April 10, 2023

Honorable Robert G. Torricelli
Office of the Special Master
RGTspecialmaster@aol.com

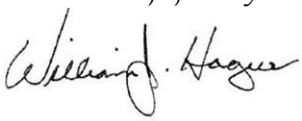
Subject: **2022 Integrated Groundwater Monitoring Report (IGWMR)**
Study Area 5, 6 & 7

Dear Senator Torricelli:

We are submitting on behalf of Honeywell the 2022 Integrated Groundwater Monitoring Report (IGWMR) for Study Areas 5, 6 & 7 prepared by our groundwater consultant, Cornerstone.

Please contact the undersigned at 973-896-9366 should you have any questions or comments on this submittal.

Sincerely,
WSP USA Environment & Infrastructure Inc.
Sent on behalf of Honeywell



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2022 Integrated Groundwater Monitoring Report (IGWMR)
Study Area 5, 6 & 7

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INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT FOR 2022

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

Prepared for

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April 2023

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

APPENDICES

LIST OF TABLES AND FIGURES

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 fourteenth such annual performance report. In 2011, the GWET LTMP was expanded to integrate groundwater monitoring requirements for Study Areas 5, 6 and 7 (Project Area). Sampling and analysis within this integrated plan were performed consistent with the requirements set forth in the *Integrated Groundwater Sampling and Analysis Plan* (SAP) *for Study Areas 5, 6 and 7* revised September 17, 2020.

Groundwater monitoring in the Project Area is also governed by Remedial Action (RA) Permits issued by the NJDEP in 2018 for the shallow, deep overburden, and bedrock groundwater zones, and site-specific LTMPs applicable to SA-5 and SA-6 sites. RA Groundwater Permit modifications were submitted to NJDEP in 2021 including changes consistent with the revised SAP and are discussed further in Section 6. Site-specific LTMPs include:

- LTMP for SA-5 New Jersey City University (NJCU) (Sites 090 and 184) November 2016, updated May 2019 and Shallow Groundwater Monitoring and Extraction System Operation Plan (Appendix L of the LTMP)
- Draft LTMP for SA-5 Shallow Groundwater, June 2018;
- LTMP for SA-6 North and SA-6 South; February 2018, revised December 2020.

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.
- Compile groundwater data in one annual report.

- 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.

1.3 Status of Integrated Monitoring Requirements for 2022

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 in available monitoring wells and piezometers to fulfill various reporting requirements as shown on **Table 1-1**. Groundwater quality sampling is conducted in a subset of designated wells in accordance with the requirements of the various monitoring plans. The status of groundwater sample collection for laboratory analysis in 2022 is shown on **Table 1-2**.

1.4 Document Organization

In accordance with the SAP, 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). Conclusions and recommendations for modifications to the GWET LTMP and related monitoring and reporting operations in the project area are provided in Section 6.

2 GENERAL CONDITIONS

The GWET system was operated at its design rate throughout the year. Long term monitoring of the SA-6 Chromium Remedy continued at SA-6 South and SA-6 North in 2022. Groundwater pumping of the contingent groundwater extraction systems (CGWES) was conducted on an as-needed basis consistent with the requirements of the LTMP in the SA-6 North and South Open Space Areas. At NJCU, the contingent groundwater pumping system was operated throughout 2022 with the exception of a few days for maintenance.

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**. Precipitation was 1.85 inches below the 30-year average for the first half of 2022 and 3.84 inches below the 30-year average for the second half of 2022. Precipitation during October was the exception with a monthly rainfall of 2.81 inches above average. Total precipitation in 2022 was 40.56 inches or 5.69 inches below the annual average of 46.25 inches.

2.2 Tidal Monitoring

Tidal fluctuations in the Hackensack River were monitored relative to the National Geodetic Vertical Datum of 1929 (NGVD-29) vertical datum. This datum is used for all reported groundwater elevation data in this report. The datalogger 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. With the exception of wells installed directly adjacent to the Hackensack River, there are no tidal influences in the Shallow Zone monitoring wells. Wells containing dataloggers do not have the data tidally corrected. The mean tidal elevation is approximately +1.2 feet above mean sea level (msl) in the NGVD-29 vertical datum.

2.3 Monitoring Well Inventory

A list of the groundwater monitoring wells in service within the Project Area during 2022 is provided in **Table 2-2**. The wells are organized by hydrogeologic zone and provide information regarding their location, total depth, screen interval, and reference point elevation. There were no monitoring wells abandoned or installed within the Project Area in 2022.

3 GROUNDWATER EXTRACTION

3.1 GWET System Operation

The Deep Overburden GWET system was in operation throughout 2022. The GWET system consists of three extraction wells pumping at a combined rate of 54.5 gallons per minute (gpm) with discharge via independent force mains to the groundwater treatment plant located on SA-6 North. Wells 087-PW-1 and 087-PW-3 are located on the DiFeo property to the north of SA-6 North and are screened in the Deep and Intermediate Zones, respectively. Well 115-MW-215BR is located on the northwest side of Site 115 (SA-7) and pumps from the upper Bedrock zone.

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. The flow rates are controlled using manually-operated valves as necessary to maintain design rates of 40 gpm for PW-1, 7.5 gpm for PW-3 and 7 gpm for the bedrock extraction well 115-MW-215BR. The total system rate of 54.5 gpm was maintained throughout the period with the exception of occasional downtime for O&M activities. **Table 3-1** identifies the events that resulted in a shutdown lasting more than 8 hours.

3.1.2 Force Main Acid Flushing

Acid flushing of the force main line from PW-1 and PW-3 to the treatment plant was conducted on September 6, 2022. Total downtime of the GWET pumping system was 24 hours as documented in **Table 3-1**.

3.1.3 Well Redevelopment

GWET extraction well redevelopment activities were not required in 2022.

3.2 SA-6 North Contingent Groundwater Pumping System

The SA-6 North contingent groundwater pumping system design consists of a horizontal perforated drain located close to the centerline of the soil containment area. The drain consists of two sections extending from near Route 440 to the western barrier wall. In 2022, the eastern portion (pump PS-2N) was operated throughout the year with the exception of approximately 30 days during a two-month period from February 9 to April 7 and occasional downtime in July and September for pump maintenance and sump cleanout. Operation of the western portion of the drain (pump PS-1N) was not required during 2022 based on inward gradients. The average daily pumping rate of PS-2N ranged from 0.5 to over 5 gpm with an average of approximately 2 gpm. **Figure 3-1** compares these average daily rates with interior groundwater levels at SA-6 North. Since pumping was relatively uniform throughout the year, interior heads do not reflect the large duration

cycles that are evident at SA-6 South. The rise in heads shown in October is due to above average precipitation events as discussed in Section 2.1.

3.3 SA-6 South Contingent Groundwater Pumping System

The SA-6 South contingent groundwater pumping system consists of a single horizontal perforated drain located close to the centerline of the soil containment area, which extends from near Route 440 to the western barrier wall in a continuous length. Two pumping cycles were conducted during 2022 to lower heads within the containment area. These were from January 4 to March 7, and from August 5 to October 15. Average pumping rates were 3.5 gpm during the first pumping cycle and 3.2 gpm during the second. **Figure 3-2** shows the response in head at the five piezometers inside of the soil containment cell to the two pumping cycles. Pumping is shown to lower heads approximately 2 feet during the January to March cycle and from 2 to 3 feet during the August to October cycle.

3.4 SA-5 NJCU Contingent Groundwater Pumping System

The contingent groundwater pumping system at the NJCU site was operated throughout 2022 with the exception of October 12 to 14 and December 19 to 21 during which repairs to the control system wiring were required. All pumping was conducted using extraction Sump B only; Sump A was not operated in 2022. The Sump B pump cycles on and off based on a water level probe set to an elevation of approximately 4.5 feet msl just below the drain line. When pumping, the discharge rate of the pump is 2.5-3.0 gpm; however, the average steady-state, long-term net yield of the drain was 0.22 gpm in 2022.

4 HYDRAULIC MONITORING

Hydraulic monitoring in 2022 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 June 2022 round are plotted for the Shallow, Intermediate, Deep, and Bedrock Zones on **Figures 4-1B through 4-4** respectively, and on **Figure 4-5** in cross section. Groundwater elevation data are reported in units of feet of water relative to mean sea level in the NGVD-29 vertical datum.

4.1 Regional Groundwater Flow

4.1.1 Shallow Zone

Due to the close spacing of monitoring wells and piezometers screened in the Shallow Zone, well location IDs are shown separately on **Figure 4-1A** to improve the readability of the groundwater elevations and contours provided on **Figure 4-1B**. Groundwater elevations in the Shallow Zone range from greater than 11 feet msl on Site 154 to less than 3 feet msl near the Hackensack River. As a point of reference, the river has a mean tide elevation of approximately +1.2 feet msl relative to the NGVD-29 datum. As shown on **Figure 4-1B**, shallow groundwater flow is generally from east to west across the region but is locally impacted by subsurface features such as the barrier walls installed at SA-5, SA-6, and SA-7, and deep sewer lines that run beneath JCMUA and Route 440. These barriers cause the groundwater flow direction to be more southerly south of Site 117.

Data loggers are installed in the piezometers along the barrier walls of SA-6 North, SA-6 South, and the four monitoring wells within SA-7. The loggers record the water level within each well at 6-hour intervals to aid in the determination of head gradients across the barrier walls as further discussed in Sections 4.5 and 4.6.

At the NJCU site in Study Area 5, groundwater flow is generally from east to west; however, the north-south oriented barrier walls, including the barrier wall extension installed in 2017, cause groundwater to be diverted to the north, generally parallel to the barrier wall.

4.1.2 Intermediate Zone

Groundwater elevations in the Intermediate Zone are shown on **Figure 4-2** and range from over 6 feet msl at SA-5 to less than mean sea level near 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. Vertically, heads within the Intermediate Zone are generally one to three feet lower than in the Shallow Zone, which indicates a downward vertical gradient across Stratum D. At the 087-MW-136D location in SA-6 North for example, the vertical head difference in June was approximately 3 feet based on a comparison of **Figures 4-1B and 4-2**. Locally however, vertical gradients can be lessened or even reversed to upwards in areas of pumping, such as within the soil containment cells of SA-6 North and South. **Figures 4-2 and 4-5** also illustrate that the combined groundwater depression in the vicinity of the GWET pumping wells fully encompasses the deep overburden plume and provides effective capture 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 **Figures 4-3 and 4-5**. 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.** The impact of the GWET pumping well 115-MW-215BR 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-3 created a combined zone of influence causing groundwater to flow both laterally and vertically into the capture zone of the wells. The drawdown associated with both wells during the startup of PW-3 was documented in Cornerstone's technical memorandum dated February 23, 2016. Based on these results and 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 effective capture that meets its 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**. A barrier wall extension, connecting the open-ended wing-wall west of Building 5 and the Building 6 sheet pile wall, was constructed during May-June 2017. This wall completed the perimeter wall in the Shallow Zone around the capped portion of the Commercial AOC. This was followed by the installation of four monitoring wells (MW-105 through MW-108) that, along with the four existing wells MW-101 through MW-104, provide four well pairs along the barrier wall extension. As noted in previous reports, the screened interval in MW-106 was at a lower position than in the adjacent well MW-102 and thus MW-106 was replaced with MW-106R in August 2021. The replacement well was constructed with a screened interval comparable to that of MW-102.

Data loggers placed in the four well pairs, as well as in Sumps A and B and wells 090-PZ-05 and 184-MW-05, were used to monitor groundwater elevation trends on a 3-hour interval. Hydrographs developed from these data were provided in the quarterly reports and indicate that groundwater elevations generally varied throughout the year in response to precipitation. For each piezometer equipped with an automatic datalogger, the arithmetic mean of the recorded values was calculated over a nominal one-month period and is plotted for 2022 in **Appendix B**. These averages were then used to determine if the head gradient across the barrier wall meets the performance criterion of an inward gradient of 0.1-foot or greater as defined in Appendix L of the LTMP. These comparisons are provided in **Table 4-3** and graphed for the year on **Figure 4-10**.

The trends on **Figure 4-10** show that the two southernmost well pairs (MW-103/107 and MW-104/108) have head differences close to zero throughout most of 2022. The lower than average precipitation during the summer months is evident in the lowering of heads both inside and outside of the barrier wall such that the head difference was not significantly changed.

At the northernmost well pair (MW-101/105), **Figure 4-10** shows a variable gradient throughout the year with alternating inward and outward directions. These variations correlate with changes in monthly precipitation, especially in the outboard well MW-101. During normal and wet periods, heads in MW-101 remained elevated which resulted in inward gradients from January through May and October through December. However, during the relatively dry summer months of June through September, heads declined in MW-101 and outward gradients were recorded. At well pair MW-106R/102, heads inside of the barrier wall were consistently higher than those outside of the wall. These conditions at the two northern well pairs are likely due to presence of the Meadow Mat (Stratum D) on the inside of the barrier wall and the lack of Meadow Mat on the outside of the wall. This difference in the Meadow Mat allows groundwater to preferentially build up on top of the Meadow Mat inside of the barrier wall and allows a localized downward gradient in the Shallow Groundwater Zone outside of the barrier wall due to the lower heads of the underlying Intermediate Zone. This difference in Meadow Mat location also explains why

the replacement of well MW-106 with MW-106R was not able to allow heads to build up to match those in well MW-102, despite its shallower screen.

Additional surface improvements and land use changes are expected in the future as part of NJCU's Phase 2 roadway and infrastructure project that may impact recharge and therefore groundwater levels. Thus, these levels should be evaluated during and after such surface modifications are conducted. For further details regarding groundwater levels, including monthly average head differences from logger data, refer to the quarterly reports. Finally, it is noted that each of the well pairs are separated by a steel sheet-pile wall constructed with sealed joints and that groundwater quality data indicates that hexavalent chromium has only been detected in one of the monitoring wells (MW-107) along the inside of the barrier wall in 2021, during one occasion (March Sampling Event), and its concentration was below 70 parts per billion (ppb) as discussed in Section 5.5.

Groundwater elevation maps are provided on **Figures 4-6 through 4-9** 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 parallel to the barrier walls that block flow to the south and west. In addition, downward vertical gradients continue to be present as documented by the reported head in the deep zone well 090-MW-09, located between 184-MW-05 and Sump B in the Commercial AOC. These data suggest that groundwater bypasses the capped portion of the Commercial AOC and moves vertically downward into the underlying zones; a conclusion that is supported by groundwater quality data from the sentinel wells as further discussed in Section 5.5.

4.4 Eastern SA-7 Perimeter Pools

The LTMP program includes monitoring of the hydraulic gradients across the soil-cement bentonite (SCB) barrier at the eastern perimeter of SA-7. This is accomplished through monitoring of the head in the eastern perimeter pools E-1 and E-2 and comparing these data to groundwater elevations in adjacent shallow piezometers E3-SO and E2-SO, respectively, located just outside of the SA-7 SCB. The location of the eastern pools, the design pool elevations, and water level trends are provided in **Appendix C**. Overall, the data indicate that water levels within the SA-7 eastern pools are greater than those outside of the SCB and thus outward gradients are occurring relative to the SA-7 SCB.

4.5 SA-6 North Containment Cell

Shallow groundwater elevations within the SA-6 North containment cell, as measured in June 2022, are illustrated on **Figure 4-1B** and include data from the ten piezometers installed around the perimeter of the soil containment cell and the six wells on the border of SA-7 and SA-6 North which includes wells 115-PZ-502 and 115-PZ-503 installed in the backfill of the SA-7 interior pool. At the time of the measurements, groundwater elevations within the cell ranged from approximately 2 to 4 feet above msl but varied during the year with pumping from the contingent drain system. Data from automatic loggers placed in each of the wells were used to construct the hydrographs provided in monthly data

submittals and quarterly reports to assess the impact of precipitation events on heads in the short term. The logger data were also used to calculate monthly average heads for the longer-term assessment of hydraulic gradients across the barrier walls. The monthly average heads are provided on **Table 4-4** and plotted in **Appendix A** for the year. Head differences across the barrier walls for these well pairs are also provided in **Table 4-4** and plotted on **Figure 4-11**. Gradient determinations include the five piezometer pairs around the east, north, and west soil containment cell walls, and four well pairs that have been identified along the SA-7 SCB using wells 115-PZ-502 and 115-PZ-503.

A review of these data indicates that the performance standard requiring at least 0.1 foot of inward gradient, as defined by the SA-6 LTMP, was met in three of the five piezometer pairs. The performance standard was not met at the PZ-1/PZ-2 well pair during the four months (June through September) of below average precipitation which caused declining heads outside of the soil containment cell. An outward gradient was present throughout the year along the western SA-6 North soil containment cell wall at the PZ-9/PZ-10 well pair due to the influence of the Hackensack River. As discussed in the 2019 annual performance report, groundwater elevations in PZ-10 remain relatively high following periods of heavy precipitation which is likely the result of water buildup on the cap that increases the head beneath the cap. In accordance with the SA-6 LTMP, the quality of groundwater along the inside of the barrier wall at this western end was determined through laboratory analysis of samples from PZ-10 as further discussed in Section 5.3

With respect to the SA-7 SCB wall along SA-North, gradients were inward during the entire year at the 115-MW-502/E4-SO pair, the 115-MW-503/W1-SO pair, and the 115-PZ-503/W6-SO pair. Head differences at the 115-MW-502/E5-SO pair were inward for 9 of the 12 months and zero for one month (May 2022) with an annual average of 0.47 feet inward. Thus, although four of the months for this pair did not meet the 0. 1 foot criteria as defined by the SA-6 LTMP, the net direction of groundwater flow through the wall was inward in 2022. The cause of these occasional outward gradients was investigated in January 2021 and as discussed in the 2021 IGWMR, was determined to be temporary ponding of water above the cap within the utility corridor depression in which 115-E5-SO is located. During the first quarter 2023, Honeywell has continued to investigate options for improving the subsurface drainage from above the SA-6 North cap into SA-7 in this area. Honeywell will report progress to the Parties in the second quarter 2023.

4.6 SA-6 South Containment Cell

Shallow groundwater elevations within the SA-6 South containment area, as measured in June 2022, are illustrated on **Figure 4-1B** and include data from the ten piezometers installed around the perimeter of the soil containment cell and the five wells on the border of SA-7 and SA-6 South which includes wells 115-PZ-500 and 115-PZ-501 installed in the backfill of SA-7. At the time of measurement, groundwater elevations were approximately 2 to 3 feet above msl within the cell but varied throughout the year in response to pumping of the contingent drain system as discussed in Section 3.3.

Data from automatic loggers placed in each of the wells were used to construct the hydrographs provided in monthly data submittals and quarterly reports and to assess the impact of precipitation events on heads in the short term. The logger data were also used to calculate monthly average heads for the longer-term assessment of hydraulic gradients across the barrier walls. The monthly average heads are provided on **Table 4-4** and plotted in **Appendix A** for the year. Head differences across the barrier walls for these well pairs are also provided in **Table 4-4** and plotted on **Figure 4-12**. Gradient determinations include the 5 piezometer pairs around the east, south, and west soil containment cell wall, and three well pairs that have been identified along the SA-7 SCB using wells 115-PZ-500 and 115-PZ-501.

A review of these data indicates that the performance standard requiring at least 0.1 foot of inward gradient, as defined by the SA-6 LTMP, was met in three of the five piezometer pairs along the outside perimeter of the soil containment cell. Outward gradients were reported in July and August at the PZ-17/PZ-18 well pair and in June, July, and August in the PZ-19R/PZ-20R well pair. These negative gradients were likely caused by declining heads outside of the soil containment cells as a result of below average rainfall during the summer months. With respect to the SA-7 SCB wall, gradients at each of the three well pairs were inward during the entire year.

In accordance with the SA-6 LTMP, the quality of groundwater along the inside of the barrier wall at selected locations was determined through laboratory analysis as further discussed in Section 5.4

4.7 SA-5 Sites 117 and 153

Groundwater movement beneath Sites 117 and 153 is generally from northeast to southwest as illustrated on **Figures 4-1B through 4-3**. In the Shallow Zone, the 48-inch diameter Interceptor Sewer beneath Route 440 serves as a groundwater sink and together with the prevalent reducing conditions associated with the Meadow Mat, limits the further movement of groundwater to the south and west. This is supported by shallow groundwater quality in this area as well as the absence of chromium detections in the underlying Intermediate Zone in well 117-MW-I1 located between SA-5 and the Interceptor Sewer. Additional detail regarding Honeywell's position on the impact of this sewer was provided in Memoranda dated December 7, 2018, January 23, 2019, March 2, 2020, August 10, 2020, December 14, 2020, March 2, 2021, and September 6, 2022, and is the subject of continuing technical discussions with Plaintiffs.

On September 3, 2022, a sample of the bedding associated with the Jersey City Municipal Utility Authority (JCMUA) Combined Sewer Outfall (CSO) pipe at the intersection of NJ Route 440 & Danforth Avenue in Jersey City, New Jersey, was collected by WSP field personnel. The sample was analyzed for various geotechnical properties by SOR Analytical Laboratories. The sample results were transmitted to the Parties on November 4, 2022 by Arnold and Porter via a memo prepared by WSP USA on behalf of Honeywell. The sample was found to consist of 77.3% sand, 14.8% gravel, and 7.9% silt and have a

permeability ranging from 0.009 to 0.028 per day (ft/day). As discussed in WSP's memo, these results show that the permeability of the bedding material for the CSO pipeline collected from the Danforth Ave project is well below that for even sandy material and thus would not promote preferential flow of shallow groundwater within the bedding towards the river. The results indicate that the bedding material used beneath the CSO pipes consisted primarily of sand rather than coarse gravel, and that the relatively large silt content suggests that the sand was either not a clean, washed material, or has accumulated silt during the estimated 100+ years since it was placed.

4.8 Miscellaneous Events

There were no miscellaneous events to be reported for 2022.

5 GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring within the project area was conducted in 2022 in accordance with the GWET 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

Regional groundwater monitoring was last conducted in May of 2019. In accordance with the SAP, regional sampling is on a 5-year frequency which would put the next round in 2024. However, the NJDEP Groundwater RA permits require regional monitoring to be on a 2-year frequency which would have required sampling in 2021. Honeywell submitted a permit modification application on June 14, 2021 to have the frequency changed to 5 years to match the SAP and had expected NJDEP approval of that change in 2021. When the proposed change in frequency was not received in 2021, the regional sampling event was rescheduled for 2022.

Data from the July 2022 sampling round are summarized on **Table 5-1** and shown in plan-view for the Bedrock, Deep Overburden, and Intermediate Zones on **Figures 5-1 through 5-3**, respectively. Groundwater sampling procedures were in accordance with EPA low-flow sampling protocol as documented in the SAP. Both filtered and unfiltered samples were collected from each well for the analysis of total and hexavalent chromium.

The objective of the sampling program is to determine if the deep overburden chromium plume in each of the three water-bearing zones has expanded beyond the horizontal extent documented in the Final Groundwater Investigation Report (FGIR) [HydroQual 2007]. During this sampling event, a total of 25 monitoring wells were sampled. These included six wells which were added to the program in accordance with NJDEP Groundwater Permits for the site. These include monitoring wells 090-MW-09, 117-MW-I4, and 117-MW-D2, screened in the Deep Zone; well 087-MW-136D, screened in the Intermediate Zone as a replacement for well 087-MW-O19D at SA-6 North; and wells 115-MW-203BR and 090-MW-7BR, screened in the Upper Bedrock. Each of these wells are located within the central portions of the chromium plume as originally delineated in the FGIR. Well 115-MW-203BR served as the original Upper Bedrock extraction well prior to being replaced by the current extraction well 115-MW-215BR in 2012. Three Deep Zone wells in the regional groundwater plan were unable to be sampled due to obstructions in the well casing. These were 090-MW-09, 124-MW-106T, and SA6-MW-AA1T. Efforts to repair these wells are currently underway and the wells will be sampled when they have been repaired.

5.1.1 Bedrock Zone

Table 5-1a provides total and hexavalent chromium data from filtered and unfiltered samples collected from nine Upper Bedrock Zone monitoring wells during the July 2022 monitoring event. Data from prior events are also provided in the table for historic reference. Hexavalent chromium results from the unfiltered samples collected during the July 2022 monitoring event have been plotted on **Figure 5-1** and iso-concentration contours from the May 2019 event are shown for reference. The June 22, 2022 analytical result from a discharge sample of the current GWET bedrock extraction well 115-MW-215BR has been added to the map and is used in the contouring. The results indicate that groundwater around the east and south edges of the plume remains non-detect for both hexavalent and total chromium.

Well 090-MW-7BR, located in the central portion of the bedrock plume, had a reported hexavalent chromium concentration of 86.7 ppm which is down from 139 ppm in 2019. Former groundwater GWET extraction well 115-MW-203BR was non-detect for hexavalent chromium and total chromium was reported in the unfiltered sample from this well at 0.1 ppm which is down from 0.3 ppm in 2019. Yield testing during the evaluation of well 115-MW-215BR as a replacement extraction well confirmed that MW-203BR is screened within the same highly-transmissive fracture zone as well MW-215BR. Thus, this non-detect result for hexavalent chromium suggests that pumping from extraction well MW-215BR has been successful at pulling the bedrock plume back from its former southern extent as shown by the contours on **Figure 5-1**.

5.1.2 Deep Overburden Zone

Table 5-1b provides total and hexavalent chromium data from filtered and unfiltered samples collected from ten Deep Overburden Zone monitoring wells during the July 2022 monitoring event. Data from prior events are also provided in the table for historic reference. Hexavalent chromium results from the unfiltered samples collected during the July 2022 monitoring event have been plotted on **Figure 5-2** and iso-concentration contours from the May 2019 event are shown for reference. The June 22, 2022 analytical result from a discharge sample of the current GWET Deep Overburden extraction well 087-PW-1 has been added to the map and is used in the contouring. Sample collection was prevented in wells 090-MW-09, 124-MW-106T, and SA-6-MW-AA1T due to obstructions within the inside well casing.

The results indicate that groundwater quality around the east and west edges of the plume remain non-detect for hexavalent chromium. Well 117-MW-I4, located in the central portion of the Deep Zone plume, reported a hexavalent chromium concentration of 7,860 ppm, which is in a similar range to that in 2019. Hexavalent chromium concentrations in the Deep Overburden Zone GWET extraction well 087-PW-1 were reported to be 14.8 ppm.

Groundwater monitoring in the Plume Diversion or “L-well” area now consists of three monitoring wells: 124-MW-106T, 119-MW-01T and 119-MW-02T located generally

downgradient of the plume. As noted above, well 124-MW-106T could not be sampled due to an obstruction in the casing. Hexavalent chromium concentrations in the unfiltered samples in wells 119-MW-01T and 119-MW-02T were reported as 0.01 ppm and 0.056 ppm, respectively. Both results represent a decline from the results of the 2019 event and are below the NJDEP GWQS of 0.070 ppm.

5.1.3 Intermediate Overburden Zone

Table 5-1c provides total and hexavalent chromium data from filtered and unfiltered samples collected from six Intermediate Zone monitoring wells during the July 2022 monitoring event. Data from prior events are also provided in the table for historic reference. Hexavalent chromium results from the unfiltered samples collected during the July 2022 monitoring event have been plotted on **Figure 5-3** and iso-concentration contours from the May 2019 event are shown for reference. The June 22, 2022 analytical result from a discharge sample of the current GWET Intermediate Zone extraction well 087-PW-3 has been added to the map and is used in the contouring. The results indicate that groundwater quality is similar to previous events and below the GWQS in five of the six wells including the replacement well 087-MW-136D at SA-6. Well 117-MW-I5 had a hexavalent chromium concentration of 0.11 ppm in the unfiltered sample which is not unexpected given its location in the plume. However, as shown in **Table 5-1c**, this result is in line with a steadily decreasing trend in concentrations since 2010.

5.2 GWET Extraction Wells

In accordance with recommendations in Section 6.5 of the 2020 Integrated Annual Groundwater Performance Report and Plaintiffs' written concurrence in their letter of September 9, 2021, sampling of the GWET extraction wells will be conducted annually beginning in 2022 and will no longer include analysis of VOCs unless one of the extraction wells is replaced. The 2022 annual round of groundwater discharge samples was collected from the three GWET pumping wells in June 22 as shown on **Table 5-2.**

The samples were collected from the discharge sampling ports for extraction wells PW-1, PW-3 and bedrock well 115-MW-215BR without filtering. The results for hexavalent chromium are plotted on **Figure 5-4** and indicate that concentrations in the Deep Zone (PW-1) have declined in an asymptotic fashion since 2009 to approximately 15 parts per million (ppm). Concentrations in the Intermediate Zone extraction well discharge initially increased significantly from 10 ppm to 90 ppm when PW-3 came online in January 2016 but since then have also declined in an asymptotic fashion to approximately 16 ppm. Hexavalent chromium concentrations in the bedrock have been generally stable in the range of approximately 10 to 14 ppm. Plots of trichloroethene and carbon tetrachloride will no longer be provided for years in which analysis of these compounds were not performed.

5.3 SA-6 North

As noted in Section 4.5 and shown on **Table 5-3**, shallow groundwater samples were collected from perimeter piezometers PZ-2 and PZ-10 located inside of the SA-6 North soil containment area. The samples were collected on December 6 and May 5, 2022, respectively. Hexavalent chromium was not detected in either the filtered or unfiltered samples and total chromium was not reported in either the filtered or unfiltered sample above the NJDEP GWQS of 0.07 ppm.

5.4 SA-6 South

As noted in Section 4.6 and shown on **Table 5-3**, shallow groundwater samples were collected from perimeter piezometer PZ-20R located inside of the SA-6 South soil containment area on May 5, 2022. Hexavalent chromium was not detected in either the filtered or unfiltered samples and total chromium was not reported in either the filtered or unfiltered sample above the NJDEP GWQS of 0.07 ppm.

5.5 New Jersey City University

In accordance with the Shallow Groundwater Monitoring and Extraction System Operation Plan and modified NJDEP Groundwater Permit for the NJCU Commercial AOC, the four monitoring wells along the interior of the barrier wall extension were sampled quarterly in 2022. These wells are 184-MW-102, 184-MW-105, 184-MW-107, and 184-MW-108. The results are provided on **Table 5-4** and plotted on **Figure 5-5**. The results indicate that hexavalent chromium was not detected above the reporting limit of 0.0055 ppm in any of the samples in 2022. Total chromium was only reported above the NJCU GWQS of 0.07 ppm in one sample, the unfiltered sample in well 184-MW-107 during the March sampling round. The corresponding filtered sample reported total chromium at non-detect with a reporting limit of 0.004 ppm. **Table 1** in **Appendix D** provides historical groundwater quality data for the wells at NJCU. A review of these data indicates that although total chromium concentrations from unfiltered samples in well 184-MW-107 have historically been quite variable, ranging from over 1 ppm to non-detect, none of the filtered sample results have exceeded 0.07 ppm.

5.6 Plume Diversion Area Monitoring

Based on the results of groundwater monitoring in 2017, groundwater sampling of the Plume Diversion Area is no longer required.

5.7 SA-5 Site 117

In accordance with the SAP and NJDEP RA Groundwater Permit, sampling of shallow monitoring wells at Site 117 is required every two years with the previous event conducted in 2021. Thus, the six listed monitoring wells are scheduled to be sampled in the summer of 2023.

5.8 SA-5 Sites 079/153

Groundwater quality sampling of the shallow monitoring wells is not required at Site 079. In accordance with the SAP, groundwater quality monitoring of the bedrock monitoring well 079-MW-13BR is part of the regional groundwater monitoring plan and was sampled in June 2022 as discussed in Section 5.1.1. This well is scheduled to be sampled next in the summer of 2023.

In accordance with the SAP and NJDEP RA Groundwater Permit, sampling of shallow monitoring wells at Site 153 is required every two years. The last sampling event was in 2021 and thus the next sampling event is scheduled for the summer of 2023.

5.9 In-Situ Sampling Beneath Riverbed Sediments

In accordance with Section 3.3 of the SA-7 Deep Overburden and Bedrock Groundwater Remedy Long-term Monitoring Plan, in-situ groundwater from within the lacustrine deposits directly beneath the soft riverbed sediments in the Hackensack River is to be sampled every five years until chromium concentrations are below the GWQS. The most recent sampling event took place in 2019 during which location PW-09-450 was sampled. Results of this investigation were provided in the July 23, 2019 Technical Memorandum. Based on these results, and in accordance with the SAP, location PW-09-450 will be resampled in the spring of 2024.

5.10 Miscellaneous Groundwater Quality

The mass of hexavalent chromium removed from the Deep Overburden Plume through pumping has been calculated for reference. As shown on **Figure 5-6**, 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. The results indicate that over 99 tons of hexavalent chromium have been removed through groundwater extraction alone through the end of 2022 and does not include the 50 tons of chromium treated during the mass removal injection program conducted from 2011 to 2016.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Compliance with Monitoring Requirements

Hydraulic and groundwater quality monitoring conducted in 2022 have fulfilled the various monitoring plan requirements in accordance with **Tables 1-1 and 1-2**.

6.2 Status of Groundwater Remedial Action Permits

Groundwater Classification Exception Areas (CEAs) were approved by NJDEP on February 16, 2012 for the three principal water bearing zones in the Project Area (Shallow Zone, Deep Overburden, and Bedrock). In 2014, NJDEP notified Honeywell that CEA biennial certifications are not due until the applicable Groundwater Remediation Permits were issued. Honeywell submitted Groundwater Remedial Action (RA) Permit Applications to NJDEP in December 2017 and RA Permits were issued by the NJDEP in 2018. The Groundwater RA Permits included one permit for the regional Deep Overburden Zone, one permit for the regional Bedrock Zone, and five permits for the shallow zone as follows: SA-5 NJCU, Site 117, Site 153, SA-6 North and SA-6 South Open Space Cap areas. Biennial certification reports were submitted during July and August of 2020 and 2022. Applications for various permit modifications are discussed in Section 6.3.

6.3 Recommendations for Monitoring Well Network

A Remedial Action Groundwater Permit modification application was submitted to NJDEP in June 2021 for Site 117 Shallow Groundwater that included a request to discontinue groundwater quality sampling at well 117-MW-I4S and to change groundwater level measurements from annually to quarterly to be consistent with the SAP. Well 117-MW-I4S was originally installed in the source area of the Deep Overburden plume to provide samples for treatability sampling and not for long term monitoring. This well is located along a roadway between Site 117 and adjacent Sites 090/184 (NJCU property) and will be retained for water level monitoring only as part of the Integrated SAP until such time that the well is abandoned, which is expected following completion of NJCU's roadway/infrastructure project.

A Remedial Action Groundwater Permit modification application was submitted to NJDEP in June 2021 for Site 117 Deep Overburden and Bedrock zones to be consistent with the SAP as follows:

Deep Overburden Zone (RAP 170002)

- Addition of well (087-MW-136D) for groundwater quality sampling.

- Addition of two wells (088-MW-15R; 124-MW-G02D) for depth-to-water measurements.
- Change in frequency of groundwater quality sampling from biennial to every 5 years and depth-to-water measurements from quarterly to annually.

Bedrock Zone (RAP 170003)

- Change in frequency of groundwater quality sampling from biennial to every 5 years and depth-to-water measurements from quarterly to annually.

As of December 2022, Honeywell has not received a reply from NJDEP on these requested permit modifications.

A Remedial Action Groundwater Permit modification application was submitted to NJDEP in December 2021 for Study Area 5 NJCU to discontinue groundwater sampling of four wells on the outside of the barrier wall including 184-MW-101, 184-MW-103, 184-MW-104, and 184-MW-106R to be consistent with the SAP. The NJDEP issued a Remedial Action Groundwater Permit modification for NJCU reflecting this modification on February 11, 2022.

6.4 Recommendations for Water Level Monitoring Frequency

The frequency of regional groundwater level monitoring has been changed to annually beginning January 2022 in accordance with the SAP. However, quarterly groundwater level monitoring will continue until such time that the NJDEP groundwater permit has been approved to reflect this change. Groundwater level monitoring frequency at specific sites will continue to be conducted in accordance with frequencies specified in the various site-specific LTMPs as indicated in **Table 1-1**. As noted in Section 6.3, a Remedial Action Groundwater Permit modification application was submitted to NJDEP in June 2021 for Site 117 Shallow Groundwater that included a request to change groundwater level measurements from annually to quarterly to be consistent with the SAP.

6.5 Recommendations for Groundwater Quality Monitoring Frequency

As noted in Section 5.2, the frequency of sampling of the GWET pumping well discharge was changed from quarterly to annually in 2022 and VOCs will no longer be analyzed. As noted in Section 6.3, a Remedial Action Groundwater Permit modification application was submitted to NJDEP in June 2021 to change the frequency of groundwater quality sampling of the Deep Overburden and Bedrock Zones from biennial to every 5 years to be consistent with the SAP. Also, as noted in Section 6.3, a Remedial Action Groundwater Permit modification for Study Area 5 NJCU was issued by NJDEP in February 2022 to discontinue groundwater sampling of four wells on the outside of the barrier wall including 184-MW-101, 184-MW-103, 184-MW-104, and 184-MW-106R consistent with the SAP.

The frequency of groundwater quality monitoring, well selection, and parameters for analysis are established in the site-specific LTMPs and the NJDEP RA Groundwater

Permits for the various sub-areas. Any additional future proposed changes to the monitoring program that differ from the requirements of RA Groundwater Permits will require approval from the NJDEP via permit modification prior to implementation. Following review and approval of any future recommendations by the Parties, Honeywell will submit required permit modifications to the NJDEP for approval prior to proceeding with implementation.

6.6 Other Recommendations

There are no further recommendations.

