AECOM

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Groundwater Data Gap Investigation Technical Memorandum – Transducer Installation and Monitoring

NERT Remedial Investigation – Downgradient Study Area
Nevada Environmental Response Trust Site
Henderson, Nevada
Final Draft

Groundwater Data Gap Investigation Technical Memorandum – Transducer

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Groundwater Data Gap Investigation Technical Memorandum – Transducer Installation and Monitoring, Revision 0
Nevada Environmental Response Trust
Remedial Investigation – Downgradient Study Area, Henderson, Nevada

Responsible Certified Environmental Manager (CEM) for this project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state and local statutes, regulations and ordinances.

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List of Abbreviations

CSM	Conceptual Site Model
Cfs	cubic feet per second
Downgradient Study Area	NERT RI Downgradient Study Area
DGIP	Data Gap Investigation Plan
°F	degrees Fahrenheit
HASP	Health and Safety Plan
LVW	Las Vegas Wash
memo	Technical Memorandum
NDEP	Nevada Division of Environmental Protection
NERT	Nevada Environmental Response Trust
Reclamation	United States Bureau of Reclamation
RI	Remedial Investigation
SNWA	Southern Nevada Water Authority
Study	transducer study
USGS	U.S. Geological Survey

1.0 Introduction

This technical memorandum (memo) presents the results of the transducer study (Study) conducted as part of the Data Gap Investigation for the Nevada Environmental Response Trust (NERT) Remedial Investigation (RI) - Downgradient Study Area, which is located in Operable Unit 3 (OU-3) of the NERT RI Study Area in Henderson, Nevada (site) (Figure 1). This memo has been prepared as an interim deliverable in advance of the forthcoming NERT OU-3 RI Report. Except as noted in this memo, the work was conducted per the procedures and methods described in the Data Gap Investigation Plan (DGIP) – Transducer Installation and Monitoring (AECOM 2016a) approved by the Nevada Division of Environmental Protection (NDEP) on December 27, 2016. **Appendix A** will contain the responses to Stakeholder comments once they are received.

The overall objective of the Downgradient Study Area investigation is to identify subsurface pathways within the Downgradient Study Area, which is downgradient and cross-gradient of the NERT Site and Eastside Sub-Area, through which perchlorate-impacted groundwater is entering the Las Vegas Wash (LVW). The objective of installing transducers is to provide detailed data on water level changes in existing wells near the LVW to address data gaps identified in the historic and most recent (April 2016) groundwater monitoring data. While quarterly groundwater level data have been collected from a limited number of groundwater wells over the past few years, groundwater data have not been collected over a continuous period of time, nor has it been collected from a comprehensive assemblage of wells along the LVW.

The objectives, methods and procedures, and monitoring plan for the Study are described in the DGIP (AECOM 2016a), which was designed to answer the following study questions:

- How do groundwater levels change near the LVW?
- What is the daily and seasonal variation along the LVW?
- Where and when does the LVW influence local groundwater levels?
- What are the statistical groundwater elevation trends?
- How do the data refine the conceptual site model (CSM)?

The selected transducer locations (**Figure 2**) were established based on the results of the April-May 2016 groundwater sampling event, during which 61 groundwater samples were collected from wells throughout the Downgradient Study Area. **Figure 3** the shows the wells equipped with transducers superimposed on the geologic map of the area.

In November 2015, NERT installed transducers in ten monitoring wells (PC-62, PC-68, PC-108, PC- 155A/155B, PC-156A/156B, PC-157A/157B, and WMW6.15S) northeast of the Bird Viewing Ponds in the vicinity of the Seep Well Field (SWF). In August 2017, the transducers in monitoring wells PC-62, PC-68, and PC-108 were removed. One of these transducers was redeployed in monitoring well PC-56, located near the SWF. The locations of these transducers are included on **Figures 2** and **3**. Each well has been equipped with a data logger (In-Situ Aqua TROLL 200) and a cellular network telemetry system (In-Situ Tube 300R). The data logger measures temperature, electrical conductivity, absolute water pressure, and water level. In addition, the data logger calculates and reports specific conductivity, salinity, total dissolved solids, resistivity, and water density. The tube measures absolute barometric pressure and automatically applies a barometric pressure correction to the water level that is reported in the telemetrically transmitted data. Measurements are taken at 15- minute intervals and tubes typically transmit recent logger and tube data telemetrically to the Ramboll FTP site every 12 hours. The data loggers continue to collect and store data when they fail to transmit, and, therefore, data can be manually downloaded if needed. In November 2017, the data loggers and telemetry tubes in monitoring wells PC-155A/155B, PC-156A/156B, and PC-157A/157B were exchanged out for In-Situ Rugged TROLL 100s which measure temperature and water level (pressure). These data loggers do not transmit and are visited quarterly by a NERT field technician.

2.0 Transducer Installation and Data Collection

Nineteen existing groundwater monitoring wells located along the LVW were selected for transducer installation based on review of available data. Well WMW6.15S located adjacent to LVW already had a transducer installed by NERT, so it was also included in the Study. The wells in which transducers were installed are shown on **Figures 2 and 3.** Seventeen wells are located on United States Bureau of Reclamation (Reclamation) and Clark County Wetlands Park properties, and two wells are located on City of Henderson property (**Figure 2**). The rationale for each transducer location selected is included in **Table 1** and summarized in Section 2.2 below. Transducers were installed between April 28 and May 2, 2017. Subsequent groundwater level monitoring activities were conducted monthly and data downloads were conducted quarterly between June and November 2017.

2.1 Pre-field Activities

A site-specific Health and Safety Plan (HASP) as well as a Quality Assurance Project Plan (QAPP) were developed for the Downgradient Study Area, including the planned field work for the transducer installation and monitoring activities (AECOM 2016b and AECOM 2017). Property owners were contacted to obtain permission for access to install and monitor the transducers. Access to property was granted by Reclamation (U.S. Bureau of Reclamation 2016), the City of Henderson, and Clark County Wetlands Park. In addition the Southern Nevada Water Authority (SNWA) provided access to their wells located on Reclamation property. AECOM provided notification to landowners prior to mobilization.

Transducers were programmed prior to deploying them in the field for installation. Each transducer was labeled with the well identification in which it was installed. The recording interval, date, time, and well identification were preprogrammed into each transducer using the manufacturer's software. The data recording interval was set at every 15 minutes and therefore provided 96 groundwater level readings per instrument per day. The transducers currently remain in the wells and continue to record data.

2.2 Rationale for Transducer Locations

The well locations for the proposed installation of transducers were selected to provide groundwater level data on the north and south sides of the LVW to determine the relationship and response of groundwater levels to the different stages of the water levels in the LVW. In addition, wells present in areas where seeps or springs were observed were selected to determine the relationship, if any, of the potentiometric surface to the surface water features. The wells that were selected for transducer installation are listed on **Table 1**, which includes the measured well depth, screened interval (if known), water-bearing zone and lithology. Only shallow water-bearing zone wells were selected because the deeper water-bearing zones would not be expected to be influenced significantly by surface water level changes. **Table 1** also presents the rationale for selecting the well to have a transducer installed.

2.3 Transducer Installation

Transducers were installed in 19 existing groundwater wells located along the LVW, extending from the Duck Creek Confluence Weir to the Three Kids Weir, spanning the length of the Downgradient Study Area. The locations of the transducers installed are shown on **Figures 2 and 3**.

The installation of each dedicated transducer consisted of placing the transducer at approximately 20 feet below the top of the measured water table and securing the transducer with a cable within the well head. As shown on **Table 1,** some wells have less than 20 feet of water column, so for these wells the transducer was placed approximately 2 feet above the bottom of the well. For each well, the approximate depth of the transducer below the groundwater level at the time of installation was recorded in the field notes. The transducer cable was secured to the well cap.

As noted in Section 2.1, each transducer was programmed to record pressure and groundwater temperature at a frequency of every 15 minutes (96 times per day). Automated readings from the transducers were corrected

for barometric pressure fluctuations after data was downloaded. A barometer was placed in well WMW4.9S to provide barometric pressure readings at the same frequency as the transducer measurements.

Prior to the installation of the transducer and again following installation of the transducer, a manual groundwater level measurement was collected using a water-level sounder. Static groundwater level readings were measured and recorded to the nearest 0.01 foot from the surveyed reference mark on the top edge of the inner well casing. If no reference mark was present, the measurement was taken from the north side of the inner casing and the location noted in the field notes. This is consistent with how each well was surveyed in 2016. Well location and well casing elevations were surveyed by a licensed surveyor in April 2016.[1] **Table 2** provides the field measurements obtained when installing the transducers.

2.4 Transducer Data Collection

As noted in Section 2.3, the transducers were set to record changes in pressure (groundwater levels) every 15 minutes (96 times per day). Similarly, a barometer installed in well WMW4.9S recorded barometric pressures at the same frequency as the transducer measurements. Manual water levels were recorded in each well that was accessible on a monthly basis (May through November 2017) while the transducers were in use. This provided comparison data in case the transducer instrument started to drift. Manual water levels were also collected during the two quarterly data downloads. **Table 3** provides the field depth to water measurements obtained from April to November 2017. Data continues to be collected from transducers and will be presented in future technical memoranda.

Data was downloaded quarterly from the transducers for two quarters following installation. Data downloads occurred in August and November 2017. During data collection, the transducers were brought up to the surface for data download directly from the transducer. The manufacturer's handheld data reader and software were used to download the data. After data was downloaded, the data recording was restarted and the transducer was reinstalled in the well at its prescribed depth. Transducers remain in the wells and data will continue to be collected.

Data from the transducer in well WMW6.15S was provided by Ramboll.

2.4.1 Quality Control

Each time a transducer was brought to the surface, the cable and transducer were inspected for signs of damage. No sign of damage was noted on any of the cables during any of the monitoring events. During each monthly groundwater level measurement event, nine transducers were pulled up and checked to ensure that they were recording data properly. No issues with data recording were noted in the transducers that were checked.

In addition, the time of data recording was checked for deviations. In general, time deviations between -25 to +95 seconds were noted in some transducers. Fluctuations in surface water levels are expected to cause level fluctuations in groundwater that is in communication with the surface water. The time required for these fluctuations to propagate through the aquifer depends upon distance of the monitoring point from the surface water body, aquifer transmissivity, and porosity, as well as other factors. Although a direct estimate is not feasible, it is expected that this timeframe would be significantly longer than the time deviations encountered in some of the transducers and this deviation is therefore considered acceptable.

2.5 USGS Gaging Station at Pabco Road

Surface water elevation data were reviewed from the USGS gaging station at Pabco Road. The elevation, based on stage heights from this station versus time are presented on **Figure 4.** The elevations depicted on **Figure 4**

[1] Coordinate system: State Plane Coordinate System; Elevations are referenced to the North American Datum 83 Nevada East Zone (2701) with vertical datum based on NAVD 88 referenced to the City of Henderson Benchmark network.

are based on the weir elevations surveyed on June 29, 2017. The average daily variation of surface water stage is 0.3 foot (4 inches). In response to rain storms that occurred from July to September 2017 the water level in LVW increased 1 to 1.4 feet several times. Based on USGS data flows from these storms ranged from about 1,000 to 2,600 cubic feet per second (cfs).

2.6 Surface Water Transducers

In January 2017, AECOM installed eight surface water gaging stations along the south shore of LVW as part of the surface water investigation (**Figures 2 and 3)**. Staff gage and transducer assemblies were similar in design to those used by USGS, but modified as appropriate given the temporary nature of the installations. Specific installation points were identified to be reachable from the shore-side access road but generally away from areas frequented by foot traffic. Each assembly consists of a recording pressure transducer mounted inside an L-shaped length of PVC pipe. The transducer head is mounted inside a perforated PVC protective casing. The transducer cable runs back to shore through the PVC pipe into a short standpipe. The standpipe has a secure, lockable cap to allow access to the data retrieval port.

The staff gage assembly was anchored to the southern bank of the LVW using fence posts. The standpipe is located at the water's edge or near-shore, depending on the condition of the LVW bottom. The transducer head extends into the channel approximately 10 feet north and is secured with fence posts. Where conditions permit, the horizontal pipes were laid in a shallow trench to both protect and secure the pipe, and to minimize their profile in the LVW. The staff gages, marked in 0.01-foot increments, were secured to the posts at the channel-end of the pipe assemblies. The gages are located near enough to shore to allow accurate readings from the stream banks and deep enough to cover the range of streamflow variation. On shore barometers were placed at three locations to provide reference atmospheric pressure data.

The transducers were set to record water levels at five minute increments (288 times per day). The gages record the changes in water levels that correspond to increases and decreases in flow volume. All of the stations recorded the daily patterns of high and low water levels related to the release of wastewater from upstream wastewater treatment plants. The timing of the high and lows vary from station to station, arriving later in the day with distance downstream. Between the stations at Duck Creek and Rainbow Gardens weirs, the daily highs and lows are separated by approximately three hours.

Data was downloaded from these transducers on February 10, 2017 and May 10, 2018. The gages were surveyed on May 10, 2018.

3.0 Transducer Monitoring Results

Data collected from the transducers and barometers were downloaded in August and in November 2017. To develop graphs of the data, transducer data were compensated to remove the effects of barometric pressure. Barometric pressure was obtained from a barometer installed in well WMW4.9S. The data was also adjusted to correlate with manual water level data. The raw and compensated data were provided to NERT electronically and are provided in **Appendix B** of this memo. Graphs of the adjusted transducer water level and temperature data are provided in **Appendix C**. Daily field reports are provided in **Appendix D**. **Table 4** summarizes the data observed on the graphs.

The transducers' records of water levels and temperatures were affected when transducers were removed from wells for groundwater sampling activities by the well owners or other third parties. Results discussed below eliminate data believed to be compromised due to these activities. These data are included in **Appendix B**, are highlighted in red, and have been filtered out of the data set using the filter applied to the "REV GW ELEV" column so that the compromised data is not shown in the hydrographs.

3.1 Water Levels

The groundwater in all of the wells exhibited daily fluctuations in water levels. All of the transducers except for the transducer in well WMW6.15N detected increases in water levels in July and August that corresponded to the increased flows in LVW due to seasonal rain storms. Groundwater in wells closer to the LVW generally showed larger water level changes than the groundwater in wells further from the LVW.

Groundwater levels in three wells (PC-74, PC-77, and WMW6.9S) exhibit a distinct decrease in elevation from April 23, 2017, to July 19, 2017, that may be a result of the extraction wells withdrawing water in the area.

3.2 Temperature

Groundwater temperature in 16 of the 20 wells was generally between 71 and 75 °F between May and November 2017. In each of these wells temperature did not vary more than 2 °F over the period measured. The other four wells exhibited average temperatures lower or higher than these wells and three of the four wells exhibited greater variations in temperature.

Groundwater in two wells west of Pabco Weir exhibited lower average temperatures between May and November. Groundwater in well WMW6.15S had an average temperature of 68.7 °F, and groundwater in well WMW6.9S had an average temperature of 69.1 °F. The temperature in groundwater in well WMW6.15S ranged from 65.2 to 72.7°F and increased 7.5 °F. The groundwater temperature in well WMW6.9S ranged from 68.7 to 69.9 °F and decreased 1.2 °F.

Groundwater from two wells between Pabco Road Weir and Historic Lateral Weir exhibited higher average temperatures between May and November. Groundwater in well WMW5.58S1 had an average temperature of 79.4 °F and groundwater in well WMW5.7N had an average temperature of 81.9 °F. The temperature in groundwater in well WMW5.58S1 ranged from 69.1 to 85.5 °F. The temperature in groundwater in well WMW5.7N ranged from 73.3 to 86.7 °F. These two wells exhibited temperature changes of more than 13 °F between April and September.

Surface water temperatures recorded from the transducer in gage S5.30 near Historic Lateral Weir show that the surface water exhibited temperatures in excess of 90 °F during June (**Figure 5**).

3.3 Trend Tests

Mann Kendall statistical trend analysis was performed on water level data collected between May and November 2017 using ProUCL statistical software (U.S. Environmental Protection Agency 2016). In many instances the changes in water levels were small. Groundwater levels showed statistically significant increases in 15 wells and statistically significant decreases in five wells. The trend tests are included in **Appendix E**.

3.3.1 Surface Water Monitoring

The surface water in all the gages exhibited daily fluctuations in water levels. After the February 10, 2017 data download, the following changes to the surface water monitoring occurred:

- Transducers at stations S4.60 and S3.65 did not record data from February 10, 2017 to May 10, 2018 because the memory filled up or the preprogrammed end date was reached. At the time that these transducers were installed it was not anticipated that they would be left in place or that the data would be used to supplement the groundwater studies. As such the recording interval was left at a higher frequency and the memory filled up before data could be downloaded.
- Transducers at station S3.80, S4.65, S4.75, and S5.30 continued recording at 5 minute intervals and stopped recording June 29, 2017 because their data storage capacities were exceeded.
- The transducer at station S3.50 was set to record at 1 hour intervals and continues to record data.
- The transducer at station S3.75 was set to record at 6 hour intervals and continues to record data.

Surface water hydrographs and temperature graphs for April through June 2017 are included in **Appendix F**. Surface water elevations were compared to groundwater elevations to evaluate where groundwater was likely to be entering LVW. The surveyed elevation of Pabco Weir, transducer elevation data, and data provided by SNWA was utilized to develop a cross section schematically depicting expected surface water elevations and groundwater elevations (**Figure 6**). Transducer data from May 2, 2017 at 12:00 pm were used for developing the cross section.

As shown on **Figure 6**, groundwater elevations appear to be higher than surface water elevations below Duck Creek Weir, Upper Narrows Weir, Sunrise Mountain Weir, Bostic Weir, Calico Ridge Weir, Lower Narrows Weir, Homestead Weir and Three Kids Weir. In the area from below Pabco Weir to above Bostic Weir the projected groundwater elevations are below the surface water elevations.

4.0 Conclusions

This memo presents the results of the transducer study, which was performed in accordance with the methods, procedures and monitoring plan described in the DGIP. Following are the Study questions formulated in the DGIP and whether/how the transducer data collected to date addresses these questions:

1. How do groundwater levels change near the LVW?

Groundwater levels in all the wells exhibit an increase and decrease each day. The magnitude of daily change varies between wells but is generally less than 0.2 foot per day. Groundwater in the following wells exhibits the highest daily change: WMW3.5S, WMW6.15S, and WMW6.55S. In general, the further the well is from the LVW the lower the daily variations.

