# INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT For 2013

# STUDY AREAS 5, 6, AND 7 JERSEY CITY, NEW JERSEY

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# TABLE OF CONTENTS

# TABLE OF CONTENTS (Continued)



## APPENDICES

# LIST OF TABLES, FIGURES AND DRAWINGS

## Tables

## Figures

# 1 INTRODUCTION

## 1.1 General

The Long Term Monitoring Plan (LTMP) for the Study Area 7 (SA-7) deep overburden and bedrock groundwater remedy was originally developed in 2008 to monitor groundwater conditions relative to the Groundwater Extraction and Treatment (GWET) system. Annual progress reports have been prepared in accordance with this plan since the startup of the GWET system in December 2008 and thus this document represents the fifth such annual performance report. In 2011, the LTMP was expanded to integrate groundwater monitoring requirements for Study Areas 5, 6 and 7 (Project Area). Sampling and analysis within this integrated plan was performed consistent with the requirements set forth in the *Integrated Groundwater Sampling and Analysis Plan for Study Areas 5, 6 and 7* dated March 12, 2014.

## 1.2 Purpose and Objectives

The purpose of this document is to provide an integrated annual reporting format that characterizes regional groundwater conditions and documents compliance with area-specific remedial objectives. The specific objectives of this approach are to:

- Improve consistency and efficiency in field procedures including sample collection and scheduling.
- Provide a central database for monitoring well specifications and status.
- Provide regional groundwater flow interpretations that consider the impact of features such as subsurface barrier walls, drains, caps, and drawdown from pumping.
- Provide localized groundwater flow maps consistent with the regional contour maps.
- Facilitate preparation of CEA biennial certifications.

## 1.3 Status of Integrated Monitoring Requirements for 2013

The two primary elements of groundwater monitoring within the Project Area are water level measurements and water quality sampling and analysis. Groundwater level monitoring is conducted quarterly in all available monitoring wells and piezometers.

These data are used to fulfill various reporting requirements as shown on **Table 1-1**. Groundwater quality sampling is conducted in a subset of wells at various times in accordance with the requirements of the various monitoring plans. The status of groundwater sample collection in 2013 is shown on **Table 1-2**.

## 1.4 Document Organization

In accordance with the approved outline for the IGWPR, this report is organized in terms of its three primary elements; groundwater extraction (Section 3), groundwater elevations and flow direction (Section 4), and groundwater quality (Section 5). These sections are prefaced by a discussion of overall site conditions and events during the reporting period (Section 2). The status of the S-3 Sand Injection/Mass Removal program is summarized in Section 6, and conclusions and recommendations for modifications to the LTMP are provided in Section 7.

# 2 GENERAL CONDITIONS

Overall conditions within the Project Area were generally uneventful throughout 2013. The GWET system was operational at design rates with the exception of scheduled maintenance and annual precipitation was only slightly below normal. The SA-7 Sediment Remedy was completed in 2013 and the S-3 Injection/Mass Removal remedy continued with six injection events. Final capping of sediments in the Hackensack River did not impact groundwater in the Project Area and the influence of the calcium polysulfide injections have not been detected in downgradient wells. Subsurface remedial activities in SA-6 began in the Fall of 2013 with partial construction of the soil containment barrier wall and groundwater dewatering/depressurization pumping for soil excavation.

## 2.1 Annual Precipitation

Monthly precipitation data recorded at Newark Airport, approximately 2.5 miles southwest of SA-7 are provided in **Table 2-1** and shown on **Figure 2-1**. With the exception of above-average precipitation in June and relatively dry fall, monthly rainfall totals were close to, albeit slightly below, the 20-year average values for this station. Total precipitation in 2013 was 42.94 inches or approximately 3 inches below the annual average of 46.25 inches.

## 2.2 Tidal Monitoring

Tidal fluctuations in the Hackensack River were monitored at the SA-7 tide gage using a data logger (with pressure transducer) suspended in a 4-inch diameter conduit attached to the bulkhead. A reference point has been established on top of the bulkhead in NGVD-1929 vertical datum. This datum is used for all reported groundwater elevation data in this report. The data logger is programmed to record river stage at 6-minute intervals. These data are used to correct groundwater levels for tidal impacts based on tidal lag and efficiency values previously determined for monitoring wells screened in the Intermediate, Deep, and Bedrock zones. There are no tidal influences in the Shallow Zone monitoring wells. The mean tidal elevation is approximately +1.2 feet (NGVD-1929).

## 2.3 Monitoring Well Inventory

A list of the groundwater monitoring wells currently in service within the Project Area is provided on **Table 2-2**. The wells are organized by hydrogeologic zone. Information regarding the total depth, screen interval, and reference point elevation are also provided. The well locations are shown on the groundwater elevation contour maps provided in **Section 4**. There were no new monitoring wells installed in 2013; however a new

injection well (088-IW-03) was installed on SA-6 North as discussed in **Section 6,** and various temporary dewatering and depressurization wells were installed on SA-6 South as discussed in **Section 3.5**. Numerous monitoring wells were abandoned in accordance with the Well Abandonment Plans for SA-6 North and South. Since this is an on-going effort, the status of well abandonment changes frequently. Abandoned wells as of this report date are noted on **Table 2-2**.

# 3 GROUNDWATER EXTRACTION

The Deep Overburden Groundwater Extraction and Treatment (GWET) system was in operation throughout 2013. Pumping from the contingent pumping system at NJCU was not required and the contingent pumping systems in SA-6 North and South are in the design stage and have not yet been installed. Groundwater pumping for dewatering of the Shallow zone and depressurization pumping of the Intermediate zone was conducted during the third and fourth quarters of 2013 on the eastern side of SA-6 South to facilitate soil excavation.

## 3.1 GWET System Operation

The GWET system consists of three extraction wells pumping at a combined rate of 54.5 gpm with discharge via independent force mains to the waste water treatment plant located on Kellogg Street. Wells PW-1 and PW-2 are located on the Difeo property on the north side of SA-6 North and pump from the Deep and Intermediate zones, respectively. Well 115-MW-203BR is located on Site 115 and pumped from the upper Bedrock zone throughout 2013. Plans to replace this well with 115-MW-215BR will be implemented in 2014.

### 3.1.1 Pumping Rates

Flow rate monitoring was conducted on each of the three force mains using flow meters located within the treatment plant, prior to flow equalization. The flow rates were controlled by a manually-operated valve and adjusted as necessary to maintain design rates of 40 gpm and 7.5 gpm for wells PW-1 and PW-2 respectively, and 7 gpm for well 115-MW-203BR. These rates were maintained throughout the period with the exception of occasional downtime for O&M activities. **Figure 3-1** illustrates the pumping history during 2013 and identifies the events that resulted in a shutdown of more than 8 hours. An explanation of each shutdown is provided on **Table 3-1.** In general, system shutdowns in 2013 were due to routine force main cleaning, well development, and activities related to the relocation of the treatment plant.

### 3.1.2 Force Main Acid Flushing

The GWET force main from extraction well PW-2 to the treatment plant is subject to fouling due to mineralization of groundwater from the Intermediate Zone. As a result, periodic cleaning of the line with hydrochloric acid is conducted on an as-needed basis as determined through monitoring of groundwater discharge trends and line pressures. There was one acid-flushing event conducted in April 2013 which was successful in

improving the yield of PW-2. Flow and pressure within the force main were restored to normal operating values.

### 3.1.3 Well Redevelopment

Routine groundwater level monitoring in the GWET extraction wells indicated that the pumping level in PW-2 was declining at an accelerated rate in the second quarter of 2013. As a result, PW-2 was redeveloped on July 25, 2013 and the pump was replaced with one of higher flow capacity. The well redevelopment procedures consisted of the following:

- The pump was removed from the well and set aside.
- The well was cleaned of loose debris by brushing the well screen and riser.
- 10 gallons of Redux 520 were added to acidify the well.
- The well was surge-blocked for 4 hours.
- The acid was allowed to remain in the well overnight.
- The spent cleaning solution was removed via Vac truck.
- The well was surge-blocked and pumped until the water/effluent ran clear.
- The pump was cleaned and returned to service.

Groundwater levels during pumping were returned to typical levels after the well development procedures were completed.

## 3.2 SA-6 North Contingent Groundwater Pumping System

The SA-6 North contingent groundwater pumping system is planned for installation as part of the soil remedy scheduled for 2015.

## 3.3 SA-6 South Contingent Groundwater Pumping System

The SA-6 South contingent groundwater pumping system is planned for installation as part of the soil remedy scheduled for 2015.

## 3.4 SA-5 NJCU Contingent Groundwater Pumping System

In accordance with the performance criteria set forth in the *Proposed Triggers for Operation of the SA-5 Contingent Groundwater Extraction and Treatment System* document and the NJCU LTMP, the contingent groundwater pumping system at the NJCU site was not operated during 2013.

## 3.5 SA-6 South Dewatering Pumping Operations

To facilitate soil excavation activities, groundwater pumping was conducted on the eastern portion of SA-6 South to 1) dewater the fill material above Stratum D, and 2)

depressurize heads below Stratum D. Pumping from the fill was conducted using a system of well points and vacuum headers that were moved from area to area as the excavation proceeded from east to west. Pumping rates varied based on location and the amount of storm water entering the excavation, but averaged approximately 15 gpm.

Groundwater pumping from below Stratum D in 2013 was conducted using depressurization wells DW-1 and DW-2 screened in the Intermediate Zone. Well DW-1 began pumping on October 22 and DW-2 came on line November 15, 2013. Pumping rates ranged from 8 to 12 gpm from each well. Drawdown from the deeper well pumping is further discussed in **Section 4.8.1.**

# 4 HYDRAULIC MONITORING

Hydraulic monitoring in 2013 consisted of four quarterly rounds of groundwater elevation measurements in available wells in March, June, September, and December. The measured depth to groundwater was subtracted from the reference point elevation to determine the elevation of the groundwater surface. For those wells that are tidally influenced, the measured values were adjusted using a time-series method developed by the U.S. Geological Survey (Halford, 2006). The results for the four quarterly rounds are provided in **Table 4-1**. Groundwater elevations from the September 2013 round, nearly five years after startup of the GWET system are plotted for the Shallow, Intermediate, Deep, and Bedrock zones on **Figures 4-1** through **4-4**, respectively and on **Figure 4-5** in cross section. Groundwater elevation data are reported in units of feet above mean sea level (amsl) in the NGVD-29 vertical datum.

## 4.1 Regional Groundwater Flow

### 4.1.1 Shallow Zone

Groundwater elevations in the Shallow zone range from 12 feet above msl on Site 154 to less than 4 feet above msl near the Hackensack River on Site 163. As a point of reference, the river has a mean tide elevation of approximately +1.2 feet relative to the NGVD-29 datum. As shown on **Figure 4-1**, shallow groundwater flow is generally from east to west across the region, but is locally impacted by subsurface features such as the SA-7 and SA-5 barrier walls, deep sewer lines that run beneath JCMUA, JCIA, and Route 440, and shallower storm sewers that run along most of the side streets. There was no influence from SA-6 construction-dewatering project at the time of this measurement round.

Shallow groundwater flow is diverted around the SA-7 barrier wall and moves onto SA-6 North and SA-6 South, ultimately discharging to the River or into other subsurface sewers that serve as local groundwater sinks. Areas of locally elevated groundwater are observed in both SA-6 North and SA-6 South along the SA-7 perimeter wall. These elevated zones are likely caused in part by soils with locally reduced hydraulic conductivity, and in part due to their location midway between groundwater discharge areas associated with the River to the west and storm sewers near Route 440 to the east.

At the NJCU site in Study Area 5, groundwater flow is generally from east to west. The north-south oriented “cross-wall” causes groundwater elevations to build up slightly east of the wall relative to heads on the Home Depot property (Site 117). Further discussion regarding localize groundwater flow on the NJCU site is provided in **Section 4.3**.

### 4.1.2 Intermediate Zone

Groundwater elevations in the Intermediate zone are shown on **Figure 4-2** and range from over 6 feet above msl in SA-5 to less than mean sea level in the vicinity of the GWET pumping wells. Groundwater is diverted around the SA-7 barrier wall but is not impacted by near-surface features on SA-6 North to the same degree as in the Shallow zone. Groundwater elevations within the SA-7 barrier wall are relatively uniform in the range of two to three feet above msl. Vertically, heads within the Intermediate zone are generally one to four feet lower than in the Shallow zone, which indicates a significant downward vertical gradient across Stratum D. This is especially the case west of Route 440 where Stratum D is nearly continuous across the site. **Figure 4-2** also illustrates that the combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides an effective capture zone in the upper lacustrine soils.

### 4.1.3 Deep Zone

Groundwater elevations in the Deep zone (**Figure 4-3**) are similar to those in the overlying Intermediate zone, although the influence of the SA-7 barrier wall is not as prominent. As noted in prior reports, groundwater flow in the Deep zone is, to a degree, able to move beneath the SA-7 barrier wall through gravel lenses in the underlying glacial till/ice contact deposits. At SA-5, the barrier wall does not extend down to the Deep zone and thus does not influence flow. The area of influence of the GWET pumping wells on groundwater flow in the Deep zone is also illustrated on **Figure 4-3**. The resulting combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides effective capture in this deeper flow zone.

### 4.1.4 Bedrock Zone

Groundwater elevation contours in the Upper Bedrock zone are shown on **Figure 4-4** and are relatively uniform compared to those in the overlying lacustrine units. The impact of the GWET pumping well 115-MW-203BR on groundwater flow is evident from the closely-spaced closed contours along the western border of SA-7. This area is characterized by the southwest-northeast trending high-permeability fracture zone which aids in the propagation of the capture zone parallel to the bulkhead as shown on **Figure 4-4**.

## 4.2 GWET System Capture Zone

**Figure 4-5** illustrates that pumping from PW-1 and PW-2 creates a combined zone of influence causing groundwater to flow both laterally and vertically into the capture zone of the wells. The capture zone spans the various semi-confining layers but considering that the vertical anisotropy of the soil is likely on the order of 10:1, the primary

component of flow to the wells is horizontal rather than vertical. It should be noted that the cross-section is drawn with a vertical exaggeration of 5X which tends to over-emphasize the vertical component of flow (i.e., the same cross-section drawn at true scale would more effectively illustrate that the majority of flow is horizontal). Based on the data provided in both plan view on **Figures 4-2 and 4-3** and in cross section on **Figure 4-5,** the combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides an effective capture zone that meets it design objectives.

## 4.3 New Jersey City University

Quarterly groundwater elevation data for the NJCU property are compiled in **Table 4-2** and mapped on **Figures 4-6 through 4-9**. NJCU site development activities required that the casing of several monitoring wells be raised and were thus temporarily inaccessible during the year. Upon completion of the work, the elevation of the new top of casing reference points were determined by survey as shown on **Table 4-2**. The results for each quarter are similar and indicate that groundwater flow is generally to the northwest as it moves onto Sites 90 and 184 from the east but then turns north as it is forced around the various barrier walls that block flow to the south and west. A "dead zone" is thus formed by the confluence of the two walls near the entrance to the Home Depot parking lot and the lack of recharge due to the overlying synthetic liner. As a result, groundwater largely bypasses the Commercial AOC located in this dead zone and thus does not promote the migration of hexavalent chromium to the north onto the Residential Area. This conclusion is supported by groundwater quality data from the sentinel wells as further discussed in **Section 5-5**.

An investigation was conducted in 2013 to further evaluate groundwater flow conditions and to determine if the horizontal HDPE liner on the NJCU site had been compromised, thereby allowing groundwater to locally recharge the underlying soils. The investigation consisted of a dye test in which the boot around Sump A was exposed and shallow groundwater was spiked with fluorescent Rhodamine WT dye. Groundwater was then pumped from beneath the liner (from Sump A) and tested for the presence of the dye with a field spectro-fluorometer. The results indicated that the liner was not leaking and thus the observed groundwater response in Sump A to surface flooding during rainfall events is more likely due to an increase in hydraulic pressure beneath the liner than actual movement of groundwater from above the liner into the Sump.

Based on the results of the dye-test and previously compiled data from the site, is has been concluded that the impact of this phenomenon (head response in Sump A) on groundwater quality at NJCU is negligible for the following reasons.

- Head changes are relatively short-lived, on the order of several days to a week, and thus groundwater does not migrate more than several feet in any direction during each event.

- The temporary mounding near Sump A during rainfall events causes the hydraulic gradient to slope from the Residential Area towards the Commercial AOC, thus helping to contain elevated chromium concentrations in the southwest corner.

- Groundwater quality in Sump A was determined to be non-detect for hexavalent chromium during the dye test.

- Historic groundwater quality data from the three sentinel wells continues to indicate that there has not been migration of hexavalent chromium in groundwater from the Commercial AOC to the Residential Area.

## 4.4 SA-7 Perimeter Pools

The LTMP program includes monitoring of the hydraulic gradients across the subsurface containment barrier (SCB) around the perimeter of SA-7. This is accomplished through monitoring of the head in each of the ten "perimeter pools" and comparing these data to groundwater elevations in various shallow piezometers located just outside of the SCB. The location of the perimeter pools and the design pool elevations are shown on **Figure 4-10**. Water level trends are plotted on the hydrographs in **Appendix C** which indicate the average ground surface elevation, the design pool elevation, the measured pool elevation, and the groundwater elevation in the closest piezometer outside of the wall.

Overall, the data indicate that, with a few exceptions, water levels within the SA-7 pools are greater than those outside of the SCB and thus outward gradients are occurring. The exceptions include areas outside of pools N-3 and N-4 on Site 087, and a small portion of SA-6 South near pool S-3. As shown on **Table 4-3**, the annual average head in several of the outside monitoring wells in these areas was marginally above the pool elevation. A review of the trends in **Appendix C** reveals a direct correlation between rainfall and water level rise. This indicates that the permeability of the soil adjacent to the SA-7 barrier wall is relatively low and that the potential for groundwater to actually migrate through the wall is quite low. For example, using a nominal wall thickness of three feet, an inward head difference of one foot, as is the average case near pool N-3 (Table 4-3), a wall permeability of 1.0 x 10 -7 cm/s (0.00028 ft/d), and a porosity of 0.3, the velocity of water moving through wall is calculated at 0.00030 feet per day. The time required for water to pass through the wall under this scenario, therefore is calculated at 10,000 days or over 27 years.

Going forward, groundwater levels outside of the SA-7 SCB wall are expected to decline when the low permeability covers are installed in the open space areas for the SA-6 North and SA-6 South soil remedy/redevelopment. Groundwater modeling of this future scenario indicates that groundwater levels will be lowered to an elevation at or below +4.0 feet above mean sea level. If this is not the case, the contingent groundwater pumping systems will be available to lower water levels outside of the SA-7 barrier if

warranted. Groundwater levels outside of the SA-7 SCB will also be managed during construction activities though localized dewatering efforts such as those being implemented at SA-6 South.

## 4.5 SA-6 North Containment Cell

A groundwater elevation contour map specific to SA-6 North will be provided in future annual reports after the containment cell has been constructed. Hydraulic gradients across the wall(s) will be determined at the perimeter piezometer locations and compared to performance criteria.

## 4.6 SA-6 South Containment Cell

Shallow groundwater levels in SA-6 South were in a state of flux during the latter part of 2013 due to the initial construction of the soil containment cell barrier wall and dewatering for soil excavations. A groundwater elevation contour map specific to SA-6 South will be provided in future annual reports after the containment cell has been completed and steady state groundwater levels can be assessed. Hydraulic gradients across the wall(s) will be determined at the perimeter piezometer locations and compared to performance criteria.

## 4.7 SA-5 Site 117

Groundwater beneath Site 117 is generally from northeast to southwest as illustrated on **Figures 4-1** through **4-3**. In the Shallow zone, the sewers beneath Route 440 serve as a groundwater sink and limit the further movement of groundwater to the south and west. In both the Shallow and Intermediate zones, a component of groundwater in the northwestern corner of Site 117 is diverted to the northwest, passing between the SA-7 SCB and the NJCU sheet pile wall. The relatively low groundwater elevations in this area are caused by sewer systems that are actively dewatered by the Jersey City MUA. Groundwater in the Deep zone is also impacted to a degree by the SA-7 SCB with flow being partially diverted to the north and south.

## 4.8 Miscellaneous Events

### 4.8.1 Depressurization Pumping for Soil Excavation on SA-6 South

As noted in **Section 3.5**, groundwater pumping from below Stratum D began on the eastern portion of SA-6 South in October 2013. Pumping wells DW-1 and DW-2 were operated at approximately 10 gpm each and groundwater levels were monitored in adjacent monitoring wells screened in the Intermediate Zone. **Figure 4-11** is a hydrograph illustrating the decline in head due to pumping. Drawdown ranged from 2 to 3 feet, providing sufficient depressurization to allow the soil above Stratum D to be removed without uplift of the underlying soils.

# 5 GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring within the project area was conducted in 2013 in accordance with the GWET Long-Term Monitoring Plan (LTMP) and the other applicable area-specific monitoring plans as discussed in **Section 1.3** and listed on **Table 1-2**.

## 5.1 Deep Overburden Regional Plume Monitoring

In 2012 the frequency of regional monitoring of the Deep Overburden Plume changed from annual to biennial (every two years). The last sampling round was in December 2011 and thus the wells were resampled in December 2013. A total of 20 wells were identified for sampling as shown on **Table 5-1**. This list accounted for 7 wells that were sampled earlier in the year as part of the "L-well" sampling event (and thus did not need to be resampled in December), and 2 wells that were abandoned in accordance with the Monitoring Well Abandonment Plan(s) for SA-6 North and South.

During the December 2013 sampling round, the "Flute" mechanism in well KP-MW-6BR was found to be inoperative such that purging and sample collection was not feasible. It was also discovered that well 090-MW-18BR had been inadvertently abandoned (sealed) by a NJCU contractor during construction activities. Both bedrock wells in question were installed during the initial phase of an investigation to determine the horizontal extent of chromium in groundwater within the upper bedrock. The results of that investigation have since defined the limits of the plume and the direction of groundwater flow. The wells are now known to be upgradient of the original source area and therefore it is recommended (in **Section 7.3)** that both wells be deleted from the GWET long term monitoring plan.

A total of 25 monitoring wells and the three GWET extraction wells were sampled as part of this biennial event. The monitoring wells are screened in the Intermediate, Deep, and Upper Bedrock zones. Monitoring of the Shallow zone is not within the scope of the LTMP. The wells are generally located on the perimeter of the chromium plume in each layer to assess if the plumes have expanded in a horizontal direction since the last sampling event. Since the GWET system is designed to provide downgradient containment, there is no expectation of significant changes in the extent of the plume, nor in the distribution of chromium concentrations within the plumes. Thus, groundwater monitoring within the plumes is not incorporated into the LTMP. Groundwater quality data from this event are summarized in **Table 5-2** and are shown on **Figures 5-1 through 5-6**. Data from the previous rounds are shown on the figures for reference, as is the foot-print of the original plumes taken from the Final Groundwater Investigation Report (FGIR) [HydroQual, 2007].

### 5.1.1 Bedrock Zone

Hexavalent chromium and total chromium concentrations in unfiltered groundwater samples collected from the upper bedrock are shown on **Figures 5-1 and 5-2**, respectively. The data on **Figure 5-1** indicate that hexavalent chromium was not detected in any of the wells on this, or any of the four previous sampling dates. The data on **Figure 3-2** indicate that total chromium was also non-detect in each of the bedrock wells sampled during this round.

### 5.1.2 Intermediate Overburden Zone

Groundwater quality data from the Intermediate overburden water-bearing zone was monitored in 5 wells as shown on **Figures 5-3 and 5-4**. Other than the sample from 117-MW-I5, located near the former source area, hexavalent chromium was not detected above the reporting limit in any of the wells. Similarly, with the exception of 117-MW-I5, total chromium concentrations were reported below the NJGWQS of 0.07 ppm in each of the wells during this monitoring event. Both hexavalent and total chromium concentrations in well 117-MW-15 have trended downward from initial sampling rounds and for the past two rounds were in the range of 0.15 to 0.25 ppm. The minor detections of total chromium (below NJGWQC) during the previous events in well SA6-MW-AA1D were not repeated in 2013. Trace levels of total chromium (0.013 ppm) were detected for a second time in the history of well 117-MW-I1.

### 5.1.3 Deep Overburden Zone

Groundwater quality data from the Deep overburden water-bearing zone is provided on **Figures 5-5 and 5-6**. Hexavalent chromium (**Figure 5-5**) was detected in three of the twelve wells monitored under this program including well 115-MW-E08TR which is located within the deep overburden plume. The other wells include 124-MW-104T which reported a hexavalent chromium concentration of 0.066 ppm that is slightly higher, but generally on par with previous results. Well 124-MW-102T had a reported concentration of 0.032 ppm during this event which was also was slightly higher but on par with the previous event. Concentrations in both of these wells are below the NJGWQC of 0.07 ppm. These results confirm that hexavalent chromium within the plume diversion area has not expanded due to the construction of the SA-7 perimeter cutoff wall.

Total chromium was reported above reporting limits in five of the 12 wells as shown on F**igure 5-6.** Concentrations were generally similar to those measured in prior rounds with no significant trends noted. The observed variability from event to event is likely due to the presence of trivalent chromium sorbed onto soil particles that become dislodged from the well during sampling and impact the non-filtered sample.

## 5.2 GWET Extraction Wells

Groundwater from the three GWET pumping wells was sampled quarterly in 2013 as shown in **Table 5-3**. Samples were analyzed for total and hexavalent chromium and volatile organic chemicals (VOC). The results for hexavalent chromium are plotted on **Figure 5-7** and indicate that concentrations in the Deep zone (PW-1) have declined in an asymptotic fashion to their current level of approximately 40 ppm. Concentrations in the Intermediate zone (PW-2) have also declined by about 50% in the last three years. The observed slow decline in concentration is likely due to cleaner water being pulled into the pumping wells as the capture zone establishes itself. The cleaner water originates at the margins of the capture zone, including beneath the river, as the plume is pulled back. Hexavalent chromium concentrations in the bedrock have been generally stable at approximately 15 to 16 ppm. There is no indication that the CaSx injections have impacted chromium concentrations in the GWET wells in 2013.

VOC data from the pumping wells are provided in **Table 5-3**. With the exception of carbon tetrachloride and on one occasion chloroform and trichloroethene (laboratory estimated values), VOCs have not been detected in the bedrock pumping well. Deep overburden pumping well PW-1 contains the highest VOC concentrations with the most prevalent compounds being chlorinated volatile organics such as trichloroethene (TCE) and its daughter products cis- and trans-dichloroethene and vinyl chloride. These same constituents were detected in the Intermediate zone pumping well PW-2 albeit at lower concentrations. Benzene was also detected in relatively low concentrations in PW-1 and PW-2 samples.

**Figure 5-8** illustrates a time-series plot of TCE in each of the GWET pumping wells. The data indicate that concentrations in both PW-1 and PW-2 are in the 50 to 150 ppb range and are continuing to decline slowly. As previously reported, the source of the VOCs in the groundwater is not related to Honeywell.

## 5.3 SA-6 South

No groundwater quality sampling was conducted on SA-6 South with the exception of the L-well sampling program discussed in **Section 5.6**.

## 5.4 SA-6 North

No chromium groundwater quality sampling was conducted on SA-6 North in 2013 with the exception of S-3 Sand Injection program discussed in **Section 6.**

## 5.5 New Jersey City University

Groundwater samples were collected quarterly in 2013 from the three “sentinel” wells at NJCU. Well 184-MW-06 could not be accessed for sample collection during the second

quarter due to site development activities. The objective of the monitoring program is to provide early warning of potential chromium migration in groundwater from the Commercial AOC (in the southwest corner of Site 90) to the Residential Area to the north. The results are provided on **Figure 5-9** and indicate that hexavalent chromium was not detected above the reporting limit of 5.5 ppb in any of the samples from wells 184-MW-04 or 184-MW-05 during 2013. However, in the June 2013 sampling round, hexavalent chromium was reported at the reporting limit of 5.5 ppb in 184-MW-04 and 184-MW-05. Subsequent sampling rounds in September and December 2013 did not confirm the presence of hexavalent chromium within the residential area and thus no remedial actions were warranted.

Hexavalent chromium was reported above the reporting limit (but below 70 ppb) in 184-MW-06 during each round in 2013 at concentrations comparable with previous results. This well is located upgradient of the Commercial AOC and thus these results are not unexpected. Total chromium was detected at 70.1 ppb in the first quarterly round in the unfiltered sample from this well; however, each of the filtered samples collected in 2013 was below the NJGWQC of 70 ppb.

Total chromium was not detected above 70 ppb in well 184-MW-04 in either the filtered or unfiltered samples, with the exception of the first quarter duplicate that indicated a concentration of 900 ppb in the unfiltered sample. The filtered duplicate sample reported total chromium at less than the detection limit of 40 ppb. These highly variable results are likely due to differences in turbidity and serves to underscore that trivalent chromium can sorb onto particulates within the sample and be reported in the total chromium result.

## 5.6 Plume Diversion Area Monitoring

In accordance with the "L-well" monitoring plan, the following wells in the Plume Diversion Area of SA-6 South were sampled in May 2013 to provide a pre-remedy baseline. These locations will be sampled a second time after the remedy is complete to evaluate if the deep plume in this area has shifted position due to the installation of the soil containment cell. In accordance with the Monitoring Well Abandonment Plan, many of these wells have since been abandoned and will either be replaced or sampled using a GeoProbe through the cap.

| | |
|---|---|
| 124-MW-106T | 124-MW-103L |
| 124-MW-107T | 124-MW-104T |
| 124-MW-G02T | 124-MW-104L |
| 119-MW-01T | 124-MW-105T |
| 119-MW-02T | 124-MW-102T |

Data for hexavalent chromium in unfiltered samples are shown on **Figure 5-10**. The original hexavalent chromium concentration contours from the 2007 FGIR are shown on the basemap for reference. The May 2013 data indicate that the magnitude and general shape and position of this area has not changed during the past 5 years.

## 5.7 SA-5 Site 117

Groundwater sampling for water quality analysis was not conducted at Site 117 in 2013.

## 5.8 SA-5 Sites 079/153

Groundwater sampling for water quality analysis was not conducted at Sites 079 or 153 in 2013.

# 6 S-3 INJECTION AND MASS REMOVAL PROGRAM

The S-3 Injection and Mass Removal program was initiated in 2012 and involves the injection of calcium polysulfide (CaSx) into the S-3 Sand beneath the project area in general accordance with the Operations Work Plan for In-Situ Chromium Mass Removal (Cornerstone, February 20, 2012). Changes to the plan, including both the location of the injection wells and the sequence of injection events, have taken place (in consultation with Plaintiffs' representatives) since the plan's inception. In April 2013, a subsurface investigation was conducted to identify a suitable location for an injection well east of Route 440 as required by the Mass Removal Consent Decree (May 2010). The investigation consisted of the advancement of three soil borings on Site 153 along the eastern side of Route 440. Soil samples retrieved from these borings indicated that the S-3 Sand is not present east of Route 440 and thus an injection well was not installed. Based on these results the requirement for injection east of Route 440 has been removed from the aforementioned Consent Decree and a new injection well (088-IW-03) was constructed west of Route 440 on the JCIA property. The well is screened in the S-3 Sand formation and was used for injections in 2013 along with wells 088-IW-01 and 088-IW-02. A well-construction diagram for this new injection well is provided in Appendix D.

## 6.1 CaSx Injection Events in 2013

Six CaSx injection events were conducted in 2013 as summarized on **Table 6-1**. Three injection wells (088-IW-01, 088-IW-02, and 088-IW-03) were used as shown on **Figure 6-1**. During each event approximately 4,000 to 4,300 gallons of CaSx was injected into the S-3 Sand formation during an 8-hour period. The actual volume varied from event to event and was based on the maximum volume that could be transported in a single tanker truck within DOT weight limitations. As shown on **Table 6-1**, a combination of gravity flow and slight pressurization of the tanker was used to off-load the material at rates ranging from 6 to 12 gpm.

During the second and third day of each event, clean water was injected into the well to aid flushing of the CaSx. The total volume of water used was approximately twice the volume of CaSx injected (8,000 to 9,000 gallons). The water was obtained from a MUA fire hydrant and the injection rates generally ranged from 10 to 12 gpm.

## 6.2 Mass Removal Summary

In accordance with the Operations Work Plan, three replicate samples from each batch were used to determine the sulfide content of the material. The geometric mean of these

data was then calculated as shown on **Table 6-2,** and used to estimate the mass of hexavalent chromium stochiometrically equivalent to the injected volume of CaSx. This calculation was conducted in accordance with the chemical reactions provided in Appendix C of the Operations Work Plan. As shown on **Table 6-3**, the stoichiometric equivalent mass reduced per event in 2013 ranged from 0.96 tons to 1.28 tons with an average of 1.14 tons per event. To date, the stoichiometric equivalent of approximately 13.5 tons of hexavalent chromium have been treated leaving 36.5 tons remaining in the program. **Figure 6-2** provides a graph of the cumulative mass treated to date

For comparison, the mass of hexavalent chromium removed from the Deep Overburden Plume through historic pumping has also been calculated. As shown on **Figure 6-3**, historic pumping includes operation of the two depressurization wells, 115-DP-1 and 115-DP-2 during the SA-7 soil excavation remedy, and the GWET system pumping that has been ongoing since December 2008. The mass removed was calculated by multiplying the pumping rate of each well by the hexavalent chromium concentration of the discharge. Values for both parameters were determined on a monthly basis from historic records. The results indicate that over 74 tons of hexavalent chromium have been removed through groundwater extraction through the end of 2013.

## 6.3 Groundwater Quality Monitoring

Groundwater monitoring of injection wells and monitoring wells was conducted in accordance with the Operations Work Plan. Injection wells were sampled several days prior to each injection event, whereas monitoring wells were sampled semi-annually.

### 6.3.1 Monitoring Well Sampling.

Data from sampling of monitoring wells associated with the S-3 Sand Injection program are provided on **Tables A-1 through A-10** in **Appendix A** and further discussed below.

**Well 090-MW-09:** Monitoring well 090-MW-09 was originally identified to monitor downgradient impacts from injections east of Route 440. However, since injections have not, and will not, be conducted east of Route 440, it has been recommended (**Section 7**) that this well be deleted from the monitoring program. As would be expected, data from this well to date indicate generally consistent concentrations.

**Well 088-MW-G19T:** This well is located approximately 400 feet downgradient of injection well 088-IW-01 on the former JCIA property. Parameters used to indicate the presence of the CaSx reductant, such as ORP, calcium, and pH, were relatively consistent throughout the reporting period in this well. Hexavalent chromium concentrations increased steadily from 777 ppm in the baseline round to 1,230 ppm in December 2013.

This may be the result of a slight shift in groundwater flow direction within the plume possibly due to the hydraulic mounding associated with the injections to date.

**Well 087-MW-29D:** Parameters used to indicate the presence of the CaSx reductant, such as ORP, calcium, and pH, were consistent throughout the reporting period in this well. Hexavalent chromium concentrations were also generally consistent ranging from 177 ppm to 235 ppm without a trend.

**Well 115-DP-1:** This is a former depressurization well located approximately 25 feet upgradient from 115-PW-21. (Well 115-PW-21 was used as a temporary injection well on August 20, 2012.) Hexavalent chromium concentrations are shown on **Table A-2** and declined by an order of magnitude from the baseline value of 389 ppm in May 2012 to 39.3 ppm in December 2012, approximately four months after the injection in 115-PW-21. This decline was likely due to the nearby CaSx injection since the ORP also declined from a baseline of +276 mV to -153 mV.

Hexavalent chromium concentrations then rebounded to 1,470 ppm in June 2013 along with a rise in OPR to +340 mV. The most recent results in December 2013 indicated a decline in hexavalent chromium to 19 ppm along with a positive ORP value of +181 mV. These variable post-injection results may be due to the influence of groundwater within the overlying S-2 formation since well 115-DP-1 has a 25-foot long screen which extends approximately 20 feet above the top of the S-3 Sand.

**GWET Wells:** Hexavalent chromium concentrations in extraction wells 087-PW-1 and PW-2 were generally consistent with the long-term downward trend as shown on **Figure 5-7**. Sulfate, calcium, and iron concentrations were also consistent indicating that impacts from the CaSx injections have not yet reached these wells.

### 6.3.2 Injection Well Sampling.

Sampling of the injection wells was conducted to assess how long the reductant remains in the groundwater at the point of contact. In general, injection wells were sampled once prior to the first injection event and then just prior to each injection event as shown on **Tables B-1 through B-10** in **Appendix B**.

