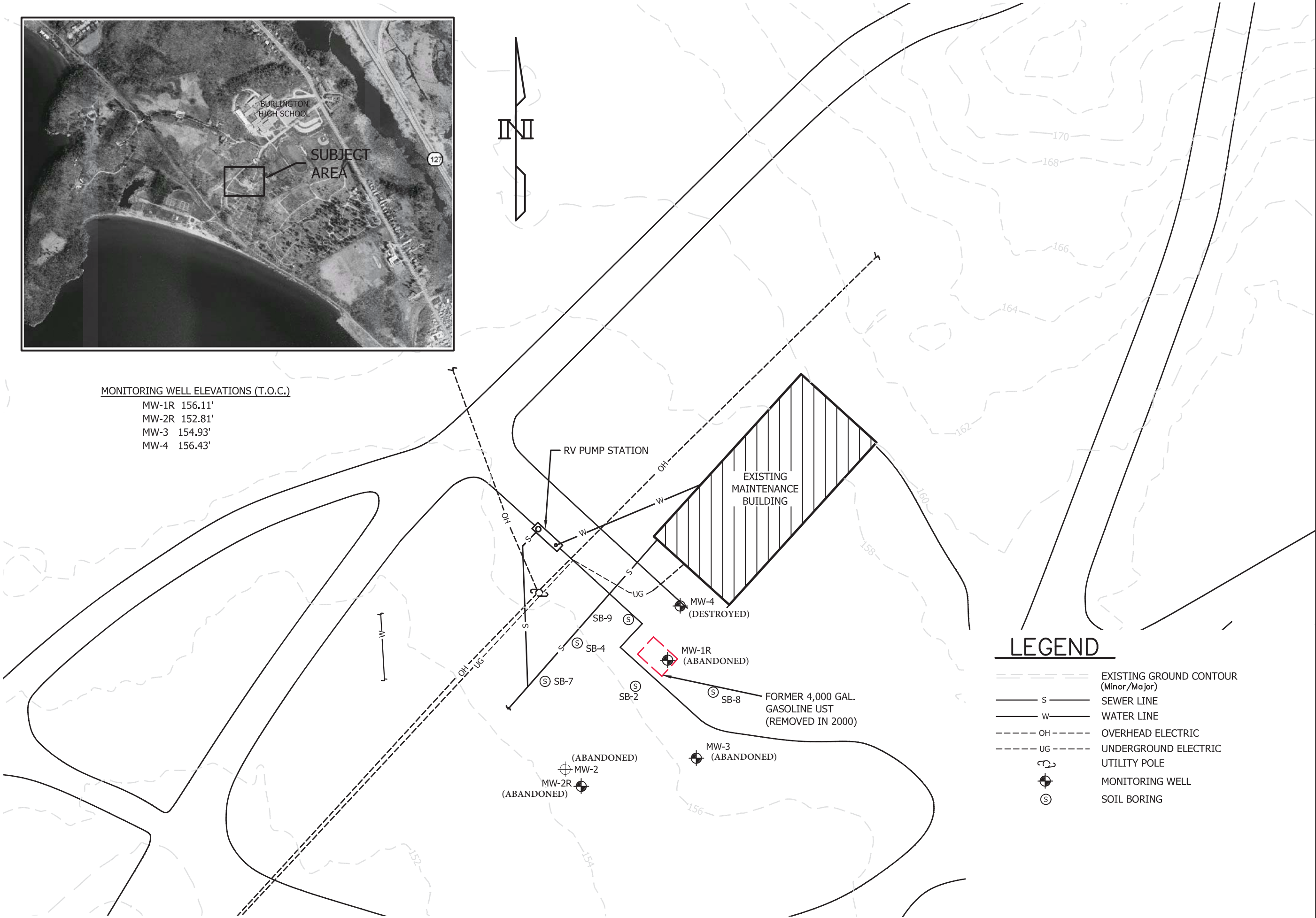
Site Plan

Photo Log



MONITORING WELL ELEVATIONS (T.O.C.)

MW-1R 156.11'  
MW-2R 152.81'  
MW-3 154.93'  
MW-4 156.43'



LEGEND

- EXISTING GROUND CONTOUR (Minor/Major)
- S SEWER LINE
- W WATER LINE
- OH OVERHEAD ELECTRIC
- UG UNDERGROUND ELECTRIC
- UTILITY POLE
- MONITORING WELL
- SOIL BORING

CITY OF BURLINGTON NORTH BEACH MAINTENANCE FACILITY BURLINGTON, VERMONT		DATE: 9/3/2020		<div>Waite - Heindel</div> <div>Environmental Management</div> <div><div><div>W</div><div>H</div><div>E</div><div>M</div></div><div>• Hydrogeology • Environmental Services • • Water and Wastewater Design • Burlington, Vermont • (802) 860-9400</div></div>	
		PROJECT NO. 07008.1			
		DRAWN BY: C.P.			
		PROJ. MGR: C.P.			
		APPROVED:			
SITE PLAN		<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FINAL		SHEET:	
		SCALE: 1"=40'		FILE: I\PROJECTS\North Beach\CADD\dwg\NB Siteplan.dwg	





Photo #1: Removing dedicated LDPE tubing from well after prying out box.



Photo #2: Exposed well, decommissioning tools.



Photo #3: PVC pulled in one piece (or, unscrewed in 10 ft sections at MW-2R).



Photo #4: Grouting annular space with bentonite slurry..





Photo #5: Adding clean sand as fill material.



Photo #6: Finishing abandoned well with clean topsoil and grass seed.

## Max Madalinski

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**From:** Noyes, Gerold <Gerold.Noyes@vermont.gov>  
**Sent:** Monday, December 4, 2017 11:11 AM  
**To:** Max Madalinski  
**Subject:** RE: Guidance; North Beach Campground

Good morning Mr. Madalinski,

The North Beach Maintenance facility is currently an active hazardous site due to the gasoline contamination found during the 2000 removal of a 4,000-gallon gasoline underground storage tank (UST). Contaminated soil and groundwater above Vermont Groundwater Enforcement standards are at this location. The entire extent of groundwater contamination is not delineated, however for current management purposes the existing delineation has been adequate. Due to the use to date, i.e. city water available, contamination 3-15' below ground, use as open space, and no subsurface structures; site management has consisted of periodic groundwater sampling. This management is sufficient to control risk to human health and the environment. As long as this area remains undisturbed no additional site management activities are required by the Sites Management Section.

I reviewed the Master Plan and paid particular attention to Attachment A and VHB's description of current conditions. With the exception of the UST release there has been no known release on this property. As long as landscaping activities are surface based it is unlikely that the contamination from the UST will be encountered.

The existing monitor wells must be preserved and the biennial groundwater monitoring program must continue. If construction damages or destroys them, replacement monitor wells will be required at Parks Department (or City) cost. If evidence of a release is found during site work this must be reported.

Based on the project description, the proposed work is capital improvement to the property. This work does not appear to have any site remediation benefit and is not necessary to protect human health and the environment. Given the preceding, this site work will not be eligible for any reimbursement from the Vermont Petroleum Cleanup Fund, other than the ongoing groundwater monitoring.

When the existing maintenance facility is demolished, standard pre-demolition testing (lead paint and asbestos) is required and should be reported to the appropriate VT Health Department Programs.