Groundwater levels in most wells show water level responses that correspond to higher stage in LVW from the rainstorms in July and August 2017. In general, the further the well is from LVW the lower the water level rise from the storm event.

2. What are the daily and seasonal variations along the LVW?

The daily variation of groundwater along the LVW is typically between 0.05 foot and 0.2 foot per day. The daily variation in stage in the surface water in the LVW is about 0.4 foot. Monitoring has not been conducted for an entire year, but high storm-related flows in the LVW during July to September 2017 were reflected in up to 1.4 foot changes in groundwater levels. Based on the USGS data, flows from these storms ranged from approximately 1,000 to 2,600 cfs. The maximum stage change measured by the USGS at the Pabco Road gaging station was also 1.4 foot indicating a high degree of correlation between the stage in the LVW and the groundwater levels in nearby wells WMW5.58S1 and WMW5.7N. Groundwater measurements in wells more distant from the LVW exhibited smaller changes.

The variation in groundwater temperature in individual wells was generally less than 2 °F from February to November 2017 with the exception of three wells. Two wells (WMW5.58S1 and WMW5.7N), exhibited temperature changes greater than 13 °F between April and September 2017. This indicates that surface water may be infiltrating and mixing with the groundwater in the area between Pabco Road Weir and Historic Lateral Weir. One well, WMW6.15S, exhibited a temperature change of 7 °F.

3. Where and when does the LVW influence local groundwater levels?

LVW appears to influence local groundwater levels daily in all of the locations measured. In general, the closer the well was to the LVW the greater the response. Groundwater levels in three wells (PC-74, PC- 77, and WMW6.9S) exhibit a different pattern over the 6 months of observation and appear to be influenced by extraction well pumping in the area. The schematic cross section provided as Figure 6 shows areas where the projected groundwater elevation is higher than the surface water elevation and therefore groundwater would be entering LVW (gaining conditions). Conversely where the projected groundwater elevation is lower than the surface water elevation, the surface water would infiltrate (losing conditions), which supports the above observation of seasonally higher temperatures in the groundwater between the Pabco Road and Historical Lateral Weirs.

4. What are the statistical groundwater elevation trends?

Groundwater levels showed statistically significant increases in 15 wells and statistically significant decreases in five wells based on the data collected from May to November 2017.

5. How do the data refine the CSM?

Figure 6 depicts the refinement of the CSM by identifying the specific reaches along LVW that are in losing conditions and other reaches are gaining conditions. The data also indicate that there is an area of mixing that

is evident by the warmer groundwater detected along the banks of the LVW. As the downgradient study area is one part of the NERT RI, AECOM is responsible for providing data and interpretations that refine the CSM specifically along LVW while it is NERT and their consultants that are responsible for the overall CSM interpretation. These physical groundwater and surface water levels are also being combined with the supplemental surface water investigation data to refine the CSM along LVW.

5.0 Recommendations

The dynamic relationship between surface water and groundwater along the LVW is complex. Evaluating the data obtained from the transducers sheds light on this relationship; however, additional data are needed to make more effective use of the information.

The transducer surface water data should be collected at the same time intervals as the groundwater transducer data so that it can be evaluated to refine the understanding of the relationship between surface water and groundwater elevations. The surface water transducers were installed first to collect data for the surface water investigation. The time interval was set at five minutes to determine variations in surface water flow over short time intervals. Once that data was evaluated the time interval was adjusted to 1 hour to support surface water data objectives. Upon completion of the surface water investigation, the interval was changed to 15 minutes to be consistent with the groundwater transducer recording interval. The 15 minute time interval will be used going forward.

Additional survey data should be collected on the weirs to refine the CSM.

Transducer data will continually need to be adjusted for the sampling events that change the depth that the transducer is set.

At least one complete year of data should be collected from the transducers.

6.0 References

AECOM, 2016a. Final Data Gap Investigation Plan – Transducer Installation and Monitoring, NERT Remedial Investigation – Downgradient Study Area, Nevada Environmental Response Trust Site, Henderson, Nevada. December.

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U.S. Environmental Protection Agency, 2016. ProUCL Software, Statistical Software ProUCL 5.1.00 for Environmental Applications for Data Sets with and without Nondetect Observations. Accessed at: https://www.epa.gov/land-research/proucl-software. Accessed on: September 26, 2016.

U.S. Bureau of Reclamation, 2016. Request for Right of Use, Non-invasive Geophysical Pilot Test and Installation of Transducers (Project), Nevada Division of Environmental Protection (NDEP), Contract No. 16-07-30-0850, Robert B. Griffith Water Project (Your Letter Dated August 12, 2016), October 6.

Tables

Table 1
Wells Selected for Installation of Transducers
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Well Owner	Proprty Owner	Depth to Groundwater (feet) (1)	Measured Well Depth (feet) (1)	Water Column (feet)	Screen Interval (feet, bgs) (2)	Water-Bearing Zone (3)	Lithology (4)	Rationale for Selection
AA-30	LandWell Company	USBR	20.44	34.05	13.61	11.7 - 31.7	Shallow	Qal	To evaluate water level changes west of C-1 drainage channel and between the Chimera Golf Course and well WMW 5.5S.
COH2B1	City of Henderson	USBR	16.98	67	50.02	Unknown	Shallow	Qal	To evaluate water level changes near the Seep Well Field.
LNDMW1	SNWA	CCPCS	36.99	61.56	24.57	Unknown	Shallow	Qal	To evaluate water level changes on north and south side of LVW between Lower Narrows and Homestead weirs.
LNDMW2	SNWA	CCPCS	34.39	55.05	20.66	Unknown	Shallow	Qal	
MW-13	City of Henderson	City of Henderson	35.58	49.4	13.82	38-48	Shallow	Qal	To evaluate water level changes at the northwest corner of Henderson Landfill and between Henderson Landfill and LVW.
MW-20	City of Henderson	City of Henderson	33.05	67.25	34.20	50-65	Shallow	Thumb Formation?	To evaluate water level changes at the northen part of Henderson Landfill and within the Thumb formation.
PC-74	NERT	CCPCS	11.59	48.25	36.66	39.5 - 49.5	Shallow	Qal	To evaluate water level changes along a tributary wash between PC-75 and LVW.
PC-77	NERT	CCPCS	7.19	38.87	31.68	29.5 - 39.5	Shallow	Qal	To evaluate water level changes along a tributary wash and uogradient of PC-74.
WMW3.5N	SNWA	CCPCS	35.64	56.6	20.96	Unknown	Shallow	Qal	To evaluate water level changes on north and south side of LVW and where a seep was observed.
WMW3.5S	SNWA	CCPCS	43.60	59.80	16.20	--	Shallow	Qal	
WMW4.9N	SNWA	CCPCS	31.91	53.00	21.09	Unknown	Shallow	Qal	To evaluate water level changes on north and south side of LVW between Bostick and Calico Ridge weirs.
WMW4.9S	SNWA	CCPCS	26.58	46.75	20.17	Unknown	Shallow	Qal	
WMW5.58S	SNWA	USBR	10.48	40.95	30.47	Unknown	Shallow	Qal	To evaluate water level changes in a well located within a meander of the LVW that exhibits lower perchlorate concentrations (510 µg/L) than nearby wells potentially due to mixing of lower concentration surface water with groundwater.
WMW5.5S	SNWA	USBR	15.51	38.3	22.79	Unknown	Shallow	Qal	To evaluate water level chages in a well that exhibits high perchlorate concentrations (3,200 µg/L) and that is along the C-1 Drainage Channel. In addition this well is between AA-30 and LVW.
WMW5.7N	SNWA	USBR	9.47	21	11.53	Unknown	Shallow	Qal	To evaluate water level changes on the north side of LVW.
WMW6.15N	SNWA	CCPCS	23.3	38.4	15.10	Unknown	Shallow	Qal	To evaluate water level data from a well located on the north side of LVW paired with WMW6.15S. WMW6.15S already has a NERT transducer installed.
WMW6.55S	SNWA	CCPCS	16.03	40.67	24.64	Unknown	Shallow	Qal	To evaluate water level changes in a well with high perchlorate concentrations (1,800 µg/L) on the south side of LVW near the Seep Well Field.
WMW6.9N	SNWA	CCPCS	18.42	48.55	30.13	--	Shallow	Qal	To evaluate water level changes on the north and south sides of LVW near Duck Creek Confluence weir.
WMW6.9S	SNWA	CCPCS	11.43	51.55	40.12	--	Shallow	Qal	

Notes:
bgs = below ground surface
LVW=Las Vegas Wash
Qal = Alluvium
µg/L = micrograms per liter
SNWA = Southern Nevada Water Authority
USBR = United States Bureau of Reclamation
CCPCS = Clark County Parks and Community Services

(1) Depth to groundwater and total well depth were measured in April 2016 by AECOM.
(2) Screened interval was obtained from the NERT All Wells Database.
(3) Water bearing zone was obtained from the NERT All Wells Database and from the definition that the shallow water bearing zone is present from 0 to 90 feet below ground surface.
(4) Lithology was obtained from the NERT All Wells Database, from geotechnical investigations conducted for the weirs, and from the 1980 Bell and Smith Geologic map of the Henderson Quadrangle.

Table 2
Field Measurements - Transducer Installation
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Easting [1]	Northing [1]	Elevation [1] (feet amsl, TOC)	Transducer Serial Number	Date Installed	Time Installed	Depth to Water Pre-Install (feet, TOC)	Depth to Water Post-Install (feet, TOC)	Groundwater Elevation (feet amsl)	Measured Depth of Well (feet, TOC)	Total Depth of Well [2] (feet, TOC)	Depth of Transducer (feet, TOC)	Elevation of Transducer (feet amsl)	Depth of Transducer Below GW (feet)
AA-30	836125.80	26733691.92	1532.35	0042069913	4/29/2017	9:30	19.64	19.64	1512.71	34.10	34.37	32.15	1500.20	12.51
COH2B1	832598.59	26733593.69	1546.95	0042069892	4/29/2017	16:18	16.37	16.37	1530.58	66.37	66.64	36.46	1510.49	20.09
LNDMW1	841145.67	26736145.45	1511.19	0042069896	4/30/2017	16:00	36.99	36.99	1474.2	61.62	61.89	56.94	1454.25	19.95
LNDMW2	840864.28	26737125.16	1501.98	0042069894	5/1/2017	12:54	34.46	34.46	1467.52	55.13	55.40	52.85	1449.13	18.39
MW-13	838306.91	26734740.22	1529.84	0042069903	5/1/2017	8:58	35.31	35.31	1494.53	49.55	49.82	47.64	1482.20	12.33
MW-20	840590.41	26735460.67	1512.54	0042069901	4/28/2017	11:20	32.99	33.00	1479.54	67.95	68.22	52.83	1459.71	19.82
PC-74	829203.19	26734003.83	1565.32	0042067239	4/30/2017	11:15	11.33	11.34	1553.98	48.44	48.71	31.52	1533.80	20.18
PC-77	829031.31	26733568.45	1566.86	0042063359	4/30/2017	12:15	6.73	6.73	1560.13	38.90	39.17	27.00	1539.86	20.27
WMW3.5N	843836.97	26737791.35	1482.54	0042069895	5/1/2017	11:00	35.62	35.62	1446.92	55.90	56.17	53.78	1428.76	18.16
WMW3.5S	844697.76	26737275.90	1483.54	0042065098	5/2/2017	8:49	43.66	43.68	1439.86	59.99	60.26	57.69	1425.85	14.01
WMW4.9N	838408.40	26736756.98	1523.37	0042069885	5/1/2017	12:00	31.79	31.81	1491.56	53.02	53.29	50.88	1472.50	19.07
WMW4.9S	838411.85	26735290.15	1518.84	0042069899	4/30/2017	14:36	26.48	26.45	1492.39	46.81	47.08	44.25	1474.59	17.80
WMW4.9S (Barologger)	838411.85	26735290.15	1518.84	0012069737	4/30/2017	14:36	26.48	26.45	1492.39	46.81	47.08	5.17	1513.67	21.28 (above GW)
WMW5.58S1	835070.11	26734647.03	1526.08	0042069897	4/29/2017	11:45	9.37	9.38	1516.7	41.08	41.35	29.77	1496.31	20.39
WMW5.5S	835768.11	26733971.74	1528.22	0042069900	4/29/2017	10:30	14.69	14.69	1513.53	38.29	38.56	34.75	1493.47	20.06
WMW5.7N	834471.76	26734425.52	1528.50	0042069904	5/1/2017	14:22	8.31	8.29	1520.21	21.01	21.28	18.83	1509.67	10.54
WMW6.15N	832493.06	26735359.77	1552.55	0042069891	5/1/2017	15:12	22.35	22.35	1530.2	38.79	39.06	36.38	1516.18	14.03
WMW6.55S	830218.73	26734351.02	1559.25	0042069889	4/30/2017	9:13	15.99	16.00	1543.25	40.69	40.96	36.00	1523.25	20.00
WMW6.9N	828913.10	26735560.65	1573.16	0042068798	5/1/2017	15:50	18.18	18.21	1554.95	48.59	48.86	37.94	1535.22	19.73
WMW6.9S	828430.55	26734539.19	1570.60	0042067219	4/30/2017	9:55	11.04	11.04	1559.56	51.36	51.63	31.03	1539.57	19.99

Notes:
(1) Well coordinates and elevations surveyed by licensed surveyor (Stanley) April 4 through 8, 2016. Coordinate system: State Plane Coordinate System; Elevations are referenced to the North American Datum (NAD) 83 Nevada East Zone (2701) with vertical datum based on NAVD 88 referenced to the City of Henderson Benchmark network.
(2) Total well depth accounts for an additional 0.27 feet from the tip of the sounder to the end of the probe.
amsl = Above mean sea level
TOC = Top of casing (measurements were obtained from the reference mark on the casing or from the north side of the casing if a mark was not present)

Table 3
Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Easting [1]	Northing [1]	Elevation [1] (feet amsl, TOC)	Date Gauged	Time Gauged	Depth to Water (feet, TOC)	Groundwater Elevation (feet amsl)
AA-30	836125.80	26733691.92	1532.35	4/29/2017	9:30	19.64	1512.71
AA-30	836125.80	26733691.92	1532.35	6/1/2017	10:01	19.68	1512.67
AA-30	836125.80	26733691.92	1532.35	7/11/2017	12:04	19.71	1512.64
AA-30	836125.80	26733691.92	1532.35	8/2/2017	11:08	19.49	1512.86
AA-30	836125.80	26733691.92	1532.35	9/6/2017	11:10	19.50	1512.85
AA-30	836125.80	26733691.92	1532.35	10/3/2017	11:55	19.33	1513.02
AA-30	836125.80	26733691.92	1532.35	11/1/2017	13:08	19.41	1512.94
COH2B1	832598.59	26733593.69	1546.95	4/29/2017	16:18	16.37	1530.58
COH2B1	832598.59	26733593.69	1546.95	6/2/2017	8:32	16.52	1530.43
COH2B1	832598.59	26733593.69	1546.95	7/11/2017	15:01	16.56	1530.39
COH2B1	832598.59	26733593.69	1546.95	8/2/2017	11:55	16.57	1530.38
COH2B1	832598.59	26733593.69	1546.95	9/6/2017	12:16	16.71	1530.24
COH2B1	832598.59	26733593.69	1546.95	10/3/2017	12:36	16.66	1530.29
COH2B1	832598.59	26733593.69	1546.95	11/1/2017	13:23	16.72	1530.23
LNDMW1	841145.67	26736145.45	1511.19	4/30/2017	16:00	36.99	1474.20
LNDMW1	841145.67	26736145.45	1511.19	6/1/2017	9:02	37.00	1474.19
LNDMW1	841145.67	26736145.45	1511.19	7/11/2017	10:46	37.01	1474.18
LNDMW1	841145.67	26736145.45	1511.19	8/2/2017	10:12	36.98	1474.21
LNDMW1	841145.67	26736145.45	1511.19	9/6/2017	9:50	37.00	1474.19
LNDMW1	841145.67	26736145.45	1511.19	10/3/2017	9:49	37.03	1474.16
LNDMW1	841145.67	26736145.45	1511.19	11/1/2017	11:41	37.03	1474.16
LNDMW2	840864.28	26737125.16	1501.98	5/1/2017	12:54	34.46	1467.52
LNDMW2	840864.28	26737125.16	1501.98	6/1/2017	11:46	34.44	1467.54
LNDMW2	840864.28	26737125.16	1501.98	7/12/2017	9:49	34.39	1467.59
LNDMW2	840864.28	26737125.16	1501.98	8/3/2017	9:16	34.39	1467.59
LNDMW2	840864.28	26737125.16	1501.98	9/7/2017	9:16	34.43	1467.55
LNDMW2	840864.28	26737125.16	1501.98	10/4/2017	9:32	34.49	1467.49
LNDMW2	840864.28	26737125.16	1501.98	11/2/2017	9:36	34.52	1467.46
MW-13	838306.91	26734740.22	1529.84	5/1/2017	8:58	35.31	1494.53
MW-13	838306.91	26734740.22	1529.84	6/1/2017	8:17	35.29	1494.55
MW-13	838306.91	26734740.22	1529.84	7/11/2017	9:31	35.26	1494.58
MW-13	838306.91	26734740.22	1529.84	8/2/2017	8:37	35.17	1494.67
MW-13	838306.91	26734740.22	1529.84	9/6/2017	8:40	35.13	1494.71
MW-13	838306.91	26734740.22	1529.84	10/3/2017	8:40	35.13	1494.71
MW-13	838306.91	26734740.22	1529.84	11/1/2017	10:01	35.16	1494.68
MW-20	840590.41	26735460.67	1512.54	4/28/2017	11:20	33.00	1479.54
MW-20	840590.41	26735460.67	1512.54	6/1/2017	8:39	32.99	1479.55
MW-20	840590.41	26735460.67	1512.54	7/11/2017	10:05	33.05	1479.49
MW-20	840590.41	26735460.67	1512.54	8/2/2017	9:35	32.95	1479.59
MW-20	840590.41	26735460.67	1512.54	9/6/2017	9:20	32.39	1480.15
MW-20	840590.41	26735460.67	1512.54	10/3/2017	9:16	32.88	1479.66
MW-20	840590.41	26735460.67	1512.54	11/1/2017	9:16	32.94	1479.60
PC-74	829203.19	26734003.83	1565.32	4/30/2017	11:15	11.34	1553.98
PC-74	829203.19	26734003.83	1565.32	6/2/2017	10:26	11.57	1553.75
PC-74	829203.19	26734003.83	1565.32	7/11/2017	16:16	11.81	1553.51
PC-74	829203.19	26734003.83	1565.32	8/2/2017	13:46	11.49	1553.83
PC-74	829203.19	26734003.83	1565.32	9/6/2017	13:47	11.54	1553.78
PC-74	829203.19	26734003.83	1565.32	10/3/2017	13:49	11.35	1553.97
PC-74	829203.19	26734003.83	1565.32	11/1/2017	14:06	11.30	1554.02
PC-77	829031.31	26733568.45	1566.86	4/30/2017	12:15	6.73	1560.13
PC-77	829031.31	26733568.45	1566.86	6/2/2017	9:01	7.10	1559.76
PC-77	829031.31	26733568.45	1566.86	7/12/2017	7:02	7.66	1559.20
PC-77	829031.31	26733568.45	1566.86	8/2/2017	14:20	7.10	1559.76
PC-77	829031.31	26733568.45	1566.86	9/6/2017	15:06	7.10	1559.76
PC-77	829031.31	26733568.45	1566.86	10/3/2017	14:57	6.84	1560.02
PC-77	829031.31	26733568.45	1566.86	11/1/2017	14:35	6.78	1560.08
WMW3.5N	843836.97	26737791.35	1482.54	5/1/2017	11:00	35.62	1446.92
WMW3.5N	843836.97	26737791.35	1482.54	6/2/2017	12:08	35.65	1446.89
WMW3.5N	843836.97	26737791.35	1482.54	7/12/2017	9:10	35.65	1446.89
WMW3.5N	843836.97	26737791.35	1482.54	8/3/2017	8:31	35.61	1446.93
WMW3.5N	843836.97	26737791.35	1482.54	9/7/2017	8:10	35.49	1447.05
WMW3.5N	843836.97	26737791.35	1482.54	10/4/2017	--	--	--
WMW3.5N	843836.97	26737791.35	1482.54	11/2/2017	8:56	35.38	1447.16
WMW3.5S	844697.76	26737275.90	1483.54	5/2/2017	8:49	43.68	1439.86
WMW3.5S	844697.76	26737275.90	1483.54	6/1/2017	7:52	43.62	1439.92
WMW3.5S	844697.76	26737275.90	1483.54	7/11/2017	8:46	43.62	1439.92
WMW3.5S	844697.76	26737275.90	1483.54	8/2/2017	9:09	43.64	1439.90
WMW3.5S	844697.76	26737275.90	1483.54	9/6/2017	8:05	43.58	1439.96
WMW3.5S	844697.76	26737275.90	1483.54	10/3/2017	8:03	43.69	1439.85
WMW3.5S	844697.76	26737275.90	1483.54	11/1/2017	8:37	43.69	1439.85
WMW4.9N	838408.40	26736756.98	1523.37	5/1/2017	12:00	31.81	1491.56
WMW4.9N	838408.40	26736756.98	1523.37	6/1/2017	12:10	31.79	1491.58
WMW4.9N	838408.40	26736756.98	1523.37	7/12/2017	10:18	31.74	1491.63
WMW4.9N	838408.40	26736756.98	1523.37	8/3/2017	9:47	31.71	1491.66

