August 10, 2011

Ms. Jaclynne Drummond
NCDENR Environmental Compliance
Solid Waste Section
1646 Mail Service Center
Raleigh, NC 27699-1646

Re: Investigative Work Plan for MW-2R
Winston-Salem Construction and Demolition (C&D) Landfill (No. 34-12)
Forsyth County, North Carolina
HDR Project No. 00162-13625-018

Dear Ms. Drummond:

HDR Engineering, Inc. of the Carolinas (HDR), on behalf of the Winston-Salem City/County Utility Commission (the City), is hereby submitting this investigative work plan for monitoring well MW-2R at the Old Salisbury Road (OSR) C&D Landfill located in Forsyth County, North Carolina.

PURPOSE

During the recent routine semiannual sampling event conducted during May, the groundwater sample collected from monitoring well MW-2R detected benzene and tetrachloroethene (PCE) at levels slightly above the 2L standard (1 µg/L and 0.7 µg/L respectively) as well as the NCDENR Solid Waste Section Limits (SWSL) standard of 1.0 µg/L. Monitoring well MW-2R is located downgradient of closed Phases I, II and III of the landfill. During the initial sampling event, benzene and PCE were detected at 1.3 and 1.4 µg/L respectively. MW-2R was subsequently resampled on June 9th. As described in the July 11, 2011 water quality report, the retest results confirmed the presence of benzene and PCE at levels slightly above their respective 2L and SWSLs. As shown in the attached table, each compound was detected at 1.6 µg/L, during the retest. These were the only compounds detected above 2L standards and neither of these compounds has been detected at the site during previous routine semiannual testing. This letter presents background information and a work plan detailing the approach to investigation.

BACKGROUND

The OSR C&D Landfill is operated by the City under NDENR Permit No. 34-12. Phases I, II and III were permitted prior to January 1, 2007 and stopped receiving waste prior to June 30, 2008 which, under Rule 15A NCAC 13B .0531(c)(1), requires the City to comply with the Conditions of the Solid Waste Permit and Rule .0510. The letter of intent to close was submitted to NCDENR on April 23, 2008; a copy is attached for reference. Hand augers were performed on a 100 x 100 foot grid to confirm that there was a minimum of two feet of suitable compacted earth as required in 15A NCAC 13B

.0505(3)(c). The closure certification dated on November 5, 2008 is included for reference. On November 6, 2008 HDR and City staff met with NCDENR on site to review the closure and hand deliver the certification. In February 2009, HDR submitted a request to enhance the cap by permanently adding excess excavated soil on top of the closed Phase I, II, and III landfill. The request was subsequently approved by NCDENR on March 18, 2009. No additional waste was placed over the closed landfill phases. Only soil to thicken the cap has been placed over the closed portions of the landfill; therefore, this enhancement should not affect the closure status of Phase I, II and III. The additional soil was placed during the construction of Phase VI base grades and was completed by June 2009. A copy of the closure re-certification documentation submitted on August 5, 2011 is attached for reference.

Well MW-2R monitors Phases I, II and III which did not accept waste after June 30, 2008 and were capped properly under 15A NCAC 13B .0510; therefore, HDR is submitting this work plan in accordance with 15A NCAC 2L .0106. MW-2R is not downgradient of subsequent phases.

INVESTIGATION PLAN

Introduction

During the recent semiannual groundwater monitoring event in May 2011, benzene and PCE were detected in a sample from one monitoring well (MW-2R) at a level slightly above their 2L standard. (Table 1). These results were subsequently confirmed in a resample event. Wells further downgradient of MW-2R (including MW-10 through MW-13) and downstream surface water sampling did not indicate the presence of these compounds. The only well indicating the presence of compounds above 2L standards is MW-2R. Given the low part per billion level volatile organic compound (VOC) concentrations detected, the proximity to waste, presence of fill materials at MW-2R, and detections of trichlorofluoromethane (common landfill gas indicator), landfill gas should be considered a possible source.

The following work plan has been developed to assess the cause, significance and extent of the groundwater impacts. The work plan also details a plan to replace MW-2R.

Site Conditions

Routine semiannual monitoring has been conducted at the site since 1996. The current monitoring network at OSR consists of one background well (MW-1R) and twelve detection wells (MW-2R through MW-5R, and MW-7 through MW-14) which are sampled semiannually and analyzed for permit required parameters. Two surface water monitoring stations located along the South Fork Muddy Creek to the east (SW-1) and northeast (SW-2) of the landfill are also sampled semiannually. OSR also routinely monitors for methane gas at twelve methane monitoring wells which surround the site. The monitoring network is shown in Figure 1.

The site is situated within an approximate 140-acre tract north of Friedberg Church Road and west of Old Salisbury Road in Forsyth County, North Carolina. The Davidson County line borders the site to the south. Land use in the site vicinity is mixed with residential, light commercial and undeveloped (agricultural) properties.

Based on the results of previously conducted drilling and lithologic sampling programs at the site, three primary geologic units have been identified. They consist of the following layers.