Pre-injection hexavalent chromium concentrations in injection wells 088-IW-1, 088-IW-02 and 088-IW-03 ranged from 72 ppm to 536 ppm. Post-injection concentrations in each well were non-detect indicating a complete reduction of hexavalent to trivalent chromium. The presence of significant concentrations of total chromium in unfiltered samples (in some cases greater than 1 mg/L) is further evidence of the presence of trivalent chromium produced via hexavalent chromium reduction. The fact that hexavalent chromium concentrations did not rebound between injections is likely due to

the establishment of a reductive zone around the well. This zone is capable of treating hexavalent chromium in groundwater that moves into the area from upgradient.

Calcium concentrations rose sharply after each injection and in all injection wells. Increases ranged from approximately double to over two orders of magnitude. In each case, the post-injection spike was followed by a steady decline in concentrations prior to the subsequent injection.

Indicator parameters measured in the field include pH, specific conductivity, dissolved oxygen, ORP, and turbidity. These data are shown on **Tables B-6 through B-10**. Of these, ORP appears to be the most reliable indicator of the presence of CaSx (reducing conditions) in groundwater. ORP values typically declined from several hundred mV to less than (minus) -400 mV. Groundwater pH is also a reasonably good indicator since the injected calcium polysulfide has a pH of between 11 and 12. Thus, an increase in pH provides a qualitative indication of calcium polysulfide influence at a specific location. Both ORP and pH indicate that reducing conditions have been established around each of the injection wells and that these conditions will persist for some time, facilitating the reduction of additional hexavalent chromium in groundwater moving into the region from upgradient.

## 6.4 Planned Activities for 2014

In accordance with the Operations Work Plan, the goal for 2014 will be to inject sufficient reductant in the S-3 Sand to reduce the stoichiometric equivalent of 10 tons of hexavalent chromium. Based on the results from 2013, this will require eight injection events throughout the year.

# 7 CONCLUSIONS AND RECOMMENDATIONS

## 7.1 Compliance with Monitoring Requirements

Hydraulic and groundwater quality monitoring conducted in 2013 have fulfilled the various monitoring plan requirements in accordance with **Tables 1-1 and 1-2**.

## 7.2 Status of Groundwater CEA Certifications

Groundwater Classification Exception Areas were approved by NJDEP on February 16, 2012 for the three principle water bearing zones in the Project Area (Shallow Zone, Deep Overburden, and Bedrock). In 2013, NJDEP notified Honeywell that CEA biennial certifications are not due until the applicable Groundwater Remediation Permits are issued.

## 7.3 Recommendations for Monitoring Well Network

As discussed in **Section 5.1,** it is recommended that bedrock monitoring wells KP-MW-6BR and 090-MW-18BR be deleted from the LTMP. These wells are located upgradient of the bedrock plume which has been well defined by prior investigations. It is also recommended that monitoring well 090-MW-09 be deleted from the S-3 Sand Injection/Mass Removal program as discussed in **Section 6.3.1.** This well is located east of Route 440 where recent investigations have shown that the S-3 Sand is not present. Finally, it is recommended that the abandonment and replacement of selected groundwater monitoring wells be conducted in accordance with the Well Abandonment Plans for SA-6 North and South, and the "L-well" Monitoring Plan.

## 7.4 Recommendations for Water Level Monitoring Frequency

Groundwater level monitoring will be conducted in accordance with the frequencies specified in the various hydraulic monitoring plans as summarized in **Table 1-1**. There are no recommended changes to these frequencies at this time.

## 7.5 Recommendations for Groundwater Quality Monitoring Frequency

The frequency of groundwater quality monitoring, well selection, and parameters for analysis are established in the monitoring plans for the various sub-areas. There are no proposed changes to these documents at this time. The next regional sampling event of the deep overburden plume is scheduled for December 2015. Recommendations regarding the frequency of LTMP events beyond 2015 will be considered based on those results.

## 7.6 Other Recommendations

There are no other recommendations regarding groundwater performance or monitoring in the Project Area at this time.

# LIMITATIONS

The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product.

# TABLES

# TABLE 1-1
# GROUNDWATER LEVEL MONITORING REQUIREMENTS
# for Integrated Groundwater Monitoring Plan

| Location | Monitoring Plan | Consent Decree | Depth | Frequency | # Wells | 2013 Activity or Estimated Start Date |
|---|---|---|---|---|---|---|
| Regional[1] | GWET Long Term Monitoring Plan June 10, 2008 | Deep Overburden and Bedrock Groundwater Remedies Consent Order | All Zones | Quarterly | 150 | On-going |
| Study Area 7 | SA-7 Perimeter Pools | Final Judgement, ICO v Honeywell | Shallow and Interm. | Monthly | 30 | On-going |
| SA-6 South | SA-6 South GW Level Monitoring Plan Appendix J of SA-6 South 100% Design June 28, 2013 | First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South | Shallow and Interm. | 1st year - Monthly<br>2nd year - Quarterly<br>3rd year -Semi-Annual | 13 | Post Remedy (2017) |
| SA-6 North | SA-6 North GW Level Monitoring Plan Appendix J of SA-6 North 100% Design June 28, 2013 | First Amended Consent Decree Regarding Remediation and Redevelopment of Study Area 6 North | Shallow and Interm. | 1st year - Monthly<br>2nd year - Quarterly<br>3rd year -Semi-Annual | 13 | Post Remedy (2017) |
| Study Area 6 N&S | "Long Term Monitoring Plan" Due October 1, 2015 | Same Consent Decrees as Above for SA-6 South and SA-6 North | Shallow | Quarterly | TBD | Post Remedy (2017) |
| SA-5 (NJCU) Sites 90 & 184 | Long Term Monitoring Plan (2/29/12)[2] | Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area | Shallow | Quarterly through 2013<br>future TBD[2] | 7 | On-going |
| SA-5: Site 079 | "Long Term Monitoring Plan" (9/07/11)[3] | Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties | Shallow | March 2014 then Annual | 2 | On-going |
| SA-5: Site153 South | Remedial Action Permit for GW[4] | Consent Decree Regarding Sites 79 and 153 South | Shallow | Annual | 2 | 2015 |
| SA-5 Site 117 | Remedial Action Permit for GW[4] | Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties | Shallow | Annual | 7 | 2015 |

[1] Includes available wells on SA-5, SA-6, SA-7, and surrounding areas historically considered part of the Deep Overburden Plume investigation..

[2]Post-remedy triggers plan under NJCU Consent Decree; plan expected to be updated 1st quarter 2014; future monitoring frequency TBD pending updated LTMP

[3]Plan currently being updated

[4]Remedial Action Permit application in progress

# TABLE 1-2
# GROUNDWATER QUALITY MONITORING REQUIREMENTS
# for Integrated Groundwater Monitoring Plan

| Location | Monitoring Plan | Consent Decree | Depth | Frequency | # Wells | 2013 Activity or Estimated Start Date |
|---|---|---|---|---|---|---|
| Regional | GWET Long Term Monitoring Plan June 10, 2008 | Deep Overburden and Bedrock Groundwater Remedies Consent Order | Shallow<br>Intermediate<br>Deep<br>Bedrock | Biennial<br>Biennial<br>Biennial<br>Biennial | 0<br>6<br>12<br>10 | <br>Dec. 2013<br>future events TBD<br> |
| Regional | S-3 Injection Mass Removal Operations Work Plan Final Feb. 28, 2012 | Deep Overburden and Bedrock Groundwater Mass Removal Consent Decree, May 18, 2010 | Deep | Every injection event<br>Semi-annual Sampling | 3<br>6 | On-going (8 events) |
| SA-6 South | SA-6 South Development AOC Appendix D of SA-6 South 100% Design Report June 28, 2013 | First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South | Shallow | Qtly first year[1] | 12 | Post Remedy (2017)[2] |
| SA-6 South | L-zone Wells (Plume Diversion Area) Appendix E of SA-6 South 100% Design June 28, 2013 | First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South | Deep | Pre-Remedy Baseline<br>Post Remedy | 12*<br>12* | Completed May 2013<br>Post Remedy (2017) |
| SA-5 (NJCU) Sites 90 & 184 | Long Term Monitoring Plan (2/29/12)[3] | Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area | Shallow | Years 1 and 2 - Quarterly<br>Year 3 + TBD | 3 | On-going |
| SA-5 Site 117 | Remedial Action Permit for GW (in progress) | Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties | Shallow | Biennial[2] | 7 | 2015 |
| SA-5: Site 079 | Long Term Monitoring Plan[2] | Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties | Shallow | Once 2014 then TBD[4] | 2 | 2014 |
| SA-5: Site153 South | Remedial Action Permit for GW (in progress) | Consent Decree Regarding Sites 79 and 153 South | Shallow | Biennial[2] | 2 | 2015 |

* Number and location of wells subject to field conditions during and after remedy construction.
Biennial = every two years
[1]Monitoring begins 12 months after construction is complete
[2]Revised/updated LTMP(in progress).
[3]Post-remedy triggers plan under NJCU Consent Decree; plan expected to be updated 1st quarter 2014; future monitoring frequency TBD pending updated LTMP
[4]TBD based on water level monitoring data per LTMP

# Table 2-1
# 2013 Monthly Precipitation Data

| Month | 2013 Precipitation | Average Precipitation |
|---|---|---|
| January | 2.49 | 3.98 |
| February | 3.85 | 2.96 |
| March | 3 | 4.21 |
| April | 1.47 | 3.92 |
| May | 5.44 | 4.46 |
| June | 8.74 | 3.4 |
| July | 3.74 | 4.68 |
| August | 4.57 | 4.02 |
| September | 1.54 | 4.01 |
| October | 0.51 | 3.16 |
| November | 2.97 | 3.88 |
| December | 4.62 | 3.57 |
| Annual Total | 42.94 | 46.25 |

Data Source: http://www.nc-climate.ncsu.edu/cronos/?station=286026&temporal=monthly
Station name: Newark International Airport
Station ID: 286026

**Table 2-2**
**Groundwater Monitoring Well Inventory**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Comments |
|---|---|---|---|---|---|
| | | (ft msl) | (ft) | (ft) | |
| 073-MW-5 | Shallow | 6.81 | 15 | 13 | |
| 073-MW-BB11 | Shallow | 7.87 | 13 | 10 | Abandonded Feb. 2014 for soil excavation |
| 073-MW-Y10 | Shallow | 6.42 | 13 | 10 | |
| 073-PZ-001 | Shallow | 7.24 | 13 | 5 | |
| 079-MW-01 | Shallow | 8.80 | NA | NA | |
| 079-MW-A2 | Shallow | 8.10 | 13 | 10 | |
| 079-MW-C6 | Shallow | 11.00 | 13 | 10 | |
| 087-MW-001 | Shallow | 12.67 | 15 | 13 | |
| 087-MW-101 | Shallow | 12.21 | 12 | NA | |
| 087-MW-102 | Shallow | 11.65 | 13 | NA | |
| 087-MW-119 | Shallow | 12.97 | 11 | NA | |
| 087-MW-120 | Shallow | 12.30 | 11 | NA | |
| 087-MW-121 | Shallow | 11.76 | 12 | NA | |
| 087-MW-A26 | Shallow | 10.10 | 13 | 10 | |
| 087-MW-I30 | Shallow | 10.86 | 14 | 10 | |
| 087-MW-O19 | Shallow | 13.50 | 13 | 10 | Abandonded Feb. 2014 for soil excavation |
| 087-MW-O23 | Shallow | 11.79 | 13 | 10 | |
| 087-MW-O29 | Shallow | 10.08 | 14 | 10 | |
| 087-MW-S19 | Shallow | 14.47 | 14 | 10 | |
| 087-MW-U28 | Shallow | 14.08 | 16 | 10 | |
| 087-MW-W25 | Shallow | 18.26 | 18 | 10 | |
| 087-MW-Y20 | Shallow | 19.06 | 20 | 10 | Abandonded Feb. 2014 for soil excavation |
| 087-PZ-001 | Shallow | 17.50 | 18 | 5 | Abandonded Feb. 2014 for soil excavation |
| 087-PZ-003 | Shallow | 13.10 | 18 | 5 | |
| 087-PZ-005 | Shallow | 14.92 | 20 | 5 | Abandonded Feb. 2014 for soil excavation |
| 088-MW-001 | Shallow | 9.34 | 15 | 13 | Abandonded Feb. 2014 for soil excavation |
| 088-MW-002 | Shallow | 12.81 | 15 | 13 | |
| 088-MW-101 | Shallow | 11.56 | 12 | NA | |
| 088-MW-102 | Shallow | 17.54 | 19 | NA | |
| 088-MW-103 | Shallow | 11.44 | 35 | NA | |
| 088-PZ-001 | Shallow | 10.67 | 12 | 5 | |
| 088-PZ-003 | Shallow | 12.07 | 15 | 5 | |
| 090-MW-F14 | Shallow | 20.50 | 15 | 10 | Abandoned for NJCU Development |
| 090-PZ-05 | Shallow | 17.20 | NA | NA | |
| 090-PZ-06 | Shallow | 17.60 | NA | NA | |
| 115-E1-SO | Shallow | 7.42 | 6.95 | NA | |
| 115-E2-SO | Shallow | 10.05 | 10 | NA | |
| 115-E3-SO | Shallow | 12.57 | NA | NA | |
| 115-E5-SO | Shallow | NA | NA | NA | |
| 115-W1-SO | Shallow | 12.59 | NA | NA | |
| 115-W3-SO | Shallow | NA | 13.93 | NA | |
| 115-W5-SO | Shallow | 12.43 | NA | NA | |
| 117-MW-A05 | Shallow | 18.48 | 16 | NA | |
| 117-MW-A14 | Shallow | 17.33 | 17 | NA | |
| 117-MW-A62 | Shallow | 18.32 | 15 | NA | |
| 117-MW-A85 | Shallow | 17.40 | 15 | NA | |

**Table 2-2**
**Groundwater Monitoring Well Inventory**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Comments |
|---|---|---|---|---|---|
| | | (ft msl) | (ft) | (ft) | |
| 117-MW-A89 | Shallow | 13.17 | 16 | NA | |
| 117-MW-A99 | Shallow | 15.95 | 14 | NA | |
| 117-MW-I4S | Shallow | 15.49 | NA | NA | |
| 124-MW-02 | Shallow | 9.00 | 9.34 | NA | Abandonded Oct. 2013 for soil excavation |
| 124-MW-07 | Shallow | NA | NA | NA | Abandonded Oct. 2013 for soil excavation |
| 124-MW-09 | Shallow | NA | NA | NA | Abandonded Oct. 2013 for soil excavation |
| 124-MW-10 | Shallow | 10.06 | 11 | 8 | |
| 124-MW-11 | Shallow | 9.05 | 8 | 6 | |
| 125-MW-01 | Shallow | 8.71 | NA | NA | Abandonded Feb. 2014 for soil excavation |
| 125-PZ-001 | Shallow | 9.50 | 13 | 5 | Abandonded Feb. 2014 for soil excavation |
| 125-PZ-003 | Shallow | 8.89 | 8.5 | 5 | Abandonded Feb. 2014 for soil excavation |
| 134-MW-2 | Shallow | 7.36 | 10 | 9 | |
| 134-MW-Q08 | Shallow | 8.37 | 13 | 10 | Abandonded Feb. 2014 for soil excavation |
| 134-MW-V09 | Shallow | 7.98 | 13 | 10 | |
| 134-PZ-001 | Shallow | 7.47 | 16 | 5 | Abandonded Feb. 2014 for soil excavation |
| 134-PZ-003 | Shallow | 8.34 | 13 | 5 | |
| 140-MW-04 | Shallow | 7.18 | NA | NA | |
| 140-MW-06 | Shallow | 8.33 | 6 | NA | |
| 140-MW-07 | Shallow | 7.70 | 6 | NA | |
| 140-MW-08 | Shallow | 8.13 | 10 | 8 | |
| 140-MW-1R | Shallow | 7.61 | 11 | NA | |
| 140-PZ-001 | Shallow | 8.29 | 11.5 | 5 | Abandonded Feb. 2014 for soil excavation |
| 153-MW-02 | Shallow | NA | NA | NA | |
| 153-MW-05 | Shallow | NA | NA | NA | |
| 153-MW-A13 | Shallow | 9.62 | 10 | 6 | |
| 153-MW-A15 | Shallow | 11.00 | 12.15 | 10 | |
| 154-MW-A01 | Shallow | 18.06 | 14.61 | NA | |
| 154-MW-A06 | Shallow | 19.87 | 15.12 | NA | |
| 154-MW-A5A | Shallow | 19.16 | 14 | NA | |
| 154-MW-B6A | Shallow | 20.71 | 13.68 | NA | |
| 154-MW-C6A | Shallow | 20.37 | 13.41 | NA | |
| 154-MW-D01 | Shallow | 18.78 | 14.28 | NA | |
| 154-MW-E08 | Shallow | 22.00 | 14.4 | NA | |
| 163-MW-R05 | Shallow | 7.22 | NA | NA | Abandonded Feb. 2014 for soil excavation |
| 184-MW-001 | Shallow | 12.09 | 12 | 10 | |
| 184-MW-C10 | Shallow | 15.20 | 16 | 10 | Abandoned for NJCU Development |
| 184-MW-04 | Shallow | 8.74 | NA | NA | |
| 184-MW-05 | Shallow | 17.18 | NA | NA | |
| 184-MW-06 | Shallow | 19.20 | NA | NA | |
| SA6-MW-AA1 | Shallow | 17.80 | 15 | 10 | |
| Sump A | Shallow | 15.95 | NA | NA | |
| Sump B | Shallow | 14.71 | NA | NA | |
| 073-PZ-002 | Intermediate | 7.26 | 26.5 | 5 | |
| 087-MW-13 | Intermediate | 12.93 | 40 | 10 | |
| 087-MW-35 | Intermediate | 18.29 | 40 | 10 | |
| 087-MW-A26D | Intermediate | 10.35 | 28 | 10 | |
| 087-MW-O29D | Intermediate | 10.32 | 56 | NA | |
| 087-MW-W25D | Intermediate | 18.17 | 66 | 10 | |
| 087-OBS-1D | Intermediate | 15.13 | 42.8 | NA | |

**Table 2-2**
**Groundwater Monitoring Well Inventory**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Comments |
|---|---|---|---|---|---|
| | | (ft msl) | (ft) | (ft) | |
| 087-OBS-2D | Intermediate | 12.68 | NA | NA | |
| 087-OBS-5D | Intermediate | 12.72 | 39.83 | NA | |
| 087-OBS-6D | Intermediate | 11.24 | NA | NA | |
| 087-PW-2 | Intermediate | 13.02 | NA | NA | |
| 087-PZ-002 | Intermediate | 17.44 | 36 | 5 | Abandonded Feb. 2014 for soil excavation |
| 087-PZ-004 | Intermediate | 13.18 | 29 | 5 | |
| 087-PZ-006 | Intermediate | 15.06 | 36 | 5 | Abandonded Feb. 2014 for soil excavation |
| 088-MW-15 | Intermediate | 12.09 | 35 | 10 | |
| 088-PZ-002 | Intermediate | 10.56 | 25 | 5 | |
| 088-PZ-004 | Intermediate | 12.05 | 27 | 5 | |
| 090-MW-07 | Intermediate | 14.00 | 40 | 10 | |
| 115-E1-DI | Intermediate | 16.72 | 44.85 | NA | |
| 115-E1-DO | Intermediate | 9.21 | 37.11 | NA | |
| 115-E2-DO | Intermediate | 10.24 | 35 | NA | |
| 115-E3-DO | Intermediate | 12.39 | 34 | NA | |
| 115-E4-DO | Intermediate | 17.87 | NA | NA | |
| 115-E5-DO | Intermediate | 15.72 | NA | NA | |
| 115-E6-DI | Intermediate | 19.89 | 48.35 | NA | |
| 115-E6-DO | Intermediate | 19.74 | 51.1 | NA | |
| 115-MW-20 | Intermediate | 14.19 | NA | NA | |
| 115-MW-E14D | Intermediate | 18.05 | 35 | 10 | |
| 115-W1-DO | Intermediate | 12.63 | NA | NA | |
| 115-W4-DO | Intermediate | 8.79 | 41.22 | NA | |
| 117-MW-I1 | Intermediate | 11.08 | 22 | 10 | |
| 117-MW-I2 | Intermediate | 17.59 | 28 | 10 | |
| 117-MW-I3 | Intermediate | 15.59 | 28 | 10 | |
| 117-MW-I5 | Intermediate | 18.76 | 37 | 15 | |
| 124-MW-102D | Intermediate | 9.38 | 30 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-103D | Intermediate | 9.58 | 29 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-104D | Intermediate | 9.08 | 26 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-105D | Intermediate | 9.63 | 24 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-G02D | Intermediate | 9.59 | 28 | 10 | |
| 125-PZ-002 | Intermediate | 9.31 | 26 | 5 | Abandonded Feb. 2014 for soil excavation |
| 125-PZ-004 | Intermediate | 8.93 | 25 | 5 | Abandonded Feb. 2014 for soil excavation |
| 134-PZ-002 | Intermediate | 7.81 | 26.5 | 5 | |
| 134-PZ-004 | Intermediate | 8.22 | 26.5 | 5 | |
| 140-MW-P05D | Intermediate | 7.44 | 30 | 10 | |
| 140-PZ-002 | Intermediate | 8.08 | 25 | 5 | Abandonded Feb. 2014 for soil excavation |
| SA6-MW-AA1D | Intermediate | 19.36 | 32 | 10 | |
| 087-MW-01 | Deep | 12.80 | 60 | 10 | |
| 087-MW-03 | Deep | 13.77 | 95 | 10 | |
| 087-MW-08 | Deep | 12.98 | 99 | 10 | |
| 087-MW-34 | Deep | 12.73 | 70 | 5 | |
| 087-MW-A26T | Deep | 9.92 | 56 | 15 | |
| 087-MW-W25T | Deep | 18.19 | 91 | 15 | |
| 087-OBS-1L | Deep | 15.27 | 67.05 | NA | |
| 087-OBS-1T | Deep | 15.23 | 100 | NA | |
| 087-OBS-3L | Deep | 12.88 | 65 | NA | |
| 087-OBS-4T | Deep | 11.60 | 75.5 | NA | |

**Table 2-2**
**Groundwater Monitoring Well Inventory**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Comments |
|---|---|---|---|---|---|
| | | (ft msl) | (ft) | (ft) | |
| 087-OBS-5T | Deep | 12.62 | 81.9 | NA | |
| 087-PW-1 | Deep | 12.66 | NA | NA | |
| 088-MW-G19T | Deep | 12.45 | 93 | 15 | |
| 088-IW-01 | Deep | 11.57 | NA | NA | |
| 088-IW-02 | Deep | 16.32 | NA | NA | |
| 088-IW-03 | Deep | 12.56 | NA | NA | |
| 090-MW-09 | Deep | 10.70 | 75 | 5 | |
| 115-MW-A12T | Deep | 15.55 | NA | NA | |
| 115-MW-E14T | Deep | 21.33 | 71 | 15 | |
| 115-OMW-E08TR | Deep | 16.82 | NA | NA | |
| 115-PW-21 | Deep | 15.13 | 71 | 10 | |
| 117-MW-D1 | Deep | 11.08 | 41 | 10 | |
| 117-MW-D2 | Deep | 17.62 | 48 | 10 | |
| 117-MW-D3 | Deep | 18.85 | 80 | 10 | |
| 117-MW-I4 | Deep | 15.49 | 75 | 10 | |
| 119-MW-01T | Deep | 10.78 | 62 | 10 | |
| 119-MW-02T | Deep | 8.80 | 70 | 10 | |
| 124-MW-06 | Deep | 9.39 | 70 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-102T | Deep | 9.33 | 75 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-103L | Deep | 9.77 | 110 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-104L | Deep | 9.22 | 43 | 10 | |
| 124-MW-104T | Deep | 9.31 | 67 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-105T | Deep | 9.33 | 62 | 10 | |
| 124-MW-106T | Deep | 9.28 | 78 | 10 | |
| 124-MW-107T | Deep | 9.08 | 70 | 10 | Abandonded Oct. 2013 for soil excavation |
| 124-MW-G02T | Deep | 9.50 | 69 | 10 | |
| 153-MW-A13T | Deep | 9.34 | 58 | 15 | |
| SA6-MW-AA1T | Deep | 15.31 | 70 | 10 | |
| 073-MW-10BR-1 | Rock | 6.67 | 155 | 10 | |
| 073-MW-10BR-2 | Rock | 6.67 | 170 | 10 | |
| 073-MW-10BR-3 | Rock | 6.67 | 195 | 15 | |
| 073-MW-10BR-4 | Rock | 6.67 | 227 | 15 | |
| 073-MW-10BR-5 | Rock | 6.67 | 327 | 15 | |
| 073-MW-1BR-1 | Rock | 7.58 | 144 | 15 | |
| 073-MW-1BR-2 | Rock | 7.58 | 209 | 15 | |
| 073-MW-1BR-3 | Rock | 7.58 | 264 | 15 | |
| 073-MW-1BR-4 | Rock | 7.58 | 295 | 15 | |
| 073-MW-1BR-5 | Rock | 7.58 | 329 | 15 | |
| 079-MW-13BR-1 | Rock | 13.08 | 121 | 10 | |
| 079-MW-13BR-2 | Rock | 13.08 | 214 | 15 | |
| 079-MW-13BR-3 | Rock | 13.08 | 284 | 15 | |
| 087-MW-14 | Rock | 10.68 | 97 | 10 | |
| 087-MW-I30T | Rock | 10.59 | 80 | 15 | |
| 087-MW-O29T | Rock | 9.98 | 102 | 15 | |
| 090-MW-18BR | Rock | 16.36 | 154 | 15 | Abandoned 2013: status under evaluation |
| 090-MW-7BR-1 | Rock | 12.66 | 134 | 15 | |
| 090-MW-7BR-2 | Rock | 12.66 | NA | NA | |
| 090-MW-7BR-3 | Rock | 12.66 | NA | NA | |
| 115-MW-203BR | Rock | 8.70 | 162 | 20 | |

**Table 2-2**
**Groundwater Monitoring Well Inventory**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Comments |
|---|---|---|---|---|---|
| | | (ft msl) | (ft) | (ft) | |
| 115-MW-211BR | Rock | 17.41 | NA | NA | |
| 115-MW-215BR | Rock | 8.82 | 143 | 20 | |
| 115-MW-216BR | Rock | 18.02 | 131 | 20 | |
| 117-MW-3BR-1 | Rock | 12.34 | 155 | 15 | |
| 117-MW-3BR-2 | Rock | 12.34 | 263 | 15 | |
| 117-MW-8BR | Rock | 12.94 | 125 | 10 | |
| 119-MW-11BR | Rock | 10.75 | 159 | 20 | |
| 119-MW-12BR | Rock | 11.26 | 154 | 20 | |
| 119-MW-16BR-1 | Rock | 8.61 | 151 | 15 | |
| 119-MW-16BR-2 | Rock | 8.61 | 187 | 15 | |
| 119-MW-16BR-3 | Rock | 8.61 | 247 | 15 | |
| 119-MW-2BR-1 | Rock | 8.43 | 163 | 15 | |
| 119-MW-2BR-2 | Rock | 8.43 | 245 | 15 | |
| 119-MW-2BR-3 | Rock | 8.43 | 315 | 15 | |
| 119-MW-4BR-1 | Rock | 8.77 | 179 | 15 | |
| 119-MW-4BR-2 | Rock | 8.77 | 229 | 15 | |
| 119-MW-4BR-3 | Rock | 8.77 | 314 | 15 | |
| 124-MW-17BR-1 | Rock | 9.56 | 153 | 15 | |
| 124-MW-17BR-2 | Rock | 9.56 | 337 | 15 | |
| 124-MW-8BR | Rock | 9.71 | NA | NA | |
| 140-MW-9BR-1 | Rock | 7.32 | 153 | 15 | |
| 140-MW-9BR-2 | Rock | 7.32 | 222 | 15 | |
| 140-MW-9BR-3 | Rock | 7.32 | 272 | 15 | |
| KP-MW-6BR-1 | Rock | 8.94 | 153 | 14 | Inoperative 2013: status under evaluation |
| KP-MW-6BR-2 | Rock | 8.94 | 231 | 15 | Inoperative 2013: status under evaluation |
| KP-MW-6BR-3 | Rock | 8.94 | 339 | 15 | Inoperative 2013: status under evaluation |
| SA6-MW-14BR | Rock | 9.99 | 85 | 10 | |
| SA6-MW-15BR | Rock | 8.08 | 103 | 20 | |
| SA6-MW-5BR-1 | Rock | 17.06 | 106 | 15 | |
| SA6-MW-5BR-2 | Rock | 17.06 | 154 | 15 | |
| SA6-MW-5BR-3 | Rock | 17.06 | 204 | 13 | |
| SA6-MW-5BR-4 | Rock | 17.06 | 236 | 15 | |
| SA6-MW-5BR-5 | Rock | 17.06 | 281 | 15 | |