Table 3
Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Easting (1)	Northing (1)	Elevation (1) (feet amsl, TOC)	Date Gauged	Time Gauged	Depth to Water (feet, TOC)	Groundwater Elevation (feet amsl)
WMW4.9N	838408.40	26736756.98	1523.37	9/7/2017	10:40	31.71	1491.66
WMW4.9N	838408.40	26736756.98	1523.37	10/4/2017	10:16	31.74	1491.63
WMW4.9N	838408.40	26736756.98	1523.37	11/2/2017	9:55	31.75	1491.62
WMW4.9S	838411.85	26735290.15	1518.84	4/30/2017	14:36	26.45	1492.39
WMW4.9S	838411.85	26735290.15	1518.84	6/2/2017	8:01	26.42	1492.42
WMW4.9S	838411.85	26735290.15	1518.84	7/11/2017	11:16	26.41	1492.43
WMW4.9S	838411.85	26735290.15	1518.84	8/3/2017	12:12	26.36	1492.48
WMW4.9S	838411.85	26735290.15	1518.84	9/6/2017	10:16	26.35	1492.49
WMW4.9S	838411.85	26735290.15	1518.84	10/3/2017	10:23	26.36	1492.48
WMW4.9S	838411.85	26735290.15	1518.84	11/1/2017	12:01	26.39	1492.45
WMW5.58S1	835070.11	26734647.03	1526.08	4/29/2017	11:45	9.38	1516.70
WMW5.58S1	835070.11	26734647.03	1526.08	6/2/2017	8:16	9.31	1516.77
WMW5.58S1	835070.11	26734647.03	1526.08	7/11/2017	14:16	9.34	1516.74
WMW5.58S1	835070.11	26734647.03	1526.08	8/2/2017	10:46	9.45	1516.63
WMW5.58S1	835070.11	26734647.03	1526.08	9/6/2017	11:40	9.63	1516.45
WMW5.58S1	835070.11	26734647.03	1526.08	10/3/2017	10:54	9.74	1516.34
WMW5.58S1	835070.11	26734647.03	1526.08	11/1/2017	12:46	9.84	1516.24
WMW5.5S	835768.11	26733971.74	1528.22	4/29/2017	10:30	14.69	1513.53
WMW5.5S	835768.11	26733971.74	1528.22	6/1/2017	9:46	14.71	1513.51
WMW5.5S	835768.11	26733971.74	1528.22	7/11/2017	12:55	14.71	1513.51
WMW5.5S	835768.11	26733971.74	1528.22	8/2/2017	11:31	14.64	1513.58
WMW5.5S	835768.11	26733971.74	1528.22	9/6/2017	10:35	14.71	1513.51
WMW5.5S	835768.11	26733971.74	1528.22	10/3/2017	11:22	14.67	1513.55
WMW5.5S	835768.11	26733971.74	1528.22	11/1/2017	12:31	14.78	1513.44
WMW5.7N	834471.76	26734425.52	1528.50	5/1/2017	14:22	8.29	1520.21
WMW5.7N	834471.76	26734425.52	1528.50	6/2/2017	11:46	8.36	1520.14
WMW5.7N	834471.76	26734425.52	1528.50	7/12/2017	11:16	8.22	1520.28
WMW5.7N	834471.76	26734425.52	1528.50	8/3/2017	10:16	8.32	1520.18
WMW5.7N	834471.76	26734425.52	1528.50	9/7/2017	11:21	8.46	1520.04
WMW5.7N	834471.76	26734425.52	1528.50	10/4/2017	--	--	--
WMW5.7N	834471.76	26734425.52	1528.50	11/2/2017	10:22	8.61	1519.89
WMW6.15N	832493.06	26735359.77	1552.55	5/1/2017	15:12	22.35	1530.20
WMW6.15N	832493.06	26735359.77	1552.55	6/1/2017	12:40	22.54	1530.01
WMW6.15N	832493.06	26735359.77	1552.55	7/12/2017	11:55	22.52	1530.03
WMW6.15N	832493.06	26735359.77	1552.55	8/3/2017	10:46	22.37	1530.18
WMW6.15N	832493.06	26735359.77	1552.55	9/7/2017	12:01	22.61	1529.94
WMW6.15N	832493.06	26735359.77	1552.55	10/4/2017	--	--	--
WMW6.15N	832493.06	26735359.77	1552.55	11/2/2017	10:46	22.72	1529.83
WMW6.55S	830218.73	26734351.02	1559.25	4/30/2017	9:13	16.00	1543.25
WMW6.55S	830218.73	26734351.02	1559.25	6/2/2017	10:38	16.09	1543.16
WMW6.55S	830218.73	26734351.02	1559.25	7/11/2017	15:46	16.08	1543.17
WMW6.55S	830218.73	26734351.02	1559.25	8/2/2017	13:28	16.00	1543.25
WMW6.55S	830218.73	26734351.02	1559.25	9/6/2017	13:05	16.09	1543.16
WMW6.55S	830218.73	26734351.02	1559.25	10/3/2017	14:25	15.94	1543.31
WMW6.55S	830218.73	26734351.02	1559.25	11/1/2017	14:24	15.91	1543.34
WMW6.9N	828913.10	26735560.65	1573.16	5/1/2017	15:50	18.21	1554.95
WMW6.9N	828913.10	26735560.65	1573.16	6/2/2017	11:31	18.26	1554.90
WMW6.9N	828913.10	26735560.65	1573.16	7/12/2017	12:32	18.13	1555.03
WMW6.9N	828913.10	26735560.65	1573.16	8/3/2017	11:03	18.20	1554.96
WMW6.9N	828913.10	26735560.65	1573.16	9/7/2017	12:36	18.22	1554.94
WMW6.9N	828913.10	26735560.65	1573.16	10/4/2017	11:01	18.20	1554.96
WMW6.9N	828913.10	26735560.65	1573.16	11/2/2017	11:02	18.23	1554.93
WMW6.9S	828430.55	26734539.19	1570.60	4/30/2017	9:55	11.04	1559.56
WMW6.9S	828430.55	26734539.19	1570.60	6/1/2017	15:55	11.21	1559.39
WMW6.9S	828430.55	26734539.19	1570.60	7/12/2017	7:35	11.46	1559.14
WMW6.9S	828430.55	26734539.19	1570.60	8/2/2017	14:02	11.02	1559.58
WMW6.9S	828430.55	26734539.19	1570.60	9/6/2017	14:20	10.96	1559.64
WMW6.9S	828430.55	26734539.19	1570.60	10/3/2017	13:09	10.85	1559.75
WMW6.9S	828430.55	26734539.19	1570.60	11/1/2017	13:50	10.88	1559.72

Notes:
(1) Well coordinates and elevations surveyed by licensed surveyor (Stanley) April 4 through 8, 2016. Coordinate system: State Plane Coordinate System; Elevations are referenced to the North American Datum (NAD) 83 Nevada East Zone (2701) with vertical datum based on NAVD 88 referenced to the City of Henderson Benchmark network.

amsl = Above mean sea level
TOC = Top of casing

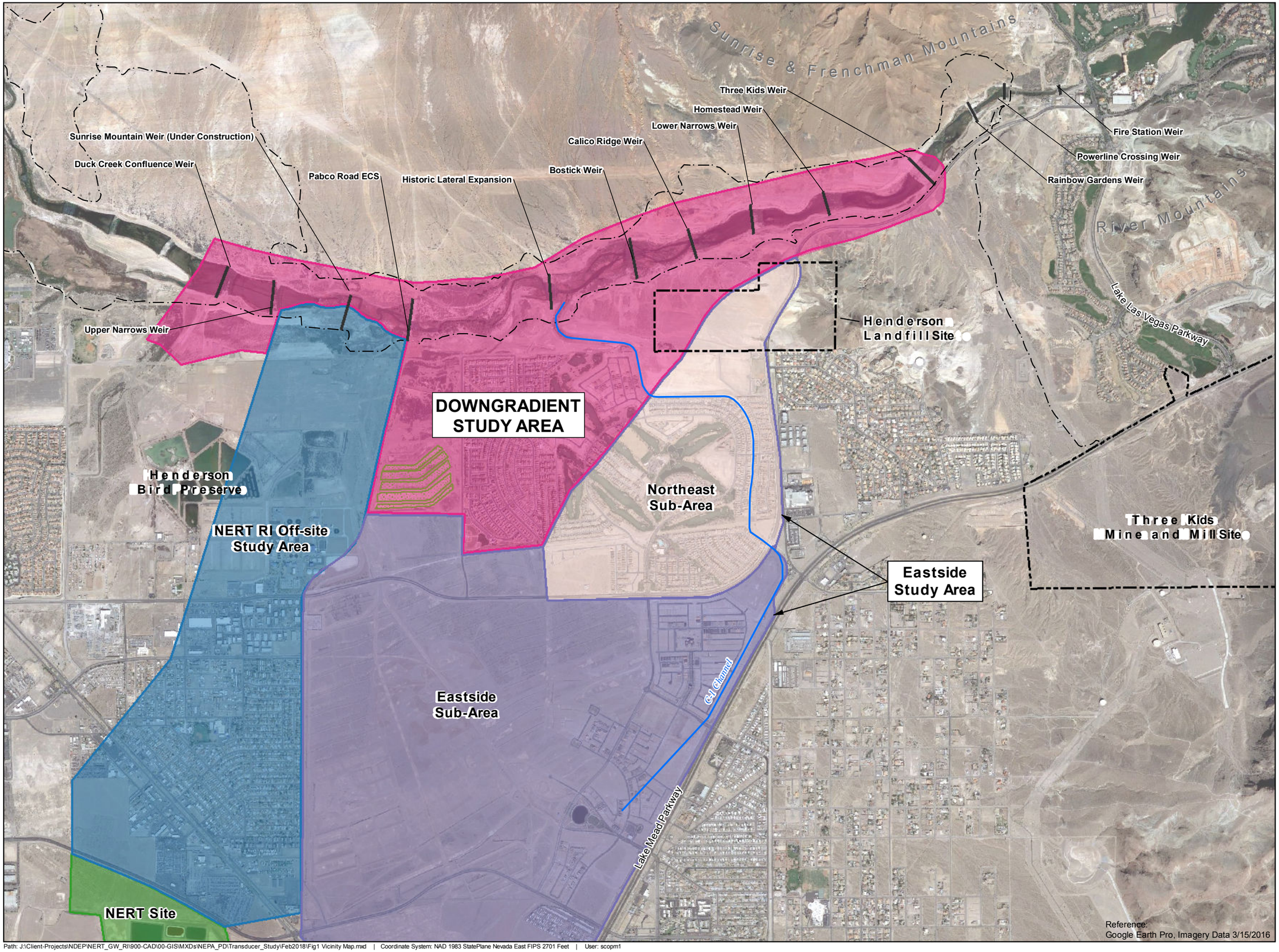
Table 4
Summary of Transducer Data
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Groundwater Level Obserations	Temperature (°F) Observations
AA-30	Water level changes approximately 1.05 feet over the period measured. Water level is higher July through November than in May through July. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Slight increase in temperature May to July with a decrease July to November Temperature varies approximately 0.8 °F during the period measured
COH2B1	Water level changes approximately 1.69 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases 0.8 °F from May to July followed by an increase of 1.2 °F July to November Temperature varies approximately 1.29 °F over the period measured.
LNDMW1	Water level changes approximately 0.65 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature varies 0.22 °F during the period measured
LNDMW2	Transducer stopped recording in September. Water level changes approximately 0.69 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature rises approximately 1.80 °F during the period measured
MW-13	Water level changes approximately 0.49 feet over the period measured. Water level increases over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases approximately 0.73 °F during the period measured
MW-20	Water level changes approximately 1.20 feet over the period measured. The drop in water level in May appears to be related to transducer removal and replacement. The increase in groundwater level is September is three times higher than the other increases in groundwater levels. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature varies 0.26 °F during the period measured
PC-74	Water level decreases May to Mid-July, then increases about 0.4 foot and continues increasing to November. Water level changes approximately 1.22 feet over the period measured.Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases approximately 1.04 °F during the period measured
PC-77	Water level decreases May to Mid-July, then increases about 0.6 foot and continues increasing to November. Water level changes approximately 1.73 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases about 0.5 °F then rises about 0.3 °F Temperature varies approximately 0.83 °F during the period measured
WMW3.5N	Drop in water level on May 15th is likely from transducer removal and replacement. Water level changes approximately 0.44 feet over the period measured - Well is near Bird Ponds. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature varies 0.23 °F during the period measured

Table 4
Summary of Transducer Data
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Groundwater Level Obserations	Temperature (°F) Observations
WMW3.5S	Groundwater level data appear to be affected by transducer removal and replacement in May and August. Water level record changes approximately 1.99 feet over the period measured but is affected by transducer removal and replacement. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature increases 2.6 °F during the period measured
WMW4.9N	Water level changes approximately 0.55 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases 0.38 °F degrees during the period measured
WMW4.9S	Water level changes approximately 0.80 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases 4 °F then raises 3 °F Temperature varies approximately 4.26 °F during the period measured
WMW5.5S	Water level changes approximately 1.02 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature increases approximately 1.79 °F over the period measured
WMW5.58S1	Water level changes approximately 1.71 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature increases 16 °F (69 to 85) to September then falls 5 °F to November.
WMW5.7N	Water level changes approximately 1.98 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature increases 13 °F (73 to 86) the decreases 8 °F in November.
WMW6.15N	Water level decreases approximately 0.63 feet over the period measured. Groundwater level changes between July and September do not reflect increased surface water flows in LVW based on USGS gage data.	Temperature decreases approximately 0.38. °F over the period measured.
WMW6.15S	Water level changes approximately 1.68 feet over the period measured, however some appear to be related to transducer removal and replacement. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature increases approximately 6.97 °F during the period measured.
WMW6.55S	Water level change in May appears to be related to transducer removal and replacement. Water level changes approximately 1.37 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases approximately 0.95 °F over the period measured.
WMW6.9N	Water level change in May appears related to removal and replacement of transducer. 'Water level changes approximately 0.75 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases approximately 0.59 °F over the period measured.
WMW6.9S	Water level decreases May to July, then increases 0.4 to 0.8 foot, and continues increasing to November. 'Water level changes approximately 1.21 feet over the period measured. Increased groundwater levels between July and September coincide with increased surface water levels in LVW based on USGS stream gauge data.	Temperature decreases approximately 1.54 °F May to September then increases slightly

Figures



Legend

- Wetlands Trail
- Channels
- Northern Rapid Infiltration Basins
- Downgradient Study Area
- NERT Eastside Study Area
- BRC Eastside Sub-Area
- Northeast Sub-Area
- Off-Site NERT RI Study Area
- NERT Site