- Residuum, the uppermost stratum (saprolite), consists predominantly of tan reddish-brown and gray silty sand (SM) with lesser amounts of a sandy silt (ML) formed in-situ by the physical and chemical weathering of bedrock. This unit has been reported to be up to 65 feet thick at the site, although it is generally much less.
- The bedrock transition unit consists of a variably decomposed and highly fractured bedrock zone lying beneath the residuum. The transition zone is sampled as a reddish-brown to tan silty sand (SM), with lesser amounts of a silty sandy gravel.
- A bedrock zone consisting of relatively unweathered, slightly fractured granodiorite is present at variable depths, but generally greater than 35 feet below ground surface along the older portion of the landfill. Fracture occurrence in the bedrock is reported to be variable and diminishes with depth.

Monitoring well MW-2R is located at the eastern edge of the Phase III area of the landfill. Groundwater flows north northeast from MW-2R along a drainage feature associated with the tributary of the South Fork of Muddy Creek. MW-2R was a replacement well installed to monitor the groundwater downgradient of the closed landfill (Phase I to III). MW-2R was completed to a depth of 20 feet below ground surface (bgs) with a screened interval of 15 feet. The well was installed through fill materials and residuum/saprolite to the top of partially weathered rock located at 20 feet bgs.

Surface drainage along the MW-2R area is to the east towards a small stream located approximately 30 feet east of MW-2R. Shallow groundwater discharges to this stream, although at times the stream reportedly does not contain flowing water. This stream flows northward through a 250-foot length of 30-inch diameter pipe beneath the road to the scale house where it discharges into a northward flowing drainage feature which is a tributary of the South Fork of Muddy Creek.

As is typical for the Piedmont Physiographic Province, groundwater flows laterally and downward through the saprolite and bedrock toward streams, and other surface water bodies (discharge areas), to and along streams in the adjacent valleys. The water table surface is generally a subdued reflection of the surface topography. Groundwater at the site flows generally northward. A recent potentiometric map is attached as Figure 1.

As reported in the 1994 Groundwater Monitoring Plan, based on site hydraulic conductivities and gradients (assuming effective porosity of 20%) of the partially weathered rock, the groundwater flow rate at the site ranges from 0.10 to 1.1 feet per day (37 to 390 feet per year) at the site.

Investigative Monitoring

To establish the nature and extent of these low level VOC concentrations, groundwater and surface water samples will be collected directly downgradient and side gradient from MW-2R. Procedural details of the proposed sampling and analysis program to determine the source and distribution of these low level VOC impacts are presented below.

Sampling

Groundwater and surface water sampling locations are described below and depicted on Figure 2 (attached)

- Groundwater samples will be collected from select monitoring wells and temporary investigative borings (e.g. Geoprobe®) at several locations, including:
  - Sampling point A (A* on Figure 2) near the north boundary of the access road approximately 100 feet from the waste boundary downgradient of MW-2R.
  - Sampling point B (B* on Figure 2) located approximately 200 ft east from the MW-2R and west of the scale house.
  - Additional borings may be installed based on conditions encountered.

- Borings will be advanced using a direct push sampler or a small diameter hollow-stem auger into the water table. Upon reaching the water table, a groundwater sample will be collected approximately 3 to 5 feet below the water table. In select borings, the soil boring may be further advanced (if conditions allow), and an additional groundwater sample will be collected approximately 20 to 25 ft below the groundwater surface int the bedrock transition zone. Samples will either be collected with an expendable drive point attached to a Geoprobe/HydroPunch tool or via a small diameter temporary PVC well screen inserted into the borehole to facilitate the collection of an adequate groundwater sample volume and assist in minimizing sample turbidity. Upon completion of groundwater sampling, these borings will be backfilled and sealed at ground surface with granular bentonite and abandoned. The location will be field measured off known landmarks such as existing wells and located horizontally with a hand held GPS unit. All drilling tools and sampling equipment will be decontaminated upon arrival to the site and between borings to minimize the possibility of cross contamination between borings.

- The on-site stream frequently contains flowing water with shallow groundwater in the vicinity of MW-2R discharging to the stream. Surface water samples will be collected from areas downstream of MW-2R including:
  - The small stream approximately 30 feet east of MW-2R (SW-3) prior to the pipe inlet.
  - At the pipe discharge point located approximately 300 feet downstream of MW-2R where the pipe discharges from beneath the road.

Analysis

Analytical testing will include Appendix I VOC's testing at select monitoring wells, temporary groundwater borings, and surface water locations. To assist in evaluating the source of the impacts, select indicator compounds will also be tested. Analytical testing is further described below.

- Surface water samples, groundwater samples from the Geoprobe® borings and MW-2 and MW-2RR (if installed) will be analyzed for Appendix I VOCs. Field measurements will include turbidity, dissolved oxygen, conductivity, oxygen reduction potential (ORP) and pH.
- To assist in source determination and verify the potential presence of landfill gas beyond the waste footprint, the well headspace in MW-2R and select other nearby wells and investigation borings will be monitored for methane gas using a GEM 2000 (or equivalent).
- To further assist in source identification, select leachate indicator compounds (including sodium, chloride and sulfate) will also be analyzed from select groundwater samples.

Based on the results of the above mentioned testing, a new groundwater monitoring well (MW-2RR) is proposed to be installed approximately 150 feet northeast of MW-2R to monitor shallow groundwater. This well will provide groundwater quality data and is intended to become a replacement for well MW-2R. The following paragraphs describe construction of this proposed well and rationale for it to serve as a replacement well for MW-2R.