Table 3-1

GWET Pumping Outages in 2013

| Well ID | Start Date | End Date | Duration Days and | Hours | Comment |
|---|---|---|---|---|---|
| | | | | | |
| 087-PW-2 | 25-Jul-13 | 26-Jul-13 | 1 | 6.1 | Shut down for PW-2 well redevelopment and pump replacement. |
| 115-MW-203BR | 29-Jul-13 | 31-Jul-13 | 1 | 21.4 | Damaged by the contractor's dozer. Well repaired. |
| 087-PW-1 | 29-Apr-13 | 30-Apr-13 | 1 | 0.4 | Shut down for forcemain acid cleaning. |
| 087-PW-2 | 29-Apr-13 | 30-Apr-13 | 1 | 0.5 | Shut down for forcemain acid cleaning. |
| 115-MW-203BR | 29-Apr-13 | 30-Apr-13 | 0 | 22.9 | Shut down for forcemain acid cleaning. |
| 087-PW-1 | 13-Dec-13 | 20-Dec-13 | 7 | 4.8 | Shut down to allow installation of temporary valved pipeline taps for pre-commissioning of the new SA6 North GWTP. Also shut down multiple times to allow drip leak repairs. |
| 087-PW-2 | 13-Dec-13 | 20-Dec-13 | 7 | 2.3 | Shut down to allow installation of temporary valved pipeline taps for pre-commissioning of the new SA6 North GWTP. Also shut down multiple times to allow drip leak repairs. |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 073-MW-10BR-1 | Rock | 6.67 | 155 | 10 | -1.02 | -1.03 | -0.94 | -1.36 |
| 073-MW-10BR-2 | Rock | 6.67 | 170 | 10 | -1.35 | -1.14 | -1.36 | -1.45 |
| 073-MW-10BR-3 | Rock | 6.67 | 195 | 15 | NA | -2.53 | -0.43 | NA |
| 073-MW-10BR-4 | Rock | 6.67 | 227 | 15 | 0.86 | 0.61 | -0.09 | -0.10 |
| 073-MW-10BR-5 | Rock | 6.67 | 327 | 15 | NA | NA | NA | NA |
| 073-MW-1BR-1 | Rock | 7.58 | 144 | 15 | -1.80 | -2.00 | -1.55 | -1.96 |
| 073-MW-1BR-2 | Rock | 7.58 | 209 | 15 | -1.32 | -1.17 | -1.10 | -1.37 |
| 073-MW-1BR-3 | Rock | 7.58 | 264 | 15 | -0.43 | 0.00 | -0.50 | -0.21 |
| 073-MW-1BR-4 | Rock | 7.58 | 295 | 15 | -0.51 | -0.36 | -0.47 | -0.26 |
| 073-MW-1BR-5 | Rock | 7.58 | 329 | 15 | -0.84 | -0.10 | -0.21 | 0.47 |
| 073-MW-5 | Shallow | 6.81 | 15 | 13 | 3.67 | 4.43 | 3.75 | NA |
| 073-MW-BB11 | Shallow | 7.87 | 13 | 10 | 3.32 | 3.83 | 3.18 | NA |
| 073-MW-Y10 | Shallow | 6.42 | 13 | 10 | 3.93 | 5.95 | 3.66 | NA |
| 073-PZ-001 | Shallow | 7.24 | 13 | 5 | 3.94 | 4.65 | 3.63 | NA |
| 073-PZ-002 | Intermediate | 7.26 | 26.5 | 5 | 1.08 | 1.94 | 2.14 | NA |
| 079-MW-01 | Shallow | 8.8 | NA | NA | 4.43 | 4.69 | 3.96 | 3.52 |
| 079-MW-13BR-1 | Rock | 13.08 | 121 | 10 | 7.41 | 8.33 | 7.08 | 7.07 |
| 079-MW-13BR-2 | Rock | 13.08 | 214 | 15 | 7.55 | 8.45 | 7.26 | 7.17 |
| 079-MW-13BR-3 | Rock | 13.08 | 284 | 15 | 7.57 | 7.96 | 5.95 | 6.99 |
| 079-MW-A2 | Shallow | 8.1 | 13 | 10 | 3.93 | 4.50 | 3.78 | 3.15 |
| 079-MW-C6 | Shallow | 11 | 13 | 10 | 6.02 | 6.78 | 5.47 | 4.66 |
| 087-IW-01 | Deep | 11.51 | NA | NA | 2.51 | 3.48 | 2.80 | 2.79 |
| 087-MW-001 | Shallow | 12.67 | 15 | 13 | 6.61 | 4.12 | 5.35 | NA |
| 087-MW-01 | Deep | 12.8 | 60 | 10 | 3.38 | NA | 3.59 | 3.58 |
| 087-MW-03 | Deep | 13.77 | 95 | 10 | 2.35 | 3.23 | 2.65 | NA |
| 087-MW-08 | Deep | 12.98 | 99 | 10 | 1.57 | 0.90 | 1.33 | 2.12 |
| 087-MW-101 | Shallow | 12.21 | 12 | NA | 3.09 | 4.82 | 4.39 | 2.86 |
| 087-MW-102 | Shallow | 11.65 | 13 | NA | 3.11 | NA | 4.36 | 2.90 |
| 087-MW-119 | Shallow | 12.97 | 11 | NA | 3.37 | 5.81 | NA | NA |
| 087-MW-120 | Shallow | 12.3 | 11 | NA | 4.40 | 5.12 | 4.82 | 5.01 |
| 087-MW-121 | Shallow | 11.76 | 12 | NA | 3.01 | 4.41 | 3.65 | 2.91 |
| 087-MW-13 | Intermediate | 12.93 | 40 | 10 | 1.08 | -1.38 | 1.49 | 0.36 |
| 087-MW-14 | Rock | 10.68 | 97 | 10 | 3.82 | 2.22 | 3.16 | 1.88 |
| 087-MW-34 | Deep | 12.73 | 70 | 5 | -0.49 | -0.33 | -0.31 | 2.50 |
| 087-MW-35 | Intermediate | 18.29 | 40 | 10 | 0.98 | 1.94 | 1.43 | 1.10 |
| 087-MW-A26 | Shallow | 10.1 | 13 | 10 | 3.59 | 4.79 | 3.34 | 2.76 |
| 087-MW-A26D | Intermediate | 10.35 | 28 | 10 | 3.29 | 4.01 | 3.27 | 2.85 |
| 087-MW-A26T | Deep | 9.92 | 56 | 15 | 3.22 | 4.00 | 3.22 | 2.80 |
| 087-MW-I30 | Shallow | 10.86 | 14 | 10 | 4.24 | 4.61 | 3.95 | 3.84 |
| 087-MW-I30T | Rock | 10.59 | 80 | 15 | 3.44 | 2.81 | 3.19 | 1.66 |
| 087-MW-O19 | Shallow | 13.5 | 13 | 10 | 7.60 | 9.23 | 7.63 | 8.59 |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 087-MW-O23 | Shallow | 11.79 | 13 | 10 | 6.27 | 6.74 | 6.69 | NA |
| 087-MW-O29 | Shallow | 10.08 | 14 | 10 | 4.37 | 1.82 | 4.08 | 4.12 |
| 087-MW-O29D | Intermediate | 10.32 | 56 | NA | 1.61 | 5.11 | 1.54 | 1.83 |
| 087-MW-O29T | Rock | 9.98 | 102 | 15 | 1.70 | 2.48 | 1.82 | 2.22 |
| 087-MW-S19 | Shallow | 14.47 | 14 | 10 | NA | NA | NA | NA |
| 087-MW-U28 | Shallow | 14.08 | 16 | 10 | 6.31 | 7.27 | 6.32 | 6.89 |
| 087-MW-W25 | Shallow | 18.26 | 18 | 10 | 5.11 | 5.56 | 5.37 | 5.58 |
| 087-MW-W25D | Intermediate | 18.17 | 66 | 10 | 1.08 | 1.95 | 1.40 | 0.97 |
| 087-MW-W25T | Deep | 18.19 | 91 | 15 | 0.86 | 1.83 | 1.20 | 1.31 |
| 087-MW-Y20 | Shallow | 19.06 | 20 | 10 | 4.01 | 4.78 | 4.61 | 4.65 |
| 087-OBS-1D | Intermediate | 15.13 | 42.8 | NA | 1.57 | 1.04 | 1.46 | 1.12 |
| 087-OBS-1L | Deep | 15.27 | 67.05 | NA | 2.37 | 1.41 | 2.44 | 0.68 |
| 087-OBS-1T | Deep | 15.23 | 100 | NA | 1.38 | 1.09 | 1.58 | 1.93 |
| 087-OBS-2D | Intermediate | 12.68 | NA | NA | -1.65 | -1.53 | -1.57 | 2.50 |
| 087-OBS-3L | Deep | 12.88 | 65 | NA | 0.03 | -0.30 | 0.07 | 1.40 |
| 087-OBS-4T | Deep | 11.6 | 75.5 | NA | 0.87 | 1.21 | 0.93 | 1.85 |
| 087-OBS-5D | Intermediate | 12.72 | 39.83 | NA | 0.59 | 0.89 | 0.61 | 2.30 |
| 087-OBS-5T | Deep | 12.62 | 81.9 | NA | -0.50 | -0.02 | 0.06 | NA |
| 087-OBS-6D | Intermediate | 11.24 | NA | NA | 2.66 | 3.44 | 3.02 | 2.72 |
| 087-PW-1 | Deep | 12.66 | NA | NA | -23.56 | -21.94 | -23.35 | 3.20 |
| 087-PW-2 | Intermediate | 13.02 | NA | NA | -20.79 | -20.87 | -15.83 | 3.32 |
| 087-PZ-001 | Shallow | 17.5 | 18 | 5 | NA | 7.09 | NA | NA |
| 087-PZ-002 | Intermediate | 17.44 | 36 | 5 | 6.00 | NA | NA | NA |
| 087-PZ-003 | Shallow | 13.1 | 18 | 5 | 5.62 | 6.82 | 4.61 | NA |
| 087-PZ-004 | Intermediate | 13.18 | 29 | 5 | 2.33 | 3.17 | 2.74 | NA |
| 087-PZ-005 | Shallow | 14.92 | 20 | 5 | 8.92 | 9.90 | NA | NA |
| 087-PZ-006 | Intermediate | 15.06 | 36 | 5 | NA | NA | NA | NA |
| 088-IW-01 | Deep | 11.58 | NA | NA | 3.78 | 4.52 | 3.70 | 3.26 |
| 088-IW-02 | Deep | 16.34 | NA | NA | 3.16 | 3.85 | 3.36 | 3.17 |
| 088-IW-03 | Deep | 12.56 | NA | NA | NA | 3.50 | 2.85 | 2.53 |
| 088-MW-001 | Shallow | 9.34 | 15 | 13 | 5.47 | 6.80 | 5.89 | 5.75 |
| 088-MW-002 | Shallow | 12.81 | 15 | 13 | 8.53 | 7.59 | 6.82 | 7.41 |
| 088-MW-101 | Shallow | 11.56 | 12 | NA | 3.38 | 4.45 | 3.24 | 2.94 |
| 088-MW-102 | Shallow | 17.54 | 19 | NA | 4.91 | 5.55 | 3.70 | 3.24 |
| 088-MW-103 | Shallow | 11.44 | 35 | NA | 3.10 | 4.17 | 3.29 | 2.82 |
| 088-MW-15 | Intermediate | 12.09 | 35 | 10 | 3.05 | NA | 2.94 | 2.81 |
| 088-MW-G19T | Deep | 12.45 | 93 | 15 | 2.94 | 3.40 | 3.03 | 2.98 |
| 088-PZ-001 | Shallow | 10.67 | 12 | 5 | 5.82 | 4.09 | 4.99 | 5.40 |
| 088-PZ-002 | Intermediate | 10.56 | 25 | 5 | 4.04 | 4.75 | 3.95 | 3.80 |
| 088-PZ-003 | Shallow | 12.07 | 15 | 5 | 5.87 | 6.27 | 5.34 | 5.47 |
| 088-PZ-004 | Intermediate | 12.05 | 27 | 5 | 2.19 | 3.10 | 2.94 | 2.78 |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 090-MW-07 | Intermediate | 14 | 40 | 10 | 6.42 | NA | -0.64 | -1.16 |
| 090-MW-09 | Deep | 10.7 | 75 | 5 | 5.25 | 5.95 | 5.18 | 4.58 |
| 090-MW-18BR | Rock | 16.36 | 154 | 15 | 11.37 | 7.35 | NA | NA |
| 090-MW-7BR-1 | Rock | 12.66 | 134 | 15 | 4.82 | 5.19 | 4.51 | 4.56 |
| 090-MW-7BR-2 | Rock | 12.66 | NA | NA | 4.88 | 5.27 | 4.54 | 4.56 |
| 090-MW-7BR-3 | Rock | 12.66 | NA | NA | 4.94 | 5.33 | 4.54 | 2.84 |
| 090-MW-F14 | Shallow | 20.5 | 15 | 10 | 12.43 | 13.29 | NA | NA |
| 090-PZ-05 | Shallow | 17.2 | 15.35 | NA | 8.79 | 9.74 | 7.75 | 7.84 |
| 090-PZ-06 | Shallow | 17.6 | 16.59 | NA | 11.12 | 11.65 | 10.18 | 9.12 |
| 115-E1-DI | Intermediate | 16.72 | 44.85 | NA | 2.61 | 3.48 | 2.95 | 2.34 |
| 115-E1-DO | Intermediate | 9.21 | 37.11 | NA | 2.83 | 3.33 | 2.68 | NA |
| 115-E1-SO | Shallow | 7.42 | 6.95 | NA | 6.43 | NA | 6.11 | NA |
| 115-E2-DO | Intermediate | 10.24 | 35 | NA | 4.61 | 0.94 | 3.52 | 3.36 |
| 115-E2-SO | Shallow | 10.05 | 10 | NA | 6.03 | 6.14 | 5.95 | 5.00 |
| 115-E3-DO | Intermediate | 12.39 | 34 | NA | 5.27 | 5.78 | 5.02 | 4.56 |
| 115-E3-SO | Shallow | 12.57 | NA | NA | 6.47 | 6.36 | 6.08 | 5.35 |
| 115-E4-DO | Intermediate | 17.87 | 45.46 | NA | 3.67 | 4.57 | 3.70 | 3.55 |
| 115-E5-DO | Intermediate | 15.72 | NA | NA | 2.51 | 3.44 | 2.82 | 2.75 |
| 115-E5-SO | Shallow | NA | NA | NA | NA | NA | NA | NA |
| 115-E6-DI | Intermediate | 19.89 | 48.35 | NA | 2.57 | 3.41 | 2.85 | 2.52 |
| 115-E6-DO | Intermediate | 19.74 | 51.1 | NA | 2.46 | 2.97 | 2.83 | 2.12 |
| 115-MW-20 | Intermediate | 14.19 | NA | NA | 2.44 | 2.86 | 2.80 | 2.04 |
| 115-MW-203BR | Rock | 8.7 | 162 | 20 | NA | NA | NA | NA |
| 115-MW-211BR | Rock | 17.41 | NA | NA | 3.79 | 4.25 | 3.51 | 3.67 |
| 115-MW-215BR | Rock | 8.82 | 143 | 20 | -4.36 | -3.83 | -4.00 | NA |
| 115-MW-216BR | Rock | 18.02 | 131 | 20 | 3.87 | 4.37 | 3.62 | 3.71 |
| 115-MW-A12T | Deep | 15.55 | NA | NA | NA | 0.57 | NA | 0.70 |
| 115-MW-E14D | Intermediate | 18.05 | 35 | 10 | 2.20 | 3.09 | 2.50 | 2.10 |
| 115-MW-E14T | Deep | 21.33 | 71 | 15 | 2.75 | 3.55 | 2.95 | 2.68 |
| 115-OMW-E08TR | Deep | 16.82 | NA | NA | 2.96 | 3.76 | 3.18 | 2.76 |
| 115-PW-21 | Deep | 15.13 | 71 | 10 | 2.36 | 3.20 | 2.65 | 2.25 |
| 115-W1-DO | Intermediate | 12.63 | NA | NA | 1.68 | 1.99 | 1.93 | NA |
| 115-W1-SO | Shallow | 12.59 | NA | NA | 8.46 | 9.77 | 9.50 | NA |
| 115-W3-SO | Shallow | NA | 13.93 | NA | NA | NA | NA | NA |
| 115-W4-DO | Intermediate | 8.79 | 41.22 | NA | 1.90 | 2.23 | 1.89 | 1.23 |
| 115-W5-SO | Shallow | 12.43 | NA | NA | 7.67 | 8.67 | 6.79 | 8.25 |
| 117-MW-3BR-1 | Rock | 12.34 | 155 | 15 | 5.59 | 5.89 | 5.22 | 5.12 |
| 117-MW-3BR-2 | Rock | 12.34 | 263 | 15 | 6.35 | 6.65 | 5.95 | 5.88 |
| 117-MW-8BR | Rock | 12.94 | 125 | 10 | 5.55 | 5.99 | 5.24 | 5.17 |
| 117-MW-A05 | Shallow | 18.48 | 16 | NA | 7.02 | NA | 7.13 | 6.22 |
| 117-MW-A14 | Shallow | 17.33 | 17 | NA | 5.42 | 5.90 | 4.94 | 4.58 |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 117-MW-A62 | Shallow | 18.32 | 15 | NA | 6.15 | 6.25 | 6.11 | 5.40 |
| 117-MW-A85 | Shallow | 17.4 | 15 | NA | 5.42 | 7.77 | 6.10 | 4.70 |
| 117-MW-A89 | Shallow | 13.17 | 16 | NA | 4.74 | 5.67 | 4.13 | 3.71 |
| 117-MW-A99 | Shallow | 15.95 | 14 | NA | 5.86 | 6.16 | 5.87 | 5.18 |
| 117-MW-D1 | Deep | 11.08 | 41 | 10 | 3.41 | 3.51 | 2.93 | NA |
| 117-MW-D2 | Deep | 17.62 | 48 | 10 | 4.89 | 5.32 | 4.65 | 3.89 |
| 117-MW-D3 | Deep | 18.85 | 80 | 10 | 6.38 | 6.93 | 5.99 | 5.56 |
| 117-MW-I1 | Intermediate | 11.08 | 22 | 10 | 4.51 | 5.14 | 4.03 | NA |
| 117-MW-I2 | Intermediate | 17.59 | 28 | 10 | 5.77 | 5.48 | 5.11 | 5.44 |
| 117-MW-I3 | Intermediate | 15.59 | 28 | 10 | 5.32 | 6.02 | 5.17 | NA |
| 117-MW-I4 | Deep | 15.49 | 75 | 10 | 6.24 | 6.11 | 6.42 | 5.53 |
| 117-MW-I4S | Shallow | 15.49 | NA | NA | 6.13 | 6.47 | 5.95 | 5.27 |
| 117-MW-I5 | Intermediate | 18.76 | 37 | 15 | 6.78 | 7.17 | 6.56 | 5.92 |
| 119-MW-01T | Deep | 10.78 | 62 | 10 | 3.47 | 2.19 | 2.77 | NA |
| 119-MW-02T | Deep | 8.8 | 70 | 10 | 3.79 | 3.29 | 2.94 | 2.32 |
| 119-MW-11BR | Rock | 10.75 | 159 | 20 | 3.60 | 6.54 | 3.51 | 4.47 |
| 119-MW-12BR | Rock | 11.26 | 154 | 20 | 4.96 | 5.46 | 4.85 | 4.76 |
| 119-MW-16BR-1 | Rock | 8.61 | 151 | 15 | 6.35 | 5.07 | 4.51 | 4.00 |
| 119-MW-16BR-2 | Rock | 8.61 | 187 | 15 | 4.06 | 4.06 | 3.59 | 3.83 |
| 119-MW-16BR-3 | Rock | 8.61 | 247 | 15 | 4.07 | 4.32 | 3.71 | 3.83 |
| 119-MW-2BR-1 | Rock | 8.43 | 163 | 15 | -0.99 | NA | -1.28 | -1.63 |
| 119-MW-2BR-2 | Rock | 8.43 | 245 | 15 | -1.16 | -0.71 | -1.41 | -1.05 |
| 119-MW-2BR-3 | Rock | 8.43 | 315 | 15 | -0.74 | -0.33 | -0.79 | -0.86 |
| 119-MW-4BR-1 | Rock | 8.77 | 179 | 15 | 3.68 | 4.43 | 3.73 | 3.14 |
| 119-MW-4BR-2 | Rock | 8.77 | 229 | 15 | 3.67 | 4.46 | 3.66 | 3.05 |
| 119-MW-4BR-3 | Rock | 8.77 | 314 | 15 | 3.81 | 4.46 | 3.67 | 3.30 |
| 124-MW-02 | Shallow | 9 | 9.34 | NA | 6.60 | 7.59 | 6.32 | NA |
| 124-MW-06 | Deep | 9.39 | 70 | 10 | 3.24 | 3.67 | 3.07 | NA |
| 124-MW-10 | Shallow | 10.06 | 11 | 8 | 5.00 | NA | 4.37 | NA |
| 124-MW-102D | Intermediate | 9.38 | 30 | 10 | 2.73 | 3.26 | 2.48 | NA |
| 124-MW-102T | Deep | 9.33 | 75 | 10 | 3.49 | 4.01 | 3.31 | NA |
| 124-MW-103D | Intermediate | 9.58 | 29 | 10 | 2.96 | 3.43 | 2.68 | NA |
| 124-MW-103L | Deep | 9.77 | 110 | 10 | 3.01 | 3.60 | 2.91 | NA |
| 124-MW-104D | Intermediate | 9.08 | 26 | 10 | 2.96 | -0.72 | 2.69 | NA |
| 124-MW-104L | Deep | 9.22 | 43 | 10 | 3.39 | 3.71 | 3.04 | 1.24 |
| 124-MW-104T | Deep | 9.31 | 67 | 10 | 3.50 | 3.95 | 3.27 | NA |
| 124-MW-105D | Intermediate | 9.63 | 24 | 10 | 3.15 | 3.66 | 2.86 | NA |
| 124-MW-105T | Deep | 9.33 | 62 | 10 | 2.89 | 3.81 | 2.77 | NA |
| 124-MW-106T | Deep | 9.28 | 78 | 10 | 2.88 | 3.14 | 2.82 | 1.22 |
| 124-MW-107T | Deep | 9.08 | 70 | 10 | 2.74 | 3.14 | 2.90 | NA |
| 124-MW-11 | Shallow | 9.05 | 8 | 6 | 4.67 | 5.45 | 3.18 | 3.80 |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 124-MW-17BR-1 | Rock | 9.56 | 153 | 15 | 3.01 | 3.55 | 3.10 | 3.40 |
| 124-MW-17BR-2 | Rock | 9.56 | 337 | 15 | 3.36 | 3.70 | 3.03 | 3.27 |
| 124-MW-8BR | Rock | 9.71 | NA | NA | 3.50 | 4.06 | 3.50 | NA |
| 124-MW-G02D | Intermediate | 9.59 | 28 | 10 | 2.89 | 3.24 | 2.63 | -0.67 |
| 124-MW-G02T | Deep | 9.5 | 69 | 10 | 3.48 | 2.42 | 2.60 | 0.84 |
| 125-MW-01 | Shallow | 8.71 | NA | NA | 6.40 | 7.63 | 5.53 | NA |
| 125-PZ-001 | Shallow | 9.5 | 13 | 5 | 7.53 | 8.86 | 6.74 | 8.27 |
| 125-PZ-002 | Intermediate | 9.31 | 26 | 5 | 2.85 | 3.28 | 2.45 | NA |
| 125-PZ-003 | Shallow | 8.89 | 8.5 | 5 | 5.73 | 6.41 | 4.76 | NA |
| 125-PZ-004 | Intermediate | 8.93 | 25 | 5 | 2.81 | 2.64 | 2.92 | NA |
| 134-MW-Q08 | Shallow | 8.37 | 13 | 10 | 6.82 | 7.37 | 5.61 | NA |
| 134-MW-V09 | Shallow | 7.98 | 13 | 10 | 5.53 | 7.02 | 5.51 | NA |
| 134-PZ-001 | Shallow | 7.47 | 16 | 5 | 4.84 | 6.10 | 4.25 | NA |
| 134-PZ-002 | Intermediate | 7.81 | 26.5 | 5 | 1.48 | 2.00 | 1.92 | NA |
| 134-PZ-003 | Shallow | 8.34 | 13 | 5 | 7.34 | 8.28 | 6.48 | NA |
| 134-PZ-004 | Intermediate | 8.22 | 26.5 | 5 | 1.92 | 2.36 | 2.03 | NA |
| 140-MW-04 | Shallow | 7.18 | NA | NA | 5.43 | 5.98 | 4.77 | 5.85 |
| 140-MW-06 | Shallow | 8.33 | 6 | NA | 6.94 | 7.88 | 6.04 | 7.27 |
| 140-MW-07 | Shallow | 7.7 | 6 | NA | 5.49 | 6.65 | 5.00 | 5.68 |
| 140-MW-08 | Shallow | 8.13 | 10 | 8 | 5.76 | 6.67 | 5.11 | 5.92 |
| 140-MW-10 | Shallow | 10.06 | 11 | 8 | NA | 5.12 | NA | NA |
| 140-MW-1R | Shallow | 7.61 | 11 | NA | 5.42 | 6.20 | 4.93 | 5.75 |
| 140-MW-9BR-1 | Rock | 7.32 | 153 | 15 | 1.17 | 1.43 | 1.03 | 1.34 |
| 140-MW-9BR-2 | Rock | 7.32 | 222 | 15 | 2.53 | 2.94 | 2.27 | 2.72 |
| 140-MW-9BR-3 | Rock | 7.32 | 272 | 15 | 2.58 | 3.01 | 2.35 | 2.61 |
| 140-MW-P05D | Intermediate | 7.44 | 30 | 10 | 2.43 | 2.91 | 2.42 | 0.71 |
| 140-PZ-001 | Shallow | 8.29 | 11.5 | 5 | 6.24 | 7.42 | 5.41 | 6.67 |
| 140-PZ-002 | Intermediate | 8.08 | 25 | 5 | 2.27 | 2.42 | 2.42 | 0.13 |
| 153-MW-A13 | Shallow | 9.62 | 10 | 6 | 3.89 | 4.95 | 2.95 | 3.28 |
| 153-MW-A13T | Deep | 9.34 | 58 | 15 | 3.46 | 3.97 | 2.89 | 2.36 |
| 153-MW-A15 | Shallow | 11 | 12.15 | 10 | 2.82 | 3.15 | 2.02 | 1.68 |
| 154-MW-A01 | Shallow | 18.06 | 14.61 | NA | 11.53 | 11.85 | 11.00 | 11.17 |
| 154-MW-A06 | Shallow | 19.87 | 15.12 | NA | 13.35 | 15.44 | 11.45 | 12.71 |
| 154-MW-A5A | Shallow | 19.16 | 14 | NA | 11.76 | 12.28 | 11.18 | 11.34 |
| 154-MW-B6A | Shallow | 20.71 | 13.68 | NA | 13.05 | 14.78 | 11.80 | 12.24 |
| 154-MW-C6A | Shallow | 20.37 | 13.41 | NA | 12.58 | 13.05 | 11.95 | 12.14 |
| 154-MW-D01 | Shallow | 18.78 | 14.28 | NA | 12.63 | 13.70 | NA | NA |
| 154-MW-E08 | Shallow | 22 | 14.4 | NA | 13.83 | 14.59 | 12.79 | 13.20 |
| 163-MW-R05 | Shallow | 7.22 | NA | NA | 5.14 | 6.27 | 5.49 | 5.72 |
| 184-MW-001 | Shallow | 12.09 | 12 | 10 | 8.00 | NA | 1.25 | NA |
| 184-MW-04 | Shallow | 8.74 | NA | NA | 4.23 | 4.47 | 3.86 | 3.97 |

**Table 4-1**
**Groundwater Elevation Data from Quarterly Rounds in 2013**

| Well ID | Screen Zone | Ref. Pt. Elev. | Well Depth | Screen Length | Groundwater Elevation (NGVD-29) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Mar-13 | Jun-13 | Sep-13 | Dec-13 |
| | | (ft msl) | (ft) | (ft) | (ft msl) | (ft msl) | (ft msl) | (ft msl) |
| 184-MW-05 | Shallow | 14.71 | NA | NA | 6.97 | 7.06 | 6.25 | 6.08 |
| 184-MW-06 | Shallow | 19.20 | NA | NA | 9.29 | NA | NA | 8.45 |
| 184-MW-C10 | Shallow | 15.2 | 16 | 10 | 10.78 | 11.78 | NA | NA |
| KP-MW-6BR-1 | Rock | 8.94 | 153 | 14 | 8.16 | NA | 8.97 | NA |
| KP-MW-6BR-2 | Rock | 8.94 | 231 | 15 | -0.35 | NA | 9.01 | NA |
| KP-MW-6BR-3 | Rock | 8.94 | 339 | 15 | NA | NA | 6.26 | 7.15 |
| SA6-MW-14BR | Rock | 9.99 | 85 | 10 | 3.53 | 3.89 | 3.13 | 3.56 |
| SA6-MW-15BR | Rock | 8.08 | 103 | 20 | 1.63 | 1.65 | 1.08 | 1.80 |
| SA6-MW-5BR-1 | Rock | 17.06 | 106 | 15 | 2.54 | 2.36 | 1.97 | 2.54 |
| SA6-MW-5BR-2 | Rock | 17.06 | 154 | 15 | 2.92 | 3.03 | 2.55 | 3.06 |
| SA6-MW-5BR-3 | Rock | 17.06 | 204 | 13 | 3.44 | 3.61 | 2.96 | 3.59 |
| SA6-MW-5BR-4 | Rock | 17.06 | 236 | 15 | 3.65 | 3.58 | 3.12 | 3.32 |
| SA6-MW-5BR-5 | Rock | 17.06 | 281 | 15 | 3.63 | 3.70 | 3.18 | 3.46 |
| SA6-MW-AA1 | Shallow | 17.8 | 15 | 10 | 3.93 | 4.73 | 3.43 | 3.41 |
| SA6-MW-AA1D | Intermediate | 19.36 | 32 | 10 | 1.31 | 1.00 | 1.43 | 2.50 |
| SA6-MW-AA1T | Deep | 15.31 | 70 | 10 | 1.16 | 1.17 | 1.27 | 2.44 |
| Sump A | Shallow | 15.95 | NA | NA | 6.59 | NA | NA | 6.62 |
| Sump B | Shallow | 13.04 | NA | NA | 7.83 | 8.15 | 8.58 | 6.92 |

* - See Table 4-2 for Reference Point Elevations.

**Table 4-2**
**Summary of Groundwater Elevations Near NJCU**
2013

| | Ref. point elevation* | | March 5, 2013 | | | | | June 11, 2013 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Pre-const. (ft, msl) | Post-const. (ft, msl) | Time hrs:min | Depth to GW (ft,) | GW Elev. (ft., msl) | Total Depth (ft) | Sampler Initial | Time hrs:min | Depth to GW (ft,) | GW Elev. (ft., msl) | Total Depth (ft) | Sampler Initial |
| 079-MW-01 | 8.80 | 8.80 | 13:28 | 4.37 | 4.43 | 13 | JB | 10:12 | 4.11 | 4.69 | 13 | JB |
| 079-MW-A02 | 8.10 | 8.10 | 13:30 | 4.17 | 3.93 | 13 | JB | 10:14 | 3.6 | 4.5 | 13 | JB |
| Sump A (North) | 9.04 | 15.95 | 13:32 | 2.45 | 6.59 | 12 | JB | 10:16 | NA | NA | NA | JB |
| Sump B (South) | 13.04 | 13.04 | 13:34 | 5.21 | 7.83 | 11.9 | JB | 10:18 | 4.89 | 8.15 | 11.9 | JB |
| 090-PZ-5 | 17.24 | 17.20 | 13:36 | 8.45 | 8.79 | 15.35 | JB | 10:20 | 7.46 | 9.74 | 15.35 | JB |
| 090-PZ-6 | 17.64 | 17.10 | 13:38 | 6.52 | 11.12 | 16.59 | JB | 10:22 | 5.45 | 11.65 | 16.59 | JB |
| 184-MW-4 | 8.74 | 8.74 | 13:40 | 4.51 | 4.23 | 6.56 | JB | 10:24 | 4.27 | 4.47 | 6.56 | JB |
| 184-MW-5 | 10.14 | 14.71 | 13:42 | 3.17 | 6.97 | 12.24 | JB | 10:26 | 7.65 | 7.06 | 12.24 | JB |
| 184-MW-6 | 12.51 | 19.20 | 13:44 | 3.22 | 9.29 | 13 | JB | 10:28 | NA | NA | NA | JB |

* NGVD29 site datum

**Table 4-2**
**Summary of Groundwater Elevations Near NJCU**
2013

| | Ref. point elevation* | | September 16, 2013 | | | | | December 18, 2013 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Pre-const. (ft, msl) | Post-const. (ft, msl) | Time hrs:min | Depth to GW (ft,) | GW Elev. (ft., msl) | Total Depth (ft) | Sampler Initial | Time hrs:min | Depth to GW (ft,) | GW Elev. (ft., msl) | Total Depth (ft) | Sampler Initial |
| 079-MW-01 | 8.80 | 8.80 | 10:25 | 4.84 | 3.96 | 13 | JB | 13:18 | 5.28 | 3.52 | 13 | JB |
| 079-MW-A02 | 8.10 | 8.10 | 10:27 | 4.32 | 3.78 | 13 | JB | 13:20 | 4.95 | 3.15 | 13 | JB |
| Sump A (North) | 9.04 | 15.95 | 10:29 | dry @ 9.9 | NA | 19 | JB | 13:22 | 9.33 | 6.62 | 19 | JB |
| Sump B (South) | 13.04 | 13.04 | 10:31 | 4.46 | 8.58 | 11.9 | JB | 13:24 | 6.12 | 6.92 | 11.9 | JB |
| 090-PZ-5 | 17.24 | 17.20 | 10:33 | 9.45 | 7.75 | 15.35 | JB | 13:26 | 9.36 | 7.84 | 15.35 | JB |
| 090-PZ-6 | 17.64 | 17.10 | 10:35 | 6.92 | 10.18 | 16.59 | JB | 13:28 | 7.98 | 9.12 | 16.59 | JB |
| 184-MW-4 | 8.74 | 8.74 | 10:37 | 4.88 | 3.86 | 6.56 | JB | 13:30 | 4.77 | 3.97 | 6.56 | JB |
| 184-MW-5 | 10.14 | 14.71 | 10:39 | 8.46 | 6.25 | 12.24 | JB | 13:32 | 8.63 | 6.08 | 12.24 | JB |
| 184-MW-6 | 12.51 | 19.20 | 10:41 | NA | NA | 13 | JB | 13:34 | 10.75 | 8.45 | 13 | JB |

* NGVD29 site datum

Table 5-1

List of Wells for December 2013 LTMP Groundwater Quality Sampling Event

| Wells Sampled Dec. 2011 LTMP Biennial Event | Wells Sampled May 2013 "L-Well" Sampling Event | Wells Lost During Soil Excavation | Wells Proposed for Sampling Dec. 2013 LTMP Biennial Event |
|---|---|---|---|
| 079-MW-13BR-2 | | | 079-MW-13BR-2 |
| 087-MW-A26D | | | 087-MW-A26D |
| 087-MW-A26T | | | 087-MW-A26T |
| 087-MW-W25D | | | 087-MW-W25D |
| 087-MW-W25T | | | 087-MW-W25T |
| 090-MW-18BR | | | 090-MW-18BR |
| 117-MW-8BR | | | 117-MW-8BR |
| 117-MW-D3 | | | 117-MW-D3 |
| 117-MW-I1 | | | 117-MW-I1 |
| 117-MW-I5 | | | 117-MW-I5 |
| 119-MW-01T | 119-MW-01T | | |
| 119-MW-02T | 119-MW-02T | | |
| 119-MW-16BR-2 | | | 119-MW-16BR-2 |
| 119-MW-2BR-2 | | | 119-MW-2BR-2 |
| 124-MW-102T | 124-MW-102T | 124-MW-102T | |
| 124-MW-104T | 124-MW-104T | 124-MW-104T | |
| 124-MW-106T | 124-MW-106T | | |
| 124-MW-107T | 124-MW-107T | | |
| 124-MW-8BR | | | 124-MW-8BR |
| 124-MW-G02T | 124-MW-G02T | | |
| 140-MW-9BR-1 | | | 140-MW-9BR-1 |
| KP-MW-6BR-1 | | | KP-MW-6BR-1 |
| SA6-MW-14BR | | | SA6-MW-14BR |
| SA6-MW-15BR-1 | | | SA6-MW-15BR-1 |
| SA6-MW-AA1D | | | SA6-MW-AA1D |
| SA6-MW-AA1T | | | SA6-MW-AA1T |
| 115-MW-E08TR | | | 115-MW-E08TR |
| | 124-MW-103L | 124-MW-103L | |
| | 124-MW-104L | | |
| | 124-MW-105T | | |

Table 5-2

Summary of Ground Water Quality Data
from Long Term Monitoring Well Sampling Rounds

Unfiltered

| Well<br>Sample Date | Total Cr (mg/L) 2006 | Total Cr (mg/L) Dec-08 | Total Cr (mg/L) Dec-09 | Total Cr (mg/L) Dec-10 | Total Cr (mg/L) Dec-11 | Total Cr (mg/L) Dec-13 | Hex Cr. (mg/L) 2006 | Hex Cr. (mg/L) Dec-08 | Hex Cr. (mg/L) Dec-09 | Hex Cr. (mg/L) Dec-10 | Hex Cr. (mg/L) Dec-11 | Hex Cr. (mg/L) Dec-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 079-MW-13BR | 0.034 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-A26D | 0.059 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-A26T | 0.162 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-W25D | 0.005 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-W25T | 0.015 | ND | ND | 0.026 | ND | ND | ND | ND | ND | ND | ND | ND |
| 090-MW-18BR | 0.367 | 0.039 | 0.011 | 0.030 | 0.017 | NS | 0.230 | ND | ND | ND | ND | NS |
| 117-MW-8BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 117-MW-D3 | 0.011 | ND | ND | 0.014 | 0.014 | 0.010 | ND | ND | ND | ND | ND | ND |
| 117-MW-I1 | ND | ND | 0.023 | ND | ND | 0.013 | ND | ND | ND | ND | ND | ND |
| 117-MW-I5 | 0.840 | 0.529 | 0.401 | 0.605 | 0.232 | 0.209 | 0.770 | 0.510 | 0.370 | 0.540 | 0.24 | 0.16 |
| 119-MW-01T | 0.137 | 0.033 | 0.033 | 0.020 | ND | 0.020* | ND | ND | ND | ND | ND | ND* |
| 119-MW-02T | ND | ND | ND | 0.014 | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 119-MW-16BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 119-MW-2BR | ND | ND | ND | NA[1] | ND | ND | ND | ND | ND | NA[1] | ND | ND |
| 124-MW-102T | 0.020 | ND | ND | 0.014 | 0.019 | 0.028* | 0.012 | ND | ND | ND | 0.012 | 0.03* |
| 124-MW-104T | 0.020 | 0.015 | 0.047 | 0.062 | 0.066 | 0.062* | 0.138 | ND | 0.046 | 0.029 | 0.060 | 0.07* |
| 124-MW-106T | 0.105 | ND | 0.013 | 0.011 | 0.024 | 0.013* | ND | ND | ND | ND | ND | ND* |
| 124-MW-107T | 0.067 | ND | 0.191 | 0.021 | ND | 0.026* | ND | ND | ND | ND | ND | ND* |
| 124-MW-8BR | 0.060 | N/A | ND | ND | ND | ND | ND | N/A | ND | ND | ND | ND |
| 124-MW-G02T | 0.024 | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 140-MW-9BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| KP-MW-6BR | ND | ND | ND | ND | ND | NS | ND | ND | ND | ND | ND | NS |
| SA6-MW-14BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-15BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-AA1D | 0.005 | 0.018 | ND | 0.020 | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-AA1T | 0.015 | 0.021 | ND | 0.013 | 0.014 | 0.035 | ND | ND | ND | ND | ND | ND |
| 115-MW-E08TR | 38.900 | NS | NS | 11.600 | 11.900 | 12.80 | 41.200 | NS | NS | 12.100 | 13.0 | 14.8 |

Notes: NA[1] - Access to Society Hill property pending revised agreement.
NS - Not Sampled
* - Sampled in May 2013

Table 5-2

Summary of Ground Water Quality Data
from Long Term Monitoring Well Sampling Rounds

| Well<br>Sample Date | Total Cr (mg/L) 2006 | Total Cr (mg/L) Dec-08 | Total Cr (mg/L) Dec-09 | Total Cr (mg/L) Dec-10 | Total Cr (mg/L) Dec-11 | Total Cr (mg/L) Dec-13 | Hex Cr. (mg/L) 2006 | Hex Cr. (mg/L) Dec-08 | Hex Cr. (mg/L) Dec-09 | Hex Cr. (mg/L) Dec-10 | Hex Cr. (mg/L) Dec-11 | Hex Cr. (mg/L) Dec-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Filtered | | | | | | | |
| 079-MW-13BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-A26D | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-A26T | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-W25D | 0.006 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 087-MW-W25T | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 090-MW-18BR | 0.345 | ND | ND | ND | ND | NS | 0.220 | ND | ND | ND | ND | NS |
| 117-MW-8BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 117-MW-D3 | ND | ND | 0.034 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 117-MW-I1 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 117-MW-I5 | 0.758 | 0.593 | 0.392 | 0.618 | 0.259 | 0.164 | 0.740 | 0.520 | 0.360 | 0.560 | 0.24 | 0.16 |
| 119-MW-01T | 0.013 | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 119-MW-02T | ND | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 119-MW-16BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 119-MW-2BR | ND | ND | ND | NA[1] | ND | ND | ND | ND | ND | NA[1] | ND | ND |
| 124-MW-102T | NA | ND | ND | ND | 0.021 | 0.036* | 0.012 | ND | ND | ND | 0.012 | 0.04* |
| 124-MW-104T | NA | ND | 0.053 | 0.050 | 0.057 | 0.092* | 0.141 | ND | 0.050 | 0.038 | 0.056 | 0.08* |
| 124-MW-106T | 0.077 | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 124-MW-107T | 0.041 | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 124-MW-8BR | ND | N/A | ND | ND | ND | 0.174 | ND | N/A | ND | ND | ND | ND |
| 124-MW-G02T | NA | ND | ND | ND | ND | ND* | ND | ND | ND | ND | ND | ND* |
| 140-MW-9BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| KP-MW-6BR | ND | ND | ND | ND | ND | NS | ND | ND | ND | ND | ND | NS |
| SA6-MW-14BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-15BR | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-AA1D | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SA6-MW-AA1T | 0.011 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 115-MW-E08TR | 37.700 | NS | NS | 11.300 | 12.200 | 14.10 | 39.100 | NS | NS | 11.600 | 12.0 | 14.6 |

Notes: NA[1]. Access to Society Hill property pending revised agreement.
NS Not Sampled
* - Sampled in May 2013

Table 5-3
Summary of Groundwater Quality Data from GWET Wells

| Parameter | 13-Mar-13 | | | 3-Jun-13 | | |
|---|---|---|---|---|---|---|
| | **PW-1** (ug/L) | **PW-2** (ug/L) | **115-MW-203BR** (ug/L) | **PW-1** (ug/L) | **PW-2** (ug/L) | **115-MW-203BR** (ug/L) |
| Benzene | 5.4 | 10.0 | ND | 3.9 | 5.5 | ND |
| Carbon Tetrachloride | 10.6 | 7.7 | 2.9 | 5.8 | 3.5 | 1.9 |
| Chloroform | 47.3 | 65.8 | 0.39J | 30.3 | 27.2 | ND |
| 1,1-Dichloroethene | 1.3 | ND | ND | 0.82J | ND | ND |
| cis-1,2-Dichloroethene | 250 | 30.2 | ND | 173 | 17.0 | ND |
| trans-1,2-Dichloroethene | 8.1 | 0.95J | ND | 5.8 | 0.47 | ND |
| Toluene | ND | ND | ND | ND | ND | ND |
| Trichloroethene | 179 | 125.0 | 0.25J | 118 | 63.3 | ND |
| 1,1-Dichloroethane | 0.74J | ND | ND | 0.47 | ND | ND |
| Methylene chloride | ND | 1.5 | ND | 1.3 | 0.76 | ND |
| Vinyl chloride | 16.7 | 10.5 | ND | 10.6 | 4.4 | ND |
| 1,2-Dichlorobenzene | 1.10 | ND | ND | 0.81 | ND | ND |
| Chlorobenzene | 0.64J | ND | ND | 0.48 | ND | ND |
| Ethylbenzene | ND | ND | ND | ND | ND | ND |
| Xylenes (total) | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND | ND | ND |
| Hexavalent Chromium | 34,100 | 10,600 | 15,600 | 34,000 | 13,000 | 15,700 |
| Total Chromium | 39,800 | 13,500 | 16,500 | 48,500 | 28,000 | 21,000 |

ND = Not detected above reporting limit.