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
Regional[1]	GWET Long Term Monitoring Plan June 10, 2008	Deep Overburden and Bedrock Groundwater Remedies Consent Order	All Zones	Quarterly through 2022; Annually thereafter	115
Study Area 7	SA-7 Perimeter Pools	Final Judgement, ICO v Honeywell	Shallow	Monthly	2
Study Area 7 - Site 115	SA-6 Long Term Monitoring Plan (February 2018, revised December 2020)	Not Applicable	Shallow	Monthly manual readings; logger readings every 6 hours-averaged monthly	6
SA-6 South[4]	SA-6 Long Term Monitoring Plan (February 2018, revised December 2020)	First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South	Shallow	Annual manual readings; logger readings every 6 hours-averaged monthly	13
SA-6 North[4]	SA-6 Long Term Monitoring Plan (February 2018, revised December 2020)	First Amended Consent Decree Regarding Remediation and Redevelopment of Study Area 6 North	Shallow	Annual manual readings; logger readings every 6 hours-averaged monthly	14
SA-5 (NJCU) Sites 90 & 184[4]	Long Term Monitoring Plan[2] (November 2016)	Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area	Shallow	Quarterly manual readings; logger readings every 6 hours-averaged monthly	9 wells and 2 sumps
SA-5: Site 079	Long Term Monitoring Plan for Sites 079 and 153 South	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Quarterly	3
SA-5: Site153[4]	Long Term Monitoring Plan for SA-5 Shallow GW[3]	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Quarterly	2
SA-5 Site 117[4]	Long Term Monitoring Plan for SA-5 Shallow GW[3]	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Quarterly	5

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

[2]SA-5 NJCU LTMP (November 2016; updated May 2019); Shallow Groundwater Monitoring and Extraction System Operation Plan (Appendix L of the LTMP).

[3]Draft LTMP for SA-5 Shallow Groundwater includes Sites 117 and 153 in progess; pending ongoing technical discussions and correspondence with Plaintiffs.

[4]Remedial Action Groundwater Permits were issued in 2018 for the Deep Overbuden; Bedrock; and Shallow groundwater zones at SA-5 Sites 90/184, 117, 153, SA-6 North and South Open Space Cap Areas; Various permit modification applications submitted 2021; pending NJDEP review and approval. SA-5 Sites 90/184 permit modified 2/11/2022.

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

Location	Monitoring Plan	Consent Decree	Depth	Frequency	# Wells	Estimated Start Date
Regional	Integrated Sampling and Analysis Plan; April 2014, revised October 2019	Deep Overburden and Bedrock Groundwater Remedies Consent Order	Intermediate Deep Bedrock Beneath River	Every 5 years[3] Every 5 years[3] Every 5 years[3] Every 5 years	6 10 9 1	On-going future events TBD
SA-5 (NJCU) Sites 90 & 184	Long Term Monitoring Plan / Shallow Groundwater Monitoring Document[1]	Consent Decree Regarding Remediation of the New Jersey City University Redevelopment Area	Shallow	Quarterly; Future TBD per Appendix L of LTMP[4]	4	On-going
SA-5 Site 117	Long Term Monitoring Plan for SA-5 Shallow GW[2]	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Biennial[2]	5	On-going
SA-5: Site153	Long Term Monitoring Plan for SA-5 Shallow GW[2]	Consent Decree Regarding Remediation of the Study Area 5 Shallow Groundwater and the Site 79 Residential Properties	Shallow	Biennial[2]	2	On-going
SA-6 South	SA-6 Long Term Monitoring Plan (February 2018, revised December 2020)	First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 South	Shallow	As required by gradients across wall	5	On-going
SA-6 North	SA-6 Long Term Monitoring Plan (February 2018, revised December 2020)	First Amended Consent Decree Regarding Remediation and Redevelopment of SA-6 North	Shallow	As required by gradients across wall	5	On-going

Biennial = every two years

[1]SA-5 NJCU LTMP (November 2016, updated May 2019); Shallow Groundwater Monitoring and Extraction System Operation Plan (Appendix L of the LTMP).

[2]Draft LTMP for SA-5 Shallow Groundwater includes Sites 117 and 153 in progress; pending ongoing technical discussions and correspondence with Plaintiffs.

[3]The current frequency in the Remedial Action Groundwater Permits issued in 2018 for the Deep Overbuden; Bedrock; and Shallow groundwater zones is every 2 years, thus a reduced frequency to every 5 years is subject to NJDEP approval of RA GW permit modifications submitted in 2021.

[4]Per NJDEP Groundwater Remedial Action Permit Modification dated February 11, 2022, only the four inboard wells along the barrier wall are now required to be sampled on a quarterly basis.

Table 2-1
2022 Monthly Precipitation Data

Month	2022 Precipitation	Average Precipitation
January	4.06	3.98
February	2.65	2.96
March	2.38	4.21
April	4.36	3.92
May	5.23	4.46
June	2.40	3.4
July	0.55	4.68
August	1.92	4.02
September	3.74	4.01
October	5.97	3.16
November	2.77	3.88
December	4.53	3.57
Annual Total	40.56	46.25

Data Source: Search | Climate Data Online (CDO) | National Climatic Data Center (NCDC) (noaa.gov)
Station name: Newark International Airport
Station ID: GHCND:USW00014734

Table 2-2
Groundwater Monitoring Well Inventory

Well ID	Screen Zone	Ref. Pt. Elev.	Well Depth	Screen Length	Comments
		(ft msl)	(ft)	(ft)	
087-MW-08	Deep	12.98	99.0	10	
087-MW-34	Deep	12.73	70.0	5	
087-MW-A26T	Deep	9.92	56.0	15	
087-MW-W25T	Deep	19.06	91.0	15	
087-OBS-1L	Deep	15.27	67.1	5	
087-OBS-1T	Deep	15.23	105.0	10	
087-OBS-3L	Deep	12.68	65.0	5	
087-OBS-4T	Deep	11.60	75.5	5	
087-OBS-5T	Deep	12.62	81.9	10	
087-PW-1	Deep	10.27	69.0	10	
088-MW-G19T	Deep	13.25	93.0	15	
090-MW-09	Deep	10.59	75.0	5	
117-MW-D1	Deep	11.08	41.0	10	
117-MW-D2	Deep	17.62	48.0	10	
117-MW-D3	Deep	18.85	80.0	10	
117-MW-I4	Deep	15.49	75.0	10	
119-MW-01T	Deep	10.78	62.0	10	
119-MW-02T	Deep	8.80	70.0	10	
124-MW-106T	Deep	17.70	86.5	10	
153-MW-A13T	Deep	9.34	58.0	15	
SA6-MW-AA1T	Deep	15.31	70.0	10	
087-MW-136D	Intermediate	13.18	36.0	10	Installed July 2018, replaced 087-MW-O19D
087-MW-13	Intermediate	12.93	40.0	10	
087-MW-A26D	Intermediate	10.35	28.0	10	
087-MW-O29D	Intermediate	10.32	56.0	NA	
087-MW-W25D	Intermediate	16.98	66.0	10	
087-OBS-07	Intermediate	12.59	30.0	5	
087-OBS-1D	Intermediate	15.13	42.8	10	
087-OBS-2D	Intermediate	12.68	54.0	10	
087-OBS-5D	Intermediate	12.72	39.8	10	
087-PW-2	Intermediate	13.02	48.0	20	
087-PW-3	Intermediate	12.40	50.0	20	
088-MW-15R	Intermediate	12.83	35.0	10	
090-MW-07	Intermediate	17.20	40.0	10	
117-MW-I1	Intermediate	11.08	22.0	10	
117-MW-I2	Intermediate	17.59	28.0	10	
117-MW-I3	Intermediate	15.59	28.0	10	
117-MW-I5	Intermediate	18.76	37.0	15	
124-MW-G02D	Intermediate	18.83/16.80	36.5/34.5	10	
SA6-MW-AA1D	Intermediate	19.36	32.0	10	
DP-1	Intermediate	12.92	38.5	10	Temporary depressurization well in SA-6 South Deferred Area, abandoned November 18, 2020
DP-2	Intermediate	13.80	38.5	10	Temporary depressurization well in SA-6 South Deferred Area, abandoned November 18, 2020
DP-3	Intermediate	13.20	38.5	10	Temporary depressurization well in SA-6 South Deferred Area, abandoned November 18, 2020
DP-4	Intermediate	12.20	38.5	10	Temporary depressurization well in SA-6 South Deferred Area, abandoned November 18, 2020
OW-1	Intermediate	11.10	32.5	10	Temporary observation well in SA-6 South Deferred Area, abandoned November 18, 2020
OW-2	Intermediate	11.10	32.5	10	Temporary observation well in SA-6 South Deferred Area, abandoned November 18, 2020
OW-3	Intermediate	11.20	32.5	10	Temporary observation well in SA-6 South Deferred Area, abandoned November 18, 2020
OW-4	Intermediate	15.00	19.0	10	Temporary observation well in SA-6 South Deferred Area, abandoned November 19, 2020

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-1BR	Rock	20.39	144.0	15	
079-MW-13BR-1	Rock	13.08	121.0	10	
079-MW-13BR-2	Rock	13.08	214.0	15	
079-MW-13BR-3	Rock	13.08	284.0	15	
090-MW-7BR-1	Rock	16.99	134.0	15	
090-MW-7BR-2	Rock	16.99	177.0	15	
090-MW-7BR-3	Rock	16.99	233.0	15	
115-MW-203BR	Rock	6.61	162.0	20	
115-MW-215BR	Rock	8.82	143.0	20	
117-MW-3BR-1	Rock	12.34	155.0	15	
117-MW-3BR-2	Rock	12.34	263.0	15	
117-MW-8BR	Rock	12.94	125.0	10	
119-MW-2BR-1	Rock	8.43	163.0	15	
119-MW-2BR-2	Rock	8.43	245.0	15	
119-MW-2BR-3	Rock	8.43	315.0	15	
119-MW-16BR-1	Rock	8.61	151.0	15	
119-MW-16BR-2	Rock	8.61	187.0	15	
119-MW-16BR-3	Rock	8.61	247.0	15	
124-MW-8BR	Rock	19.67/17.24	143/140.5	15	
SA6-MW-5BR-1	Rock	17.06	106.0	15	
SA6-MW-5BR-2	Rock	17.06	154.0	15	
SA6-MW-5BR-3	Rock	17.06	204.0	15	
SA6-MW-5BR-4	Rock	17.06	236.0	15	
SA6-MW-5BR-5	Rock	17.06	281.0	15	
SA6-MW-14BR	Rock	9.99	85.0	10	
SA6-MW-15BR	Rock	8.08	103.0	20	
079-MW-01	Shallow	8.80	8.9	5	
079-MW-A2	Shallow	8.10	11.5	10	
079-MW-C6	Shallow	11.00	13.0	10	
087-PZ-1	Shallow	10.04	11.0	5	Installed June 2016
087-PZ-2	Shallow	10.35	8.0	5	Installed June 2016
087-PZ-3	Shallow	13.28	13.0	5	Installed June 2016
087-PZ-4	Shallow	13.65	12.0	5	Installed June 2016
087-PZ-5	Shallow	19.49	13.0	5	Installed June 2016
087-PZ-6	Shallow	21.01	13.0	5	Installed June 2016
087-PZ-7	Shallow	16.24	26.0	5	Installed June 2016
087-PZ-8	Shallow	16.54	14.0	5	Installed June 2016
087-PZ-9	Shallow	17.19	12.0	5	Installed June 2016
087-PZ-10	Shallow	17.06	12.0	5	Installed June 2016
090-PZ-05	Shallow	18.08	16.4	NA	
090-PZ-06	Shallow	18.20	18.0	NA	
115-E1A-SO	Shallow	16.48	7.0	NA	Replaced 115-E1A-SO in 2015
115-E2-SO	Shallow	10.33	10.0	5	
115-E3-SO	Shallow	12.57	20.7	5	

Table 2-2
Groundwater Monitoring Well Inventory

Well ID	Screen Zone	Ref. Pt. Elev. (ft msl)	Well Depth (ft)	Screen Length (ft)	Comments
115-E4-SO	Shallow	14.04	13.5	10	
115-E5-SO	Shallow	17.39	21.4	8	
115-PZ-500	Shallow	6.68	11.0	9	
115-PZ-501	Shallow	14.47	16.5	8.5	
115-PZ-502	Shallow	14.51	16.0	8	
115-PZ-503	Shallow	7.32	10.0	8	
115-W1-SO	Shallow	18.84	24.7	10	
115-W3-SO	Shallow	14.96	14.0	10	
115-W5-SO	Shallow	21.68	16.0	NA	
115-W6-SO	Shallow	14.76	18.2	NA	
117-MW-A05	Shallow	18.48	16.0	10	
117-MW-A14	Shallow	17.33	17.0	10	
117-MW-I4S	Shallow	16.70	11.2	10	
117-MW-A85	Shallow	17.40	15.0	10	
117-MW-A89	Shallow	13.17	16.0	10	
117-MW-A99	Shallow	15.95	14.0	10	
124-MW-10	Shallow	10.06	11.0	8	
124-MW-11	Shallow	9.05	8.0	6	
124-PZ-11	Shallow	9.69	9.5	5	Installed 2015
124-PZ-12	Shallow	10.63	9.5	5	Installed 2015
124-PZ-13	Shallow	21.49/19.34	20.5/18.35	5	Installed 2015
124-PZ-14	Shallow	15.15	14.1	5	Installed 2015
124-PZ-15	Shallow	34.34/29.34/ 25.41	31.1/26.15/ 22.21	5	Installed 2015
124-PZ-16	Shallow	17.70	19.6	5	Installed 2015
124-PZ-17	Shallow	15.15	12.0	5	Installed 2015
124-PZ-18	Shallow	18.28	16.2	5	Installed 2015
124-PZ-19	Shallow	17.91	10.4	5	Installed 2015, abandoned Q2 2020
124-PZ-20	Shallow	18.38	17.3	5	Installed 2015, abandoned Q3 2020
124-PZ-19R	Shallow	18.30	24.6	5	Installed Q4 2020
124-PZ-20R	Shallow	20.41	27.6	5	Installed Q4 2020
153-MW-A13	Shallow	9.62	10.0	6	
153-MW-A15	Shallow	11.19	12.2	10	
154-MW-A06	Shallow	19.87	15.1	NA	
154-MW-A5A	Shallow	19.16	14.0	NA	
184-MW-04	Shallow	8.87	6.8	NA	
184-MW-05	Shallow	14.71	13.0	NA	
184-MW-06	Shallow	18.75	15.0	NA	
184-MW-101	Shallow	14.85	13.0	5	
184-MW-102	Shallow	13.16	12.0	5	
184-MW-103	Shallow	14.71	14.0	5	
184-MW-104	Shallow	15.47	13.0	5	
184-MW-105	Shallow	15.10	12.0	5	
184-MW-106	Shallow	12.72	14.0	5	Abandoned August 12, 2021
184-MW-106R	Shallow	12.68	9.5	5	Installed August 12, 2021
184-MW-107	Shallow	13.41	11.0	5	
184-MW-108	Shallow	15.32	15.0	5	
Sump A	Shallow	15.98	21.0	NA	
Sump B	Shallow	13.08	15.0	NA	

NA - information not available

Wells showing two Ref. Pt. Elev. and Well Depth values had casings elevations altered in 2022 (prior/current).

Table 3-1

GWET Pumping Outages in 2022

Well ID	Start Date	End Date	Duration Days and	Hours	Comment
087-PW-1, 087-PW-3, 087-MW-215BR	12-Feb-22	14-Feb-22	1	15.25	Chemical pump failure.
087-PW-1, 087-PW-3, 087-MW-215BR	6-Sep-22	7-Sep-22	1	0.00	PW-1 and PW-3 line cleaning.
087-PW-1, 087-PW-3, 087-MW-215BR	27-Nov-22	27-Nov-22	0	18.50	Alarms occuring with no callouts.

TABLE 4-1
GROUNDWATER ELEVATION DATA FROM QUARTERLY ROUNDS IN 2022

Well ID	Screen Zone	Ref. Pt. Elev.	Well Depth	Screen Length	Groundwater Elevation (NGVD-29)			
					3/29/22	6/30/22	9/29/22	12/28/22
		(ft msl)	(ft)	(ft)	(ft msl)	(ft msl)	(ft msl)	(ft msl)
087-MW-08	Deep	12.98	99	10	0.36	1.00	2.30	0.71
087-MW-34	Deep	12.73	70	5	-1.09	-0.61	-0.24	-0.66
087-MW-A26T	Deep	9.92	56	15	3.07	3.21	2.56	3.37
087-MW-W25T	Deep	19.06	91	15	0.92	1.31	-0.75	1.09
087-OBS-1L	Deep	15.27	67.05	5	0.17	1.02	2.57	0.46
087-OBS-1T	Deep	15.23	105	10	0.73	1.49	3.24	1.05
087-OBS-3L	Deep	12.68	65	5	-0.41	0.44	1.20	0.14
087-OBS-4T	Deep	11.60	75.5	5	0.48	0.79	0.85	0.88
087-OBS-5T	Deep	12.62	81.9	10	-0.63	-0.08	0.40	-0.12
087-PW-1	Deep	10.27	69	10	-42.34	-42.85	-44.28	-43.83
088-MW-G19T	Deep	13.25	93	15	2.68	2.75	2.38	2.81
090-MW-09	Deep	18.81	75	5	4.88	4.86	4.48	5.14
117-MW-D1	Deep	11.08	41	10	2.96	2.95	2.96	2.94
117-MW-D2	Deep	17.62	48	10	4.44	4.36	4.25	4.54
117-MW-D3	Deep	18.85	80	10	5.63	6.60	5.22	5.90
117-MW-I4	Deep	15.49	75	10	4.67	4.37	4.49	4.87
119-MW-01T	Deep	10.78	62	10	2.63	2.62	2.84	2.63
119-MW-02T	Deep	8.80	70	10	3.17	2.78	2.75	2.96
124-MW-106T	Deep	17.70	86.5	10	2.67	2.73	2.61	2.82
153-MW-A13T	Deep	9.34	58	15	3.96	3.32	3.28	3.69
SA6-MW-AA1T	Deep	15.31	70	10	0.57	1.00	0.67	1.19
087-MW-136D	Intermediate	13.18	36	10	1.17	1.36	1.01	N/A
087-MW-13	Intermediate	12.93	40	10	-0.94	0.57	2.99	0.71
087-MW-A26D	Intermediate	10.35	28	10	3.10	3.25	2.75	3.45
087-MW-O29D	Intermediate	10.32	56	NA	0.77	1.27	0.25	1.30
087-MW-W25D	Intermediate	16.98	66	10	0.74	1.49	-0.87	1.03
087-OBS-07	Intermediate	12.59	30	5	-0.10	-0.32	-0.46	0.41
087-OBS-1D	Intermediate	15.13	42.8	10	0.77	2.15	3.24	1.09
087-OBS-2D	Intermediate	12.68	54	10	-2.44	-1.94	-1.67	-2.11
087-OBS-5D	Intermediate	12.72	39.83	10	-0.39	0.01	0.44	0.12
087-PW-2	Intermediate	13.02	48	20	1.74	1.07	1.24	2.19
087-PW-3	Intermediate	12.40	50	20	-6.73	-7.21	-7.20	-6.36
088-MW-15R	Intermediate	12.83	35	10	2.41	2.62	2.20	2.80
090-MW-07	Intermediate	17.20	40	10	6.58	5.55	5.25	5.59
117-MW-I1	Intermediate	11.08	22	10	4.33	4.01	3.42	4.07
117-MW-I2	Intermediate	17.59	28	10	4.94	4.84	4.55	5.11
117-MW-I3	Intermediate	15.59	28	10	4.76	4.84	4.24	4.89
117-MW-I5	Intermediate	18.76	37	15	6.08	6.06	5.56	6.01
124-MW-G02D	Intermediate	18.83/16.80	36.5/34.5	10	2.41	2.53	2.52	2.57
SA6-MW-AA1D	Intermediate	19.36	32	10	0.59	1.11	0.71	1.23
073-MW-1BR	Rock	20.39	144	15	-1.92	-1.45	-1.86	-1.79
079-MW-13BR-1	Rock	13.08	121	10	7.21	7.24	6.99	7.45
079-MW-13BR-2	Rock	13.08	214	15	7.44	7.37	6.96	7.96
079-MW-13BR-3	Rock	13.08	284	15	7.23	7.15	7.11	7.40
090-MW-7BR-1	Rock	16.99	134	15	4.85	4.84	4.42	5.00
090-MW-7BR-2	Rock	16.99	177	15	4.97	5.01	4.68	5.18
090-MW-7BR-3	Rock	16.99	233	15	5.14	5.08	4.77	5.29
115-MW-203BR	Rock	6.61	162	20	-1.65	-1.46	-0.73	-1.09
115-MW-215BR	Rock	8.82	143	20	-4.65	-4.35	-5.57	-4.18
117-MW-3BR-1	Rock	12.34	155	15	5.54	6.12	5.12	5.51
117-MW-3BR-2	Rock	12.34	263	15	6.38	5.44	5.80	6.12
117-MW-8BR	Rock	12.94	125	10	5.49	5.50	5.13	5.72
119-MW-2BR-1	Rock	8.43	163	15	-1.72	-1.78	0.43	-1.30
119-MW-2BR-2	Rock	8.43	245	15	-1.24	-1.19	1.06	0.05
119-MW-2BR-3	Rock	8.43	315	15	-0.78	-1.55	1.23	-0.27
119-MW-16BR-1	Rock	8.61	151	15	4.71	4.67	6.63	5.21
119-MW-16BR-2	Rock	8.61	187	15	4.36	5.26	4.03	4.33
119-MW-16BR-3	Rock	8.61	247	15	4.45	4.51	4.21	4.51
124-MW-8BR	Rock	19.67/17.24	143/140.5	15	3.53	3.68	3.29	3.66
SA6-MW-5BR-1	Rock	17.06	106	15	1.74	1.93	1.62	2.21
SA6-MW-5BR-2	Rock	17.06	154	15	1.92	2.67	2.42	2.74
SA6-MW-5BR-3	Rock	17.06	204	15	2.95	2.92	2.91	3.40
SA6-MW-5BR-4	Rock	17.06	236	15	3.20	3.08	2.97	3.31
SA6-MW-5BR-5	Rock	17.06	281	15	3.07	3.05	3.12	3.34
SA6-MW-14BR	Rock	9.99	85	10	3.19	3.37	2.83	3.29
SA6-MW-15BR	Rock	8.08	103	20	1.04	1.66	0.29	1.13

TABLE 4-1
GROUNDWATER ELEVATION DATA FROM QUARTERLY ROUNDS IN 2022

Well ID	Screen Zone	Ref. Pt. Elev.	Well Depth	Screen Length	Groundwater Elevation (NGVD-29)			
					3/29/22	6/30/22	9/29/22	12/28/22
079-MW-01	Shallow	8.80	8.88	5	3.28	3.38	2.75	3.49
079-MW-A2	Shallow	8.10	11.48	10	2.99	3.17	2.72	3.25
079-MW-C6	Shallow	11.00	13	10	5.02	5.06	4.71	5.18
087-PZ-1	Shallow	10.04	11.03	5	4.28	3.47	3.10	5.36
087-PZ-2	Shallow	10.35	8	5	3.60	3.93	3.60	3.60
087-PZ-3	Shallow	13.28	13	5	4.56	4.55	3.64	5.26
087-PZ-4	Shallow	13.65	12	5	3.28	3.03	2.59	3.83
087-PZ-5	Shallow	19.49	13	5	5.61	5.06	4.24	5.97
087-PZ-6	Shallow	21.01	13	5	2.82	3.08	2.76	3.07
087-PZ-7	Shallow	16.24	26	5	5.93	4.44	5.02	6.92
087-PZ-8	Shallow	16.54	14	5	3.05	3.49	3.48	3.92
087-PZ-9	Shallow	17.19	12	5	2.23	2.24	2.14	2.42
087-PZ-10	Shallow	17.06	12	5	3.41	3.58	3.46	4.60
090-PZ-05	Shallow	18.08	16.41	NA	7.06	6.72	6.27	N/A
090-PZ-06	Shallow	18.20	18	NA	8.92	8.84	8.49	9.08
115-E1A-SO	Shallow	16.48	7	NA	2.30	4.05	2.56	3.23
115-E2-SO	Shallow	10.33	10	5	6.25	6.49	5.89	6.07
115-E3-SO	Shallow	12.57	20.73	5	6.54	6.45	5.84	6.37
115-E4-SO	Shallow	14.04	13.45	10	4.43	3.56	3.38	3.26
115-E5-SO	Shallow	17.39	21.39	8	4.48	3.60	3.16	N/A
115-PZ-500	Shallow	6.68	11	9	4.33	4.33	4.04	4.26
115-PZ-501	Shallow	14.47	16.5	8.5	4.66	4.60	4.04	4.55
115-PZ-502	Shallow	14.51	16	8	4.55	4.39	4.02	4.33
115-PZ-503	Shallow	7.32	10	8	4.35	4.21	3.97	N/A
115-W1-SO	Shallow	18.84	24.66	10	2.34	3.46	3.39	3.89
115-W3-SO	Shallow	14.96	14	10	2.26	3.58	2.82	2.66
115-W5-SO	Shallow	21.68	16	NA	2.65	4.11	2.35	N/A
115-W6-SO	Shallow	14.76	18.15	NA	3.16	3.53	3.43	4.25
117-MW-A05	Shallow	18.48	16	10	N/A	N/A	5.86	6.58
117-MW-A14	Shallow	17.33	17	10	5.49	4.83	4.51	4.75
117-MW-A85	Shallow	17.40	15	10	4.95	4.90	4.41	N/A
117-MW-A89	Shallow	13.17	16	10	4.22	4.15	4.10	4.12
117-MW-A99	Shallow	15.95	14	10	5.68	5.45	4.87	5.09
117-MW-I4S	Shallow	16.70	11.17	10	5.57	5.69	5.03	5.45
124-MW-10	Shallow	10.06	11	8	4.81	4.38	4.38	4.58
124-MW-11	Shallow	9.05	8	6	4.40	3.54	5.04	4.75
124-PZ-11	Shallow	9.69	9.5	5	6.42	5.78	6.00	6.49
124-PZ-12	Shallow	10.63	9.5	5	3.51	4.45	3.62	3.55
124-PZ-13	Shallow	21.49/19.34	20.5/18.35	5	6.85	6.03	4.76	7.11
124-PZ-14	Shallow	15.15	14.1	5	2.47	4.17	2.50	3.12
124-PZ-15	Shallow	34.34/29.34/ 25.41	31.1/26.15/ 22.21	5	6.19	5.69	5.75	6.11
124-PZ-16	Shallow	17.70	19.6	5	2.44	4.05	2.68	3.42
124-PZ-17	Shallow	15.15	12	5	4.53	4.20	3.48	4.61
124-PZ-18	Shallow	18.28	16.2	5	2.47	4.02	2.06	3.23
124-PZ-19R	Shallow	18.30	24.55	5	6.32	6.74	6.67	6.60
124-PZ-20R	Shallow	20.41	27.55	5	3.07	4.70	2.85	3.70
153-MW-A13	Shallow	9.62	10	6	3.70	3.24	3.64	3.80
153-MW-A15	Shallow	11.00	12.15	10	2.79	2.86	2.87	2.98
154-MW-A06	Shallow	19.87	15.12	NA	13.42	11.79	11.51	13.77
154-MW-A5A	Shallow	19.16	14	NA	12.04	11.64	11.53	12.14
184-MW-04	Shallow	8.70	6.8	NA	3.59	3.58	3.55	3.63
184-MW-05	Shallow	14.71	13	NA	5.74	5.50	5.19	N/A
184-MW-06	Shallow	18.75	15	NA	7.83	7.76	7.59	8.07
184-MW-101	Shallow	14.85	13	5	6.12	5.51	5.51	6.17
184-MW-102	Shallow	13.12	12	5	6.22	6.19	5.79	6.38
184-MW-103	Shallow	14.71	14	5	6.41	6.37	6.01	6.77
184-MW-104	Shallow	15.47	13	5	6.79	6.82	6.51	7.23
184-MW-105	Shallow	15.10	12	5	5.60	5.86	5.45	5.54
184-MW-106R	Shallow	12.68	9.5	5	5.93	5.76	5.40	6.27
184-MW-107	Shallow	13.41	11	5	6.35	6.30	5.89	6.62
184-MW-108	Shallow	15.32	15	5	6.80	6.70	6.33	7.04
SUMP A	Shallow	15.98	21	NA	5.66	5.90	5.35	5.57
SUMP B	Shallow	13.08	15	NA	5.15	5.10	5.01	4.72

NA- information not available
N/A - well abandoned or no access
Wells showing two Ref. Pt. Elev. and Well Depth values had casings altered in 2022 (prior/current).

Table 4-2
Summary of Groundwater Elevations Near NJCU
2022

		3/29/2022		6/30/2022		9/29/2022		12/28/2022	
Location	8/31/2021 Ref. pt. Elev. (ft, msl)	Depth to GW (ft,)	GW Elev. (ft., msl)	Depth to GW (ft,)	GW Elev. (ft., msl)	Depth to GW (ft,)	GW Elev. (ft., msl)	Depth to GW (ft,)	GW Elev. (ft., msl)
079-MW-A02	8.10	5.11	2.99	4.93	3.17	5.38	2.72	4.85	3.25
Sump A (North)	15.98	10.32	5.66	10.08	5.90	10.63	5.35	10.41	5.57
Sump B (South)	13.08	7.93	5.15	7.98	5.10	8.07	5.01	8.36	4.72
090-PZ-5	18.08	11.02	7.06	11.36	6.72	11.81	6.27	N/A	N/A
090-PZ-6	18.20	9.28	8.92	9.36	8.84	9.71	8.49	9.12	9.08
184-MW-4	8.87	5.28	3.59	5.29	3.58	5.32	3.55	5.24	3.63
184-MW-5	14.71	8.97	5.74	9.21	5.50	9.52	5.19	N/A	N/A
184-MW-6	18.751	10.92	7.83	10.99	7.76	11.16	7.59	10.68	8.07
090-MW-09	10.59	5.71	4.88	5.73	4.86	6.11	4.48	5.45	5.14
090-MW-07	17.20	10.62	6.58	11.65	5.55	11.95	5.25	11.61	5.59
117-MW-I4S	16.70	11.13	5.57	11.01	5.69	11.67	5.03	11.25	5.45
117-MW-I5	18.76	12.68	6.08	12.7	6.06	13.2	5.56	12.75	6.01
184-MW-101 (outside)	14.85	8.73	6.12	9.34	5.51	9.34	5.51	8.68	6.17
184-MW-105 (inside)	15.1	9.50	5.60	9.24	5.86	9.65	5.45	9.56	5.54
184-MW-106R (outside)	12.68	6.79	5.89	6.96	5.72	7.32	5.36	6.45	6.23
184-MW-102 (inside)	13.16	6.94	6.22	6.97	6.19	7.37	5.79	6.78	6.38
184-MW-103 (outside)	14.71	8.30	6.41	8.34	6.37	8.70	6.01	7.94	6.77
184-MW-107 (inside)	13.41	7.06	6.35	7.11	6.30	7.52	5.89	6.79	6.62
184-MW-104 (outside)	15.47	8.68	6.79	8.65	6.82	8.96	6.51	8.24	7.23
184-MW-108 (inside)	15.32	8.52	6.80	8.62	6.70	8.99	6.33	8.28	7.04

Table 4-3
Monthly Average Heads and Gradients Across Barrier Walls - NJCU

	184-MW-101/184-MW-105			184-MW-106/184-MW-102		
	Exterior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Average Head Difference (ft)[2]	Exterior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Average Head Difference (ft)[2]
2022 - Month	184-MW-101	184-MW-105		184-MW-106R	184-MW-102	
January	5.52	5.46	**0.06**	5.40	5.85	**-0.45**
February	5.87	5.44	0.43	5.89	6.10	**-0.21**
March	6.02	5.58	0.44	5.94	6.23	**-0.29**
April	6.23	5.75	0.48	6.11	6.34	**-0.23**
May	6.30	6.00	0.30	6.29	6.52	**-0.23**
June	6.00	6.13	**-0.13**	6.21	6.51	**-0.30**
July	5.25	5.84	**-0.59**	5.60	6.09	**-0.49**
August	4.99	5.68	**-0.69**	5.35	5.86	**-0.51**
September	5.14	5.45	**-0.31**	5.29	5.80	**-0.51**
October	5.90	5.51	0.39	5.75	6.13	**-0.38**
November	5.36	5.38	**-0.02**	5.48	5.91	**-0.43**
December	5.83	5.29	0.54	5.64	5.99	**-0.35**

Notes:

1. Average monthly head from data logger
2. Average monthly gradient across barrier wall. Bold values do not meet the LTMP criterion of inward gradient (>0.1 ft)

Table 4-3
Monthly Average Heads and Gradients Across Barrier Walls - NJCU

	184-MW-103/184-MW-107			184-MW-104/184-MW-108		
	Exterior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Average Head Difference (ft)[2]	Exterior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft. msl)[1]	Average Head Difference (ft)[2]
2022 - Month	184-MW-103	184-MW-107		184-MW-104	184-MW-108	
January	6.00	5.93	**0.07**	6.56	6.46	**0.10**
February	6.28	6.28	**0.00**	6.77	6.73	**0.04**
March	6.44	6.29	0.15	6.92	6.83	**0.09**
April	6.63	6.44	0.19	7.10	6.98	0.12
May	6.83	6.70	0.13	7.22	7.17	**0.05**
June	6.76	6.64	0.12	7.07	7.00	**0.07**
July	6.20	6.18	**0.02**	6.69	6.55	0.14
August	6.00	5.95	**0.05**	6.31	6.33	**-0.02**
September	5.97	5.87	**0.10**	6.18	6.31	**-0.13**
October	6.43	6.39	**0.04**	6.98	6.78	0.20
November	6.25	6.04	0.21	6.70	6.44	**0.10**
December	6.48	6.41	**0.07**	7.06	6.61	**0.09**

Notes:

1. Average monthly head from data logger
2. Average monthly gradient across barrier wall. Bold values do not meet the LTMP criterion of inward gradient (>0.1 ft)

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	087-PZ-1/087-PZ-2			087-PZ-3/087-PZ-4		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-1	PZ-2		PZ-3	PZ-4	
January	4.26	3.49	0.77	4.08	2.70	1.38
February	4.78	3.52	1.26	4.50	2.84	1.66
March	4.43	3.67	0.76	4.53	3.20	1.33
April	4.93	3.88	1.05	4.79	3.60	1.19
May	4.87	4.10	0.77	5.02	3.55	1.47
June	4.23	4.20	**0.03**	4.91	3.27	1.64
July	3.54	3.93	**-0.39**	4.20	2.95	1.25
August	3.12	3.80	**-0.68**	3.61	2.75	0.86
September	3.18	3.71	**-0.53**	3.53	2.66	0.87
October	4.86	4.02	0.84	4.63	3.19	1.44
November	4.13	3.99	0.14	4.44	3.12	1.32
December	5.27	3.70	1.57	4.85	3.56	1.29

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 North soil containment cell.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	087-PZ-5/087-PZ-6			087-PZ-7/087-PZ-8		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-5	PZ-6		PZ-7	PZ-8	
January	5.41	2.78	2.63	6.22	2.61	3.61
February	6.02	2.66	3.36	6.42	2.85	3.57
March	5.54	NA	NA	6.10	3.02	3.08
April	5.62	3.04	2.58	6.35	3.18	3.17
May	5.59	3.15	2.44	6.44	NA	NA
June	5.67	3.19	2.48	6.02	3.48	2.54
July	4.83	3.14	1.69	5.14	3.50	1.64
August	4.40	3.00	1.40	4.67	3.50	1.17
September	4.28	2.92	1.36	4.78	3.55	1.23
October	5.89	2.93	2.96	6.21	3.63	2.58
November	5.50	3.02	2.48	6.24	3.72	2.52
December	6.15	3.10	3.05	6.70	3.76	2.94

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 North soil containment cell.

NA - data logger malfunction.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	087-PZ-9/087-PZ-10			124-PZ-11/124-PZ-12		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,4]
2022 - Month	PZ-9	PZ-10		PZ-11	PZ-12	
January	2.58	2.92	**-0.34**	6.56	4.10	2.46
February	2.34	3.36	**-1.02**	6.86	3.95	2.91
March	2.46	3.55	**-1.09**	6.68	3.80	2.88
April	2.74	3.75	**-1.01**	6.81	3.86	2.95
May	3.06	3.92	**-0.86**	6.76	4.18	2.58
June	2.90	3.83	**-0.93**	6.48	4.62	1.86
July	2.45	3.73	**-1.28**	5.69	4.51	1.18
August	2.36	3.72	**-1.36**	5.26	4.27	0.99
September	2.54	3.71	**-1.17**	5.52	3.86	1.66
October	2.90	4.29	**-1.39**	6.92	3.81	3.11
November	2.52	4.13	**-1.61**	6.42	3.32	3.10
December	2.88	4.57	**-1.69**	6.96	3.23	3.73

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 North soil containment cell.
4. Positive value indicates inward gradient towards SA-6 South soil containment cell.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	124-PZ-13/124-PZ-14			124-PZ-15/124-PZ-16		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
20212- Month	PZ-13	PZ-14		PZ-15	PZ-16	
January	6.23	3.13	3.10	4.74	3.81	0.93
February	7.14	2.75	4.39	6.22	2.94	3.28
March	7.29	2.54	4.75	6.52	2.59	3.93
April	7.47	3.23	4.24	6.69	3.11	3.58
May	7.22	3.75	3.47	6.82	3.64	3.18
June	6.77	4.30	2.47	5.85	4.13	1.72
July	5.71	4.19	1.52	4.69	4.12	0.57
August	4.96	3.72	1.24	4.26	3.96	0.30
September	4.84	2.98	1.86	4.07	3.20	0.87
October	6.24	2.25	3.99	5.63	2.26	3.37
November	6.09	2.29	3.80	6.18	2.28	3.90
December	6.90	2.76	4.14	6.17	2.98	3.19

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 South soil containment cell.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	124-PZ-17/124-PZ-18			124-PZ-19R/124-PZ-20R		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-17	PZ-18		PZ-19R	PZ-20R	
January	4.02	3.70	0.32	3.03	3.62	**-0.59**
February	4.42	2.66	1.76	2.69	2.28	0.41
March	4.71	2.35	2.36	2.87	1.93	0.94
April	4.98	3.13	1.85	3.08	2.74	0.34
May	5.13	3.72	1.41	3.38	NA	NA
June	4.87	4.13	0.74	3.35	3.88	**-0.53**
July	4.14	4.26	**-0.12**	3.16	3.98	**-0.82**
August	3.65	3.87	**-0.22**	3.23	3.65	**-0.42**
September	3.70	3.05	0.65	3.38	2.87	0.51
October	4.26	1.75	2.51	3.47	1.23	2.24
November	4.07	2.45	1.62	3.12	2.19	0.93
December	4.53	3.05	1.48	3.33	2.65	0.68

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 South soil containment cell.

