Waite - Heindel
Environmental Management

MEMO

TO: John Gay, NEWSVT
FR: Wendy Krembs, WHEM Staff Scientist;
Craig Heindel, WHEM Senior Hydrogeologist
DT: Jan. 10, 2014
RE: Proposed Compliance Monitoring Wells in Black River Wetland (shallow, hand-installed)
BRW-4S to 10S
CC: Lenny Wing, Larry Shilling, Kimberly Crosby (NEWSVT)
Brian Beaudoin, SHA

Introduction; Purpose of Wells: Six (6) shallow groundwater monitoring wells would be hand-installed in the Black River Wetland (BRW) on NEWSVT property near property boundaries (MW-BRW-4S through 9S). Permission would also be sought from the VT Fish & Game Department to install one similar well located in the Black River wetland up-gradient of the estimated groundwater flowpath from the permitted Phase IV waste-containment boundary (MW-BRW-10S). The purpose of the six wells on NEWSVT property is to monitor groundwater quality near NEWSVT's property lines, down-gradient of the solid waste management facilities. The purpose of the upgradient well is to monitor "background" or up-gradient groundwater quality.

Well Locations: The locations of the six proposed well sites on NEWSVT property (MW-BRW-4S to 9S) are shown on the map in the Attachment to this Memo. They are proposed to be evenly spaced at about 1,000 to 2,000 feet apart along the down-gradient NEWSVT property line. The up-gradient location (MW-BRW-10S) would be field-chosen at the location most convenient to install where it is clearly up-gradient of the estimated groundwater flowpath from the permitted solid waste containment boundaries. This appears to unavoidably be off-property, since there is no apparent location in the Black River Wetland that is up-gradient AND on NEWSVT property. Permission to install MW-BRW-10S must be obtained from the State of Vermont (landowner of the proposed location).

Well Installation Method: A 3.5-inch diameter stainless steel hand auger will be advanced approximately 1 foot at a time. After each 1-foot advancement, the auger will be removed and the soils visually characterized. Total depth of 10 to 15 feet will be reached, or 2 feet into a low-permeability silt-clay layer, whichever is shallower. Auger cuttings will be placed back down the annular space surrounding the well.

After reaching the total depth, a 2-inch inner diameter, schedule 40 PVC well with a 5-foot, 0.010-inch slotted Pre-Pack screen will be installed with a solid bottom slip cap. A stickup of approximately 2 to 3 feet above the ground surface will be installed with a locking gripper cap and without an outer well-guard.

The annular space surrounding the PVC well will be filled with all the soils that were removed during the hand augering process. At approximately 0.5 ft. below the ground surface, a bentonite seal will be placed to the ground surface. Upon completion, the total stickup above the ground surface will be measured.

Between installations, the hand auger will be decontaminated with a mixture of water and Alconox. Upon completion, a soil boring log/well construction record would be completed (see attached template).

Well Development: Prior to the first groundwater sampling event, each well will be developed using a peristaltic pump to purge the well of three well volumes or until dry. Sand and silt will also be purged from the bottom of the well during this process by agitating the tubing at the bottom of the well. New tubing will be used at each well.

Well Sampling: After development, each well will be sampled via low flow technology as follows:

- Measure the depth to groundwater and total depth.
- Purge the well, utilizing a peristaltic pump evacuating approximately 200 milliliters per minute or less (adjusted as necessary if well draws down too much). The purged water will pass through an inline flow-through cell measuring *temperature, dissolved oxygen, specific conductance, and pH* every three minutes. We will also take depth-to-water readings, so the purging can be reduced or ended before the well goes dry. A Low Flow Sampling Field Data Sheet template is in the Attachment.
- A separate meter will be used to collect turbidity readings at the same three minute interval.
- After the field parameters reach equilibrium, samples will be obtained directly from the pump, and placed in appropriately sized and preserved bottles.
- New tubing will be used at each well, and the water level probe will be decontaminated with a mixture of water and Alconox between each well.
- A minimum of four rounds of groundwater sampling will be conducted, approximately 10 to 20 days apart.

Analytical Parameters: Samples will be analyzed for the complete list of analytes that are conducted on groundwater samples in the May and October semi-annual sampling rounds, plus Semi-Volatile Organic Compounds by EPA Method 8270 on the first round only (unless SVOCs are detected, then continue with analyses for SVOCs in all subsequent sampling rounds). See Chain of Custody Template in the Attachment.

