REVISED
POST CORRECTIVE ACTION QUARTERLY MONITORING REPORT
CHESTER RIVER HOSPITAL CENTER
100 BROWN STREET
CHESTERTOWN, MARYLAND 21620

SEPTEMBER 2012

Prepared For:

CHESTER RIVER HOSPITAL CENTER
100 Brown Street
Chestertown, Maryland 21620

Submitted To:

MDE – OIL CONTROL PROGRAM
1800 Washington Boulevard
Baltimore, MD 21230

Prepared By:

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W.O. 2781

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1.0 EXECUTIVE SUMMARY

On behalf of the Chester River Hospital Center (CRHC), Earth Data Incorporated (Earth Data) collected gauging and groundwater quality data after shutting down the groundwater remediation system on July 12, 2012 as required by the Maryland Department of the Environment – Oil Control Program (MDE-OCP). On July 27, August 23 and September 4, 2012, Earth Data gauged 46 monitoring, recovery and injection wells at the CRHC in Chestertown, Maryland. Gauging results showed a regional groundwater flow direction to the southeast towards the Chester River. In addition, as a result of the termination of the pumping from the remediation system's seven recovery wells, the water-table contour at the site has returned to its natural flow pattern. On separate occasions, product thicknesses of 0.01 to 0.02 feet were measured in two monitoring wells (MW-14 and MW-47). Absorbent wicks were placed in each well to retrieve accumulated liquid product. Measurable thicknesses of liquid product were not detected in any other well gauged during this monitoring period. A petroleum sheen or film was, however, observed on the surface of the water-table in nine monitoring wells and all seven recovery wells at least once during this monitoring period.

On September 5 and 6, 2012, groundwater samples were collected from 45 monitoring, recovery and injection wells for VOCs and TPH-DRO analysis. Gauging results from September 4, 2012 showed a measurable thickness of liquid hydrocarbons (fuel oil) on the water-table in monitoring well MW-47. Consequently, water samples were not collected from this well for laboratory analysis. Analytical results showed detectable concentrations of TPH-DRO in 23 of the 45 wells sampled. Analytical results also showed that detectable concentrations of VOCs (primarily the petroleum related

compounds, benzene, toluene, ethylbenzene, xylenes, isopropylbenzene and naphthalene) were present in 10 of the 45 wells sampled. In addition, low concentrations of acetone were found in samples collected from nine wells. Low concentrations of tetrachloroethene (PCE) were also found in samples collected from five wells and low levels of chloroform were found in three wells. The data presented herein represents the first round of quarterly monitoring after the trial shutdown of the remediation/containment system at the CRHC. In addition, the data has been revised to reflect the requirements made in the October 25, 2012 letter from MDE-OCP to CRHC.

It should also be noted that, in the recent past (June 5, 2012), groundwater samples collected from two wells (MW-20 and MW-34) immediately down-gradient of the remediation/containment system (south of Brown Street) showed detectable levels of dissolved TPH-DRO. The gauging data collected prior to the shutdown of the remediation/containment system suggest that these two wells were located within the cone of depression created by the system. However, after turning off the system, the existing dissolved contamination in the vicinity of these wells will likely begin to move down-gradient with the regional groundwater flow. To better document this movement, Earth Data sampled monitoring wells MW-20 and MW-34 during the July 27, 2012 gauging event and plan to continue to sample both wells during each monthly gauging event. Analytical results of the water samples collected from MW-20 during the July and September sampling events (1.9 ug/L and 1.8 ug/L, respectively) indicate no significant change in the TPH-DRO concentrations. Analytical results of the samples collected from MW-34 during these two sampling events showed no detectable concentrations of petroleum hydrocarbons. Analytical data collected from these two wells represents the

down-gradient or leading edge of the dissolved hydrocarbon plume emanating from the CRHC site. Accordingly, if analytical results of the samples collected from MW-20 and MW-34 show a significant increase in the dissolved hydrocarbon concentrations, Earth Data will recommend reactivating the remediation system.

It should be noted that, based on the gauging data collected while the remediation system was in operation, the hydraulic influence of the system extends down-gradient to the vicinity of MW-34. As a consequence, if the dissolved hydrocarbon plume were to move past the location of MW-34, it may no longer be contained by the recovery system. Therefore, in an effort to more accurately delineate the leading edge of the dissolved phase hydrocarbon plume, Earth Data recommends installing additional monitoring wells down-gradient of MW-34. The recommendations for placement of wells have been outlined in a separate letter to MDE (*CRHC - Work Plan for Proposed Well Abandonment and Replacement)* dated September 19, 2012.

2.0 INTRODUCTION

2.1 Background

In May 1991, shortly after the discovery of the release of fuel oil from a supply line in the hospital's heating system, a groundwater remediation and containment system was installed. The system was designed not only to recover liquid phase fuel oil from the subsurface, but also to contain the product plume on-site. Plume containment is necessary to protect Chestertown's well field, which is located approximately 1,200 feet down-gradient from the CRHC.

In 2001, an upgraded remediation system was installed to include both pump-and-treat and vacuum extraction components to reduce the levels of immiscible, dissolved and adsorbed hydrocarbons in the subsurface. The vacuum extraction portion of the system was never operated due to relatively high water-table elevations recorded during the past 10 years. The product recovery and containment (pump-and-treat) portion of the system consists of seven recovery wells (RW-1b, RW-2d, RW-3b, MW-4, MW-5, MW-6 and MW-22) that are installed with submersible water-table suppression pumps. A separate satellite system located in the basement boiler room used a converted monitoring well (MW-37) to recover liquid product and suppress the water-table at that location. This system was shut down and dismantled in September 2009 due to decreased oil recovery and excessive bio-fouling of the well.

To remove liquid hydrocarbons from each recovery well, Genie™ Controllerless Skimmers pump the liquid (free) product into an on-site aboveground storage tank located in the treatment building at the southeast corner of the hospital building. A filtration system, which includes a series of pre-filters and Mycelx® filters, treats the

groundwater pumped from the containment-and-recovery wells. After treatment, the recovered groundwater is discharged to the on-site storm sewer at the intersection of Roberts Drive and Brown Street. This system has typically been operated to withdraw between 100 and 120 gallons per minute of groundwater to maintain a sufficient depression in the water-table at the site to contain the dissolved and liquid product plume.

The remediation effort to date has resulted in the recovery of 83,452 gallons of fuel oil from the subsurface. During the past two years, the average rate of product recovery has dropped to below 2 gallons per month, indicating the practical completion of liquid product recovery from the subsurface with the current system.