The dry well should be sampled for Volatile Organic Compounds by EPA method 8260, total petroleum hydrocarbons (TPH) by EPA 8100 and RCRA 8 metals. The results and remediation recommendation (if necessary) should be reported to the SMS.

Gerold Noyes, PE

 **VERMONT**  
**Department of Environmental Conservation**  
Sites Management Section  
1 National Life Drive – Davis 1  
Montpelier, VT 05620-3704

[Gerold.noyes@vermont.gov](mailto:Gerold.noyes@vermont.gov)  
(802) 522-5614

---

**From:** Max Madalinski [mailto:mmadalinski@burlingtonvt.gov]  
**Sent:** Friday, November 10, 2017 1:23 PM  
**To:** Noyes, Gerold <Gerold.Noyes@vermont.gov>  
**Subject:** Guidance; North Beach Campground

Good Afternoon,

I work with the Burlington, VT Parks, Recreation, and Waterfront department as a project coordinator. We recently underwent a Master Planning process with VHB Inc. for North Beach Campground (SMS Site #2000-2788, North Beach Maintenance Facility). I'm reaching out hoping that you might be able to provide us some guidance in developing a work scope for relevant QEP services so that we can begin moving forward with the project.

As part of the Master Plan, VHB provided an environmental report outlining the existing conditions and their recommendations regarding soil contaminants and groundwater monitoring at the site. I had initially reached out to Kurt Muller of the Johnson Company (who is currently providing us QEP services during the bike path reconstruction) to get a cost quotation and he recommended that we first reach out to DEC to confirm the scope requirements. I've attached the Master Plan (which includes VHB's findings and recommendations in *Attachment A: OHM Existing Conditions Memo*) for your review. If you could please look these over and get back to me with DEC's recommendations/requirements I would really appreciate it.

Best,



**Max Madalinski**

**Associate Parks Project Coordinator**  
**Burlington Parks, Recreation & Waterfront**  
645 Pine Street Suite B Burlington, VT 05401  
Mobile: (802) 881-4000  
Pine St. Office: (802) 865-7247  
General Info Line: (802) 864-0123

[enjoyburlington.com](http://enjoyburlington.com)

@BTVparks



*Please note that this communication and any response to it will be maintained as a public record and may be subject to disclosure under the Vermont Public Records Act.*



**2018 BIENNIAL SITE STATUS REPORT**  
**NORTH BEACH MAINTENANCE FACILITY**  
**60 INSTITUTE ROAD**  
**BURLINGTON, VT**  
**VERMONT SMS SITE #2000-2788**

March 14, 2019  
Revised March 28, 2019

*Prepared for:*



City of Burlington  
Department of Parks and Recreation  
645 Pine Street, Suite B  
Burlington, Vermont 04501  
Attn: Alec Kaeding

*Prepared by:*



Waite-Heindel Environmental Management  
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### ATTACHMENT

USGS Topographic Map

Groundwater Contour and Total VOC Concentration Map

Table 1: Groundwater Elevation Data

Table 2: Groundwater Quality Data: VOCs

Table 3: Quality Assurance / Quality Control

Graph: Petroleum in Groundwater: MW-1/MW-1R

Graph: Petroleum in Groundwater: MW-2/MW-2R

Laboratory Report

## **1.0 INTRODUCTION**

Waite-Heindel Environmental Management (WHEM) is pleased to present the *2018 Biennial Site Status Report* for the North Beach Maintenance Facility at 60 Institute Road in Burlington, Vermont (Site; see Site Location map in Attachment page 1). Monitoring wells and other pertinent site features are illustrated in the site plans included in the Attachment as pages 2 and 3.

This site is identified by the Sites Management Section (SMS) as Site #2000-2788. This report presents details and results of the 12<sup>th</sup> round of groundwater monitoring at the Site since the wells were installed in February 2007. This is the fourth round of monitoring by WHEM; previous monitoring had been completed by Heindel & Noyes (H&N). In a letter (sent via e-mail) to Alec Kaeding of Burlington Parks & Recreation dated January 17, 2017, the SMS states that “continued biennial sampling of MW-1 and MW-2, and water measurement only in MW-3 are sufficient to protect human health and to track contaminant degradation.” This report describes the work conducted in accordance with our approved Scope dated November 26, 2018. Groundwater sampling and well abandonment activities were completed on December 21, 2018.

## **2.0 PROJECT BACKGROUND**

The North Beach Maintenance Facility is located approximately a quarter of a mile from Burlington High School and approximately 2,000 feet from Lake Champlain. The topography slopes steadily to the southwest, towards Lake Champlain. Campground facilities are located approximately 500 to 1,000 feet to the southwest, south and southeast of the maintenance garage.

The building, which is currently used for storage of Parks & Recreation supplies and materials, was historically used as a maintenance shop until 1990. In 2000, subsurface contamination was discovered during the removal of a 4,000-gallon gasoline underground storage tank (UST). The site maps in Attachment, pages 2 and 3, show the approximate original location of the former UST.

### **2.1 Previous Investigations**

In February 2007, nine soil borings were advanced in the area of the former location of the 4,000-gallon gasoline UST by H&N. Four of the nine soil borings were completed as monitoring wells MW-1, 2, 3 and 4. Well MW-1 was subsequently destroyed by plowing and replaced as MW-1R in September 2008. The investigation revealed that soils around the UST were contaminated with



petroleum compounds and groundwater was impacted at levels that exceeded the Vermont Groundwater Enforcement Standards (VGES).

Prior to the July 2010 groundwater monitoring events, groundwater was monitored on a semi-annual basis using the four existing monitoring wells. However, MW-3 and MW-4 were removed from the sampling plan because they contained no detectable contamination in April and September 2009. MW-1R has contained concentrations of toluene, benzene, and MTBE above the VGES since sampling began. MW-2 had been dry since 2008 and H&N recommended deepening it because it is the only directly downgradient well from the source area and results from this well would determine the plume extent. MW-2R was installed in January 2010 under the supervision of H&N.

Concentrations over the past several rounds have fluctuated dramatically in MW-1R and MW-2R, but a general trend in decreasing concentrations and a lack of sensitive receptors led the SMS to reduce sampling to a biennial schedule following WHEM's 2012 Annual Site Status Report. Sampling has continued on a biennial basis since that time.

### **3.0 GROUNDWATER MONITORING**

On December 21, 2018, WHEM performed the 12<sup>th</sup> round of groundwater monitoring at the site since the original monitoring wells were installed in February 2007.

#### **3.1 Groundwater Elevations and Well Conditions**

Static water level measurements were obtained from wells MW-1R, MW-2R, and MW-3. No water level was obtained from MW-4 as that well has been formally abandoned (refer to WHEM's 2016 site status report, dated January 12, 2017). A tabulated summary of groundwater depths and elevations is provided in Table 1 of the Attachment. The water table was shallower than in November 2016, which was the driest monitoring event to date based on water level measurements from MW-2R and MW-3, the latter of which was dry to depth at that time. In December 2018, groundwater was present in all wells, with depth-to-groundwater within typical historic ranges.

Data indicates that groundwater flow continues to be toward the southwest, toward Lake Champlain, at an approximate gradient of 0.16 ft/ft (estimated using MW-1R and MW-2R). Note that in previous reports, the horizontal gradient was incorrectly calculated; the distance between MW-1R is 65 ft, not 95 ft; this typographic error has caused the calculated horizontal gradients to

appear gentler than they are in reality. Approximate groundwater contours are depicted on the Site Plan on page 3 of the Attachment.