Site maps depict the permitted limit of waste as being adjacent to MW-2R. The boring log indicates that MW-2R was installed through soil fill material. This well is surrounded by waste on the west, south and southeast sides. MW-2R is also within 50 feet of two stormwater features located upgradient. Sedimentation Basin No.1 was installed in 1995 to collect stormwater runoff from Phase I and a drop inlet with a culvert directing drainage into the basin was installed in late 2009. The drop inlet collects runoff from the landfill access road on top of the landfill. The proximity to these storm water features may impair MW-2R's ability to yield representative groundwater quality data. Given the geometry of the waste footprint and direction of groundwater flow, a more appropriate location for this well is approximately 150 feet to the northeast. The proposed location is approximately 150 feet from the limit of waste and more than 300 feet inside the property boundary.

MW-2RR will be constructed with a hollow stem auger rig in a manner comparable to other existing wells at the site. A hollow stem auger boring will be extended approximately 15 feet below the water table. Two-inch inside diameter (ID), Schedule 40 polyvinyl chloride (PVC) riser pipe will be flush-mounted to 15-foot section of 0.01-inch slotted PVC well screen thread connected to a PVC riser pipe. Washed #2 silica sand will be emplaced between the borehole wall and the well screen. In general, the sand pack will extend from the bottom of the boring to approximately 2 feet above the top of the well screen. A 2-foot thick bentonite seal will then be installed above the filter pack. The remaining borehole annulus from the top of the bentonite seal will be sealed using a Portland Type I cement with three percent bentonite mixture. The top of the new well will be fitted

with a watertight locking well cap. A small vent hole in the PVC well pipe just below the cap will allow the water level in the piezometer to adjust to changes in atmospheric conditions. A concrete pad and protective riser casing will be installed. Upon completion, the well will be surveyed by a licensed surveyor and a slug test will be conducted to determine the hydraulic conductivity of this replacement well. A construction documentation report including soil boring and well construction log will be developed.

Upon NCDENR approval of this investigative work plan, field activities (including water quality sampling and analysis) will be initiated. Upon the completion of field activities, a report will be prepared summarizing the initial findings, assessing the cause (source), extent, and significance of the water quality impacts, and providing recommendations for future actions. Based on the results of the initial sampling, additional sampling may be conducted. The summary report will be submitted to the NCDENR within four months after receipt of NCDENR work plan approval.

If you have any questions or comments concerning the information presented in this letter, or in the attached documents, please do not hesitate to contact me at (704) 338-6843.

Sincerely,

HDR Engineering, Inc. of the Carolinas

NORTH CAROLINA PROFESSIONAL SEAL 025495 ENGINEER MICHAEL D. PLUMMER

8/10/11

Michael D. Plummer, P.E.
Project Engineer

MDP/apb

Enclosures: Letter of Intent to Close, April 2008
Certification of Closure, November 2008
Re-Certification of Closure, August 2011
Figure 1, GW Contours and Monitoring Locations
Figure 2, Proposed Sampling Locations for Site Assessment
Event Summary Table, May-June 2011

cc: Jan McHargue, PE Winston-Salem City/County Utility Commission
Edward Gibson, PE, Winston-Salem City/County Utility Commission
File

HDR ONE COMPANY | *Many Solutions* ®

April 23, 2008

Mr. Ed Mussler, P.E.
NC Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

Re: Letter of Intent for Closure
Old Salisbury Road Landfill (OSR) Phase I, II, and III
OSR Permit # 3412
HDR Project 00162-13625-018

Dear Mr. Mussler:

In accordance with 15A NCAC 13B .0510 (a) (1), HDR Engineering, Inc. of the Carolinas (HDR), on behalf of the Winston-Salem/ Forsyth County Utility Commission, is submitting this letter to notify the North Carolina Department of Environment and Natural Resources (NCDENR) of their intent to close all or a portion of Phases I, II, and III of the OSR Construction and Demolition Debris Landfill. These phases will cease receiving waste as of June 30, 2008, and closure will be in accordance with the existing approved Permit and permit application, and also rules .505 and .0510. To be more specific, HDR will perform hand augers on a 100 foot by 100 foot grid to verify the required 24-inch thick soil layer as discussed in phone conversation I had with Mr. Geof Little of your office on February 28th. Once closure has been certified NCDENR will be notified in order to conduct a site inspection. This information will be submitted to NCDENR for documentation of certification.

If any of this process conflicts with your understanding of the current regulations please let me know immediately.

Sincerely,

HDR Engineering, Inc. of the Carolinas

Michael D. Plummer
Project Manager

cc: Mr. Ed Gibson, City of Winston-Salem

November 5, 2008

Mr. John Murray, PE
Mooresville Regional Office
610 East Center Ave
Mooresville NC 28115

Re: OSR Phase I, II, and III Final Cover Certification
Cover Thickness Verification
HDR Project No. 00162-13625-018

Dear Mr. Murray:

This letter is written to inform you of the results from HDR Engineering, Inc. of the Carolinas (HDR) final cover thickness verification at the Old Salisbury Road (OSR) C&D Landfill. HDR was on-site to verify the thickness of the final cover soil layer on top of Phases I, II, and III. Brady Surveying (Brady) surveyed a 100-foot grid for hand auger verification. HDR personnel performed the hand augers and recorded the depth on these dates: May 22, August 4-6, September 16, and October 23, 2008.