NA - data logger malfunctioned.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	115-PZ-500/115-W3-SO			115-PZ-501/115-E1A-SO		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-500	W3-SO		PZ-501	E1A-SO	
January	4.24	3.79	0.45	4.28	3.39	0.89
February	4.46	2.97	1.49	4.32	2.58	1.74
March	4.34	2.12	2.22	4.74	2.15	2.59
April	4.43	2.48	1.95	4.87	2.80	2.07
May	4.50	2.97	1.53	5.02	3.40	1.62
June	4.39	NA	NA	4.94	3.90	1.04
July	4.20	3.73	0.47	4.42	4.05	0.37
August	4.11	3.77	0.34	4.34	3.63	0.71
September	4.19	3.27	0.92	4.30	2.98	1.32
October	4.32	2.04	2.28	4.58	2.32	2.26
November	4.20	2.15	2.05	4.52	2.16	2.36
December	4.30	2.49	1.81	4.69	2.76	1.93

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 South soil containment cell.

NA - data logger malfunctioned.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	115-PZ-501/115-W5-SO			115-PZ-502/115-E4-SO		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,4]
2022 - Month	PZ-501	W5-SO		PZ-502	E4-SO	
January	4.28	3.66	0.62	4.46	3.22	1.24
February	4.32	2.75	1.57	4.72	3.28	1.44
March	4.74	2.30	2.44	4.76	3.45	1.31
April	4.87	3.11	1.76	4.98	3.61	1.37
May	5.02	3.68	1.34	5.06	3.72	1.34
June	4.94	4.05	0.89	4.95	3.77	1.18
July	4.42	4.09	0.33	4.50	3.73	0.77
August	4.34	3.76	0.58	4.30	3.70	0.60
September	4.30	2.96	1.34	4.28	3.66	0.62
October	4.58	2.30	2.28	4.63	3.83	0.80
November	4.52	2.30	2.22	4.48	3.79	0.69
December	4.69	3.22	1.47	4.61	3.46	1.15

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 South soil containment cell.
4. Positive value indicates inward gradient towards SA-6 North soil containment cell.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	115-PZ-502/115-E5-SO			115-PZ-503/115-W6-SO		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-502	E5-SO		PZ-503	W6-SO	
January	4.46	3.53	0.93	4.14	2.47	1.67
February	4.72	4.10	0.62	4.28	2.79	1.49
March	4.76	4.40	0.36	4.26	3.02	1.24
April	4.98	4.89	**0.09**	4.36	3.23	1.13
May	5.06	5.06	**0.00**	4.33	3.46	0.87
June	4.95	4.13	0.82	4.21	3.51	0.70
July	4.50	3.42	1.08	4.10	3.48	0.62
August	4.30	3.21	1.09	4.10	3.41	0.69
September	4.28	3.17	1.11	4.27	3.52	0.75
October	4.63	4.71	**-0.08**	4.56	3.73	0.83
November	4.48	4.36	0.12	4.13	3.76	0.37
December	4.61	5.09	**-0.48**	4.24	3.95	0.29

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 North soil containment cell.

Table 4-4
Monthly Average Heads and Gradients Across Barrier Walls - SA-6

	115-PZ-503/115-W1-SO		
	Exterior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Interior Piezometer/Monitoring Well Average Head (ft, msl)[1]	Average Head Difference (ft)[2,3]
2022 - Month	PZ-503	W1-SO	
January	4.14	2.49	1.65
February	4.28	2.68	1.60
March	4.26	2.79	1.47
April	4.36	3.02	1.34
May	4.33	3.21	1.12
June	4.21	3.37	0.84
July	4.10	3.40	0.70
August	4.10	3.37	0.73
September	4.27	3.25	1.02
October	4.56	3.40	1.16
November	4.13	3.53	0.60
December	4.24	3.64	0.60

1. Average monthly head from datalogger
2. Average monthly gradient across barrier wall. **Bold** values do not meet the LTMP criterion of inward gradient (>0.1ft)
3. Positive value indicates inward gradient towards SA-6 North soil containment cell.

Table 5-1a
Groundwater Quality Data from Regional LTMP Sampling

Upper Bedrock Zone

Monitoring Well ID	Sample Date	Sample Notes	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
079-MW-13BR	12/2008	N	10	U	10	U	10	U	10	U
	12/2009	N	10	U	10	U	10	U	10	U
	12/2010	N	10	U	10	U	10	U	10	U
	12/2011	N	10	U	10	U	10	U	10	U
	12/2013	N	10	U	10	U	10	U	10	U
	11/2015	N	10	U	10	U	10	U	10	U
	5/1/2019	N	10	U	10	U	5.5	U	5.5	U
	7/5/2022	N	4	U	4	U	5.5	U	5.5	U
117-MW-8BR	11/12/2008	N	10	U	10	U	10	U	10	U
	11/17/2009	N	10	U	10	U	10	U	10	U
	12/13/2010	N	10	U	10	U	10	U	10	U
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/12/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	4/30/2019	N	10	U	10	U	5.5	U	5.5	U
	7/5/2022	N	4	U	4	U	5.5	U	5.5	U
119-MW-2BR	12/2008	N	10	U	10	U	10	U	10	U
	12/2009	N	10	U	10	U	10	U	10	U
	12/2010	N	NA		NA		NA		NA	
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/20/2013	N	10	U	10	U	10	U	10	U
	11/21/2015	N	10	U	10	U	10	U	10	U
	4/30/2019	N	10	U	10	U	5.5	U	5.5	U
	7/5/2022	N	4	U	4	U	5.5	U	5.5	U
119-MW-16BR	11/11/2008	N	10	U	10	U	10	U	10	U
	11/19/2009	N	10	U	10	U	10	U	10	U
	12/2010	N	10	U	10	U	10	U	10	U
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/12/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/1/2019	N	10	U	10	U	5.5	U	5.5	U
	7/5/2022	N	4	U	4	U	5.5	U	5.5	U
124-MW-8BR	11/20/2009	N	10	U	10	U	10	U	10	U
	12/8/2010	N	10	U	10	U	10	U	10	U
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/12/2013	N	10	U	**174**		10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/2/2019	N	25.7		10	U	5.5	U	5.5	U
	7/7/2022	N	4.9		4	U	5.5	U	5.5	U
090-MW-7BR	5/1/2019	N	**106000**		**89100**		**139000**		**122000**	
	7/5/2022	N	**76300**		**67700**		**86700**		**90500**	
115-MW-203BR	12/12/2008	N	**7490**		**7540**		**7600**		**7200**	
	12/21/2009	N	**13700**		NA		**15100**		NA	
	12/15/2010	N	**15900**		**15700**		**16300**		**16500**	
	11/17/2011	N	**17000**		NA		**16300**		NA	
	6/6/2019	N	**304**		10	U	5.5	U	5.5	U
	7/7/2022	N	**103**		4	U	5.5	U	5.5	U

Table 5-1a
Groundwater Quality Data from Regional LTMP Sampling

Upper Bedrock Zone

Monitoring Well ID	Sample Date	Sample Notes	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
SA6-MW-14BR	12/2008	N	10	U	10	U	10	U	10	U
	12/2009	N	10	U	10	U	10	U	10	U
	12/2010	N	10	U	10	U	10	U	10	U
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/12/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	4/29/2019	N	10	U	10	U	5.5	U	5.5	U
	7/5/2022	N	4	U	4	U	5.5	U	5.5	U
SA6-MW-15BR	11/14/2008	N	10	U	10	U	10	U	10	U
	11/16/2009	N	10	U	10	U	10	U	10	U
	12/16/2010	N	10	U	10	U	10	U	10	U
	12/9/2011	N	10	U	10	U	10	U	10	U
	12/12/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	22		10	U	10	U	10	U
	4/29/2019	N	18.8		10	U	5.5	U	5.5	U
	7/6/2022	N	4	U	4	U	5.5	U	5.5	U

General Notes:
Analysis methods E200.8 used for Total Chromium and SW7199 for Hexavalent Chromium (SW1796 through 2009).
Bold and underlined values exceed the NJDEP Ground Water Quality Standards (Chromium - 70 µg/L)
Concentrations measured in micrograms per liter

Abbreviations:
N: Normal sample
NA: Not sampled

Table 5-1b
Groundwater Quality Data from Regional LTMP Sampling

Deep Overburden Zone

Monitoring Well ID	Sample Date	Sample Notes	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
087-MW-A26T	11/14/2008	N	10	U	10	U	10	U	10	U
	11/18/2009	N	10	U	10	U	10	UJ	10	UJ
	12/14/2010	N	10	U	10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/1/2019	N	23.3		10	U	5.5	U	5.5	U
	7/7/2022	N	4	U	4	U	5.5	U	5.5	U
087-MW-W25T	11/14/2008	N	10	U	10	U	10	U	10	U
	11/18/2009	N	10	U	10	U	10	UJ	10	UJ
	12/14/2010	N	25.8		10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	NA		NA		NA		NA	
	5/2/2019	N	31.4		10.4		5.5	U	5.5	U
	7/6/2022	N	55.5		4	U	5.5	U	5.5	U
090-MW-09	4/30/2019	N	**2240000**		**2520000**		**1940000**		**2240000**	
	07/7/2022	well obstructed	NA		NA		NA		NA	
117-MW-D2	4/30/2019	N	12.2		10	U	5.5	U	5.5	U
	7/5/2022	N	5.5		4	U	5.5	U	5.5	U
117-MW-D3	11/12/2008	N	10	U	10	U	10	U	10	U
	11/17/2009	N	10	U	33.6		10	U	10	U
	12/15/2010	N	14.2		10	U	10	U	10	U
	12/2/2011	N	14		10	U	10	U	10	U
	12/22/2013	N	10		10	U	10	U	10	U
	11/17/2015	N	24		10	U	10	U	10	U
	4/29/2019	N	66.2		10	U	5.5	U	5.5	U
	7/5/2022	N	21		4	U	5.5	U	5.5	U
117-MW-I4	4/30/2019	N	**6550000**		**6340000**		**6080000**		**6010000**	
	7/6/2022	N	**624000**		**673000**		**7860000**		**9790000**	
119-MW-01T	11/11/2008	N	32.5		10	U	10	U	10	U
	11/19/2009	N	32.5		10	U	10	U	10	U
	12/9/2010	N	19.7		10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	20		10	U	10	U	10	U
	11/17/2015	N	40		10	U	10	U	10	U
	5/1/2019	N	**140**		34.7		26		28	
	7/6/2022	N	35.8		21.3		10		13	
119-MW-02T	11/11/2008	N	10	U	10	U	10	U	10	U
	11/16/2009	N	10	U	10	U	10	U	10	U
	12/9/2010	N	14.3		10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	22.9		10	U	10	U	10	U
	5/1/2019	N	**141**		**86.7**		62		57	
	7/6/2022	N	**80.8**		21.1		56		**73**	
124-MW-106T	11/17/2008	N	10	U	10	U	10	U	10	U
	11/20/2009	N	12.6		10	U	10	U	10	U
	12/7/2010	N	12.9		10	U	10	U	10	U
	12/2/2011	N	24		10	U	10	U	10	U
	12/22/2013	N	13		10	U	10	U	10	U
	11/17/2015	N	NA		NA		NA		NA	
	5/2/2019	N	**110**		14.9		5.5	U	5.5	U
	7/7/2022	well obstructed	NA		NA		NA		NA	

Table 5-1b
Groundwater Quality Data from Regional LTMP Sampling

Deep Overburden Zone

Monitoring Well ID	Sample Date	Sample Notes	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
SA6-MW-AA1T	11/13/2008	N	21.2		10	U	10	UJ	10	U
	11/16/2009	N	10	U	10	U	10	U	10	U
	12/10/2010	N	12.8		10	U	10	U	10	U
	12/2/2011	N	14		10	U	10	U	10	U
	12/22/2013	N	35		10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/2/2019	N	10	U	10	U	5.5	U	5.5	U
	7/7/2022	well obstructed	NA		NA		NA		NA	

General Notes:
Bold and underlined values exceed the NJDEP Ground Water Quality Standards (Chromium - 70 µg/L).
Concentrations reported in micrograms per liter

Abbreviations:
N: Normal Sample
NA: Not sampled
Q: Qualifiers

Table 5-1c
Groundwater Quality Data from Regional LTMP Sampling

Intermediate Zone

Monitoring Well ID	Sample Date	Sample Notes	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
087-MW-A26D	11/14/2008	N	10	U	10	U	10	U	10	U
	11/18/2009	N	10	U	10	U	10	UJ	10	UJ
	12/14/2010	N	10	U	10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/1/2019	N	18.9		10	U	5.5	U	5.5	U
	7/7/2022	N	4	U	4	U	5.5	U	5.5	U
087-MW-W25D	11/14/2008	N	10	U	10	U	10	U	10	U
	11/18/2009	N	10	U	10	U	10	UJ	10	UJ
	12/14/2010	N	10	U	10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	NA		NA		NA		NA	
	5/2/2019	N	49.1		10	U	5.5	U	5.5	U
	7/6/2022	N	4	U	4	4	5.5	U	5.5	U
087-MW-136D	5/2/2019	N	41.3		35		5.5	U	5.5	U
	7/6/2022	N	24.7		23.7		5.5	U	5.5	U
117-MW-I1	11/12/2008	N	10	U	10	U	10	U	10	U
	11/17/2009	N	22.8		10	U	10	U	10	U
	12/16/2010	N	10	U	10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	13		10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	5/1/2019	N	20.1		14		5.5	U	5.5	U
	7/5/2022	N	4.5		4	U	5.5	U	5.5	U
117-MW-I5	11/18/2008	N	**529**		**593**		**510**		**520**	
	11/17/2009	N	**401**		**392**		**370**		**360**	
	12/15/2010	N	**605**		**618**		**540**		**560**	
	12/15/2010	N	**650**		**627**		**590**		**600**	
	12/2/2011	N	**232**		**259**		**240**		**240**	
	12/22/2013	N	**209**		**164**		**160**		**160**	
	11/17/2015	N	**192**		**178**		**140**		**160**	
	4/30/2019	N	**160**		**147**		**140**		**120**	
	7/5/2022	N	**117**		**98.2**		**110**		**100**	
SA6-MW-AA1D	11/13/2008	N	17.8		10	U	10	UJ	10	U
	11/16/2009	N	10	U	10	U	10	U	10	U
	12/10/2010	N	20.1		10	U	10	U	10	U
	12/2/2011	N	10	U	10	U	10	U	10	U
	12/22/2013	N	10	U	10	U	10	U	10	U
	11/17/2015	N	10	U	10	U	10	U	10	U
	4/29/2019	N	10	U	10	U	5.5	U	5.5	U
	7/6/2022	N	4	U	4	U	5.5	U	5.5	U

General Notes:
Bold and underlined values exceed the NJDEP Ground Water Quality Standards (Chromium - 70 µg/L), N.J.A.C 7:9C; last amended 6/1/2020.
Concentrations reported in micrograms per liter

Abbreviations:
N: Normal Sample
NA: Not sampled
Q: Qualifiers

Table 5-2
Summary of Groundwater Quality Data from GWET Extraction Wells

Parameter	29-Jun-21			9-Sep-21			28-Dec-21			24-Jun-22		
	PW-1 (ug/L)	**PW-3** (ug/L)	**115-MW-215BR** (ug/L)	**PW-1** (ug/L)	**PW-3** (ug/L)	**115-MW-215BR** (ug/L)	**PW-1** (ug/L)	**PW-3** (ug/L)	**115-MW-215BR** (ug/L)	**PW-1** (ug/L)	**PW-3** (ug/L)	**115-MW-215BR** (ug/L)
Benzene	1.2	2.8	ND	0.8	2.2	ND	NS	NS	NS	NS	NS	NS
Carbon Tetrachloride	2.2	4.9	2.1	1.2	3.5	2.4	NS	NS	NS	NS	NS	NS
Chloroform	7.9	4.2	ND	5	3.3	ND	NS	NS	NS	NS	NS	NS
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene	45.4	26.7	ND	31.9	21.8	ND	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene	1.6	0.83	ND	0.94	0.88	ND	NS	NS	NS	NS	NS	NS
Toluene	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Trichloroethene	36.2	33.6	ND	22	24.2	ND	NS	NS	NS	NS	NS	NS
1,1-Dichloroethane	1.0	ND	ND	0.8	ND	ND	NS	NS	NS	NS	NS	NS
Methylene chloride	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Vinyl chloride	9.6	7.1	ND	5.5	4.6	ND	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	0.39	ND	ND	0.44	ND	ND	NS	NS	NS	NS	NS	NS
Chlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Ethylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Xylenes (total)	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Bromodichloromethane	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Hexavalent Chromium	16,600	18,700	10,100	16,200	19,100	13,900	15,900	18,600	10,700	14,800	16,100	11,700
Total Chromium	15,400	16,400	8,650	16,700	20,100	13,600	15,400	17,200	10,600	14,600	15,500	10,700

ND = Not detected above reporting limit.

NS = Volatile Organic Compounds no longer analyzed as of fourth quarter 2021.

Hexavalent Chromium and Total Chromium sampled annually as of 2022.

Table 5-3
Summary of Groundwater Quality Monitoring Results - SA-6 and SA-7

Sample Location	Sample Date	Total Chromium µg/l	Total Chromium µg/l (Filtered)	Hexavalent Chromium µg/l	Hexavalent Chromium µg/l (Filtered)
087-PZ-02	12/6/2022	42.6	<4	<5.5	<5.5
087-PZ-10	5/5/2022	4 U	5.5	5.5 U	5.5 U
124-PZ-20R	5/5/2022	46.7	12.0	5.5 U	5.5 U

Notes:

Bold Exceeds GWQS 70 µg/l

GWQS - Highest of NJDEP Ground Water Quality Standards, N.J.A.C 7:9C; last amended 6/20/2020

U - Not detected above reporting limit

J - Estimated value

µg/l - micrograms/liter

<: not detected at minimum detection limit shown

Table 5-4
Summary of Groundwater Quality Monitoring Results - NJCU

Sample Location	Sample Date	Total Chromium ug/l	Total Chromium ug/l (Filtered)	Hexavalent Chromium ug/l	Hexavalent Chromium ug/l (Filtered)
184-MW-102	3/16/2022	4.9	4.5	5.5 U	5.5 UJ
	6/2/2022	5	4.8	5.5 U	5.5 UJ
	9/14/2022	6.1	6.1	5.5 U	5.5 UJ
	12/6/2022	5.6	4.5	5.5 UJ	5.5 UJ
184-MW-105	3/16/2022	4 U	4 U	5.5 U	5.5 UJ
	6/2/2022	4 U	4 U	5.5 U	5.5 U
	9/14/2022	4 U	4 U	5.5 U	5.5 U
	12/6/2022	4 U	4 U	5.5 UJ	5.5 UJ
184-MW-107	3/16/2022	**74.9**	4 U	5.5 UJ	5.5 UJ
	6/2/2022	4 U	4 U	5.5 U	5.5 U
	9/14/2022	DRY	DRY	DRY	DRY
	12/6/2022	13.6	4 U	5.5 UJ	5.5 UJ
184-MW-108	3/16/2022	4 U	4 U	5.5 U	5.5 UJ
	3/16/2022 DUP	4 U	4 U	5.5 U	5.5 UJ
	6/2/2022	4 U	4 U	5.5 U	5.5 U
	6/2/2022 DUP	4 U	4 U	5.5 U	5.5 U
	9/14/2022	4 U	4 U	5.5 U	5.5 U
	9/14/2022 DUP	4 U	9.1	5.5 U	5.5 U
	12/6/2022	15.3	4 U	5.5 UJ	5.5 UJ
	12/6/2022 DUP	3	4 U	5.5 UJ	5.5 UJ

BOLD - sample exceeds the GWQS of 70 ug/l for Total Chromium

U - Value not detected above reporting limit

J- Estimated value

FIGURES

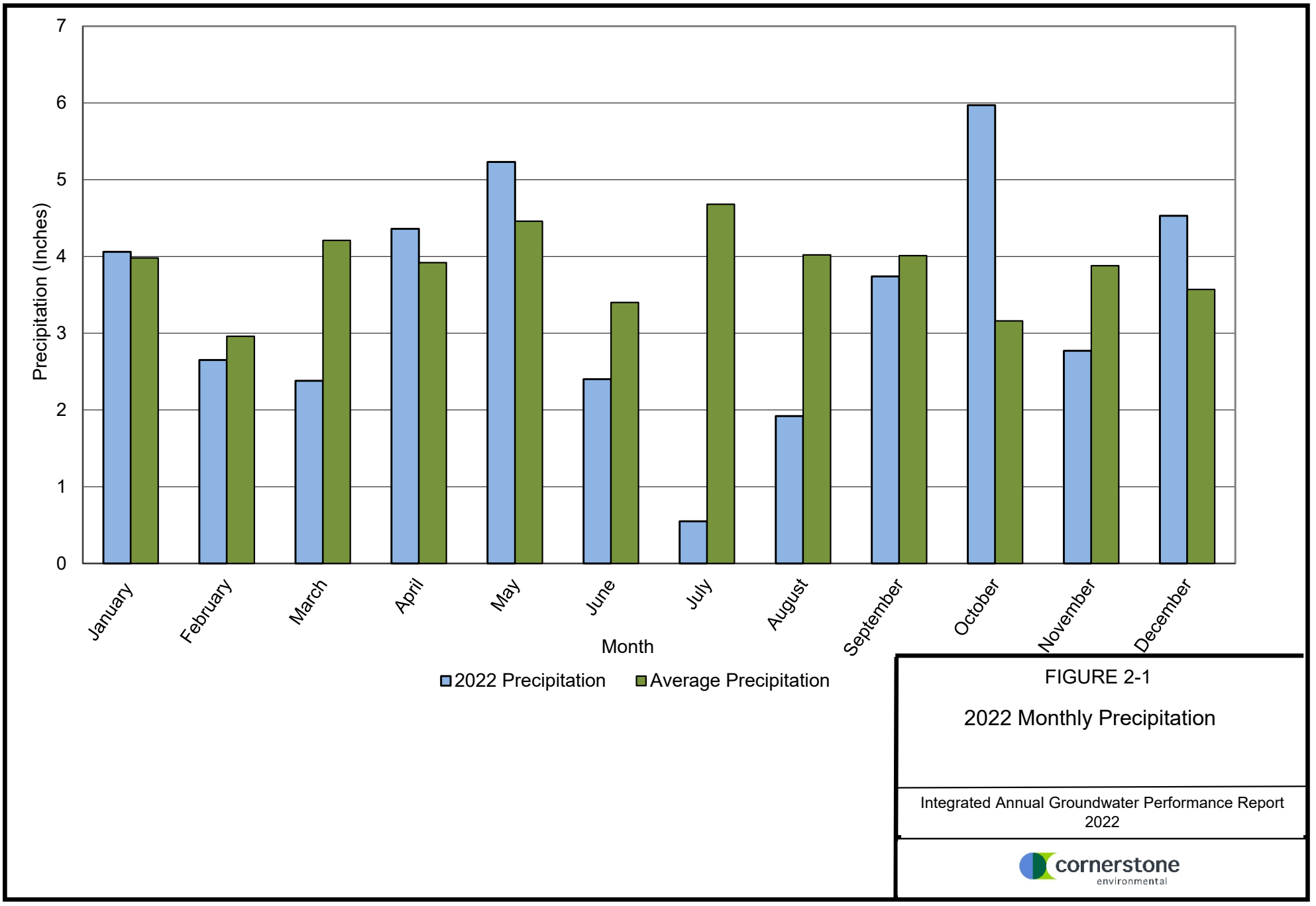
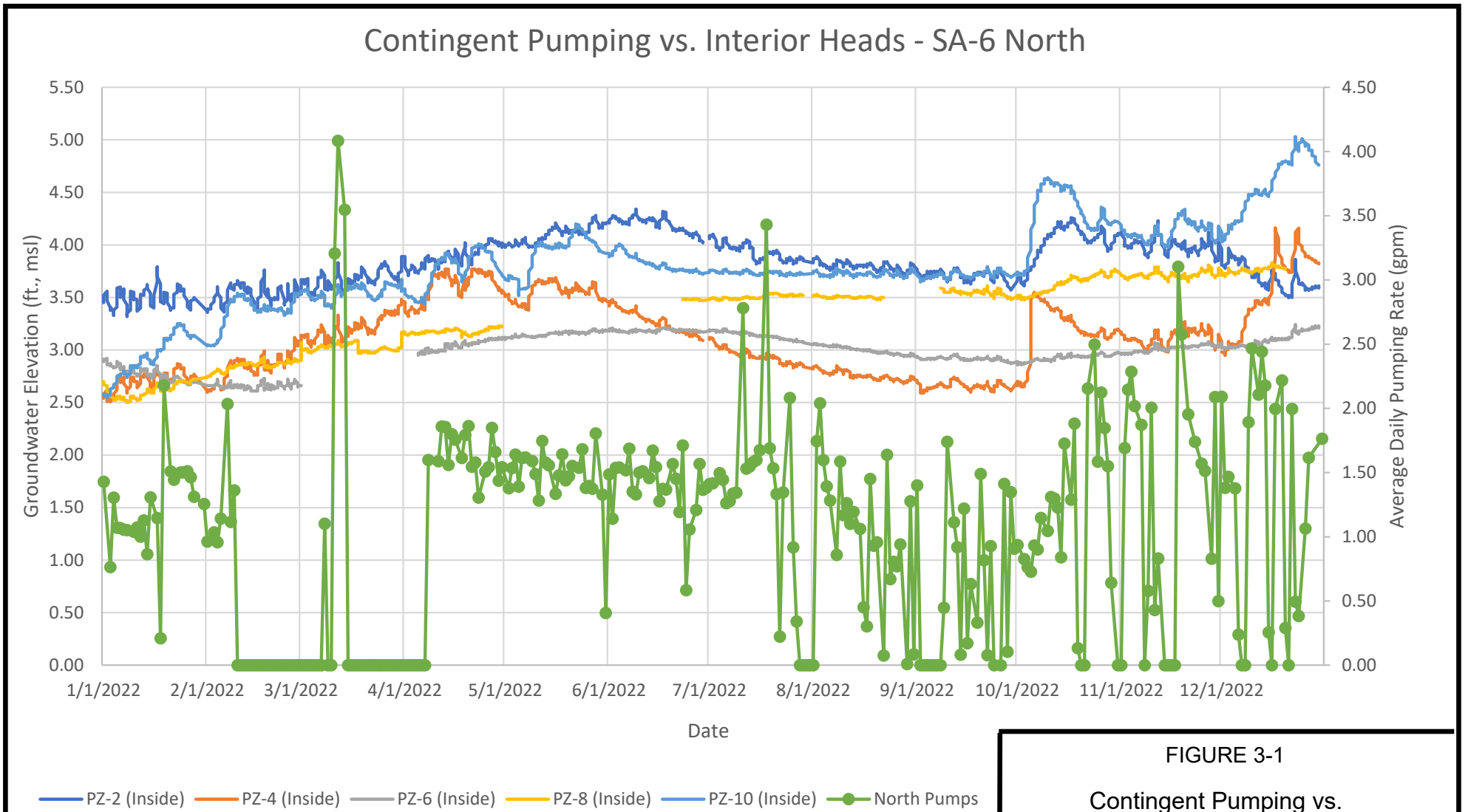


FIGURE 2-1

2022 Monthly Precipitation

Integrated Annual Groundwater Performance Report
2022

cornerstone environmental



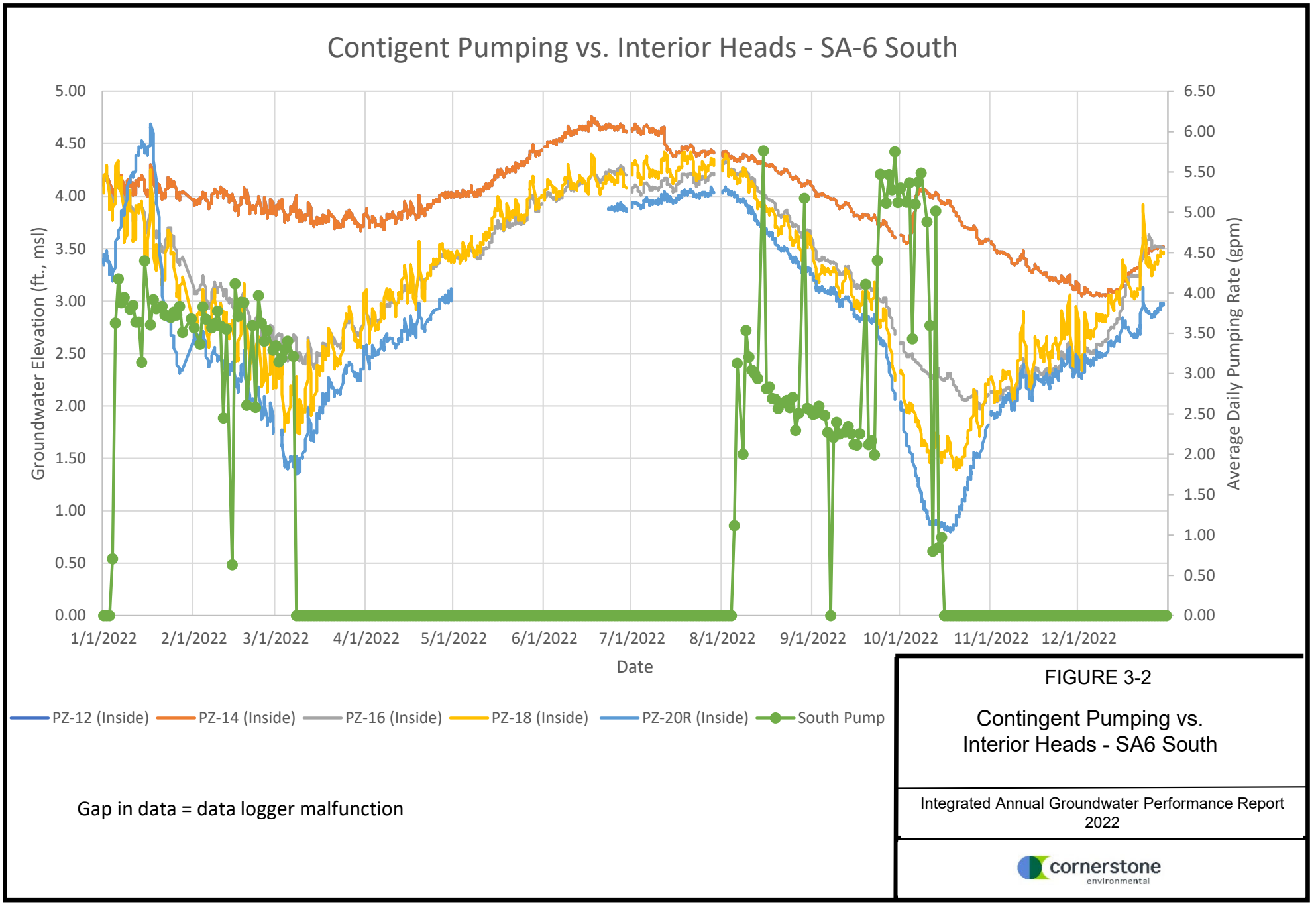
Gap in data = data logger malfunction

FIGURE 3-1

Contingent Pumping vs.
Interior Heads – SA6 North

Integrated Annual Groundwater Performance Report
2022

cornerstone
environmental



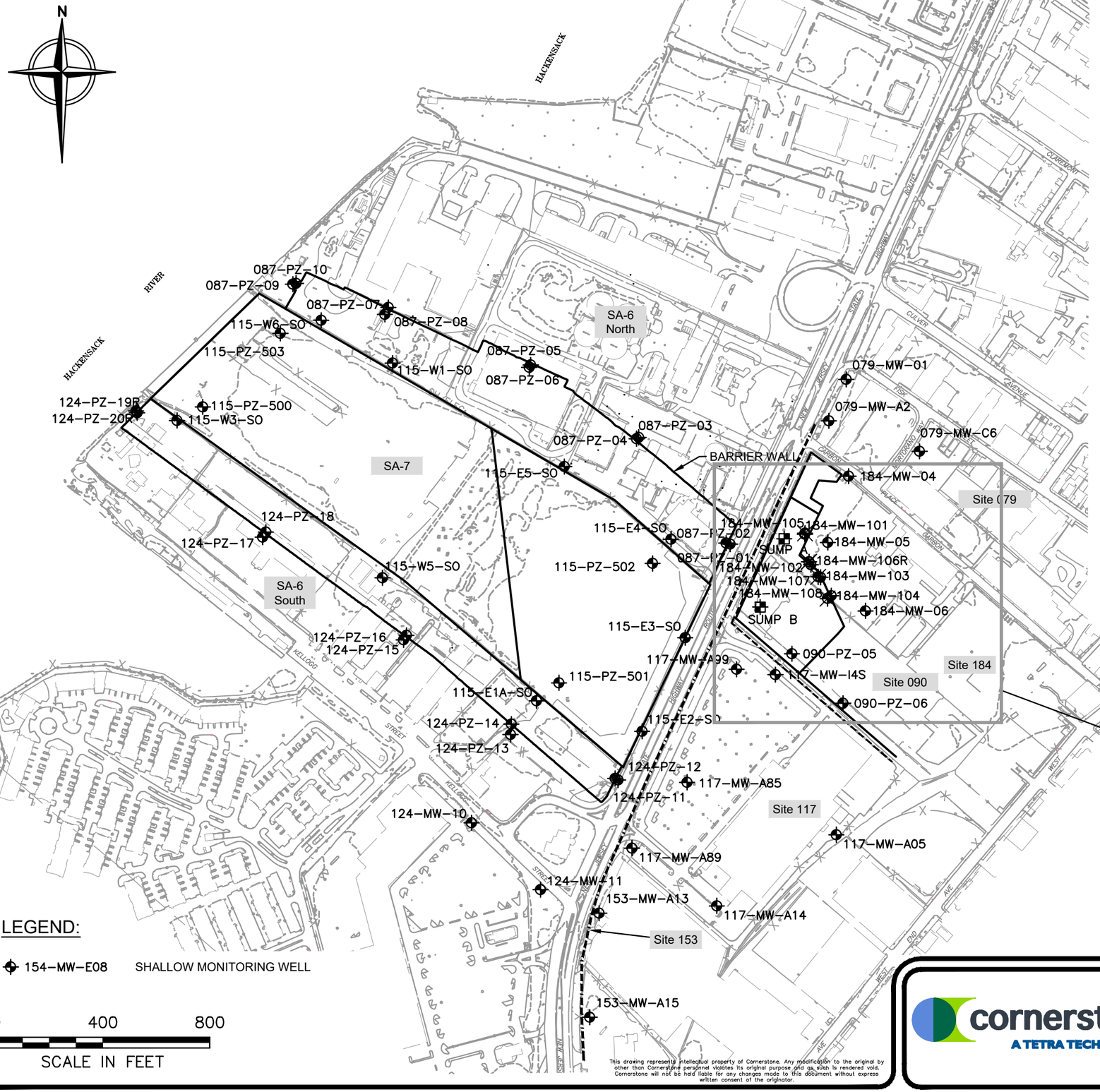
Gap in data = data logger malfunction

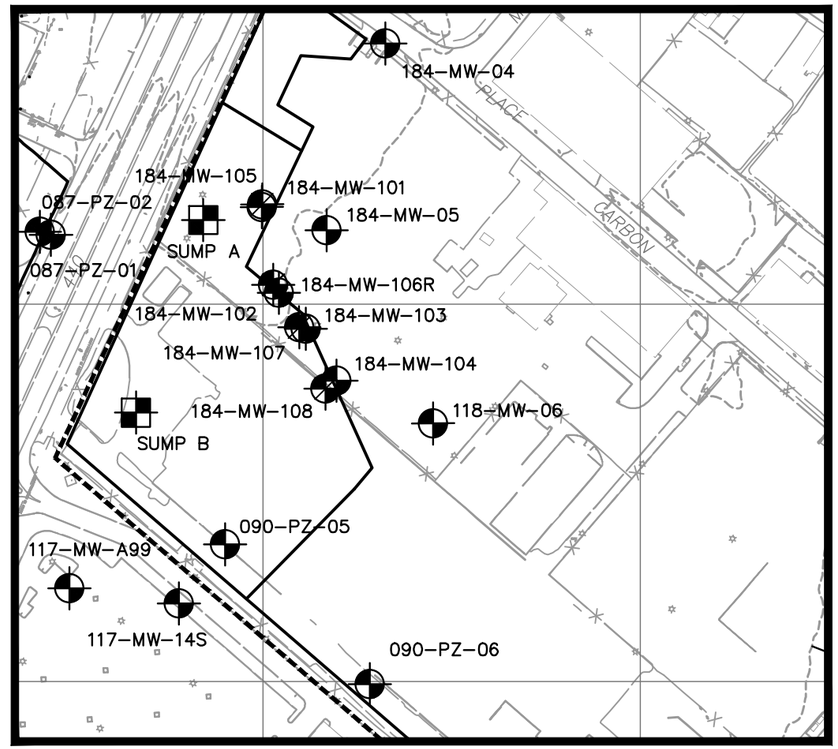
FIGURE 3-2

Contingent Pumping vs.
Interior Heads - SA6 South

Integrated Annual Groundwater Performance Report
2022

cornerstone
environmental





ENLARGED AREA OF SITE

0 200 400

SCALE IN FEET

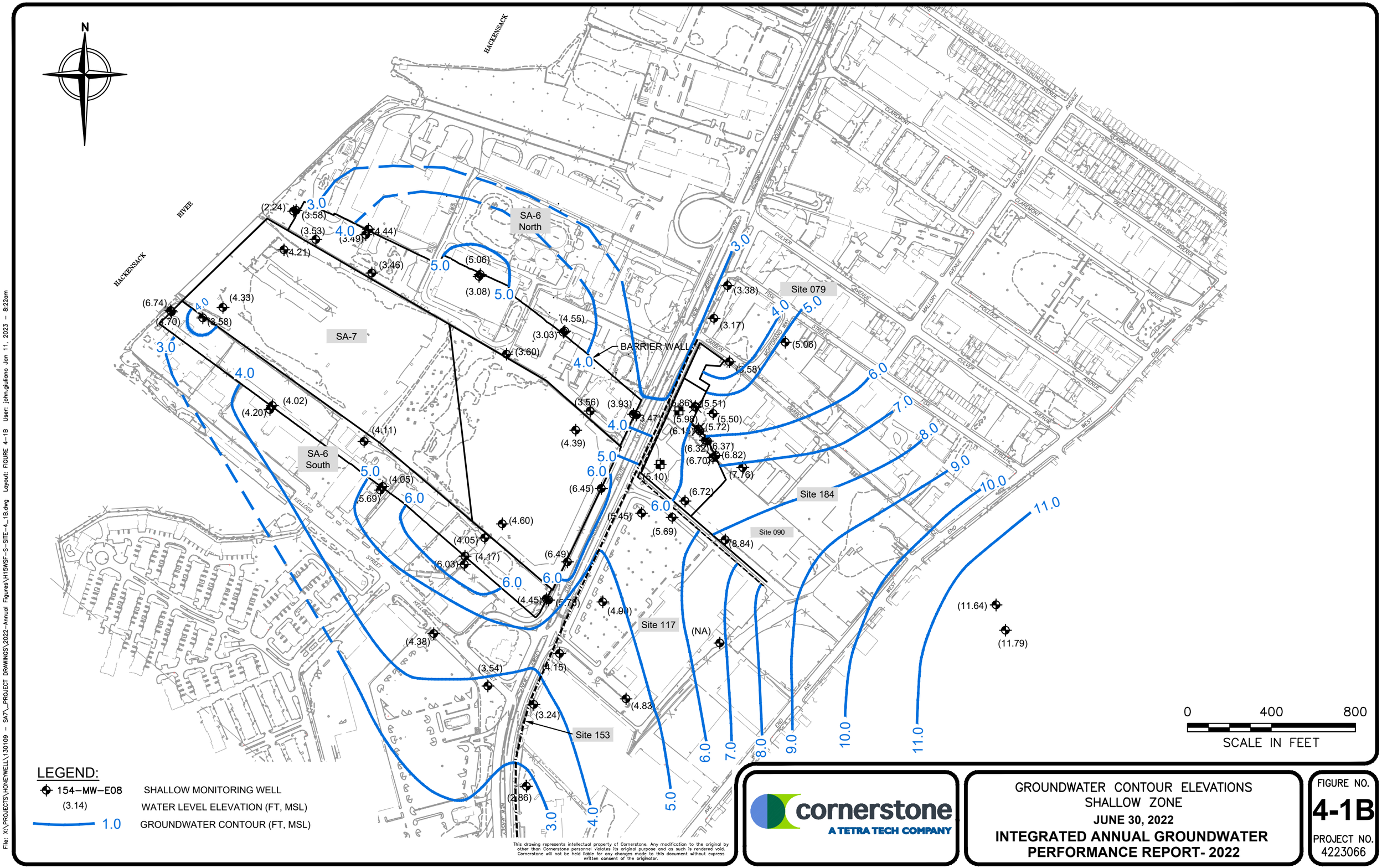
cornerstone
A TETRA TECH COMPANY

WELL LOCATION PLAN
SHALLOW ZONE
JUNE 30, 2022

INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-1A
PROJECT NO.
4223066

File: \\tt.local\ceg\625\PROJECTS\HONEYWELL\130109 - SA7_PROJECT DRAWINGS\2022-Annual Figures\H15WSF-S-SITE-4_1A.dwg Layout: FIGURE 4-1A User: JOHN.GIULIANO Jan 06, 2023 - 10:44am