Measurements in other Monitoring Wells when Sampling MW-BRW-4S through 10S: On the first and third sampling rounds of MW-BRW-4S through 10S, water level measurements will be conducted in selected other wells listed below. The purpose of collecting these measurements is to provide same-time groundwater elevation data throughout the Black River Wetland complex:

- A1
- B1
- BRW-1
- BRW-2R
- BRW-3S
- BRW-3D
- D1-R
- D2
- GP-2R
- P2R
- P5
- P6.

Topographic Survey of New Monitoring Wells: Topographic locations and elevations of all new monitoring wells will the surveyed using the same datum as previous surveys.

Attachment:

- Monitor Well and Soil Boring Log Template for MW-BRW-4S through 10S;
- Low Flow Sampling Field Data Collection Sheet;
- Chain of Custody TEMPLATE for Groundwater Quality Analyses, Endyne Laboratories;
- Map, Proposed Compliance Monitoring Wells (BRW-4S – 10S) 01-02-2014.

[U:\PROJECTS - WHEM\NEWSVT\Groundwater Quality Compliance - GWPRS\MW-BRW-4S through 10S\
NEWSVT Groundwater Compliance Wells in Black River Wetland - WHEM Memo 01-10-2014.docx] or PDF.

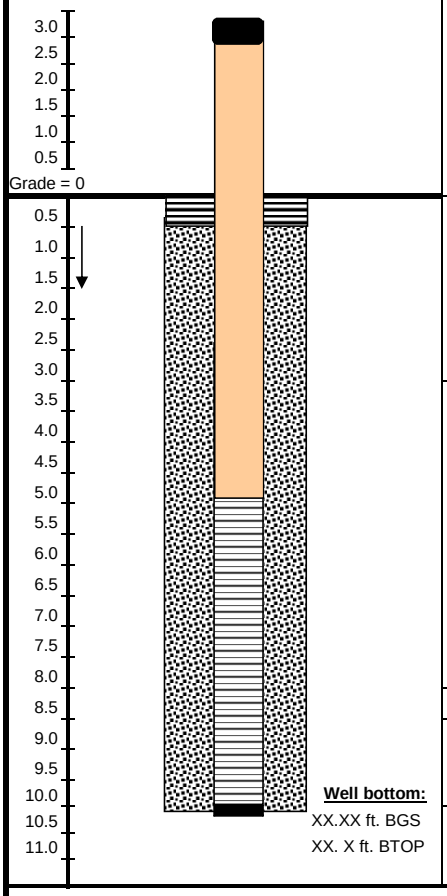
ATTACHMENT

SOIL BORING LOG;
WELL CONSTRUCTION RECORD
BRW-4S through BRW-10S

Site Name: **NEWSVT** **("Black River Wetland monitoring well #X-S (= Shallow")**
Coventry, VT

WHEM Proj. #: xxxxx/x-x
Drilled by: Waite-Heindel Environmental Mgmt.
Logged by: xxx xxx

Date Installed: xx/xx/xxxx
Drilling Method: Stainless Steel Hand Auger, 3.5-in. diam.
Sampling Method: same
Development Method: Peristaltic Pump, on xx/xx/xxxx



Interval (ft)	Soil Characteristics	Letter Symbol	Graphic Symbol	Water
	Gripper cap, locking (No outer steel well-guard) stick-up (X.XX ft.)			
	(XX.X ft. = Bottom of auger hole)			

LEGEND:

No well-guard installed.

Bentonite Seal Placed in Annulus.

Auger cuttings (Peat) placed in Annulus.

Soils:
OL = Organic Soil.
CL = Clay, Lean.

Water:
SAT = Saturated.

Cap: Gripper Cap, Locking (Master key #XXXX).
Solid Riser: 2" ID, Schedule 40 PVC, X.X ft. AGS to X.X ft. BGS (total X.X ft.).
Screen: 2" ID, Schedule 40 PVC, 0.010"-Slotted Pre-Pak Sand Well Screen: X.X ft. to X.X ft. BGS
Bottom: Solid bottom cap (~ 0.2 ft.).