Measurements were taken at the points shown on the attached drawing. The hand auger was marked 24 inches from the tip of the barrel. If the hand auger reached the mark, the location was deemed passing and the augering was stopped at that depth. The auger hole was then backfilled. In areas where the depth did not reach the mark, the distance from the mark to the ground surface was measured to determine the total depth of soil cover. The hand augers were conducted over several days as the cap material was placed over Phases I, II and III. The initial survey was completed on May 22, August 4-6, and September 16. In addition to hand augering the grid, the entire cap was visually inspected for erosion problems. Areas with erosion problems are noted on the attached drawing. The following table presents the results from the hand augering.

RESULTS FROM HAND AUGERING

Pass (Depth ≥ 24 inches)						Fail (Depth < 24 inches)	Auger Depth (inches)	October 23, 2008 Recheck
2235	2259	2282	2305	2334	2364	2246[A]	18,21	**Pass**
2236	2260	2283	2306	2335	2365	2247	14	**Pass**
2237	2261	2284	2307	2337	2366	2258[B]	18, 21	**Pass**
2238	2263	2285	2308	2341	2368	2262[C]	12	**Pass**
2239	2264	2286	2309	2342	2369	2271[D]	18	**Pass**
2240	2265	2287	2312	2343	2370	2320[E]	5	**Pass**
2241	2266	2288	2313	2344	2371	2336	18	**Pass**
2242	2267	2289	2314	2349	2372	2367	12	**Pass**
2243	2268	2290	2315	2350	2373			
2244	2269	2291	2316	2351				
2245	2270	2292	2317	2353				
2248	2272	2293	2318	2354				
2249	2273	2294	2321	2355				
2250	2274	2295	2322	2356				
2251	2275	2296	2323	2357				
2252	2276	2297	2324	2358				
2253	2277	2298	2327	2359				
2254	2278	2299	2328	2360				
2255	2279	2302	2329	2361				
2256	2280	2303	2330	2362				
2257	2281	2304	2331	2363				

Footnotes:

A. Point 2246 was repaired twice to obtain the proper thickness.

B. Point 2258 was in the road, so the actual measurement took place on the side of the road. This point was repaired twice to obtain the proper thickness.

C. Point 2262 was in the road, so the actual measurement took place on the side of the road.

D. Point 2271 originally had a thickness of approximately 18 inches and the last 4 inches of material was dark gray to black possibly indicating decomposing matter.

E. Point 2320 originally had a thickness of approximately 5 inches. The hand augering dug to a depth of approximately 5 inches before the hand auger could no longer be advanced

HDR notified the City of Winston Salem staff of the points that failed the hand auger test and areas where the cap had erosion problems. The City of Winston Salem staff added cap material and fixed the erosion problems. HDR re-inspected the cap thickness and erosion areas on October 23, 2008. Photos of examples where cap material was added and erosion problems were fixed is attached. All locations then met the 24-inch cover thickness as required in Rule 15 NCAC 13B section .0505(3)(c).

Please consider this as formal notification of closure to the NCDENR Solid Waste Division as required under Rule 15 NCAC 13B section .0510 (a)(1). Should you have any questions, please feel free to contact me at (704) 338-6843.

Sincerely,

HDR Engineering, Inc. of the Carolinas

NORTH CAROLINA PROFESSIONAL SEAL 025495 ENGINEER MICHAEL D. PLUMMER

11/5/08

Michael D. Plummer, P.E.
Project Manager

Enclosures

cc: Jan McHargue, P.E. – City of Winston-Salem
Ed Gibson, P.E. - City of Winston-Salem

August 5, 2011

Mr. John Murray
Mooresville Regional Office
610 East Center Ave
Mooresville NC 28115

Re: OSR Landfill Closure Re-Certification
Final Certification Report
HDR Project No. 00162-13625-018

Dear Mr. Murray:

On behalf of the Winston-Salem/Forsyth County Utility Commission (City), HDR Engineering, Inc. of the Carolinas (HDR) is pleased to submit the Old Salisbury Road (OSR) Landfill Closure As-Built Re-Certification Documentation Report.

BACKGROUND

This certification report addresses the enhanced closure cap thickness placed on Phases I, II, and III of the Winston-Salem OSR Construction and Demolition (C&D) Landfill. This area was closed prior to June 30, 2008 with the required two-foot layer of compacted earth. HDR submitted a certification dated November 5, 2008, documenting that the City had met the capping requirements in Phase I, II and III of their C&D Landfill. This certification has been attached for reference.

On February 20, 2009, HDR submitted a permit modification to add additional soil from the excavation of the Phase VI basegrades above the capped portions of Phase I, II and III. NCDENR responded in a March 18, 2009, acknowledging the change and requesting a new certification be submitted once the cap enhancement was complete. The following submittal documents the placement of additional material on the cap.

CERTIFICATION

Excavated soil from Phase VI of the C&D landfill was placed on top of the Phase I, II and III cap between May and June of 2009. During this time, HDR provided construction quality assurance (CQA) services to the City for monitoring and testing of the soils. HDR provided CQA services on the following components of the OSR Landfill Phase I, II, and III cap enhancement.