LEGEND:

- 154-MW-E08 — SHALLOW MONITORING WELL
- (3.14) — WATER LEVEL ELEVATION (FT, MSL)
- 1.0 — GROUNDWATER CONTOUR (FT, MSL)

cornerstone
A TETRA TECH COMPANY

GROUNDWATER CONTOUR ELEVATIONS
SHALLOW ZONE
JUNE 30, 2022
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-1B
PROJECT NO.
4223066

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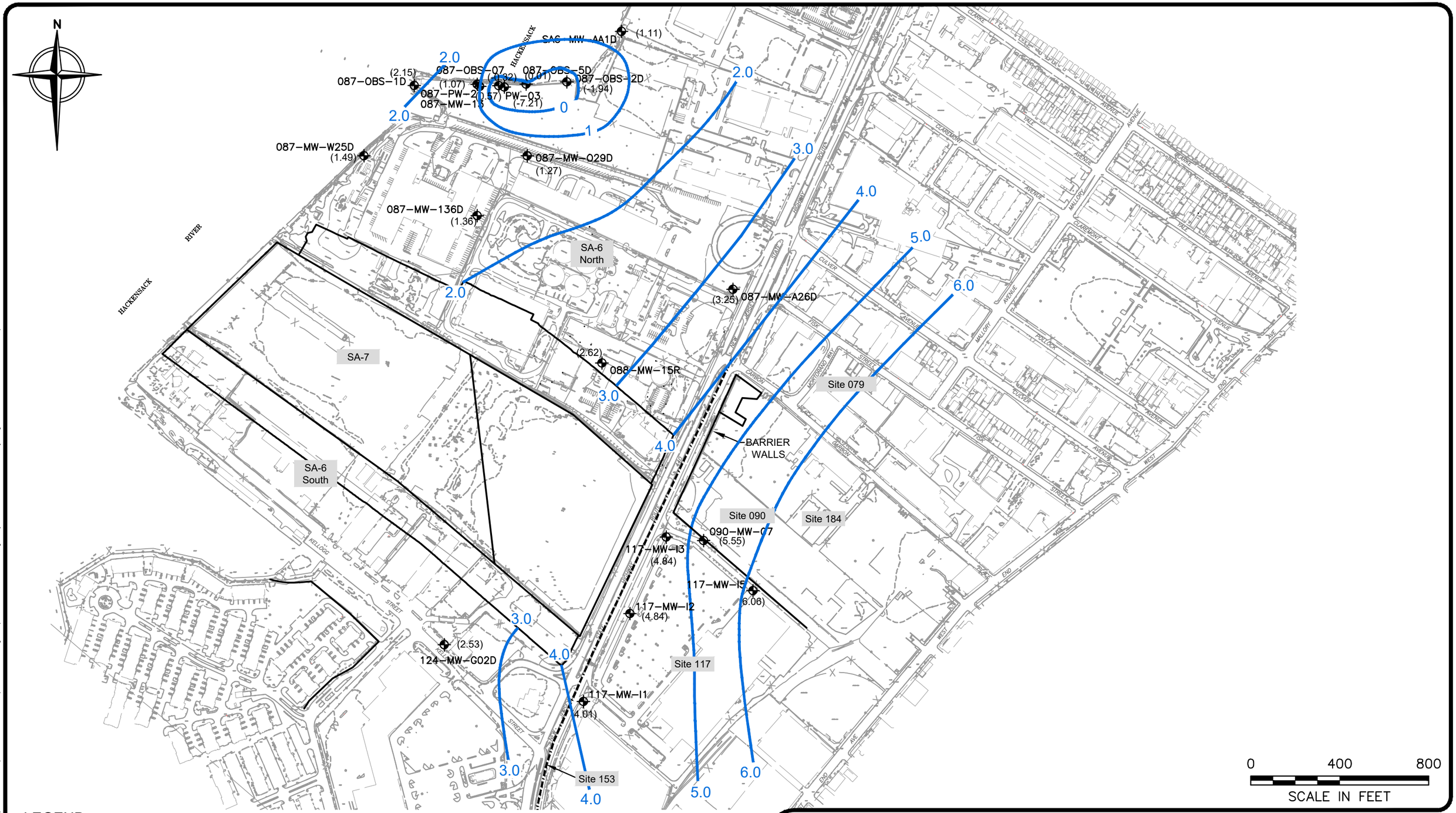


LEGEND:

- 087-MW-029D — INTERMEDIATE ZONE MONITORING WELL
- (3.45) — WATER LEVEL ELEVATION (FT, MSL)
- 1.0 — GROUNDWATER CONTOUR (FT, MSL)

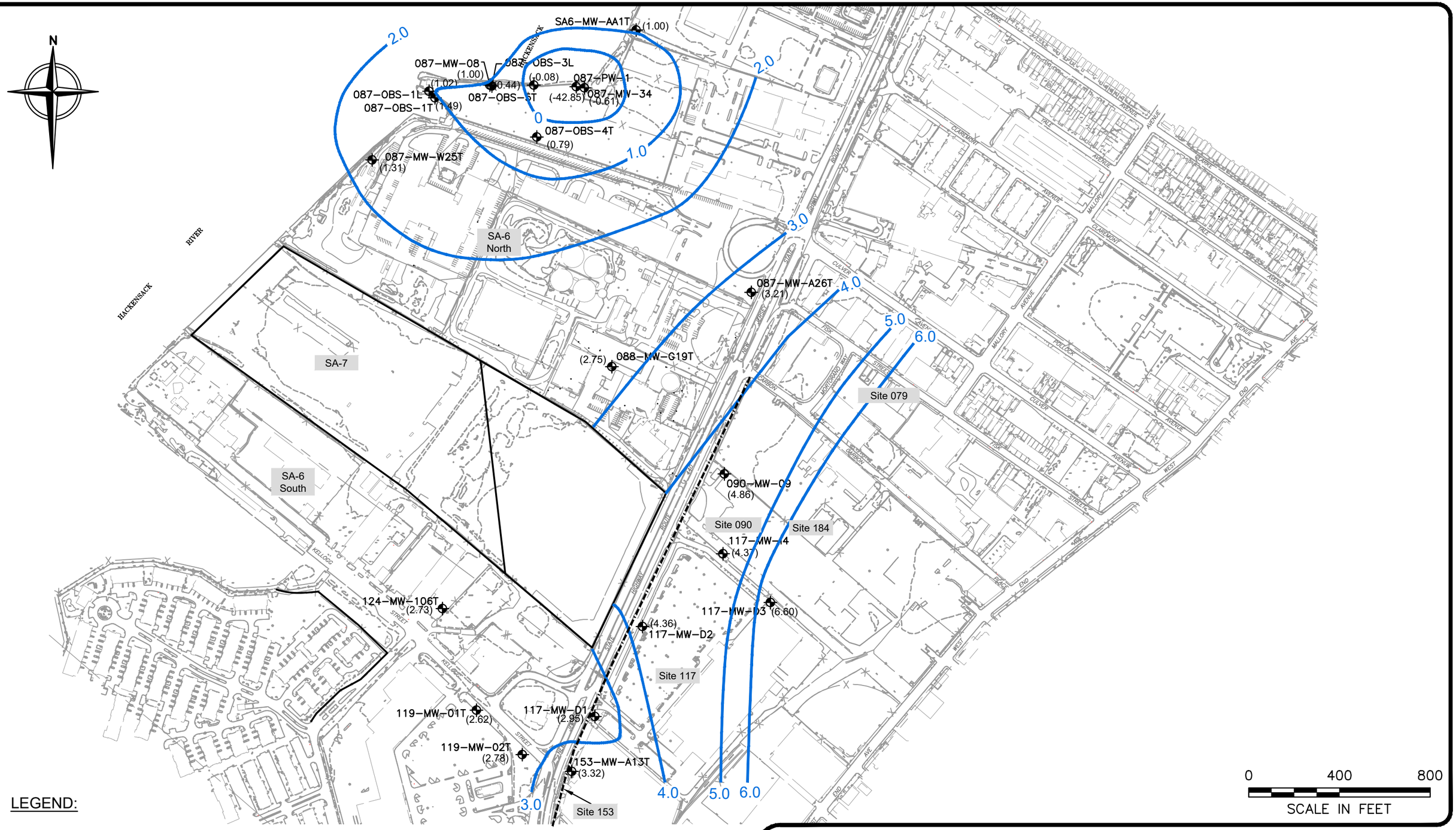
FIGURE REVISED JANUARY 2020

cornerstone
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS
INTERMEDIATE ZONE
JUNE 30, 2022
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-2
PROJECT NO.
4223066

File: X:\PROJECTS\HONEYWELL\130109 - SA7_PROJECT DRAWINGS\2022-Annual Figures\H15WSF-S-SITE-4_2.dwg Layout: FIGURE 4-2 User: john.giuliano Jan 30, 2023 - 12:14pm



LEGEND:

087-MW-029D	DEEP ZONE MONITORING WELL
(2.25)	WATER LEVEL ELEVATION (FT, MSL)
1.0	GROUNDWATER CONTOUR (FT, MSL)

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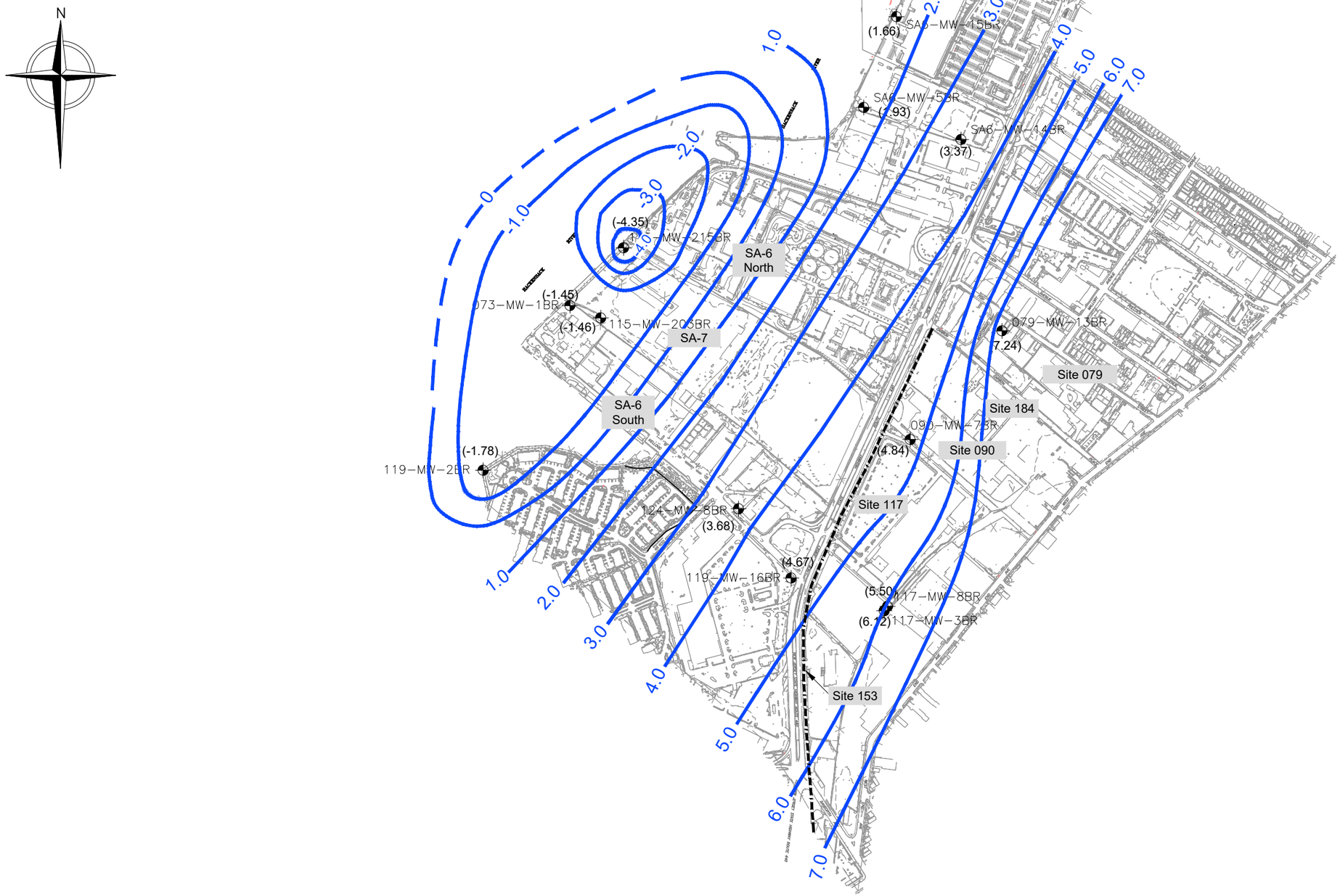
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS
DEEP ZONE
JUNE 30, 2022
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-3
PROJECT NO.
4223066

File: X:\PROJECTS\HONEYWELL\130109 - SA7_PROJECT DRAWINGS\2022-Annual Figures\H15WSF-S-SITE-4_3.dwg Layout: FIGURE 4-3 User: john.giuliano Jan 11, 2023 - 8:49am



LEGEND:

119-MW-11BR (5.04)	BEDROCK ZONE MONITORING WELL WATER LEVEL ELEVATION (FT, MSL)
1.0	GROUNDWATER CONTOUR (FT, MSL)

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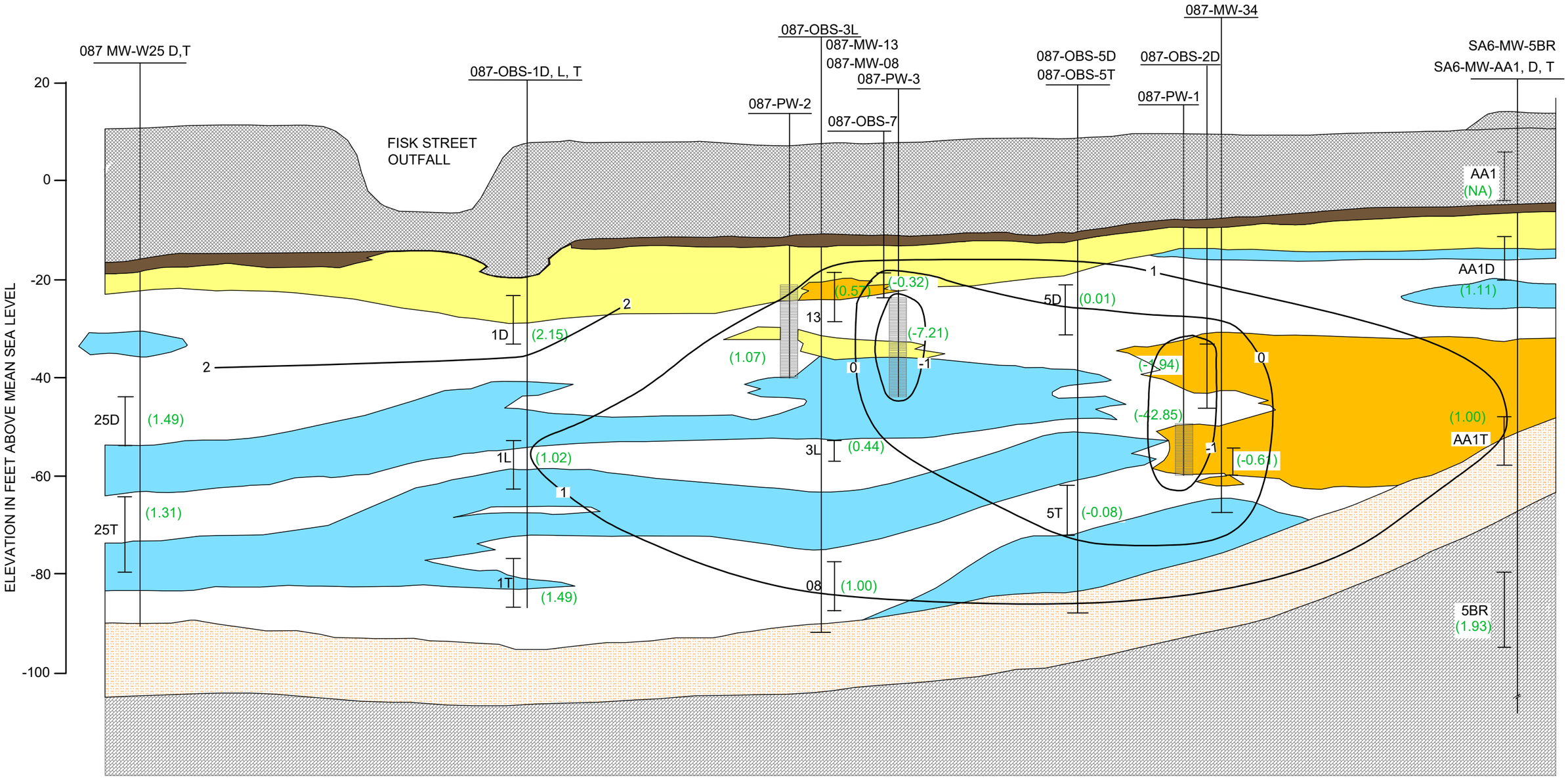
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS
BEDROCK ZONE
JUNE 30, 2022
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-4
PROJECT NO.
4223066



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

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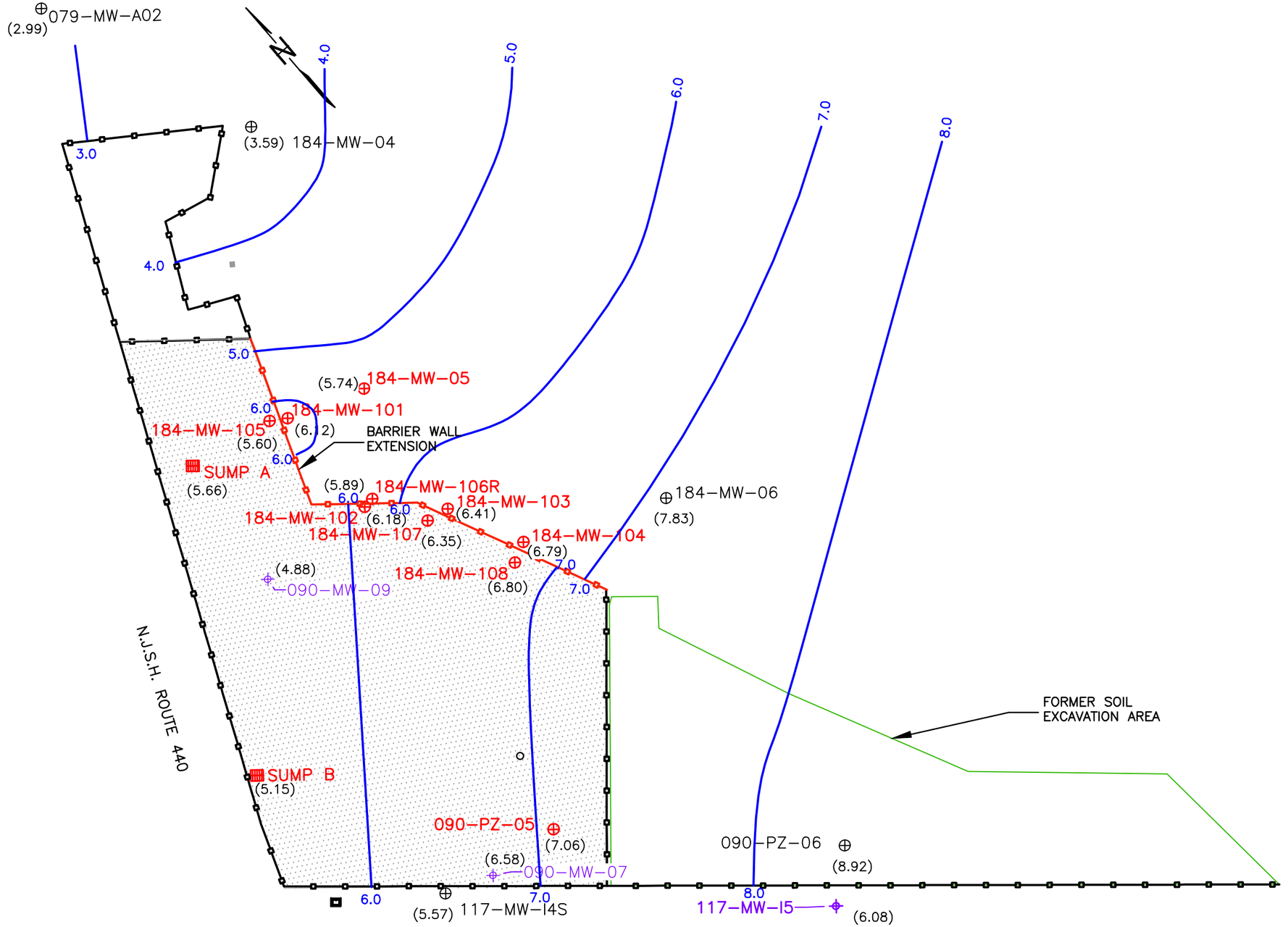
GROUNDWATER ELEVATIONS (FT, MSL)
IN CROSS-SECTION
JUNE 30, 2022
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-5
PROJECT NO.
4223066



LEGEND

- MONITORING WELL
- PIEZOMETER
- SUMP
- SHEET PILE WALL
- CAP AREA
- SHALLOW MONITORING LOCATION WITH DATA LOGGER INSTALLED
- INDICATES INTERMEDIATE OR DEEP ZONE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR
- TCE WELLS AS OF MAY 2019 ARE NO LONGER MEASURED

0 100 200

SCALE IN FEET

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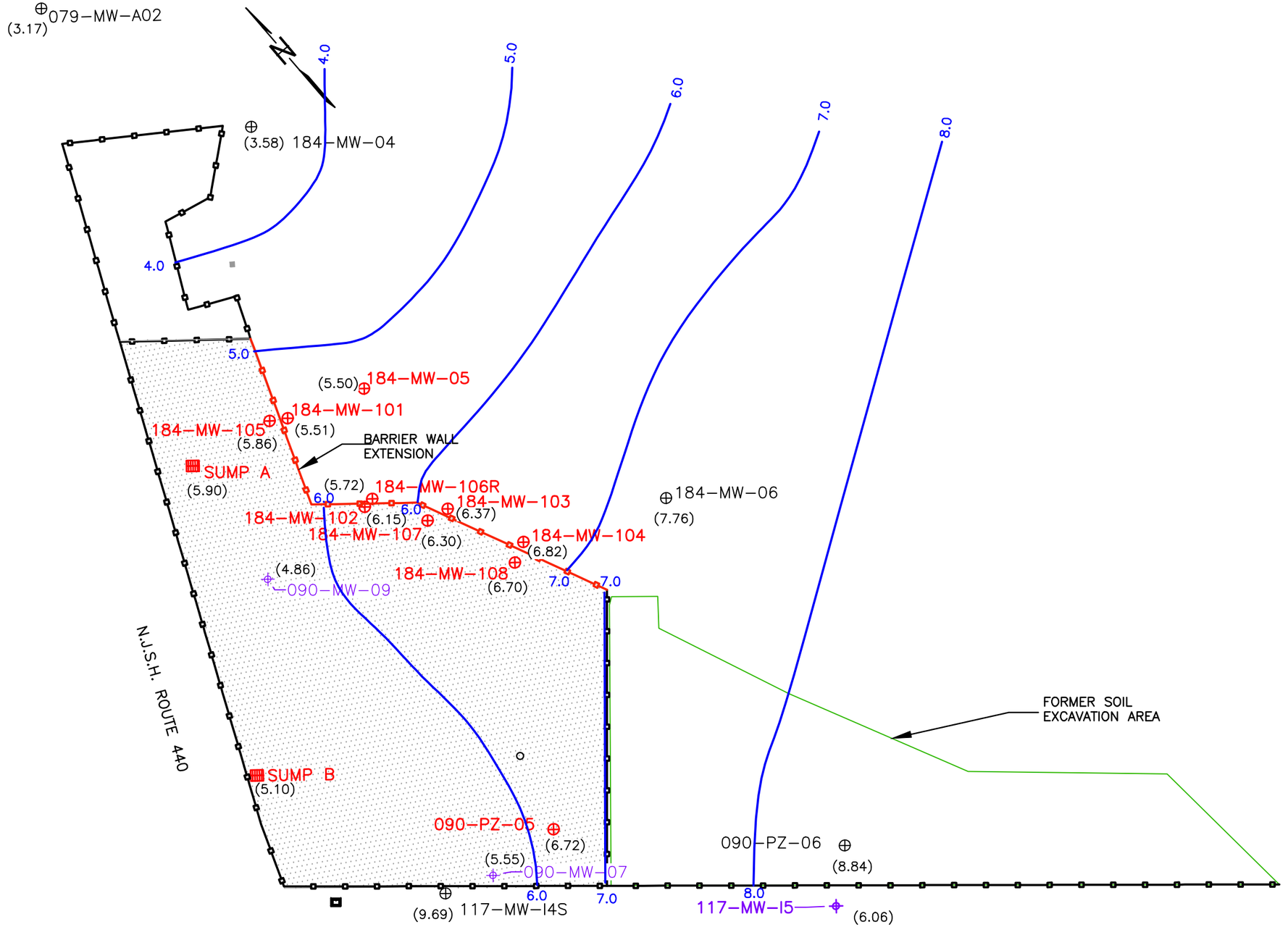
GROUNDWATER ELEVATION CONTOURS (ft.,msl)
MARCH 29, 2022
STUDY AREA 5 - NJCU
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-6
PROJECT NO.
4223066



LEGEND

- MONITORING WELL
- PIEZOMETER
- SUMP
- SHEET PILE WALL
- CAP AREA
- SHALLOW MONITORING LOCATION WITH DATA LOGGER INSTALLED
- INDICATES INTERMEDIATE OR DEEP ZONE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR
- TCE WELLS AS OF MAY 2019 ARE NO LONGER MEASURED

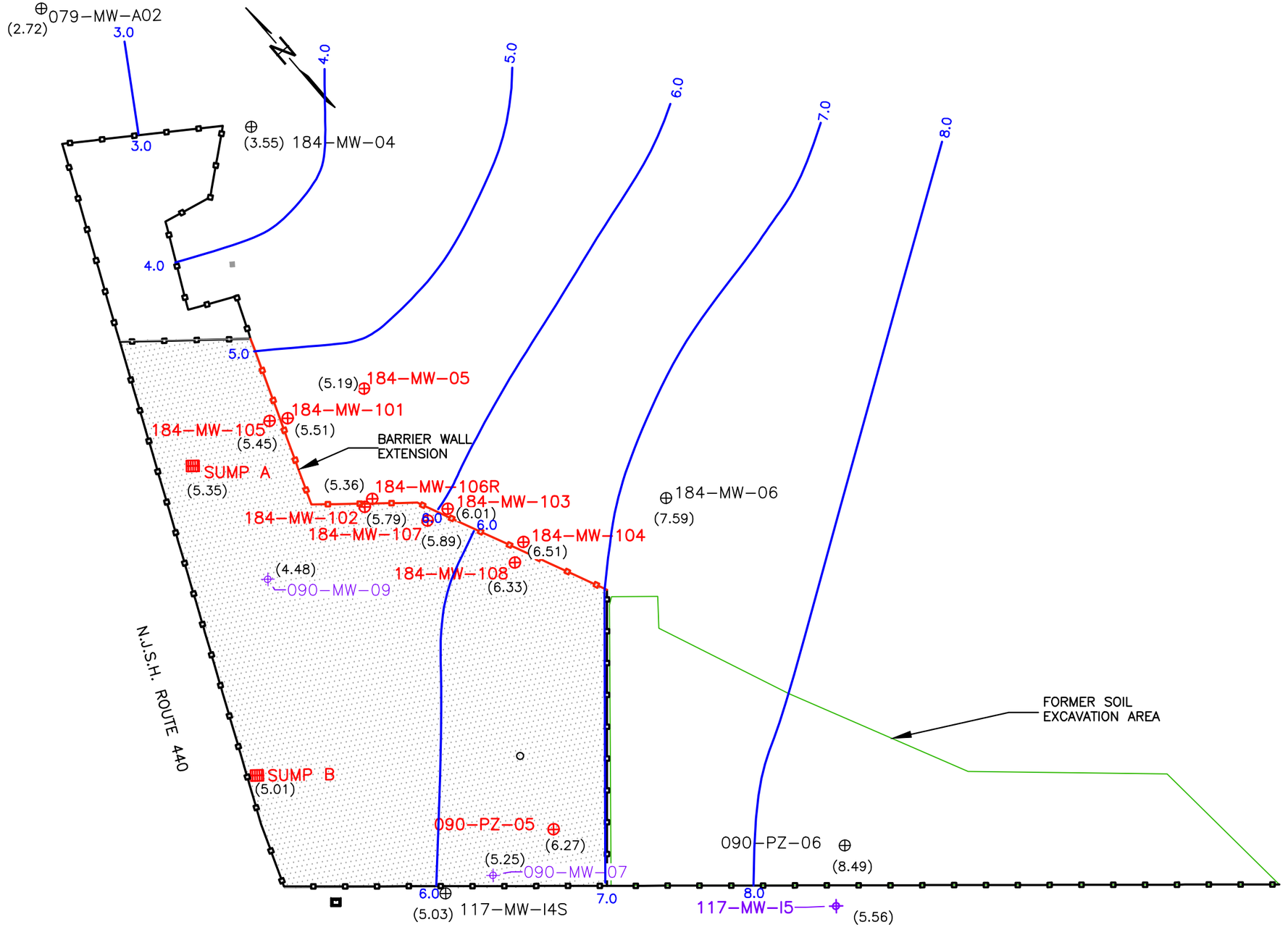
0 100 200

SCALE IN FEET

cornerstone
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS (ft.,msl)
JUNE 30, 2022
STUDY AREA 5 - NJCU
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-7
PROJECT NO.
4223066



LEGEND

- MONITORING WELL
- PIEZOMETER
- SUMP
- SHEET PILE WALL
- CAP AREA
- SHALLOW MONITORING LOCATION WITH DATA LOGGER INSTALLED
- INDICATES INTERMEDIATE OR DEEP ZONE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR
- TCE WELLS AS OF MAY 2019 ARE NO LONGER MEASURED

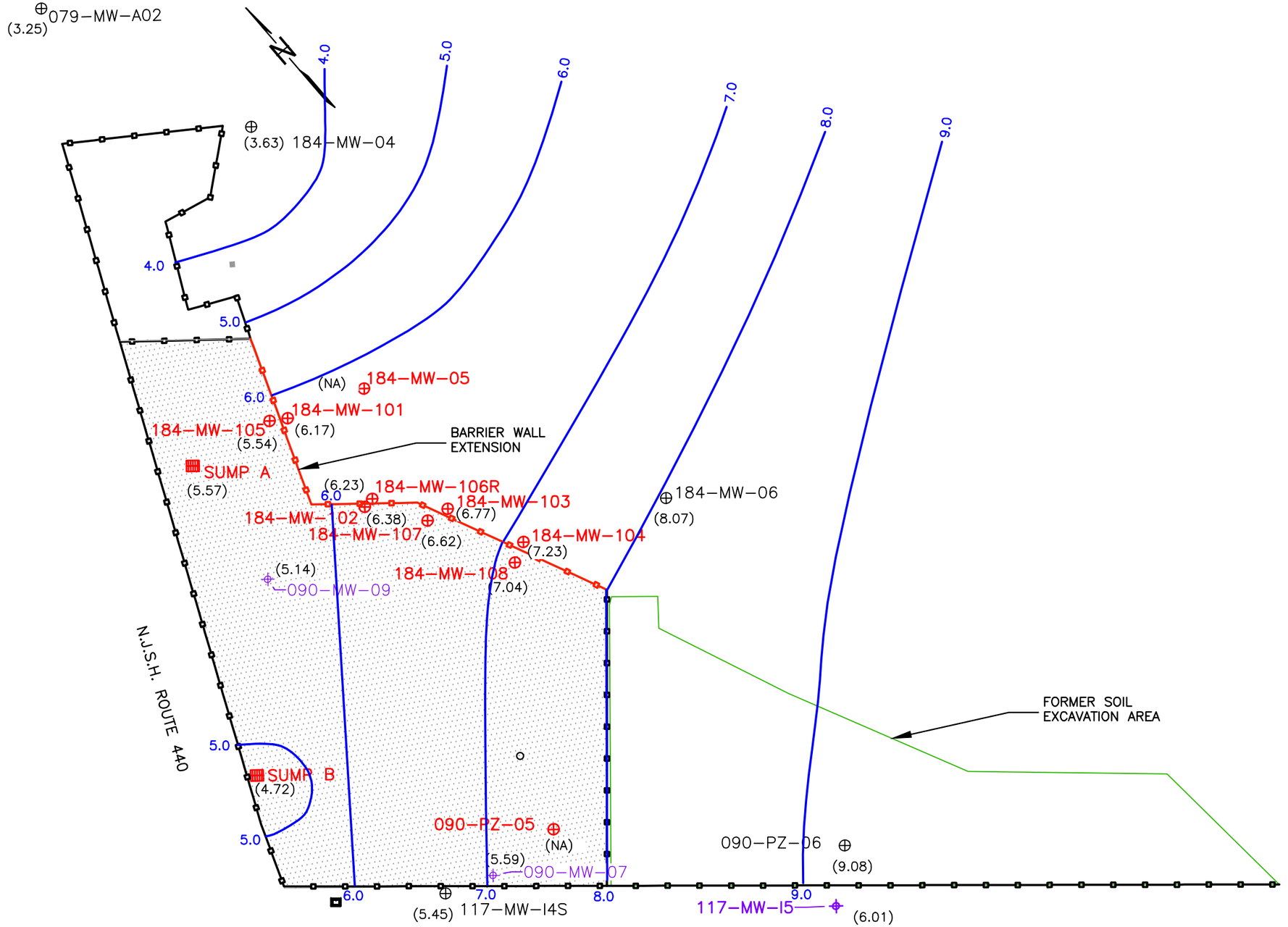
0 100 200

SCALE IN FEET

cornerstone
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS (ft.,msl)
SEPTEMBER 29, 2022
STUDY AREA 5 - NJCU
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-8
PROJECT NO.
4223066



LEGEND

- MONITORING WELL
- PIEZOMETER
- SUMP
- SHEET PILE WALL
- CAP AREA
- SHALLOW MONITORING LOCATION WITH DATA LOGGER INSTALLED
- INDICATES INTERMEDIATE OR DEEP ZONE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR
- TCE WELLS AS OF MAY 2019 ARE NO LONGER MEASURED