NORTH

0 2,000
Feet

Scale 1:24,000
1 inch = 2,000 feet

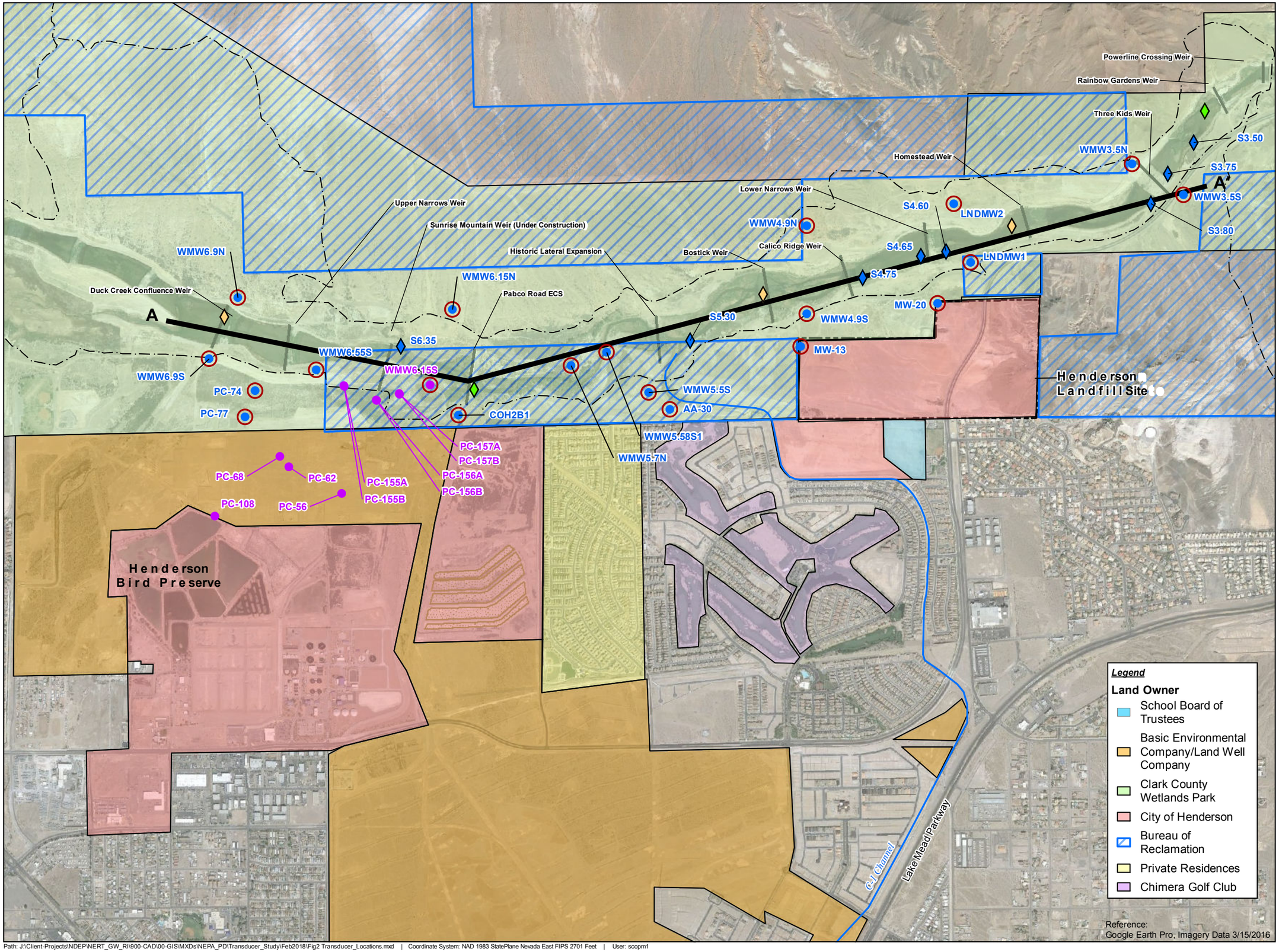
NERT
Downgradient Study Area

DOWNGRADIENT STUDY AREA LOCATION MAP

Date: 8/29/2018 Project: 60477365

AECOM **Figure 1**

Path: J:\Client-Projects\NDEP\NERT_GW_RI\900-CAD\00-GIS\MXDs\NEPA_PD\Transducer_Study\Feb2018\Fig1 Vicinity Map.mxd | Coordinate System: NAD 1983 StatePlane Nevada East FIPS 2701 Feet | User: scopm1



Legend

- Location of Transducer Installation in Existing Well
- NERT Transducer Well
- Approximate Location of Temporary USGS Stream Gage
- Approximate Location of Permanent USGS Stream Gage
- Approximate Location of Staff Gage Installation
- Wetlands Trail
- C-1 Channel
- Northern Rapid Infiltration Basins
- A A' Cross Section Line

Note:

In August 2017 the transducers in wells PC-62, PC-68 and PC-108 were removed. One of these transducers was put in well PC-56.

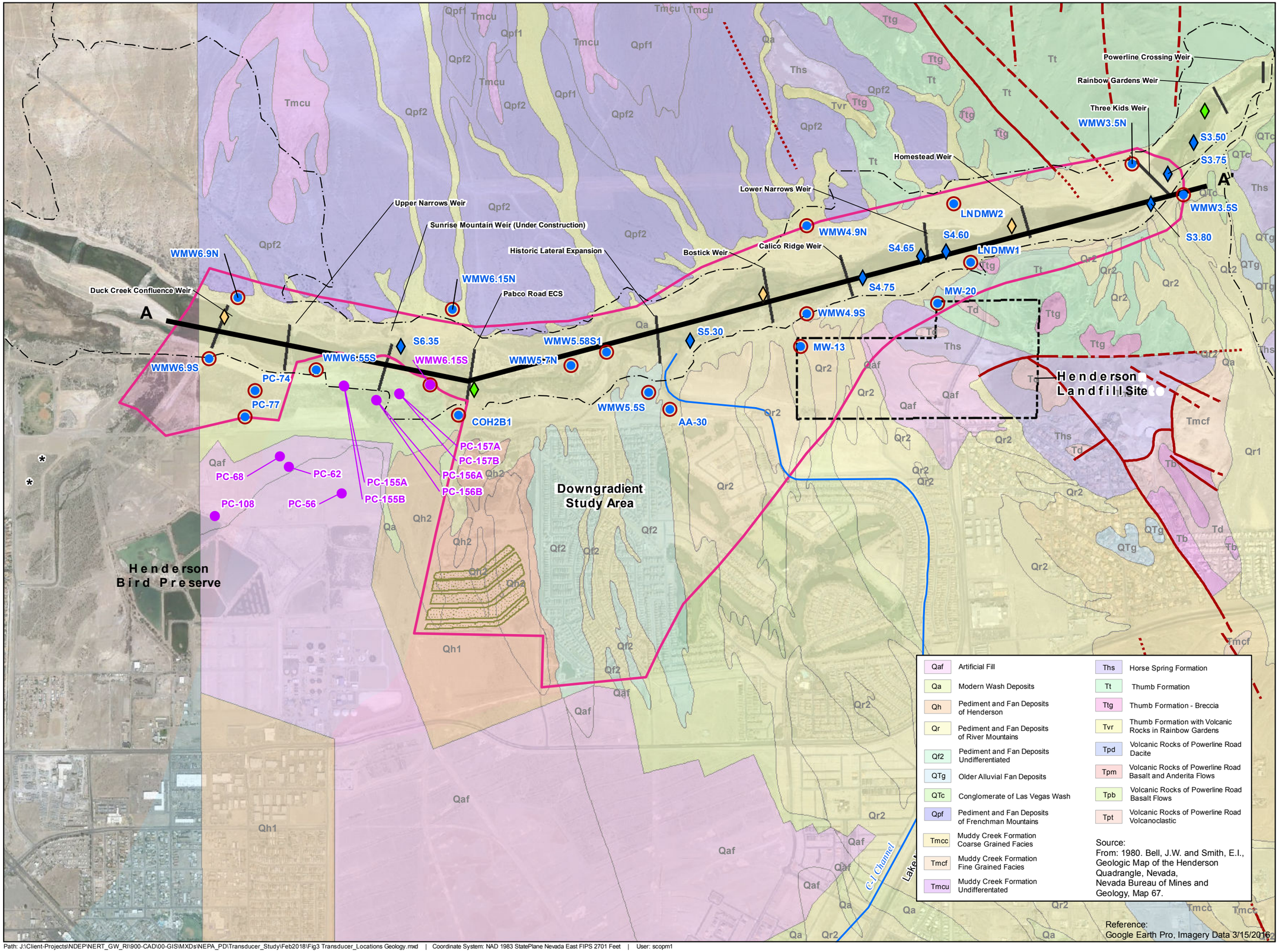
0 1,500
Feet
Scale 1:18,000
1 inch = 1,500 feet

NERT
Downgradient Study Area

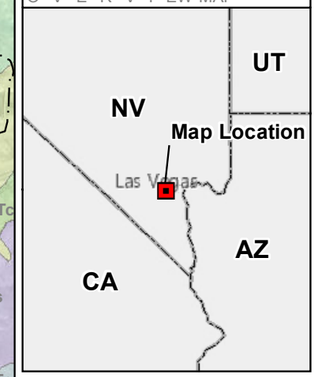
TRANSDUCER INSTALLATION LOCATIONS AND LAND OWNERSHIP

Date: 8/29/2018 Project: 60477365

AECOM **Figure 2**



O V E R V I EW MAP



Legend

- Location of Transducer Installation in Existing Well
- NERT Transducer Well
- Approximate Location of Temporary USGS Stream Gage
- Approximate Location of Permanent USGS Stream
- Approximate Location of Staff Gage Installation
- Wetlands Trail
- C-1 Channel
- Northern Rapid Infiltration Basins
- Downgradient Study Area
- Fault, dashed where inferred, dotted where concealed
- A A' Cross Section Line

Note:

In August 2017 the transducers in wells PC-62, PC-68 and PC-108 were removed. One of these transducers was put in well PC-56.

0 1,500
Feet
Scale 1:18,000
1 inch = 1,500 feet

Qaf	Artificial Fill	Ths	Horse Spring Formation
Qa	Modern Wash Deposits	Tt	Thumb Formation
Qh	Pediment and Fan Deposits of Henderson	Ttg	Thumb Formation - Breccia
Qr	Pediment and Fan Deposits of River Mountains	Tvr	Thumb Formation with Volcanic Rocks in Rainbow Gardens
Qf2	Pediment and Fan Deposits Undifferentiated	Tpd	Volcanic Rocks of Powerline Road Dacite
QTg	Older Alluvial Fan Deposits	Tpm	Volcanic Rocks of Powerline Road Basalt and Anderita Flows
QTc	Conglomerate of Las Vegas Wash	Tpb	Volcanic Rocks of Powerline Road Basalt Flows
Qpf	Pediment and Fan Deposits of Frenchman Mountains	Tpt	Volcanic Rocks of Powerline Road Volcanoclastic
Tmcc	Muddy Creek Formation Coarse Grained Facies		
Tmcf	Muddy Creek Formation Fine Grained Facies		
Tmcu	Muddy Creek Formation Undifferentated		

Source:
From: 1980. Bell, J.W. and Smith, E.I., Geologic Map of the Henderson Quadrangle, Nevada, Nevada Bureau of Mines and Geology, Map 67.

Reference:
Google Earth Pro, Imagery Data 3/15/2016

NERT
Downgradient Study Area

TRANSDUCER INSTALLATION LOCATIONS WITH GEOLOGY

Date: 8/29/2018 Project: 60477365

AECOM

Figure 3

Figure 4
USGS Gage at Pabco Road

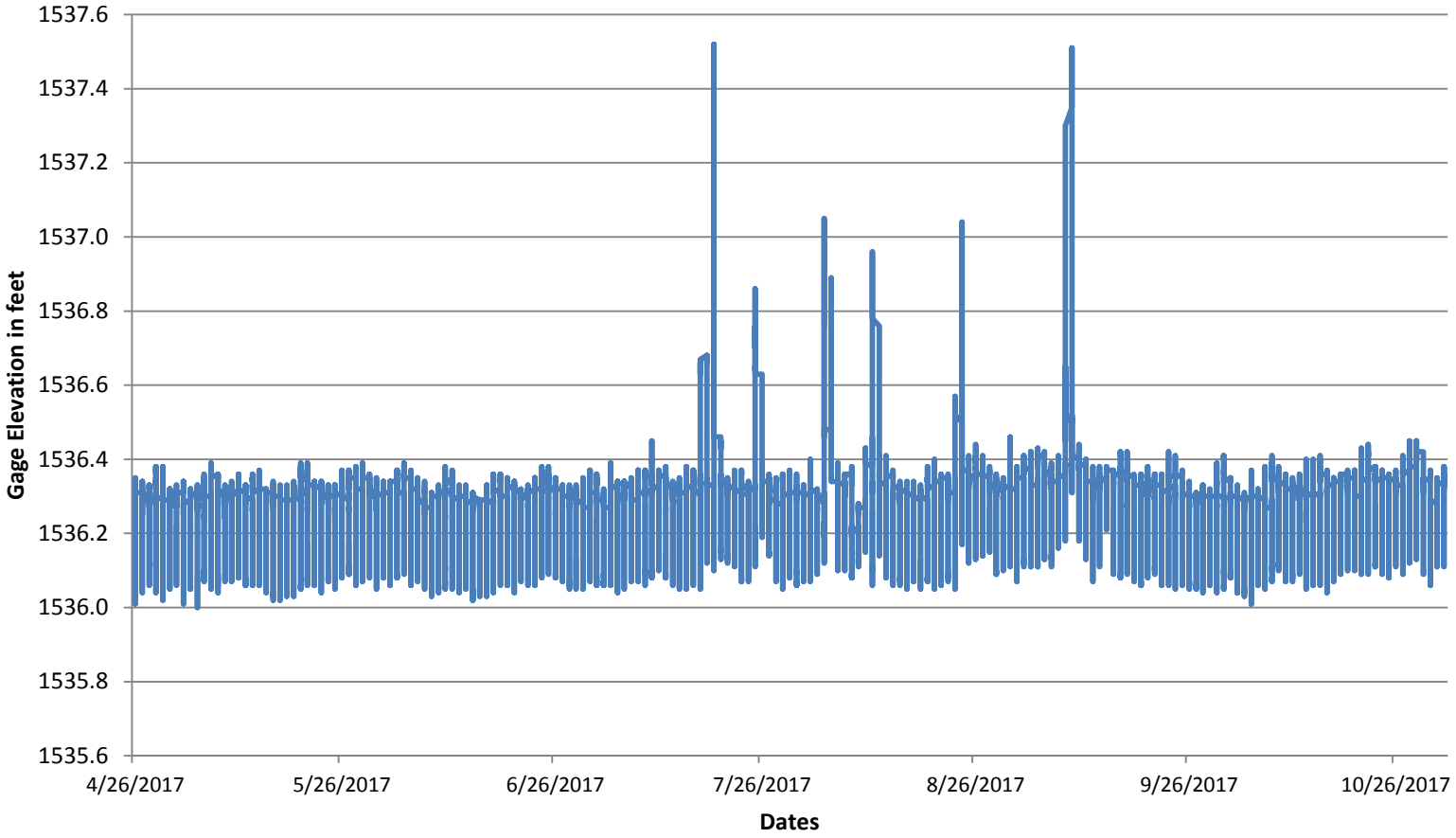
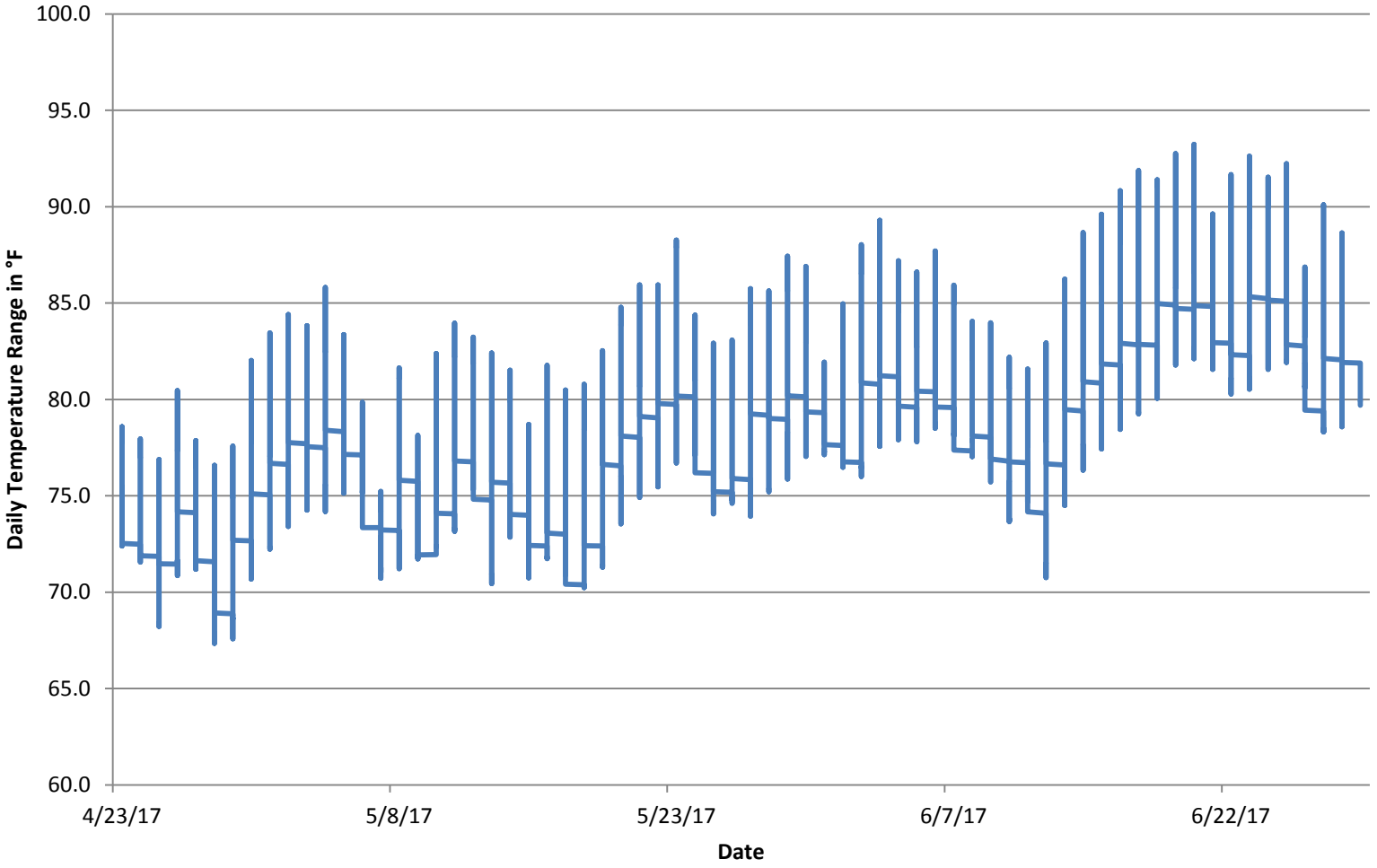
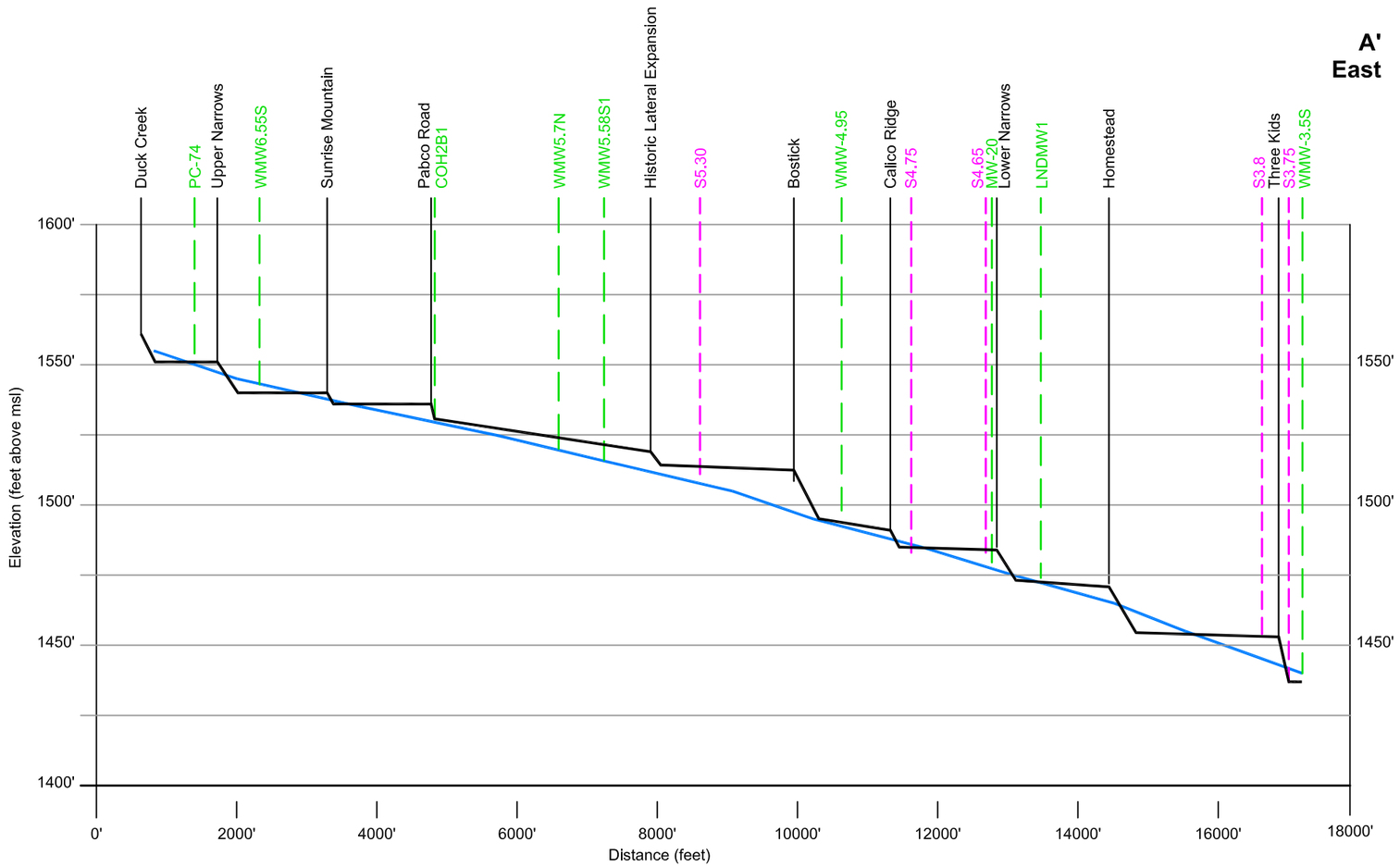