- Erosion and sedimentation control features
- Subgrade preparation and protection of existing cap
- Soil placement and compaction

The conformance of the construction materials and installation methods with the requirements of the Construction Quality Assurance/Construction Quality Control (CQA/CQC) Plan and the technical specifications was documented during the construction of each component. The required testing was performed using the methods and frequencies outlined in the CQA/CQC Plan and technical specifications. HDR reviewed construction and as-built survey information, as provided by A.N. James Surveying and Mapping, Inc. of Goldhill, North Carolina, to verify conformance with the construction limits and tolerances specified.

Drawing 00C-02, Additional Cap Cover to Phase I, II and III, from the February 20, 2009 permit modification shows the contours required to offset the anticipated amount of excavation to reach the Phase VI basegrades. The as-built survey of the actual contours achieved is attached. The anticipated quantity was 117,000 cubic yards; however, the actual quantity was approximately 75,600 cubic yards.

HDR's construction drawings required the contractor to work above the previously certified cap as seen in Details 4 and 5 of Drawing 00C-04, Sediment and Erosion Control Details (1 of 2). This drawing is attached for reference. HDR CQA personnel were on-site to monitor the protection of the previously certified cap during construction and to confirm that the additional soil material was placed and compacted per the technical specifications. Pictures taken at various periods during construction to document the protection of the existing cap and placement of the additional material are attached. In addition, this certification report includes a standard proctor compaction test result, 52 passing field density tests performed on the fill material, and field logs completed by the contractor's construction quality control firm.

Based on HDR's observations during construction, test results, and as-built documentation presented in this report, it is our opinion that the OSR Landfill Phase I, II and III cap enhancement was constructed in accordance with:

- the technical specifications, CQA/CQC Plan, and contract drawings;
- the conditions of Permit to Construct No. 34-12, originally issued July 3, 1996;
- the requirements of Rule 15A NCAC 13B .0510; and
- acceptable engineering practices.

The services provided for this project were performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions at the same time and the same or similar locality. No warranty, expressed or implied, is made or intended by rendition of these consulting services or by furnishing oral or written reports of the findings made. This report has been prepared for the exclusive use of the Winston-Salem City/County Utility Commission.

If you have any questions regarding this submittal, please contact me at 704-338-6843.

Sincerely,

HDR Engineering, Inc. of the Carolinas

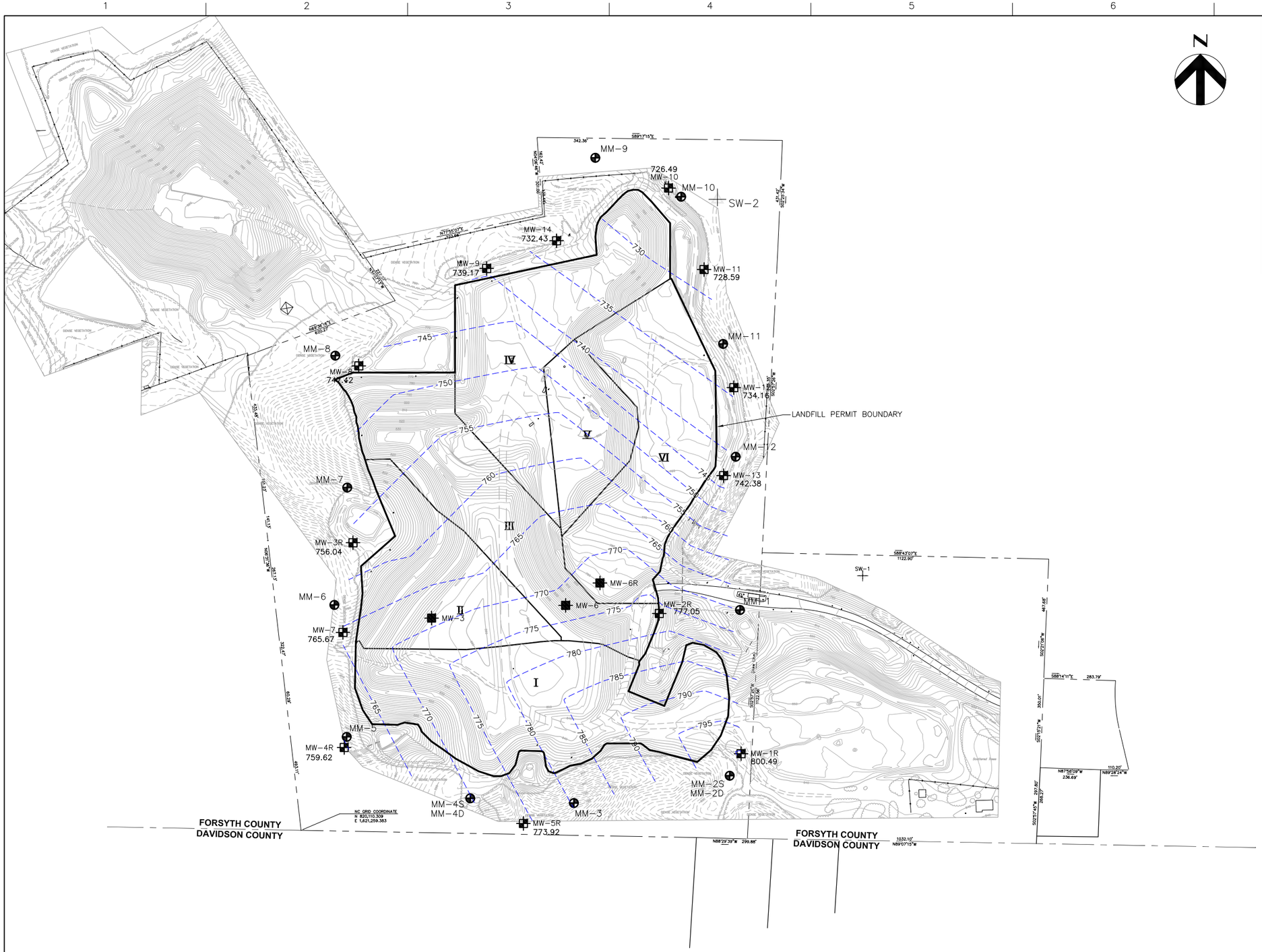
Michael D. Plummer, PE
Senior Project Engineer