2.2 Site Description

Located at 100 Brown Street in Chestertown, Maryland, the Chester River Hospital Center (CRHC) occupies approximately 7.1 acres east of Washington Street (Rt. 213) (Figure 1). The property was originally developed as a local general hospital around 1935. Prior to 1935, the property appears to have been farmland.

The CRHC property is bordered on the north, east and south by residential properties. To the west are lands of Washington College. The hospital and surrounding residential area including Washington College is served by public water and sewer provided by the Town of Chestertown.

2.3 Local Geology and Hydrogeology

Surface water from the CRHC property eventually drains into the Chester River through the local storm water collection system. The Chester River is a tidal tributary of

the Chesapeake Bay and enters the bay approximately 15 miles southwest of Chestertown.

Chestertown is located in south central Kent County on the Eastern Shore of Maryland. The Eastern Shore of Maryland is part of the Delmarva Peninsula, which is in of the Atlantic Coastal Plain physiographic province. The coastal plain is underlain by thick layers of unconsolidated sediments (sands, silts and clays), which dip and thicken towards the southeast.

The Pennsauken Formation, of Pleistocene or Pliocene age, comprises the surface sediments over much of the northern portion of the Delmarva Peninsula. In Kent County, this formation consists of yellowish brown sands, silty sands and clayey sands to a depth of approximately 30 feet below ground surface. The total thickness of the Pennsauken Formation ranges from 0 to 50 feet in Kent County. It appears to be very thin or absent under the CRHC property.

The Paleocene age Aquia Formation, which underlies the Pennsauken Formation in the Chestertown area, typically consists of sands to a depth of approximately 120 feet below ground surface (Drummond, 1998). The Aquia Formation is underlain by silts and clays of the Monmouth Formation (Cretaceous aged) to a depth of approximately 220 feet below ground surface. Cretaceous age silts, sands and clays of the Matawan Formation underlie the Monmouth Formation to a depth of approximately 320 feet. Beneath the Matawan Formation lie sands and clays of the Magothy Formation to a depth of approximately 430 feet. The Monmouth, Matawan and Magothy Formations comprise sediments of the Chesapeake Group. The Cretaceous-aged Potomac Formation underlies the Chesapeake Group. The Potomac Formation consists of several sand layers separated

by relatively thick confining clay units. In the Chestertown area, the Potomac Formation extends from a depth of approximately 430 feet to 1,500 feet below ground surface. At 1,500 feet, crystalline bedrock would be encountered.

2.4 Aquifers and Water-Supply Wells

The CRHC property is directly underlain by the outcrop of the Aquia Formation. It extends from ground surface to a depth of approximately 120 feet and is characterized by layers of sand and silty sand. Some of the sand units are semi-cemented with iron oxide. Under non-pumping conditions, the water-table fluctuates seasonally between 30 ft and 55 ft below ground surface depending on location. Natural groundwater flow is to the southwest towards the Town of Chestertown well field and the Chester River. The aquifer under the property is unconfined though individual sand layers may exhibit semi-confined characteristics.

The containment/recovery system at the CRHC has depressed the water-table around the recovery wells causing a localized "cone of depression" to extend under much of the hospital property. This cone of influence has prevented liquid phase and dissolved phase hydrocarbons from moving off-site and also enabled the capture and recovery of liquid phase product.

The primary well field for the Town of Chestertown is located at the intersection of Kent Street and Byford Drive, approximately 1,750 feet southwest of the CRHC property. Many of the municipal water supply wells are screened in the same unconfined Aquia aquifer which underlies the CRHC property. The Town also operates two wells in the same well field that are screened in the deeper, confined Magothy aquifer.

Prior to the discovery of the fuel oil release at CRHC in 1991, the Town of Chestertown operated their Well No. 8, which is located at the intersection of Campus Avenue and Philosopher's Terrace approximately 850 feet down-gradient of the location of the release. Well No. 8 was taken out of service in 1991 shortly after the fuel oil release at the CRHC was reported. At that time, it was concluded that the continued operation of the town well would exacerbate recovery operations at the CRHC and might pull dissolved hydrocarbons into the well which would then require treatment or the well's abandonment. Because Well No. 8 had a high yield and excellent water quality, it was not abandoned. The Town of Chestertown plans to put Well No. 8 back into service when the remediation effort at the CRHC is competed.

2.5 Scope of Work

On July 27, August 23 and September 4, 2012, each monitoring and recovery well at the CRHC was gauged with an oil/water interface probe to determine the depth of the water-table and the presence or absence of liquid hydrocarbons on the surface of the water-table aquifer. Figure 2 shows the location of each monitoring and recovery well plus the locations of monitoring and recovery wells that were abandoned in the past. Based on the gauging data for each date, water-table contour maps were prepared showing the groundwater flow direction.

On September 5 and 6, 2012, Earth Data personnel collected groundwater samples from 37 on-site monitoring wells, seven recovery wells and one prior injection well for laboratory analysis. Groundwater samples were collected from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-23,

MW-24, MW-25, MW-28, MW-29, MW-31, MW-32, MW-33, MW-34, MW-35, MW-37, MW-40, MW-41, MW-42, MW-43, MW-44, MW-45 and MW-46, recovery wells RW-1B, RW-2D, RW-3B, RW-4, RW-5, RW-6 and MW-22 and injection well IW-1. Due to the presence of a measurable quantity of liquid product in monitoring well MW-47, it was not sampled for laboratory analysis.

Prior to sampling, each well was purged of at least three standing volumes of water to ensure that the sample collected was representative of the water in the surrounding formation. The purge water was filtered through granular activated carbon before being discharged on-site. Using dedicated disposable bailers for each well, the groundwater samples were collected in pre-labeled sample containers and placed on ice in a laboratory-supplied cooler. The samples were then sent via courier to an EPA-approved laboratory for analysis. Each groundwater sample was analyzed for volatile organic compounds (VOCs) plus oxygenates using EPA Method 8260 and total petroleum hydrocarbons – diesel range organics (TPH-DRO) using EPA Method 8015. Additionally, two monitoring wells, (MW-20 and MW-34), immediately down-gradient of the remediation/containment system, were sampled on July 27, 2012 for the same parameters.

3.0 SITE MONITORING RESULTS

3.1 Water-Table Measurements and Water-Table Contours

To document the rise or rebound in the water-table after the remediation/containment system was shut down on July 12, 2012 and the return of natural water-table contours in the vicinity of the hospital, the monitoring well network was gauged on July 27, August 23 and September 4, 2012. Gauging data collected on all three dates show a groundwater flow direction towards the southeast and the Chester River (Figures 3, 4 and 5). The Earth Data well gauging reports and corresponding field reports may be found in Appendix A. Hydrographs for the entire history of the remediation showing depth to water and product thickness for each well are presented in Appendix B. Gauging data used to prepare the hydrographs may be found in Appendix C.