J = estimated value.

Table 5-3 (continued)
Summary of Groundwater Quality Data from GWET Wells

| Parameter | 20-Sep-13 | | | 3-Dec-13 | | |
|---|---|---|---|---|---|---|
| | **PW-1** (ug/L) | **PW-2** (ug/L) | **115-MW-203BR** (ug/L) | **PW-1** (ug/L) | **PW-2** (ug/L) | **115-MW-203BR** (ug/L) |
| Benzene | 3.1 | 4.4 | ND | 3.4 | 5.2 | ND |
| Carbon Tetrachloride | 4.6 | 3.1 | 1.4 | 5.8 | 4.8 | 2.5 |
| Chloroform | 27.4 | 17.9 | ND | 31.0 | 16.8 | ND |
| 1,1-Dichloroethene | 0.55 | ND | ND | 0.07 | ND | ND |
| cis-1,2-Dichloroethene | 148 | 13.8 | ND | 135 | 12.3 | ND |
| trans-1,2-Dichloroethene | 4.5 | 0.76 | ND | 4.9 | 0.35 | ND |
| Toluene | ND | ND | ND | ND | ND | ND |
| Trichloroethene | 95.1 | 52.6 | ND | 113.0 | 63.0 | ND |
| 1,1-Dichloroethane | 0.45 | ND | ND | 0.47 | ND | ND |
| Methylene chloride | 0.84 | ND | ND | 0.87 | 0.31 | ND |
| Vinyl chloride | 12.6 | ND | ND | 14.2 | 4.8 | ND |
| 1,2-Dichlorobenzene | 0.66 | ND | ND | 0.72 | ND | ND |
| Chlorobenzene | 0.38 | ND | ND | 0.39 | ND | ND |
| Ethylbenzene | ND | ND | ND | ND | ND | ND |
| Xylenes (total) | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | ND | ND | ND | ND | ND | ND |
| Hexavalent Chromium | 38,200 | 11,400 | 16,700 | 39,600 | 11,300 | 16,500 |
| Total Chromium | 39,900 | 13,500 | 17,000 | 34,200 | 10,600 | 14,900 |

ND = Not detected above reporting limit.

J = estimated value.

**Table 6-1**
**Summary of S-3 Injection Events**
**Through 2013**

| Event # | Injection Dates | Injection Well | Injection History | Volume Calmet Injected (gallons) | Volume Water Injected (gallons) | Average Injection Rate (gpm) | Pressurization Required (psi) |
|---|---|---|---|---|---|---|---|
| 1 | 05/20/12 | 088-IW-01 | First | 4,291 | 9,135 | 9.0 to 10.9 | 0 |
| 2 | 07/01/12 | 088-IW-02 | First | 4,267 | 9,000 | 10.0 | 0 |
| 3 | 08/20/12 | 115-PW-21 | First | 4,350 | 9,440 | 12.0 | 0 |
| 4 | 10/01/12 | 115-DP-2 | First | 4,340 | 9,022 | 10-11.5 | 3 to 5 |
| 5 | 12/09/12 | 088-IW-02 | Second | 4,230 | 9,006 | 11-12.5 | 0 to 2 |
| 6 | 03/17/13 | 088-IW-01 | Second | 4,305 | 9,027 | 5.0 to 10.0 | 0 |
| 7 | 06/23/13 | 088-IW-03 | First | 4,320 | 9,007 | 7.0 to 11.5 | 0 to 4 |
| 8 | 08/18/13 | 088-IW-02 | Third | 4,171 | 8,400 | 10 to 12 | 0 |
| 9 | 09/22/13 | 088-IW-01 | Third | 4,242 | 8,500 | 7 to 10 | 0 |
| 10 | 10/20/13 | 088-IW-03 | Second | 3,954 | 7,950 | 6 to 9 | 4 to 7 |
| 11 | 12/08/13 | 088-IW-02 | Fourth | 4,080 | 8,200 | 10.0 | 2 to 7 |

## Table 6-2
## Calculation of Percent Sulfide in CaSx Samples

| Event | Product Name | CaSx Manufacturer | Sulfide % T-1 | Sulfide % T-2 | Sulfide % T-3 | Sulfide % Geometric Mean |
|---|---|---|---|---|---|---|
| 1 | Calmet | TKI | 5.10 | 4.91 | 5.01 | 5.01 |
| 2 | Calmet | TKI | 5.31 | 5.12 | 5.44 | 5.29 |
| 3 | Calmet | TKI | 5.19 | 5.25 | 5.19 | 5.21 |
| 4 | Calmet | TKI | 5.48 | 5.41 | 5.45 | 5.45 |
| 5 | Calcium Polysulfide | Graus | 6.48 | 6.48 | 6.56 | 6.51 |
| 6 | Calcium Polysulfide | Graus | 4.30 | 4.31 | 4.33 | 4.31 |
| 7 | Calcium Polysulfide | Graus | 3.84 | 3.84 | 4.06 | 3.91 |
| 8 | Calcium Polysulfide | Graus | 5.12 | 5.48 | 5.40 | 5.33 |
| 9 | Calcium Polysulfide | Graus | 5.08 | 4.88 | 4.92 | 4.96 |
| 10 | Calcium Polysulfide | Graus | 5.17 | 5.13 | 5.16 | 5.15 |
| 11 | Calcium Polysulfide | Graus | 5.18 | 5.13 | 5.11 | 5.14 |

TKI = ′TKI = Tessenderlo Kerley, Inc.
Graus ·Graus = Graus Chemicals
T- Trij T- Triplicate #

**Table 6-3**
**Summary of Stoichiometriclly Equivalent Cr(VI) Mass Reduced**
**S-3 Injection/Mass Removal Program**

| Event # | Injection Date | Injection Well | Mass CaSx Delivered (tons) | Volume CaSx Injected[(a)] (gallons) | Geometric mean [(b)] Sulfide % | Stoichiometric Equivalent Mass Cr(VI) Reduced[(c)] (tons) | Cumulative Stoichiometric Equivalent Mass Cr(VI) Reduced (tons) |
|---|---|---|---|---|---|---|---|
| 1 | 5/20/12 | 088-IW-01 | 22.53 | 4,291 | 5.01% | 1.22 | 1.22 |
| 2 | 7/1/12 | 088-IW-02 | 22.40 | 4,267 | 5.29% | 1.28 | 2.50 |
| 3 | 8/20/12 | 115-PW-21 | 22.84 | 4,350 | 5.21% | 1.29 | 3.79 |
| 4 | 10/1/12 | 115-DP-2 | 22.79 | 4,340 | 5.45% | 1.34 | 5.13 |
| 5 | 12/9/12 | 088-IW-02 | 22.42 | 4,230 | 6.51% | 1.58 | 6.71 |
| 6 | 3/17/13 | 088-IW-01 | 22.60 | 4,305 | 4.31% | 1.05 | 7.76 |
| 7 | 6/23/13 | 088-IW-03 | 22.68 | 4,320 | 3.91% | 0.96 | 8.72 |
| 8 | 08/18/13 | 088-IW-02 | 22.13 | 4,171 | 5.33% | 1.28 | 9.99 |
| 9 | 09/22/13 | 088-IW-01 | 22.27 | 4,242 | 4.96% | 1.19 | 11.19 |
| 10 | 10/20/13 | 088-IW-03 | 20.76 | 3,954 | 5.15% | 1.16 | 12.34 |
| 11 | 12/08/13 | 088-IW-02 | 21.43 | 4,080 | 5.14% | 1.19 | 13.53 |

(a) Mass CaSx Delivered / CaSx density

(b) see Table 6.2

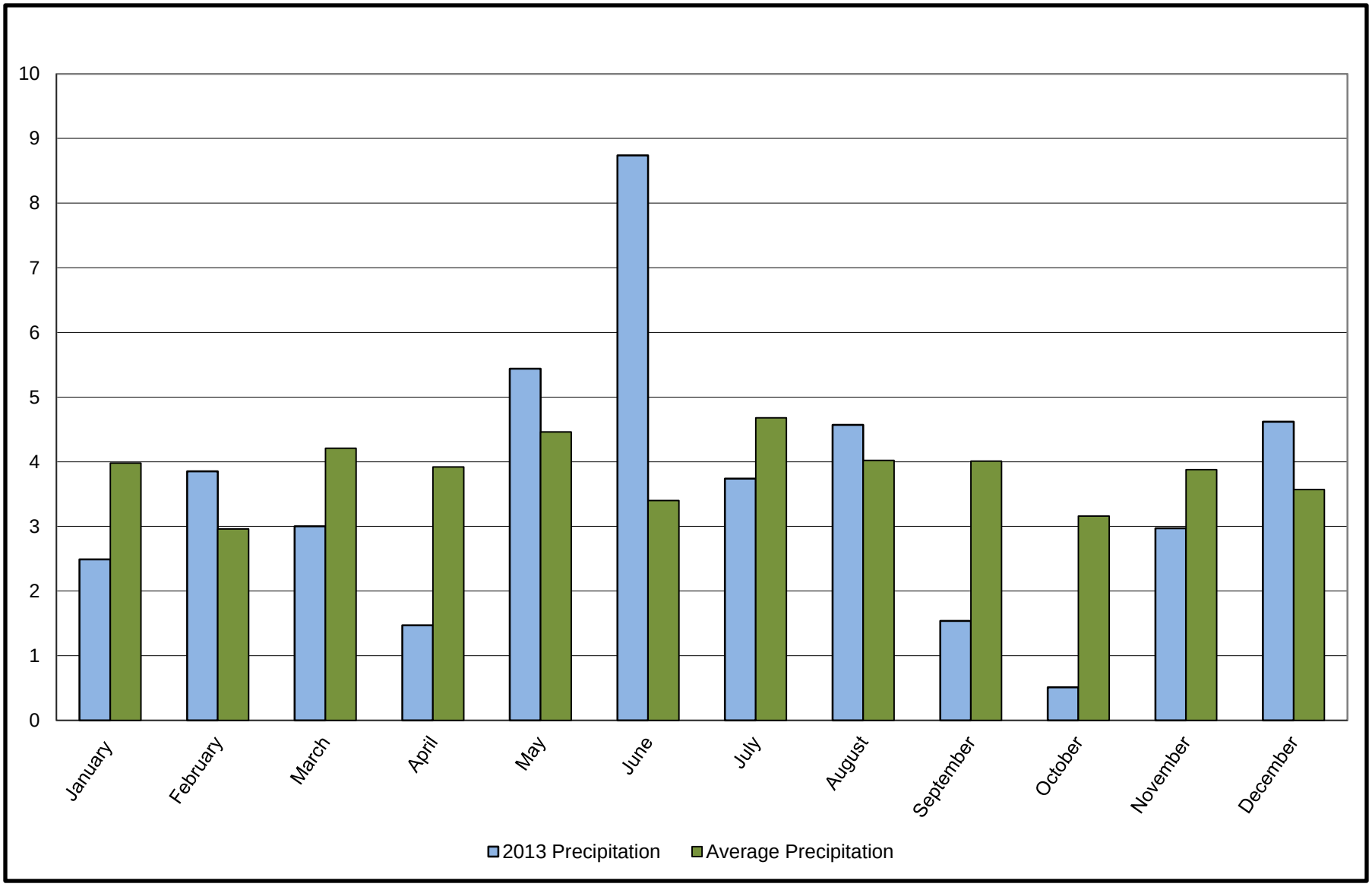
(c) Mass CaSx Delivered × Sulfide% × (51.996/32.065) / 1.5;

The factor 1.5 represents the molar ratio of S(–II) to Cr(VI) in the balanced redox reaction:

$1.5CaS_{4.2} + CrO_4^{2-} + 5H^+ = Cr(OH)_3(s) + 6.3S(s) + 1.5Ca^{2+} + H_2O$

51.996 and 32.065 are the atomic masses of Cr and S, respectively

# FIGURES

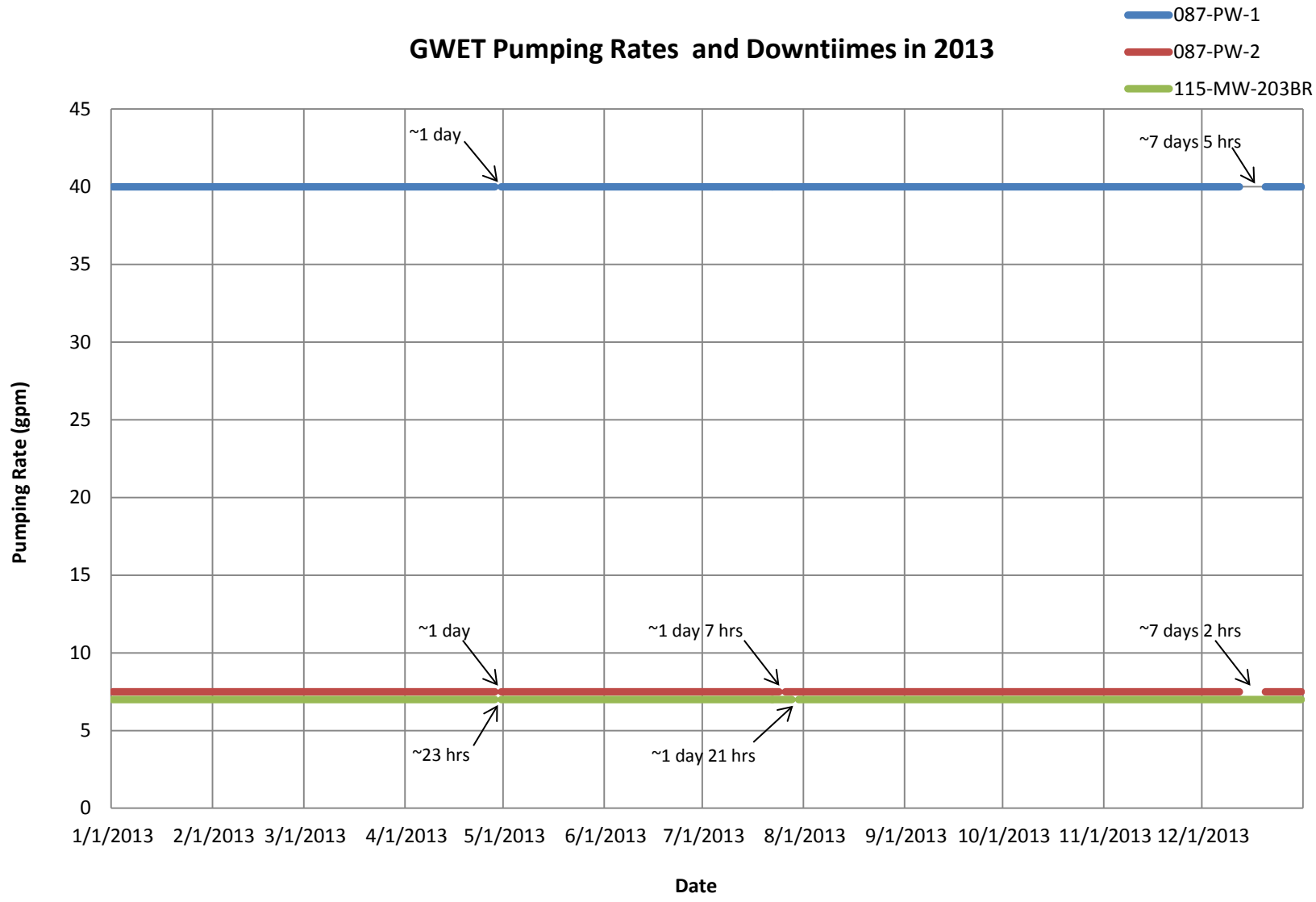



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
2013 Monthly Precipitation

Figure 2-1

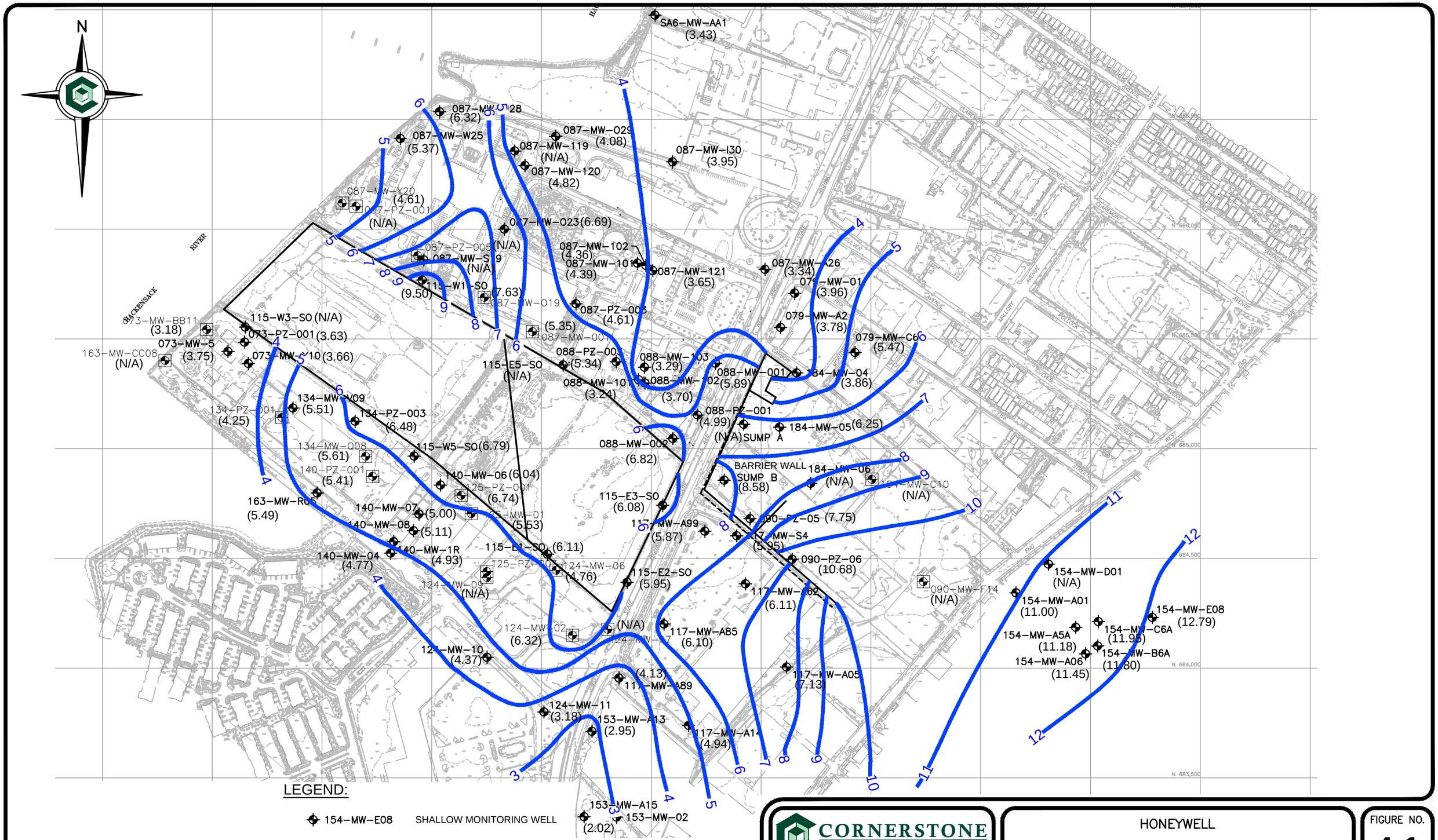



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
GWET Pumping Rates and Downtime in 2013

Figure 3-1




CORNERSTONE Environmental Group, LLC

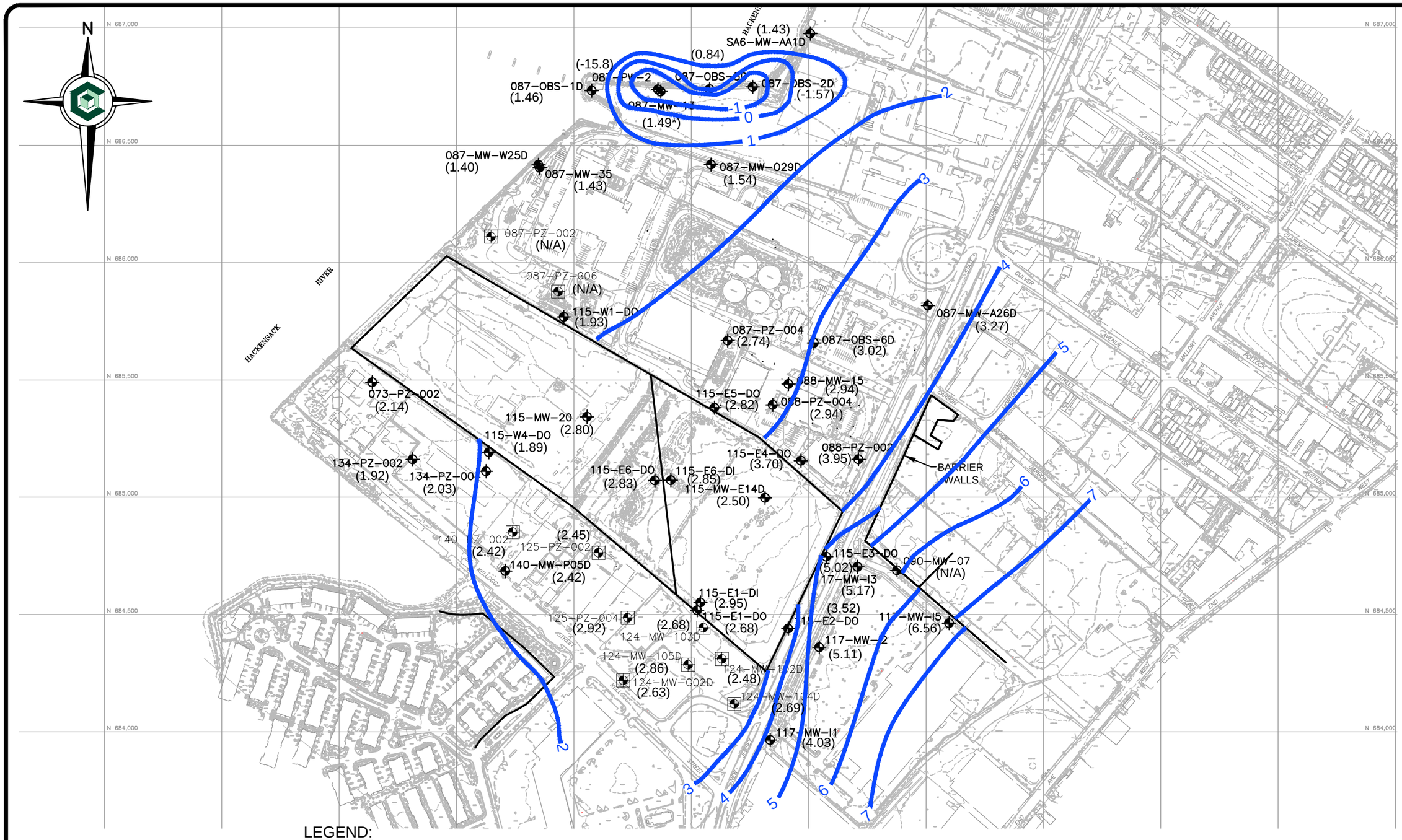


HONEYWELL

**GROUNDWATER ELEVATION CONTOURS SHALLOW ZONE SEPTEMBER 16, 2013**

FIGURE NO. **4-1**

PROJECT NO.




LEGEND:

| | |
|---|---|
| 087-MW-029D | INTERMEDIATE ZONE MONITORING WELL |
| 154-MW-E08 | ABANDONED WELL |
| | GROUND WATER CONTOUR |
| (2.63) | GROUND WATER ELEVATION |
| * | DATA SUSPECT - NOT USED IN CONTOURING |

0 400 800

SCALE IN FEET

CORNERSTONE Environmental Group, LLC



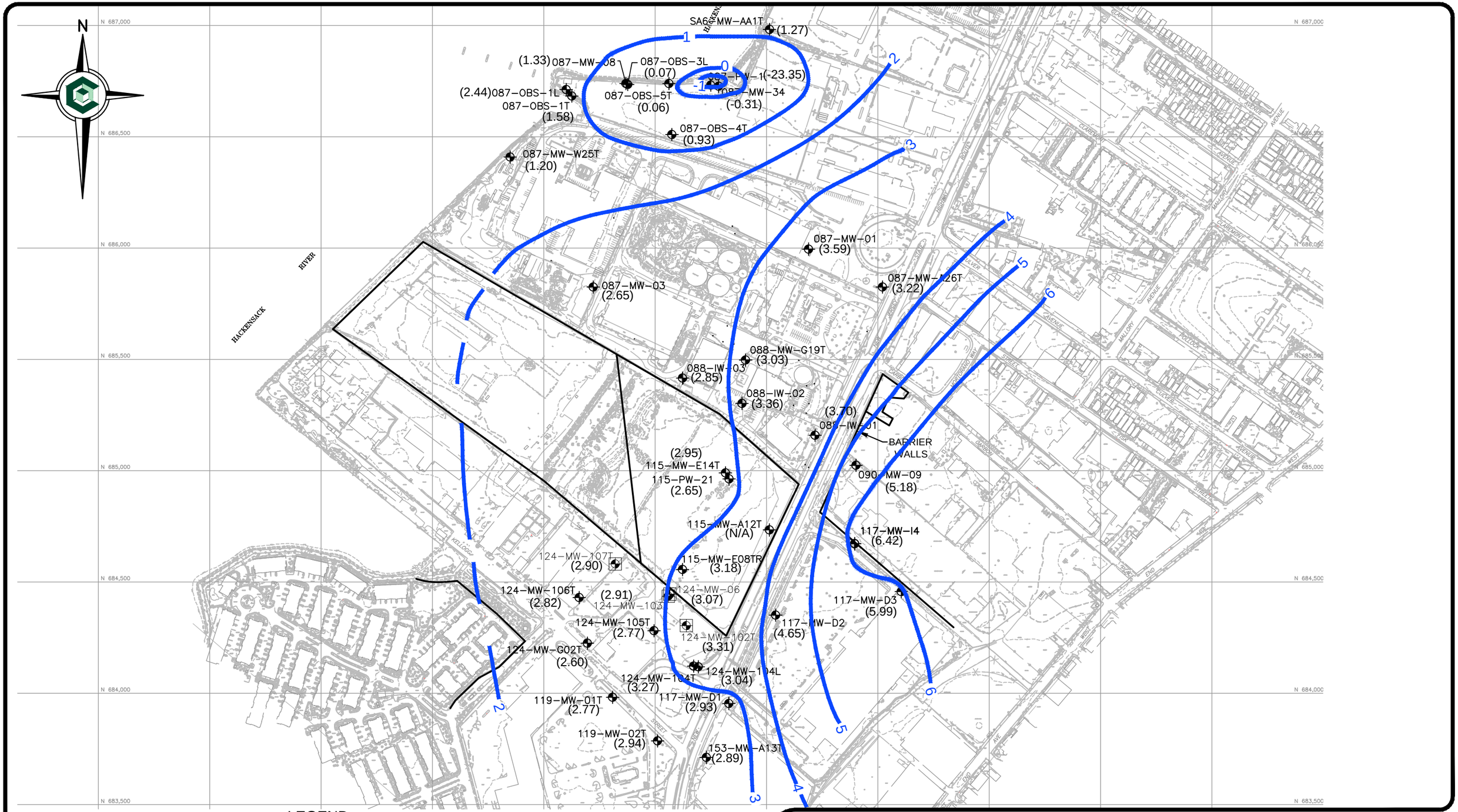
HONEYWELL

# GWET LTMP
# GROUNDWATER ELEVATION CONTOURS
# INTERMEDIATE ZONE SEPTEMBER 16, 2013

FIGURE NO. 4-2

PROJECT NO.

File: X:\PROJECTS\HONEYWELL\090354 - SA7_PROJECT DRAWINGS\2013- 4Q - Annual Figures 031814\MIHONSF-A-1b.dwg Layout: FIGURE 4-2 INTERMEDIATE ZONE User: blayne.gibbons Mar 24, 2014 - 9:43a




LEGEND:

- 087-MW-029D — DEEP ZONE MONITORING WELL
- 087-MW-029D — ABANDONED WELL
- GROUND WATER CONTOUR
- (3.18) — GROUND WATER ELEVATION

0 400 800

SCALE IN FEET

CORNERSTONE Environmental Group, LLC



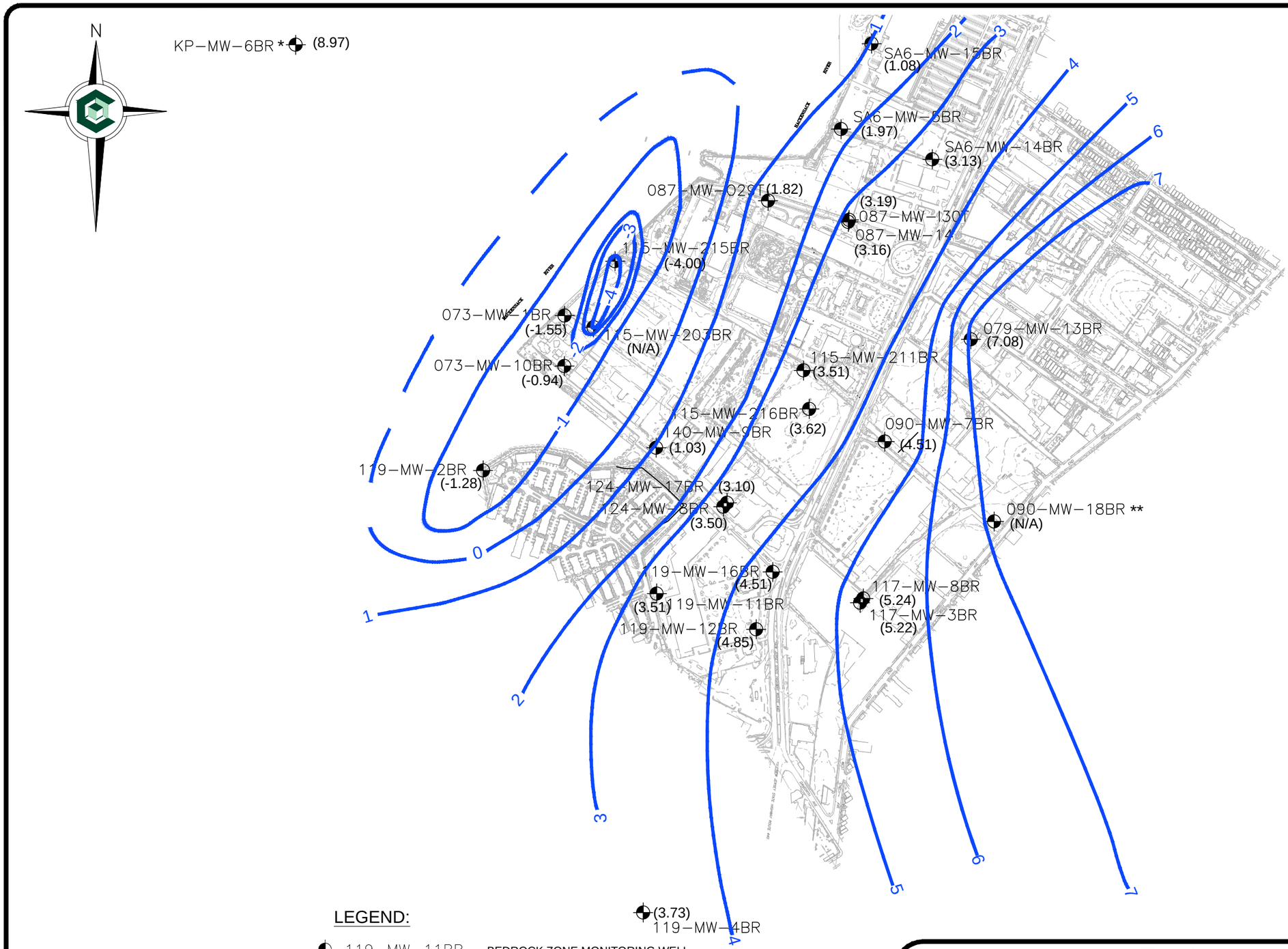
HONEYWELL

# GWET LTMP
# GROUNDWATER ELEVATION CONTOURS
# DEEP ZONE SEPTEMBER 16, 2013

FIGURE NO. 4-3

PROJECT NO.

File: X:\PROJECTS\HONEYWELL\090354 - SA7_PROJECT DRAWINGS\2013- 4Q - Annual Figures 03181 4\MIHONSF-A-1c.dwg Layout: FIGURE A-1c User: blayne.gibbons Mar 24, 2014 - 10:16am




LEGEND:

| | |
|---|---|
| 119–MW–11BR | BEDROCK ZONE MONITORING WELL |
| * | INOPERATIVE IN 2013: STATUS UNDER EVALUATION |
| ** | ABANDONED BY NJCU CONTRACTORS: STATUS UNDER EVALUATION |
| | GROUND WATER CONTOUR |
| (3.18) | GROUND WATER ELEVATION |

0 750 1500

SCALE IN FEET

CORNERSTONE Environmental Group, LLC



HONEYWELL

**GWET LTMP**
**GROUNDWATER ELEVATION CONTOURS**
**BEDROCK ZONE SEPTEMBER 16, 2013**

FIGURE NO.
**4-4**
PROJECT NO.