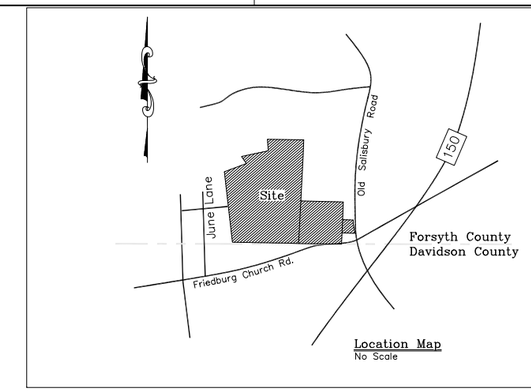
NORTH CAROLINA
SEAL
025495
8/5/11
ENGINEER
MICHAEL D. PLUMMER

Enclosures:

- Certification Report, November 2008
- Permit Modification, February 2009
- As Built Survey, A.N. James Surveying and Mapping
- Drawing 00C-04, Sediment and Erosion Control Details
- Construction photos
- Lab & Field Density Test Results
- CQC Field Reports

cc: Jan McHargue, PE w/ enclosures
Ed Gibson, PE, w/ enclosures





Location Map
No Scale

LEGEND

810	EXISTING CONTOURS
	PROPERTY BOUNDARY
	COUNTY LINE
	PERMIT/PHASE BOUNDARY
	STREAM
EXISTING / ABANDONED	MONITORING WELLS (MW & OW)
EXISTING / ABANDONED	METHANE PROBES (MM)
SW-#	SURFACE WATER
735	GROUNDWATER CONTOURS

NOTES

1. AERIAL TOPOGRAPHIC SURVEY PROVIDED BY BRADY SURVEYING COMPANY. DATE OF PHOTOGRAPH IS JANUARY 3, 2011.
2. PROPERTY SURVEY TAKEN FROM DATA SUPPLIED BY BRADY SURVEYING, INC. DATED MARCH 14, 1994.
3. GROUNDWATER ELEVATIONS MEASURED ON MAY, 2011.
4. MSL – MEAN SEA LEVEL

HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION
A	06/2011	ISSUED WITH GW REPORT

CLIENT MANAGER	M.D. PLUMMER, P.E.
PROJECT MANAGER	E.A. WRIGHT, P.E.
CAD	G.M. WILLIAMS, P.E.
PROJECT NUMBER	00000013625.018