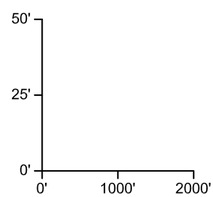
Figure 5
Surface Water Temperature from Gage S5.30
near Historic Lateral Weir

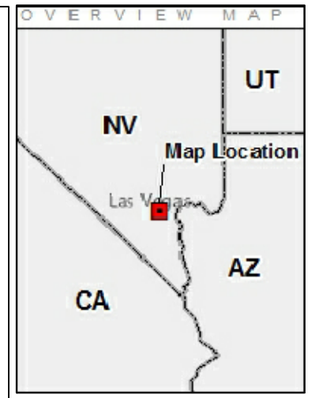


A
West

A'
East







Legend

- Surface Water Elevation
- Groundwater Elevation Based on Transducer Information in Nearby Monitoring Wells, (May 2, 2017; 12:00pm).
- Location of Staff Gage, Reference for Surface Water Gaging
- Location of Transducers in Monitoring Wells; Reference for Groundwater Elevation.
- Location of Weir

NERT
Downgradient Study Area

SCHEMATIC CROSS SECTION OF SURFACE WATER AND GROUNDWATER ELEVATION ALONG LAS VEGAS WASH

Date: 8/29/2018 Project: 60477365

AECOM

Figure 6

Appendix A

Response to Comments

Stakeholder comments, when received, will be responded to in this appendix.

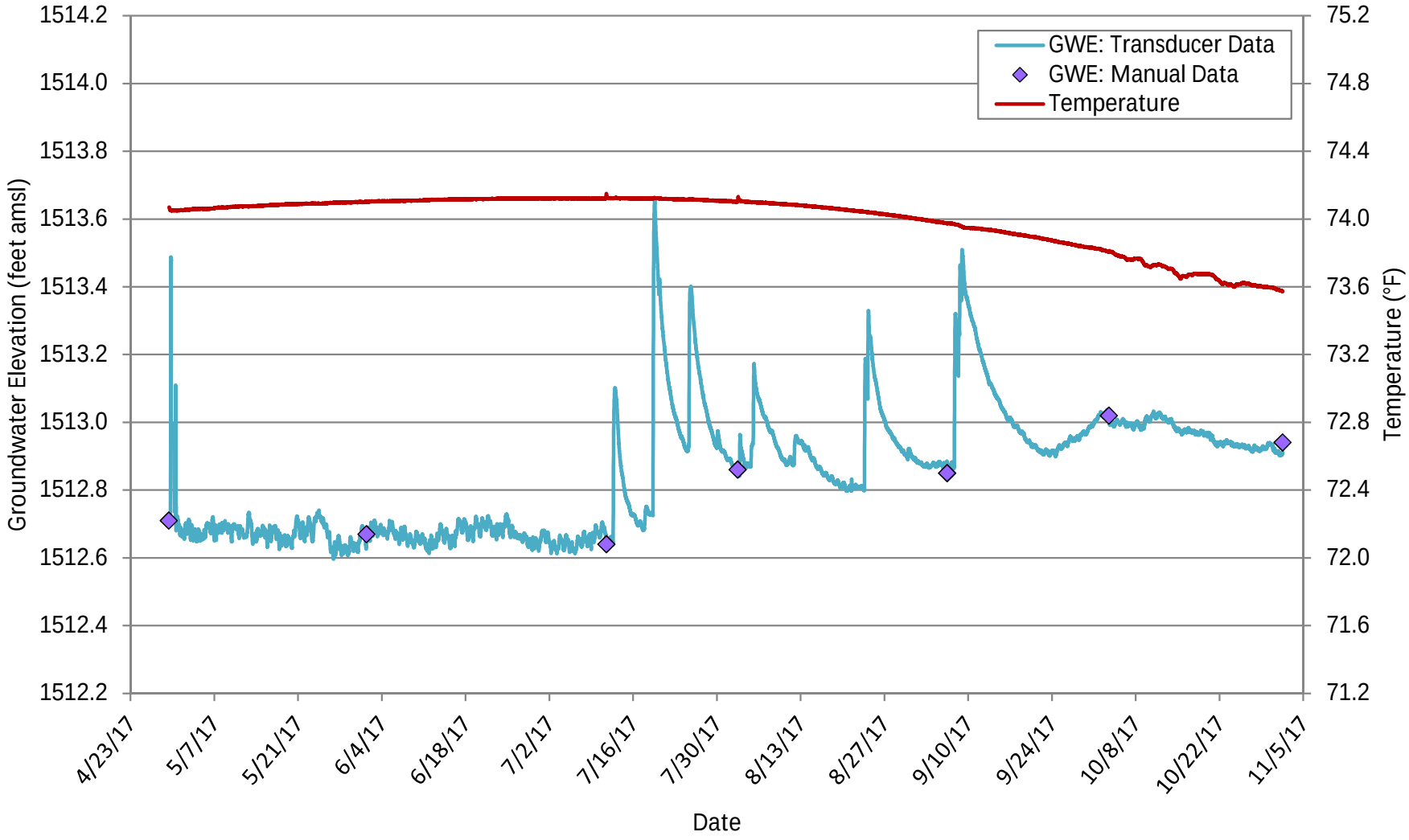
Appendix B

Transducer Data (electronic files)

Appendix C

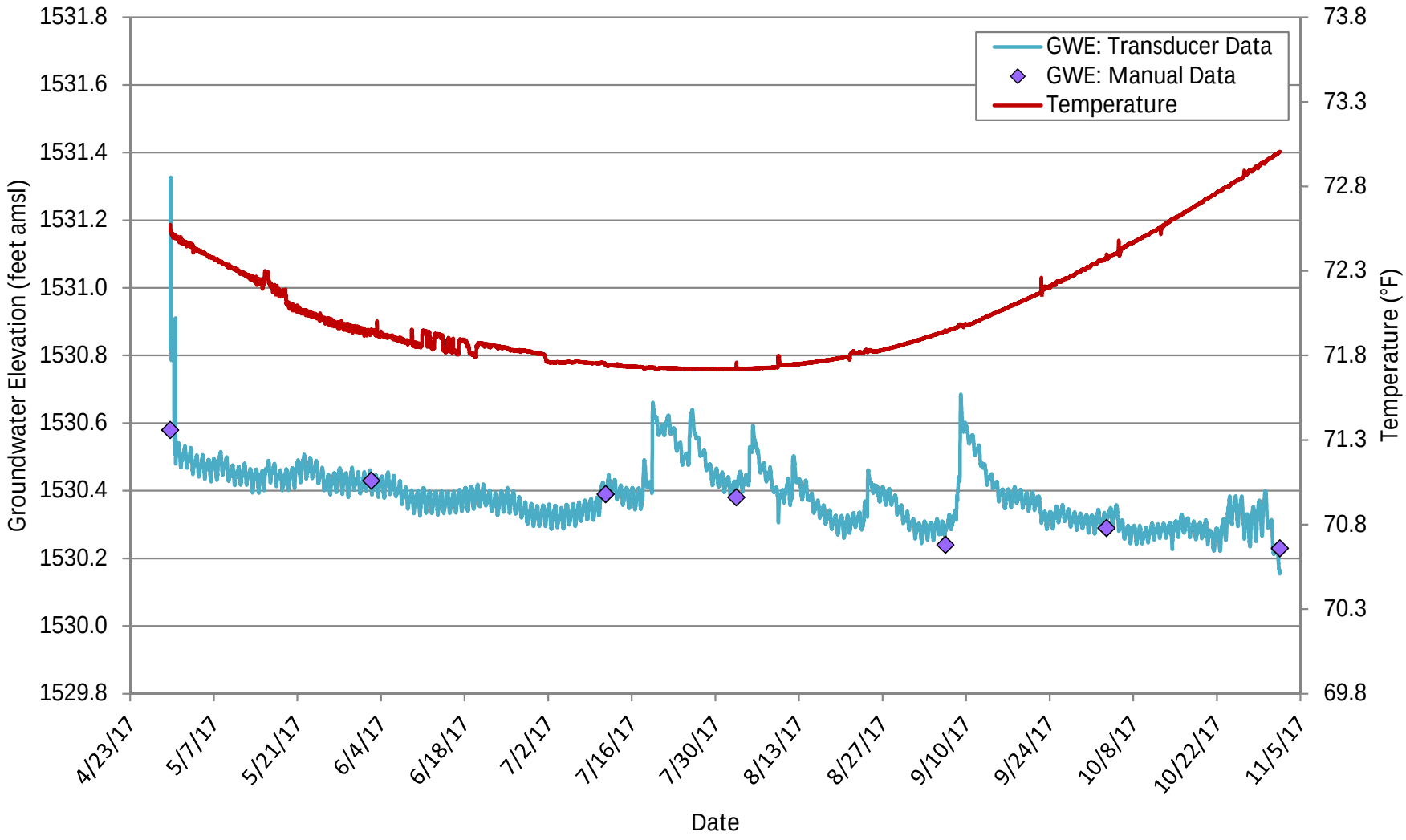
Hydrographs and Temperature Graphs

AA-30 Hydrograph



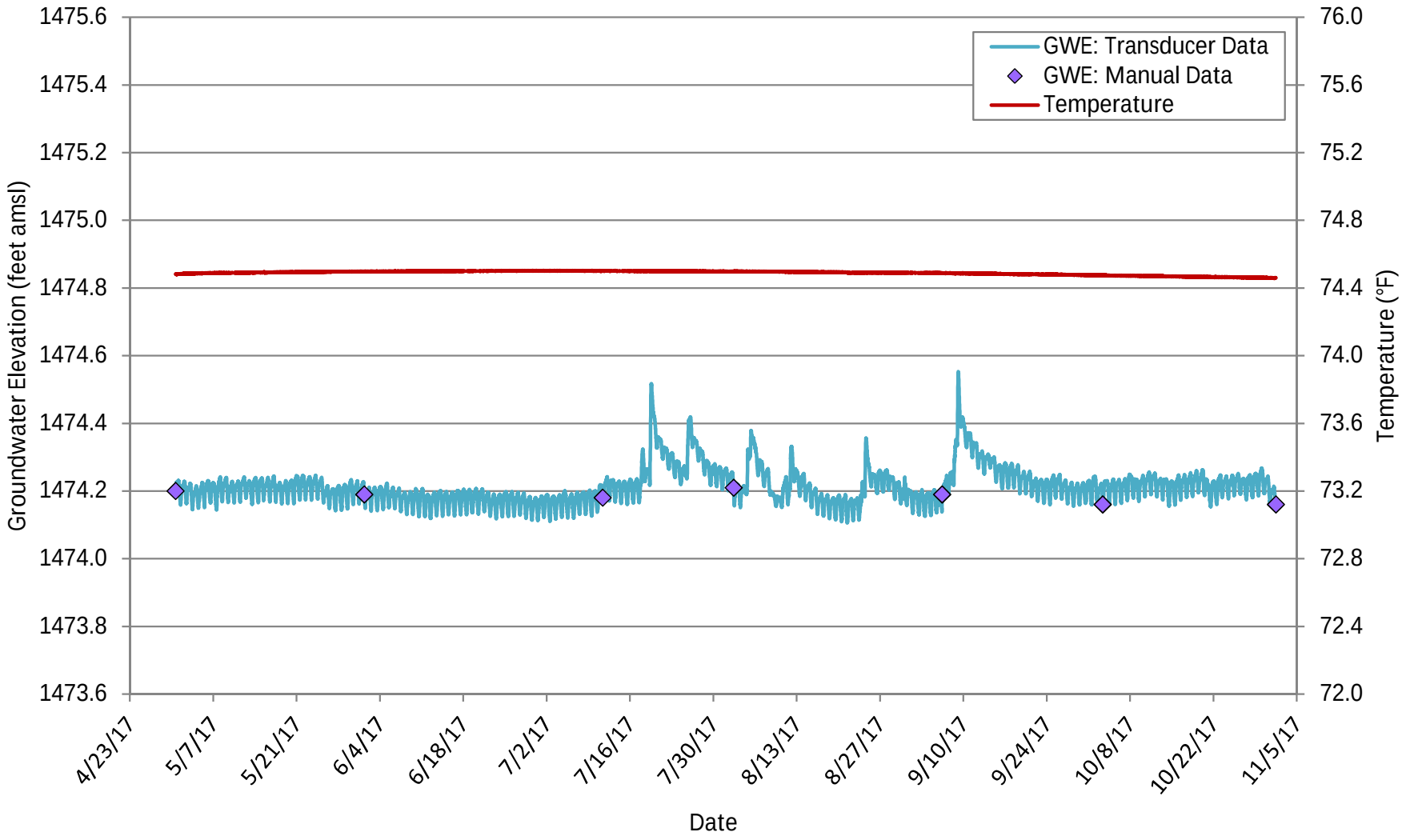
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