ELEVATION IN FEET ABOVE MEAN SEA LEVEL

20
0
-20
-40
-60
-80
-100

087-MW-35
087 MW-W25S, D,T
087-OBS-1D, L, T
087-OBS-3L
087-MW-13
087-MW-08
087-PW-2
087-OBS-5D
087-OBS-5T
087-OBS-2D
087-MW-34
087-PW-1
SA6-MW-5BR
SA6-MW-AA1, D, T

FISK STREET
OUTFALL

25S (5.37)
5
4
3
2
35 (1.43)
1D (1.46)
13 (1.49)
1
5D (1.16)
AA1 (3.43)
AA1D (1.43)
(-15.83)
0
-1
-2
-2
-1
0
(-1.57)
(-23.35)
25D (1.40)
1L (2.44)
3L (-0.09)
(-0.31)
AA1T (1.97)
2
5T (0.06)
25T (1.20)
1T (1.58)
08 (1.33)
1
5BR (1.57)

0 100 200
SCALE IN FEET

LEGEND:

- FILL
- MEADOW MAT
- FINE TO MEDIUM SAND
- FINE, MEDIUM TO COARSE SAND
- INTERBED SILTS AND CLAYS
- GLACIAL TILL
- PASSAIC FORMATION
- FINE TO VERY FINE SAND

087-MW-W25T WELL DESIGNATION

GROUND SURFACE

25T SCREENED INTERVAL

CORNERSTONE
Environmental Group, LLC

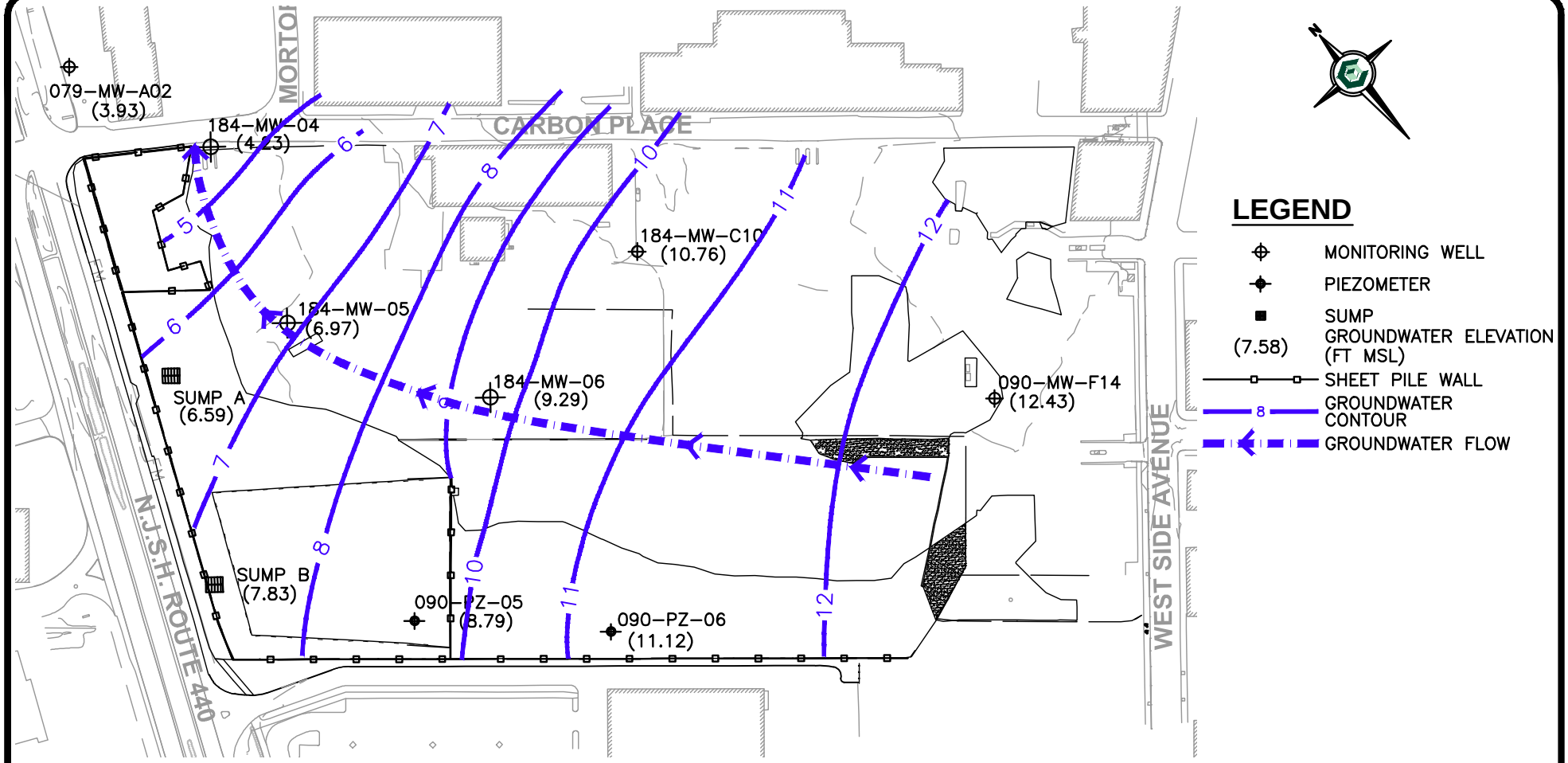


HONEYWELL

**GROUNDWATER ELEVATIONS IN CROSS-SECTION SEPTEMBER 16, 2013**

FIGURE NO.
**4-5**
PROJECT NO.

File: X:\PROJECTS\HONEYWELL\100241 – SA5 100414\Post-remedy Evaluation\RTC-2014\MAPS\FIG 4-6 SHALLOW GW CONTS 032112.dwg Layout: BASEMAP User: magda.mendola Mar 18, 2014 – 2:15pm




CORNERSTONE
Environmental Group, LLC

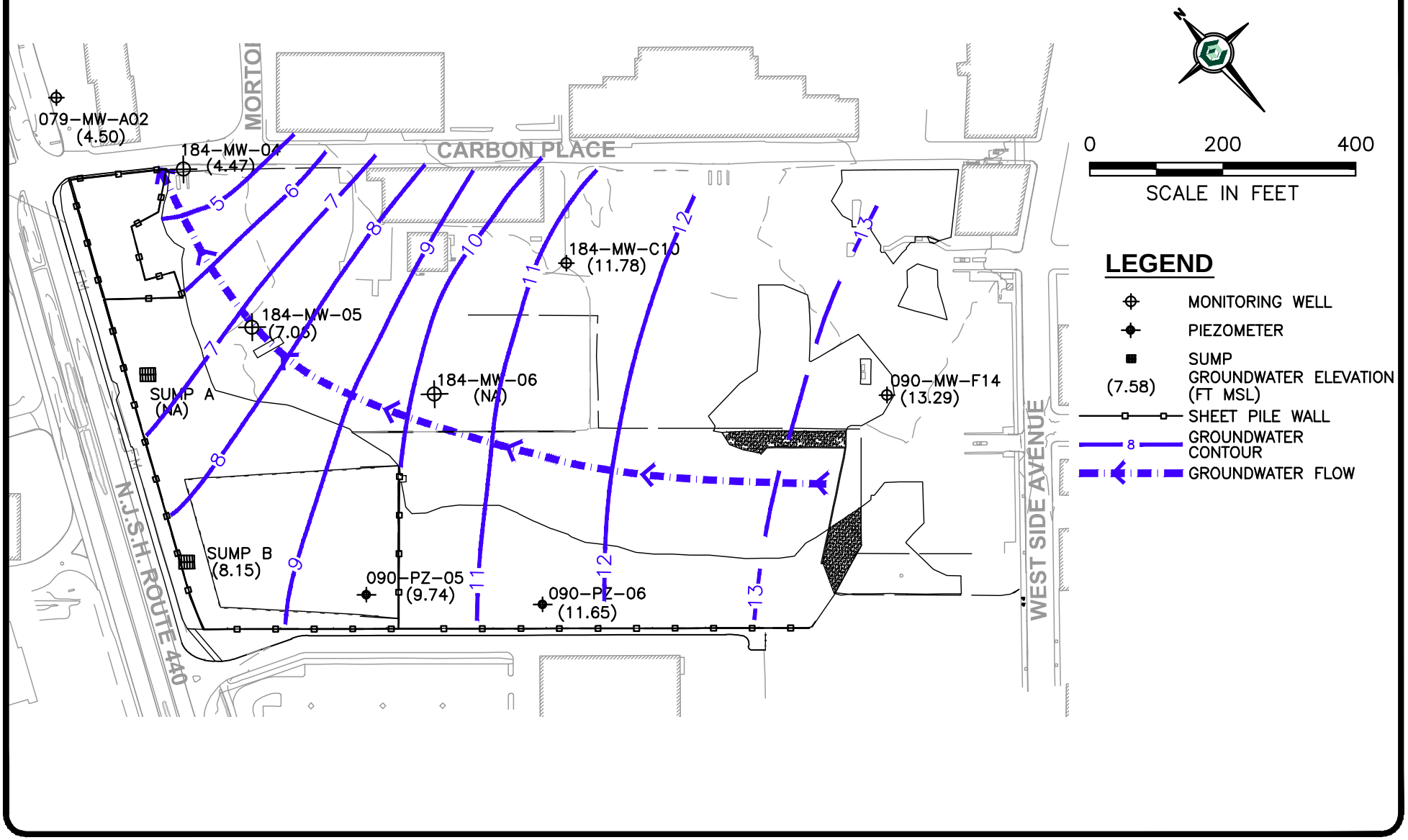


SA-5 / NJCU

# GROUNDWATER ELEVATION CONTOURS SHALLOW ZONE - MARCH 2013

FIGURE NO.
**4-6**
PROJECT NO.
100414.02

File: X:\PROJECTS\HONEYWELL\100241 – SA5 100414\Post-remedy Evaluation\RTC-2014\MAPS\FIG 4-7 SHALLOW GW CONTS 061212.dwg Layout: SHALLOW 061212 User: magda.mendola Mar 18, 2014 – 2:16pm




CORNERSTONE
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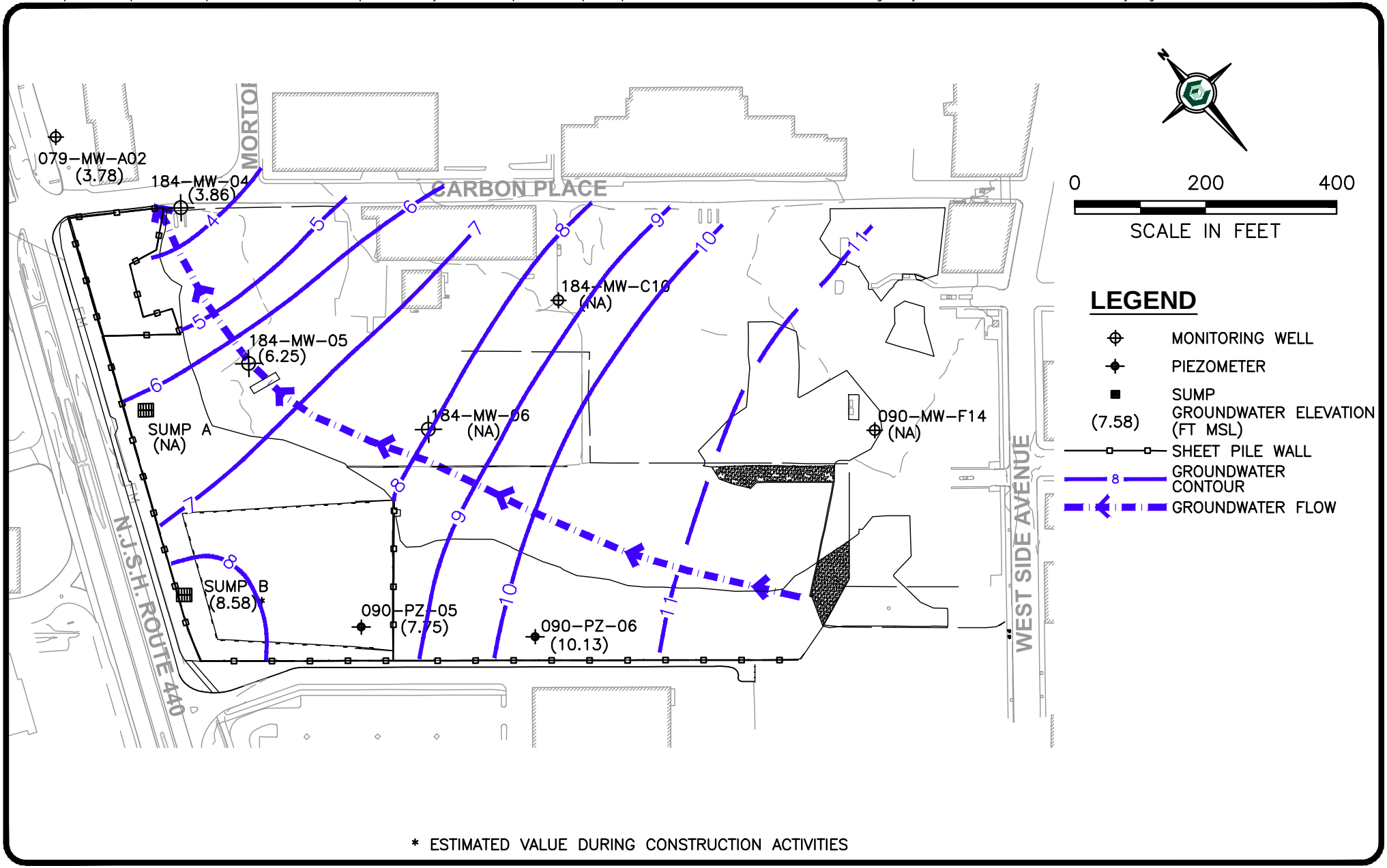
SA-5 / NJCU

# GROUNDWATER ELEVATION CONTOURS SHALLOW ZONE - JUNE 2013

FIGURE NO.
**4-7**
PROJECT NO.
100414.02




* ESTIMATED VALUE DURING CONSTRUCTION ACTIVITIES

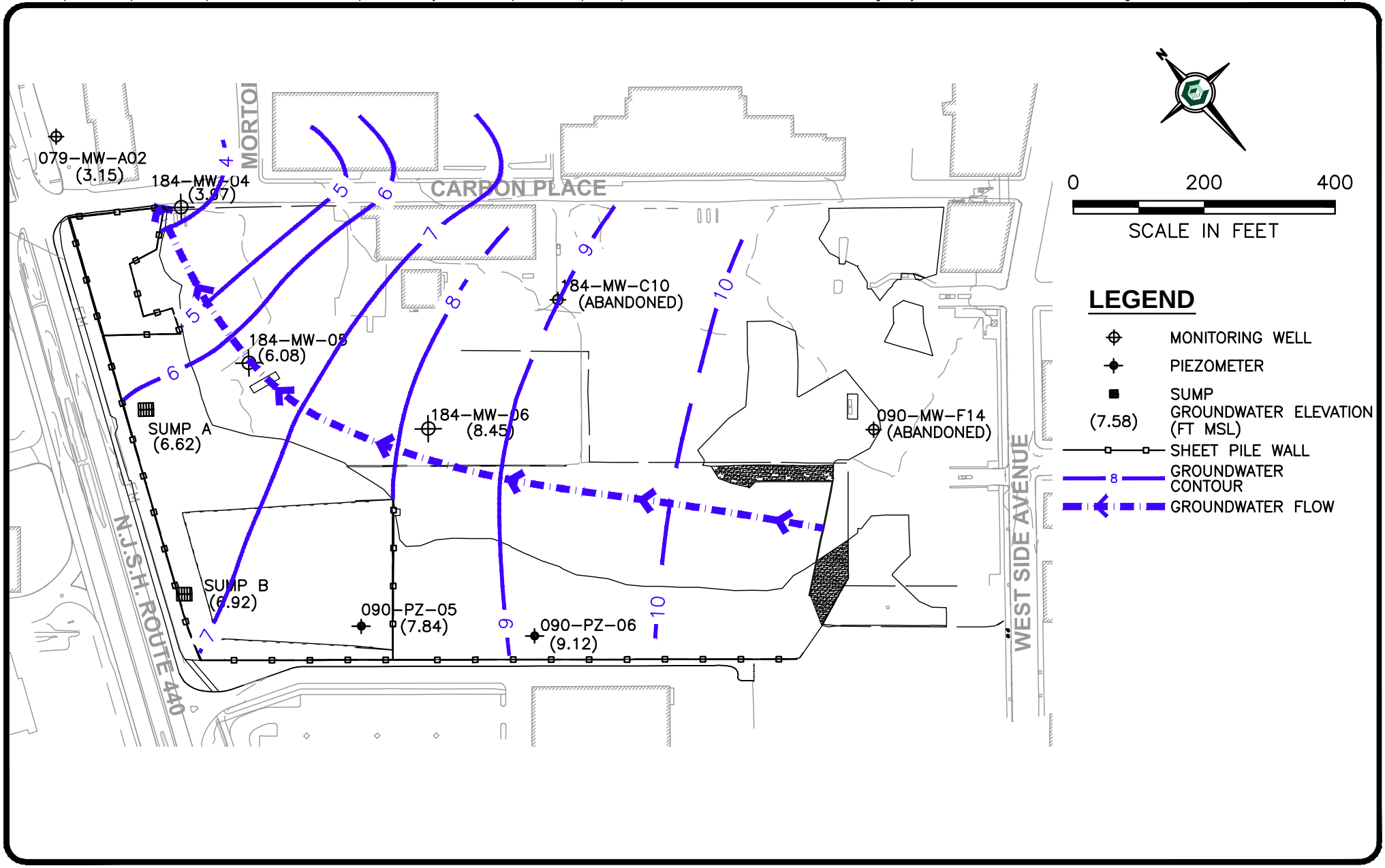
CORNERSTONE
Environmental Group, LLC



SA-5 / NJCU

# GROUNDWATER ELEVATION CONTOURS SHALLOW ZONE - SEPTEMBER 2013

FIGURE NO.
**4-8**
PROJECT NO.
100414.03




CORNERSTONE
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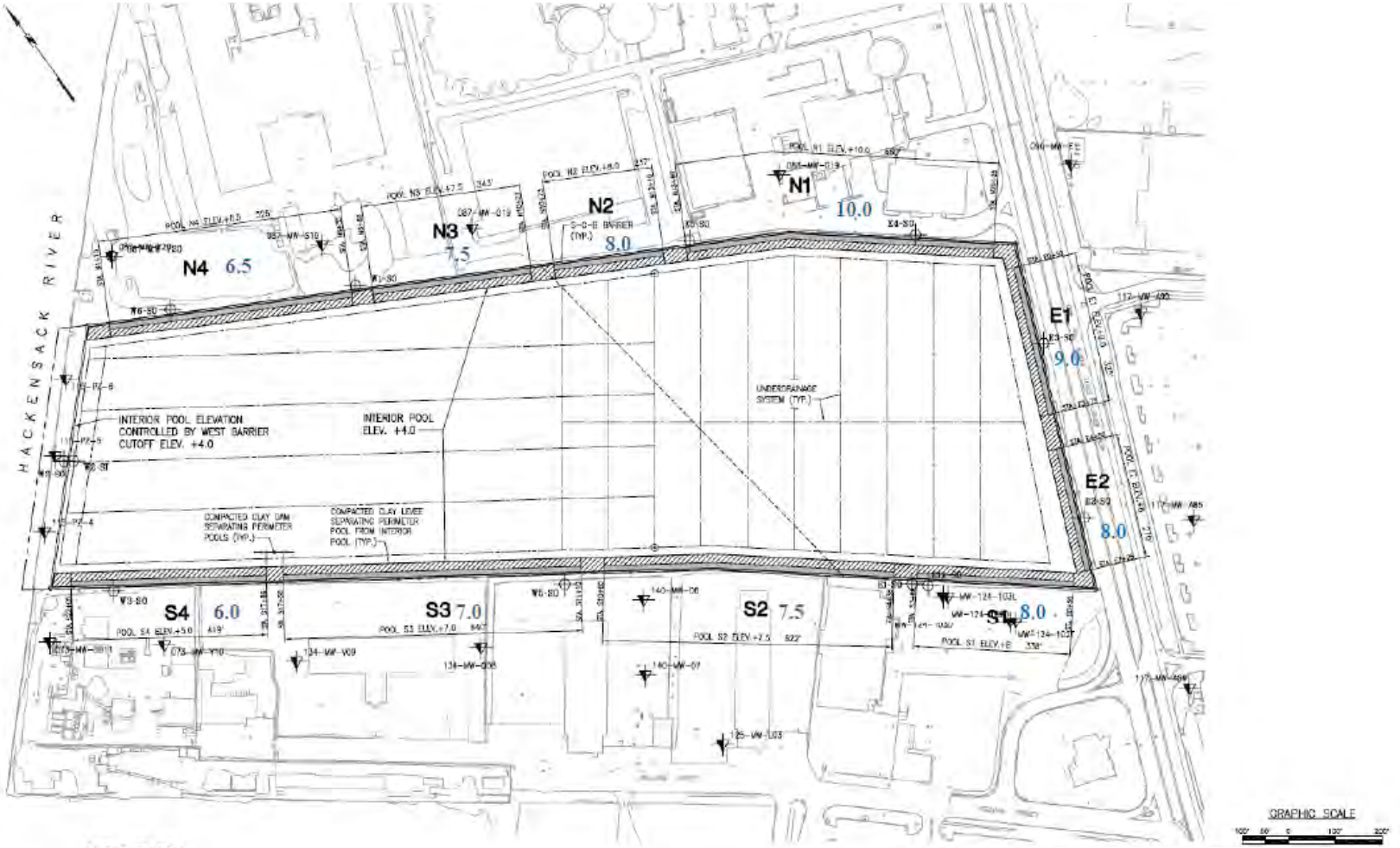
SA-5 / NJCU

# GROUNDWATER ELEVATION CONTOURS SHALLOW ZONE - DECEMBER 2013

FIGURE NO.
**4-9**
PROJECT NO.
100414.03




LEGEND:

N2 – Perimeter Pool

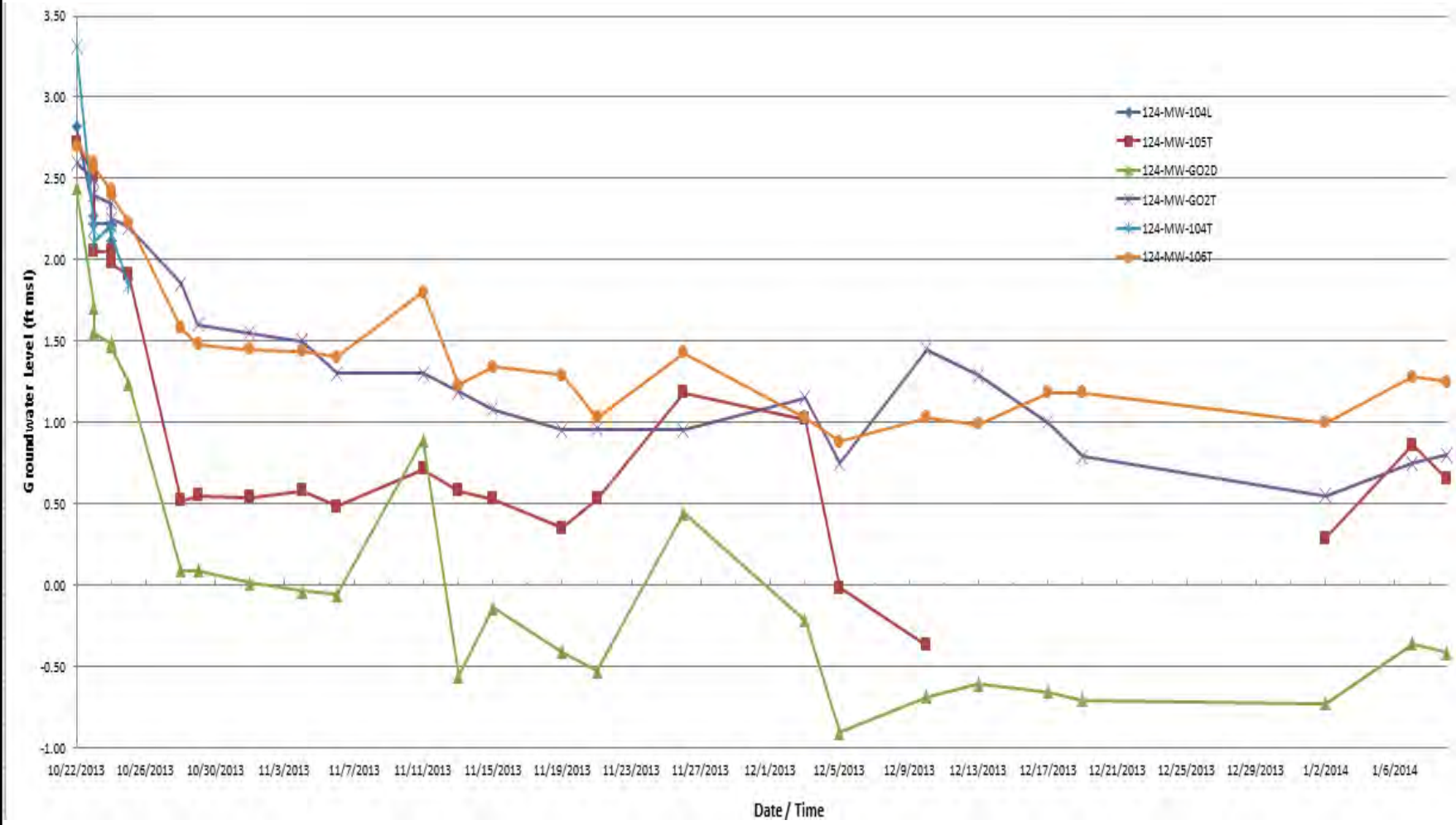
8.0 – Design Elevation of Perimeter Pool Water Level (ft, msl)

CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Location of SA-7 Perimeter Pools

Figure 4-10

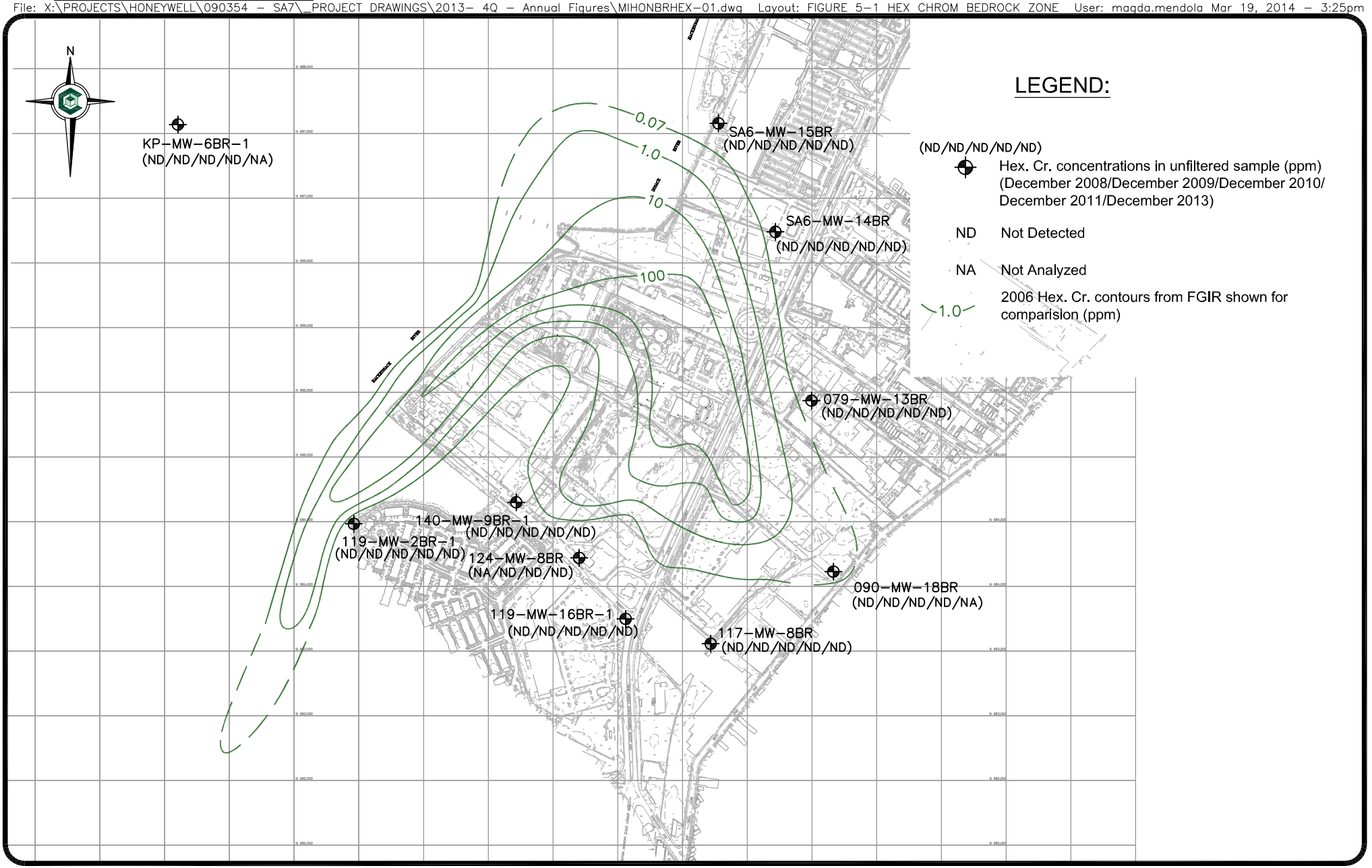



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Drawdown in Intermediate Zone
Depressurization Pumping at SA-6 South

Figure
4-11




0 1000 2000

SCALE IN FEET

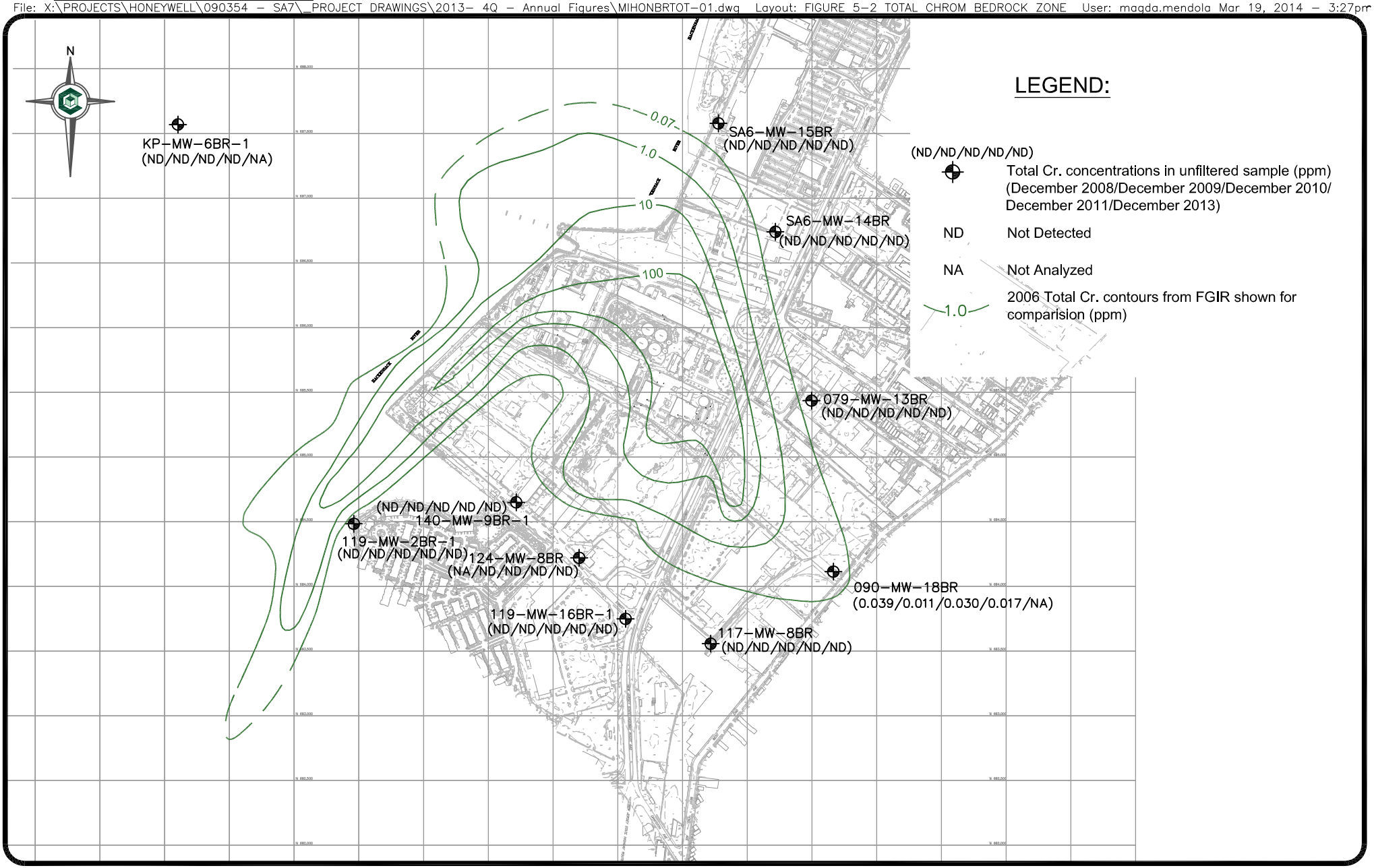
CORNERSTONE Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Hexavalent Chromium Concentrations in Bedrock Groundwater

FIGURE NO.
**5-1**
PROJECT NO.
120040




0 1000 2000

SCALE IN FEET

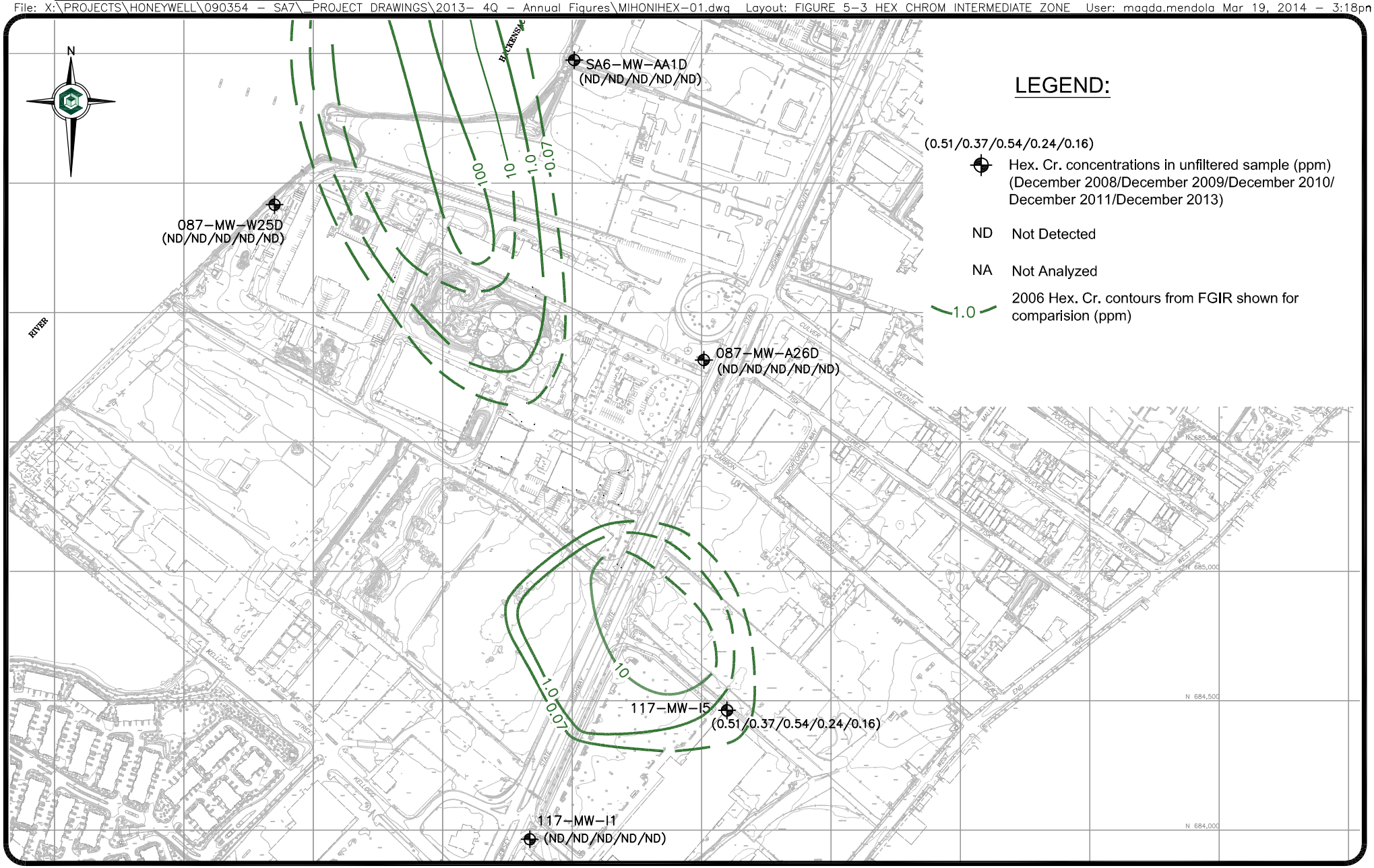
CORNERSTONE
Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Total Chromium Concentrations in Bedrock Groundwater