### **3.2 Groundwater Quality**

In accordance with the current monitoring plan, groundwater samples were collected from monitoring wells MW-1R and MW-2R. MW-3 was not sampled, as per the VT DEC's January 2017 letter, but depth to groundwater was measured. Prior to collecting a sample, three well volumes were purged from each well with a peristaltic pump (MW-1R) or the well was pumped dry and allowed to recharge (MW-2R). Groundwater was allowed to recharge to static level prior to sampling. The samples were transported to Endyne, Inc., of Williston, VT and analyzed for volatile organic compounds (VOCs) via EPA Method 8021B. A tabulated summary of the results is provided in Table 1 of Attachment and the full laboratory report is also included in the Attachment. Total BTEX concentrations are provided on the map in the Attachment, page 3.

A mixed trend in Total VOC concentrations was observed compared to the November 2016 monitoring event.

In **MW-1R**, the Total Petroleum VOC concentration (6,186 ug/L) was the second-lowest to date, increasing slightly from November 2016 (4,318 ug/L). Benzene, Trimethylbenzenes, and Naphthalene exceeded VGES; MTBE was non-detected (< 100 ug/L), but its detection limit was in exceedance of the VGES (40 ug/L). Benzene (1,310 ug/L) was reported at a higher concentration than in November 2014 (778 ug/L) or November 2016 (1,170 ug/L), but remains in the lower end of its historic range. Trimethylbenzenes (796 ug/L, 1,3,5- and 1,2,4-aggregate) were similar to Benzene, reporting higher than in November 2014 and November 2016 but well below historical levels. Of all detected compounds, only MTBE (ND / < 100 ug/L) decreased compared to November 2016. This was the first monitoring event to date that MTBE was non-detected in MW-1R. A graph depicting the trends in concentrations of Petroleum VOCs with time MW-1/1R is provided in the Attachment.

In **MW-2R**, no petroleum VOCs were detected for the first time since April 2008. Between 2010 and November 2016, total petroleum VOCs ranged from 8,122 ug/L (November 2012) to 28,726 ug/L (November 2014). Typically, all BTEX compounds except Xylenes are found in exceedance of VGES; both Naphthalene and MTBE also usually exceed VGES. Benzene, Naphthalene, and MTBE often greatly exceed the VGES, with the November 2016 Benzene concentration (4,550 ug/L) nearly three orders of magnitude in exceedance of VGES (5.0 ug/L).

As mentioned earlier, MW-3 was not sampled, as this well has only reported a handful of detections and no VGES exceedances throughout monitoring history. The removal of MW-3 from the sampling plan was approved by the SMS in their April 2015 letter to the City of Burlington.

### **3.3 Discussion of Results**

Between 2012 and 2016, a decreasing trend was observed in MW-1R. This trend has stalled based on December 2018 data, which reported a slight increase in BTEX concentrations compared to November 2016, though the total BTEX concentration (6,186 ug/L) remains well below 2012 (21,846 ug/L) and historic concentrations. Based on this comparison to historic data, the slight increase in VOC concentrations since 2016 is not an indication of any significant change in contaminant degradation. It is likely that groundwater VOC concentrations in the vicinity of MW-1 are stabilizing and will continue to trend downward over time.

The non-detection of petroleum VOCs in MW-2R in December 2018 is anomalous, given this well's historically high VOC concentrations. This is the first event since the well was deepened in 2010 that VOCs have been non-detected in MW-2R. Since 2010, VOC concentrations in MW-2R have ranged from a low of 8,122 ug/L in November 2012 to a peak of 28,726 ug/L in November 2014. These data point to significant fluctuations in groundwater concentrations. Similar, though less dramatic fluctuations occur at MW-1R. Comparing Total VOC concentrations with groundwater elevations suggest that there is positive correlation between increasing groundwater elevation and VOC concentrations at MW-1R, while there is evidence of a weak negative correlation at MW-2R (high water table yields lower VOC concentrations). However, the increase in water table relative to November 2016 does not explain the total lack of petroleum VOCs in MW-2R in December 2018.

The cause for the anomalous non-detection of VOCs at this well is unclear, but may be due to heavy precipitation on the date of sampling causing changes to typical well recharge. Field staff noted that the well went dry very quickly and recharged extremely slowly, and that the recharged water contained none of the odor or sheen that was noted of the initial purgewater. Staff did not note any obvious indication of surface infiltration from precipitation runoff. MW-2R is the most downgradient monitoring well in the network, so the leading edge of the plume is currently undefined. Historic results from MW-2R have suggested that a substantial mass of petroleum contamination is present downgradient of the identified source area.



### **3.4 Quality Assurance / Quality Control**

As part of WHEM's quality assurance/quality control (QA/QC) procedure, a trip blank was collected at WHEM offices prior to sampling. No VOCs were detected in the Trip Blank, nor were any unidentified peaks, confirming that there were no spurious influences on sample quality during the December 2018 sampling event. A duplicate sample was intended to be collected at MW-2R, but extremely poor recharge at this well precluded the collection of a duplicate sample, and MW-1R had already been sampled so a true duplicate could not be collected from that well. Historically, acceptable sample parity has been observed at this site. A QA/QC table is included as Table 3 in the Attachment.

## **4.0 CONCLUSIONS AND RECOMMENDATIONS**

Based on the results of the December 2018 sampling event, and all available site information, WHEM concludes the following:

- Water levels in December 2018 were considerably higher than the record-low levels observed in November 2016, and were more within typical ranges. WHEM has made a correction to horizontal gradient calculations, which until now incorrectly reported the distance between MW-1R and MW-2R as 95 ft; the actual distance is 65 ft, so hydraulic gradients are underestimated in previous reports.
- Concentrations of MTBE, Benzene, Trimethylbenzenes, and Naphthalene were in exceedance of the VGES in MW-1R. MTBE was non-detected, but at an elevated reporting limit (100 ug/L) that is above VGES (40 ug/L). The Total Petroleum VOC concentration (6,186 ug/L) was higher than in November 2016, and was consistent with November 2014 (6,638 ug/L), indicating a stabilizing trend in source area VOC concentrations.
- No petroleum VOCs were detected in MW-2R, for the first time since the well was deepened in 2010. Typically, VOC concentrations in this well are higher than in MW-1R, as the plume appears to have migrated downgradient of the source area. The lack of detections is anomalous, given the most recent data (November 2016) showing total VOC concentrations of 23,677 ug/L, with VGES exceedances of all reported compounds except Total Xylenes. WHEM field staff also identified unusually slow recharge at the well. Sampling was conducted during heavy rain immediately following deep freezing conditions, so it is possible that somehow normal groundwater recharge was disrupted or interrupted by rainwater.

Additionally, the freshly recharged water possessed none of the sheen or odor of purged groundwater.