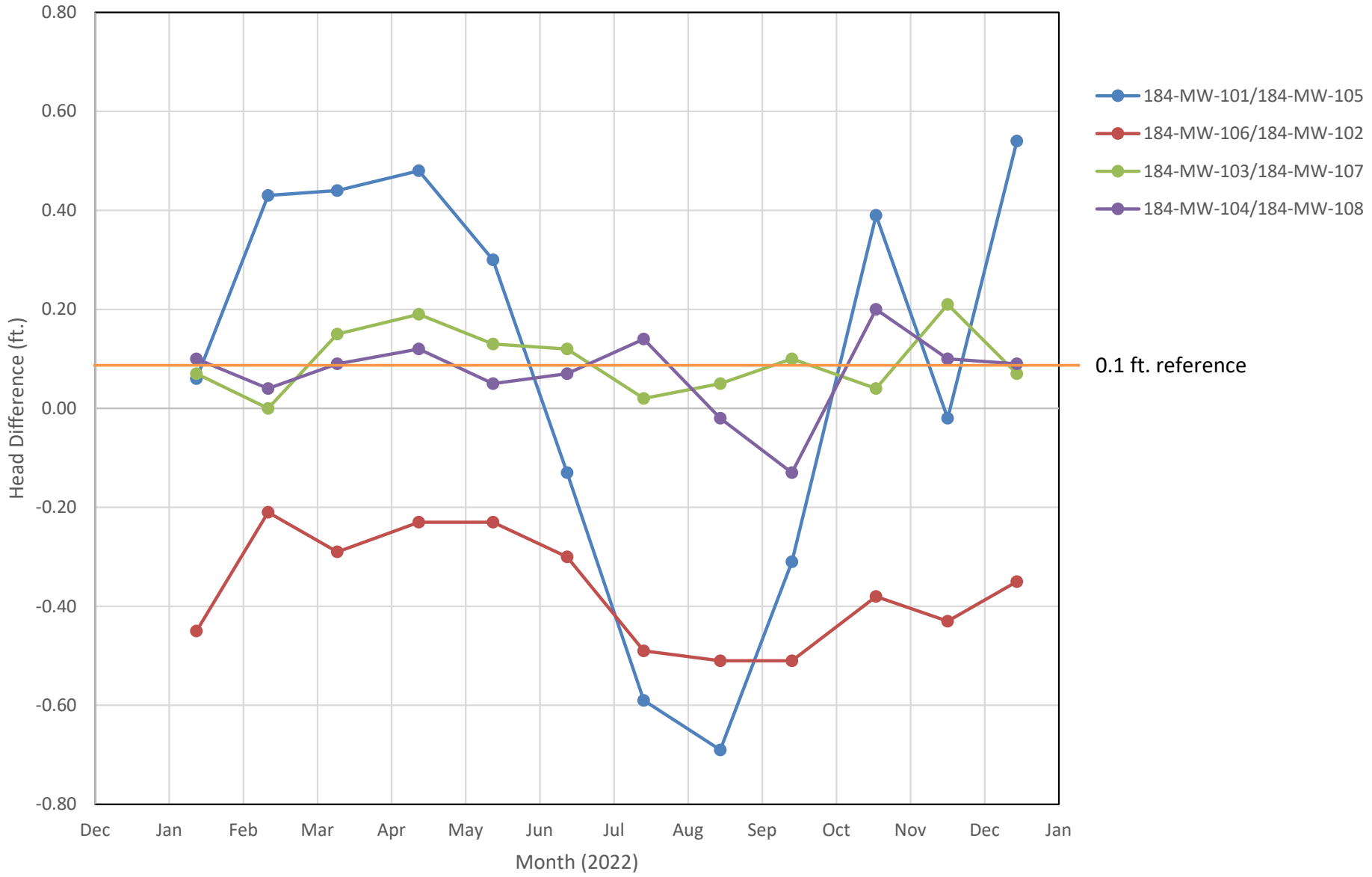
0 100 200

SCALE IN FEET

cornerstone
A TETRA TECH COMPANY

GROUNDWATER ELEVATION CONTOURS (ft.,msl)
DECEMBER 28, 2022
STUDY AREA 5 - NJCU
INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT- 2022

FIGURE NO.
4-9
PROJECT NO.
4223066



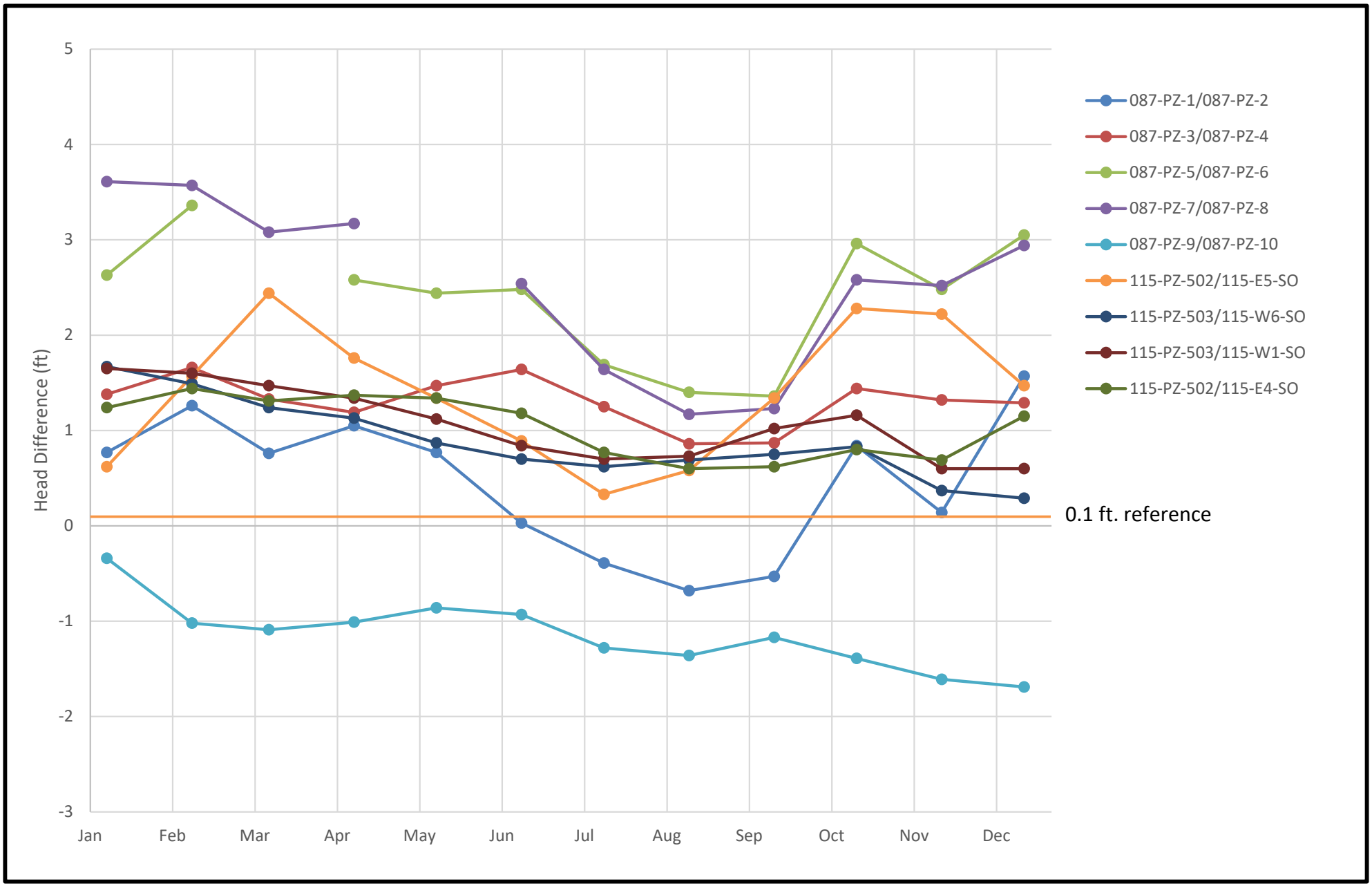
Note:
Positive head difference = inward gradient
Negative head difference = outward gradient

cornerstone
A TETRA TECH COMPANY

Integrated Annual Groundwater Performance Report 2022

Monthly Average Head Differences Across NJCU Barrier Wall

Figure 4-10



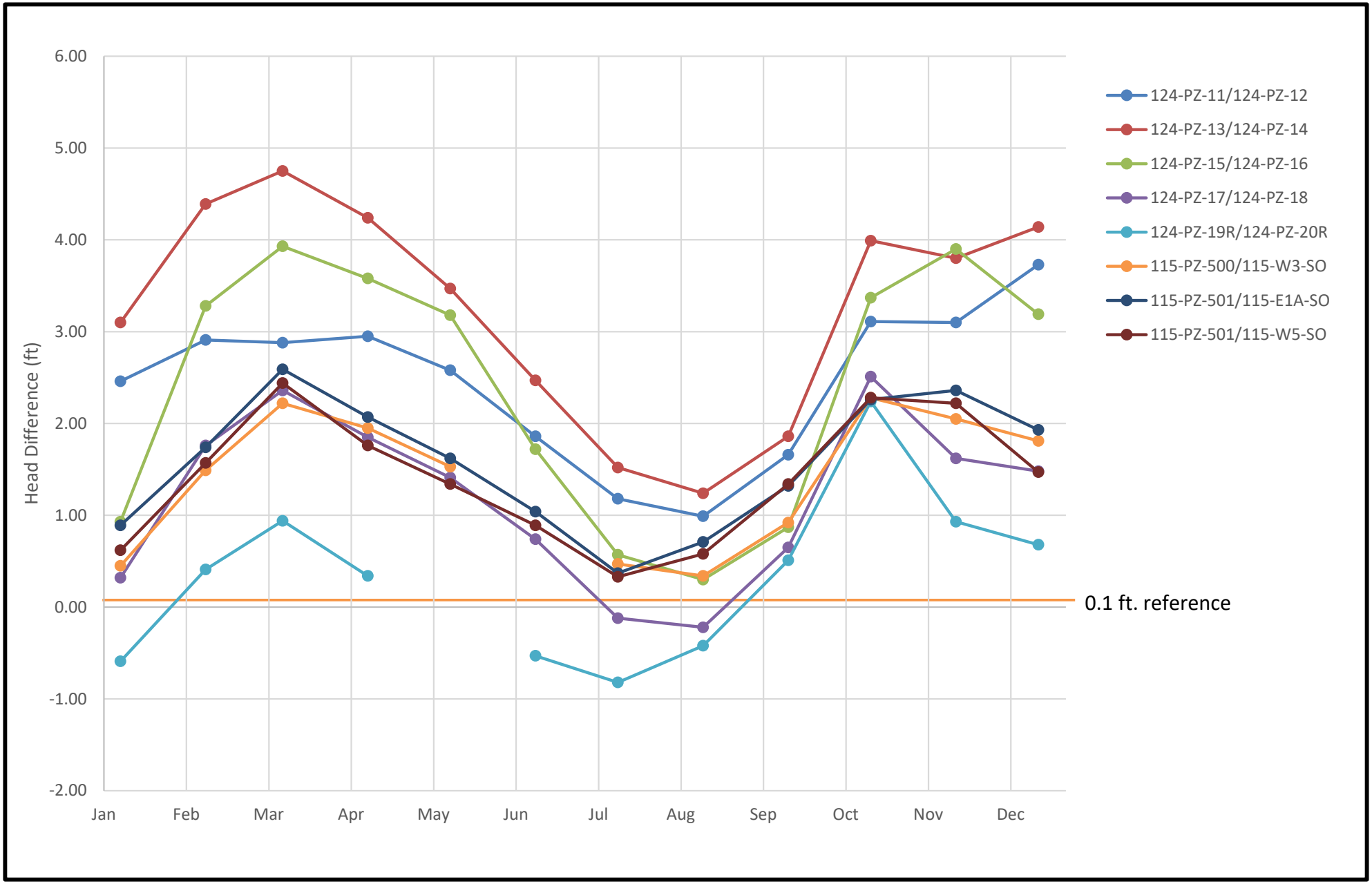
Note:
Positive head difference = inward gradient
Negative head difference = outward gradient
Gap in data = data logger malfunction

cornerstone
A TETRA TECH COMPANY

Integrated Annual Groundwater Performance Report 2022

Monthly Average Head Differences Across SA-6 North Barrier Wall

Figure 4-11



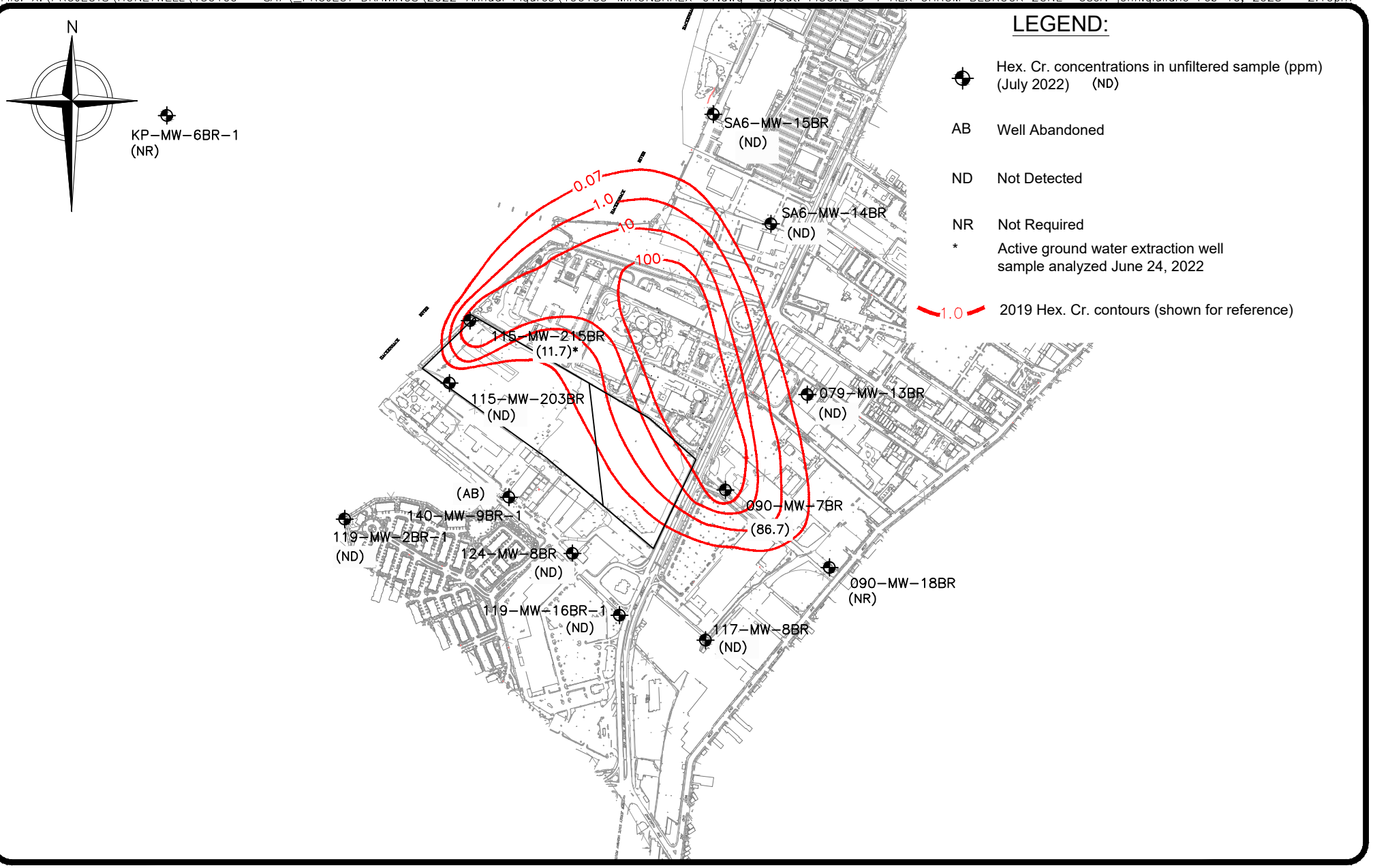
Note:
Positive head difference = inward gradient
Negative head difference = outward gradient
Gap in Data = data logger malfunction

cornerstone
A TETRA TECH COMPANY

Integrated Annual Groundwater Performance Report 2022

Monthly Average Head Differences Across SA-6 South Barrier Wall

Figure 4-12



0 1000 2000

SCALE IN FEET

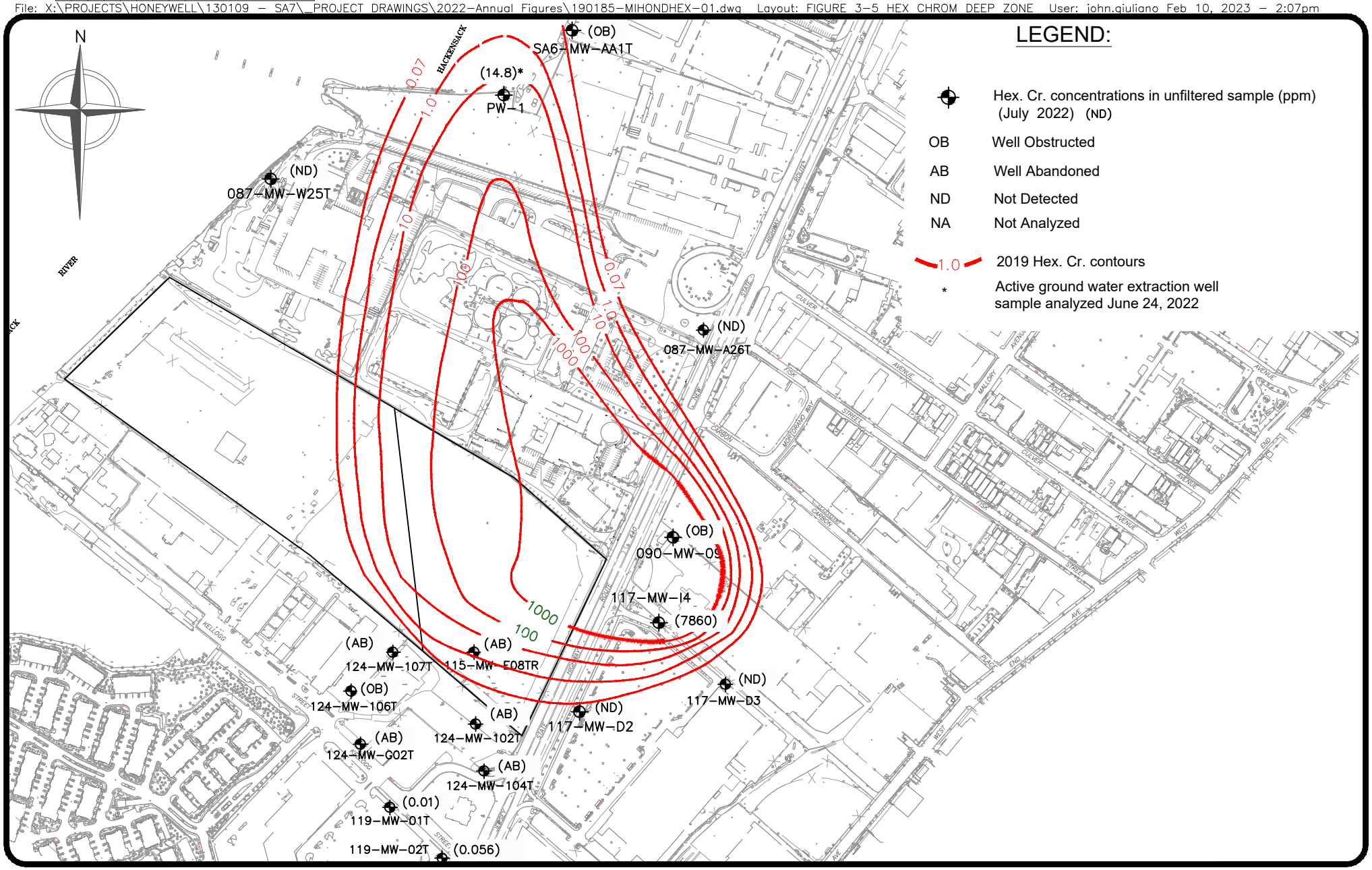
cornerstone
A TETRA TECH COMPANY

PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

Hexavalent Chromium Concentrations in Bedrock Groundwater

INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT-2022

FIGURE NO.
5-1
PROJECT NO.
4223066



0 500 1000
SCALE IN FEET

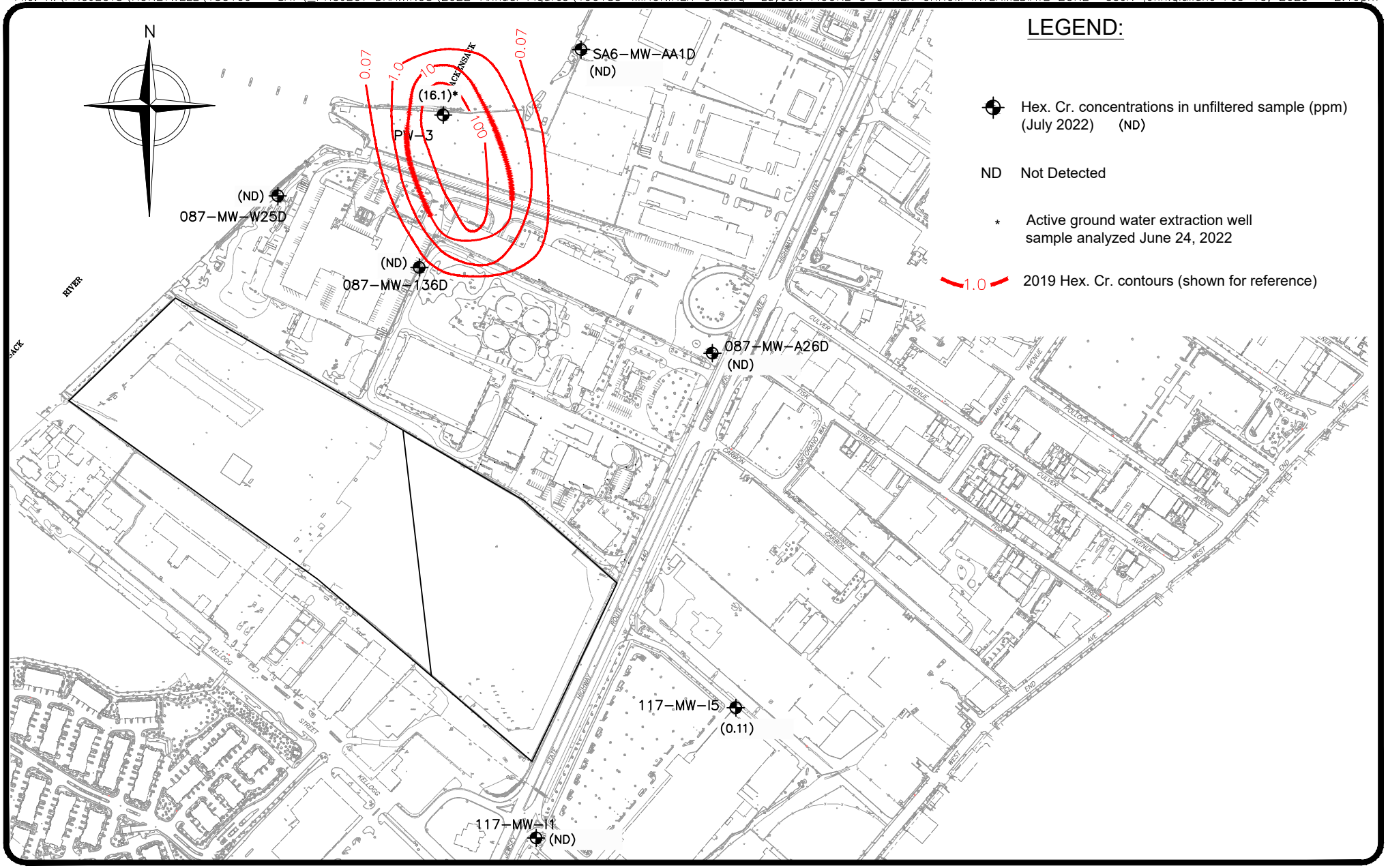
cornerstone
A TETRA TECH COMPANY

PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

Hexavalent Chromium Concentrations in Deep Groundwater

INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT-2022

FIGURE NO.
5-2
PROJECT NO.
4223066



0 500 1000

SCALE IN FEET

cornerstone
A TETRA TECH COMPANY

PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

Hexavalent Chromium Concentrations in Intermediate Zone Groundwater

INTEGRATED ANNUAL GROUNDWATER PERFORMANCE REPORT-2022

FIGURE NO.
5-3
PROJECT NO.
4223066

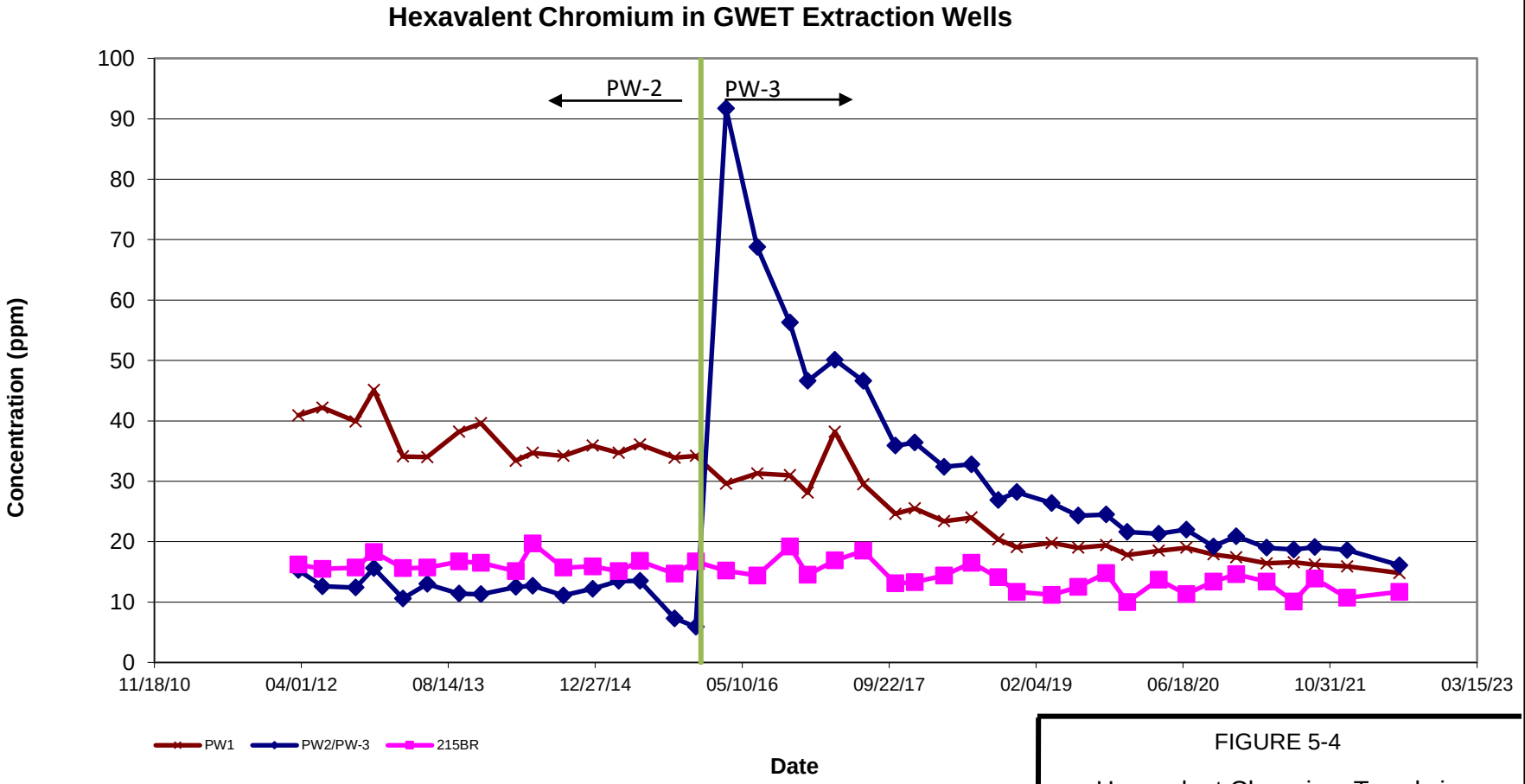
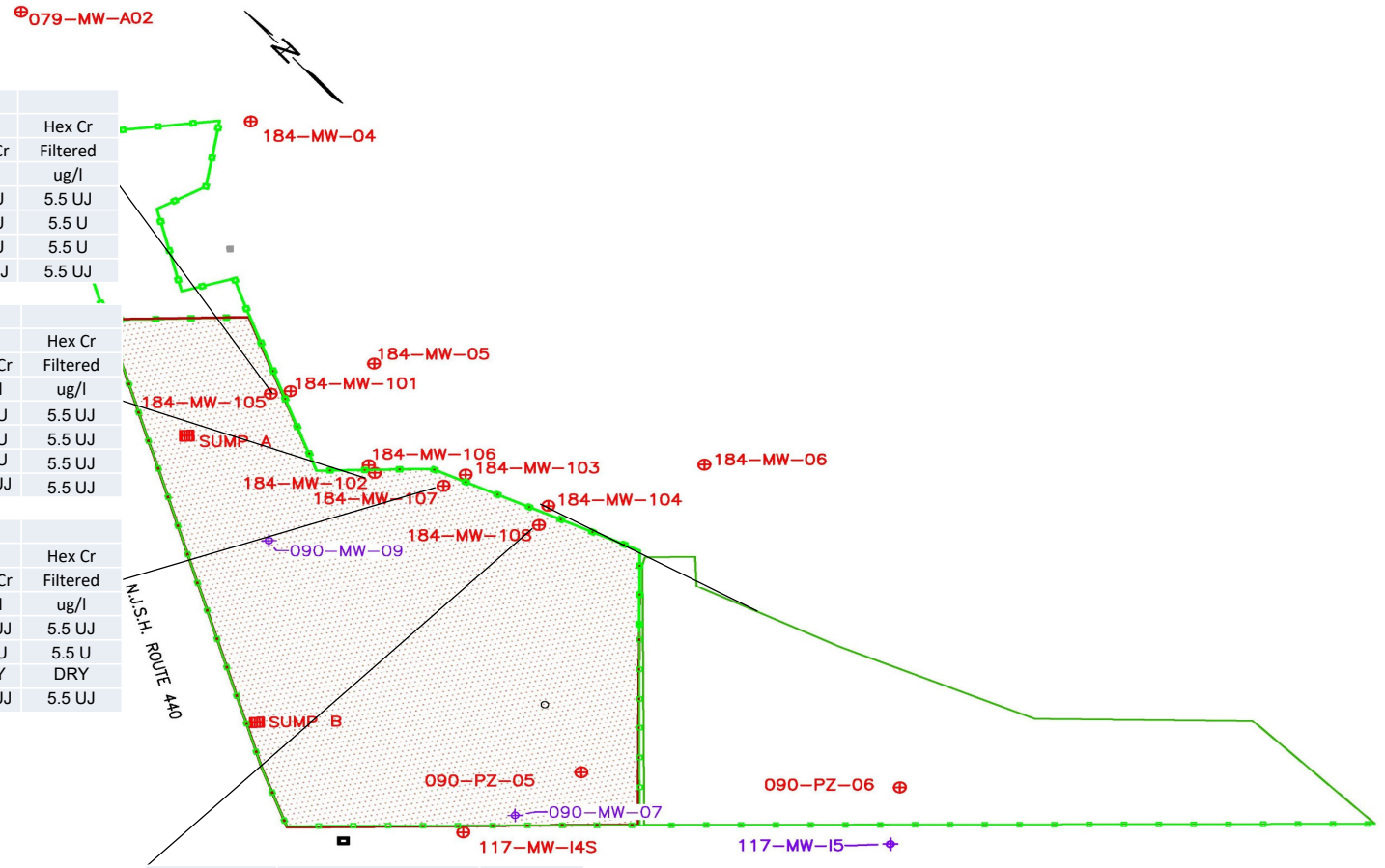


FIGURE 5-4

Hexavalent Chromium Trends in GWET Extraction Wells

Integrated Annual Groundwater Performance Report 2022

cornerstone environmental



	184-MW-105			
		Total Cr		Hex Cr
Sample	Total Cr	Filtered	Hex Cr	Filtered
Date	ug/l	ug/l	ug/l	ug/l
3/16/2022	4 U	4 U	5.5 U	5.5 UJ
6/2/2022	4 U	4 U	5.5 U	5.5 U
9/14/2022	4 U	4 U	5.5 U	5.5 U
12/6/2022	4 U	4 U	5.5 UJ	5.5 UJ

	184-MW-102			
		Total Cr		Hex Cr
Sample	Total Cr	Filtered	Hex Cr	Filtered
Date	ug/l	ug/l	ug/l	ug/l
3/16/2022	4.9	4.5	5.5 U	5.5 UJ
6/2/2022	5	4.8	5.5 U	5.5 UJ
9/14/2022	6.1	6.1	5.5 U	5.5 UJ
12/6/2022	5.6	4.5	5.5 UJ	5.5 UJ

	184-MW-107			
		Total Cr		Hex Cr
Sample	Total Cr	Filtered	Hex Cr	Filtered
Date	ug/l	ug/l	ug/l	ug/l
3/16/2022	**74.9**	4 U	5.5 UJ	5.5 UJ
6/2/2022	4 U	4 U	5.5 U	5.5 U
9/14/2022	DRY	DRY	DRY	DRY
12/6/2022	13.6	4 U	5.5 UJ	5.5 UJ

	184-MW-108			
		Total Cr		Hex Cr
Sample	Total Cr	Filtered	Hex Cr	Filtered
Date	ug/l	ug/l	ug/l	ug/l
3/16/2022	4 U	4 U	5.5 U	5.5 UJ
3/16/2022 DUP	4 U	4 U	5.5 U	5.5 UJ
6/2/2022	4 U	4 U	5.5 U	5.5 U
6/2/2022 DUP	4 U	4 U	5.5 U	5.5 U
9/14/2022	4 U	4 U	5.5 U	5.5 U
9/14/2022 DUP	4 U	9.1	5.5 U	5.5 U
12/6/2022	15.3	4 U	5.5 UJ	5.5 UJ
12/6/2022 DUP	3	4 U	5.5 UJ	5.5 UJ