3.2 Groundwater Sampling and Analysis

On September 5 and 6, 2012, Earth Data representatives collected groundwater samples from each monitoring, recovery and injection well that did not contain measureable quantities of liquid hydrocarbons. All wells within the network but one (MW-47) were sampled. As previously stated, the samples were analyzed for VOCs plus fuel oxygenates (EPA Method 8260) and TPH-DRO (EPA Method 8015). Figure 6 shows the benzene, BTEX, MTBE and TPH-DRO concentrations for each well sampled in September 2012. The figure also identifies those monitoring wells where measurable thicknesses of free product were found.

Diesel-range organics (TPH-DRO) were detected in 23 of 45 wells sampled. Detected concentrations of TPH-DRO ranged from 0.21 to 280 mg/L, depending on the location. One monitoring well (MW-20) located south of Brown Street (down-gradient of the remediation/containment system) showed detectable concentrations of TPH-DRO. Monitoring well MW-20 was found to have a TPH-DRO concentration of 1.8 mg/L. Samples collected from MW-20 in the recent past have shown similar or greater concentrations of TPH-DRO. In addition, sheens or hydrocarbon films have been detected in MW-20 in the past. MW-20 and adjacent monitoring wells in the lower parking area have occasionally shown very low but detectable concentrations of TPH-DRO in the past.

Because monitoring wells MW-20 and MW-34 are located directly down-gradient of the past source of liquid product, these two wells have been put on a monthly sampling schedule. In addition to the September sampling event, these two wells were sampled on July 27, 2012. TPH-DRO was found in MW-20 during the July sampling event at a concentration of 1.9 mg/L. Although MW-34, located near the center of the lower parking area, has shown low concentrations of TPH-DRO in the recent past (0.14 mg/L during the June 5, 2012 sampling event), TPH-DRO was not detected in the water sample collected from this well during either the July 27, 2012 or September 5, 2012 sampling events.

Of the 58 VOCs tested, eight were found at detectable concentrations in some of the groundwater samples collected. Ten monitoring wells had detectable concentrations of naphthalene. Naphthalene concentrations ranged from 1.1 ug/L to 28 ug/L. Low concentrations of the dissolved petroleum hydrocarbons associated with fuels (benzene,

ethyl-benzene, xylenes and isopropylbenzene) were found in samples collected from four wells (MW-37, MW-40, MW-41 and MW-46). Detectable concentrations of dissolved acetone were found in nine water samples, with concentrations ranging from 22 ug/L to 220 ug/L. Tetrachloroethene (PCE) was found in five samples, with concentrations ranging from 1.1 ug/L to 1.6 ug/L. Chloroform concentrations ranging between 1.2 ug/L and 1.9 ug/L were found in samples collected from three monitoring wells.

A summary of the laboratory analytical results for the current sampling period may be found in Table 1. Laboratory analytical reports for the groundwater samples collected at the site during this monitoring period may be found in Appendix D. For comparison purposes, analytical data for each monitoring well are presented in a time series format for all previous sampling events and may be found in Appendix E.

4.0 DISCUSSION

4.1 Water-Table Elevation and Contours

Between July 27 and September 4, 2012, two monitoring wells (MW-14 and MW-47) have shown measurable thicknesses (0.01 to 0.02 feet) of liquid phase hydrocarbons. Oil-absorbent wicks were used to retrieve the liquid product from the surface of the water-table in these wells. From the shutdown of the remediation/containment system on July 12, 2012 to the September 4, 2012 gauging event, the rise in the water-table elevation across the site ranged from 0.17 to 4.60 feet, depending on the location. Since ending the suppression of the water-table, the groundwater flow pattern has returned to its natural state. The water-table contour maps prepared using the July 27, August 23 and September 4, 2012 gauging data clearly show the natural groundwater flow across the site to the southeast.

4.2 Water Quality

Analytical results of groundwater samples collected on September 5 and 6, 2012 from 45 monitoring, recovery and injection wells apparently show that the dissolved and liquid phase hydrocarbon plumes have not migrated down-gradient since the shutdown of the remediation/containment system. Laboratory analytical results show dissolved phase hydrocarbons in 23 of the 45 wells sampled. These wells were all located within the prior cone of depression created by the remediation system, including monitoring well MW-20 located down-gradient (southwest) of Brown Street. Dissolved diesel-range petroleum hydrocarbon (TPH-DRO) concentrations in the 23 wells ranged from 0.21 mg/L to 280 mg/L. The MDE clean-up level for TPH groundwater used as a source of

potable water is 0.047 mg/L.

Dissolved naphthalene was found in groundwater samples collected from ten of the 45 wells sampled. As with the wells exhibiting detectable concentrations of dissolved TPH-DRO, those wells showing measurable concentrations of naphthalene are located within the former water-table depression created by the remediation system. Dissolved naphthalene concentrations in the ten wells ranged from 1.1 ug/l to 28 ug/l. The MDE clean-up level for dissolved naphthalene in groundwater used as a source of drinking water is 18 ug/l.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Since the shutdown of the remediation/containment system at the CRHC on July 12, 2012, gauging data indicates that the water-table contour at the site has returned to its natural flow pattern. Data for each gauging event during this monitoring period show a groundwater flow across the site to the southeast. On separate occasions, measurable amounts (0.01 to 0.02 feet) of liquid phase hydrocarbons were observed in two monitoring wells (MW-14 and MW-47). No measurable thicknesses of liquid product were observed in any other wells; however a petroleum sheen or film was observed on the surface of the water-table in nine other monitoring wells and all seven recovery wells at least once during the monitoring period.

In September 2012, 45 of the 46 onsite wells were sampled for VOCs and TPH-DRO. Laboratory analytical results show dissolved phase hydrocarbons in 23 of the 45 wells sampled. Petroleum related VOCs were detected in samples collected from ten wells. Additionally, two wells (MW-20 and MW-34) were also sampled in July.