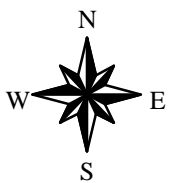
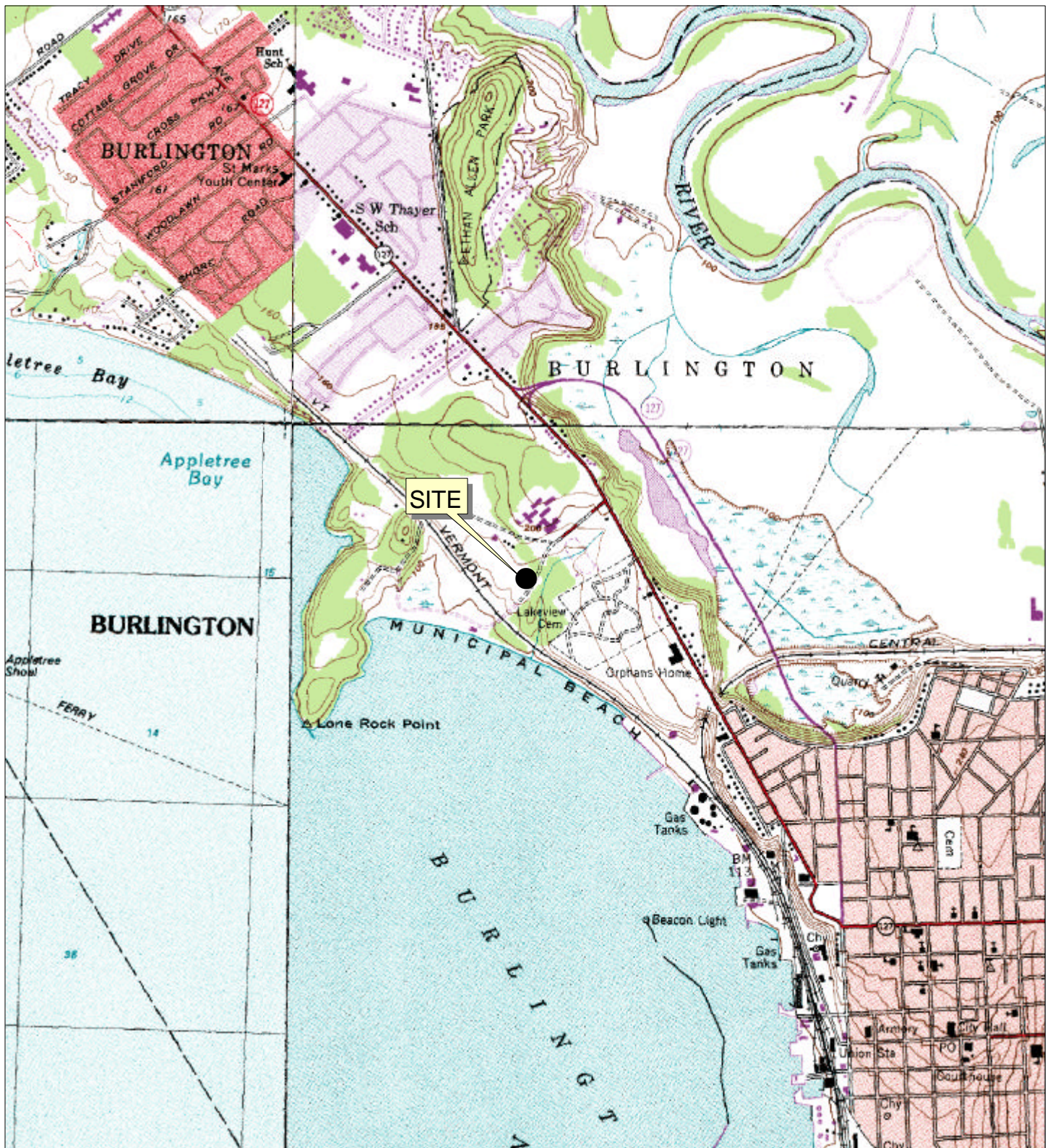
Because of the anomalous and dramatic change in MW-2R, WHEM recommends collecting a follow-up grab sample in Spring 2019 to confirm whether the lack of VOC detections in December 2018 is a reflection of site conditions or an anomaly of unknown causes. MW-2R is the most downgradient monitoring well in the network, so the leading edge of the plume is currently undefined. After collecting a confirmatory sample from MW-2R and generating a short letter report, WHEM recommends returning to a biennial sampling schedule to track contaminant degradation. The next full sampling event would be scheduled for November 2020.

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# ATTACHMENT

USGS Topographic Map  
Groundwater Contour and VOC Concentration Map  
Table 1: Groundwater Elevation Data  
Table 2: Groundwater Quality Data: VOCs  
Table 3: Quality Assurance / Quality Control  
Graph: Petroleum in Groundwater: MW-1/MW-1R  
Graph: Petroleum in Groundwater: MW-2/MW-2R  
Laboratory Report