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SITE: xxxxxx
FIELD WATER COLLECTION SHEET

SAMPLING LOCATION					Pump Intake Depth	
Date					Pump Type	
Sampler					Well Diameter	
Weather					Well Depth	
Water Type	gw	sw	supply		Initial Depth to Water	
Sampling Method	bailer	low flow	grab		Traditional Purge Rate (ml/min / gpm)	

LOW FLOW PURGING DATA

	within 3%	within 3%	within 10%	1 pH unit	10 mv	within 10%			
Time	**Temp.** (deg C)	**Specific Cond.** (us/cm)	**DO** (mg/L)	**pH**	**ORP** (mv)	**Turbidity** (NTU)	**Depth to Water** (ft btp)	**Purge Rate** (ml/min)		**Notes**

SAMPLE COLLECTION	**Purge Volume**	**Temp.**	**Specific Cond.**	**pH**	**ORP**	**DO**	**Turbidity**		
Final Measurements:									

Sample Description	**Label**	**Type Container**	**# Container**	**Preservative**	**Analysis Method**	**Collection Time**	**COC #**	
Sample								
Additional								
Additional								
Field Duplicate								
MS/MSD								
Field Blank								

General Notes:

Purge volume (2 cup/500 ml = 1 mark)

NEWSVT LF Ground Water

Endyne Inc. COC

Prepared: 2/24/12

Lab Use WO#

Bill to:

Report to:

Customer # 070338

NEWSVTLFGWSW

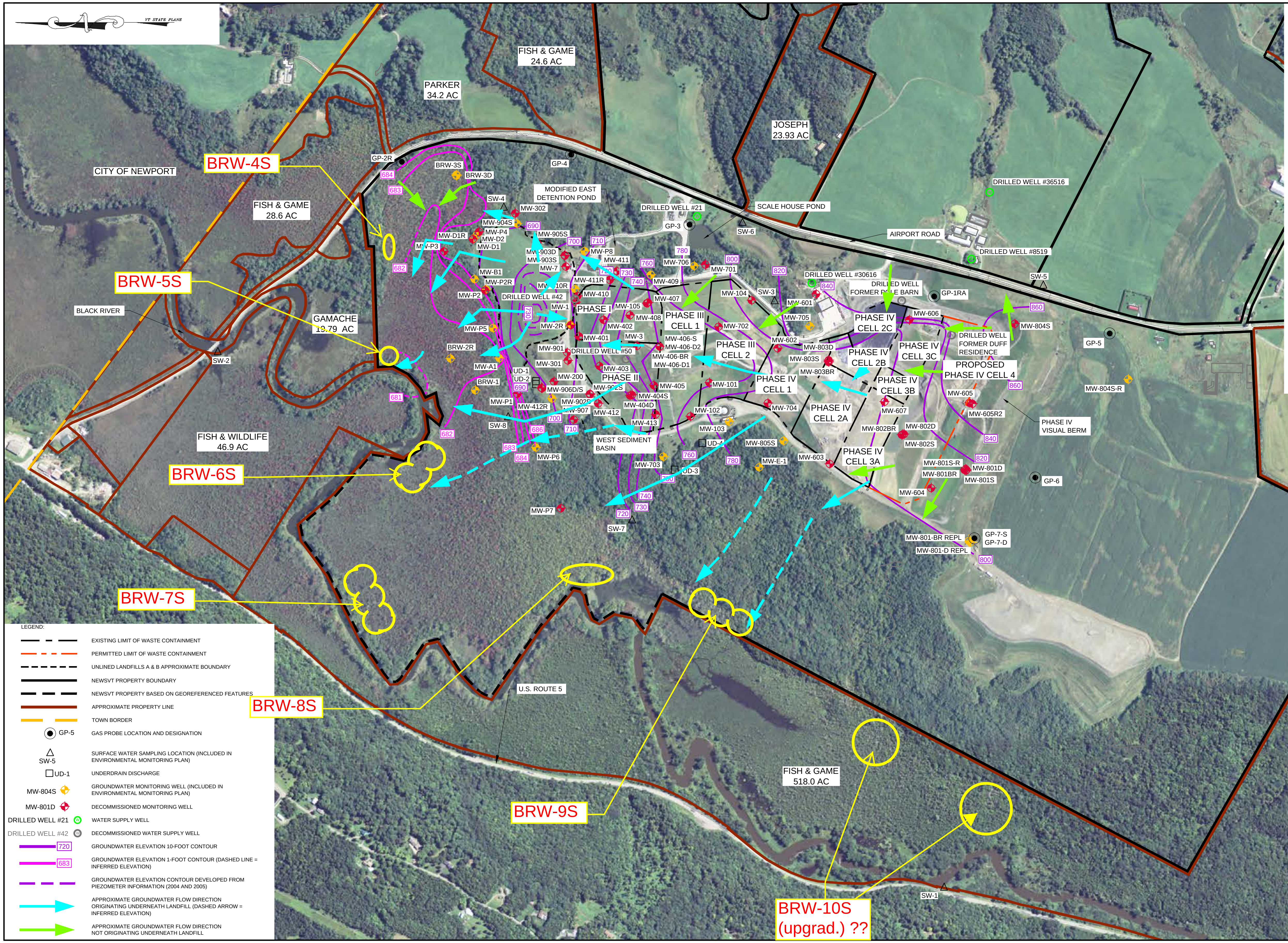
VT 05406

W-70338NGW

A-1 Sampled Date/Time: ____/____/____@_____ Sampler: _____

Chloride	**1 - 2 oz --**	Plastic	<6C
COD	**1 - 2 oz --**	Plastic or Glass	<6C, H2SO4_____
Iron, Dissolved Manganese, Dissolved	**1 - 8 oz --**	Plastic Filtered Metals	Filter_____ HNO3_____
Metals Furnace Digestion Antimony, Total Arsenic, Total Barium, Total Beryllium, Total Cadmium, Total Chromium, Total Cobalt, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Nickel, Total Selenium, Total Silver, Total Sodium, Total Thallium, Total Vanadium, Total Zinc, Total	**1 - 16 oz --**	Plastic Total Metals	HNO3_____
VOC w/ Oxygenates, Water	**2 --**	40ml vials	<6C, HCl

SVOCs via EPA Method 8270, for first sampling round.


VT STATE PLANE
FISH & GAME 24.6 AC
PARKER 34.2 AC
JOSEPH 23.93 AC
CITY OF NEWPORT
FISH & GAME 28.6 AC
BRW-4S
BRW-5S
BRW-6S
BRW-7S
BRW-8S
BRW-9S
BRW-10S (upgrad.) ??
BLACK RIVER
GAMACHE 13.79 AC
FISH & WILDLIFE 46.9 AC
FISH & GAME 518.0 AC
VERMONT STATE AIRPORT 540.4 AC
MODIFIED EAST DETENTION POND
DRILLED WELL #21
SCALE HOUSE POND
AIRPORT ROAD
DRILLED WELL #36516
DRILLED WELL #8519
DRILLED WELL #30616
DRILLED WELL FORMER POLE BARN
DRILLED WELL #42
DRILLED WELL #50
DRILLED WELL FORMER DUFF RESIDENCE
PHASE I
PHASE II
PHASE III CELL 1
PHASE III CELL 2
PHASE IV CELL 1
PHASE IV CELL 2A
PHASE IV CELL 2B
PHASE IV CELL 2C
PHASE IV CELL 3A
PHASE IV CELL 3B
PHASE IV CELL 3C
PROPOSED PHASE IV CELL 4
PHASE IV VISUAL BERM
WEST SEDIMENT BASIN
U.S. ROUTE 5
GP-2R
GP-3
GP-4
GP-1RA
GP-5
GP-6
GP-7-S
GP-7-D
SW-1
SW-2
SW-3
SW-4
SW-5
SW-6
SW-7
SW-8
UD-1
UD-2
UD-3
UD-4
BRW-3S
BRW-3D
BRW-2R
BRW-1
MW-302
MW-301
MW-D1R
MW-D1
MW-D2
MW-P3
MW-P4
MW-904S
MW-905S
MW-903D
MW-903S
MW-P8
MW-411
MW-B1
MW-P2R
MW-7
MW-411R
MW-410
MW-10R
MW-P2
MW-1
MW-105
MW-408
MW-407
MW-409
MW-706
MW-701
MW-104
MW-601
MW-705
MW-602
MW-702
MW-P5
MW-2R
MW-402
MW-3
MW-401
MW-406-S
MW-406-D2
MW-406-BR
MW-406-D1
MW-901
MW-403
MW-A1
MW-200
MW-906D/S
MW-902S
MW-902D
MW-907
MW-404S
MW-404D
MW-405
MW-101
MW-P1
MW-412R
MW-412
MW-413
MW-102
MW-103
MW-704
MW-805S
MW-E-1
MW-P6
MW-703
MW-P7
MW-603
MW-606
MW-804S
MW-804S-R
MW-803D
MW-803S
MW-803BR
MW-605
MW-605R2
MW-607
MW-802BR
MW-802D
MW-802S
MW-801S-R
MW-801BR
MW-801D
MW-801S
MW-604
MW-801-BR REPL
MW-801-D REPL
681
682
683
684
690
700
710
720
730
740
760
780
800
820
840
860