With the exception of monitoring well MW-20, all of the wells showing detectable concentrations of petroleum hydrocarbons were located north of Brown Street. Data collected during corrective action monitoring over the past several years have consistently showed detectable concentrations of dissolved TPH-DRO in MW-20. Monitoring well MW-20 is located directly across Brown Street from RW-3B. During the June 2012 sampling event, dissolved TPH-DRO was detected in the sample collected from MW-34 at a concentration just above the laboratory detection limit (0.14 mg/l); however, no detectable concentrations have been observed in the samples collected from

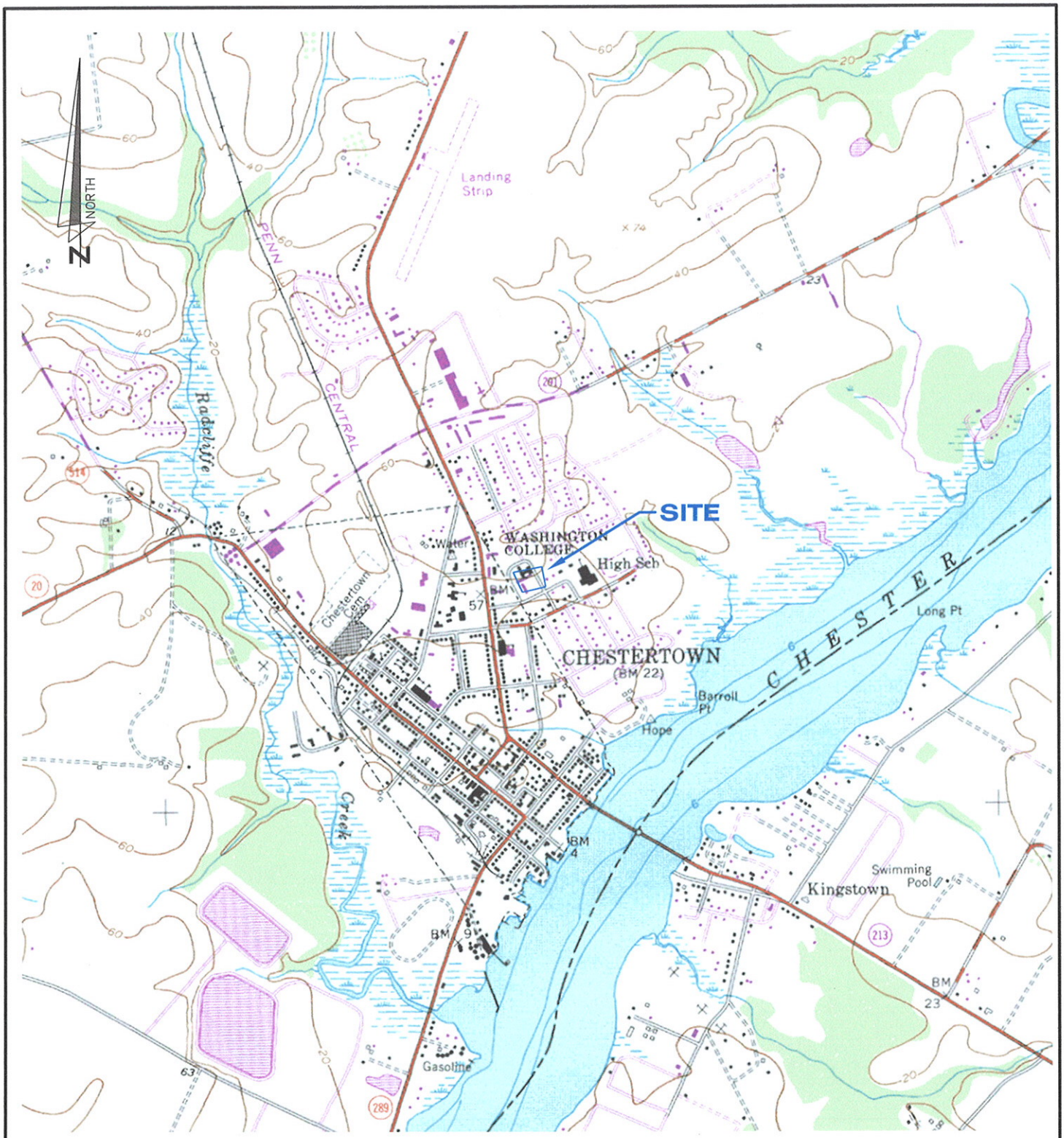
this well during the July or September sampling events. Monitoring well MW-34 is located near the center of the lower parking area.

To better document the movement of the dissolved phase hydrocarbon plume, Earth Data will continue to sample monitoring wells MW-20 and MW-34 during each gauging event. Analytical data collected from these two wells represents the down-gradient or leading edge of the dissolved hydrocarbon plume emanating from the CRHC site. Accordingly, if analytical results of the samples collected from MW-20 and MW-34 show a significant increase in the dissolved hydrocarbon concentrations, Earth Data will recommend reactivating the remediation system in compliance with the Post Corrective Action Monitoring Plan. It should also be noted that based on the gauging data collected while the remediation system was in operation, the hydraulic influence of the system only extends out to the vicinity of MW-34. As a consequence, if the dissolved hydrocarbon plume were to move past the location of MW-34, it may not be contained by the remediation system if it were turned back on. Therefore, in an effort to more accurately delineate the leading edge of the dissolved phase hydrocarbon plume, Earth Data has recommended installing additional monitoring wells down-gradient of MW-34. The recommendation for the placement of these additional wells is outlined in a separate letter to MDE (*CRHC – Work Plan for Proposed Well Abandonment and Replacement*) dated September 19, 2012.

6.0 LIMITATIONS

The findings and conclusions presented in this report are the results of both fieldwork and data analysis by Earth Data Incorporated. Due to the limited scope of this study, Earth Data collected data from only a limited number of locations on the property and on limited occasions. Therefore, there may be environmental or subsurface conditions on the property not disclosed by our investigation. This report has been prepared using generally accepted environmental and hydrogeologic practices for the exclusive use of the Chester River Hospital Center and their representatives. No other warranty, expressed or implied, is made.

FIGURES



2000 0 1000 2000

GRAPHIC SCALE (FEET)

* CREATED 1953 *
* MODIFIED 1973 *

J:_Job_Directories\current\2781 Hospital\CAD\Quad\USGS.dwg

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131 COMET DRIVE
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FIGURE 1

LOCATION MAP
FOR
CHESTER RIVER HOSPITAL CENTER
CHESTERTOWN, MARYLAND

PROJ. MGR.:	A.BULLEN
DATE:	10/31/2011
SCALE:	AS SHOWN
EDI #:	2781
DRAWN BY:	T.COCHRUN

PORTION OF USGS 7.5 MINUTE QUADRANGLE FOR CHESTERTOWN, MARYLAND

Figure 1 – Portion of USGS Quadrangle for Chestertown showing the location of Chester River Hospital Center – Chestertown, Maryland.