LEGEND

- MONITORING WELL
- PIEZOMETER
- SUMP
- SHEET PILE WALL
- CAP AREA

FIGURE 5-5

Groundwater Quality Monitoring Well Results 2022 - NJCU

Integrated Annual Groundwater Performance Report 2022

cornerstone environmental

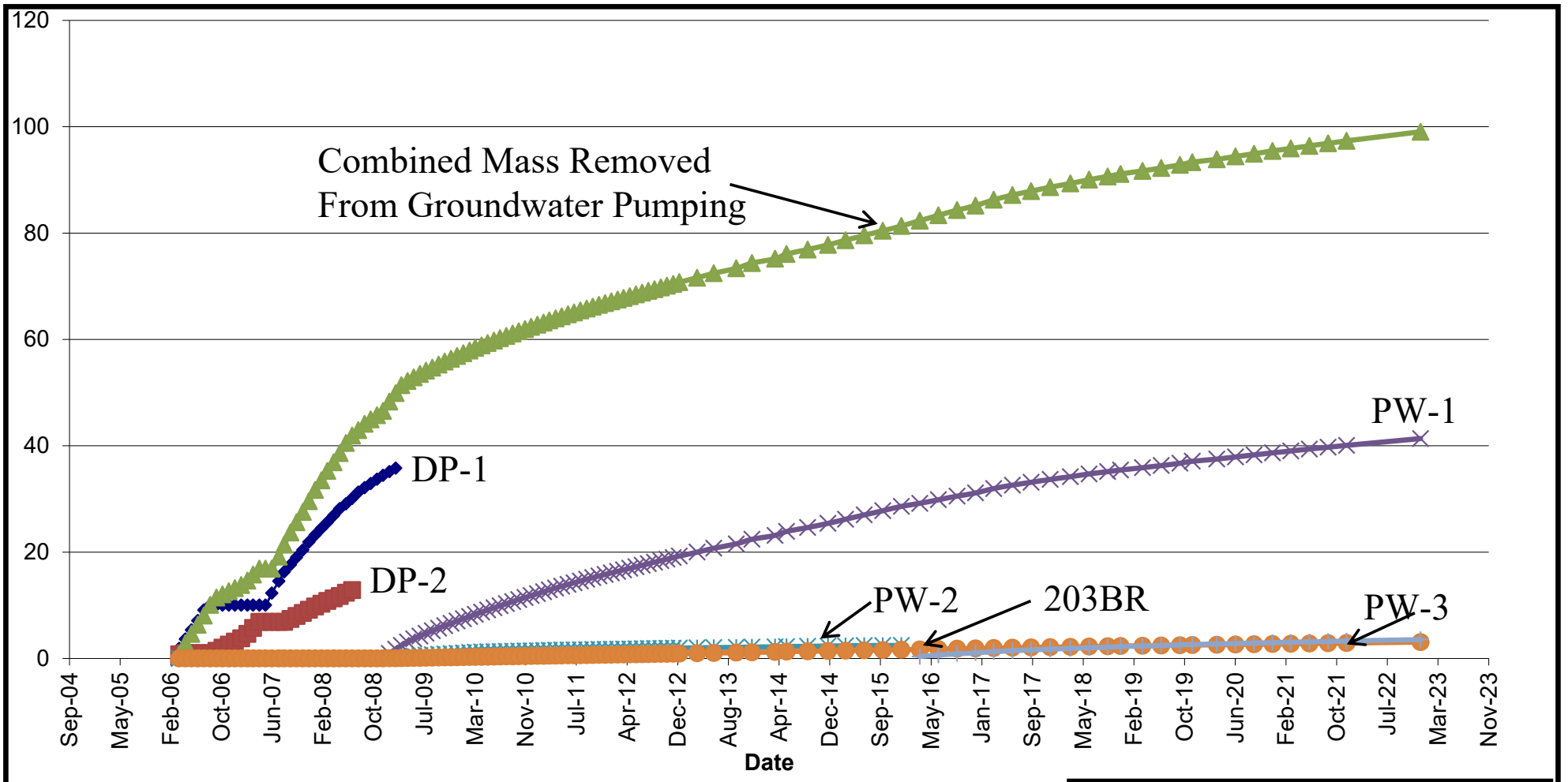


FIGURE 5-6

Cumulative Mass of Chromium Removed From

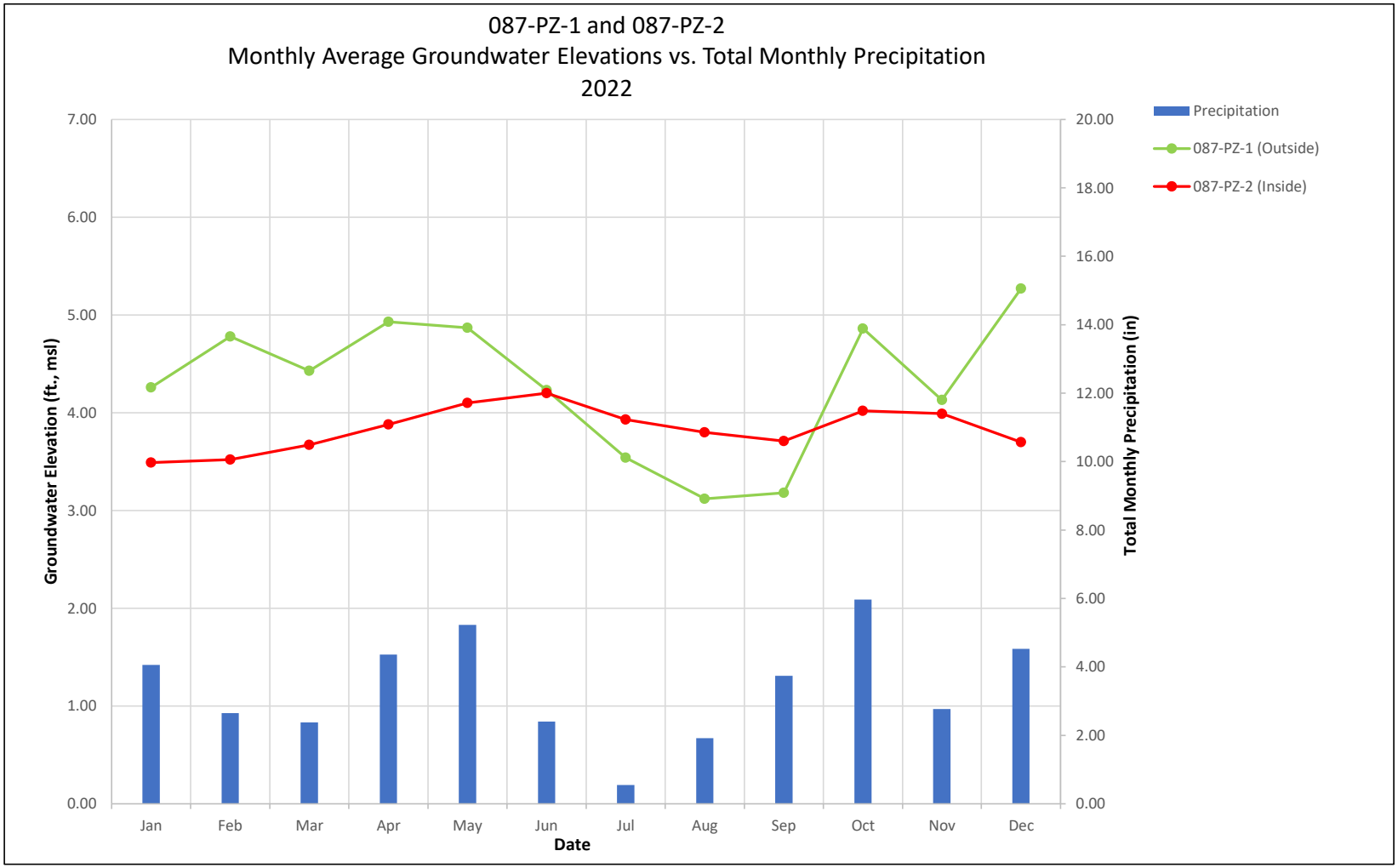
Groundwater by Pumping

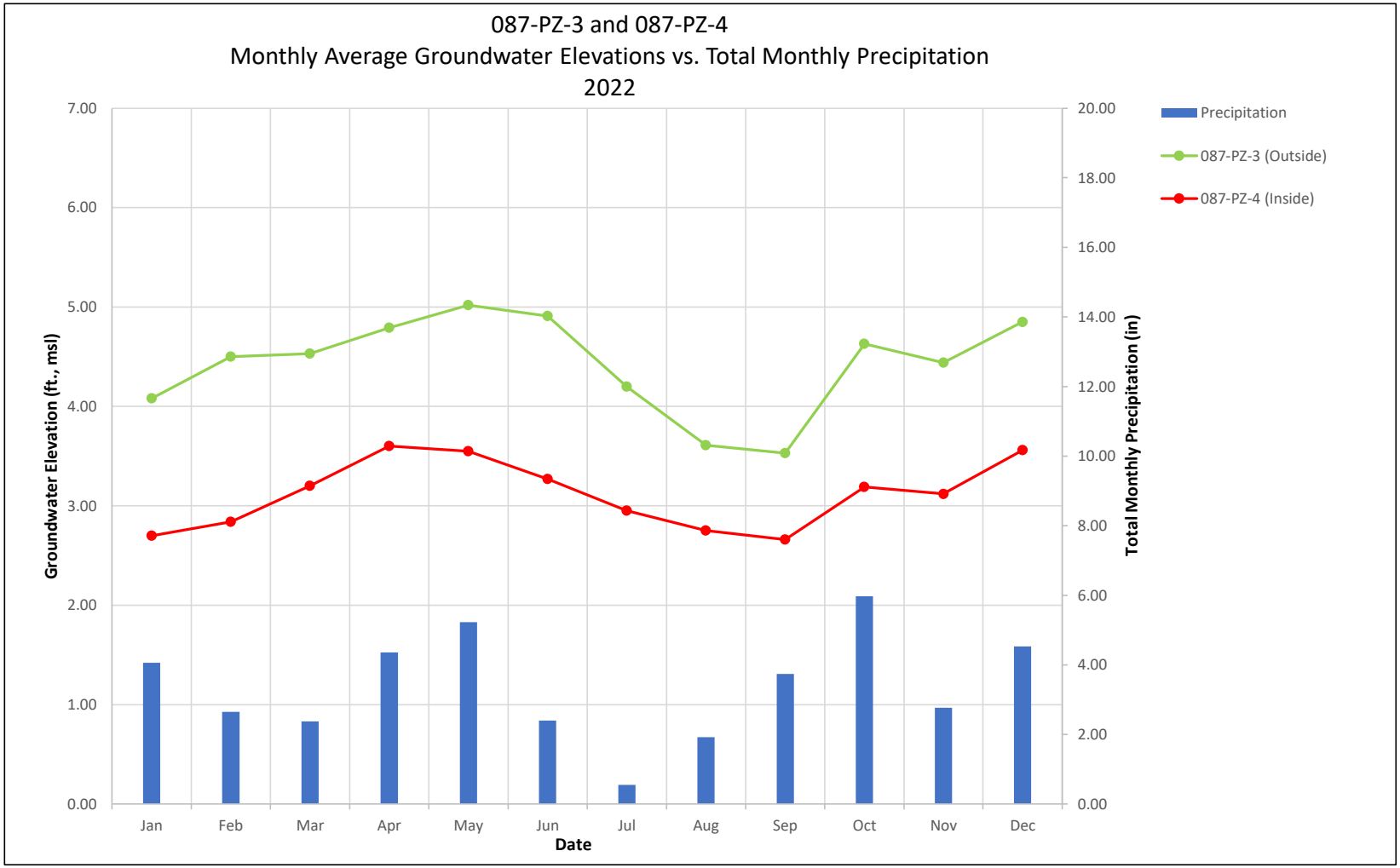
Integrated Annual Groundwater Performance Report 2022

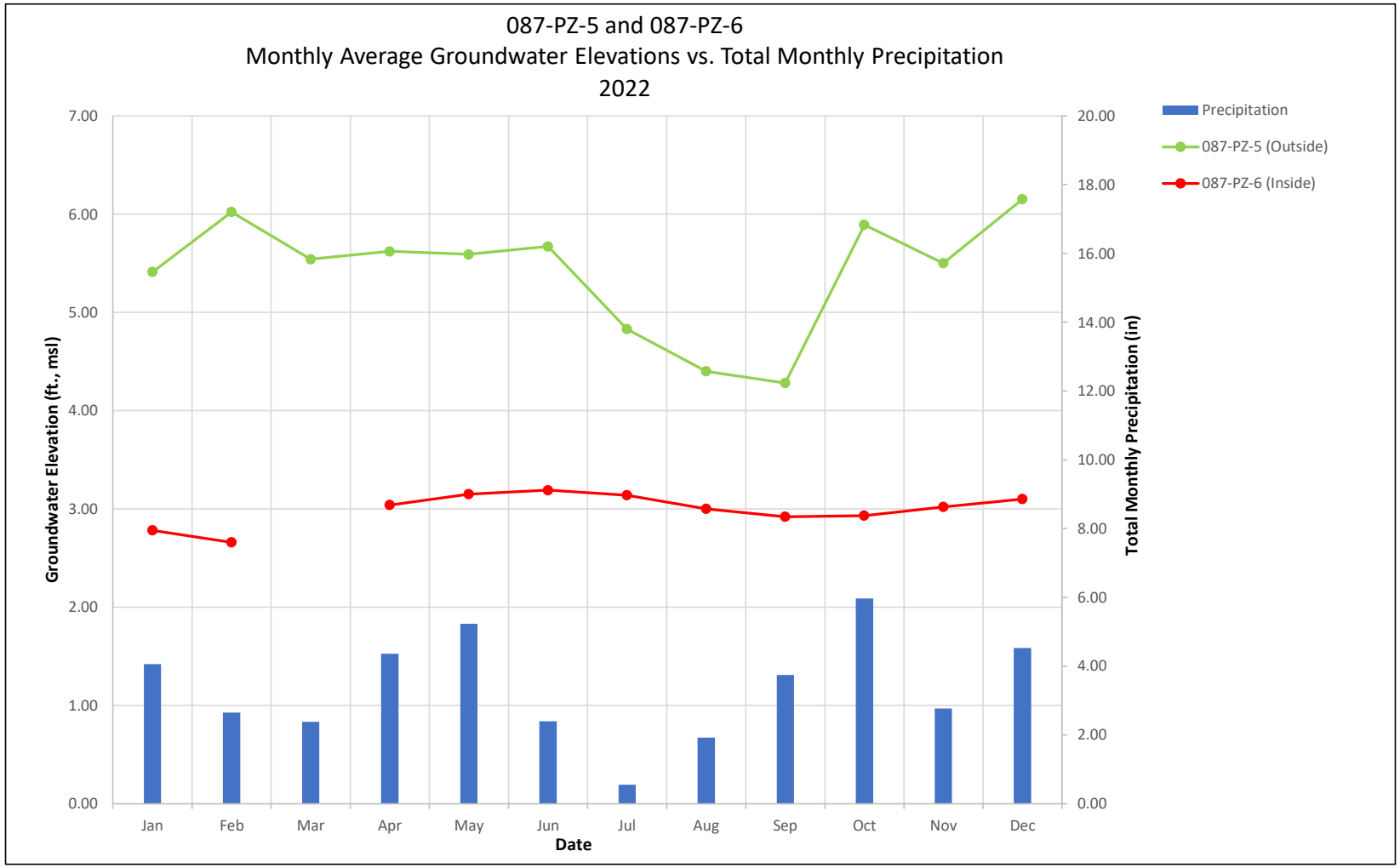
cornerstone environmental

APPENDIX A

HYDROGRAPHS OF AVERAGE MONTHLY HEADS FROM SA-6 AND SA-7

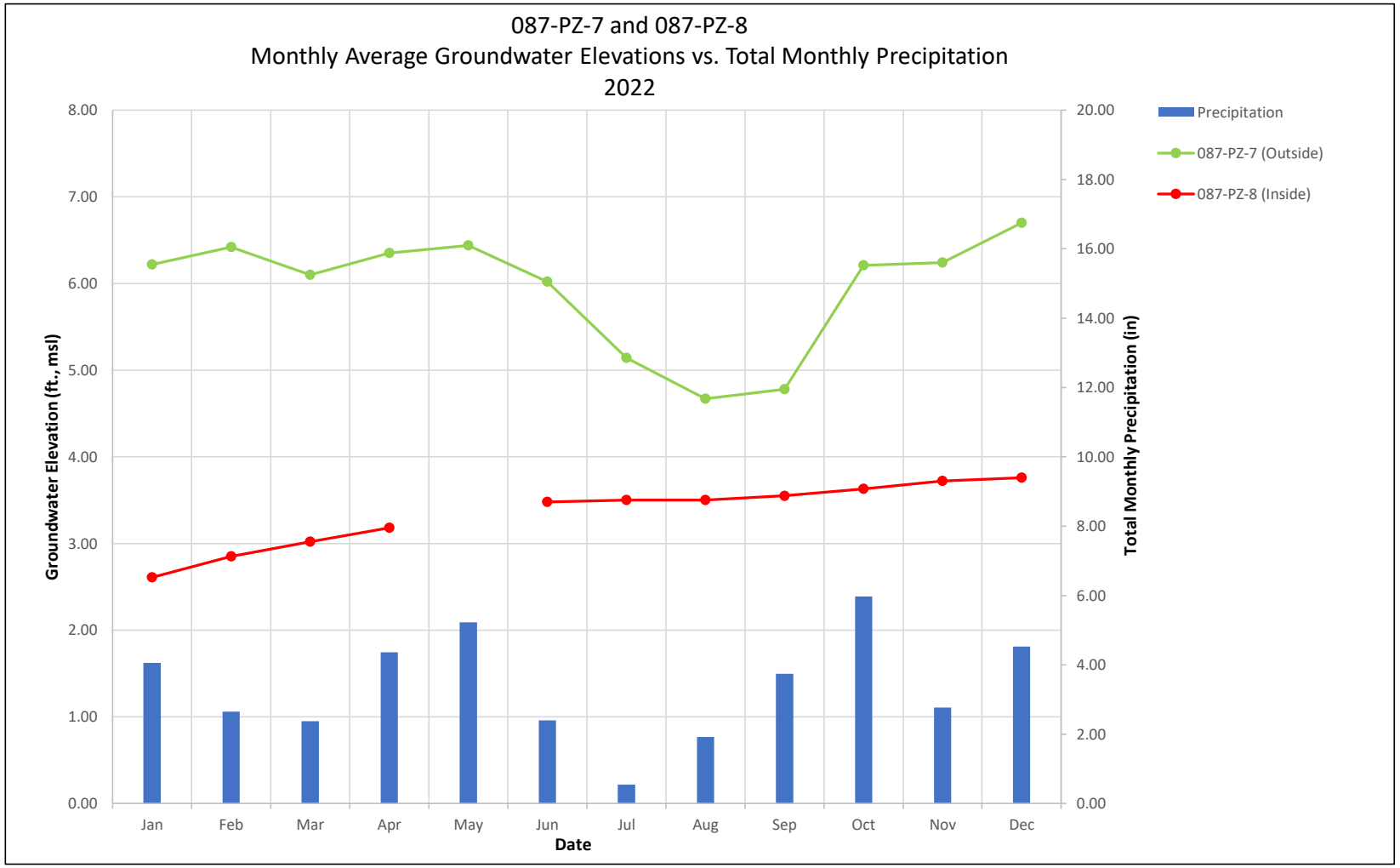

087-PZ-1 and 087-PZ-2
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
087-PZ-1 (Outside)
087-PZ-2 (Inside)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


087-PZ-3 and 087-PZ-4
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
087-PZ-3 (Outside)
087-PZ-4 (Inside)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec



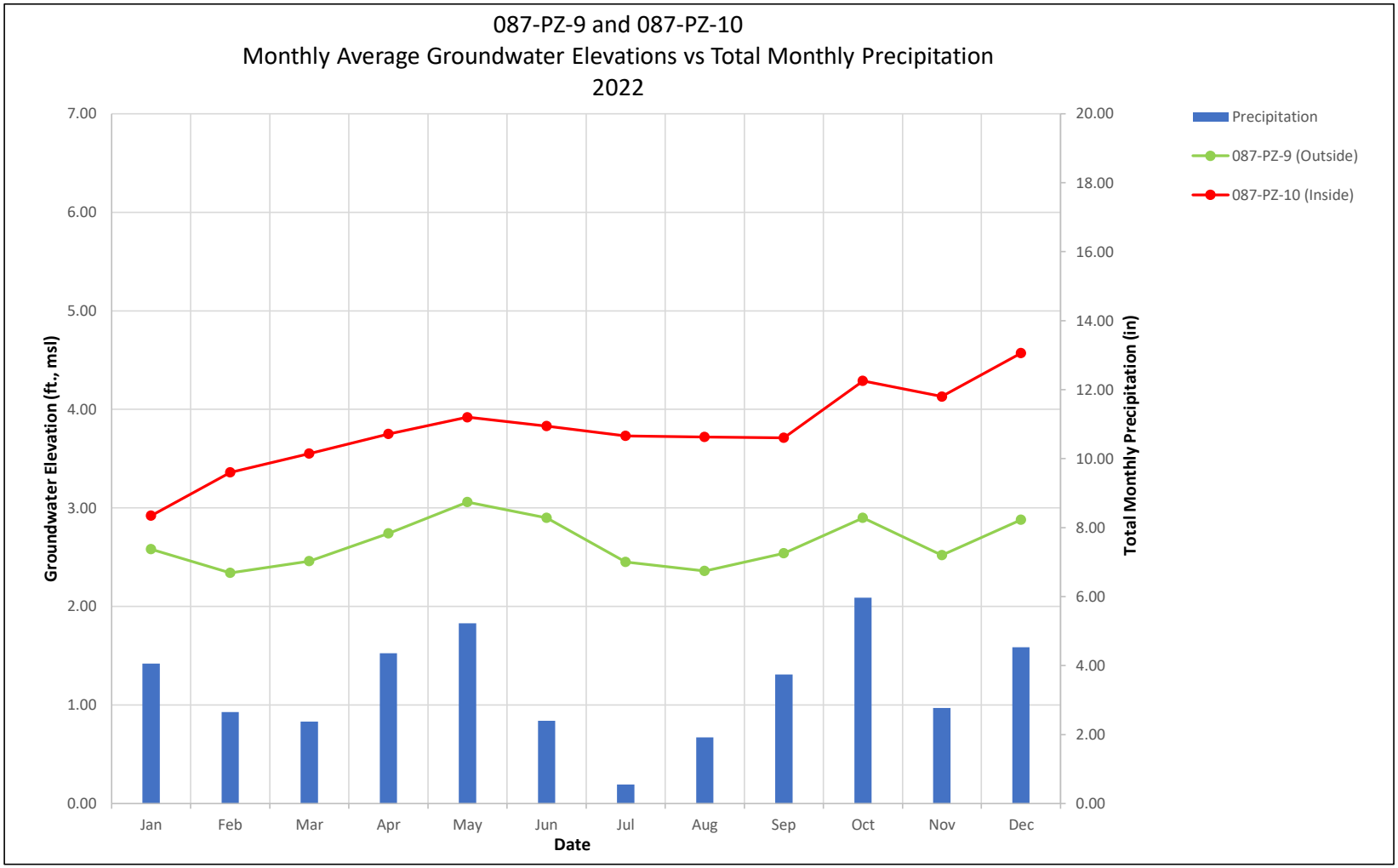
Notes:

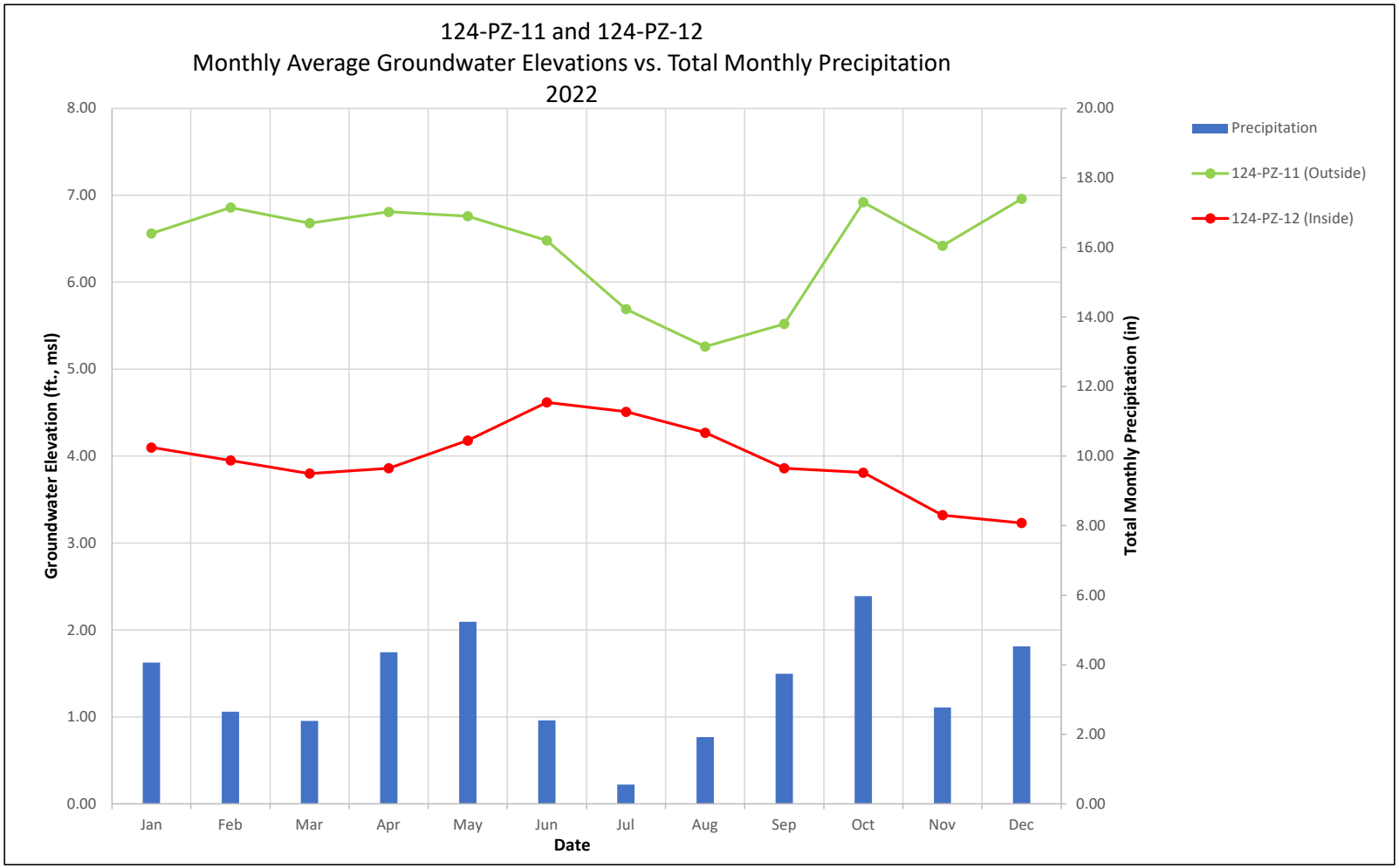
No data provided in March for 087-PZ-06 due to data logger malfunction.

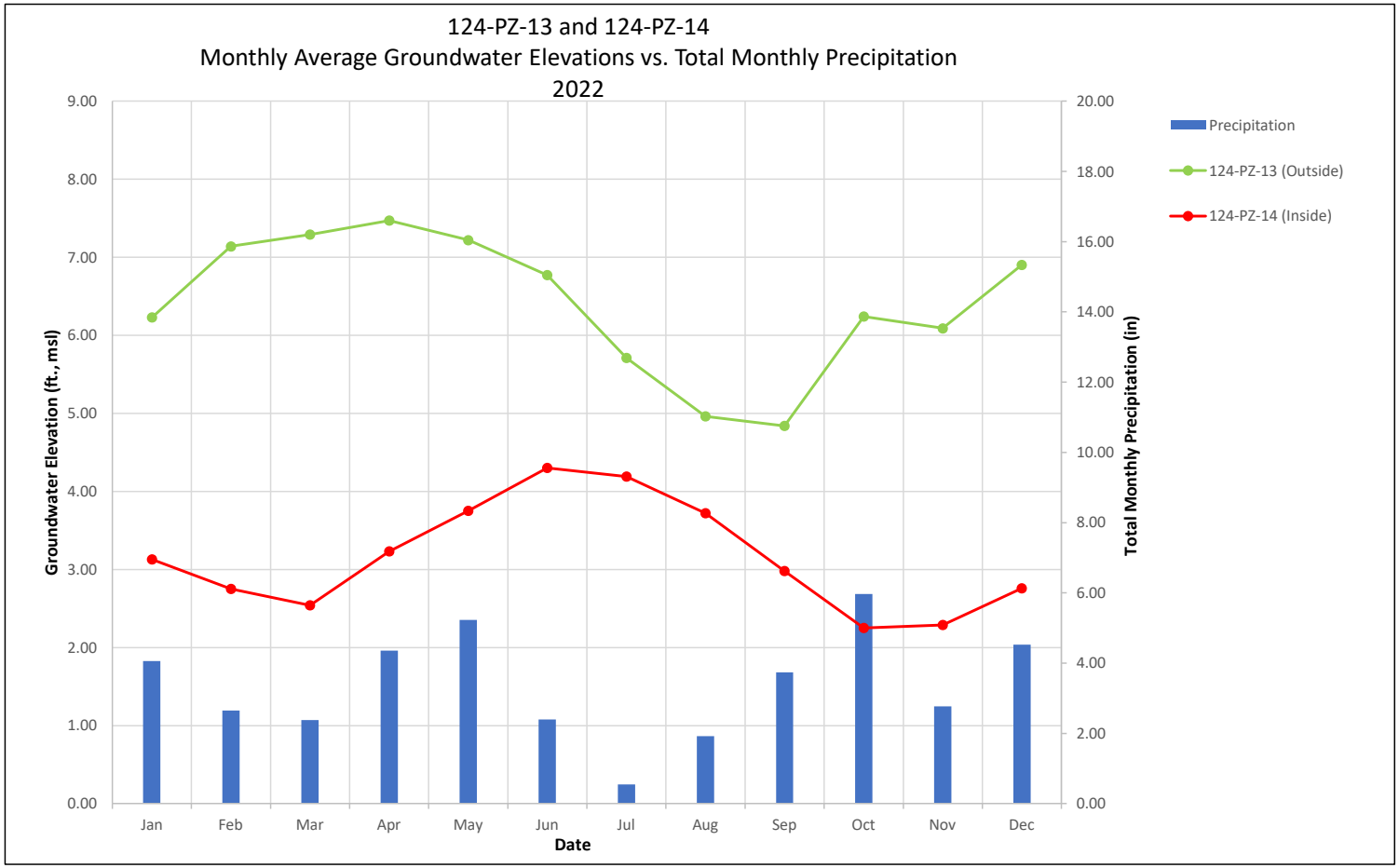


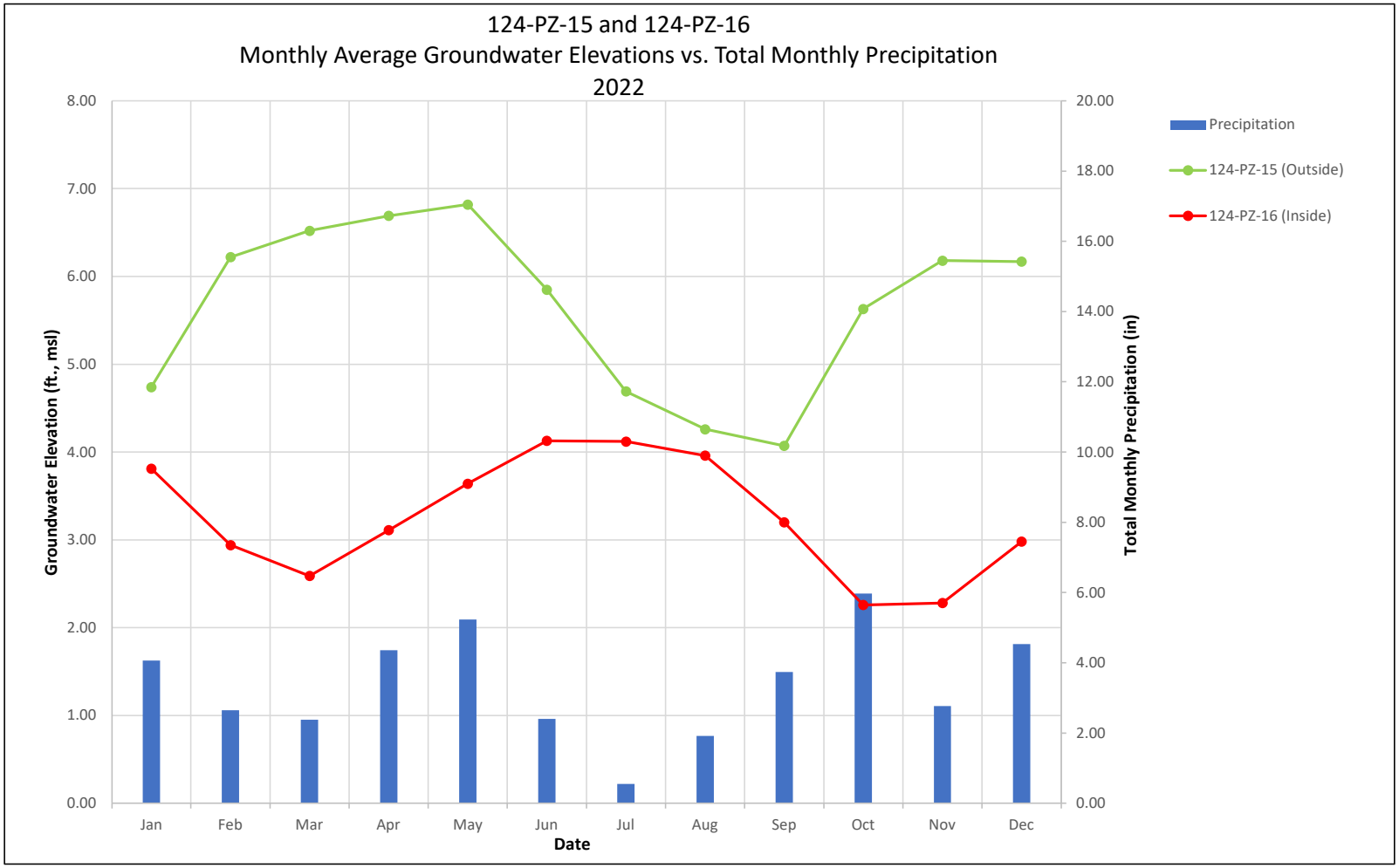
Notes:

No data provided in May for 087-PZ-08 due to data logger malfunction.


087-PZ-9 and 087-PZ-10
Monthly Average Groundwater Elevations vs Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
087-PZ-9 (Outside)
087-PZ-10 (Inside)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

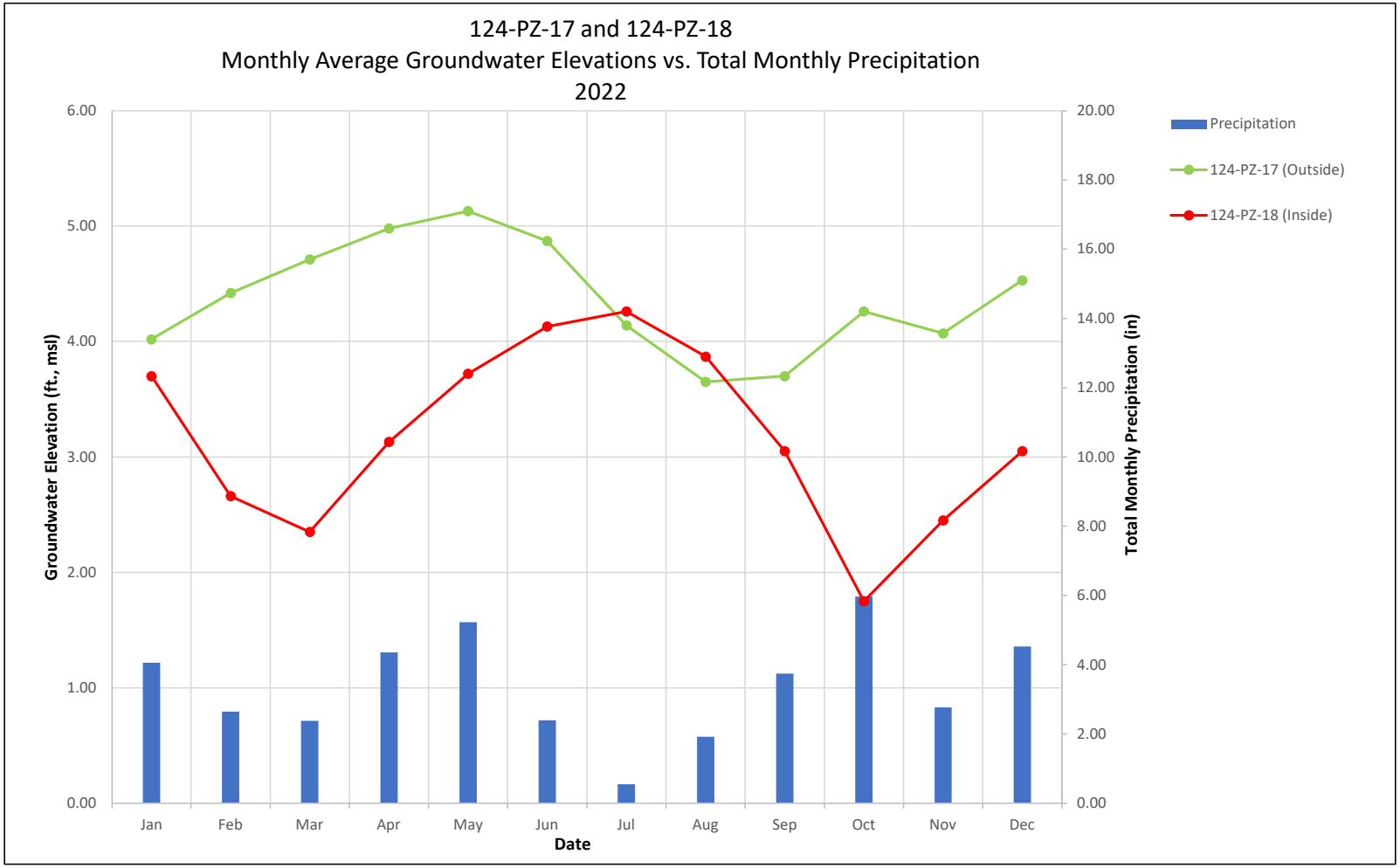

124-PZ-11 and 124-PZ-12
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Precipitation
124-PZ-11 (Outside)
124-PZ-12 (Inside)

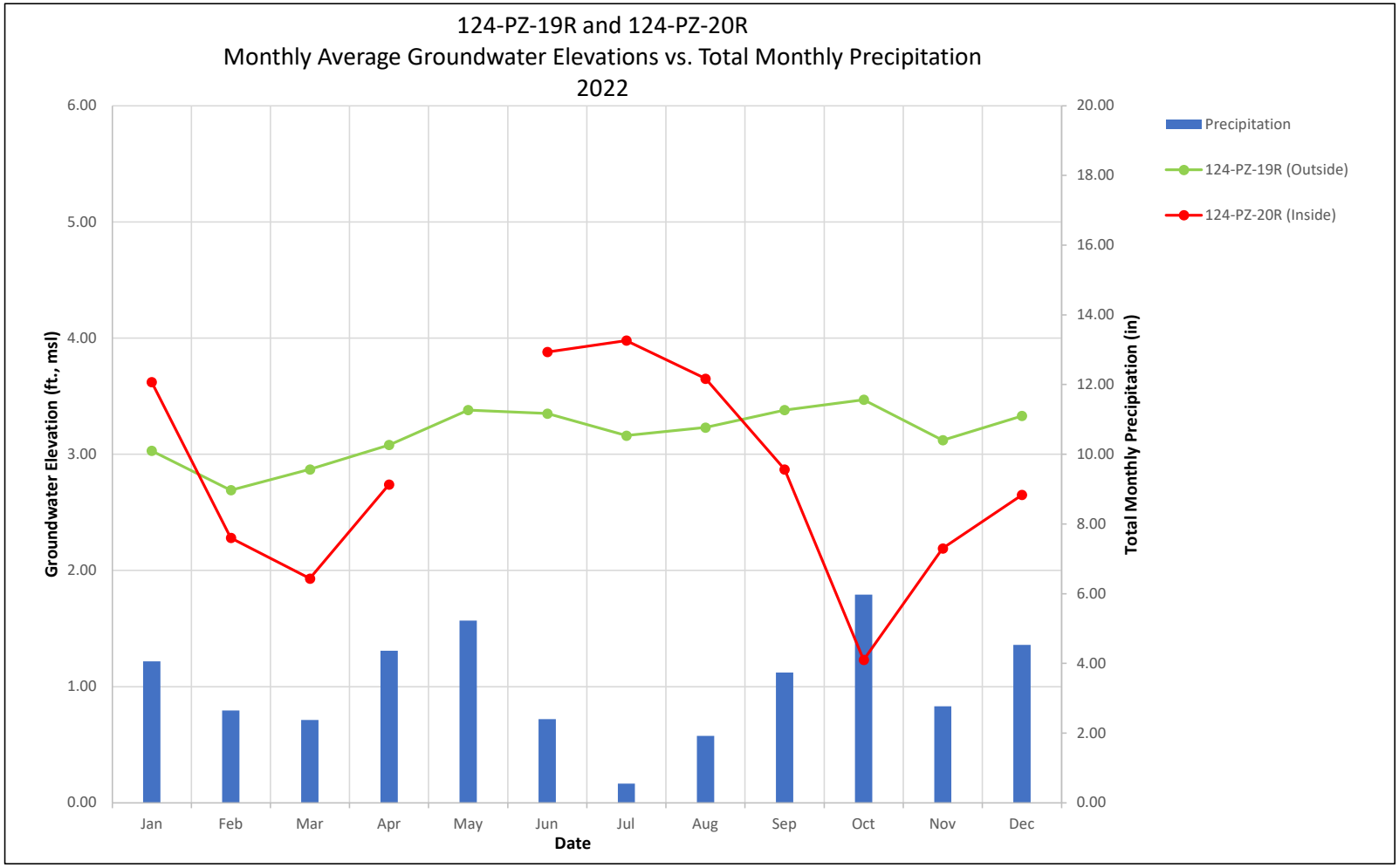

124-PZ-13 and 124-PZ-14
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
Precipitation
124-PZ-13 (Outside)
124-PZ-14 (Inside)



Notes:

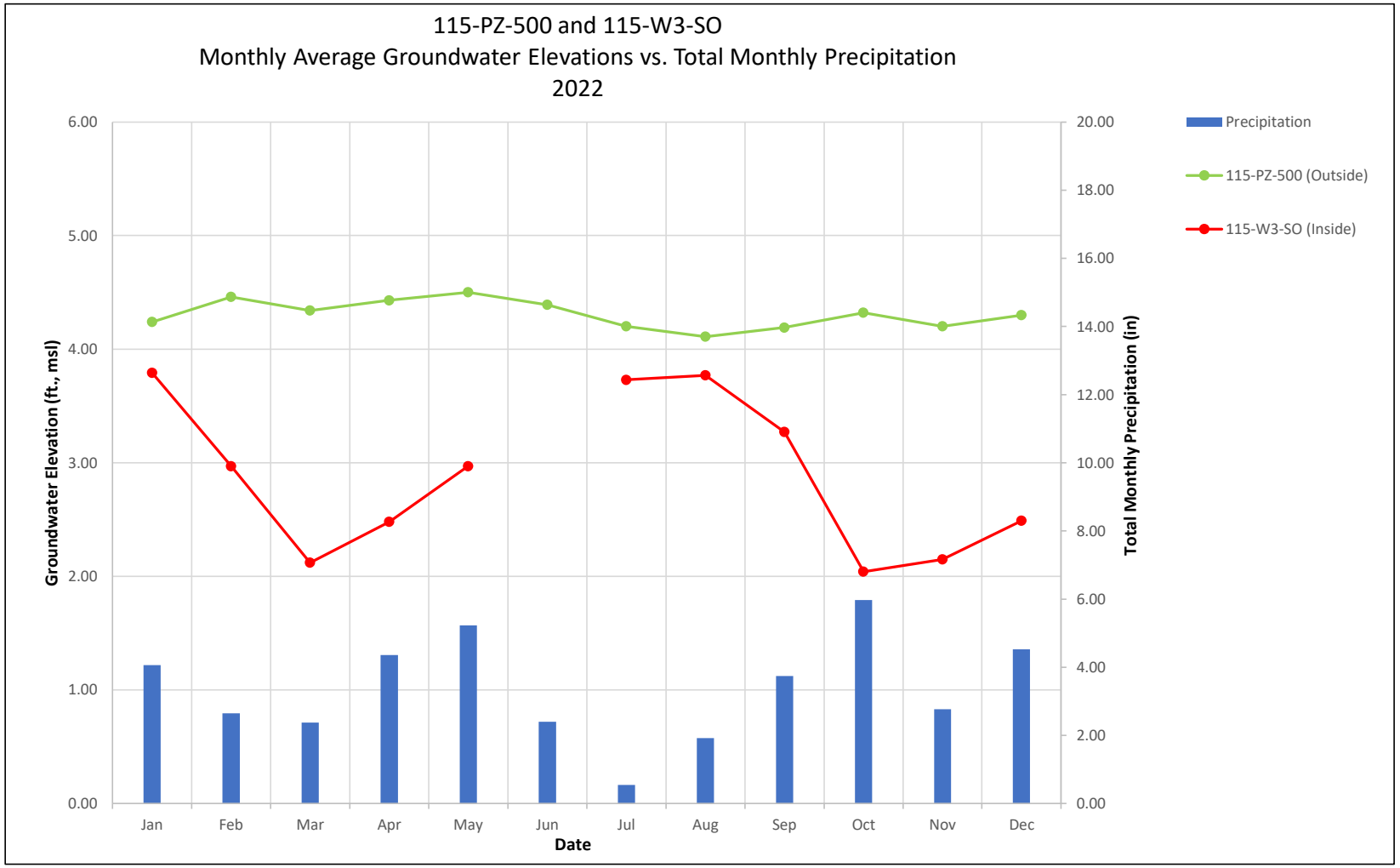
Due to development activties on SA-6 South, logger data for PZ-15 during October was not available.