**City of Burlington - North Beach Maintenance Facility**  
**Burlington, Vermont**  
*USGS Topographic Map*

2000 0 2000 Feet



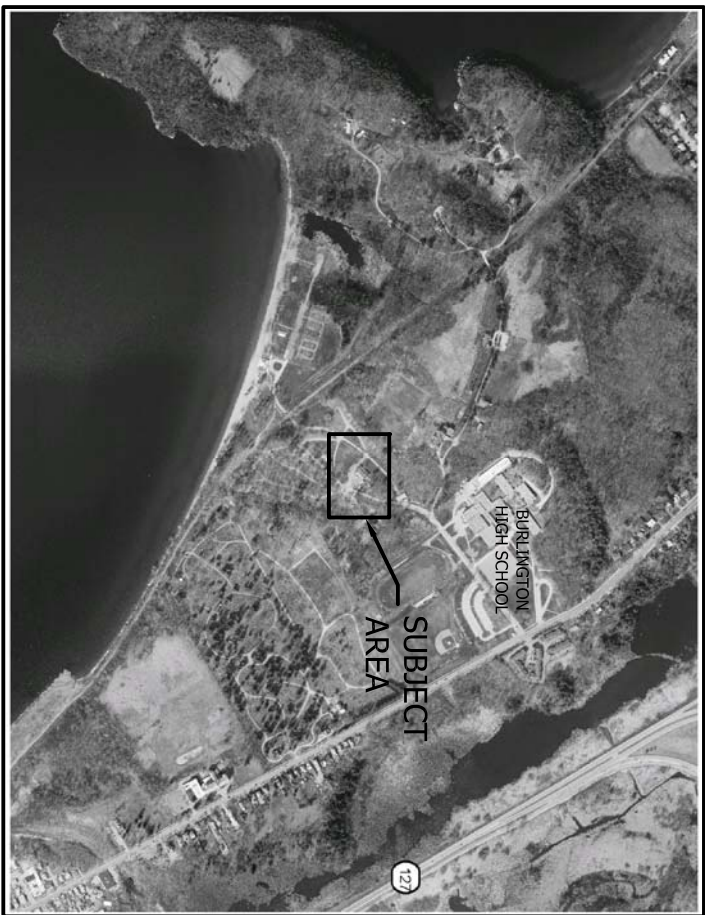
**Waite - Heindel**

Environmental Management



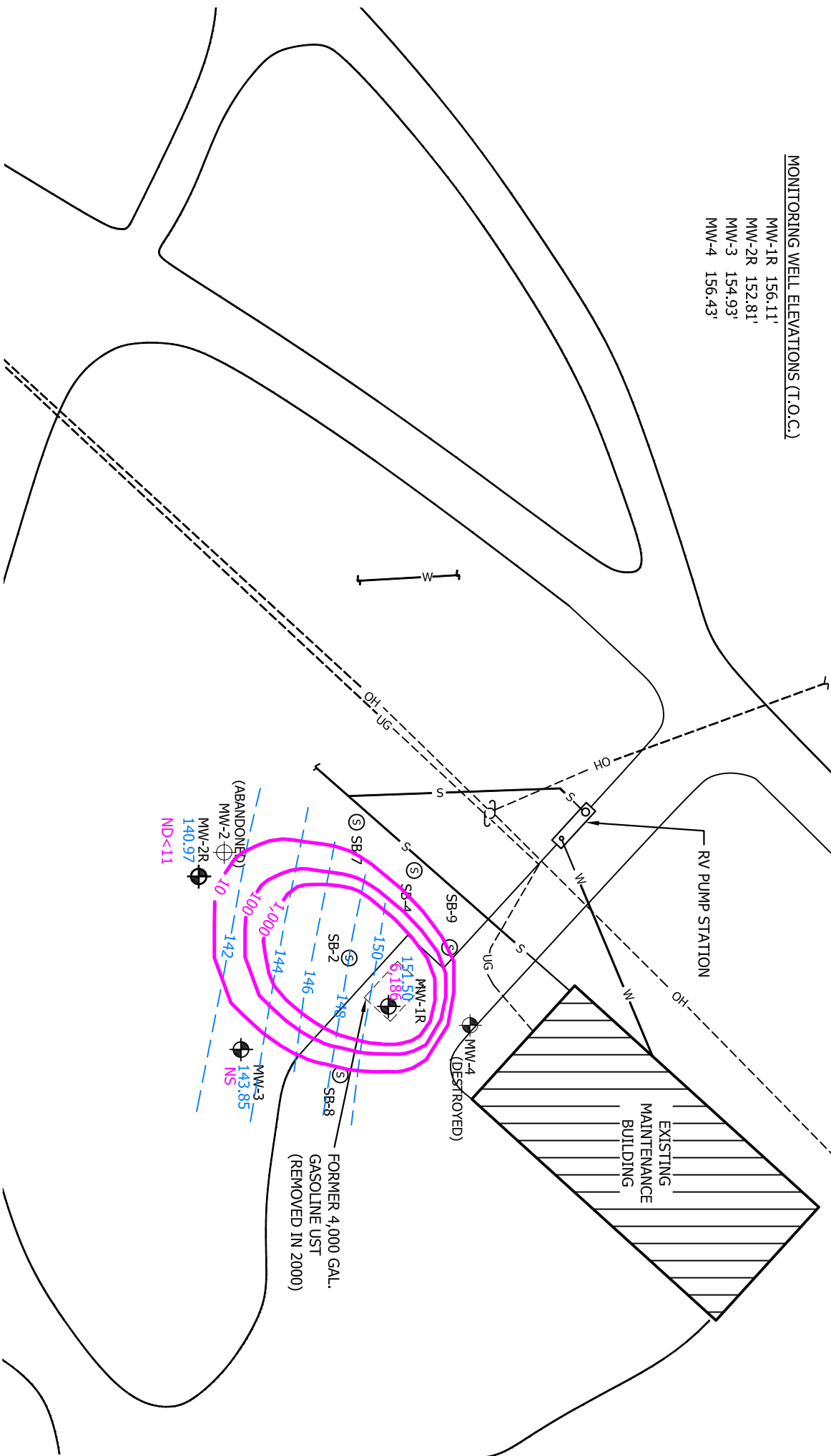
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MONITORING WELL ELEVATIONS (T.O.C.)

MW-1R 156.11'  
MW-2R 152.81'  
MW-3 154.93'  
MW-4 156.43'



LEGEND

- EXISTING GROUND CONTOUR (Minor/Major)
- SEWER LINE
- WATER LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- UTILITY POLE
- MONITORING WELL
- SOIL BORING
- GROUNDWATER CONTOUR (FEET)
- GROUNDWATER ELEVATION (FEET)
- GROUNDWATER CONTOUR (FEET)
- TOTAL VOC CONCENTRATION (ppb)
- TOTAL VOC CONCENTRATION (ppb)
- TOTAL VOC CONCENTRATION (ppb)
- NONE DETECTED

CITY OF BURLINGTON NORTH BEACH MAINTENANCE FACILITY BURLINGTON, VERMONT	DATE:	1/24/2019	<div>Waite - Heindel</div> <div>Environmental Management</div> <div>• Hydrogeology • Environmental Services • • Water and Wastewater Design • Burlington, Vermont • (802) 860-9400</div>
	PROJECT NO.	07008.1	
	DRAWN BY:	D.W.F./M.E.W.	
	PROJ. MGR:	C.P.	
GROUNDWATER CONTOUR AND TOTAL VOC CONCENTRATION MAP FOR 12/21/2018	APPROVED:		
SCALE: 1"=40'	FILE: \PROJECTS\North Beach\CADD\dwg\NB Siteplan.dwg	<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FINAL	SHEET:

**TABLE 1: GROUNDWATER ELEVATION DATA**  
North Beach Maintenance Garage  
Burlington, Vermont

**Groudwater Depths (ft below Top of Casing)**

Monitoring Well	Top of Casing Elevation (ft)	9/21/08	4/15/09	9/10/09	7/23/10	11/15/10	11/10/11	11/30/12	11/13/14	11/18/16	12/21/18
MW-1/MW-1R	156.11	7.20	4.31	7.51	3.94	3.6	4.43	4.55	6.38	8.94	4.61
MW-2/MW-2R	153.49	DRY	11.58	DRY	10.08	9.53	11.2	11.95	12.97	17.45	12.52
MW-3	154.93	11.96	7.31	11.97	7.16	9.15	9.28	9.32	11.54	DRY	11.08
MW-4	156.35	4.13	4.21	4.2	2.47	0.5	2.56	2.35	Well Destroyed	Well abandoned	Well abandoned

**Groundwater Elevations (ft)**

Monitoring Well	Top of Casing Elevation (ft)	9/21/08	4/15/09	9/10/09	7/23/10	11/15/10	11/10/11	11/30/12	11/13/14	11/18/16	12/21/18
MW-1/MW-1R	156.11	148.91	151.80	148.60	152.17	152.51	151.68	151.56	149.73	147.17	151.50
MW-2/MW-2R	153.49	DRY	141.91	DRY	143.41	143.96	142.29	141.54	140.52	136.04	140.97
MW-3	154.93	142.97	147.62	142.96	147.77	145.78	145.65	145.61	143.39	DRY	143.85
MW-4	156.35	152.22	152.14	152.15	153.88	155.85	153.79	154.00	Well Destroyed	Well abandoned	Well abandoned



TABLE 2: GROUNDWATER QUALITY DATA: VOCs  
North Beach Maintenance Garage  
Burlington, Vermont