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM THE FOLLOWING SURVEY DATA MERGED BY SANBORN, HEAD & ASSOCIATES, INC. (SANBORN HEAD):
   A. TOPOGRAPHY PREPARED USING AERIAL PHOTOGRAMMETRIC TECHNIQUES FOR NEWSVT BY EASTERN TOPOGRAPHICS (ET) OF WOLFEBORO, NEW HAMPSHIRE. TOPOGRAPHY WAS DEVELOPED BASED ON AERIAL PHOTOGRAPHS DATED 10/09/13, 10/08/2012, 10/28/2011, 10/28/10, 10/19/09, 11/05/08, 11/11/07 AND 11/12/05 AND PROVIDED TO SANBORN HEAD IN DIGITAL FORMAT AT AN ORIGINAL SCALE OF 1" = 40'.
   B. TOPOGRAPHY TO THE EAST OF AIRPORT ROAD WAS PREPARED USING AERIAL PHOTOGRAMMETRIC TECHNIQUES FOR NEWSVT BY ET. TOPOGRAPHY WAS DEVELOPED BASED ON AERIAL PHOTOGRAPHS DATED 05/04/02 AND PROVIDED TO SANBORN HEAD IN DIGITAL FORMAT AT AN ORIGINAL SCALE OF 1" = 40'.
2. THE VERTICAL DATUM IS BASED ON THE NAVD OF 1988 AND THE HORIZONTAL DATUM IS BASED ON THE VERMONT STATE PLANE COORDINATE SYSTEM. THE APPROXIMATE GLOBAL COORDINATES FOR THE SITE ARE: LONGITUDE - W72°14', LATITUDE - N44°54'.
3. WETLANDS SHOWN TO THE NORTH AND WEST OF THE EXISTING LANDFILLS AND TO THE EAST OF THE LFGTE AREA WERE DELINEATED BY ARROWWOOD ENVIRONMENTAL (AE) OF HUNTINGTON, VERMONT IN MAY 2004 AND SURVEYED BY BLAIS SURVEYING COMPANY (BSC), OF NEWPORT, VERMONT. WETLAND INFORMATION WAS PROVIDED TO SANBORN HEAD BY BSC IN DIGITAL FORMAT ON JUNE 10, 2004. WETLANDS TO THE NORTH AND EAST OF THE LFGTE AREA WERE REDELINEATED BY AE ON MAY 17, 2013. ADDITIONAL WETLAND INFORMATION WAS TAKEN FROM THE PHASE IV DESIGN DRAWINGS DATED JUNE 2003 AND PREPARED BY SANBORN HEAD.
4. THE WETLAND DELINEATION WAS FIELD REVIEWED BY AE ON JUNE 8, 2009 WITH THE RESULTANT CHANGE IN THE DELINEATION IN THE BOUNDARY IMMEDIATELY NORTH OF THE WEST SEDIMENT BASIN. THE BOUNDARY CHANGE WAS SURVEYED BY AE VIA SUBMETER GPS. THE WETLAND DELINEATION BOUNDARY PRESENTED IN THIS AREA HAS BEEN FIELD VERIFIED FOR ACCURACY BY AE AS OF JUNE 8, 2009.
5. WETLANDS TO THE EAST OF AIRPORT ROAD WERE DELINEATED BY AE, AND ARE BASED ON GPS DERIVED SURVEY LOCATIONS PREPARED BY AE . WETLAND INFORMATION PROVIDED TO SANBORN HEAD BY AE IN DIGITAL FORMAT ON JULY 19 AND AUGUST 20, 2012.
6. WETLANDS TO THE WEST OF THE MEAD SOIL STOCKPILE AREA AND SOUTH OF THE PHASE IV VISUAL BERM WERE DELINEATED BY AE AND PROVIDED TO SANBORN HEAD IN DIGITAL FORMAT ON OCTOBER 14, 2010, JUNE 28, 2011, AND APRIL 25, 2013.
7. GROUNDWATER ELEVATION CONTOURS WERE DEVELOPED BY C. HEINDEL OF WAITE-HEINDEL ENVIRONMENTAL MANAGEMENT OF BURLINGTON, VERMONT.
8. AERIAL IMAGE WAS DEVELOPED FROM A NATIONAL AGRICULTURE IMAGERY PROGRAM ORTHOPHOTOGRAPH, OBTAINED FROM THE VERMONT CENTER OF GEOGRAPHIC INFORMATION. SOURCE DATES JULY TO OCTOBER 2011. ORIGINAL SCALE = 1:40,000.
9. THE PROPERTY LINE IS BASED ON GEOREFERENCED FEATURES AND WAS DERIVED FROM "PLAN OF LAND" DRAWING PREPARED BY BLAIS SURVEY CO. (ORIGINAL SCALE 1"=400'), DATED JULY 24, 1992, AND PROVIDED TO SANBORN HEAD BY NEWSVT AS AN ELECTRONIC SCAN OF THE ORIGINAL DOCUMENT. ADJUSTMENTS WERE MADE TO THE ALIGNMENT TO MAKE THE PROPERTY LINE MATCH THE PLANFORM OF THE BLACK RIVER AS SHOWN IN THE GEOREFERENCED ORTHOPHOTOGRAPH DISPLAYED ON THIS SHEET (SEE NOTE 8).