124-PZ-17 and 124-PZ-18
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Precipitation
124-PZ-17 (Outside)
124-PZ-18 (Inside)



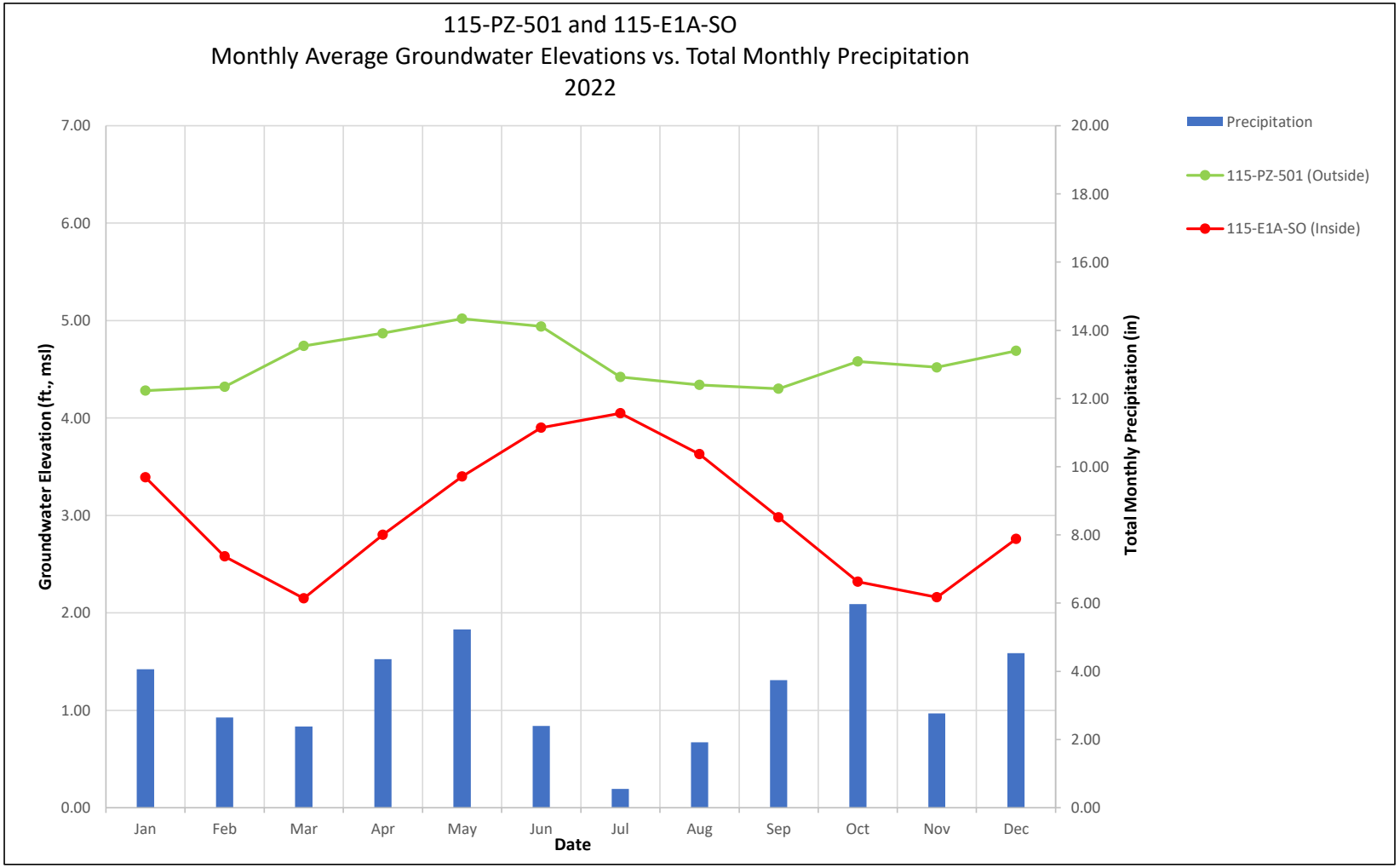
Notes:

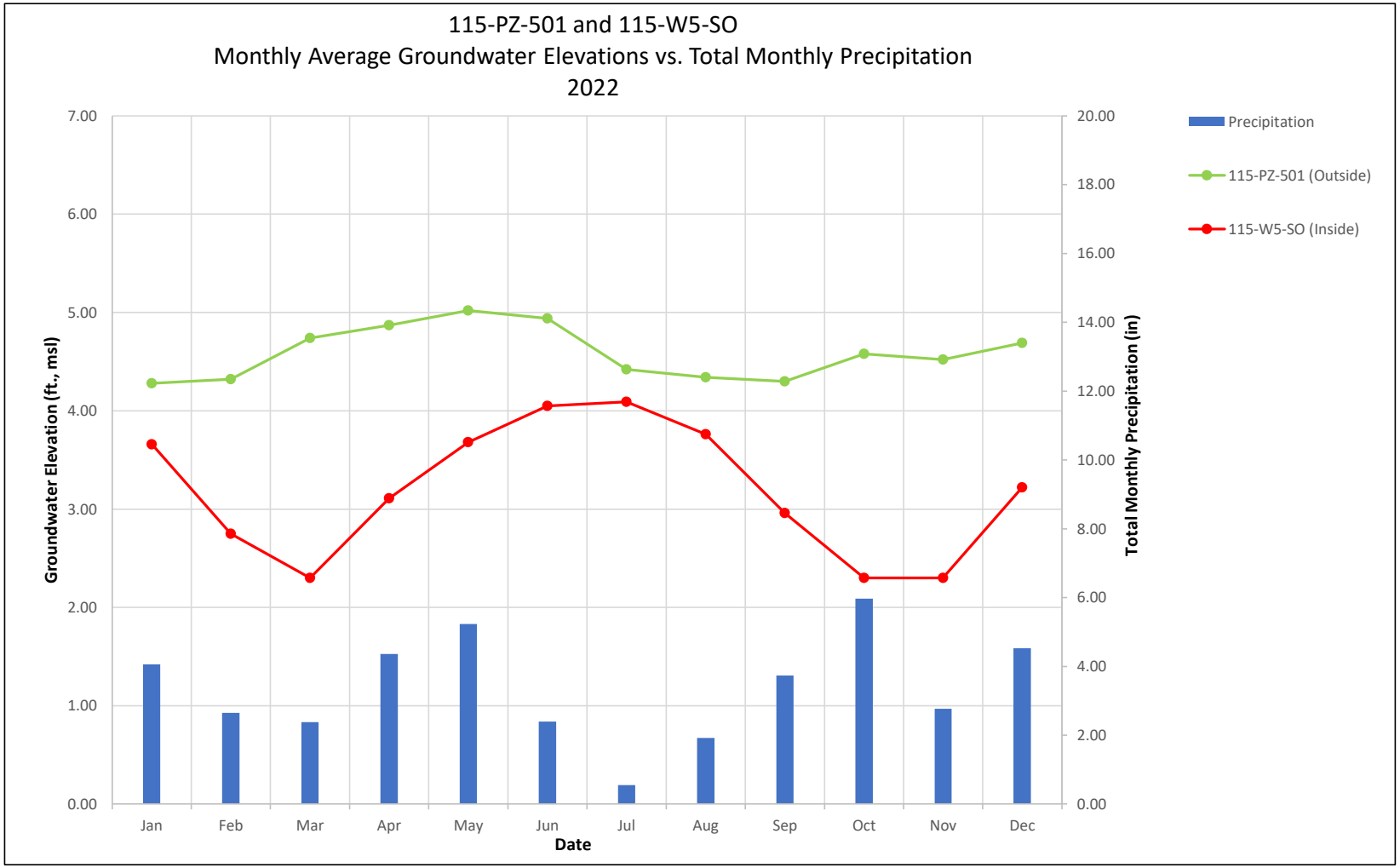
No data provide in May for 124-PZ-20R due to data logger malfunction.

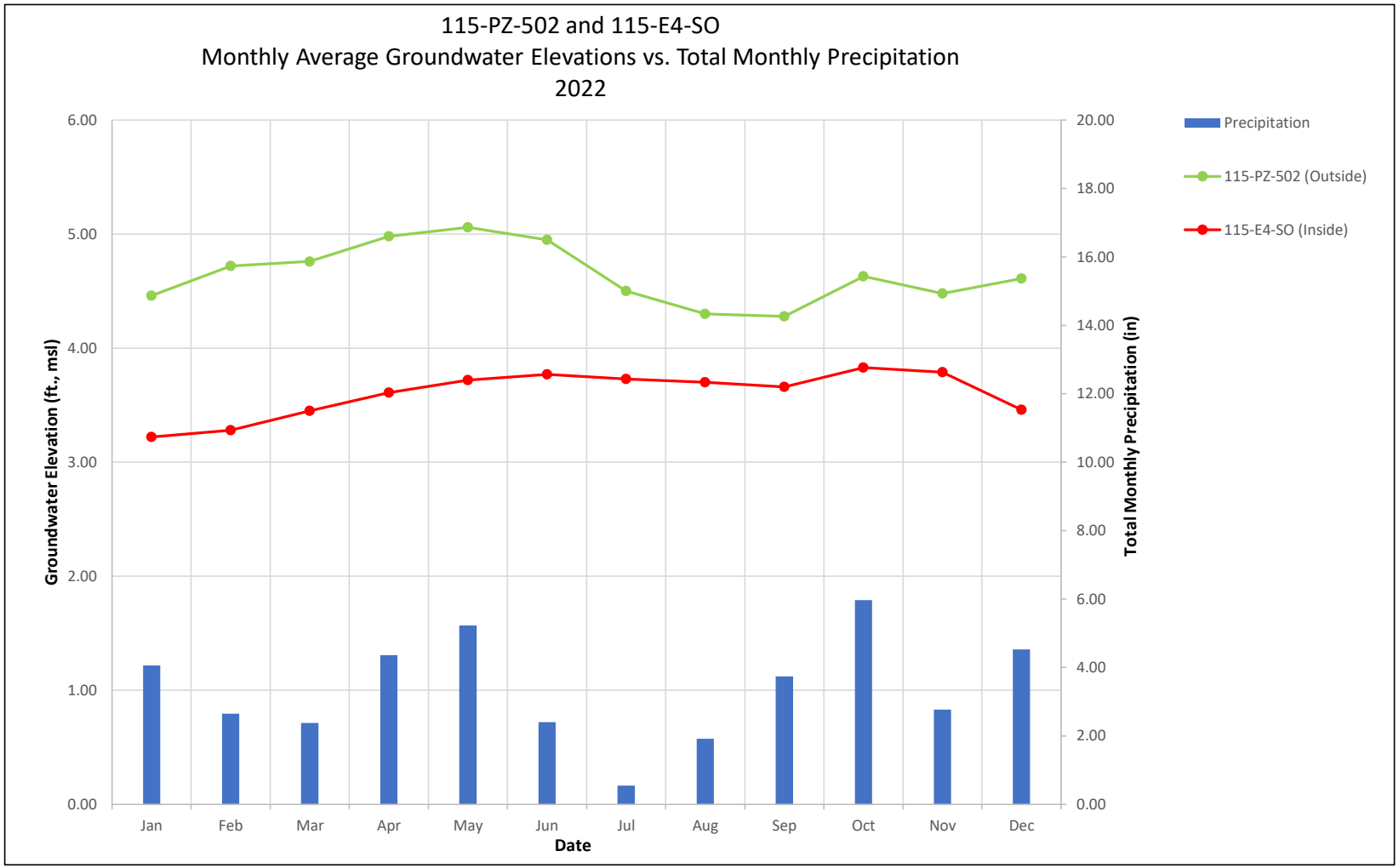


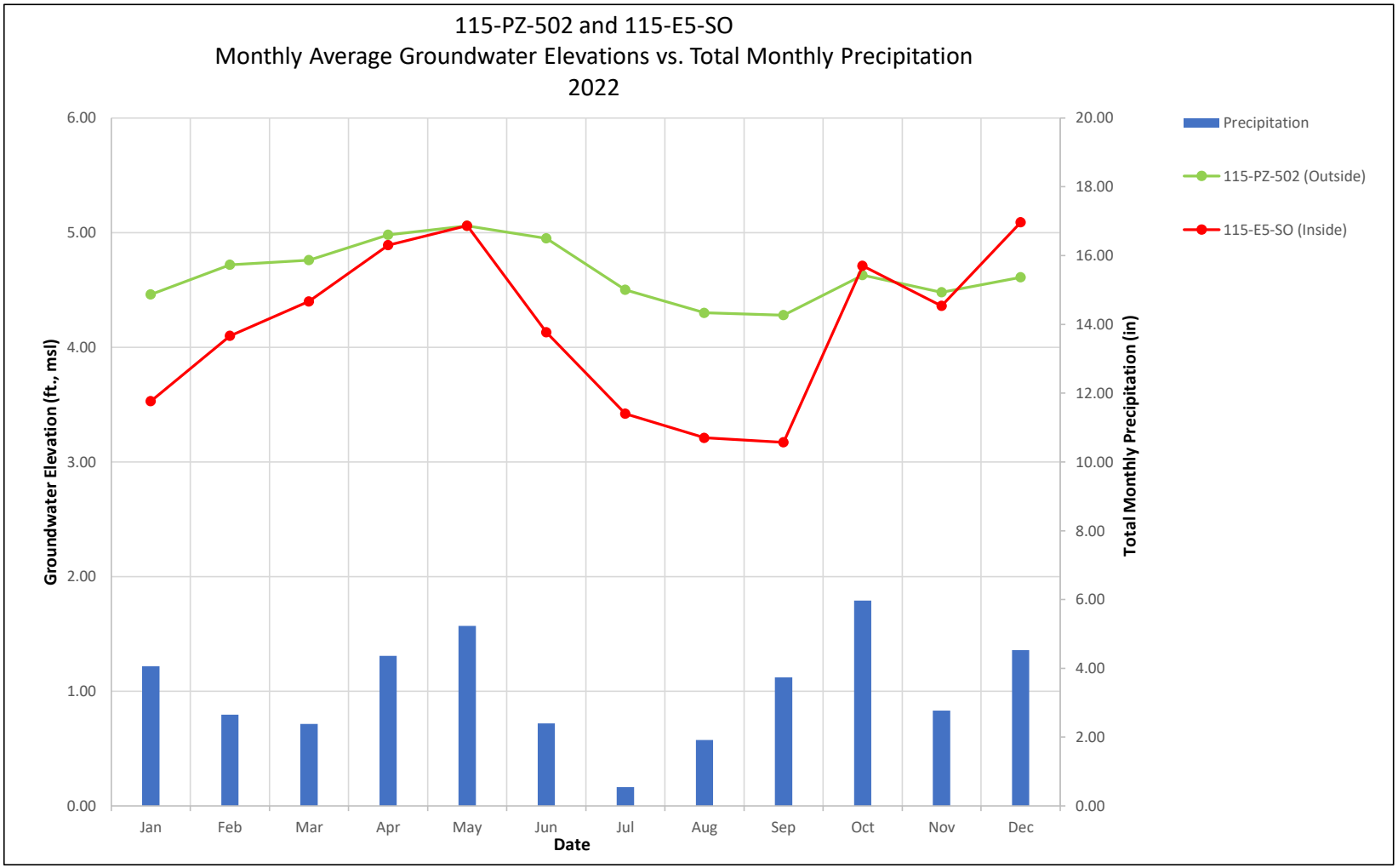
Notes:

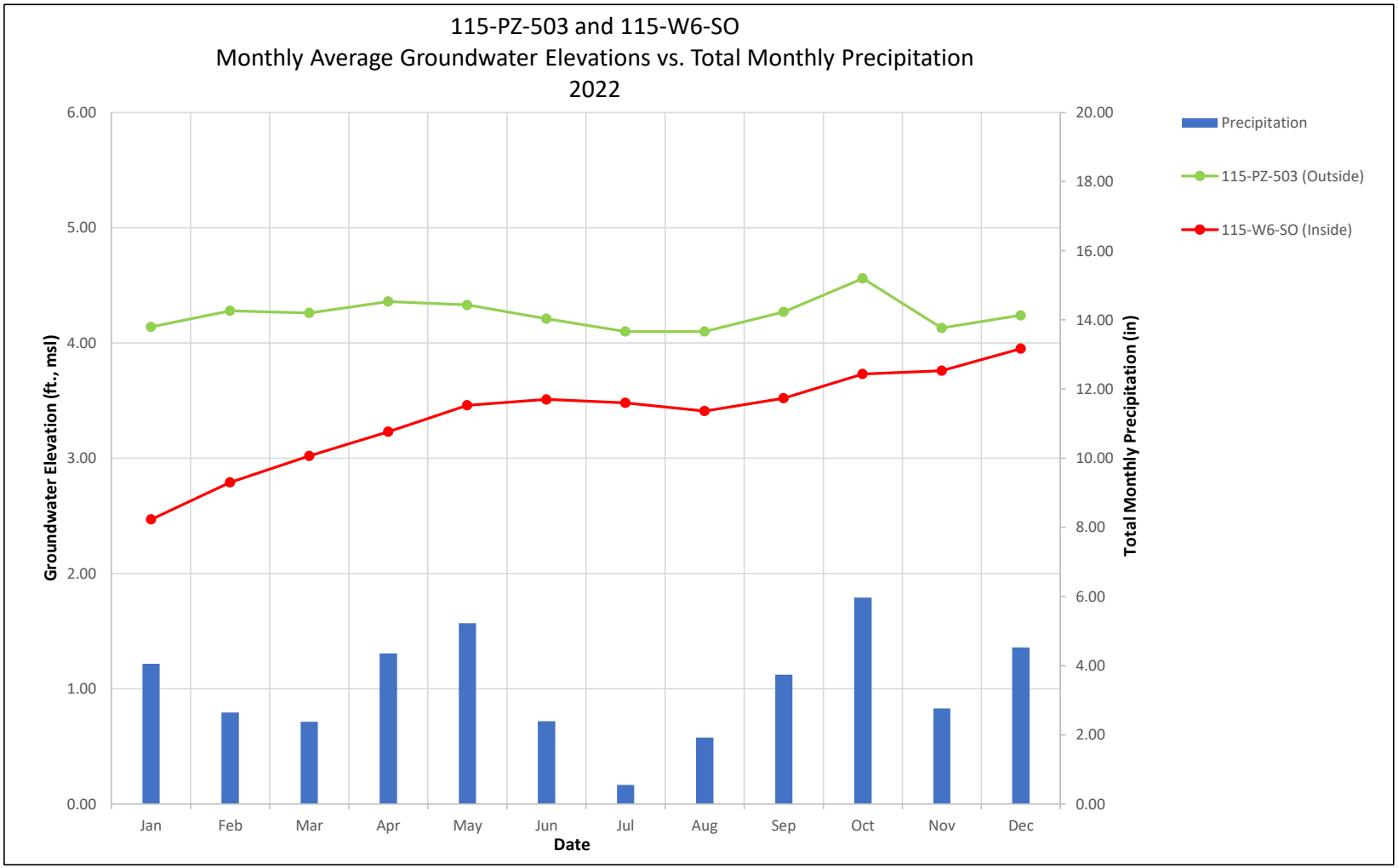
No data provided for 115-W3-SO in June due to data logger malfunction.

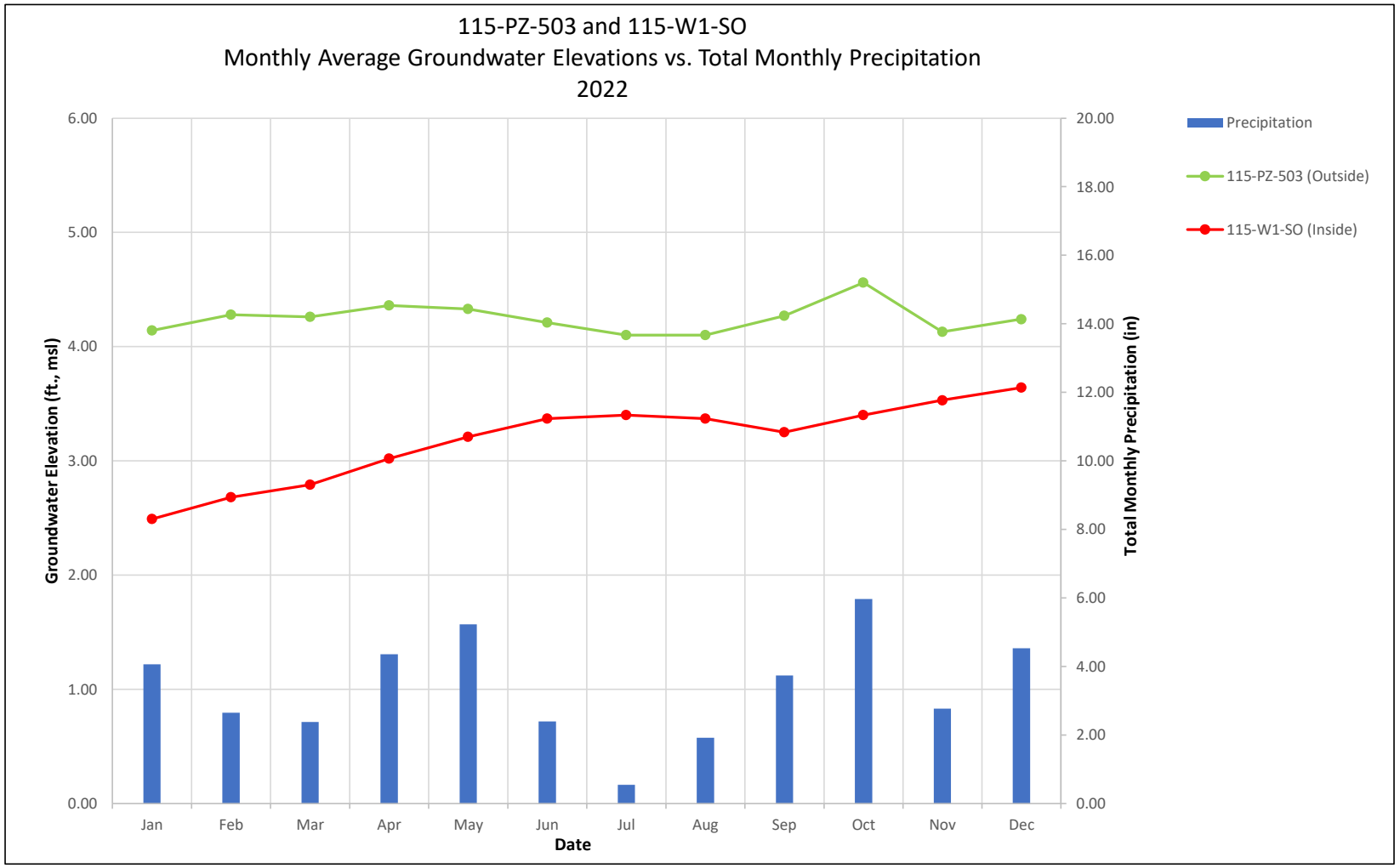

115-PZ-501 and 115-E1A-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
115-PZ-501 (Outside)
115-E1A-SO (Inside)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


115-PZ-501 and 115-W5-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
Precipitation
115-PZ-501 (Outside)
115-W5-SO (Inside)


115-PZ-502 and 115-E4-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
115-PZ-502 (Outside)
115-E4-SO (Inside)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

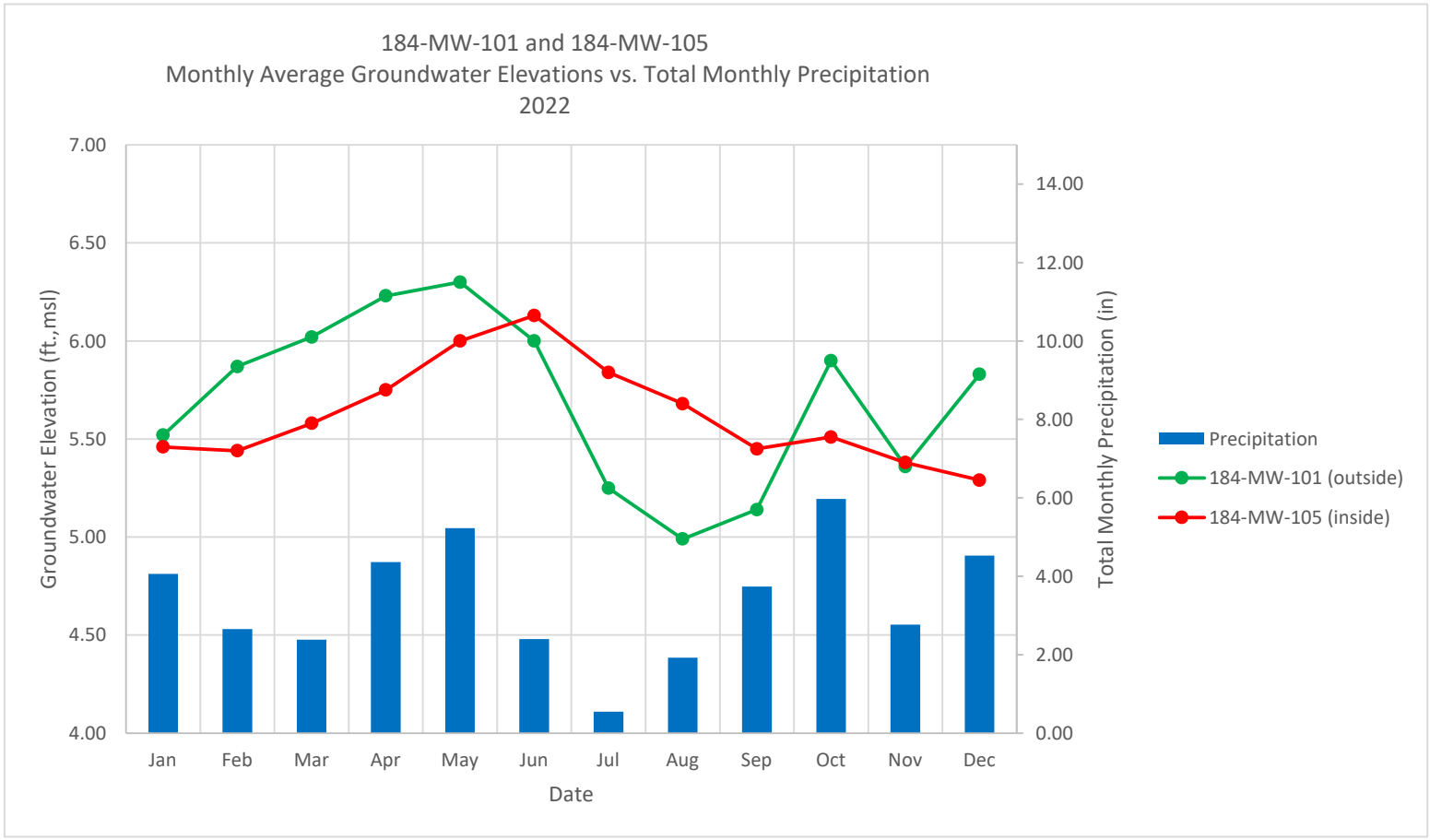

115-PZ-502 and 115-E5-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
115-PZ-502 (Outside)
115-E5-SO (Inside)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

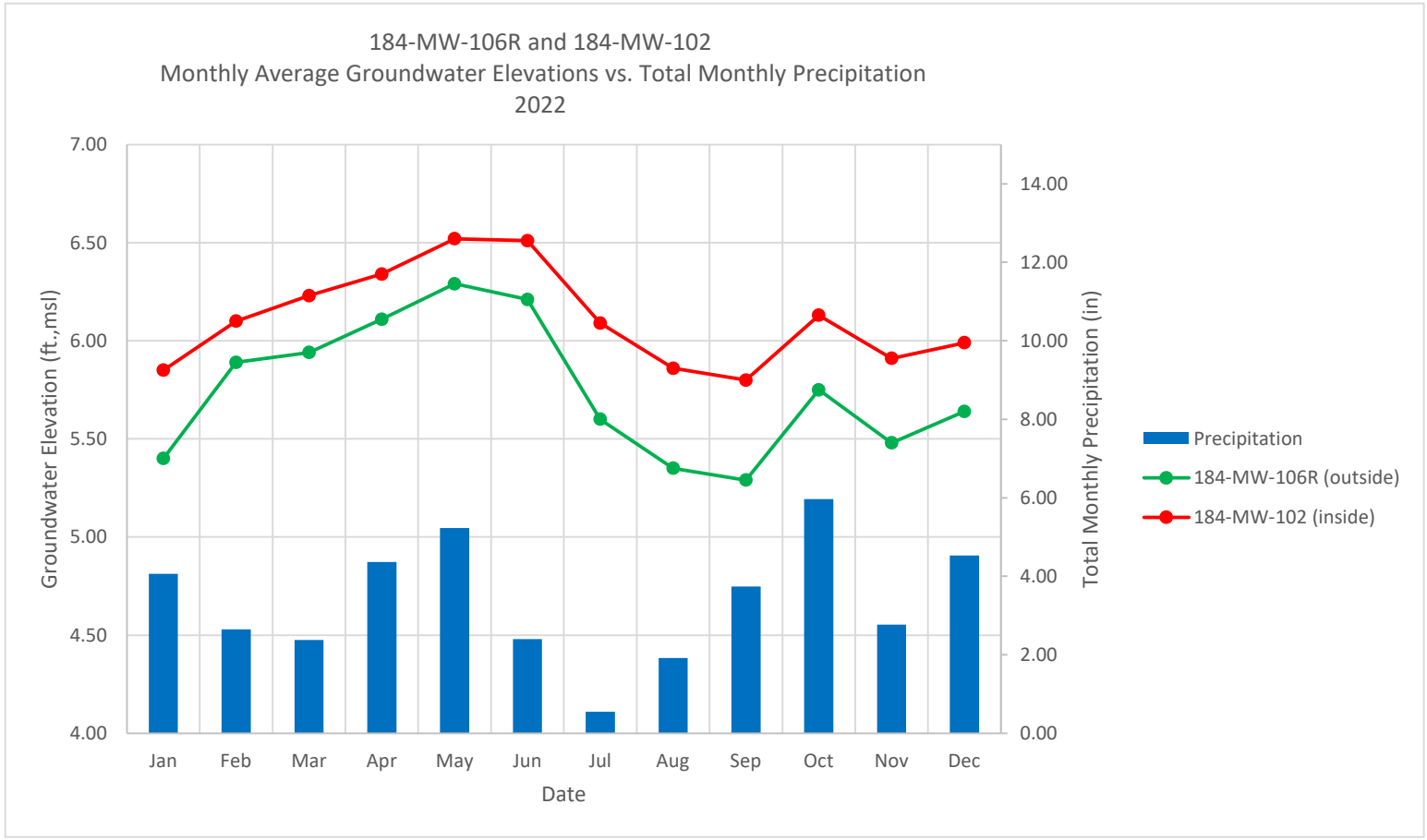

115-PZ-503 and 115-W6-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Precipitation
115-PZ-503 (Outside)
115-W6-SO (Inside)

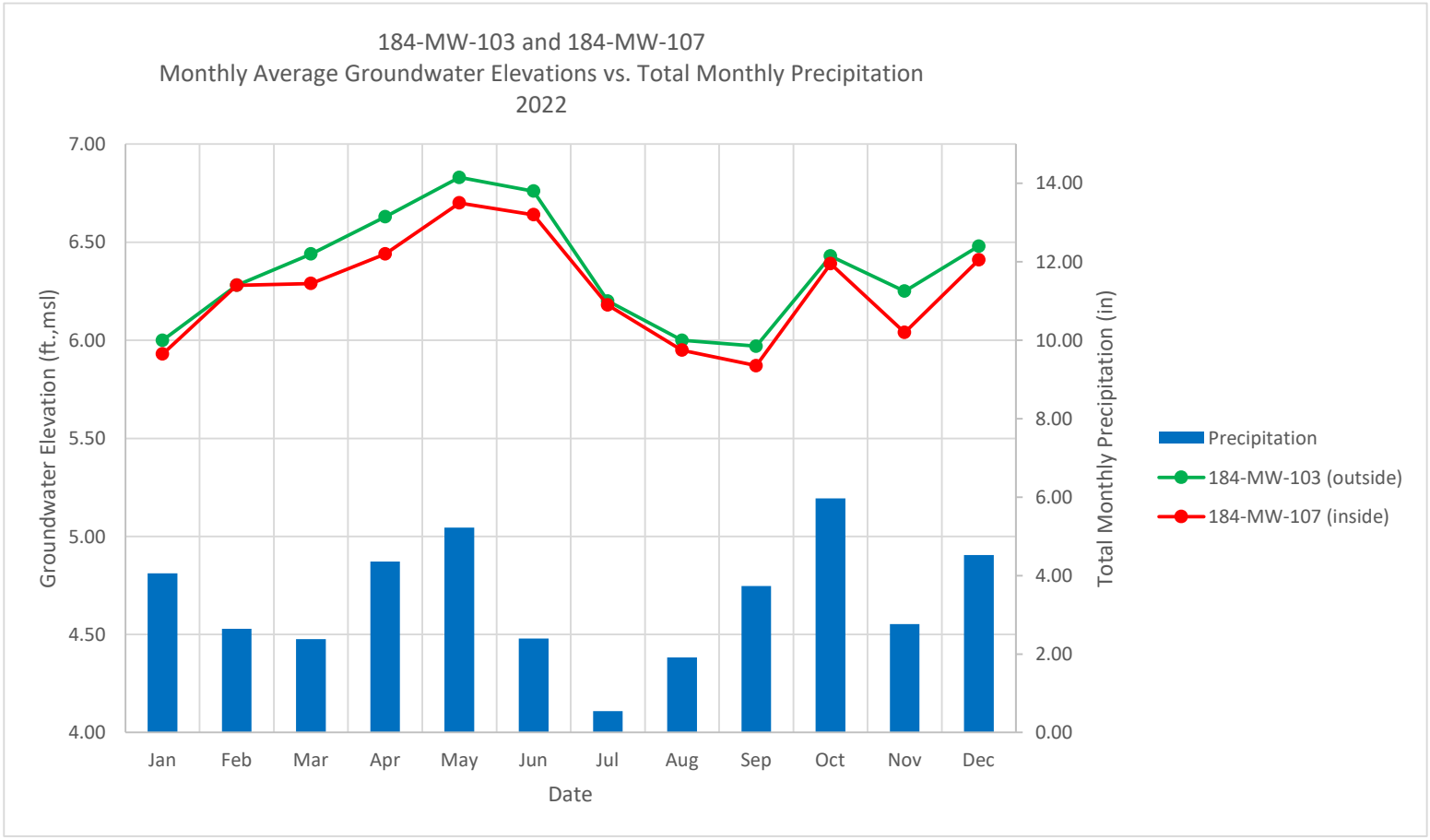

115-PZ-503 and 115-W1-SO
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft., msl)
Total Monthly Precipitation (in)
Date
Precipitation
115-PZ-503 (Outside)
115-W1-SO (Inside)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