Parameter			Benzene	Ethyl- benzene	MTBE	Toluene	1,3,5-TMB	1,2,4-TMB	1,2,4-TMB and 1,3,5-TMB	Total Xylenes	Naphthalene	Total Petrol. VOCs	Unidentified Peaks
VT Enforcement Standard			5.0	700.0	40.0	1000.0			350.0	10,000.0	20.0	---	---
VT Preventive Action Limit			0.5	350.0	20.0	500.0			none	5,000.0	10.0	---	---
VT Health Advisory			1.0	none	40.0	none			none	none	20.0	---	---
Federal MCL			5.0	700.0	none	1000.0			none	10,000.0	none	---	---
UNITS			ug/L	ug/L	ug/l	ug/l			ug/l	ug/l	ug/l	---	---
Sample ID	Date	Method											
MW-1/MW-1R*	3/7/2007	8021B	596	673	2,000	1,660			1,943	6,020	200	13,092	> 10
	9/7/2007	8021B	1540	814	3,420	ND / < 100			1,869	353	215	< 8,311	>10
	4/11/2008	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	9/21/2008	8021B	3,040	438	4,250	2,020			1165	2,670	261	13,844	> 10
	4/15/2009	8021B	5,670	1,150	1,860	7,060			<932	5,680	ND / < 400	21,820	>10
	9/10/2009	8021B	3,730	583	1,320	3,680			<313	2,940	ND / < 200	12,453	>10
	7/23/2010	8021B	7,350	1,970	1,390	9,490			2,621	13,100	363	36,284	>10
	11/15/2010	8021B	6,600	1,800	1,010	6,830			2,630	10,500	420	29,790	>10
	11/10/2011	8021B	4,360	1,250	608	4,420			1,766	7,160	243	19,807	>10
	11/30/2012	8021B	3,580	1,540	479	3,570	507	1,520	2,027	8,270	353	21,846	>10
	11/13/2014	8021B	778	380	104	790	200	578	778	2,930	ND / < 100	6,638	>10
	11/18/2016	8021B	1,170	417	300	131	109	421	530	1,140	ND / < 100	4,318	>10
12/21/2018	8021B	1,310	580	ND / < 100	140	217	579	796	2,370	94.2	6,186	>10	
MW-2/MW-2R**	3/7/2007	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	9/7/2007	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	4/11/2008	8021B	ND < 1	ND < 1	ND < 2	ND < 1			ND < 2	ND < 2	ND < 2	ND < 11	0
	9/21/2008	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	4/15/2009	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	9/10/2009	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	7/23/2010	8021B	2,800	1,040	2,670	2,960			747	3,290	ND / < 200	< 13,707	NS
	11/22/2010	8021B	2,080	691	1,540	1,460			753	1,910	ND / < 200	< 8,634	> 10
	11/10/2011	8021B	4,900	1,730	4,660	5,780			1308	6,660	243	25,281	> 10
	11/30/2012	8021B	1,450	771	1,430	880	210	475	685	2,040	181	8,122	> 10
	11/13/2014	8021B	4,930	1,750	8,620	3,280	235	1,240	1,475	6,890	306	28,726	> 10
	11/18/2016	8021B	4,550	1,840	8,030	1,840	358	973	1,331	4,510	245	23,677	>10
12/21/2018	8021B	ND < 1	ND < 1	ND < 2	ND < 1			ND < 2	ND < 2	ND < 2	ND < 11	0	
MW-3	3/7/2007	8021B	2.8	ND / < 1	ND / < 2	1.2			ND / < 2	2.1	ND / < 2	< 13.1	> 10
	9/7/2007	8021B	ND / < 1	ND / < 1	ND / < 2	ND / < 1			ND / < 2	ND / < 2	ND / < 2	ND / < 11	3
	4/11/2008	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND / < 11	0
	9/21/2008	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND / < 11	0
	4/15/2009	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	9/10/2009	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND / < 11	0
	7/23/2010	NS	NS	NS	NS	NS			NS	NS	NS	NS	NS
	11/15/2010	NS	NS	NS	NS	NS			NS	NS	NS	NS	NS
	11/10/2011	8021B	2.6	ND < 1.0	ND < 2.0	3.4			ND < 2.0	3.8	ND < 2.0	< 16.8	0
	11/30/2012	8021B	1.3	ND < 1.0	ND < 2.0	2.2			ND < 2.0	3.5	ND < 2.0	< 14.0	0
	11/13/2014	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND / < 11	0
	11/18/2016		No Sample										
12/21/2018		No Sample											
MW-4	3/7/2007	8021B	< 1	< 1	2.4	< 1			< 2	< 2	< 2	< 11.4	0
	9/7/2007	8021B	< 1	< 1	2.0	< 1			< 2	< 2	< 2	ND < 11	0
	4/11/2008	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND < 11	0
	9/21/2008	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND < 11	0
	4/15/2009	8021B	NS	NS	NS	NS			NS	NS	NS	NS	NS
	9/10/2009	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND < 11	> 10
	7/23/2010	NS	NS	NS	NS	NS			NS	NS	NS	NS	NS
	11/15/2010	NS	NS	NS	NS	NS			NS	NS	NS	NS	NS
	11/10/2011	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND < 11	0
	11/30/2012	8021B	ND < 1.0	ND < 1.0	ND < 2.0	ND < 1.0			ND < 2.0	ND < 2.0	ND < 2.0	ND < 11	0
	11/13/2014		Well Destroyed										
	11/18/2016		Well Abandoned										
12/21/2018		Well Abandoned											

**Note:**

NS = "not sampled" because well was dry during sampling event

ND = "not detected"

Bold values detected above reporting limits; shaded box indicates concentration above Vermont Groundwater Enforcement Standards (VGES)

\* = reinstalled 9/11/08 by Specialty Drilling and Investigation

\*\* = reinstalled 1/7/2010 by Specialty Drilling and Investigation

**TABLE 3: QUALITY ASSURANCE /  
QUALITY CONTROL**

North Beach Maintenance Garage  
Burlington, Vermont

PARAMETER	12/21/2018		
	Trip Blank	No Duplicate	RPD
Benzene	ND<1.0	NA	NA
Toluene	ND<1.0	NA	NA
Ethylbenzene	ND<1.0	NA	NA
Xylenes	ND<2.0	NA	NA
MTBE	ND<2.0	NA	NA
1,2,4-Trimethylbenzene	ND<1.0	NA	NA
1,3,5-Trimethylbenzene	ND<1.0	NA	NA
Naphthalene	ND<2.0	NA	

The results of the laboratory analysis of the duplicate sample were analyzed using a relative percent difference (RPD) analysis. The RPD is defined as 100 times the difference in reported concentration between sample and duplicate, divided by the mean of the two samples. A small RPD indicates good correlation between sample and duplicate.

**Notes:**

All values reported in ug/l (ppb) unless otherwise noted.

ND<X - Not Detected (Detection Limit).