LEGEND:

Symbol	Description
	EXISTING LIMIT OF WASTE CONTAINMENT
	PERMITTED LIMIT OF WASTE CONTAINMENT
	UNLINED LANDFILLS A & B APPROXIMATE BOUNDARY
	NEWSVT PROPERTY BOUNDARY
	NEWSVT PROPERTY BASED ON GEOREFERENCED FEATURES
	APPROXIMATE PROPERTY LINE
	TOWN BORDER
GP-5	GAS PROBE LOCATION AND DESIGNATION
SW-5	SURFACE WATER SAMPLING LOCATION (INCLUDED IN ENVIRONMENTAL MONITORING PLAN)
UD-1	UNDERDRAIN DISCHARGE
MW-804S	GROUNDWATER MONITORING WELL (INCLUDED IN ENVIRONMENTAL MONITORING PLAN)
MW-801D	DECOMMISSIONED MONITORING WELL
DRILLED WELL #21	WATER SUPPLY WELL
DRILLED WELL #42	DECOMMISSIONED WATER SUPPLY WELL
720	GROUNDWATER ELEVATION 10-FOOT CONTOUR
683	GROUNDWATER ELEVATION 1-FOOT CONTOUR (DASHED LINE = INFERRED ELEVATION)
	GROUNDWATER ELEVATION CONTOUR DEVELOPED FROM PIEZOMETER INFORMATION (2004 AND 2005)
	APPROXIMATE GROUNDWATER FLOW DIRECTION ORIGINATING UNDERNEATH LANDFILL (DASHED ARROW = INFERRED ELEVATION)
	APPROXIMATE GROUNDWATER FLOW DIRECTION NOT ORIGINATING UNDERNEATH LANDFILL

SANBORN HEAD

GRAPHICAL SCALE
400' 200' 0 400' 800'

1. 1-03-2014. Proposed compliance mon. wells (BRW-4S - 10S). WHEM.

NO.	DATE	DESCRIPTION	BY

DRAWN BY: M. HILDENBRAND / J. GRACE
DESIGNED BY: C. HEINDEL (WHEM)
REVIEWED BY: C. HEINDEL (WHEM)
PROJECT MGR: B. BEAUDOIN
PIC: M. POIRIER
DATE: DECEMBER 2013

HYDROGEOLOGIC SITE CHARACTERIZATION
NEW ENGLAND WASTE SERVICES OF VERMONT, INC.
COVENTRY, VERMONT

FULL SITE GROUNDWATER CONTOUR PLAN

PROJECT NUMBER: 3620.00

SHEET NUMBER: 1 OF 1