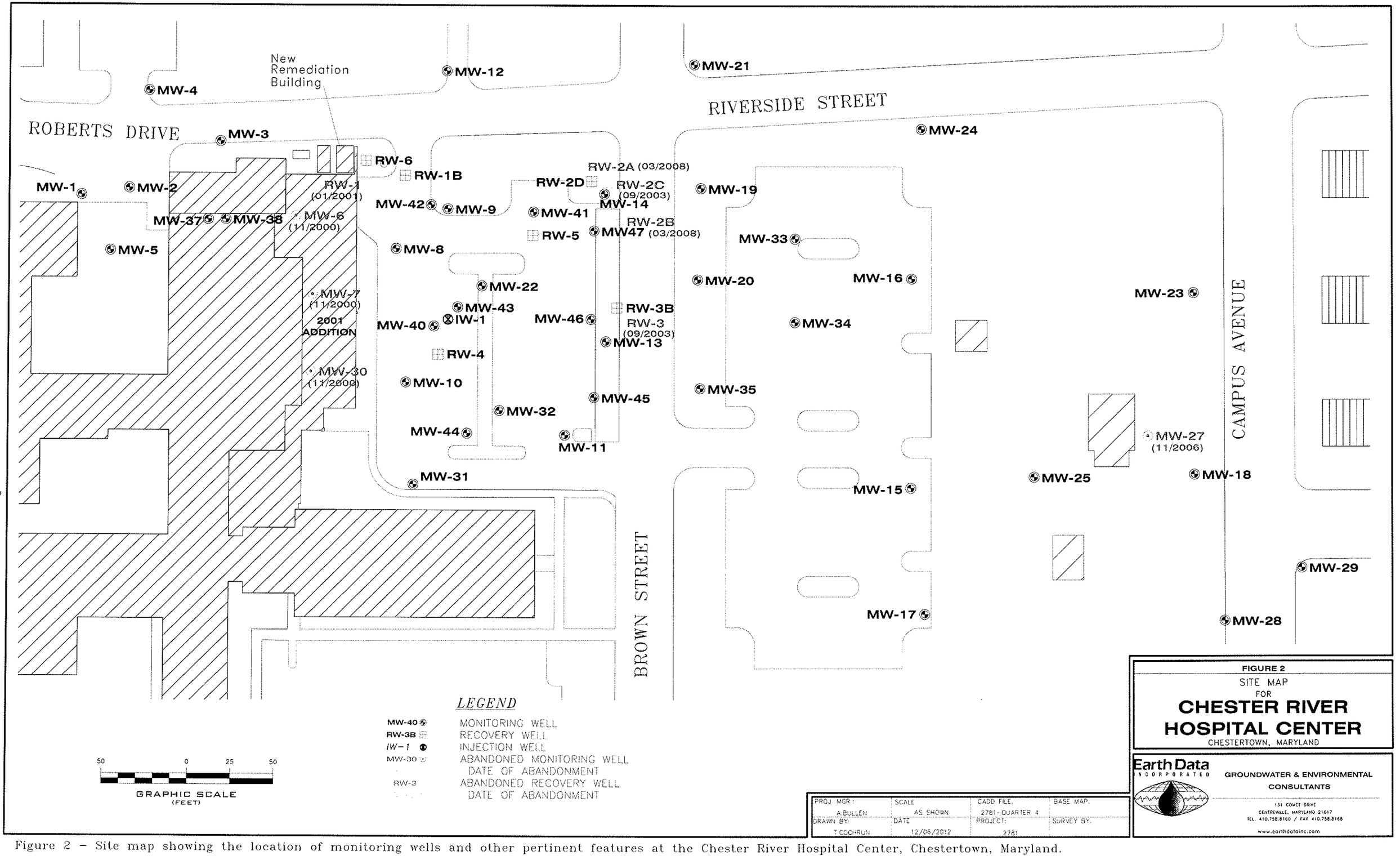
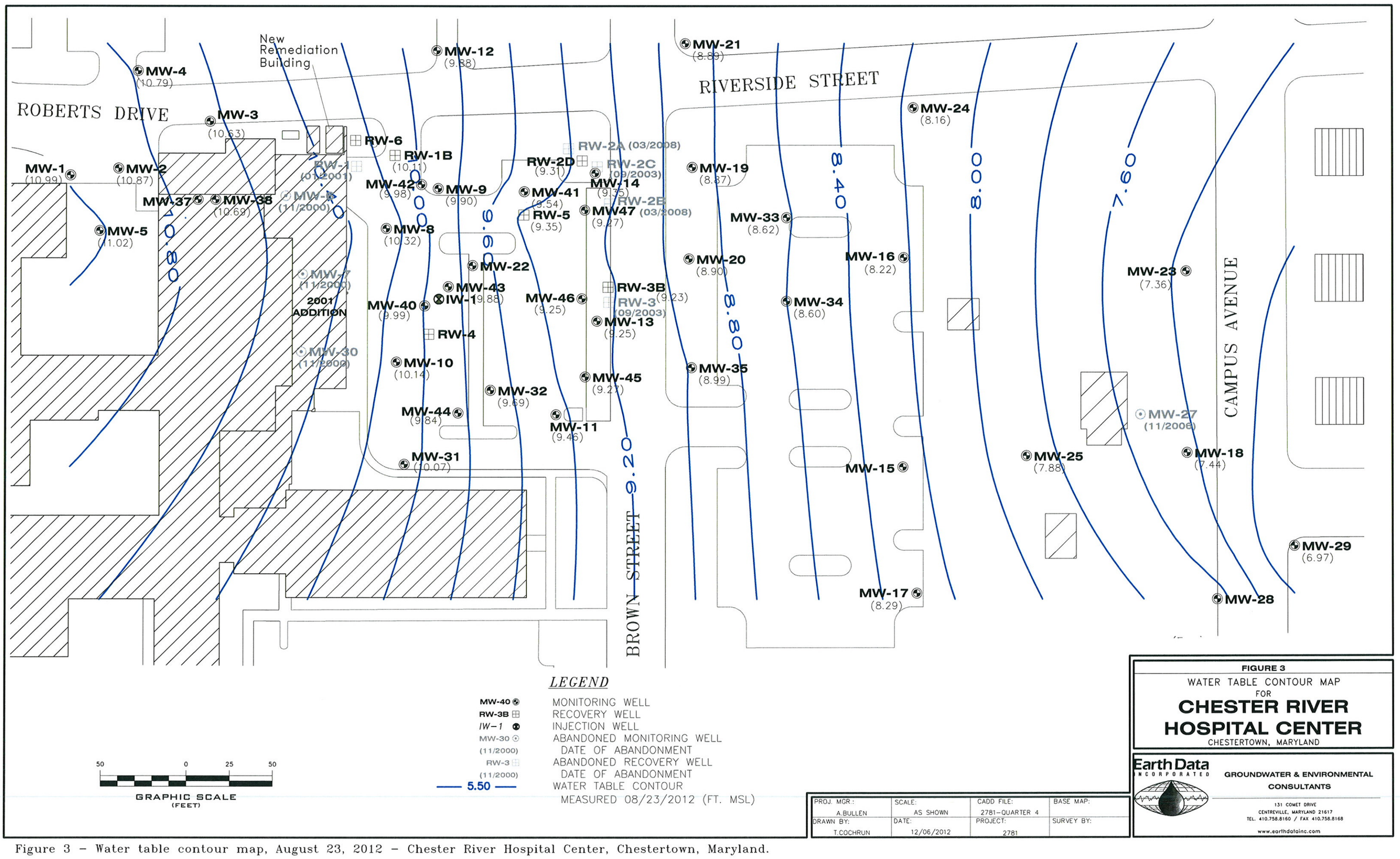


Figure 2 – Site map showing the location of monitoring wells and other pertinent features at the Chester River Hospital Center, Chestertown, Maryland.