COH2B1 Hydrograph



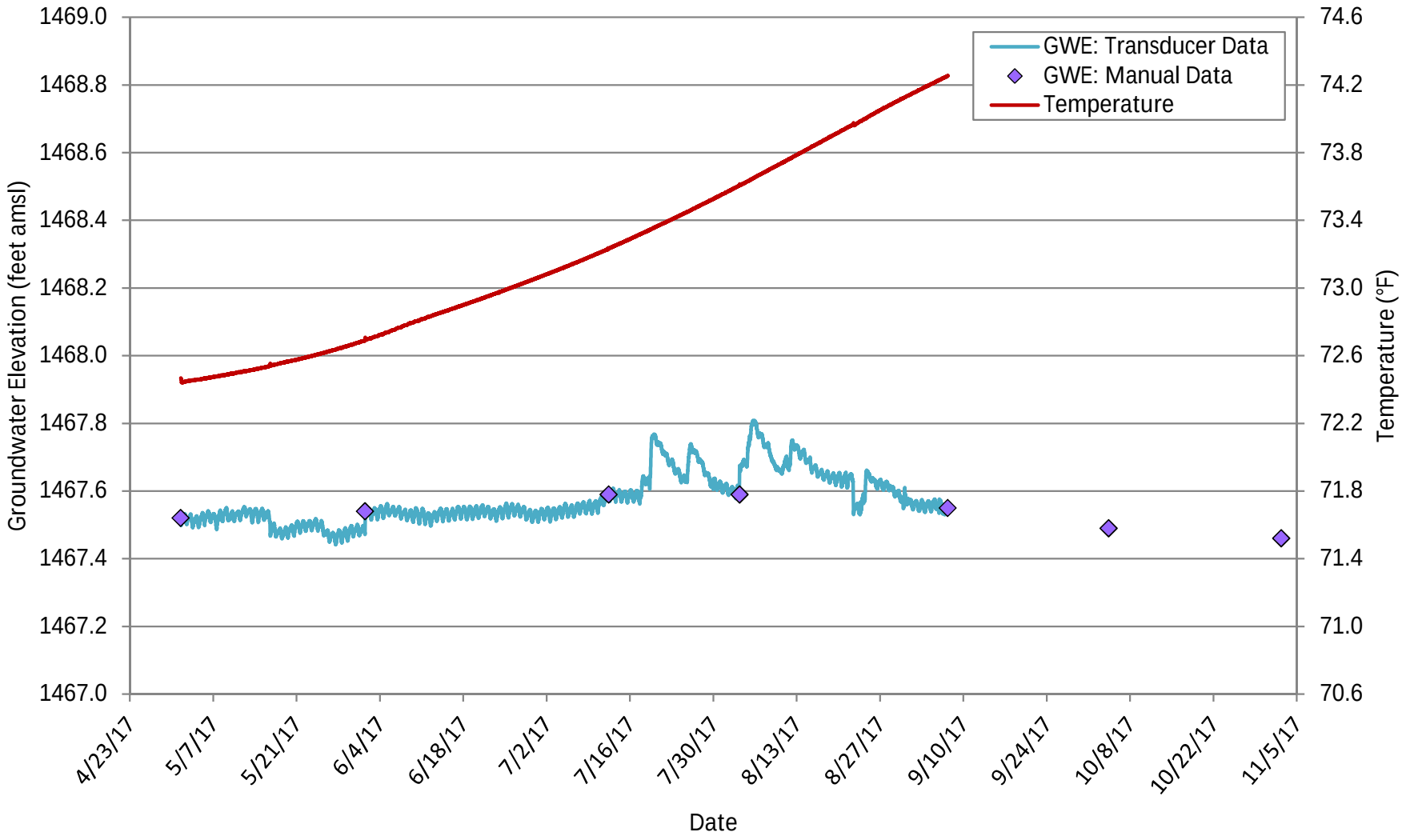
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

LNDMW1 Hydrograph



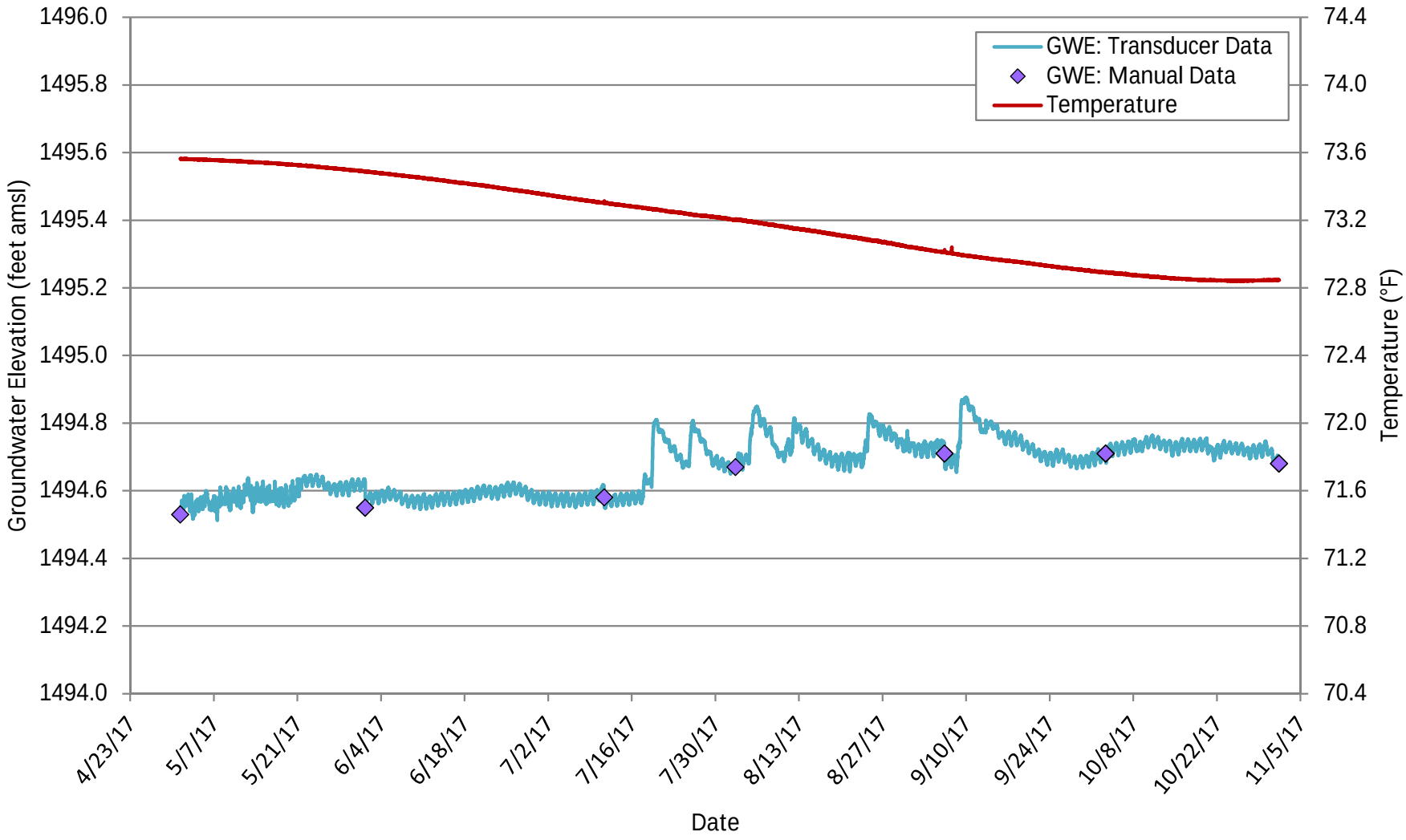
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

LNDMW2 Hydrograph



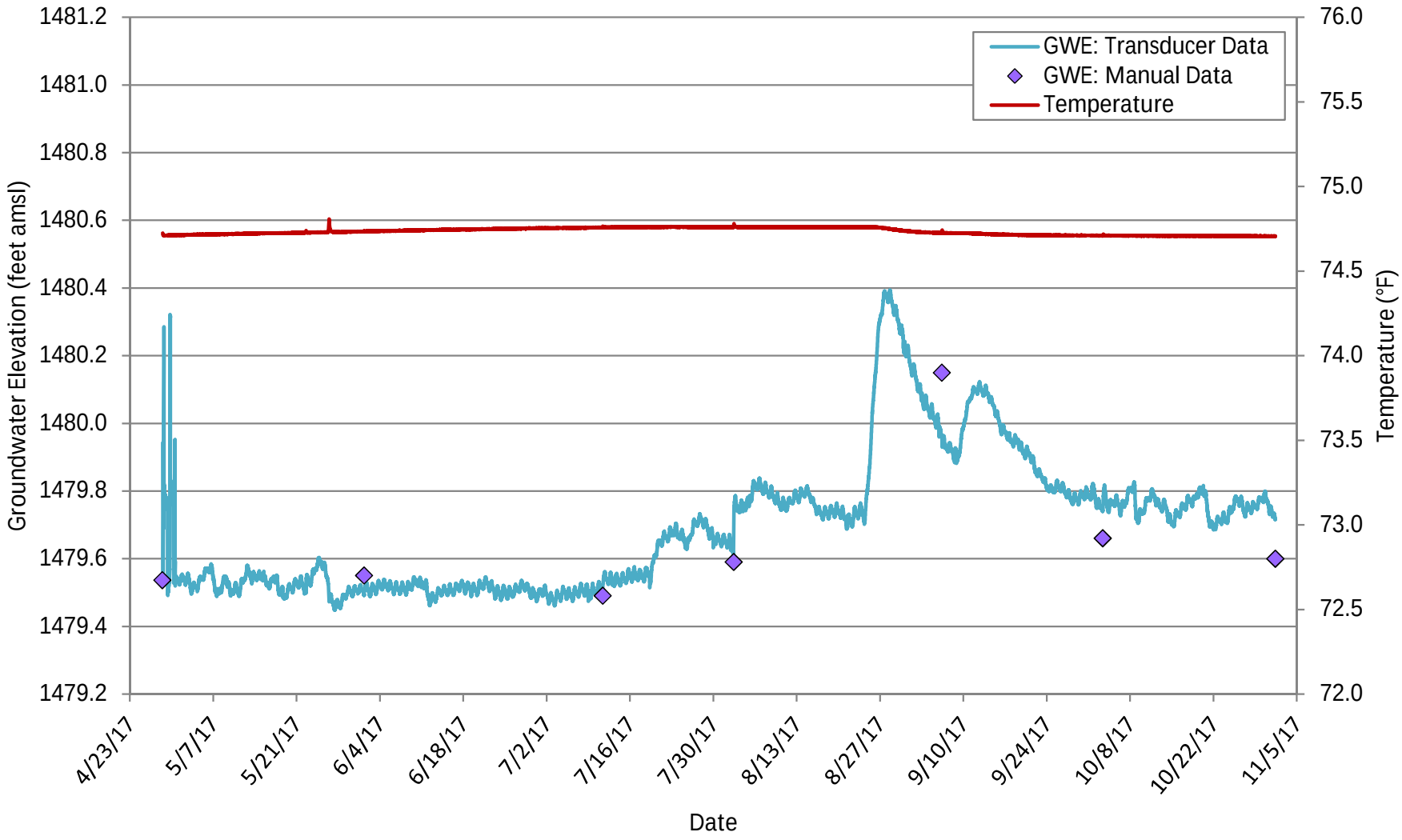
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

MW-13 Hydrograph



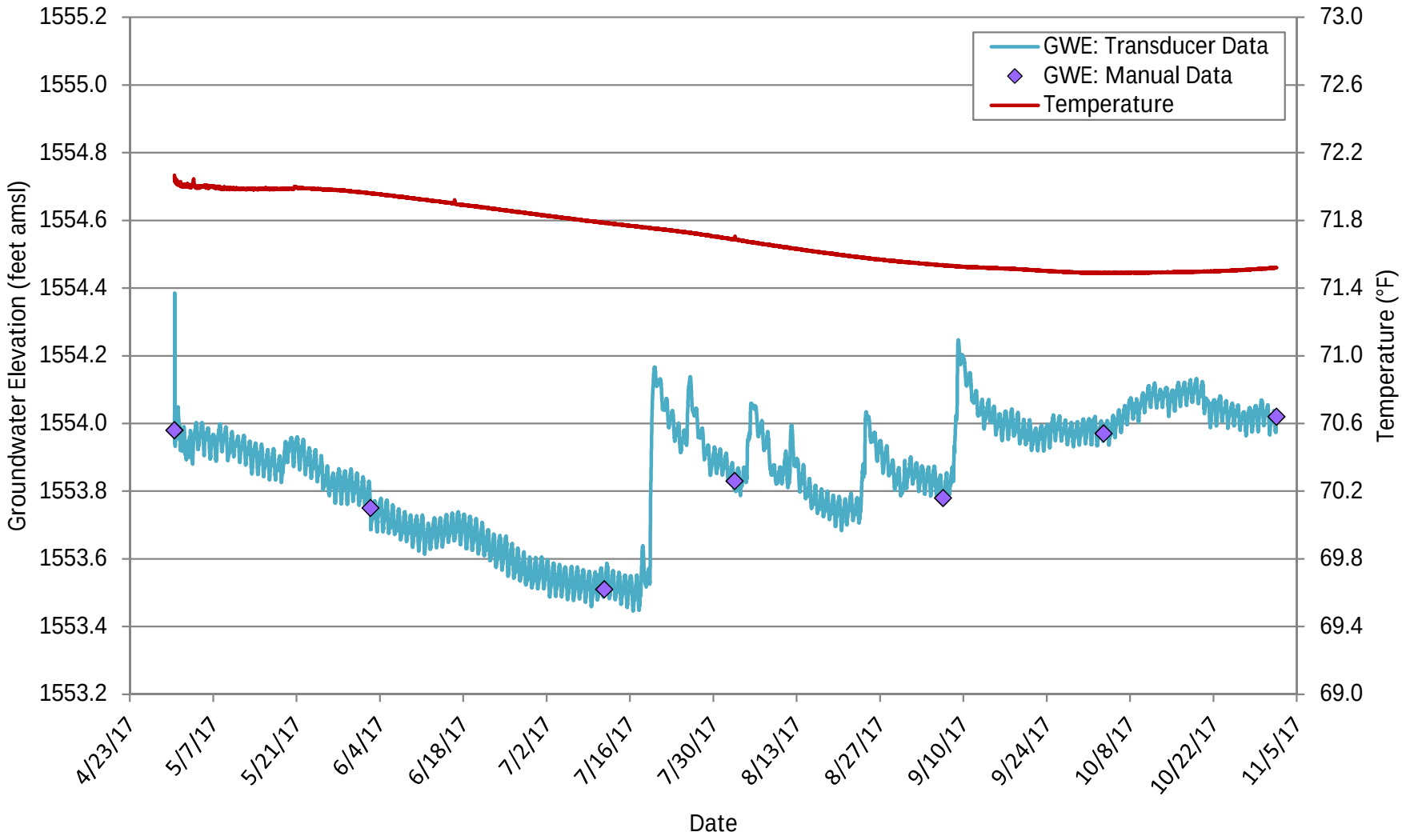
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

MW-20 Hydrograph



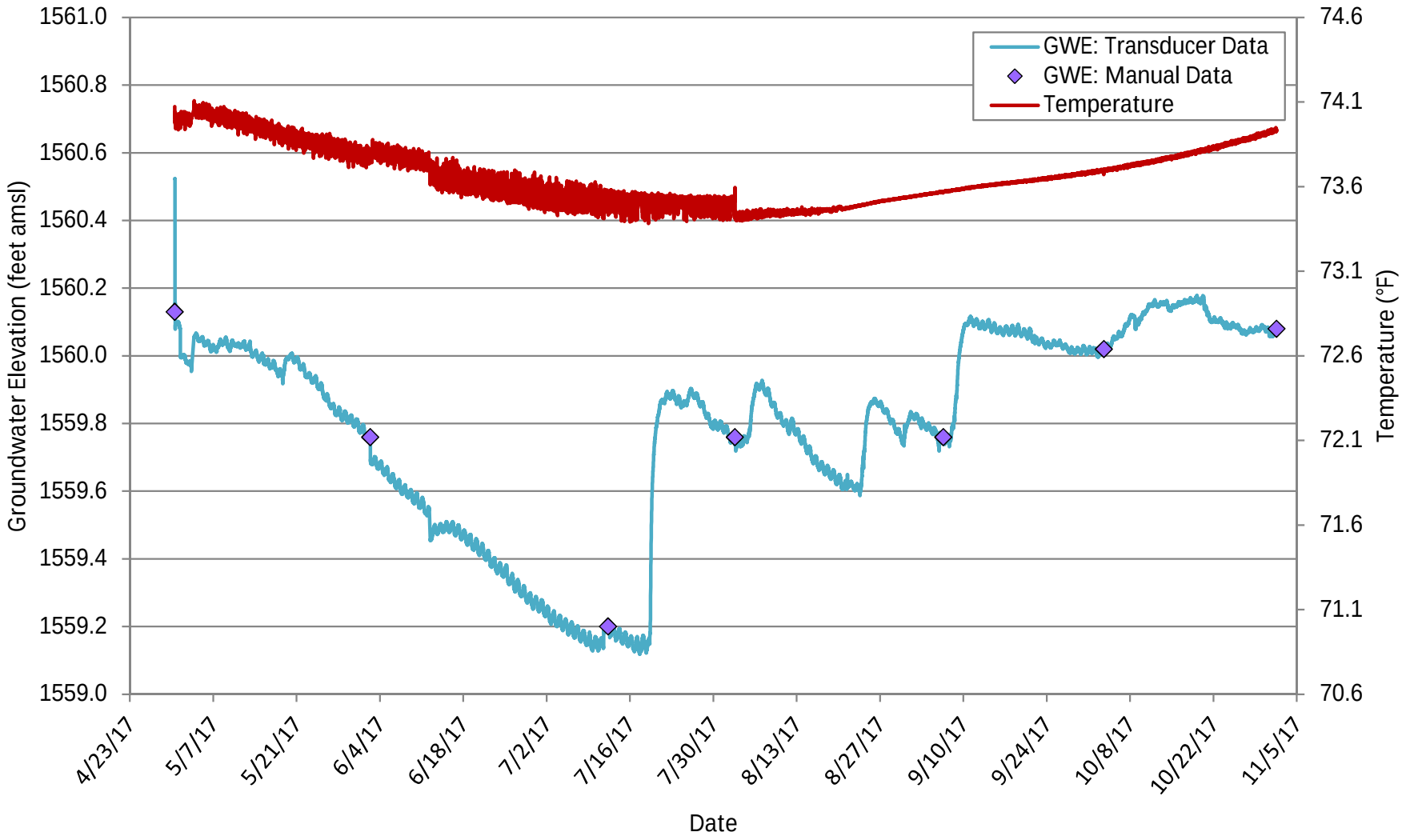
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