OLD SALISBURY ROAD C & D LANDFILL

WINSTON-SALEM NORTH CAROLINA

FIGURE 1 GROUNDWATER CONTOURS AND MONITORING LOCATIONS

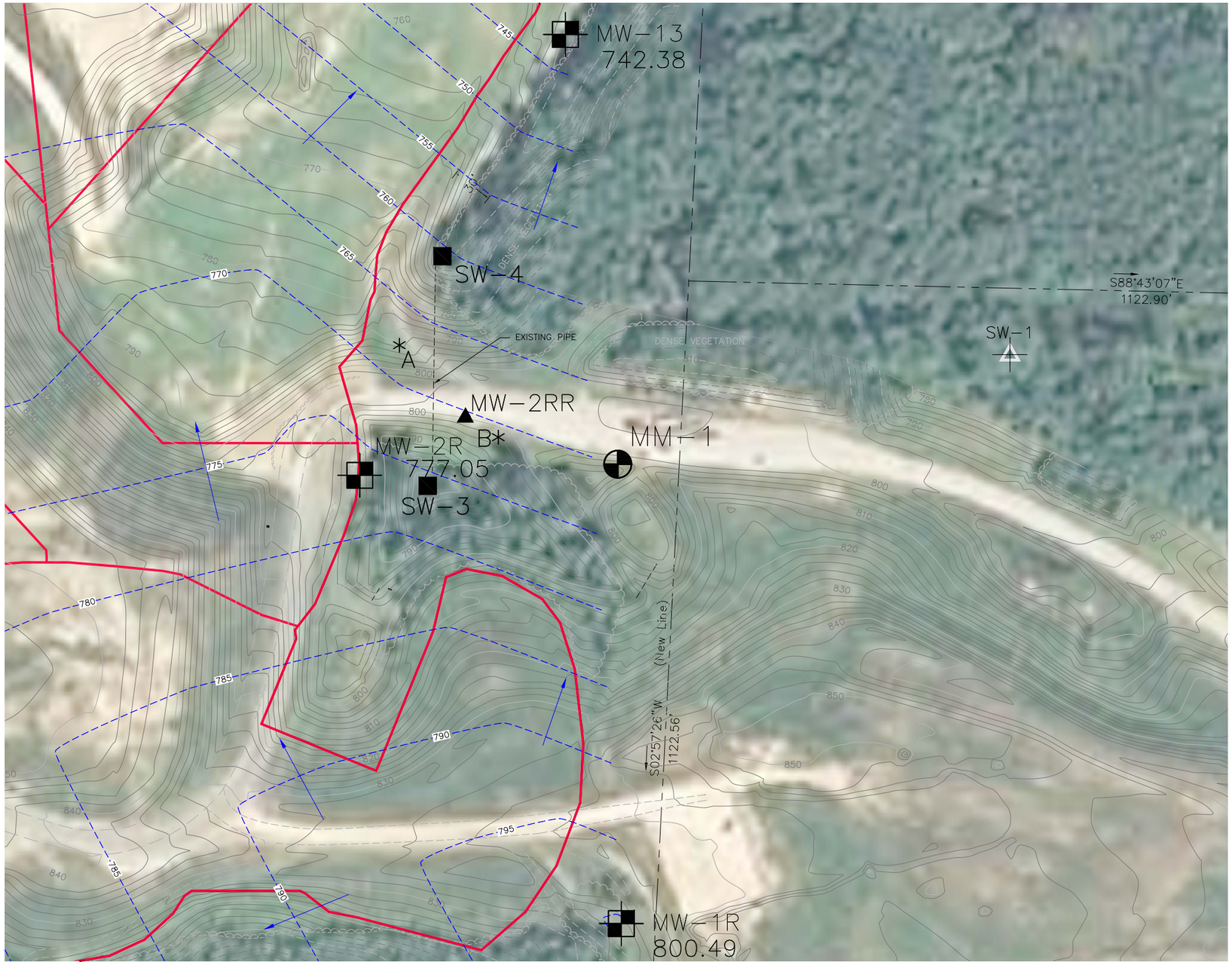
0 1" 2"

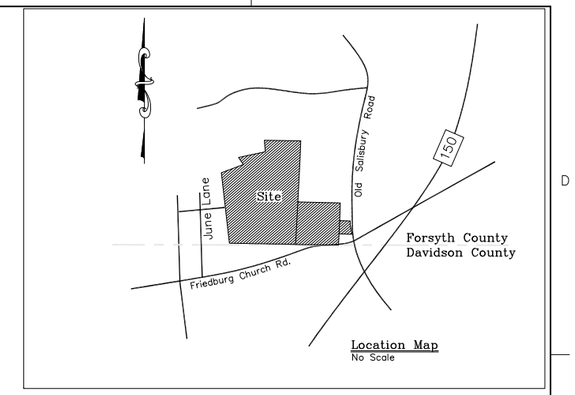
FILENAME

SCALE 1"=200'

SHEET

C:\pwworking\tpaid0131119\00D-03.dwg, Layout1, 8/9/2011 4:31:51 PM, chbrewer





LEGEND

810	EXISTING CONTOURS
	PROPERTY BOUNDARY
	PERMIT/PHASE BOUNDARY
735	GROUNDWATER CONTOURS
	GROUNDWATER FLOW ARROW
	EXISTING MONITORING WELL
	EXISTING METHANE PROBE
SW-#	EXISTING SURFACE WATER SAMPLE LOCATION
SW-3	PROPOSED SURFACE WATER SAMPLE LOCATION
A*	PROPOSED ASSESSMENT SAMPLE LOCATION
MW-2RR	PROPOSED REPLACEMENT WELL

NOTES

1. AERIAL TOPOGRAPHIC SURVEY PROVIDED BY BRADY SURVEYING COMPANY. DATE OF PHOTOGRAPH IS JANUARY 3, 2011.
2. PROPERTY SURVEY TAKEN FROM DATA SUPPLIED BY BRADY SURVEYING, INC. DATED MARCH 14, 1994.
3. GROUNDWATER ELEVATIONS MEASURED ON MAY, 2011.
4. MSL – MEAN SEA LEVEL
5. PROPOSED ASSESSMENT SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED BASED ON FIELD CONDITIONS.

HDR
HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION
A	08/04/11	SITE ASSESSMENT

CLIENT MANAGER	M.D. PLUMMER, P.E.
PROJECT MANAGER	E.A. WRIGHT, P.E.
CAD	G.M. WILLIAMS, P.E.
PROJECT NUMBER	00000013625.018

OLD SALISBURY ROAD
C & D LANDFILL

WINSTON-SALEM **NORTH CAROLINA**

FIGURE 2
PROPOSED SAMPLING LOCATIONS
FOR SITE ASSESSMENT

0 1" 2"

FILENAME
SCALE 1"=70'
SHEET

C:\pwworking\tpa\d0131119\00D-04.dwg, Layout1, 8/8/2011 11:32:45 AM, chbrewer

Event Summary Table

Facility Permit 34-12

Old Salisbury Road Landfill (C&D)

To distinguish non detections (ND) from not sampled (NS), refer to complete laboratory analysis. This table represents both ND and NS as blanks.