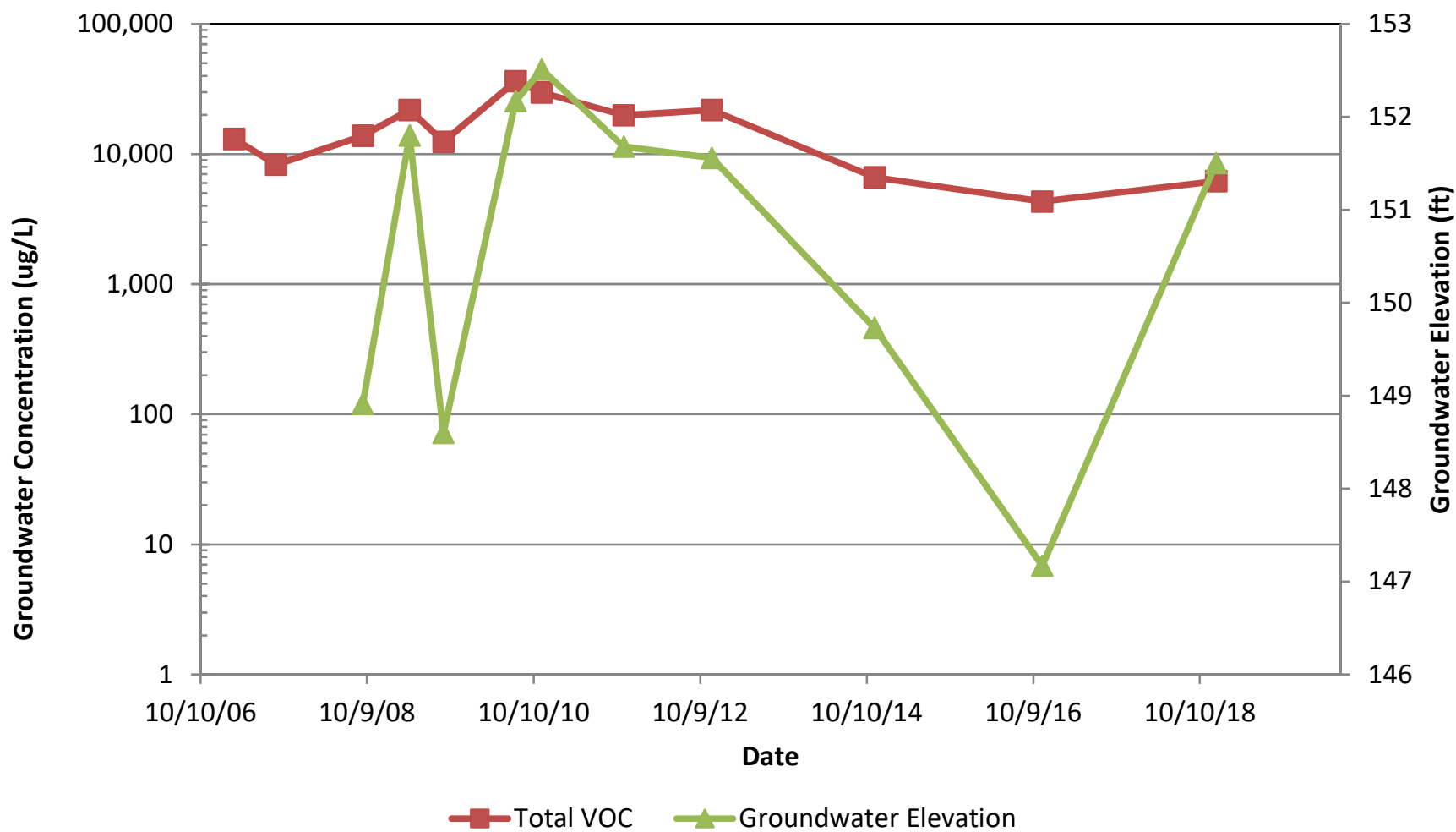
na - not applicable (RPD cannot be calculated)

MW-1R duplicate is labelled as "Duplicate".

All analyses by EPA Method 8021B.

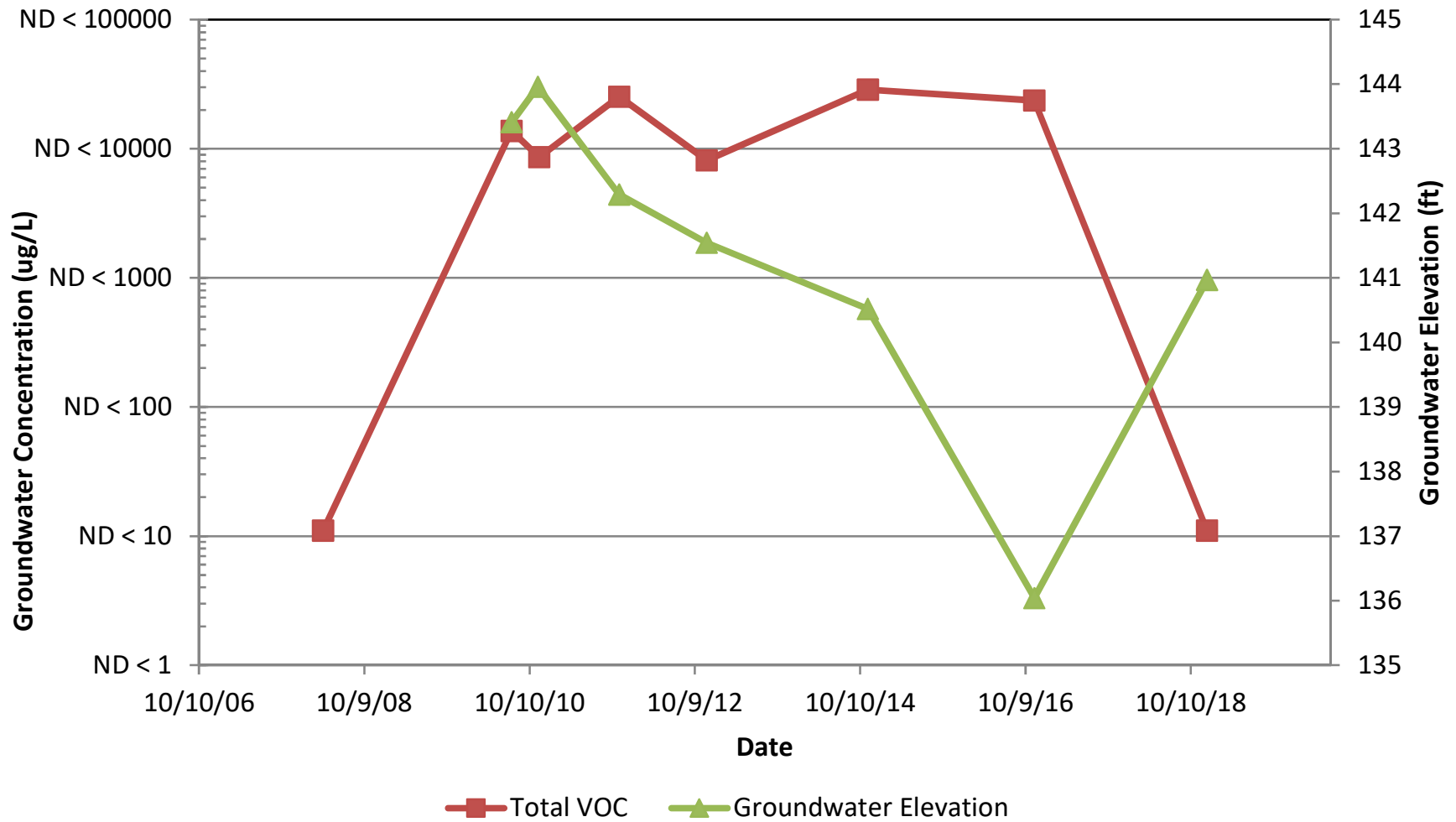
# Petroleum in Groundwater: MW-1/MW-1R

## North Beach, Burlington, Vermont



# Petroleum in Groundwater: MW-2/MW-2R

## North Beach, Burlington, Vermont







Waite-Heindel Environmental  
7 Kilburn Street, Suite 301 100675  
Burlington, VT 05406  
  
Atten: Miles Waite

PROJECT: North Beach  
WORK ORDER: **1812-32751**  
DATE RECEIVED: December 24, 2018  
DATE REPORTED: January 07, 2019  
SAMPLER: Chris Page

### Laboratory Report

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.  
Laboratory Director

[www.endynelabs.com](http://www.endynelabs.com)