LEGEND

MW-40	MONITORING WELL
RW-3B	RECOVERY WELL
IW-1	INJECTION WELL
MW-30 (11/2000)	ABANDONED MONITORING WELL DATE OF ABANDONMENT
RW-3 (11/2000)	ABANDONED RECOVERY WELL DATE OF ABANDONMENT
5.50	WATER TABLE CONTOUR MEASURED 08/23/2012 (FT. MSL)

FIGURE 3

WATER TABLE CONTOUR MAP
FOR
CHESTER RIVER HOSPITAL CENTER
CHESTERTOWN, MARYLAND

PROJ. MGR.: A.BULLEN	SCALE: AS SHOWN	CADD FILE: 2781-QUARTER 4	BASE MAP:
DRAWN BY: T.COCHRUN	DATE: 12/06/2012	PROJECT: 2781	SURVEY BY:

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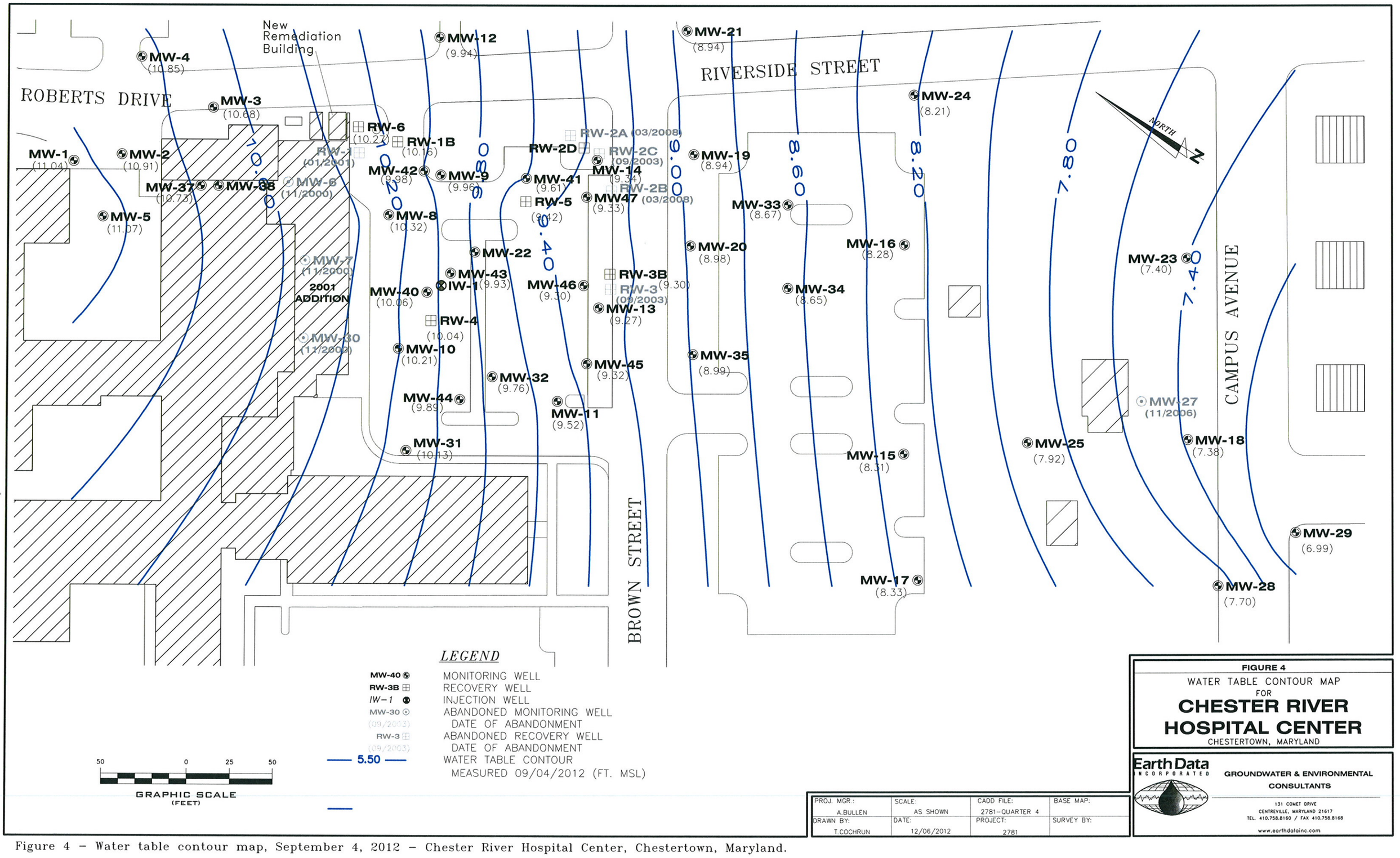
Figure 3 – Water table contour map, August 23, 2012 – Chester River Hospital Center, Chestertown, Maryland.



LEGEND

MW-40	MONITORING WELL
RW-3B	RECOVERY WELL
IW-1	INJECTION WELL
MW-30	ABANDONED MONITORING WELL
(09/2003)	DATE OF ABANDONMENT
RW-3	ABANDONED RECOVERY WELL
(09/2003)	DATE OF ABANDONMENT
5.50	WATER TABLE CONTOUR
	MEASURED 09/04/2012 (FT. MSL)

FIGURE 4

WATER TABLE CONTOUR MAP
FOR
CHESTER RIVER HOSPITAL CENTER
CHESTERTOWN, MARYLAND

PROJ. MGR.: A.BULLEN	SCALE: AS SHOWN	CADD FILE: 2781-QUARTER 4	BASE MAP:
DRAWN BY: T.COCHRUN	DATE: 12/06/2012	PROJECT: 2781	SURVEY BY:

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Figure 4 - Water table contour map, September 4, 2012 - Chester River Hospital Center, Chestertown, Maryland.