Standard		Value		Jun-11		May-11																
SWSL	2L	units		MW-2R	Trip Blank	MW-1R	MW-2R	MW-3R	MW-4R	MW-5R	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	SW-1	SW-2	Equipment Blank	Trip Blank
			°C																			
			Field Temperature	19.1		17	16	14.6	14.3	15.5	16.2	16.6	18.7	16.6	15.6	15	15	17.1	19.7	18.6		
			µg/L																			
5	NE	µg/L	1,1,1,2-Tetrachloroethane																			
1	200	µg/L	1,1,1-Trichloroethane								0.82											
3	0	µg/L	1,1,2,2-Tetrachloroethane																			
1	NE	µg/L	1,1,2-Trichloroethane																			
5	6.00	µg/L	1,1-Dichloroethane				1.1				3.8											
1	0	µg/L	1,2,3-Trichloropropane																			
13	0	µg/L	1,2-Dibromo-3-chloropropane																			
1	0.02	µg/L	1,2-Dibromoethane (EDB)																			
5	20	µg/L	1,2-Dichlorobenzene																			
1	0	µg/L	1,2-Dichloroethane																			
1	1	µg/L	1,2-Dichloropropane																			
1	6	µg/L	1,4-Dichlorobenzene																			
100	4000	µg/L	2-Butanone (MEK)																			
50	NE	µg/L	2-Hexanone																			
100	NE	µg/L	4-Methyl-2-pentanone (MIBK)																			
100	6000	µg/L	Acetone									3.8										
200	NE	µg/L	Acrylonitrile																			
10	10	µg/L	Arsenic																			
100	700	µg/L	Barium			84.7	273	301	126	63.7	104	27.3	153	80.7	56.2	39.1	164	125	69.9	49.2		
1	1	µg/L	Benzene	1.6			1.3															
3	NE	µg/L	Bromochloromethane																			
1	1	µg/L	Bromodichloromethane																			
3	4	µg/L	Bromoform																			
10	NE	µg/L	Bromomethane																			
1	2.00	µg/L	Cadmium																			
100	700	µg/L	Carbon disulfide																			
1	0	µg/L	Carbon tetrachloride																			
3	50	µg/L	Chlorobenzene																			
10	3000	µg/L	Chloroethane																			
5	70	µg/L	Chloroform				0.36															
1	3	µg/L	Chloromethane						0.15							0.21		0.24				
10	10.0	µg/L	Chromium			1.4	5.4		1.3	7.6		0.96		0.63		2.6	3.9	1.8				
5	70.0	µg/L	cis-1,2-Dichloroethene				0.26				0.71											
1	0	µg/L	cis-1,3-Dichloropropene																			
3	0	µg/L	Dibromochloromethane																			
10	NE	µg/L	Dibromomethane																			
1	600	µg/L	Ethylbenzene																			
10	NE	µg/L	Iodomethane																			
10	15	µg/L	Lead																			
5	500	µg/L	m&p-Xylene				0.74				1.4											
0	1	µg/L	Mercury																			
10	20	µg/L	Silver			0.51	2.5	0.6	0.88	0.57	0.84	0.1	0.43	0.12	1.2	0.7	0.72	0.74	0.4	0.2		
5	7	µg/L	1,1-Dichloroethene																			
1	5	µg/L	Methylene Chloride				4.1															
NE	NE	µg/L	o-Xylene				0.84				0.39											
1	2000	µg/L	Trichlorofluoromethane				31.6				0.48		0.26	0.52								
10	20	µg/L	Selenium																			
1	70	µg/L	Styrene																			
1	1	µg/L	Tetrachloroethene	1.6			1.4															
1	600	µg/L	Toluene																			
5	100	µg/L	trans-1,2-Dichloroethene																			
1	0	µg/L	trans-1,3-Dichloropropene																			
100	NE	µg/L	trans-1,4-Dichloro-2-butene																			
1	3.00	µg/L	Trichloroethene				0.65															
50	NE	µg/L	Vinyl acetate																			
1	0	µg/L	Vinyl chloride																			
NE	NE	µg/L	Sodium	27200																		
NS	NS	µg/L	Methane	1280																		
NE	NE	µg/L	Ethane																			
NE	NE	µg/L	Ethene																			
NS	NS	µg/L	Nitrogen, Ammonia	0.12																		
NS	NS	µg/L	Tetrahydrofuran	274			226								12.1		18.6					
			µmhos/cm																			
			Field Specific Conductance	698		110	687	409	174	208	193	10	153	55	321	179	171	140	295	129		
			feet																			
			Static Water Level	8.31		35.93	8.17	20.6	8.34	10.44	38	15.1	51.1	11.7	4	4.91	8.85	51.5				
			Total Well Depth	21		60	21	27	20	19.56	48	27	60	21	20	15.6	20	60				
			mg/L																			
NS	NS	mg/L	Chloride	39.9																		
			Oxygen, Dissolved	4.2		6.3	3.9	6.3	5.3	9	3.2	8.7	7.3	7.1	4.3	7.4	5.2	7.8	6.6	9.1		
			Alkalinity, Total as CaCO3	165																		
			mV																			
			REDOX	88		263	71	-43	271	141	245	272	265	279	-36	188	245	272	-15	23		
			NTU																			
			Turbidity	3		55	57	70	96	85	40	18	1	4	23	25	177	39	50	52		
			Std. Units																			
			Field pH	5.8		5.8	5.9	6.2	5.7	6.1	5.6	5.1	5.6	5.5	6.2	6	5.6	5.5	6.4	6.5		