160 James Brown Dr., Williston, VT 05495  
Ph 802-879-4333 Fax 802-879-7103

56 Etna Road, Lebanon, NH 03766  
Ph 603-678-4891 Fax 603-678-4893



**Laboratory Report**

DATE REPORTED: 01/07/2019

CLIENT: Waite-Heindel Environmental  
PROJECT: North Beach

WORK ORDER: 1812-32751  
DATE RECEIVED: 12/24/2018

001	Site: MW-2R			Date Sampled: 12/21/18		Time: 13:40	
<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
Vt Petroleum List 8021B							
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Benzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Toluene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Ethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Xylenes, Total	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
1,3,5-Trimethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Naphthalene	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Surr. 1 (Bromobenzene)	100	%	EPA 8021B	1/3/19	W TEL	N	
Unidentified Peaks	0		EPA 8021B	1/3/19	W TEL	N	

002	Site: MW-1			Date Sampled: 12/21/18		Time: 13:10	
<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>	<u>Analysis Date/Time</u>	<u>Lab/Tech</u>	<u>NELAC</u>	<u>Qual.</u>
Vt Petroleum List 8021B							
Methyl-t-butyl ether (MTBE)	< 100	ug/L	EPA 8021B	1/4/19	W TEL	N	
Benzene	1,310	ug/L	EPA 8021B	1/4/19	W TEL	N	
Toluene	140	ug/L	EPA 8021B	1/4/19	W TEL	N	
Ethylbenzene	580	ug/L	EPA 8021B	1/4/19	W TEL	N	
Xylenes, Total	2,370	ug/L	EPA 8021B	1/4/19	W TEL	N	
1,3,5-Trimethylbenzene	217	ug/L	EPA 8021B	1/4/19	W TEL	N	
1,2,4-Trimethylbenzene	579	ug/L	EPA 8021B	1/4/19	W TEL	N	
Naphthalene	94.2	ug/L	EPA 8021B	1/4/19	W TEL	N	
Surr. 1 (Bromobenzene)	97	%	EPA 8021B	1/4/19	W TEL	N	
Unidentified Peaks	> 10		EPA 8021B	1/4/19	W TEL	N	

003	Site: Trip Blank			Date Sampled: 12/21/18		Time: 12:20	
Parameter	Result	Units	Method	Analysis Date/Time	Lab/Tech	NELAC	Qual.
Vt Petroleum List 8021B							
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Benzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Toluene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Ethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Xylenes, Total	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
1,3,5-Trimethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
1,2,4-Trimethylbenzene	< 1.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Naphthalene	< 2.0	ug/L	EPA 8021B	1/3/19	W TEL	N	
Surr. 1 (Bromobenzene)	103	%	EPA 8021B	1/3/19	W TEL	N	
Unidentified Peaks	0		EPA 8021B	1/3/19	W TEL	N	

ENDYNE INC.

# CHAIN-OF-CUSTODY-RECORD



80610

160 James Brown Drive  
Williston, Vermont 05495  
(802) 879-4333

Special Reporting Instructions/PO#:


Project Name: <i>North Beach</i>		Client/Contact Name: <i>Chris Page, WHEM</i>		Sampler Name: <i>Chris Page, WHEM</i>	
State of Origin: VT <input checked="" type="checkbox"/> NY <input type="checkbox"/> NH <input type="checkbox"/> Other <input type="checkbox"/>		Phone #: <i>802 860 9400 x124</i>		Phone #: <i>802 860 9400 x124</i>	
Endyne WO #		Mailing Address: <i>WHEM</i>		Billing Address: <i>WHEM</i>	

[illegible]

Relinquished by:	Date/Time	Received by:	Date/Time
	12/24/18 12:30		12/24/18 @ 12:31

1	pH	6	TKN	11	Total Solids	16	Sulfate	21	1664 TPH/FOG	26	8270 PAH Only
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	8015 GRO	27	8081 Pest
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	8015 DRO	28	8082 PCB
4	Nitrite N	9	BOD	14	Turbidity	19	VT PCF				
5	Nitrate N	10	Alkalinity	15	Conductivity	20	VOC Halocar				
31	Metals (Total, Diss.) Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Ni, Pb, Se, Si, Sn, Ti, Tl, U, V, Zn, Zr										
32	TCLP (volatiles, semi-volatiles, metals, pesticides, herbicides)					33	Other				
34	Corrosivity	35	Ignitability	36	Reactivity	37	Other				
38	Other										

**1812-32751**



**1812-32751**

**Waite-Heindel Environmental**  
North Beach

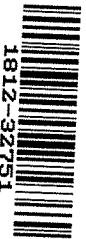
LAB USE ONLY

Delivery: *Client*

Temp: *2.4*

Comment:

**Waite-Heindel Environmental  
North Beach**



1812-32751

**1812-32751**

Comments:

Temp: 2.4

LAB USE ONLY

Delivery: Client

**State of Vermont**  
**Department of Environmental Conservation**  
**Waste Management and Prevention Division**  
**1 National Life Dr – Davis 1**  
**Montpelier, VT 05620-3704**  
**(802) 522-5614**  
[gerold.noyes@vermont.gov](mailto:gerold.noyes@vermont.gov)

January 17, 2017  
E-mail

ALEC KAEDING  
FACILITIES OPERATIONS SUPERVISOR  
DEPT. OF PARKS AND RECREATION  
645 PINE STREET, SUITE B  
BURLINGTON, VERMONT 05401  
[akaeding@burlingtonvt.gov](mailto:akaeding@burlingtonvt.gov)

RE: North Beach Maintenance Facility, SMS Site #2000-2788, Burlington

Dear Mr. Kaeding:

The Sites Management Section (SMS) has reviewed the January 12, 2017 report '2016 Biennial Site Status Report, North Beach Maintenance Facility, 60 Institute Road, Burlington' prepared by Waite-Heindel Environmental Management (WHEM). The report describes groundwater sampling and monitor well closure conducted on November 18, 2016 at the above referenced site.

MW-1R, the tank pit monitor well, contained benzene (1,170 µg/L), MTBE (300 µg/L), and trimethylbenzene (530 µg/L) above the Vermont Groundwater Enforcement Standards (VGES). Down gradient monitor well MW-2R contained benzene (4,550 µg/L), ethyl benzene (1,840 µg/L), MTBE (8,030), trimethylbenzene (1,331 µg/L), and naphthalene (245 µg/L) above the VGES. MW-3 was removed from the sample schedule since it never had contamination above the VGES and frequently did not even contain detectable contamination. MW-4 was properly closed; there had been previously no detected contamination.

WHEM recommended expanding the scope of investigation and monitoring at this site. Given the lack of impacted receptors other than soil and groundwater in the former tank location, the SMS does not believe that this is warranted. We believe that continued biennial sampling of MW-1 and -2, and water level measurement only in MW-3 are sufficient to protect human health and the environment and to track contaminant degradation. We look forward to reviewing the next sample results by **December 31, 2018** and recommendations for future site activity.

Please feel free to contact me if I can be of assistance.

Sincerely,



over



January 17, 2017

Gerold Noyes, P.E.  
Environmental Engineer  
Sites Management Section

CC: Chris Page, WHEM  
Miles Waite, PhD, WHEM

Y:\WM\_Sites\Sites.Files\1999.2701.to.2000.2800\2000.2788.North.Beach.Maintenance.Facility\2017\0117.kaeding.let.doc