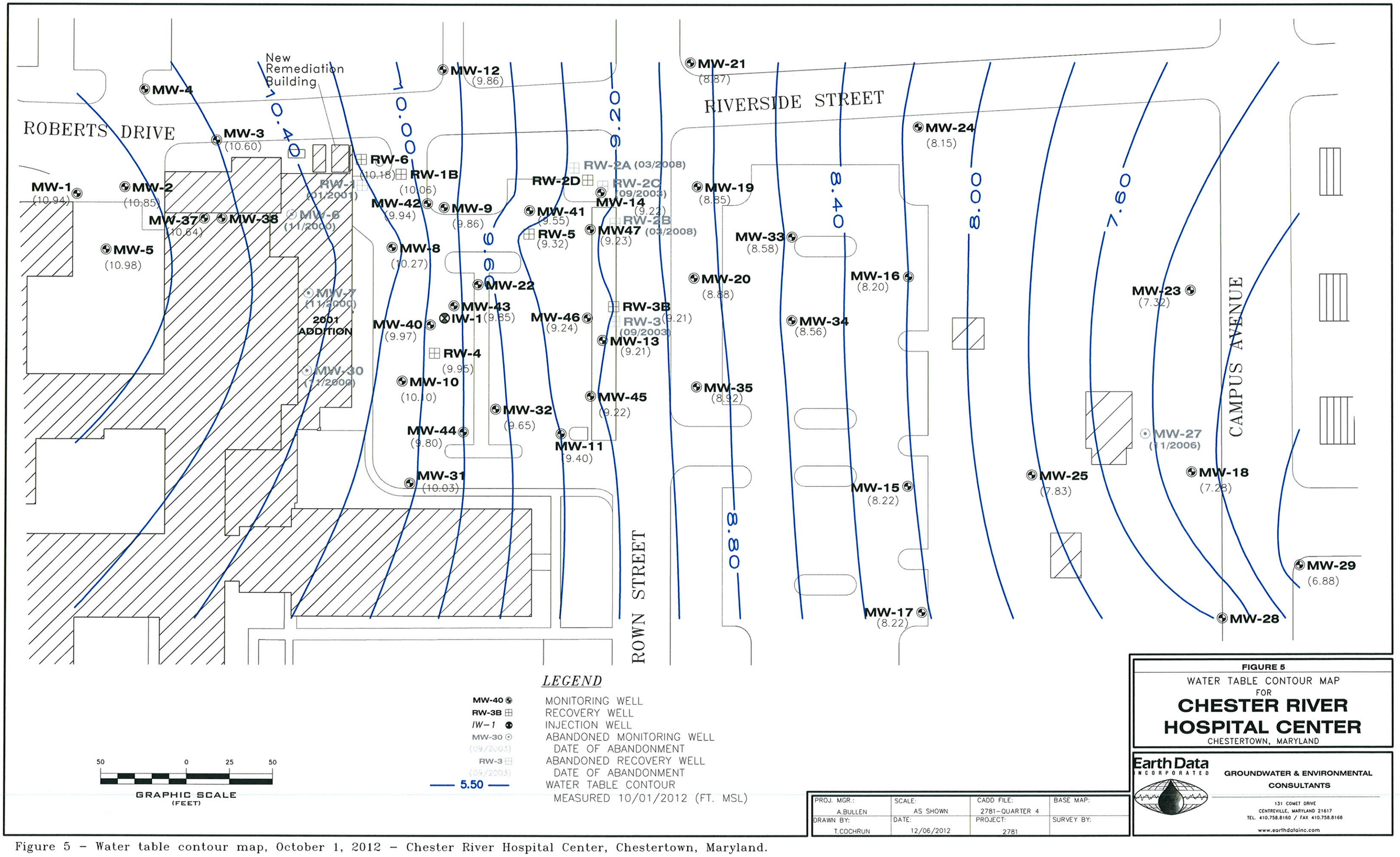

FIGURE 5

WATER TABLE CONTOUR MAP FOR

CHESTER RIVER HOSPITAL CENTER

CHESTERTOWN, MARYLAND

PROJ. MGR.:	SCALE:	CADD FILE:	BASE MAP:
A.BULLEN	AS SHOWN	2781-QUARTER 4	
DRAWN BY:	DATE:	PROJECT:	SURVEY BY:
T.COCHRUN	12/06/2012	2781	

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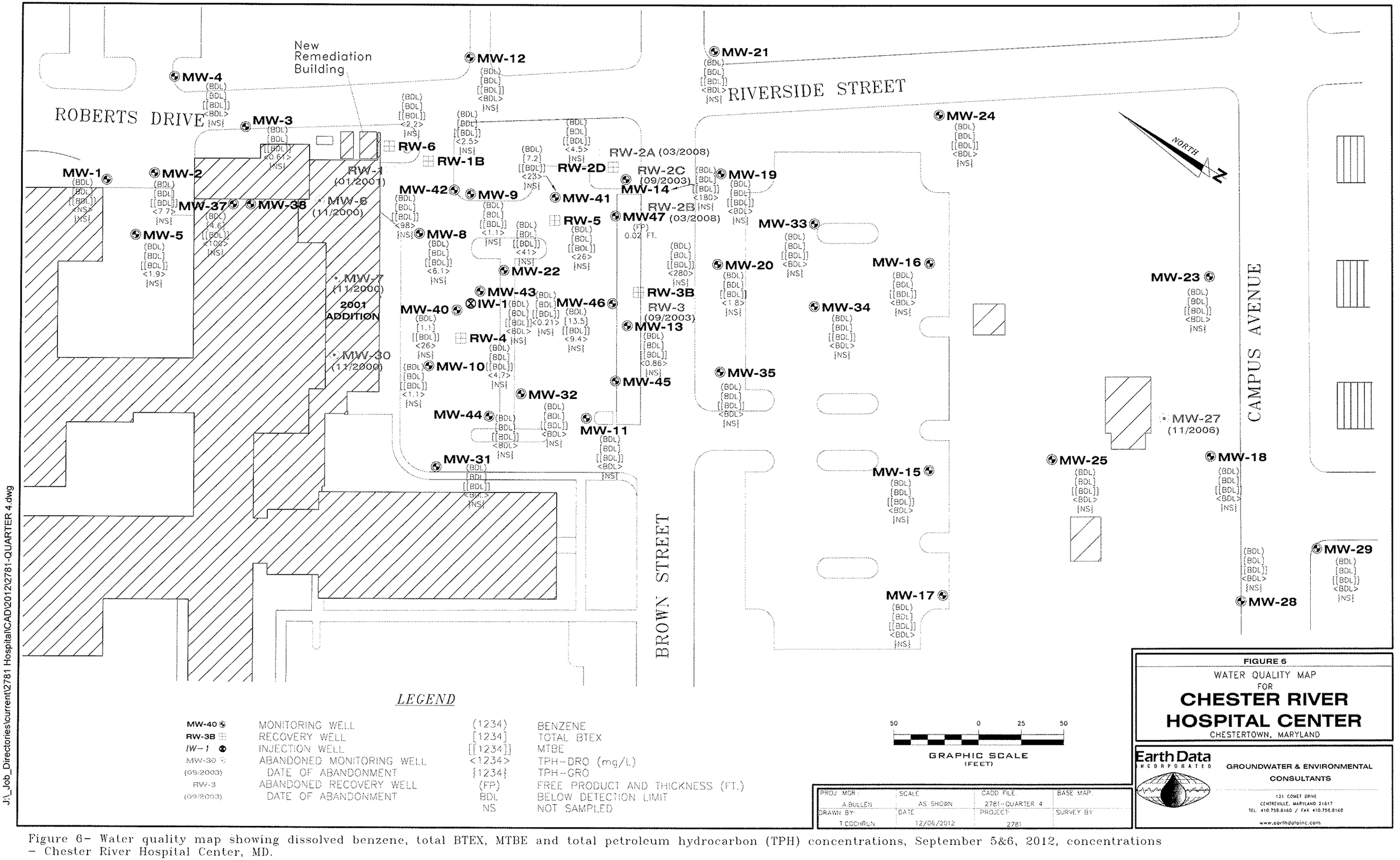
Figure 5 - Water table contour map, October 1, 2012 - Chester River Hospital Center, Chestertown, Maryland.