FIGURE NO.
**5-2**
PROJECT NO.
120040




0 500 1000

SCALE IN FEET

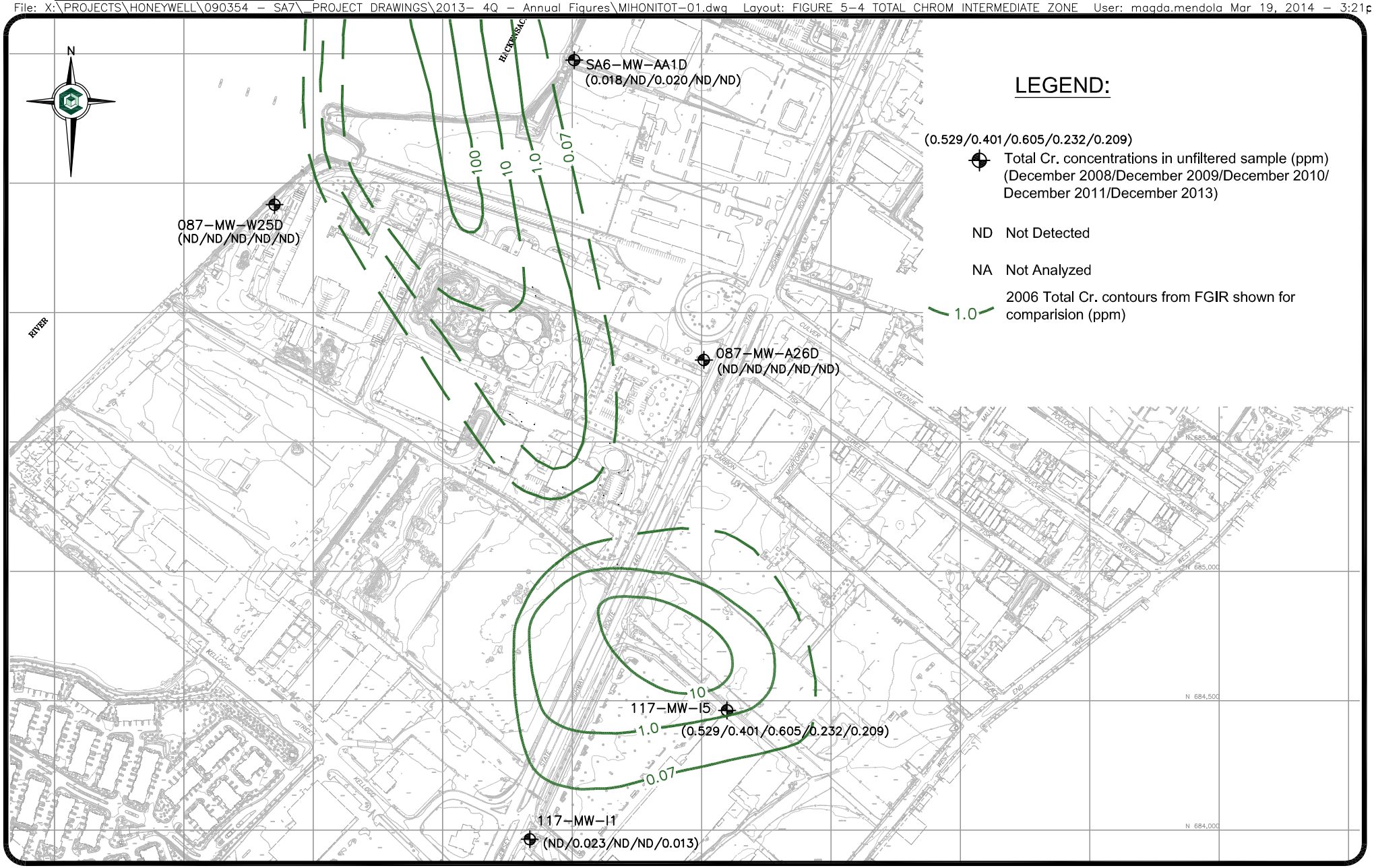
CORNERSTONE
Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Hexavalent Chromium Concentrations in Intermediate Zone Groundwater

FIGURE NO.
**5-3**
PROJECT NO.
120040




0 500 1000

SCALE IN FEET

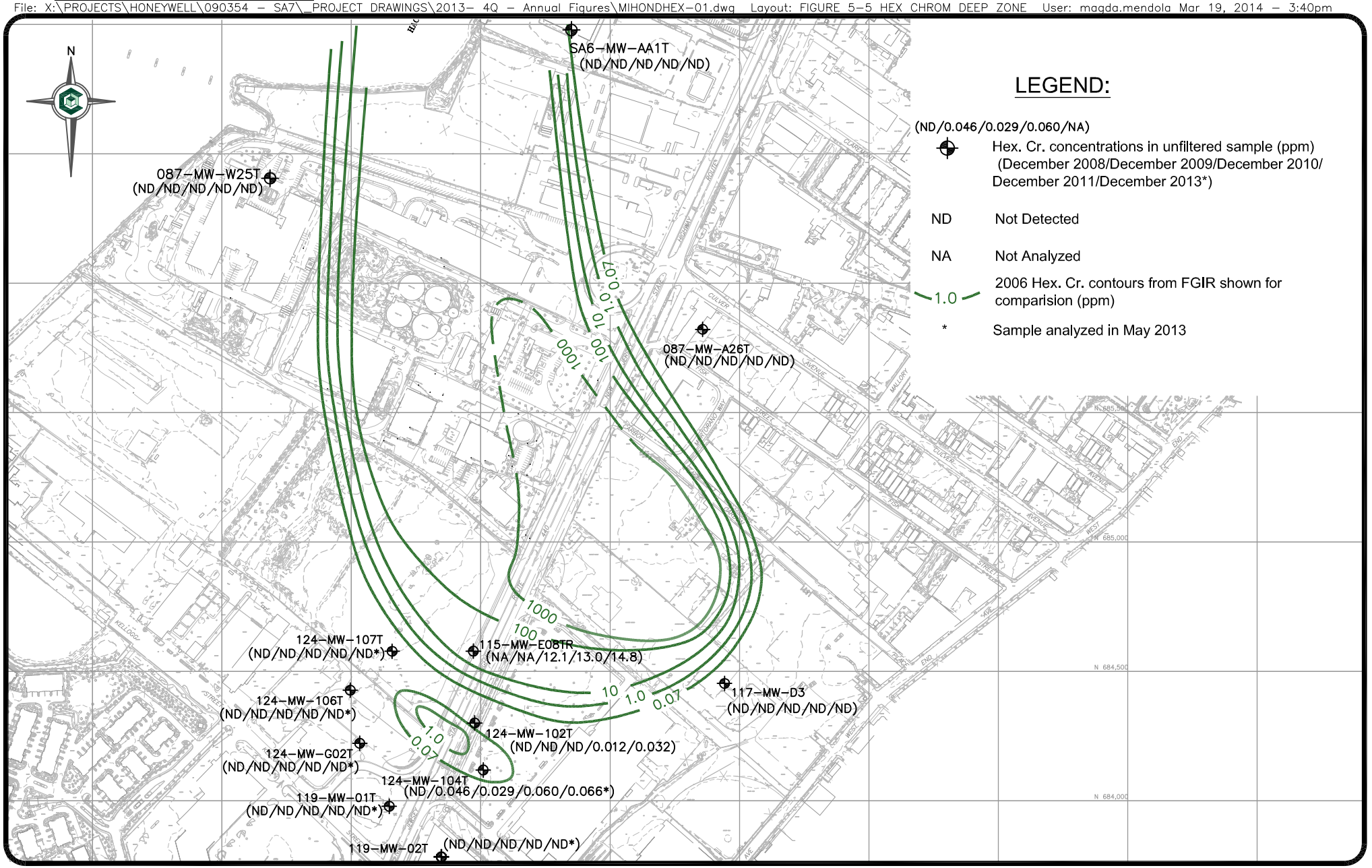
CORNERSTONE
Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Total Chromium Concentrations in Intermediate Zone Groundwater

FIGURE NO.
**5-4**
PROJECT NO.
120040




## LEGEND:

(ND/0.046/0.029/0.060/NA) Hex. Cr. concentrations in unfiltered sample (ppm) (December 2008/December 2009/December 2010/ December 2011/December 2013*)

ND Not Detected

NA Not Analyzed

1.0 2006 Hex. Cr. contours from FGIR shown for comparision (ppm)

* Sample analyzed in May 2013

0 500 1000

SCALE IN FEET

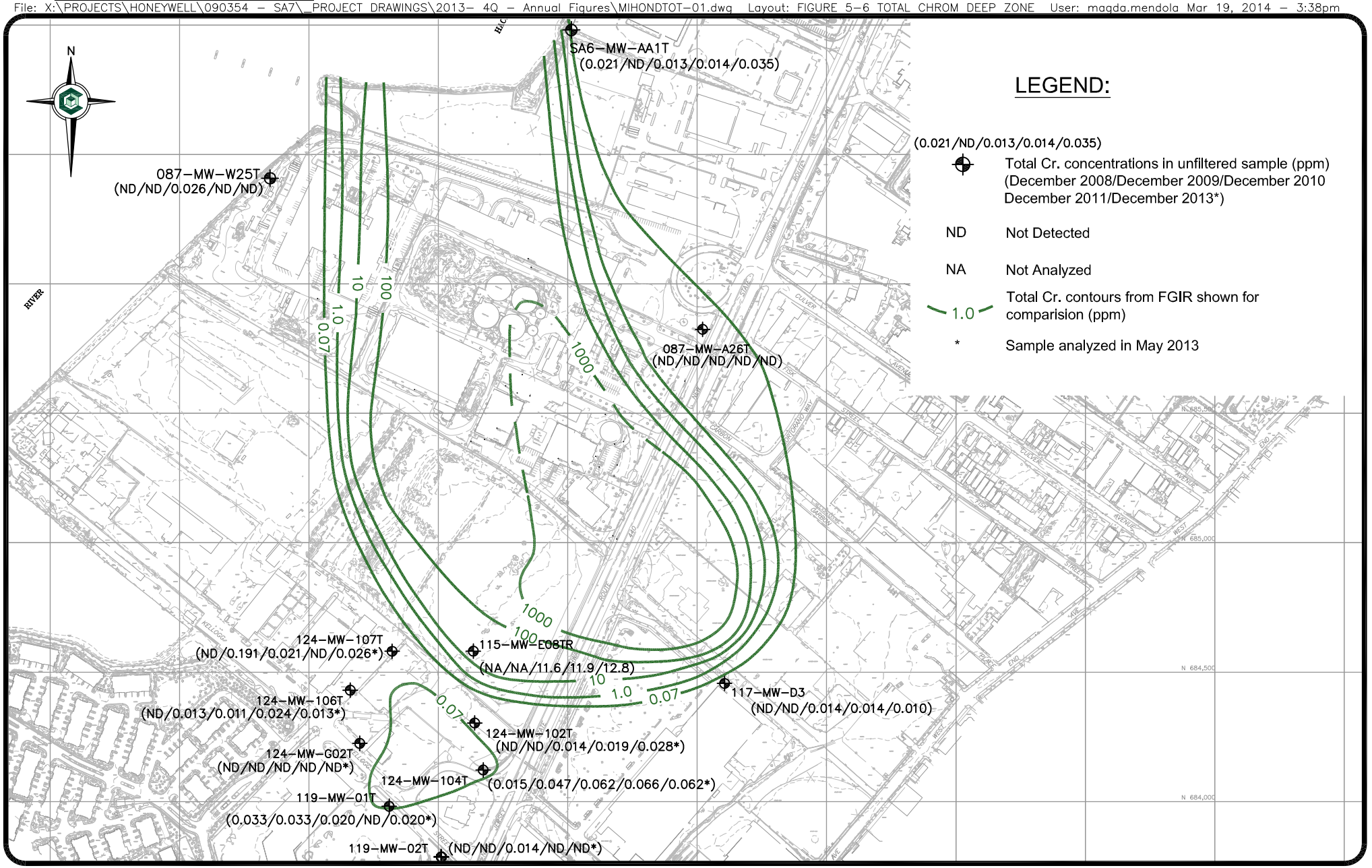
CORNERSTONE Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Hexavalent Chromium Concentrations in Deep Groundwater

FIGURE NO.
**5-5**
PROJECT NO.
120040




## LEGEND:

(0.021/ND/0.013/0.014/0.035) — Total Cr. concentrations in unfiltered sample (ppm) (December 2008/December 2009/December 2010 December 2011/December 2013*)

ND — Not Detected

NA — Not Analyzed

1.0 — Total Cr. contours from FGIR shown for comparision (ppm)

* — Sample analyzed in May 2013

0 500 1000

SCALE IN FEET

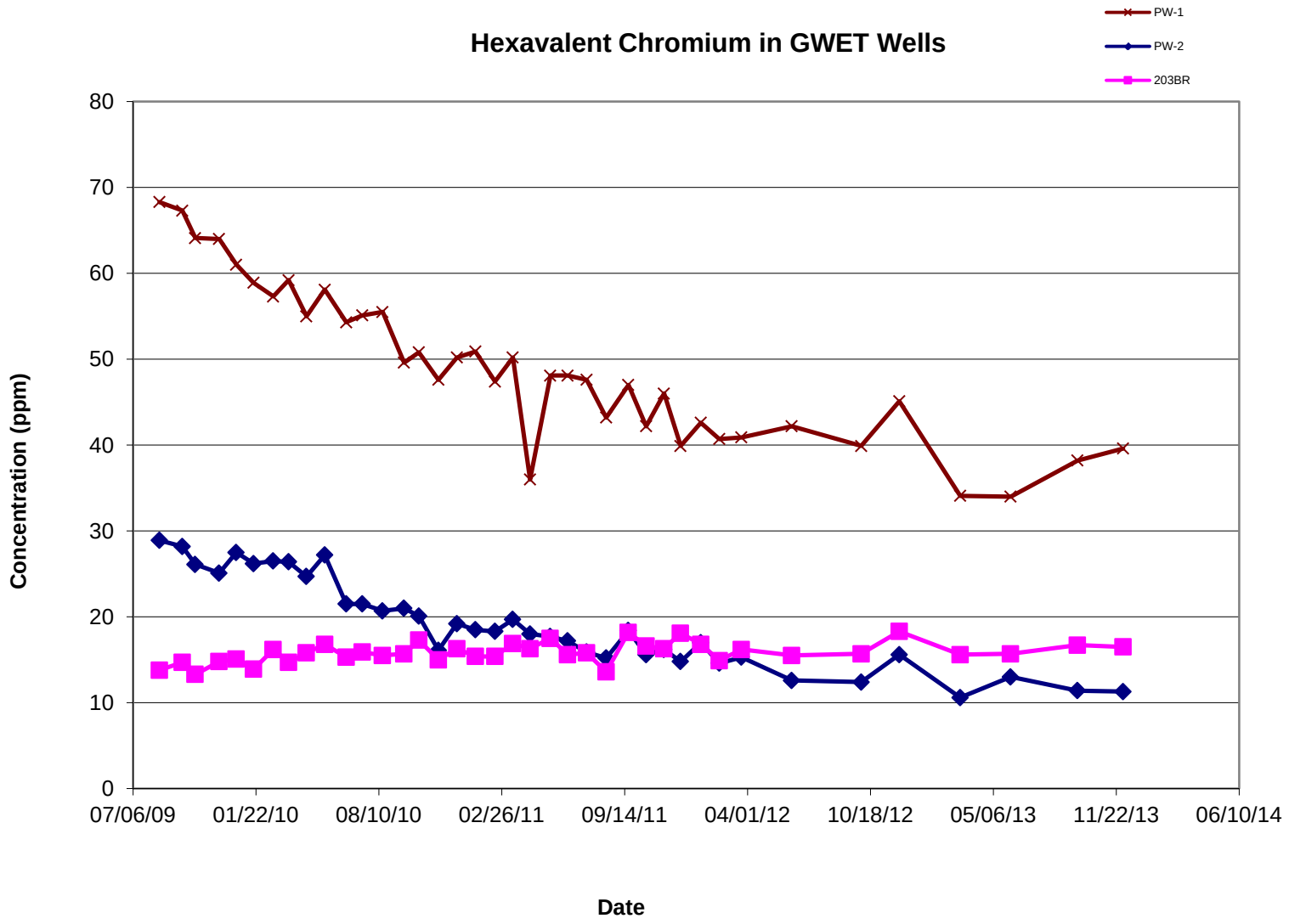
CORNERSTONE Environmental Group, LLC



HONEYWELL
STUDY AREA 7

# Total Chromium Concentrations in Deep Groundwater

FIGURE NO.
**5-6**
PROJECT NO.
120040

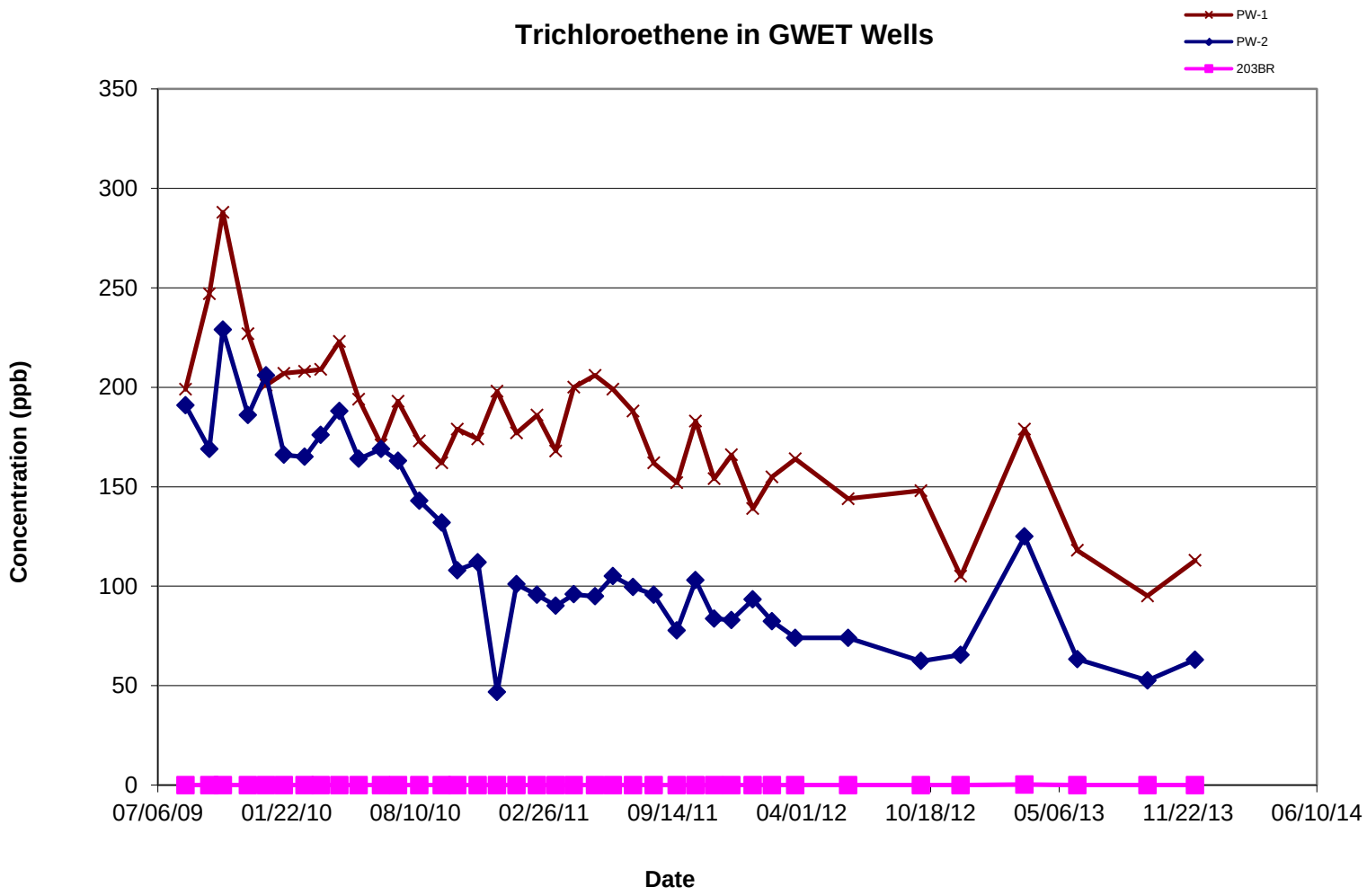



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Hexavalent Chromium Trends
in GWET Extraction Wells

Figure
5-7

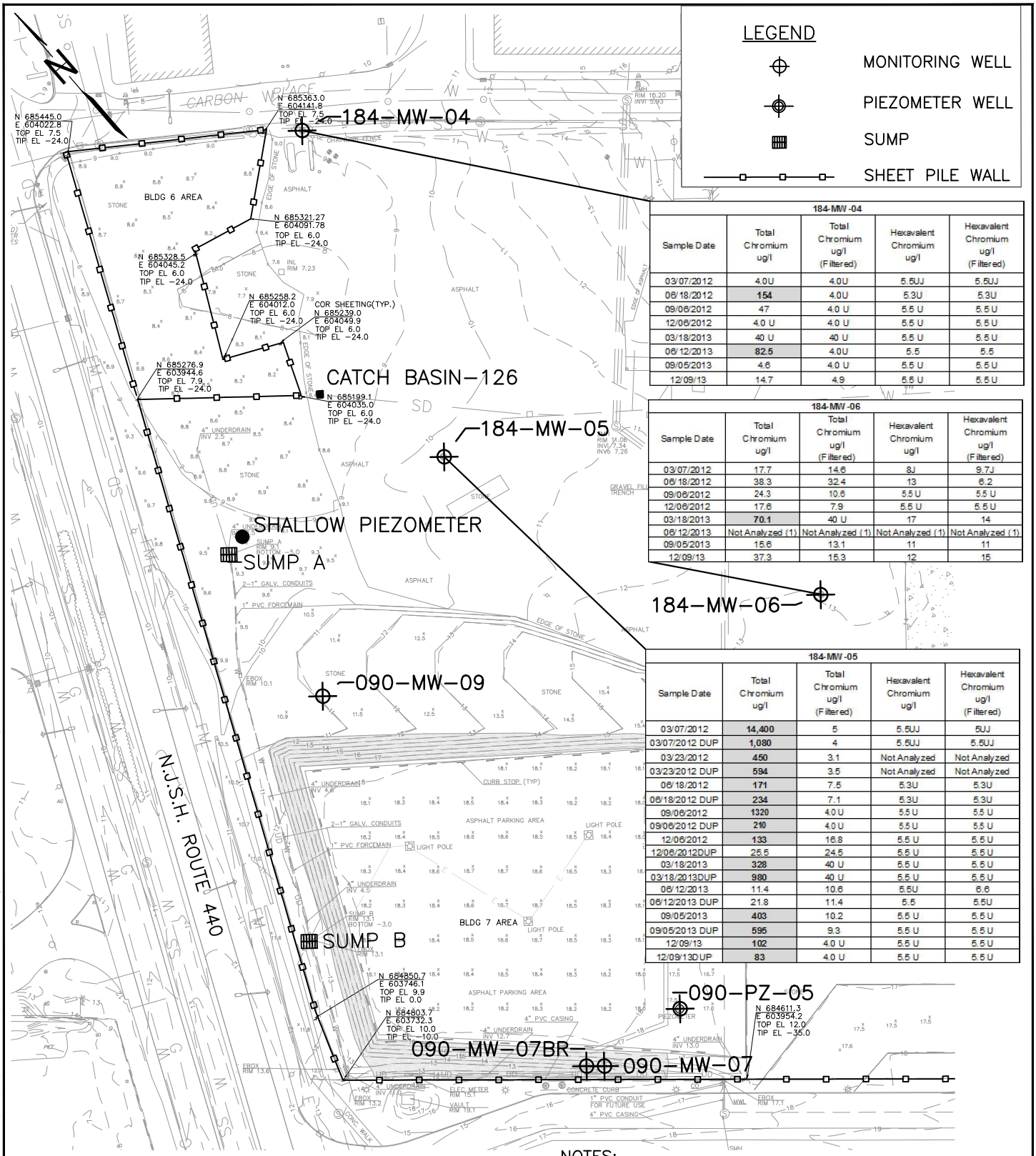



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Trichloroethylene Trends
in GWET Extraction Wells

Figure
5-8




| 184-MW-04 | | | | |
|---|---|---|---|---|
| Sample Date | Total Chromium ug/l | Total Chromium ug/l (Filtered) | Hexavalent Chromium ug/l | Hexavalent Chromium ug/l (Filtered) |
| 03/07/2012 | 4.0U | 4.0U | 5.5UJ | 5.5UJ |
| 06/18/2012 | 154 | 4.0U | 5.3U | 5.3U |
| 09/06/2012 | 47 | 4.0 U | 5.5 U | 5.5 U |
| 12/06/2012 | 4.0 U | 4.0 U | 5.5 U | 5.5 U |
| 03/18/2013 | 40 U | 40 U | 5.5 U | 5.5 U |
| 06/12/2013 | 82.5 | 4.0U | 5.5 | 5.5 |
| 09/05/2013 | 4.6 | 4.0 U | 5.5 U | 5.5 U |
| 12/09/13 | 14.7 | 4.9 | 5.5 U | 5.5 U |

| 184-MW-06 | | | | |
|---|---|---|---|---|
| Sample Date | Total Chromium ug/l | Total Chromium ug/l (Filtered) | Hexavalent Chromium ug/l | Hexavalent Chromium ug/l (Filtered) |
| 03/07/2012 | 17.7 | 14.6 | 8J | 9.7J |
| 06/18/2012 | 38.3 | 32.4 | 13 | 6.2 |
| 09/06/2012 | 24.3 | 10.6 | 5.5 U | 5.5 U |
| 12/06/2012 | 17.6 | 7.9 | 5.5 U | 5.5 U |
| 03/18/2013 | 70.1 | 40 U | 17 | 14 |
| 06/12/2013 | Not Analyzed (1) | Not Analyzed (1) | Not Analyzed (1) | Not Analyzed (1) |
| 09/05/2013 | 15.6 | 13.1 | 11 | 11 |
| 12/09/13 | 37.3 | 15.3 | 12 | 15 |

| 184-MW-05 | | | | |
|---|---|---|---|---|
| Sample Date | Total Chromium ug/l | Total Chromium ug/l (Filtered) | Hexavalent Chromium ug/l | Hexavalent Chromium ug/l (Filtered) |
| 03/07/2012 | 14,400 | 5 | 5.5UJ | 5UJ |
| 03/07/2012 DUP | 1,080 | 4 | 5.5UJ | 5.5UJ |
| 03/23/2012 | 450 | 3.1 | Not Analyzed | Not Analyzed |
| 03/23/2012 DUP | 594 | 3.5 | Not Analyzed | Not Analyzed |
| 06/18/2012 | 171 | 7.5 | 5.3U | 5.3U |
| 06/18/2012 DUP | 234 | 7.1 | 5.3U | 5.3U |
| 09/06/2012 | 1320 | 4.0 U | 5.5 U | 5.5 U |
| 09/06/2012 DUP | 210 | 4.0 U | 5.5 U | 5.5 U |
| 12/06/2012 | 133 | 16.8 | 5.5 U | 5.5 U |
| 12/06/2012DUP | 25.5 | 24.5 | 5.5 U | 5.5 U |
| 03/18/2013 | 328 | 40 U | 5.5 U | 5.5 U |
| 03/18/2013DUP | 980 | 40 U | 5.5 U | 5.5 U |
| 06/12/2013 | 11.4 | 10.6 | 5.5U | 6.6 |
| 06/12/2013 DUP | 21.8 | 11.4 | 5.5 | 5.5U |
| 09/05/2013 | 403 | 10.2 | 5.5 U | 5.5 U |
| 09/05/2013 DUP | 595 | 9.3 | 5.5 U | 5.5 U |
| 12/09/13 | 102 | 4.0 U | 5.5 U | 5.5 U |
| 12/09/13DUP | 83 | 4.0 U | 5.5 U | 5.5 U |

SOURCE MAP REFERNCE:

"AS-BUILT SURVEY FINAL EXISTING CONDITIONS" BLOCK 1286.5, LOT 1 & BLOCK 1286, LOT 5 JERSEY CITY, NEW JERSEY HONEYWELL SITE ID 37288, 37811 & 37460 KENNON SURVEYING SERVICES INC. WARREN, NEW JERSEY SHEET 1 OF 2, PROJECT NUMBER 2201, DATED 01-13-12

NOTES:

1. 184-MW-06 WAS DAMAGED AND WAS UNABLE TO BE SAMPLED FOR SECOND QUARTER 2013.

0 50 100 200

SCALE IN FEET

| REV. | DATE | STATUS | DRFT BY | CHKD BY |
|---|---|---|---|---|
| 6 | 03/21/14 | UPDATE RESULT DATA | STR | AG |
| 5 | 01/08/14 | UPDATE RESULT DATA | STR | AG |
| 4 | 10/11/13 | UPDATE RESULT DATA | STR | AG |
| 3 | 04/11/13 | UPDATE RESULT DATA | STR | AG |
| 2 | 10/09/12 | UPDATE RESULT DATA | STR | AG |
| 1 | 06/29/12 | UPDATE RESULT DATA | STR | AG |

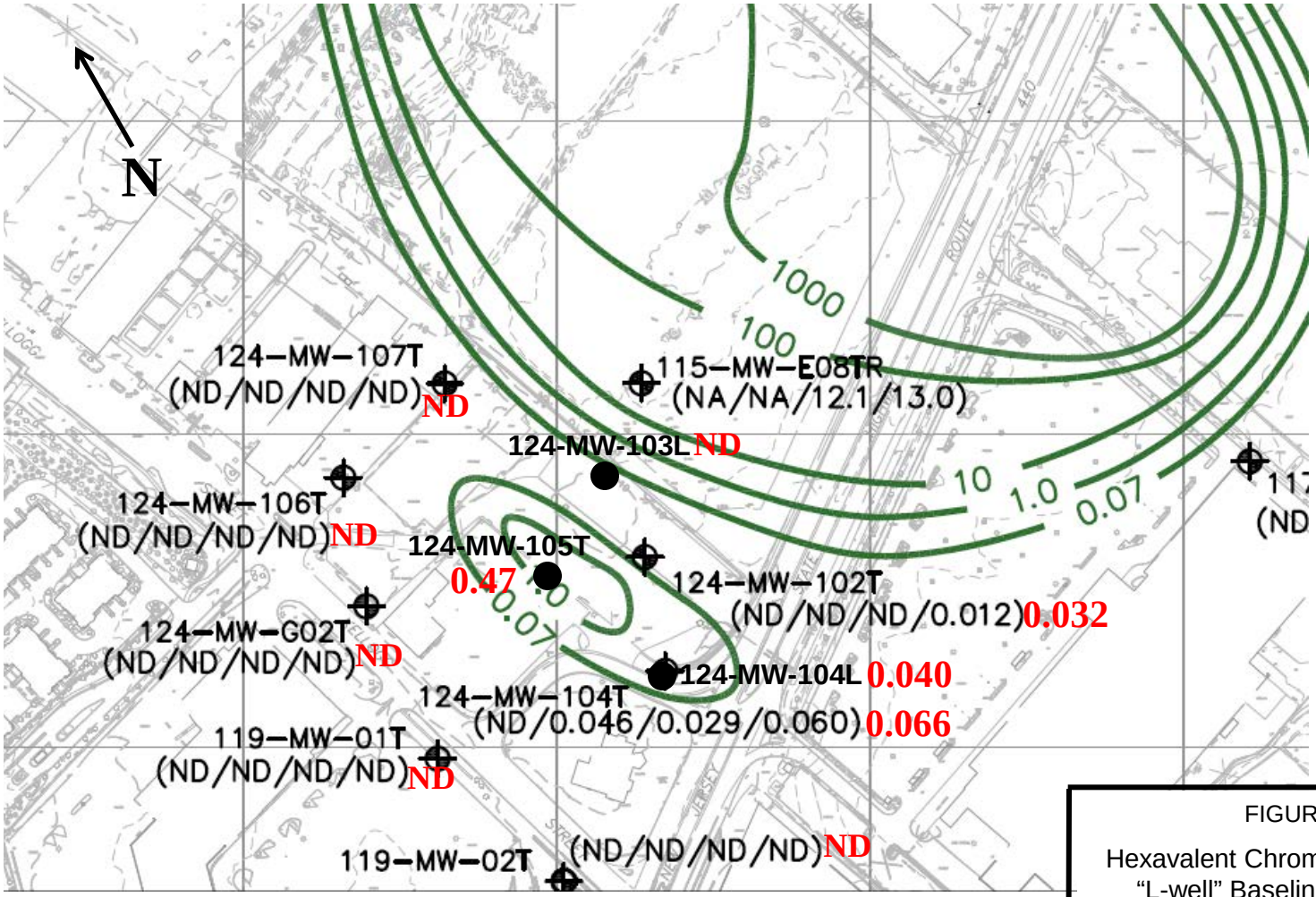
AMEC PROJ No.: 3480130369
DRAWING: 3480110369-6100-MWCB-000G

PREPARED/DATE: STR 05/31/12
CHECKED/DATE: AG 05/31/12

amec
ENVIRONMENT & INFRASTRUCTURE
200 AMERICAN METRO BLVD, SUITE 113
HAMILTON, NEW JERSEY 08619

**FIGURE 5-9**
LONG TERM MONITORING WELL RESULTS
STUDY AREA 5 NEW JERSEY CITY UNIVERSITY
JERSEY CITY, NEW JERSEY

P:\CADD\HONEYWELL\JERSEY CITY\SA 5\SITE 90 & 184 NJCU\3480110292\6100\6101\CURRENT DRAWINGS\3480110369-6100-MWCB-000G.dwg Mon, 24 Mar 2014 - 8:46am scott.rudkin Layout: 5-9




NTS

(ND/ND/ND/0.012)
Data from December:
(2008/2009/2010/2011)

**0.032**

Data from May 2, 2013
Sampling Event in ***red***
all values in ug/L

FIGURE 5-10

Hexavalent Chromium Results from
"L-well" Baseline Groundwater
Sampling Event (May 2, 2013)

Study Area 6 South
Jersey City, NJ

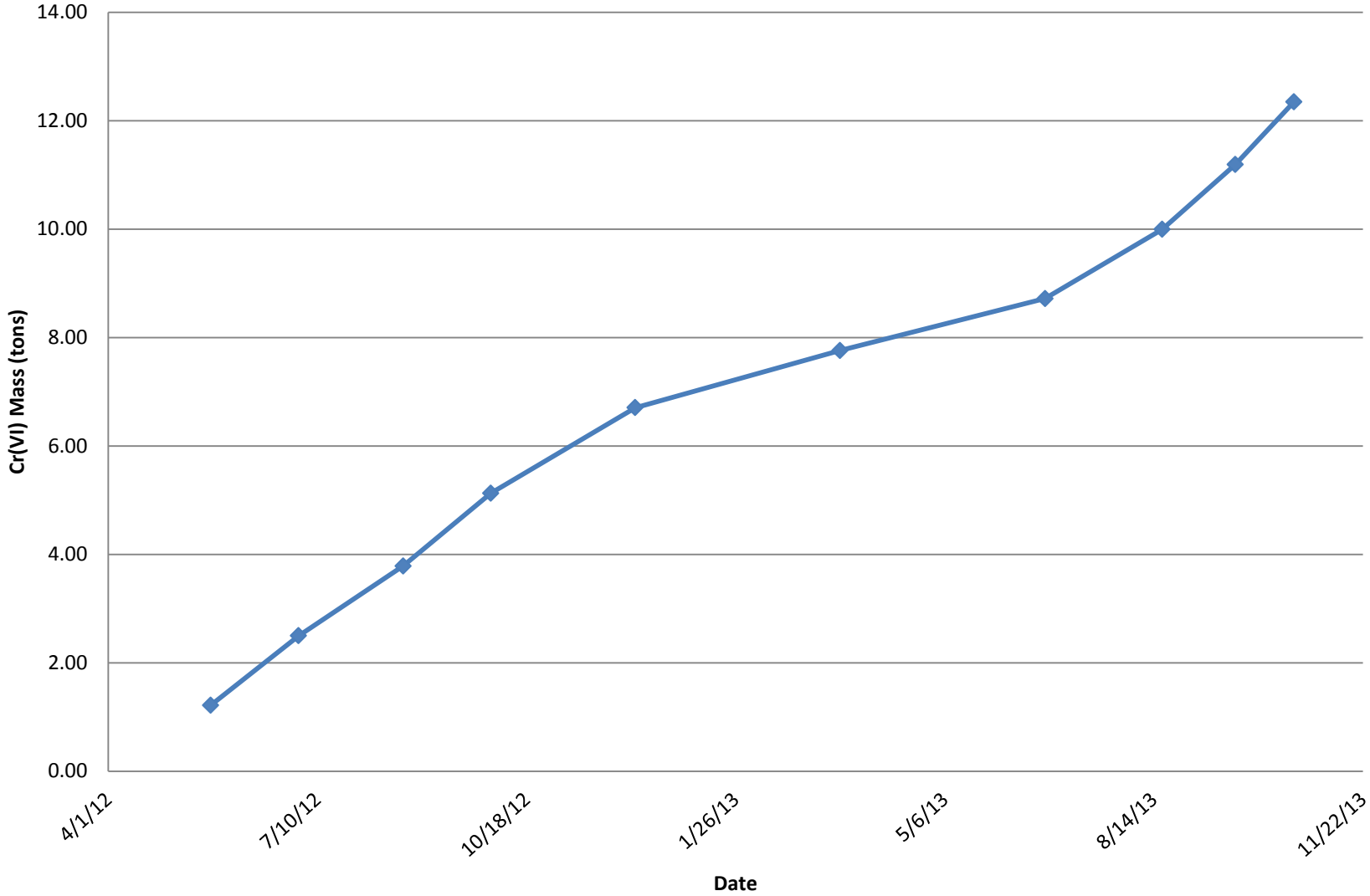
CORNERSTONE
Engineering Group, LLC


CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Location of S-3 Injection Wells
Used in 2013