PC-74 Hydrograph



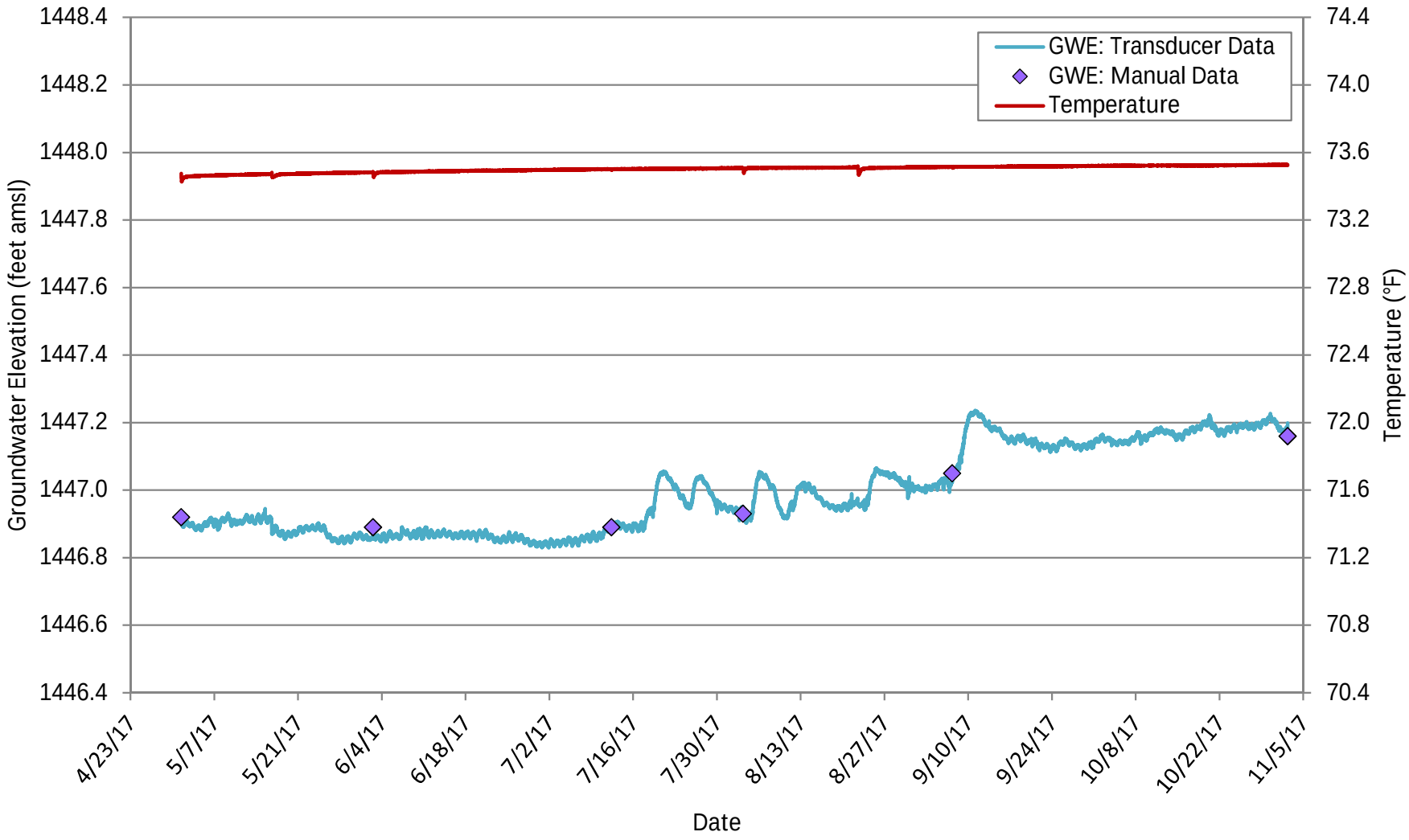
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

PC-77 Hydrograph



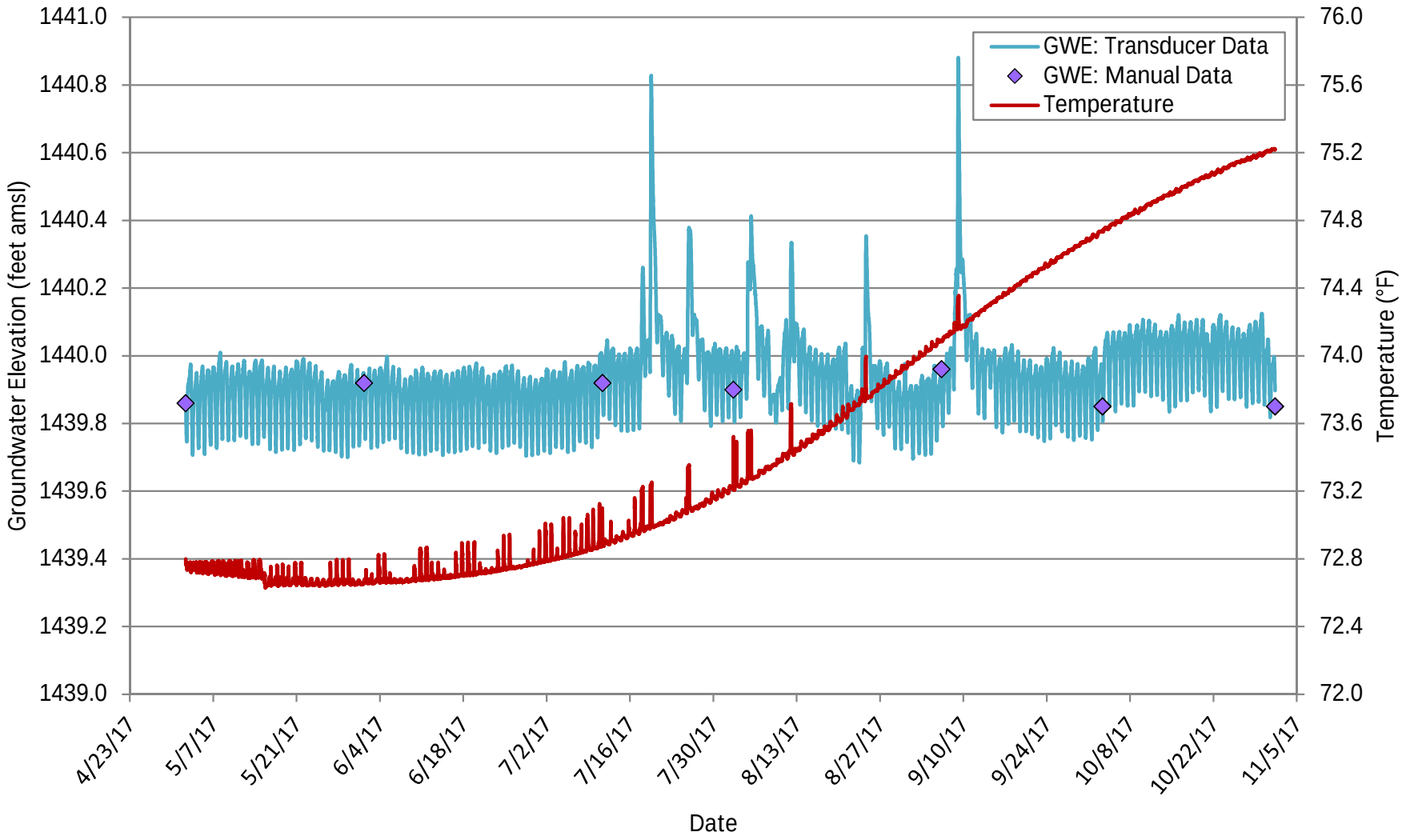
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW3.5N Hydrograph



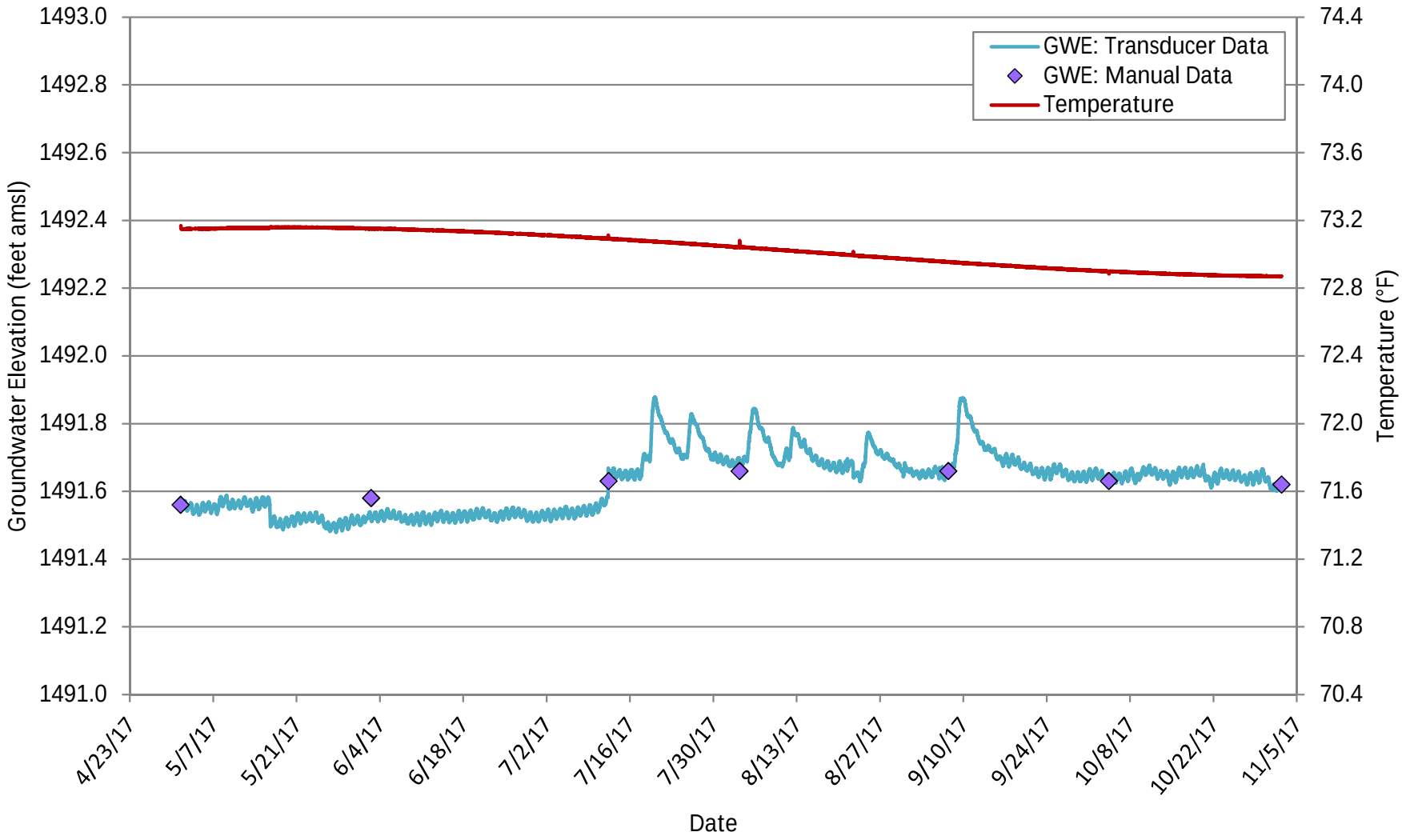
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW3.5S Hydrograph



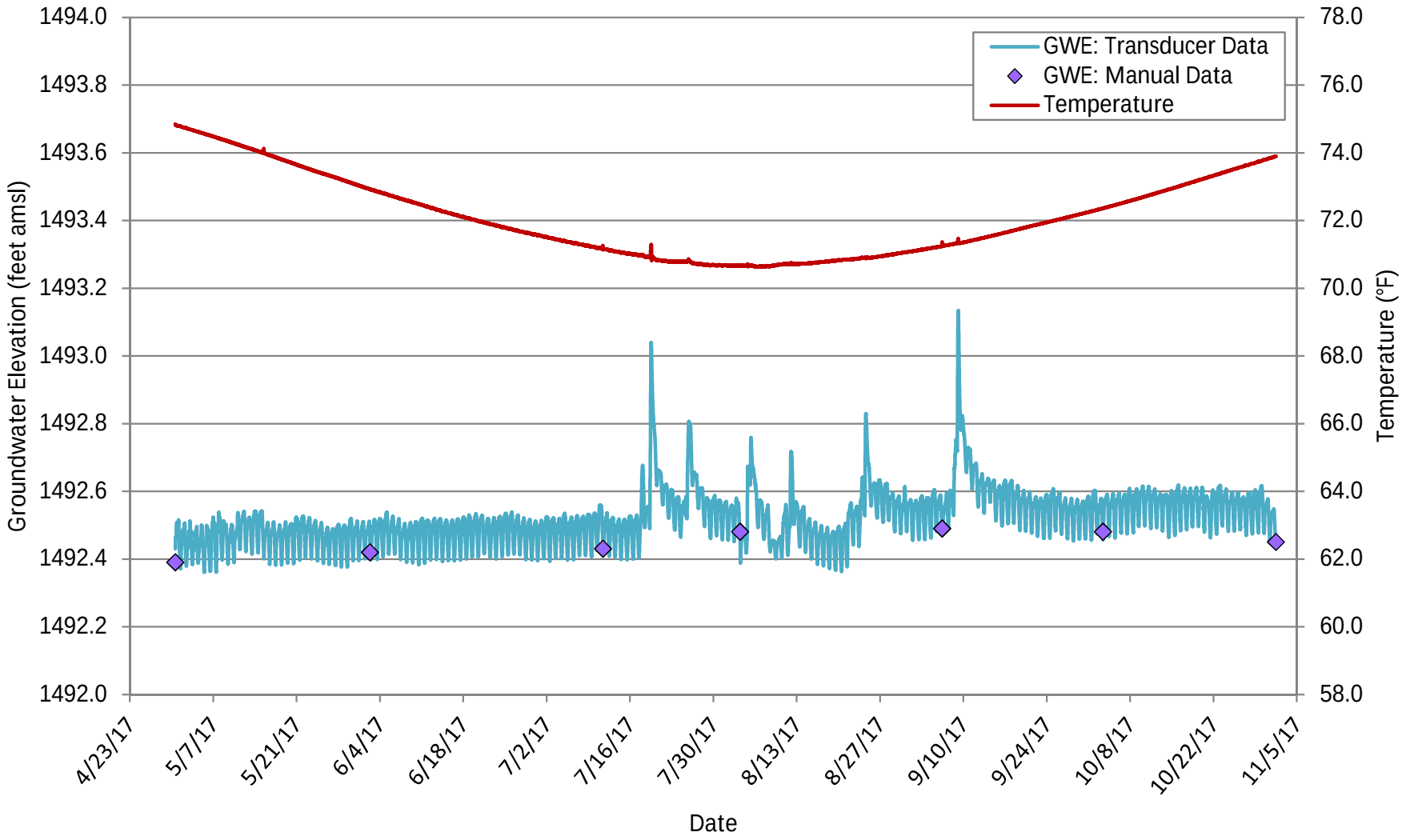
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW4.9N Hydrograph



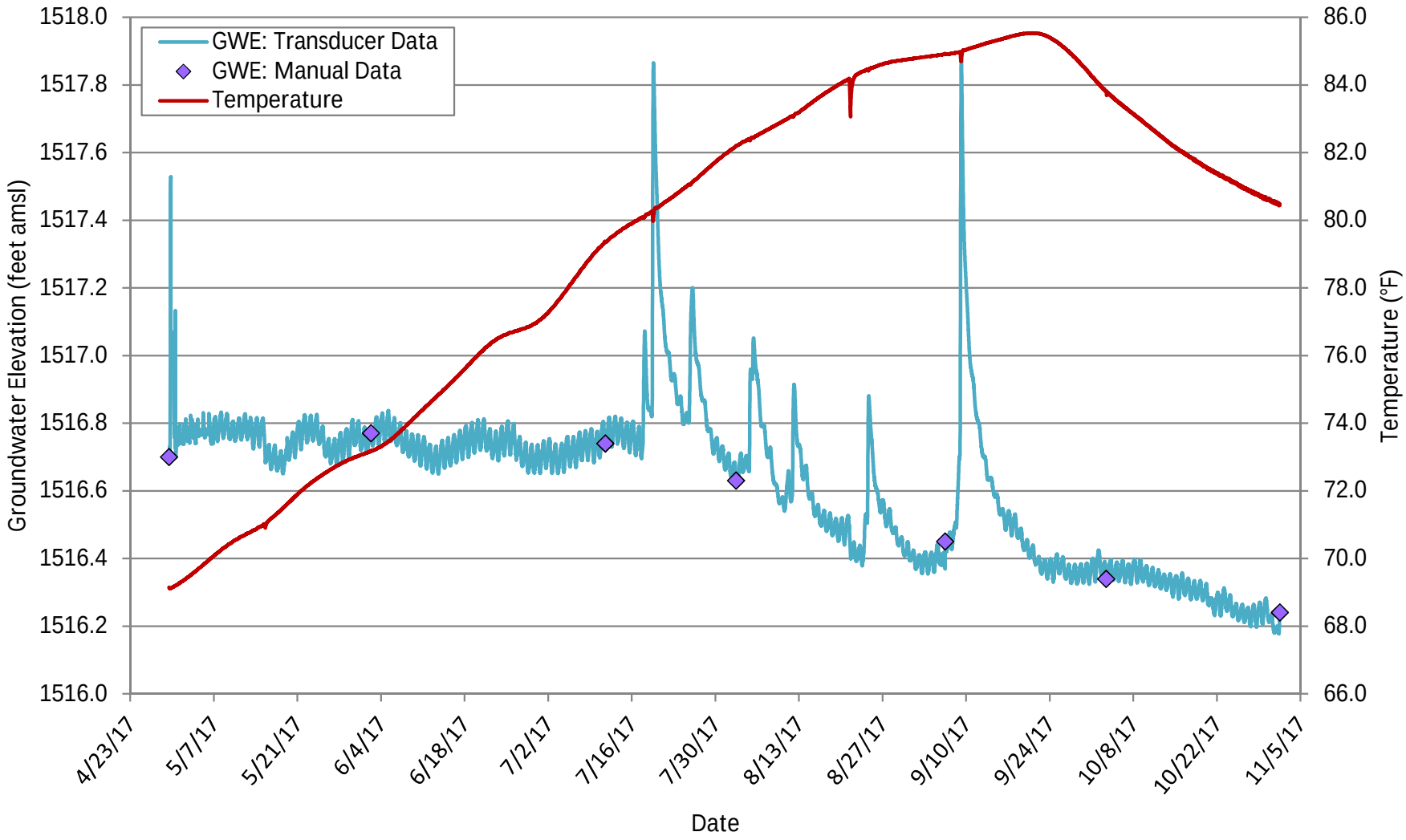
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW4.9S Hydrograph