LEGEND

MW-40	MONITORING WELL	(1234)	BENZENE
RW-3B	RECOVERY WELL	[1234]	TOTAL BTEX
IW-1	INJECTION WELL	[[1234]]	MTBE
MW-30	ABANDONED MONITORING WELL	<1234>	TPH-DRO (mg/L)
(09/2003)	DATE OF ABANDONMENT	{1234}	TPH-GRO
RW-3	ABANDONED RECOVERY WELL	(FP)	FREE PRODUCT AND THICKNESS (FT.)
(09/2003)	DATE OF ABANDONMENT	BDL	BELOW DETECTION LIMIT
		NS	NOT SAMPLED

PROJ. MGR.: A.BULLEN	SCALE: AS SHOWN	CADD FILE: 2781-QUARTER 4	BASE MAP:
DRAWN BY: T.COCHRUN	DATE: 12/06/2012	PROJECT: 2781	SURVEY BY:

FIGURE 6

WATER QUALITY MAP
FOR
CHESTER RIVER HOSPITAL CENTER
CHESTERTOWN, MARYLAND

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Figure 6- Water quality map showing dissolved benzene, total BTEX, MTBE and total petroleum hydrocarbon (TPH) concentrations, September 5&6, 2012, concentrations – Chester River Hospital Center, MD.

TABLE

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14
	6-Sep-12	6-Sep-12	6-Sep-12	5-Sep-12	6-Sep-12	6-Sep-12	6-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	6-Sep-12	6-Sep-12
Benzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
TOTAL BTEX (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (ug/L)	<1	<1	2.7	<1	<1	<1	<1	<1	<1	<1	1.1	6.3
Acetone (ug/L)	<10	<10	<10	<10	29	<10	39	54	<10	<10	<10	<10
Chloroform (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene (ug/L)	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.2
TPH-DRO (mg/L)	16	7.7	0.61	<0.1	1.9	6.1	1.1	1.1	<0.1	<0.1	0.86	180

	MW-15	MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-23	MW-24	MW-25	MW-28	MW-29
	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12
Benzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
TOTAL BTEX (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acetone (ug/L)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform (ug/L)	<1	1.9	<1	<1	<1	1.5	<1	<1	<1	<1	<1	<1
Tetrachloroethene (ug/L)	<1	1.1	<1	<1	<1	1.2	<1	<1	<1	<1	<1	<1
TPH-DRO (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1	1.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

	MW-31	MW-32	MW-33	MW-34	MW-35	MW-37	MW-40	MW-41	MW-42	MW-43	MW-44	MW-45
	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	6-Sep-12	6-Sep-12	6-Sep-12	6-Sep-12	6-Sep-12	5-Sep-12	5-Sep-12
Benzene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene (ug/L)	<1	<1	<1	<1	<1	2.9	<1	<1	<1	<1	<1	<1
Ethylbenzene (ug/L)	<1	<1	<1	<1	<1	1.7	<1	2.1	<1	<1	<1	<1
Total Xylenes (ug/L)	<2	<2	<2	<2	<2	<2	1.1	5.1	<2	<2	<2	<2
TOTAL BTEX (ug/L)	<2	<2	<2	<2	<2	4.6	1.1[a]	7.2	<2	<2	<2	<2
Isopropylbenzene (ug/L)	<1	<1	<1	<1	<1	1.8	<1	2.7	<1	<1	<1	<1
Naphthalene (ug/L)	<1	<1	<1	<1	<1	17	1.5	24	6.5	<1	<1	<1
Acetone (ug/L)	<10	<10	<10	<10	<10	22	<10	<10	<10	<10	<10	<10
Chloroform (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.2	<1	<1
Tetrachloroethene (ug/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TPH-DRO (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1	100	26	23	98	0.21	<0.1	<0.1

	MW-46	MW-47	IW-1	RW-1B	RW-2D	RW-3B	RW-4	RW-5	RW-6	MW-22
	6-Sep-12	6-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12	5-Sep-12
Benzene (ug/L)	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1
Toluene (ug/L)	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene (ug/L)	1.5	NS	<1	<1	<1	<1	<1	<1	<1	<1
Total Xylenes (ug/L)	12	NS	<2	<2	<2	<2	<2	<2	<2	<2
TOTAL BTEX (ug/L)	13.5	NS	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene (ug/L)	6.3	NS	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (ug/L)	28	NS	<1	<1	<1	4.1	<1	<1	<1	1.7
Acetone (ug/L)	<10	NS	<10	<10	24	<10	150	18	220	77
Chloroform (ug/L)	<1	NS	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene (ug/L)	<1	NS	<1	<1	1.6	<1	<1	<1	<1	<1
TPH-DRO (mg/L)	9.4	NS	<0.1	2.5	4.5	280	4.7	26	2.2	41

NS = NOT SAMPLED

Table 1. Summary of water quality data for monitoring wells sampled at Chester River Hospital Center, Chestertown, Maryland, September 2012.