Figure
6-1

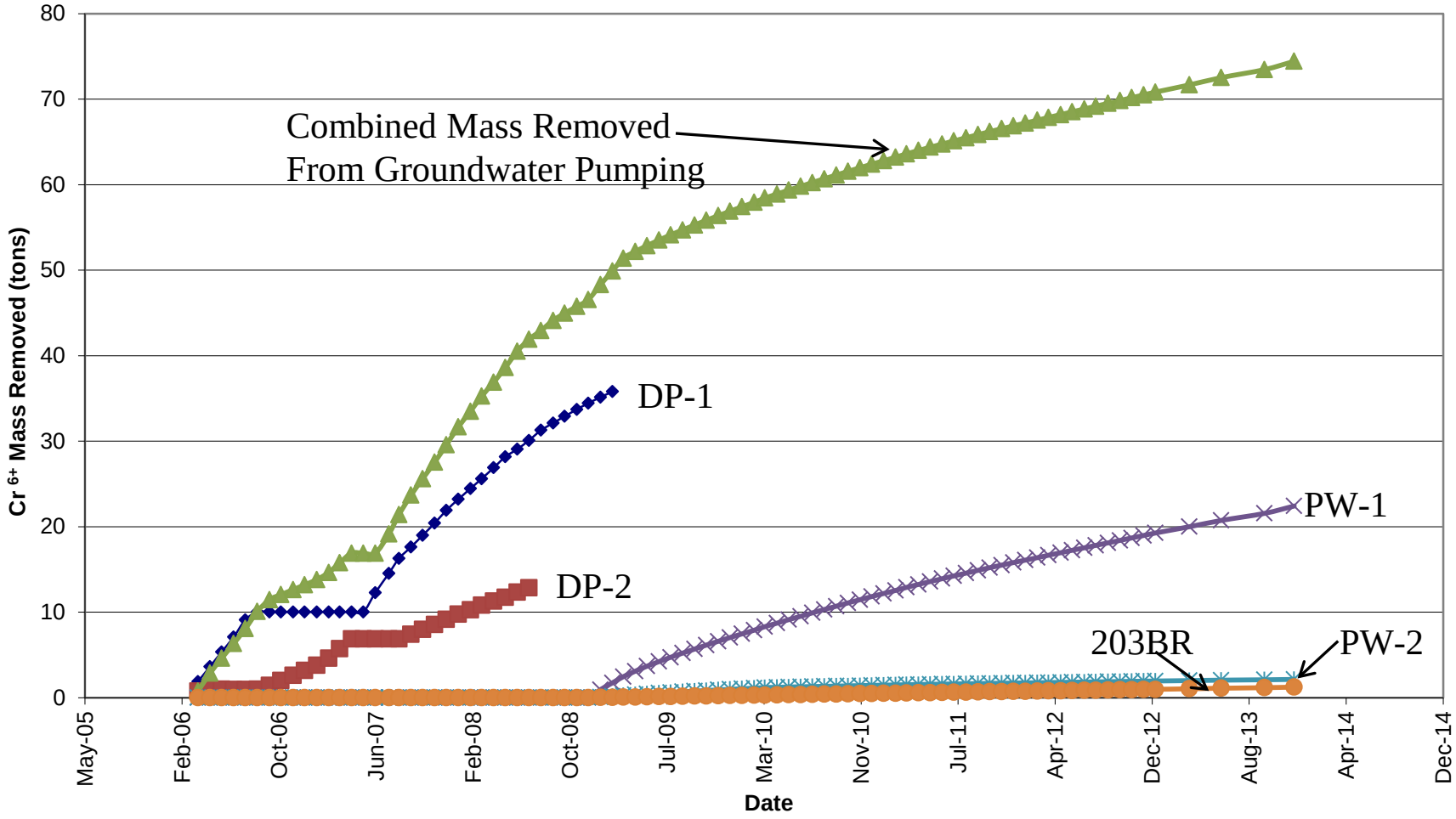



CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Stoichiometrically Equivalent Cr(VI) Mass Reduced in S-3 Sand by Injection

Figure 6-2




CORNERSTONE Engineering Group, LLC



HONEYWELL
Jersey City, New Jersey
Cumulative Cr(VI) Mass Removed From Groundwater by Pumping

Figure 6-3

# APPENDIX A

# RESULTS OF PRE-INJECTION MONITORING IN MONITORING WELLS

# Table A1
## Results of Pre-injection Monitoring of Monitoring Wells

Total Chromium in Unfiltered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 46.9 | 16.2 | 1,680 | 307 | 762 | 180 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 889 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 989 | NR | 155 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 37.9 | 14.8 | 2,220 | 359 | 985 | 171 | NR |
| 6 | 3/17/2013 | 39.8 | 13.5 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 48.5 | 28.0 | 2,930 | 1,670 | 967 | 233 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | 39.9 | 13.5 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 34.2 | 10.6 | 2,990 | 20.8 | 1,150 | 182 | NR |

Total Chromium in Filtered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 46.1 | 17.1 | 1,680 | 274 | 817 | 220 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 871 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 993 | NR | 168 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | NA | NA | 2,180 | 38 | 994 | 197 | NR |
| 6 | 3/17/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | NA | NA | 2,920 | 1,680 | 1,130 | 243 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NA | NA | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | NA | NA | 2,820 | 18.8 | 764 | 189 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A2
## Results of Pre-injection Monitoring of Monitoring Wells

Hexavalent Chromium in Unfiltered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 43.9 | 15.1 | 2,600 | 389.0 | 777 | 189 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 933 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 897 | NR | 195 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 45.1 | 15.6 | 2,690 | 39.3 | 1,150 | 235 | NR |
| 6 | 3/13/2013 | 34.1 | 10.6 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 34.0 | 13.0 | 2,110 | 1,470 | 1,050 | 177 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | 38.2 | 11.4 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 39.6 | 11.3 | 3,060 | 19.0 | 1,230 | 192 | NR |

Hexavalent Chromium in Filtered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 42.8 | 14.9 | 2,210 | 375.0 | 1,120 | 199 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 909 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 897 | NR | 203 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | NA | NA | 2,590 | 45.4 | 1,210 | 233 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | NA | NA | 2,790 | 1,380 | 1,040 | 179 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NA | NA | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | NA | NA | 2,880 | 19.3 | 959 | 195 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A3
## Results of Pre-injection Monitoring of Monitoring Wells

Sulfate in Unfiltered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 320 | 613 | 1,000 | 749 | 843 | 604 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 1,030 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 1,020 | NR | 850 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 307 | 671 | 1,110 | 202 | 1,020 | 688 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 268 | 654 | 1,080 | 2,130 | 1,090 | 662 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | 292 | 664 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 291 | 701 | 1,270 | 137 | 1,140 | 614 | NR |

Sulfate in Filtered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 318.0 | 639 | 1,030 | 607 | 880 | 639 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 1,030 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 945 | NR | 859 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | NA | NA | 1,130 | 222 | 1,030 | 671 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | NA | NA | 1,180 | 2,110 | 1,100 | 653 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NA | NA | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | NA | NA | 1,150 | 144 | 868 | 1,100 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A4
## Results of Pre-injection Monitoring of Monitoring Wells

Calcium in Unfiltered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 97.7 | 169 | 547 | 112 | 287 | 48.2 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 293 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 284 | NR | 207 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 88.4 | 146 | 492 | 370 | 336 | 52.1 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 99.6 | 158 | 446 | 473 | 317 | 53.1 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | 99.7 | 168 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 86.7 | 145 | 560 | 37.3 | 307 | 52.4 | NR |

Calcium in Filtered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 97.0 | 163 | 503 | 106 | 289 | 57.9 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | 320 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 314 | NR | 219 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | NA | NA | 477 | 367 | 340 | 61.7 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | NA | NA | 491 | 450 | 366 | 56.9 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NA | NA | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | NA | NA | 534 | 34.6 | 272 | 53.3 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A5
## Results of Pre-injection Monitoring of Monitoring Wells

Iron in Unfiltered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | <.5 | < .5 | < 25 | 0.764 | <2 | 1.12 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | <10 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | 4.79 | NR | 1.62 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | <0.1 | <0.1 | NR | 0.954 | NR | <0.5 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 0.709 | 1.21 | <5.0 | <5.0 | <5.0 | 1.19 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | 0.345 | <0.1 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | <0.1 | <0.1 | <10.0 | 0.535 | <2.0 | <1.0 | NR |

Iron in Filtered Samples (ppm)

| Event # | Sample Date | 087-PW-1 | 087-PW-2 | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | < .5 | < .5 | <25 | <.5 | <2 | 0.517 | NR |
| 2 | 6/28/2012 | NR | NR | NR | NR | <3 | NR | NR |
| 3 | 7/31/2012 | NR | NR | NR | NR | <2.5 | NR | <0.5 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | NA | NA | NR | 0.171 | NR | <0.5 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | NA | NA | <5.0 | <5.0 | <5.0 | <1.0 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NA | NA | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | NA | NA | <10.0 | 0.120 | <2.0 | <0.5 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
NA: Not Analyzed; the collection of filtered samples from the GWET pumping wells is not required.
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A6
## Results of Pre-injection Monitoring of Monitoring Wells

Field pH (pH units)

| Event # | Sample Date | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 6.84 | 7.29 | 7.72 | 7.73 | NR |
| 2 | 5/28/2012 | NR | NR | 7.83 | NR | NR |
| 3 | 7/31/2012 | NR | NR | 7.41 | NR | 7.15 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 7.36 | 7.97 | 7.47 | 7.35 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 6.94 | 6.99 | 7.74 | 7.75 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 6.82 | 8.00 | 7.83 | 7.78 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A7
## Results of Pre-injection Monitoring of Monitoring Wells

Field Specific Conductivity (ms/cm)

| Event # | Sample Date | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 12.2 | 5.45 | 7.56 | 5.09 | NR |
| 2 | 6/28/2012 | NR | NR | 7.21 | NR | NR |
| 3 | 7/31/2012 | NR | NR | 7.66 | NR | 15.8 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 11.7 | 3.03 | 8.10 | 4.85 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 10.9 | 11.1 | 8.29 | 4.91 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 13.9 | 3.03 | 8.53 | 4.73 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A8
## Results of Pre-injection Monitoring of Monitoring Wells

Field Redox Potential (mv)

| Event # | Sample Date | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 347 | 276 | 251 | 244 | NR |
| 2 | 6/28/2012 | NR | NR | 184 | NR | NR |
| 3 | 7/31/2012 | NR | NR | 187 | NR | 173 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 300 | -153 | 104 | -7.0 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 343 | 340 | 255 | 242 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 289 | 181 | 244 | 199 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A9
## Results of Pre-injection Monitoring of Monitoring Wells

Field Dissolved Oxygen (mg/L)

| Event # | Sample Date | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 0.46 | 2.25 | 0.43 | 0.67 | NR |
| 2 | 6/28/2012 | NR | NR | 0.00 | NR | NR |
| 3 | 7/31/2012 | NR | NR | 0.00 | NR | 0.00 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 0.99 | 1.22 | 1.02 | 1.07 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 0.36 | 5.05 | 1.31 | 0.36 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 0.85 | 0.00 | 0.33 | 0.33 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

## Table A10
## Results of Pre-injection Monitoring of Monitoring Wells

Field Turbidity (NTU)

| Event # | Sample Date | 090-MW-09 | 115-DP-1 | 088-MW-G19T | 087-MW-O29D | 087-MW-03* |
|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 0.0 | 0.0 | 74.3 | 0.0 | NR |
| 2 | 6/28/2012 | NR | NR | 64.0 | NR | NR |
| 3 | 7/31/2012 | NR | NR | 157 | NR | 19.0 |
| 3A | 8/16/2012 | NR | NR | NR | NR | NR |
| 4 | 10/1/2012 | NR | NR | NR | NR | NR |
| 5 | 12/9/2012 | 177 | 0.0 | 650 | 708 | NR |
| 6 | 3/13/2013 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 52.7 | 0.0 | 47.8 | 11.5 | NR |
| 8 | 8/18/2013 | NR | NR | NR | NR | NR |
| 9 | 9/22/2013 | NR | NR | NR | NR | NR |
| 10 | 10/20/2013 | NR | NR | NR | NR | NR |
| 11 | 12/8/2013 | 10.0 | 19.6 | 0.0 | 12.1 | NR |

NR: Not Required; the sampling frequency for monitoiring wells in the S-3 Mass Removal Program is semi-annual .
* Well 087-MW-03 was sampled on a one-time basis at the request of Plaintiffs and is not part of the monitoring plan.

# APPENDIX B

# RESULTS OF PRE-INJECTION MONITORING IN INJECTION WELLS

# Table B1
## Results of Pre-injection Monitoring of Injection Wells

Total Chromium in Unfiltered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 72.40 | 255.0 | NR | NR | 0.047 | 6,980 | NR |
| 2 | 6/28/2012 | 0.52 | 111.0 | NR | NR | 0.026 | 8,900 | NR |
| 3 | 7/31/2012 | 0.14 | 4.33 | NR | NR | 0.019 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 536 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 0.155 | 4.19 | <0.020 | 40.4 | NR | NR | NR |
| 5 | 12/9/2012 | 0.059 | 2.82 | <0.050 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 1.36 | 4.18 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <0.050 | 36.2 | NR | NR | NR | NR | 98.6 |
| 8 | 8/18/2013 | <10 | 5.4 | NR | NR | NR | NR | 0.114 |
| 9 | 9/22/2013 | <.01 | <.01 | NR | NR | NR | NR | <.01 |
| 10 | 10/20/2013 | <.1 | 0.198 | NR | NR | NR | NR | <.02 |
| 11 | 12/8/2013 | <.1 | 1.61 | NR | NR | NR | NR | <.01 |

Total Chromium in Filtered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 56.50 | 250.0 | NR | NR | 0.037 | 7120 | NR |
| 2 | 6/28/2012 | 0.56 | 104.0 | NR | NR | 0.022 | 7540 | NR |
| 3 | 7/31/2012 | <.1 | <.1 | NR | NR | 0.017 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 532 | NR | NR | NR | NR |
| 4 | 10/1/2012 | <0.020 | 0.071 | <0.020 | 41.4 | NR | NR | NR |
| 5 | 12/9/2012 | <0.050 | 0.143 | <0.050 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 0.416 | 0.317 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <0.050 | 1.76 | NR | NR | NR | NR | 110.0 |
| 8 | 8/18/2013 | <.01 | 2.80 | NR | NR | NR | NR | <0.1 |
| 9 | 9/22/2013 | <.01 | <.01 | NR | NR | NR | NR | <.01 |
| 10 | 10/20/2013 | <.1 | <.02 | NR | NR | NR | NR | <.02 |
| 11 | 12/8/2013 | <.1 | <.01 | NR | NR | NR | NR | <.01 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B2
## Results of Pre-injection Monitoring of Injection Wells

Hexavalent Chromium in Unfiltered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 48.8 | 94.2 | NR | NR | <0.010 | 7,250 | NR |
| 2 | 6/28/2012 | <0.55 | 130.0 | NR | NR | <0.005 | 9,130 | NR |
| 3 | 7/31/2012 | <.55 | <.55 | NR | NR | <0.0055 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 594 | NR | NR | NR | NR |
| 4 | 10/1/2012 | <0.55 | <0.55 | <0.50 | 40.9 | NR | NR | NR |
| 5 | 12/9/2012 | <0.14 | <0.14 | <0.14 | NR | NR | NR | NR |
| 6 | 3/13/2013 | <0.28 | <0.55 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <2.2 | <0.5 | NR | NR | NR | NR | 116 |
| 8 | 8/18/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 9 | 9/22/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 10 | 10/20/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 11 | 12/8/2013 | <.025 | <.025 | NR | NR | NR | NR | <.025 |

Hexavalent Chromium in Filtered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 54.2 | 98.7 | NR | NR | <0.010 | 7,390 | NR |
| 2 | 6/28/2012 | <0.55 | 126.0 | NR | NR | <0.005 | 8,760 | NR |
| 3 | 7/31/2012 | <100 | <.55 | NR | NR | <.0055 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 621 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 44.7* | <0.55 | <0.55 | 44.7 | NR | NR | NR |
| 5 | 12/9/2012 | <0.14 | <0.14 | <0.14 | NR | NR | NR | NR |
| 6 | 3/13/2013 | <0.28 | <0.55 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <2.2 | <0.55 | NR | NR | NR | NR | 110 |
| 8 | 8/18/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 9 | 9/22/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 10 | 10/20/2013 | <.0055 | <.0055 | NR | NR | NR | NR | <.0055 |
| 11 | 12/8/2013 | <.025 | <.025 | NR | NR | NR | NR | <.025 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

* reported concentration questionable due to matrix interference

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B3
## Results of Pre-injection Monitoring of Injection Wells

Sulfate in Unfiltered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 147 | 95.7 | NR | NR | 49.6 | 3,160 | NR |
| 2 | 6/28/2012 | 861 | 315 | NR | NR | 50.6 | 4,640 | NR |
| 3 | 7/31/2012 | 474 | 1,390 | NR | NR | 40.3 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 1,290 | NR | NR | NR | NR |
| 4 | 10/1/2012 | <400 | 479 | 740 | 395 | NR | NR | NR |
| 5 | 12/9/2012 | 244 | 227 | 830 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 224 | 290 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 108 | 341 | NR | NR | NR | NR | 259 |
| 8 | 8/18/2013 | 138 | 275 | NR | NR | NR | NR | 152 |
| 9 | 9/22/2013 | 149 | 155 | NR | NR | NR | NR | 251 |
| 10 | 10/20/2013 | <100 | 344 | NR | NR | NR | NR | 317 |
| 11 | 12/8/2013 | <100 | 403 | NR | NR | NR | NR | <160 |

Sulfate in Filtered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 157 | 111 | NR | NR | 50.0 | 3,140 | NR |
| 2 | 6/28/2012 | 1,010 | 290 | NR | NR | 56.2 | 4,360 | NR |
| 3 | 7/31/2012 | 506 | 1,390 | NR | NR | 39.9 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 1,250 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 424 | 468 | 867 | 392 | NR | NR | NR |
| 5 | 12/9/2012 | 249 | 229 | 856 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 259 | 289 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 107 | 346 | NR | NR | NR | NR | 257 |
| 8 | 8/18/2013 | 134 | 278 | NR | NR | NR | NR | 145 |
| 9 | 9/22/2013 | 137 | 150 | NR | NR | NR | NR | 252 |
| 10 | 10/20/2013 | <100 | 337 | NR | NR | NR | NR | 310 |
| 11 | 12/8/2013 | <100 | 410 | NR | NR | NR | NR | <160 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B4
## Results of Pre-injection Monitoring of Injection Wells

Calcium in Unfiltered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 34.7 | 51.2 | NR | NR | 73.0 | 1,590 | NR |
| 2 | 6/28/2012 | 7,760 | <50 | NR | NR | 69.3 | 1,370 | NR |
| 3 | 7/31/2012 | 2,900 | 14,300 | NR | NR | 603 | NR | NR |
| 3A | 8/16/2012 | #N/A | NR | 370 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 1,400 | 1,800 | 3,900 | 97.4 | NR | NR | NR |
| 5 | 12/9/2012 | 827 | 970 | 2,280 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 586 | 2,060 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 3,320 | 432 | NR | NR | NR | NR | 61.5 |
| 8 | 8/18/2013 | 1,490 | 250 | NR | NR | NR | NR | 3,010 |
| 9 | 9/22/2013 | 1,650 | 6,680 | NR | NR | NR | NR | 1,550 |
| 10 | 10/20/2013 | 6,220 | 1,210 | NR | NR | NR | NR | 1,150 |
| 11 | 12/8/2013 | 6,060 | 1,100 | NR | NR | NR | NR | 7,670 |

Calcium in Filtered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 24.2 | 48.2 | NR | NR | 72.7 | 1,550 | NR |
| 2 | 6/28/2012 | 7,280 | <50 | NR | NR | 69.0 | 1,460 | NR |
| 3 | 7/31/2012 | 3,310 | 12,900 | NR | NR | 58.8 | NR | NR |
| 3A | 8/16/2012 | #N/A | NR | 366 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 2,220 | 1,670 | 3,840 | 95.4 | NR | NR | NR |
| 5 | 12/9/2012 | 695 | 1,040 | 2,630 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 375 | 1,870 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 2,810 | 359 | NR | NR | NR | NR | 67.7 |
| 8 | 8/18/2013 | 1,640 | 241 | NR | NR | NR | NR | 3,180 |
| 9 | 9/22/2013 | 1,720 | 6,350 | NR | NR | NR | NR | 1,590 |
| 10 | 10/20/2013 | 5,460 | 1,190 | NR | NR | NR | NR | 1,140 |
| 11 | 12/8/2013 | 5,810 | 1,080 | NR | NR | NR | NR | 6,680 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B5
## Results of Pre-injection Monitoring of Injection Wells

Iron in Unfiltered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 5.060 | 4.070 | NR | NR | 0.516 | <50 | NR |
| 2 | 6/28/2012 | <5.0 | 1.900 | NR | NR | 0.502 | <20 | NR |
| 3 | 7/31/2012 | 4.68 | <0.5 | NR | NR | NR | NR | NR |
| 3A | 8/16/2012 | NR | NR | 0.861 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 0.835 | 0.255 | 0.464 | <0.1 | NR | NR | NR |
| 5 | 12/9/2012 | 0.504 | 0.517 | <0.5 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 0.854 | 0.277 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <0.5 | 0.478 | NR | NR | NR | NR | 0.509 |
| 8 | 8/18/2013 | 0.126 | <0.1 | NR | NR | NR | NR | <0.1 |
| 9 | 9/22/2013 | <0.1 | <0.1 | NR | NR | NR | NR | 0.114 |
| 10 | 10/20/2013 | <0.5 | <0.1 | NR | NR | NR | NR | 0.126 |
| 11 | 12/8/2013 | <0.2 | 0.268 | NR | NR | NR | NR | <0.2 |

Iron in Filtered Samples (ppm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 0.327 | <.2 | NR | NR | 0.386 | <50 | NR |
| 2 | 6/28/2012 | <5.0 | <1.0 | NR | NR | 0.475 | <10 | NR |
| 3 | 7/31/2012 | <1.0 | <0.5 | NR | NR | 0.41 | NR | NR |
| 3A | 8/16/2012 | NR | NR | <5.0 | NR | NR | NR | NR |
| 4 | 10/1/2012 | <0.2 | <0.2 | 0.429 | <0.1 | NR | NR | NR |
| 5 | 12/9/2012 | <0.5 | <0.5 | <0.5 | NR | NR | NR | NR |
| 6 | 3/13/2013 | <0.1 | <0.1 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | <0.5 | <0.1 | NR | NR | NR | NR | 0.217 |
| 8 | 8/18/2013 | <0.1 | <0.1 | NR | NR | NR | NR | <0.1 |
| 9 | 9/22/2013 | <0.1 | <0.1 | NR | NR | NR | NR | <0.1 |
| 10 | 10/20/2013 | <0.5 | <0.1 | NR | NR | NR | NR | <0.1 |
| 11 | 12/8/2013 | <0.2 | <0.1 | NR | NR | NR | NR | <0.2 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B6
## Results of Pre-injection Monitoring of Injection Wells

Field pH (pH units)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 8.08 | 7.46 | NR | NR | 7.21 | 6.91 | NR |
| 2 | 5/28/2012 | 10.98 | 7.53 | NR | NR | 7.42 | 7.13 | NR |
| 3 | 7/31/2012 | 10.56 | 10.38 | NR | NR | 6.96 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 6.56 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 10.95 | 11.19 | 11.52 | 7.65 | NR | NR | NR |
| 5 | 12/9/2012 | 8.27 | 9.46 | 10.74 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 10.81 | 11.35 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 11.43 | 10.29 | NR | NR | NR | NR | 7.66 |
| 8 | 8/18/2013 | 10.70 | 11.5 | NR | NR | NR | NR | 11 |
| 9 | 9/22/2013 | 11.44 | 11.99 | NR | NR | NR | NR | 12 |
| 10 | 10/20/2013 | 10.71 | 11.20 | NR | NR | NR | NR | 10.74 |
| 11 | 12/8/2013 | 11.01 | 11.5 | NR | NR | NR | NR | 10.94 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B7
## Results of Pre-injection Monitoring of Injection Wells

Field Specific Conductivity (ms/cm)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 1.78 | 1.68 | NR | NR | 2.81 | 6.27 | NR |
| 2 | 6/28/2012 | 32.7 | 1.41 | NR | NR | 2.11 | 30.3 | NR |
| 3 | 7/31/2012 | 14.2 | 47.0 | NR | NR | 2.33 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 5.16 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 7.1 | 10.0 | 17.7 | 1.8 | NR | NR | NR |
| 5 | 12/9/2012 | 37.6 | 5.89 | 13.0 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 5.47 | 9.79 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 3.15 | 17.0 | NR | NR | NR | NR | 2.99 |
| 8 | 8/18/2013 | 7.06 | 2.6 | NR | NR | NR | NR | 17 |
| 9 | 9/22/2013 | 7.22 | 25.9 | NR | NR | NR | NR | 8 |
| 10 | 10/20/2013 | 20.5 | 6.08 | NR | NR | NR | NR | 6.89 |
| 11 | 12/8/2013 | 22.7 | 6.1 | NR | NR | NR | NR | 27.1 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B8
## Results of Pre-injection Monitoring of Injection Wells

Field Redox Potential (mv)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 93 | 230 | NR | NR | -38 | 362 | NR |
| 2 | 6/28/2012 | -533 | 140 | NR | NR | -128 | 298 | NR |
| 3 | 7/31/2012 | -498 | -507 | NR | NR | -49 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 263 | NR | NR | NR | NR |
| 4 | 10/1/2012 | -508 | -510 | -498 | 170 | NR | NR | NR |
| 5 | 12/9/2012 | -497 | -497 | -493 | NR | NR | NR | NR |
| 6 | 3/13/2013 | -483 | -505 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | -478 | -509 | NR | NR | NR | NR | 245 |
| 8 | 8/18/2013 | -500 | -466 | NR | NR | NR | NR | -500 |
| 9 | 9/22/2013 | -516 | -536 | NR | NR | NR | NR | -516 |
| 10 | 10/20/2013 | -509 | -512 | NR | NR | NR | NR | -496 |
| 11 | 12/8/2013 | -524 | -514 | NR | NR | NR | NR | -521 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B9
## Results of Pre-injection Monitoring of Injection Wells

Field Dissolved Oxygen (mg/L)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 0.38 | 0.51 | NR | NR | 1.02 | 0.37 | NR |
| 2 | 6/28/2012 | 0.00 | 0.00 | NR | NR | 0.00 | 0.10 | NR |
| 3 | 7/31/2012 | 0.52 | 4.73 | NR | NR | 0.00 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 0.00 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 2.70 | 5.88 | 5.00 | 1.02 | NR | NR | NR |
| 5 | 12/9/2012 | 5.16 | 0.43 | 1.49 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 8.56 | 5.37 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 0.24 | 0.42 | NR | NR | NR | NR | 5.22 |
| 8 | 8/18/2013 | 0.38 | 0.28 | NR | NR | NR | NR | 0 |
| 9 | 9/22/2013 | 2.19 | 2.29 | NR | NR | NR | NR | 3.20 |
| 10 | 10/20/2013 | 0.48 | 0.96 | NR | NR | NR | NR | 2.90 |
| 11 | 12/8/2013 | 1.95 | 1.36 | NR | NR | NR | NR | 1.45 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

## Table B10
## Results of Pre-injection Monitoring of Injection Wells

Field Turbidity (NTU)

| Event # | Sample Date | 088-IW-01 | 088-IW-02 | 115-PW-21 | 115-DP-2 | 087-IW-01 | 117-MW-I4 | 088-IW-03 |
|---|---|---|---|---|---|---|---|---|
| 1 | 5/16/2012 | 15.2 | 39.4 | NR | NR | 0.0 | 3.6 | NR |
| 2 | 6/28/2012 | >800 | 24.1 | NR | NR | 8.5 | 609 | NR |
| 3 | 7/31/2012 | 13.0 | 113 | NR | NR | 18.1 | NR | NR |
| 3A | 8/16/2012 | NR | NR | 12.5 | NR | NR | NR | NR |
| 4 | 10/1/2012 | 0.0 | 34.1 | 0.0 | 0.0 | NR | NR | NR |
| 5 | 12/9/2012 | 0.0 | 0.0 | 0.0 | NR | NR | NR | NR |
| 6 | 3/13/2013 | 3.7 | 8.8 | NR | NR | NR | NR | NR |
| 7 | 6/3/2013 | 545 | 1.0 | NR | NR | NR | NR | 8.4 |
| 8 | 8/18/2013 | 0.0 | 3.2 | NR | NR | NR | NR | 0.0 |
| 9 | 9/22/2013 | 2.40 | 8.4 | NR | NR | NR | NR | 15.2 |
| 10 | 10/20/2013 | 0.0 | 0.0 | NR | NR | NR | NR | 0.0 |
| 11 | 12/8/2013 | 0.0 | 42.2 | NR | NR | NR | NR | 8.0 |

NR-Not Required; The selection of injection wells for sampling prior to each event was coordinated with Plaintiffs.

Sample collected just prior to first injection in indicated well

Sample collected just prior to second injection in indicated well

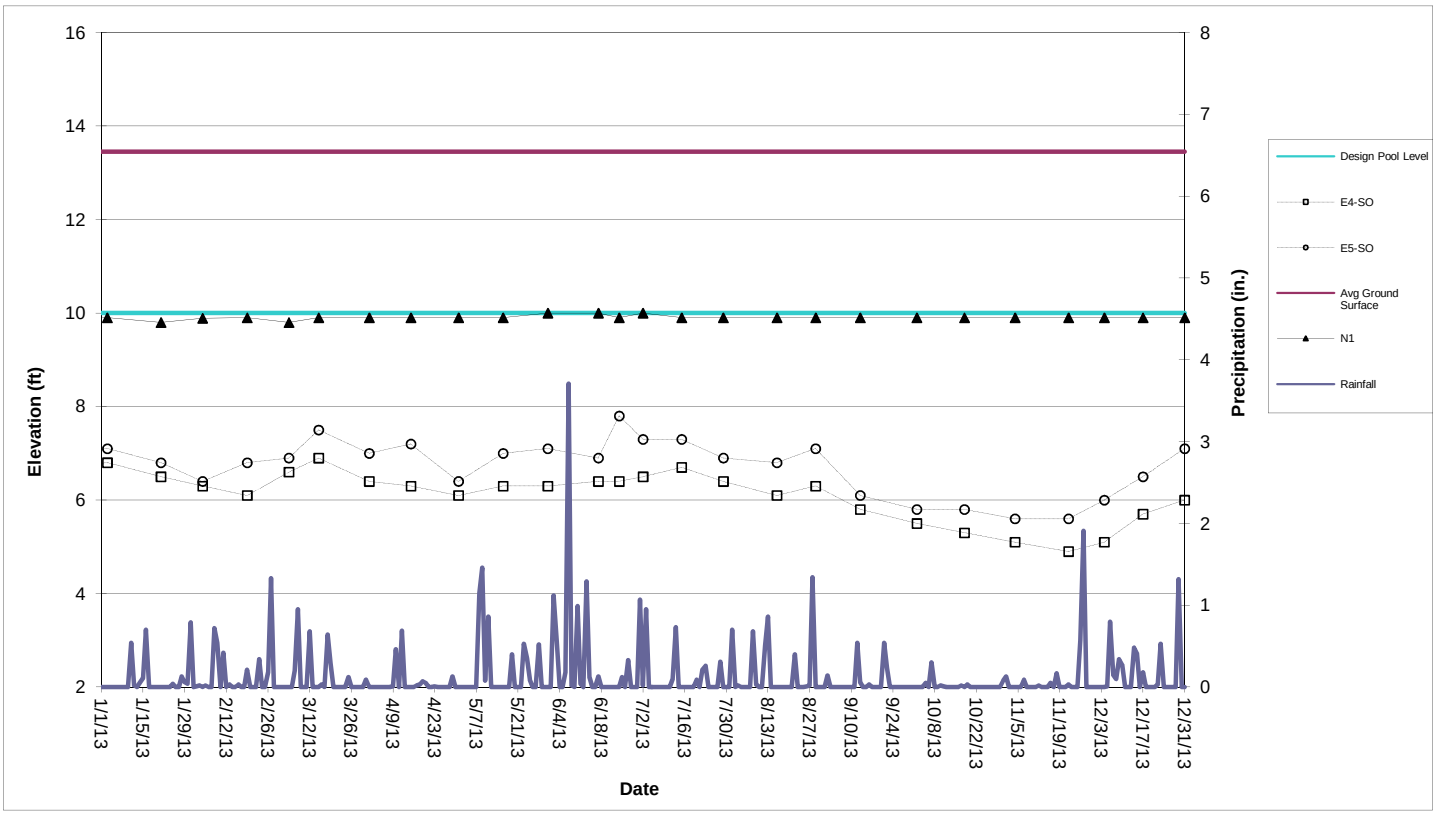
Sample collected just prior to third injection in indicated well