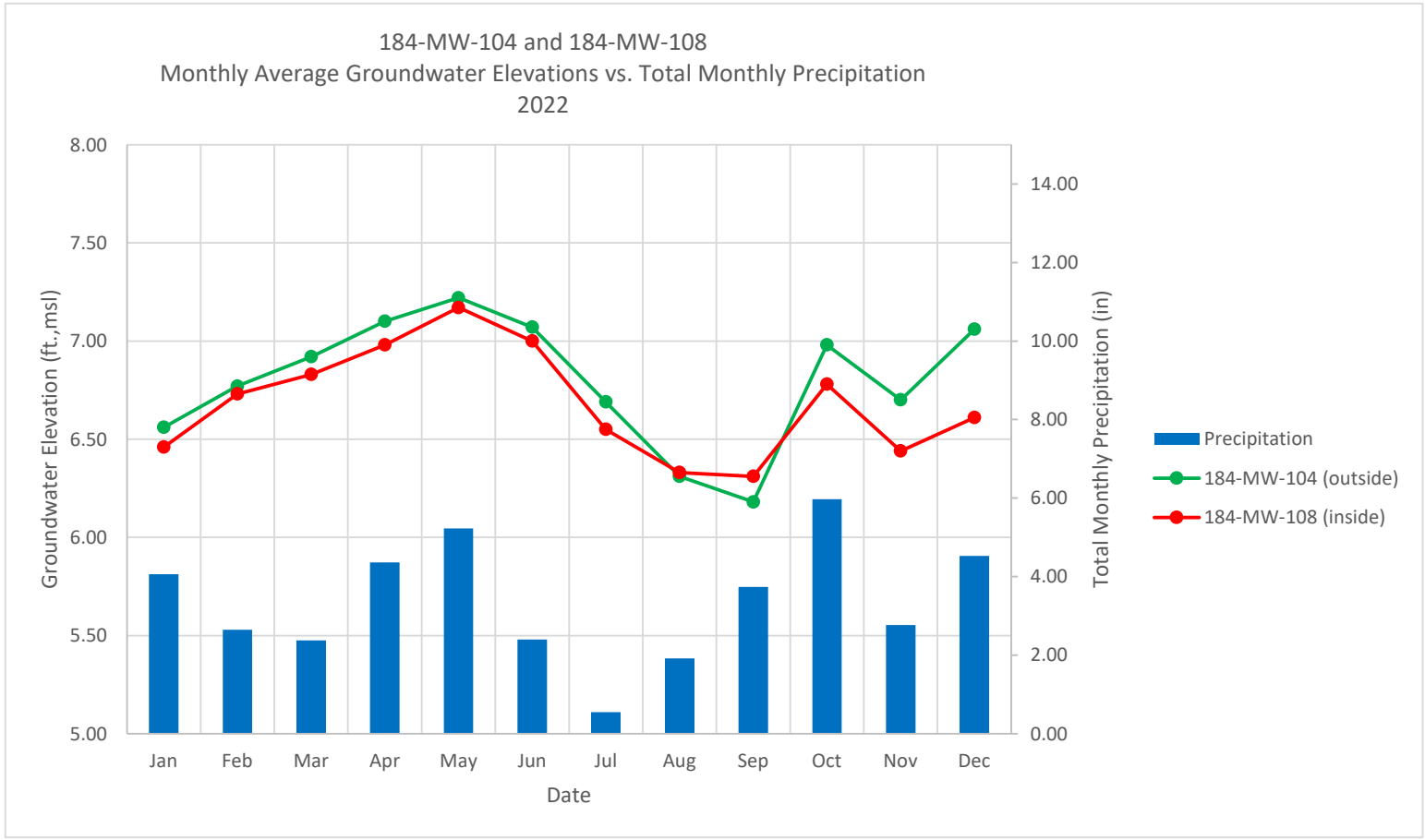
APPENDIX B

HYDROGRAPHS OF AVERAGE MONTHLY HEADS FROM SA-5 NJCU


184-MW-101 and 184-MW-105
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft.,msl)
Total Monthly Precipitation (in)
7.00
6.50
6.00
5.50
5.00
4.50
4.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date
Precipitation
184-MW-101 (outside)
184-MW-105 (inside)

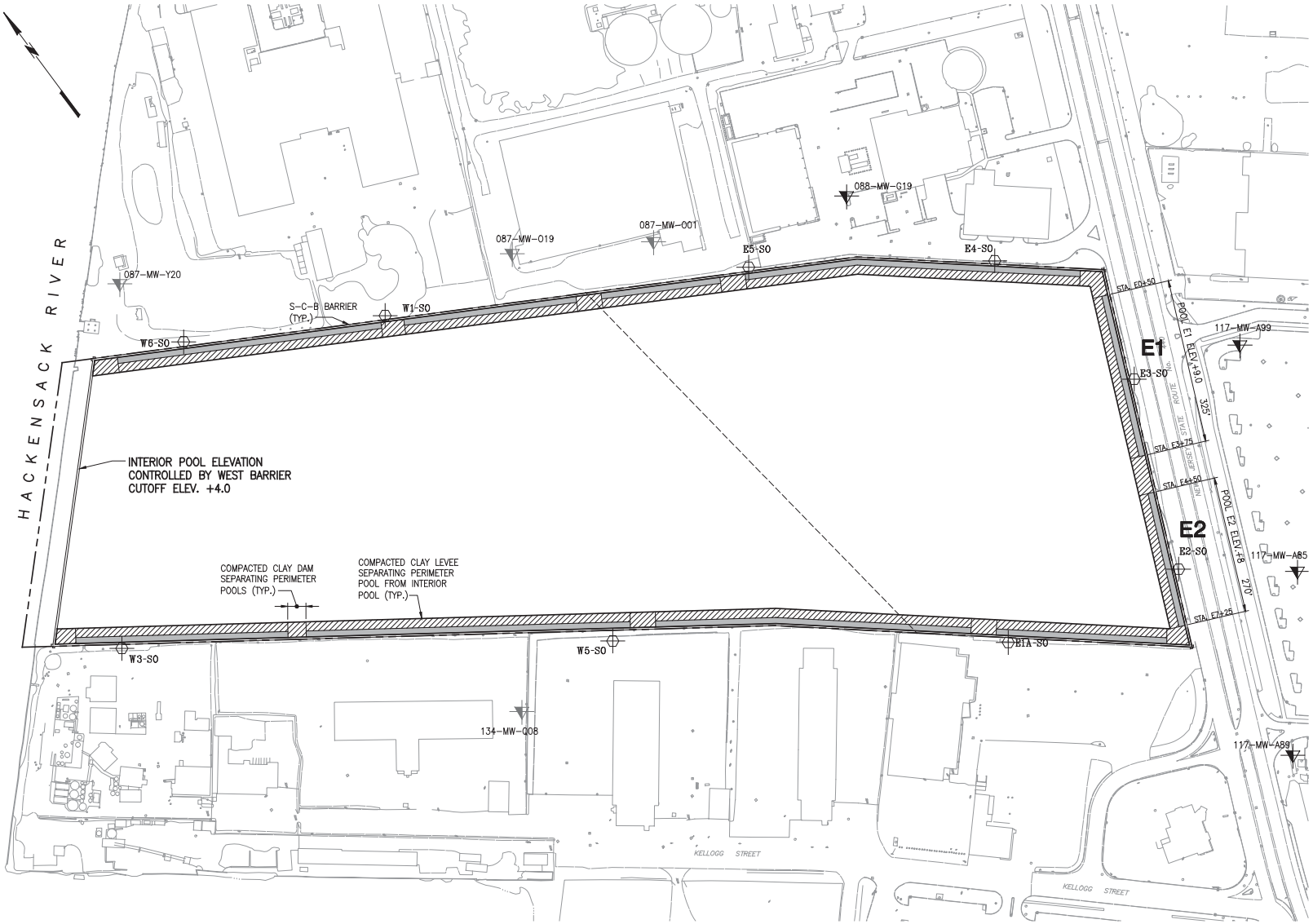

184-MW-106R and 184-MW-102
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft.,msl)
7.00
6.50
6.00
5.50
5.00
4.50
4.00
Total Monthly Precipitation (in)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date
Precipitation
184-MW-106R (outside)
184-MW-102 (inside)


184-MW-103 and 184-MW-107
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft.,msl)
7.00
6.50
6.00
5.50
5.00
4.50
4.00
Total Monthly Precipitation (in)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date
Precipitation
184-MW-103 (outside)
184-MW-107 (inside)


184-MW-104 and 184-MW-108
Monthly Average Groundwater Elevations vs. Total Monthly Precipitation
2022
Groundwater Elevation (ft.,msl)
8.00
7.50
7.00
6.50
6.00
5.50
5.00
Total Monthly Precipitation (in)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date
Precipitation
184-MW-104 (outside)
184-MW-108 (inside)

APPENDIX C

SA-7 EASTERN PERIMETER POOL HYDROGRAPHS



NOTES:

1. THE FOLLOWING WERE REMOVED FROM THIS DRAWING ON OCTOBER 15, 2018, AT THE REQUEST OF HONEYWELL:

   WELLS NORTH FS-1, NORTH FS-2, NORTH FS-3, NORTH FS-4, NORTH FS-5, NORTH FS-6, NORTH FS-7, NORTH FS-8, NORTH FS-9, NORTH FS-13, 087-MW-S19, 088-MW-G19, 090-MW-E1, 115-PZ-4, 115-PZ-5, 115-PZ-6, 073-MW-BB11, 073-MW-Y10, SOUTH-FS-1, SOUTH-FS-3, SOUTH-FS-4, SOUTH FS-5, SOUTH-FS-6, SOUTH FS-7, 134-MW-V09, 140-MW-06, 140-MW-07, 125-MW-L03, E1-SO, MW-124-103L, MW-124-103D, MW-124-103, MW-102D, MW-124-102T,

   PERIMETER POOL CALLOUTS N1, N2, N3, N4, S1, S2, S3, S4.

LEGEND

- FILL TYPE A CLAY
- FILL TYPE B GRANULAR FILL
- SHALLOW WELL INSTALLED BY OTHERS
- SHALLOW WELL ABANDONED IN 2014 IN ACCORDANCE WITH STUDY AREA 6 100% DESIGN
- SHALLOW WELL INSTALLED FOR STUDY AREA 7 REMEDIATION

GRAPHIC SCALE

100' 50' 0 100' 200'

NOTE: BEGINNING MARCH 1, 2018, PERIMETER POOLS DESIGNATED N1, N2, N3, N4, S1, S2, S3 AND S4 ARE NO LONGER MONITORED. PERIMETER POOLS E1 AND E2 WILL CONTINUE TO BE MONITORED AND WATER LEVEL DATA FOR THE REPORTING PERIOD IS ATTACHED.

IN PROGRESS
10-16-2018

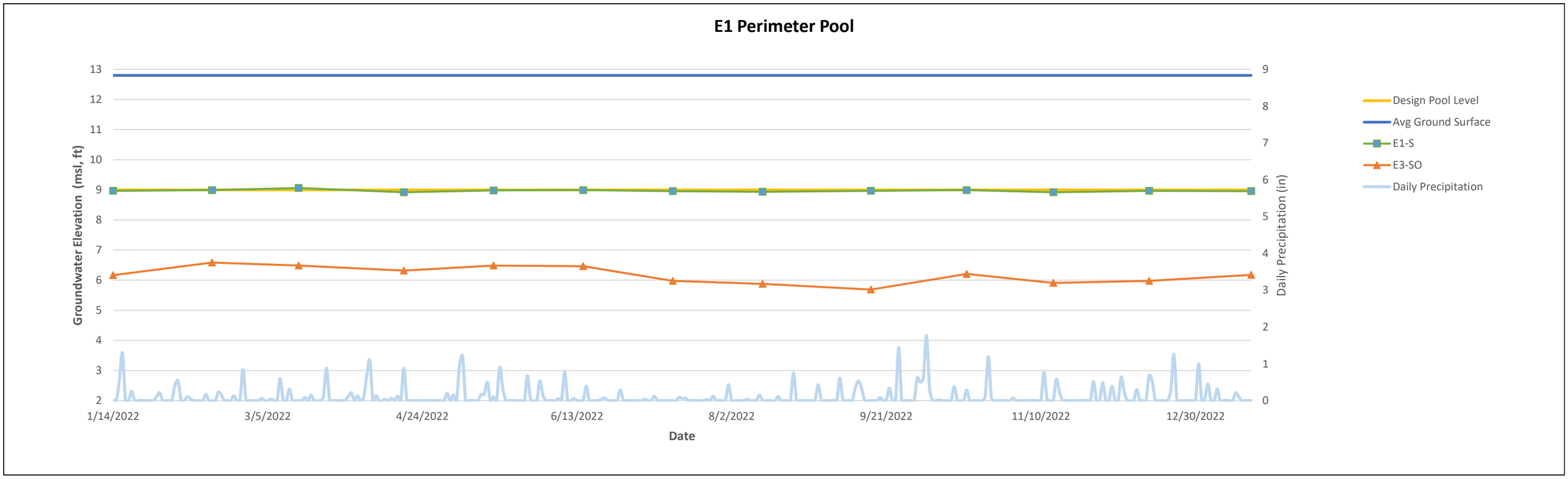
STUDY AREA 7
PERIMETER POOL DESIGN ELEVATIONS

NEW JERSEY

MUESER RUTLEDGE CONSULTING ENGINEERS
14 PENN PLAZA – 225 WEST 34th STREET

FILE NO. 10210
DRAWING NO. PP-1

Oct. 16, 2018 at 11:22am
G:\DWGS\102\10210\Dewatering\PP-1.dwg
bbascaino


E1 Perimeter Pool
Groundwater Elevation (msl, ft)
Daily Precipitation (in)
Date
1/14/2022
3/5/2022
4/24/2022
6/13/2022
8/2/2022
9/21/2022
11/10/2022
12/30/2022
Design Pool Level
Avg Ground Surface
E1-S
E3-SO
Daily Precipitation

E2 Perimeter Pool

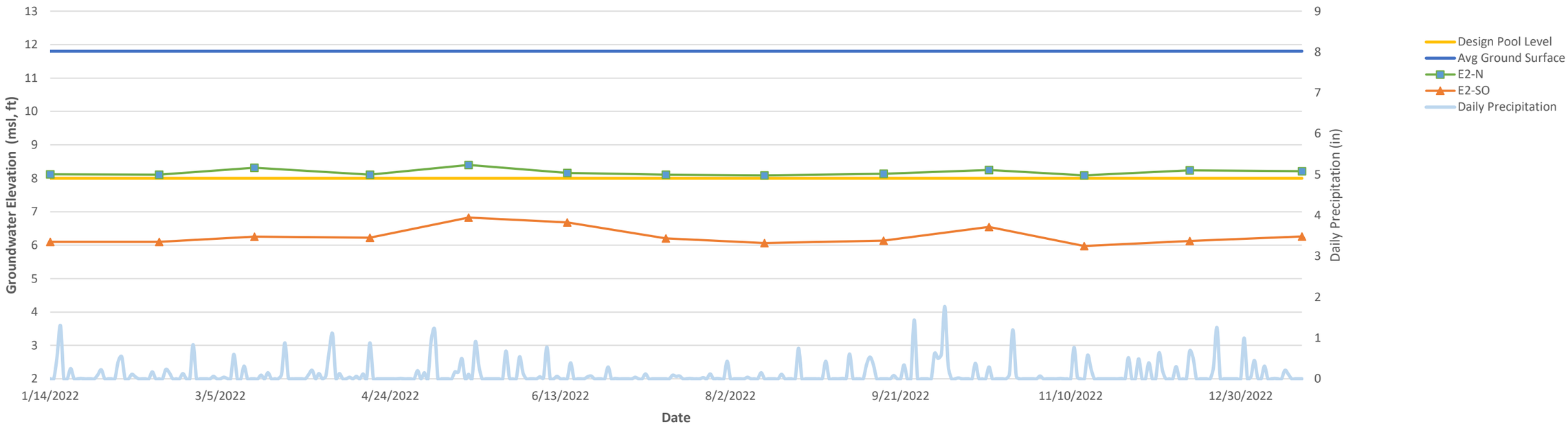


Table 1 Shallow Groundwater Data		
Date	**E2-SO**	**E3-SO**
1/14/2022	6.09	6.17
2/15/2022	6.09	6.59
3/15/2022	6.25	6.49
4/18/2022	6.22	6.32
5/17/2022	6.82	6.49
6/15/2022	6.68	6.47
7/14/2022	6.20	5.98
8/12/2022	6.06	5.88
9/16/2022	6.13	5.69
10/17/2022	6.54	6.21
11/14/2022	5.97	5.91
12/15/2022	6.12	5.98
1/17/2023	6.26	6.18

APPENDIX D

HISTORICAL GROUNDWATER QUALITY MONITORING RESULTS

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-04	4/8/2014	N	6		4	U	5.5	U	5.5	U
	6/24/2014	N	16.4		4	U	5.5	U	5.5	U
	9/23/2014	N	12.4		5.8		5.5	U	5.5	U
	12/4/2014	N	27.2		5.7		5.5	U	5.5	U
	3/18/2015	N	23.6		4	U	6	U	6	U
	6/3/2015	N	10.6		4	U	5.5	UJ	5.5	UJ
	9/9/2015	N	22.3		4.3		5.5	U	5.5	U
	12/10/2015	N	**527**		5.6		5.5	U	5.5	U
	3/31/2016	N	17.6		4.2		5.5	U	5.5	U
	6/10/2016	N	16		4.3		5.5	U	5.5	U
	9/7/2016	N	18.2		7.8		5.5	U	5.5	U
	12/8/2016	N	14.6		4.5		5.5	UJ	5.5	UJ
	3/9/2017	N	12.1		4.6		5.5	U	5.5	UJ
	6/22/2017	N	9.8		4	U	5.5	U	5.5	UJ
	9/15/2017	N	**80.3**		7		5.5	UJ	5.5	UJ
	12/8/2017	N	24.6		4.7		5.5	UJ	5.5	UJ
	3/30/2018	N	4	U	4	U	5.5	U	5.5	U
	6/6/2018	N	6.5		4.1		6	U	6	U
	9/7/2018	N	50.9		8		5.5	U	5.5	U
	12/4/2018	N	6.5		4	U	5.5	U	5.5	UJ

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-05	4/8/2014	N	45.1		4.3		5.5	U	5.5	U
	4/8/2014	Y	43.7		4.3		5.5	U	5.5	U
	6/24/2014	N	26.6		5.7		5.5		5.5	U
	6/24/2014	Y	20.6		13.2		10		5.5	
	9/23/2014	N	15.4		4	U	5.5	U	5.5	U
	9/23/2014	Y	20	U	20	U	5.5	U	5.5	U
	12/4/2014	N	18.8		4	U	5.5	U	5.5	U
	12/4/2014	Y	32.5		4	U	5.5	U	5.5	U
	3/18/2015	N	**396**		4	U	6	U	6	U
	3/18/2015	Y	**399**		4	U	6	U	6	U
	6/3/2015	N	63		4		5.5	UJ	5.5	UJ
	6/3/2015	Y	21.8		4.5		5.5	UJ	5.5	UJ
	9/9/2015	N	36.3		5.6		5.5	U	5.5	U
	9/9/2015	Y	22.5		5.7		5.5	U	5.5	U
	12/10/2015	N	56.3		6.4		5.5	U	5.5	U
	12/10/2015	Y	**120**		6.8		5.5	U	5.5	U
	3/31/2016	N	**996**		4	U	5.5	U	5.5	U
	3/31/2016	Y	**707**		4	U	5.5	U	5.5	U
	6/10/2016	N	48.3		5.6		5.5	U	5.5	U
	6/10/2016	Y	41.3		5.7		5.5	U	5.5	U
	9/7/2016	N	33.9		7.1		5.5	U	5.5	U
	9/7/2016	Y	12.1		7.2		5.5	U	5.5	U
	12/7/2016	N	7.6		4	U	5.5	UJ	5.5	UJ
	12/7/2016	Y	7.5		4.3		5.5	UJ	5.5	UJ
	3/9/2017	N	4.9		4	U	5.5	U	5.5	UJ
	3/9/2017	Y	4		4	U	5.5	U	5.5	UJ
	6/22/2017	N	12.5		5.3		5.5	U	5.5	UJ
	6/22/2017	Y	25.5		5.5		5.5	U	5.5	UJ
	9/14/2017	N	10	J	4.7	J	6	U	6	U
	9/14/2017	Y	9.5	J	5.1	J	6	U	6	U
	12/7/2017	N	10.4		10.3		5.5	U	5.5	U
	12/7/2017	Y	10.4		10.6		5.5	U	5.5	U
	3/29/2018	N	**91.3**		8	U	5.5	UJ	5.5	UJ
	3/29/2018	Y	**84.1**		8	U	5.5	UJ	5.5	UJ
	6/5/2018	N	17.3		7.7		5.5	UJ	5.5	U
	6/5/2018	Y	23.3		6.7		5.5	UJ	5.5	U
	9/6/2018	N	7.3		5.7		5.5	U	5.5	U
	9/6/2018	Y	7.7		6		5.5	U	5	U
	12/4/2018	N	16.1		6.8		5.5	U	5.5	UJ
	12/4/2018	Y	13.3		6.8		5.5	U	5.5	UJ

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-06	4/8/2014	N	30.9		28.8		20		20	
	6/24/2014	N	**81.4**		5.1		5.5	U	10	
	9/23/2014	N	12.9		11.8		7.7		9.9	
	12/4/2014	N	9.9		9.8		8.8		8.8	
	3/18/2015	N	10.9		8		9.1		9.2	
	6/3/2015	N	21.6		20.3		20	J	20	J
	9/9/2015	N	36.2		30.7		30		30	
	12/10/2015	N	10.3		8.9		9.8		9.6	
	3/31/2016	N	15.6		13.1		10		10	
	6/10/2016	N	28.6		26.3		20		20	
	9/7/2016	N	28		8		9.3		9.1	
	12/7/2016	N	9.4		9.1		9	J	8.6	J
	3/9/2017	N	20.8		19.8		20		20	J
	6/22/2017	N	17.2		12.1		10		10	J
	9/14/2017	N	14.4	J	12.1	J	10		10	
	12/7/2017	N	6.2		5.3		7.3		8.3	
	3/30/2018	N	8.1		7.6		7.6		6.4	
	6/6/2018	N	9.2		7.8		6	U	6.3	
	9/7/2018	N	5.6		4.9		5.5	U	5.5	U
	12/5/2018	N	6.9		5.2		5.5	U	5.5	U
184-MW-101*	7/20/2016	N	4	U	4	U	5.5	U	5.5	U
	9/7/2016	N	5.4		4.1		5.5	U	5.5	U
	12/7/2016	N	4.3		4	U	5.5	UJ	5.5	UJ
	3/9/2017	N	4	U	4	U	5.5	U	5.5	UJ
	6/22/2017	N	4	U	4	U	5.5	U	5.5	UJ
	9/14/2017	N	4	U	4	U	5.5	U	5.5	U
	12/7/2017	N	4	U	4	U	5.5	U	5.5	U
	3/29/2018	N	4	U	4	U	5.5	UJ	5.5	UJ
	6/5/2018	N	4	U	4	U	5.5	UJ	5.5	U
	9/6/2018	N	4	U	4	U	5.5	U	5.5	U
	12/4/2018	N	6.3		4	U	5.5	U	5.5	UJ
	3/4/2019	N	4.5		4	U	5.5	U	5.5	U
	6/14/2019	N	4	U	4	U	5.5	U	5.5	U
	9/5/2019	N	4	U	4	U	5.5	UJ	5.5	UJ
	12/5/2019	N	4.7		4	U	5.5	U	5.5	UJ
	3/12/2020	N	4	U	4	U	5.5	UJ	5.5	UJ
	6/3/2020	N	4	U	4	U	5.5	U	5.5	U
	9/11/2020	N	4.4		4		5.5	U	5.5	U
	12/10/2020	N	4	U	4	U	5.5	U	5.5	U
	3/8/2021	N	4	U	4	U	5.5	U	5.5	U
	6/23/2021	N	4.3		4	U	5.5	U	5.5	U
	9/8/2021	N	4	U	4	U	5.5	U	5.5	U
	12/1/2021	N	4.5		4.3		5.5	U	5.5	U

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-102*	7/20/2016	N	8.5		5		5.5	U	5.5	U
	9/7/2016	N	13.6		4.6		5.5	U	5.5	U
	12/7/2016	N	12.6		4.4		5.5	UJ	5.5	UJ
	3/9/2017	N	7.1		4.3		5.5	U	5.5	UJ
	9/14/2017	N	18.6		4.3		5.5	U	5.5	U
	12/7/2017	N	26.6		5.6		5.5	U	5.5	U
	3/29/2018	N	**205**		6.1		5.5	UJ	5.5	UJ
	6/5/2018	N	11.5		5.4		5.5	UJ	5.5	U
	9/6/2018	N	8.3		5.7		5.5	U	5.5	U
	12/4/2018	N	13.2		6.5		5.5	U	5.5	UJ
	3/4/2019	N	45.1		6.4		5.5	U	5.5	U
	6/13/2019	N	26.7		5.2		5.5	U	5.5	U
	9/4/2019	N	15.9		5.1		5.5	UJ	5.5	UJ
	12/5/2019	N	13.8		5.7		5.5	U	5.5	UJ
	3/12/2020	N	**129**		7.5		5.5	UJ	5.5	UJ
	6/3/2020	N	8.3		5.6		5.5	U	5.5	U
	9/9/2020	N	9.6		5.8		5.5	UJ	5.5	UJ
	9/9/2020 DUP	Y	9.5		5.6		5.5	UJ	5.5	UJ
	12/11/2020	N	8		5.1		5.5	UJ	5.5	UJ
	12/11/2020 DUP	Y	7.1		4.9		5.5	UJ	5.5	UJ
	3/9/2021	N	4		4	U	5.5	U	5.5	UJ
	3/9/2021 DUP	Y	4	U	4	U	5.5	U	5.5	UJ
	6/22/2021	N	8.7		5.6		5.5	U	5.5	U
	9/8/2021	N	5.7		5		5.5	U	5.5	U
	12/2/2021	N	5		4.3		5.5	U	5.5	U
	3/16/2022	N	4.9		4.5		5.5	U	5.5	UJ
	6/2/2022	N	5		4.8		5.5	U	5.5	UJ
	9/14/2022	N	6.1		6.1		5.5	U	5.5	UJ
	12/6/2022	N	5.6		4.5		5.5	UJ	5.5	UJ
184-MW-103*	7/20/2016	N	4		4	U	5.5	U	5.5	U
	7/20/2016	Y	4.3		4	U	5.5	U	5.5	U
	9/7/2016	N	4	U	4	U	5.5	U	5.5	U
	12/7/2016	N	4	U	4	U	5.5	UJ	5.5	UJ
	3/9/2017	N	4	U	4	U	5.5	U	5.5	UJ
	6/22/2017	N	12.8		4	U	5.5	U	5.5	UJ
	9/15/2017	N	4	U	4	U	5.5	UJ	5.5	UJ
	12/7/2017	N	4	U	4	U	5.5	U	5.5	U
	3/29/2018	N	24.8		20		20	J	10	J
	6/6/2018	N	12.2		8.8		6.1		6.8	
	9/7/2018	N	5.4		4	U	5.5	U	5.5	U
	12/5/2018	N	21.2		16.4		5.5	U	5.5	U
	3/4/2019	N	34.2		28.9		30	J	30	J
	6/13/2019	N	34.7		28.1		29		27	
	9/4/2019	N	11.3		4	U	5.5	UJ	5.5	UJ
	12/4/2019	N	20.2		4	U	5.5	UJ	5.5	UJ
	3/11/2020	N	29.5		4	U	5.5	UJ	5.5	UJ
	6/2/2020	N	33.2		4	U	5.5	U	5.5	UJ
	9/9/2020	N	5.9		4	U	5.5	UJ	5.5	UJ
	12/10/2020	N	29.6		27.8		28		27	
	3/8/2021	N	30.9		28.6		31		30	
	6/22/2021	N	26.1		19		19		18	
	9/8/2021	N	6.7		4	U	5.5	U	5.5	U
	12/1/2021	N	4	U	4	U	5.5	U	5.5	U

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-104*	7/20/2016	N	4	U	4	U	5.5	U	5.5	U
	9/7/2016	N	4	U	4	U	5.5	U	5.5	U
	12/7/2016	N	4	U	4	U	5.5	UJ	5.5	UJ
	3/9/2017	N	4	U	4	U	5.5	U	5.5	UJ
	6/22/2017	N	4	U	4	U	5.5	U	5.5	UJ
	9/14/2017	N	4	U	4	U	5.5	U	5.5	U
	12/7/2017	N	4	U	4	U	5.5	U	5.5	U
	3/30/2018	N	4	U	4	U	5.5	U	5.5	U
	6/5/2018	N	4	U	4	U	5.5	UJ	5.5	U
	9/6/2018	N	4	U	4	U	5.5	U	5.5	U
	12/4/2018	N	4	U	4	U	5.5	U	5.5	UJ
	3/5/2019	N	4	U	4	U	5.5	U	5.5	U
	9/4/2019	N	4	U	4	U	5.5	UJ	5.5	UJ
	12/4/2019	N	4	U	4	U	5.5	UJ	5.5	UJ
	3/11/2010	N	4	U	4	U	5.5	UJ	5.5	UJ
	3/11/2020 DUP	Y	4	U	4	U	5.5	UJ	5.5	UJ
	6/2/2020	N	4	U	4	U	5.5	U	5.5	UJ
	9/9/2020	N	4	U	4	U	5.5	UJ	5.5	UJ
	12/10/2020	N	4	U	4	U	5.5	U	5.5	U
	3/8/2021	N	4.1		4.2		5.5	U	5.5	U
	6/22/2021	N	4	U	4	U	5.5	U	5.5	U
	6/22/2021 DUP	Y	4	U	4	U	5.5	U	5.5	U
	9/8/2021	N	4	U	4	U	5.5	U	5.5	U
	9/8/2021 DUP	Y	4	U	4	U	5.5	U	5.5	U
	12/1/2021	N	4	U	4	U	5.5	U	5.5	U
	12/1/2021 DUP	Y	4	U	4	U	5.5	U	5.5	U
184-MW-105*	9/14/2017	N	4	U	4	U	5.5	U	5.5	U
	12/7/2017	N	4	U	4	U	5.5	U	5.5	U
	3/29/2018	N	4	U	4	U	5.5	UJ	5.5	UJ
	6/5/2018	N	4	U	4	U	5.5	UJ	5.5	U
	9/6/2018	N	4	U	4	U	5.5	U	5.5	U
	12/4/2018	N	4	U	4	U	5.5	U	5.5	UJ
	3/4/2019	N	4	U	4	U	5.5	U	5.5	U
	6/14/2019	N	4	U	4	U	5.5	U	5.5	U
	9/5/2019	N	4	U	4	U	5.5	UJ	5.5	UJ
	12/5/2019	N	4	U	4	U	5.5	U	5.5	UJ
	3/12/2020	N	4	U	4	U	5.5	UJ	5.5	UJ
	6/3/2020	N	4	U	4	U	5.5	U	5.5	U
	9/11/2020	N	4	U	4	U	5.5	U	5.5	U
	12/10/2020	N	4	U	4	U	5.5	U	5.5	U
	3/8/2021	N	4	U	4	U	5.5	U	5.5	U
	6/23/2021	N	4	U	4	U	5.5	U	5.5	U
	9/8/2021	N	4	U	4	U	5.5	U	5.5	U
	12/1/2021	N	4	U	4	U	5.5	U	5.5	U
	3/16/2022	N	4	U	4	U	5.5	U	5.5	UJ
	6/2/2022	N	4	U	4	U	5.5	U	5.5	U
	9/14/2022	N	4	U	4	U	5.5	U	5.5	U
	12/6/2022	N	4	U	4	U	5.5	UJ	5.5	UJ

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-106*	6/22/2017	N	5.8		4.7		5.5	U	5.5	UJ
	9/14/2017	N	6.2		4.8		5.5	U	5.5	U
	12/7/2017	N	6.7		5.8		5.5	U	5.5	U
	3/29/2018	N	13.4		5.9		6	UJ	6	UJ
	6/5/2018	N	6.3		5.6		5.5	UJ	5.5	U
	9/6/2018	N	8.1		7.3		5.5	U	5.5	U
	12/4/2018	N	7.9		7.9		5.5	U	5.5	UJ
	3/4/2019	N	7.2		5.1		5.5	U	5.5	U
	6/13/2019	N	5.7		5		5.5	U	5.5	U
	9/4/2019	N	6.5		6		5.5	UJ	5.5	UJ
	12/4/2019	N	6.8		6.5		5.5	UJ	5.5	UJ
	3/12/2020	N	6.8		6		5.5	UJ	5.5	UJ
	6/2/2020	N	6.3		6		5.5	U	5.5	UJ
	9/9/2020	N	6.9		6.3		5.5	UJ	5.5	UJ
	12/10/2020	N	5.8		5.6		5.5	U	5.5	U
	3/8/2021	N	5		4.1		5.5	U	5.5	U
	6/23/2021	N	5.6		4.9		5.5	U	5.5	U
184-MW-106R*	9/8/2021	N	4	U	4	U	5.5	U	5.5	U
	12/2/2021	N	4	U	4	U	5.5	U	5.5	U
184-MW-107*	9/15/2017	N	5.7		4	U	5.5	UJ	5.5	UJ
	12/8/2017	N	**1210**		4	U	5.5	UJ	5.5	UJ
	3/29/2018	N	4	U	4	U	5.5	UJ	5.5	UJ
	6/6/2018	N	33.2		4	U	6	U	6	U
	9/7/2018	N	**108**		4.4		5.5	U	5.5	U
	12/5/2018	N	**139**		4	U	5.5	U	5.5	U
	3/5/2019	N	40.7		4	U	5.5	U	5.5	U
	3/5/2019	Y	36		4	U	5.5	U	5.5	U
	6/13/2019	N	**136**		4	U	5.5	U	5.5	U
	6/13/2019	Y	**715**		4	U	5.5	U	5.5	U
	9/4/2019	N	**95.7**		4	U	5.5	UJ	5.5	UJ
	9/4/2019	Y	**76.3**	J	8	UJ	5.5	UJ	5.5	UJ
	12/4/2019	N	49		4	U	5.5	UJ	5.5	UJ
	12/4/2019	Y	34.5		4	U	5.5	UJ	5.5	UJ
	3/11/2020	N	**689**		4	U	5.5	UJ	5.5	UJ
	6/2/2020	N	**2790**		4	U	5.5	U	5.5	UJ
	9/9/2020	N	61		4	U	5.5	UJ	5.5	UJ
	12/11/2020	N	**84.7**		4	U	5.5	UJ	5.5	UJ
	3/8/2021	N	**656**		21.1		15		22	
	6/23/2021	N	4	U	4	U	5.5	U	5.5	U
	9/7/2021	N	18.9		4	U	5.5	UJ	5.5	U
	12/1/2021	N	4	UJ	4	UJ	5.5	U	5.5	U
	3/16/2022	N	**74.9**		4	U	5.5	UJ	5.5	UJ
	6/2/2022	N	4	U	4	U	5.5	U	5.5	U
	9/14/2022	N	DRY		DRY		DRY		DRY	
	12/6/2022	N	13.6		4	U	5.5	UJ	5.5	UJ

Table 1
Historical Groundwater Quality Monitoring Results - NJCU

Monitoring Well ID	Sample Date	Sample Duplicate (Y/N)	Total Chromium (Unfiltered)		Total Chromium (Filtered)		Hexavalent Chromium (Unfiltered)		Hexavalent Chromium (Filtered)	
			Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
184-MW-108*	9/14/2017	N	4	UJ	4	UJ	5.5	U	5.5	U
	12/8/2017	N	4	U	4	U	5.5	UJ	5.5	UJ
	3/30/2018	N	4	U	4	U	5.5	U	5.5	U
	6/5/2018	N	4	U	4	U	5.5	UJ	5.5	U
	9/6/2018	N	4	U	4	U	5.5	U	5.5	U
	12/5/2018	N	4.3		4	U	5.5	U	5.5	U
	3/5/2019	N	4.5		4	U	5.5	U	5.5	U
	9/4/2019	N	8	UJ	8	UJ	5.5	UJ	5.5	UJ
	12/4/2019	N	5.3		4	U	5.5	UJ	5.5	UJ
	3/11/2020	N	20	U	4	U	5.5	UJ	5.5	UJ
	6/2/2020	N	4	U	4	U	5.5	U	5.5	UJ
	6/2/2020 DUP	Y	4	U	4	U	5.5	U	5.5	UJ
	9/9/2020	N	21.7		4	U	5.5	UJ	5.5	UJ
	12/10/2020	N	4	U	4	U	5.5	U	5.5	U
	3/8/2021	N	4	U	4	U	5.5	U	5.5	U
	6/23/2021	N	4	U	4	U	5.5	U	5.5	U
	9/7/2021	N	4	U	4	U	5.5	UJ	5.5	U
	12/1/2021	N	4	U	4	U	5.5	UJ	5.5	U
	3/16/2022	N	4	U	4	U	5.5	U	5.5	UJ
	3/16/2022 DUP	Y	4	U	4	U	5.5	U	5.5	UJ
	6/2/2022	N	4	U	4	U	5.5	U	5.5	U
	6/2/2022 DUP	Y	4	U	4	U	5.5	U	5.5	U
	9/14/2022	N	4	U	4	U	5.5	U	5.5	U
	9/14/2022 DUP	Y	4	U	9.1		5.5	U	5.5	U
	12/6/2022	N	15.3		4	U	5.5	UJ	5.5	UJ
	12/6/2022 DUP	Y	3		4	U	5.5	UJ	5.5	UJ

General Notes:

1. Analysis methods E200.8 used for Total Chromium and SW7199 for Hexavalent Chromium.
2. **Bold and underlined values** exceed the NJDEP Ground Water Quality Standards (Chromium - 70 µg/L), N.J.A.C 7:9C; last amended 6/1/2020.
3. Monitoring well 184-MW-106 abandoned and replaced by 184-MW-106R on August 12, 2021.

*Defined as Sentinel Well in Groundwater Remedial Action Permit

Abbreviations:

Conc.: Concentration measured in micrograms per liter
N: No
Q: Qualifiers
Y: Yes

Data Qualifies:

B: Analyte found in blank and sample
J: Estimated concentration
U: Analyte not detected above method detection limit