Sample collected just prior to fourth injection in indicated well

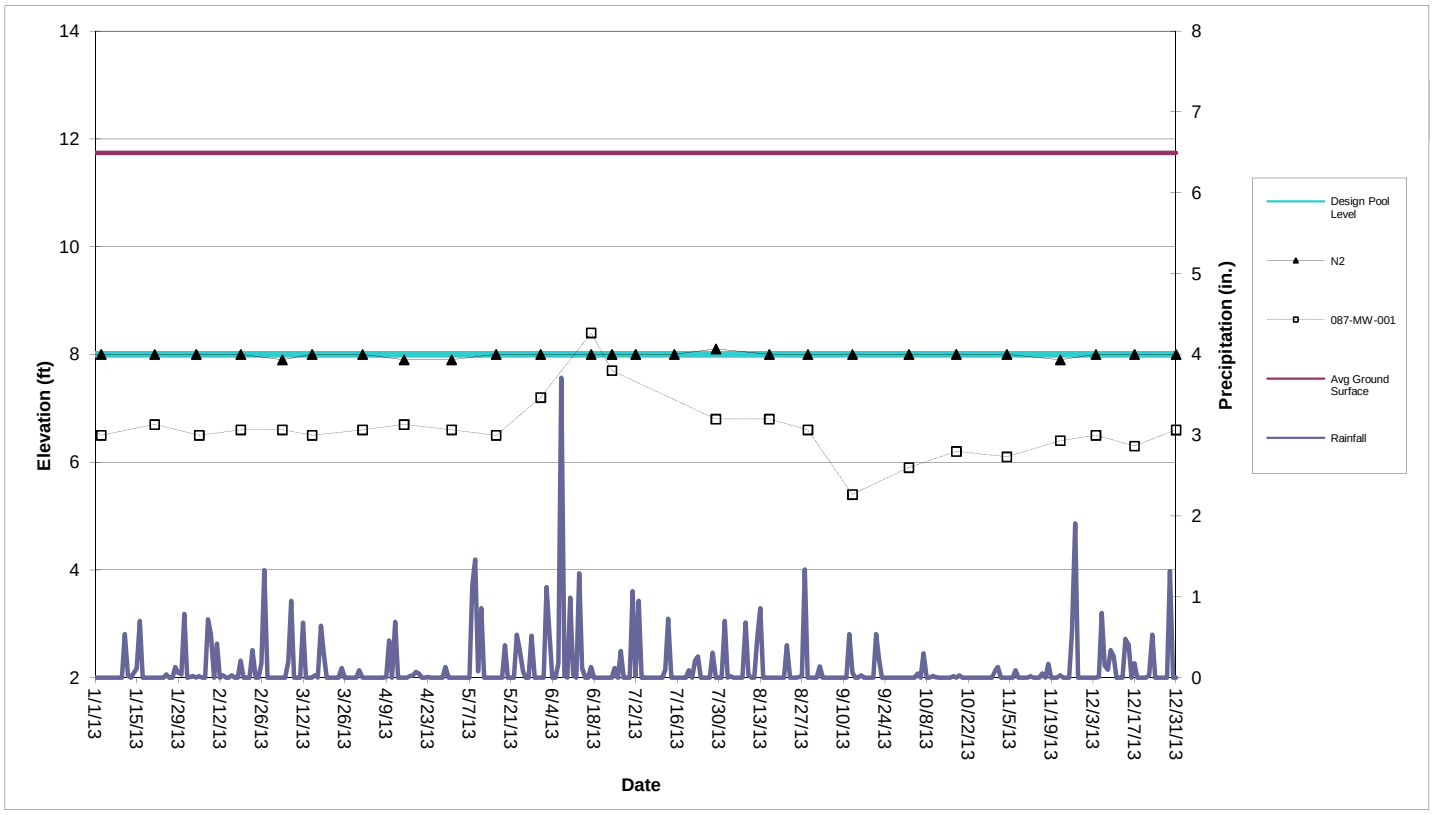
# APPENDIX C

## SA-7 PERIMETER POOL HYDROGRAPHS

## Attachment C: Perimeter Pools

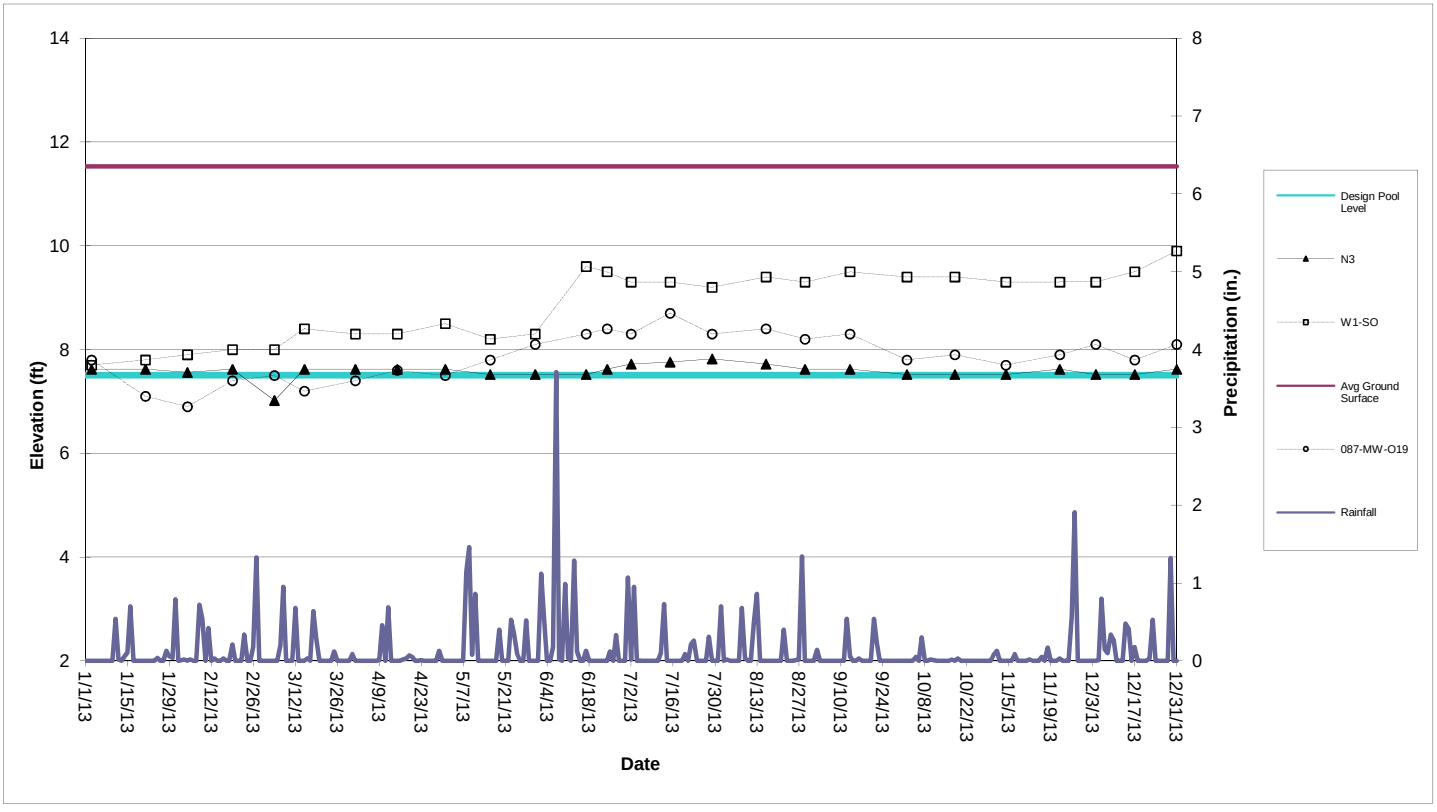



**Perimeter Pool N1** (Sta. N13+60 to N20+25)

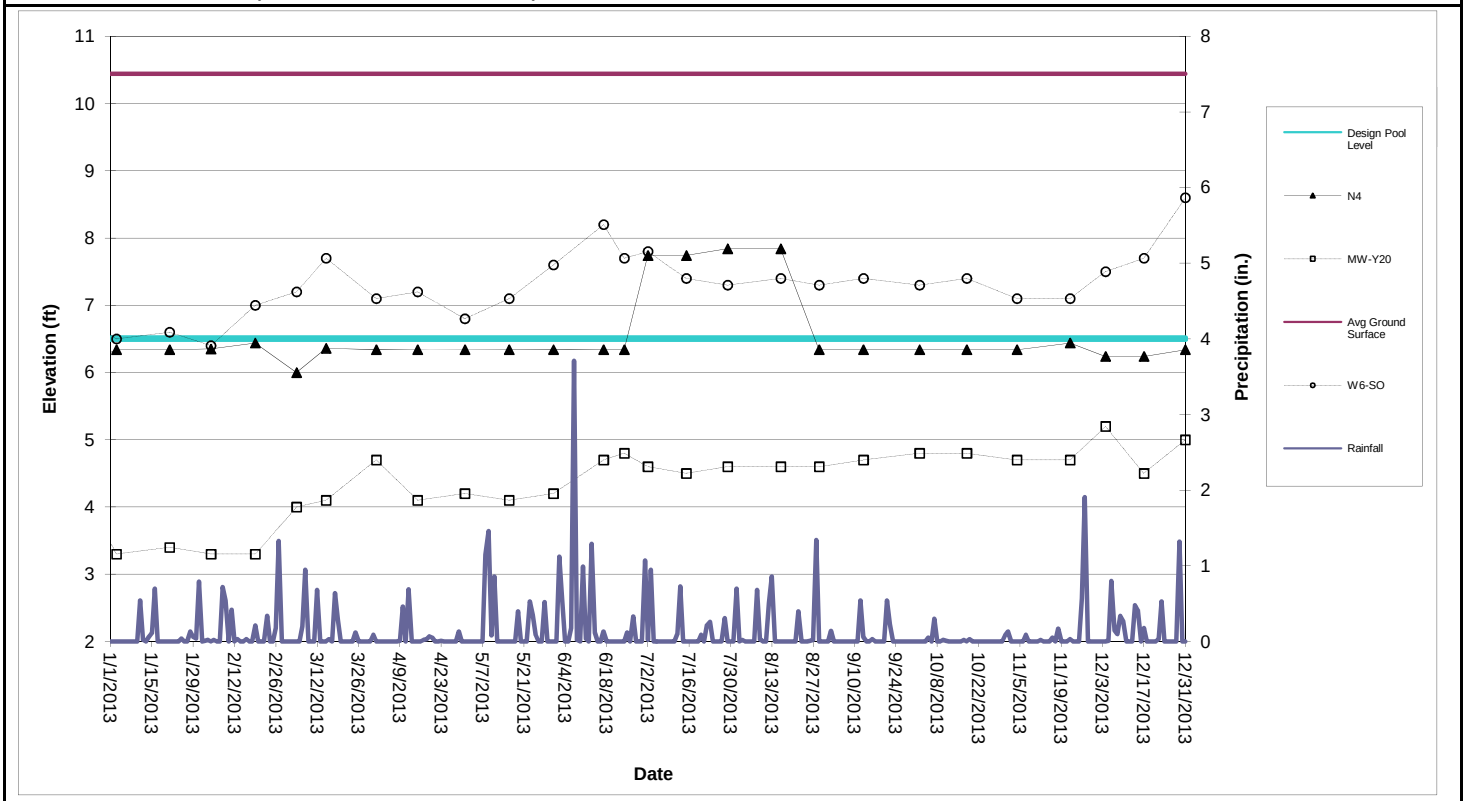



**Perimeter Pool N2** (Sta. N10+73 to N13+10)

## Attachment C: Perimeter Pools

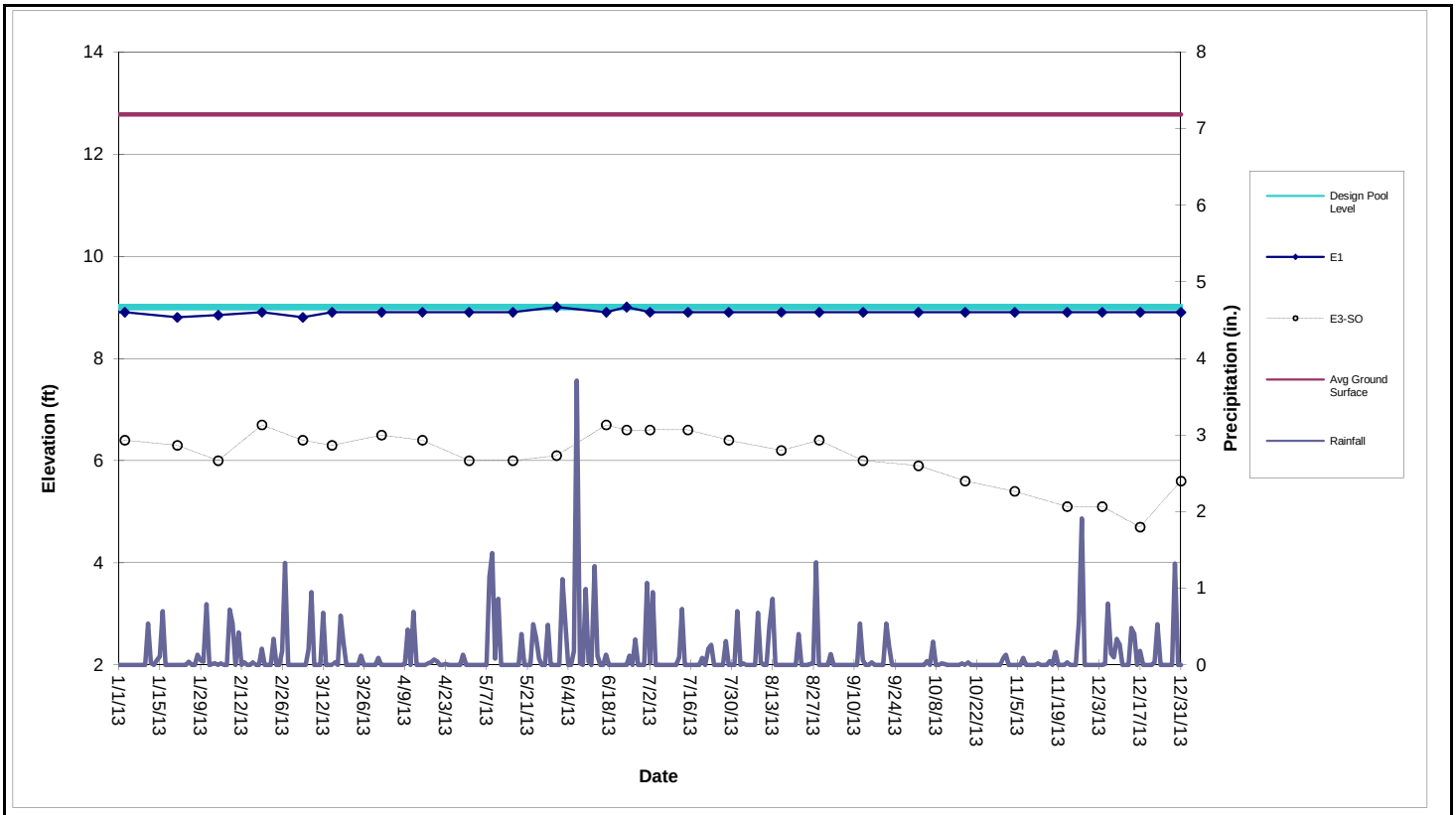



**Perimeter Pool N3** (Sta. N6+80 to N10+23)

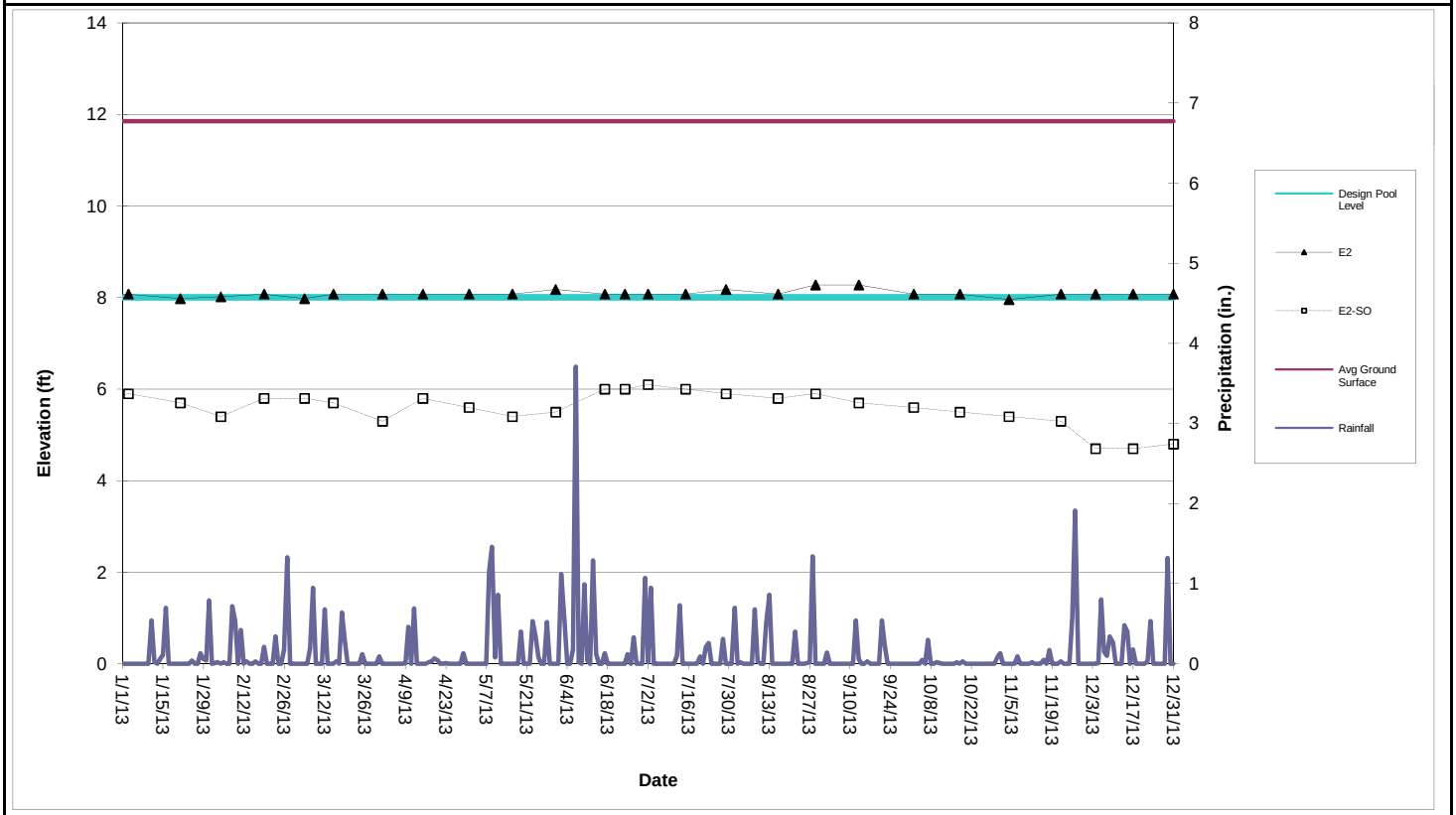



**Perimeter Pool N4** (Sta. N6+80 to N10+23)

## Attachment C: Perimeter Pools

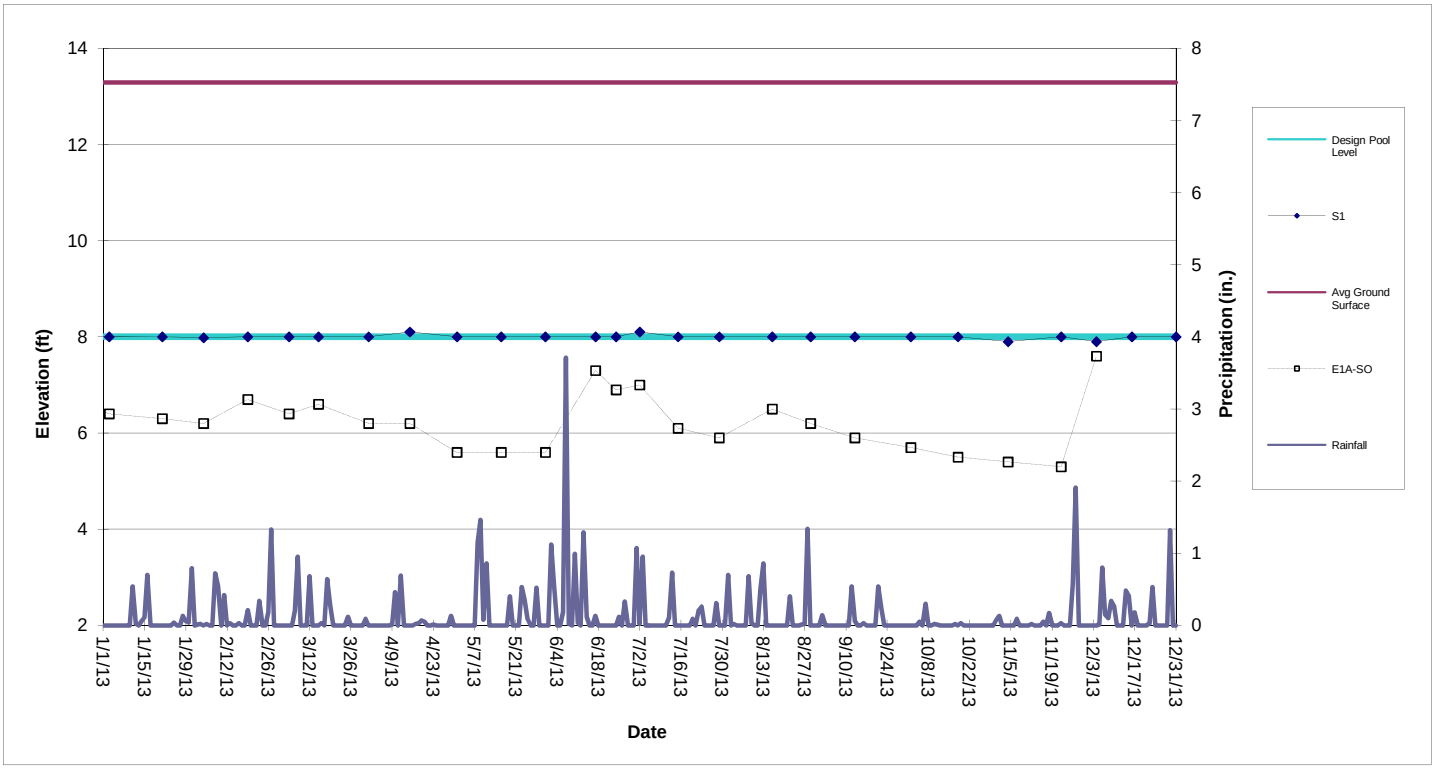



**Perimeter Pool E1** (Sta. E0+50 to E3+75)

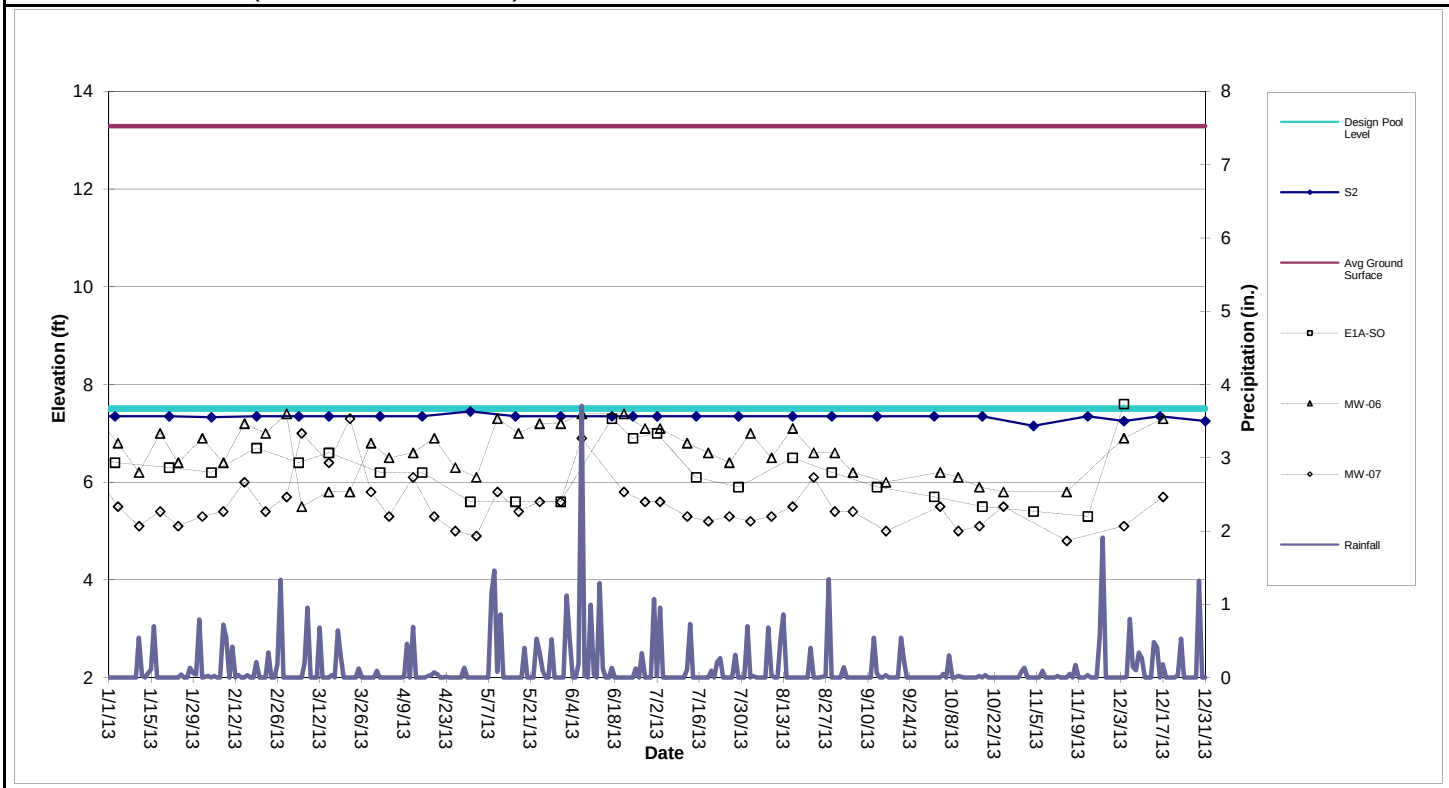



**Perimeter Pool E2** (Sta. E4+50 to E7+25)

## Attachment C: Perimeter Pools

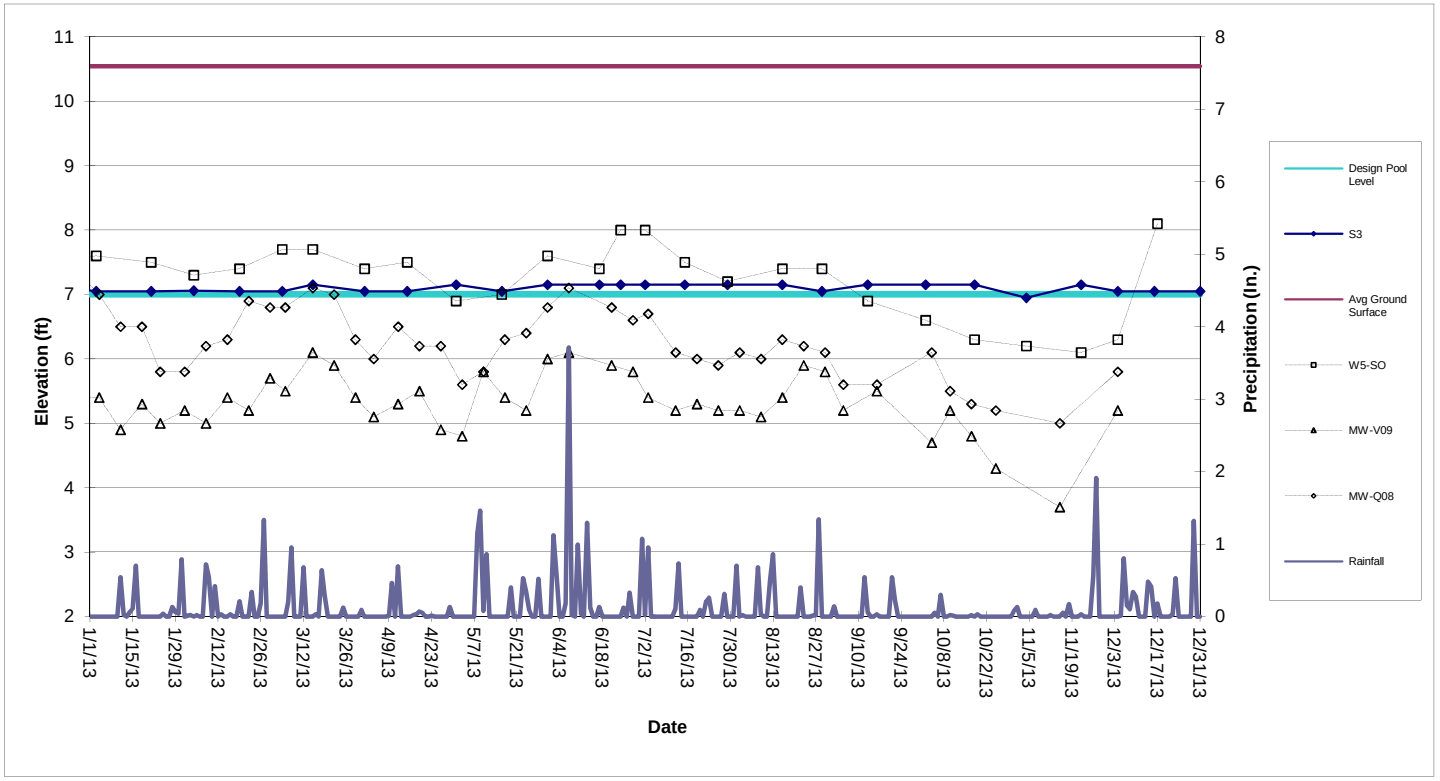



**Perimeter Pool S1** (Sta. S0+50 to S3+88)

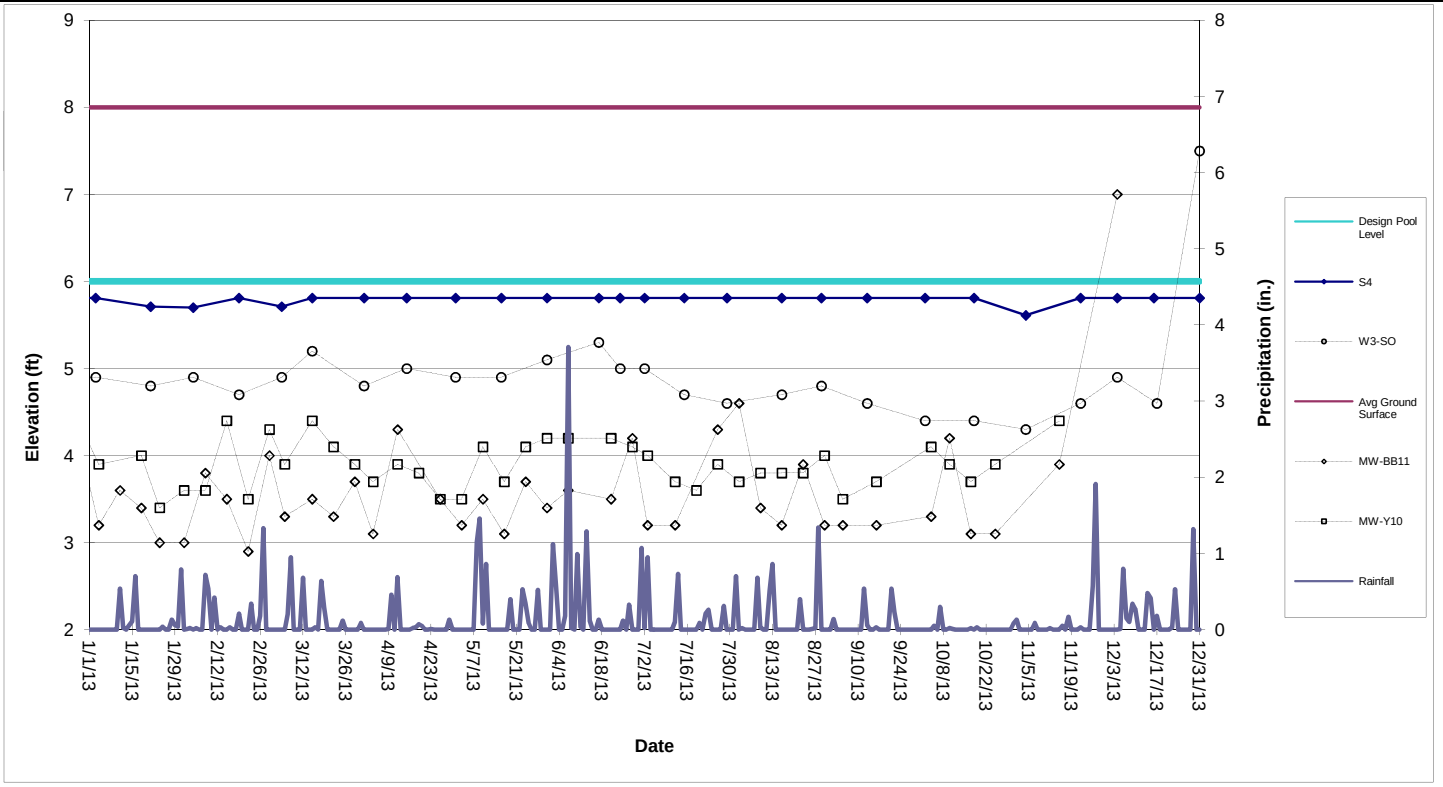



**Perimeter Pool S2** (Sta. S4+38 to S10+60)

## Attachment C: Perimeter Pools




**Perimeter Pool S3** (Sta. S11+10 to S17+50)




**Perimeter Pool S4** (Sta. S17+86 to S22+05)

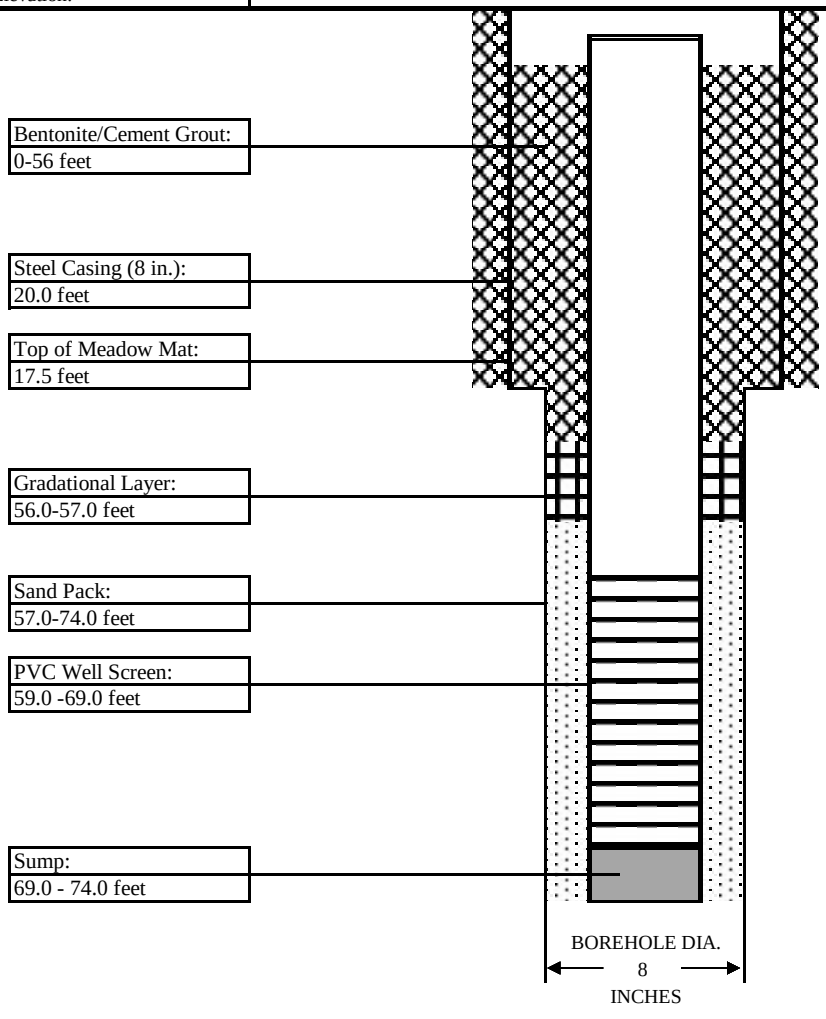
# APPENDIX D

## INJECTION WELL 088-IW-03 WELL COMPLETION DIAGRAM

# WELL CONSTRUCTION LOG - 088-IW-03

| | | | |
|---|---|---|---|
| WELL NO.: | 088-IW-03 | FACILITY/SITE NAME: | Study Area 6, Site 088 |
| PROJ. NO.: | 130110 | CLIENT: | Honeywell |
| INSPECTOR: | Joseph Brennan | DRILLING CONTACTOI | B&B Drilling |
| DATE START: | 15-May-13 | DATE END: | 22-May-13 |
| LOCATION: | Jersey City, NJ | DRILLING METHOD: | Mud Rotary |

GS Elevation:




| MANHOLE | |
|---|---|
| Material: | STEEL |
| Diameter: | 12 INCHES |
| Depth BGS: | 12 INCHES |
| Water Tight Seal: | YES |
| Flushmount: | YES |
| Expanding Cap: | YES |

| GUARD POSTS | |
|---|---|
| Material: | N/A |
| No. & Size: | N/A |

| SURFACE PAD | |
|---|---|
| Composition: | QUIKRETE |
| Size: | 24" DIAMETER |

| RISER PIPE | |
|---|---|
| Material: | PVC |
| Schedule: | SCH 40 |
| Joint Type: | THREADED |
| O-ring: | RUBBER |
| Diameter: | 4.0 INCHES |

| BENTONITE/CEMENT GROUT | |
|---|---|
| Amt cement: | N/A |
| Amt bentonite: | N/A |
| Amt water: | N/A |
| Tremied: | YES |
| Interval: | 0-56 FEET |

| GRADATIONAL LAYER | |
|---|---|
| Material: | FINE SAND |
| Type: | N/A |
| Amount Used: | N/A |
| Interval: | 56.0-57.0 FEET |

| FILTER PACK | |
|---|---|
| Material: | SILICA SAND |
| Brand Name: | FILPRO |
| Amount Used: | N/A |
| Grain Size Dist.: | #2 WELL GRAVEL |
| Interval: | 57.0-74.0 FEET |
| Tremied: | YES |

| SCREEN | |
|---|---|
| Material: | PVC |
| Diameter: | 4.0 INCHES |
| Slot Size & Type: | 0.020" MACHINE SLOT |
| Interval BGS: | 59.0 - 69.0 FEET |

| SUMP | |
|---|---|
| Interval BGS: | 69.0 - 74.0 |
| Bottom Cap: | YES |

| BACKFILL PLUG | |
|---|---|
| Material: | NA |
| Setup/Hydration Time: | NA |