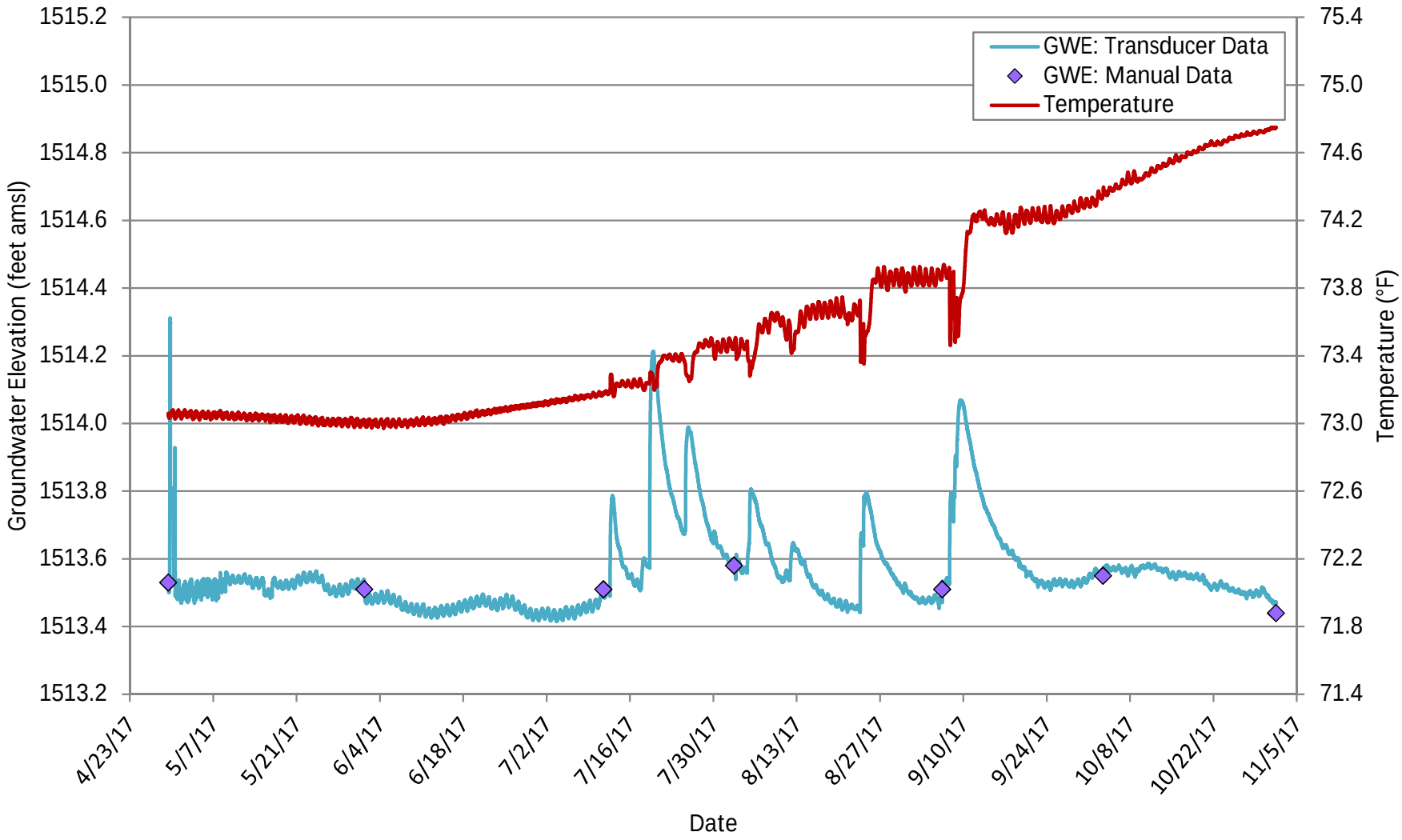
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW5.58S1 Hydrograph



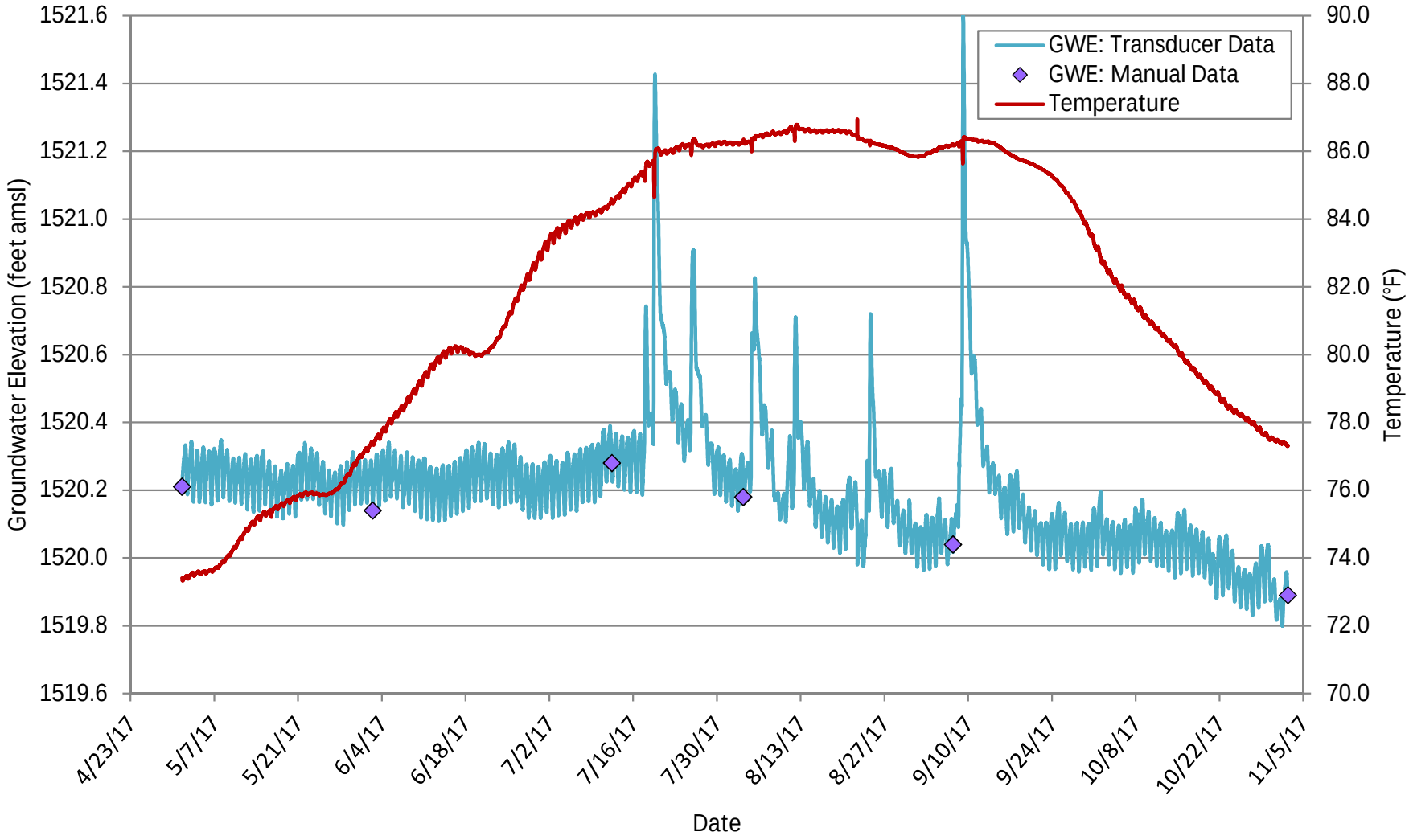
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW5.5S Hydrograph



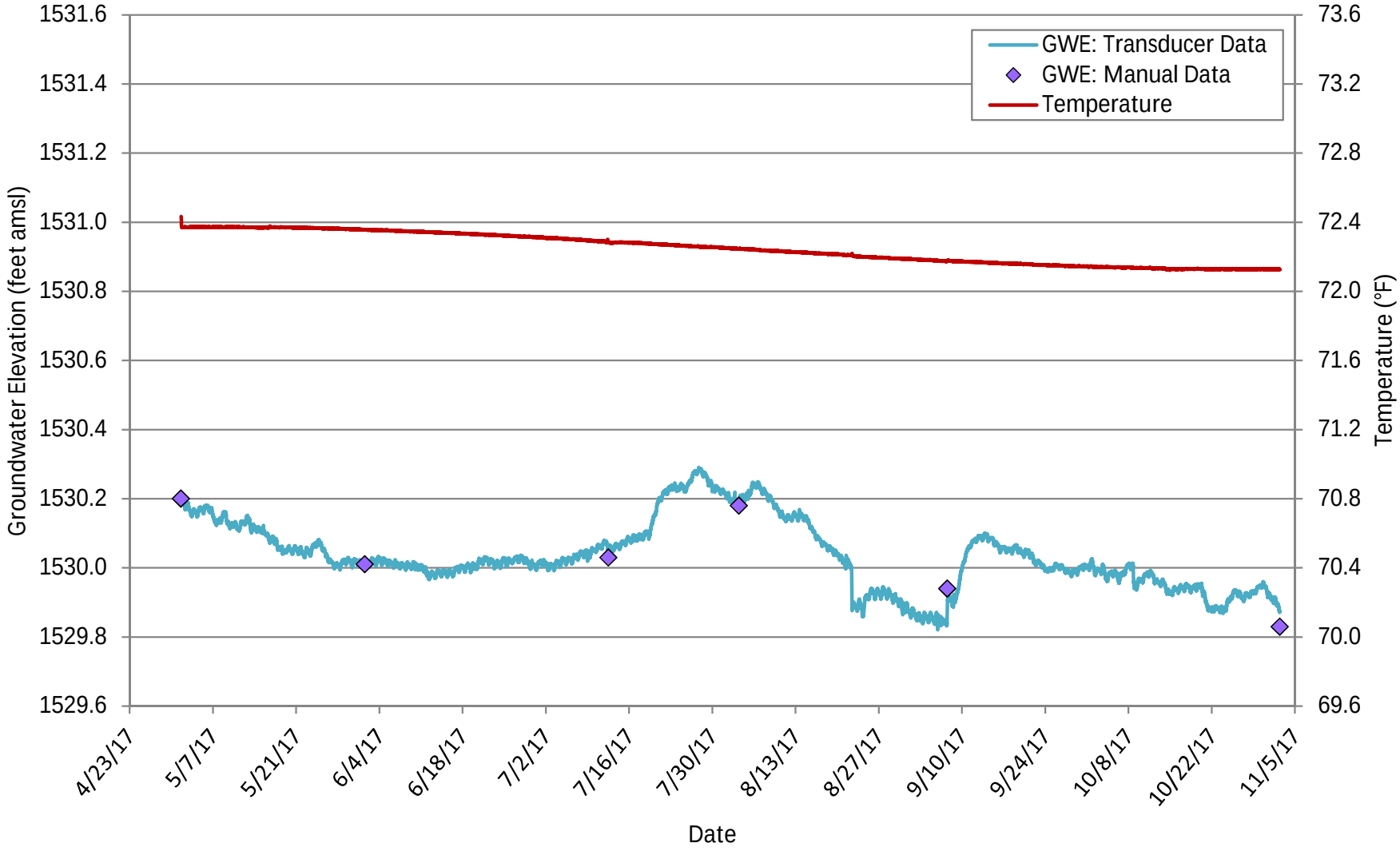
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW5.7N Hydrograph



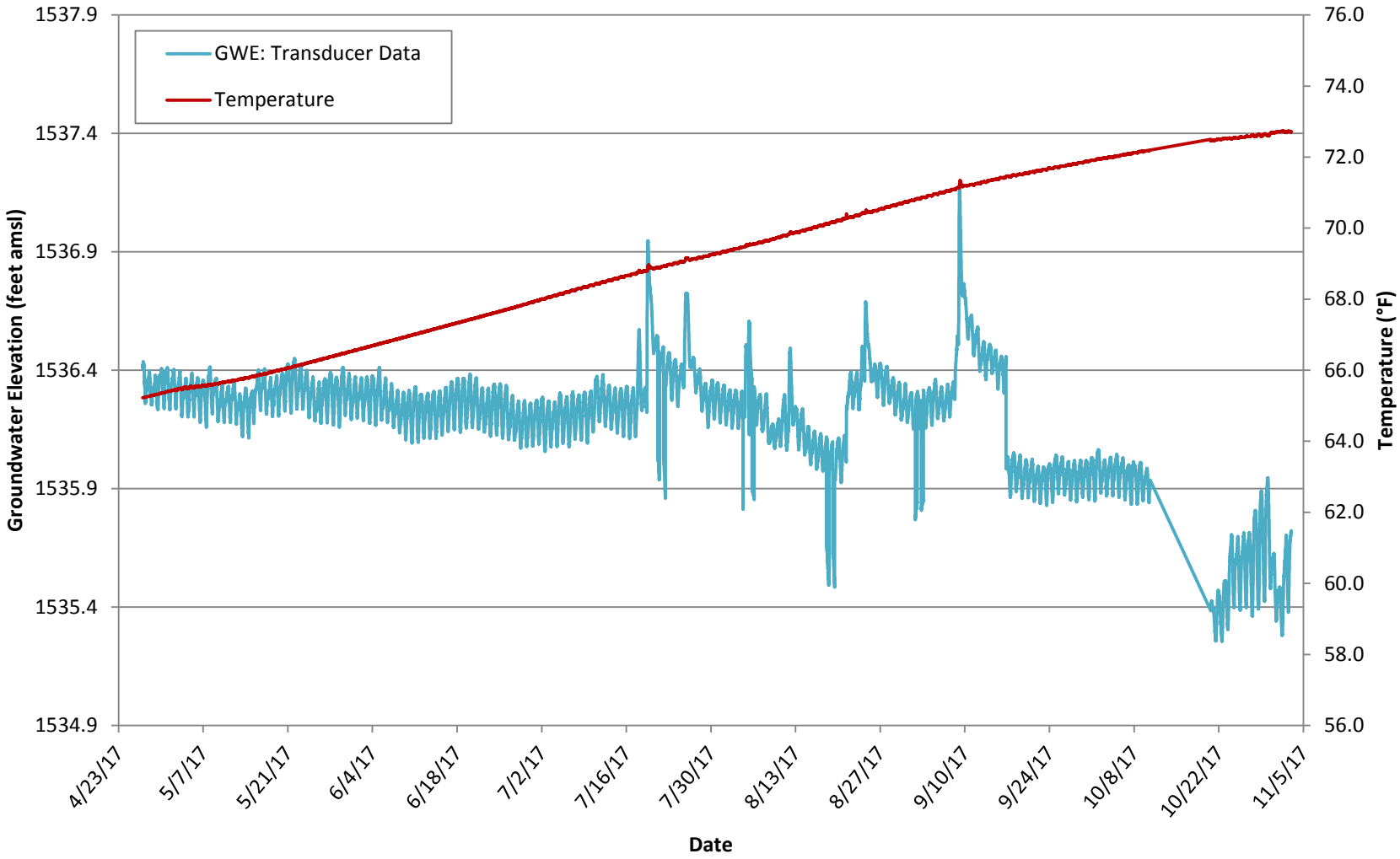
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW6.15N Hydrograph



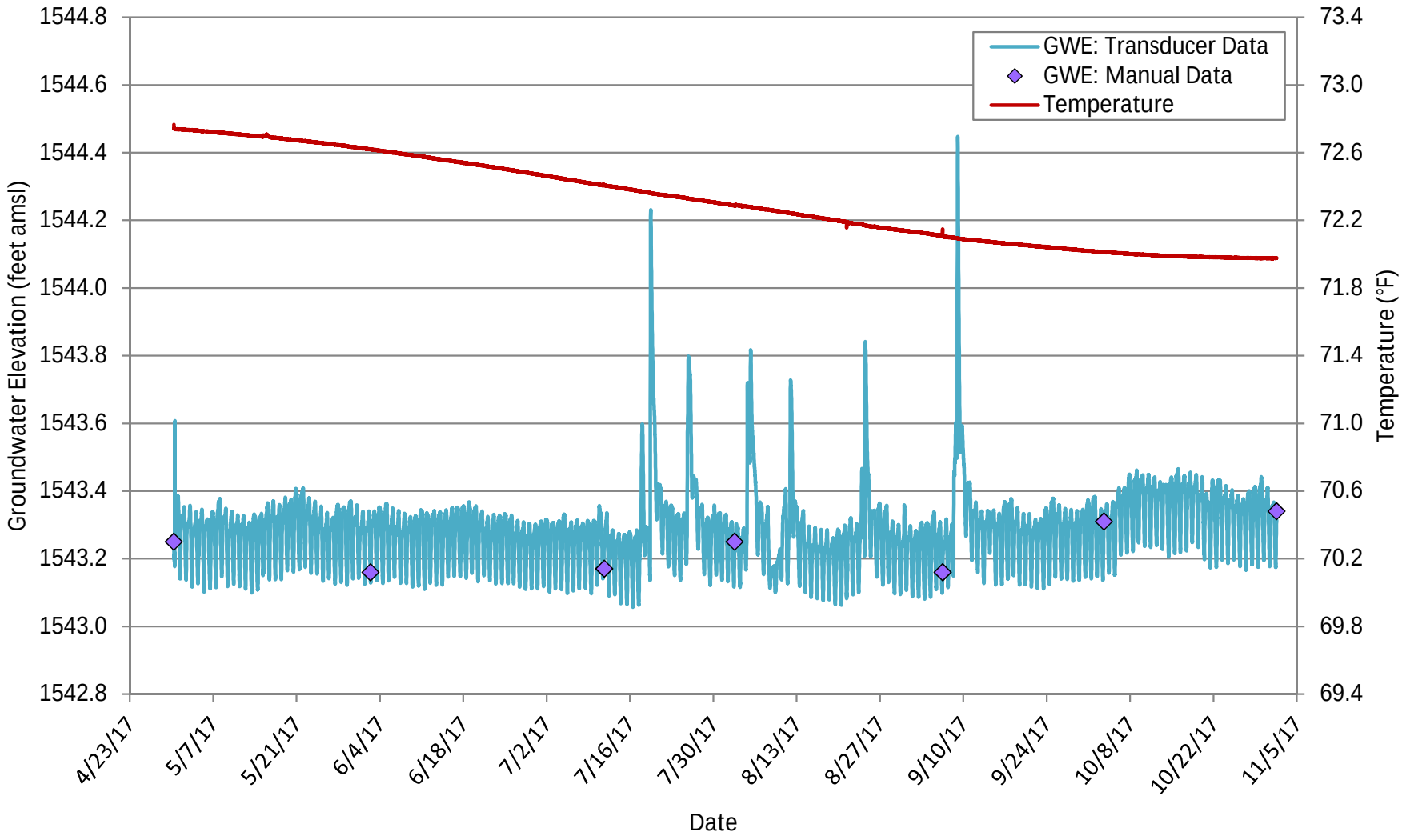
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW6.15S Hydrograph



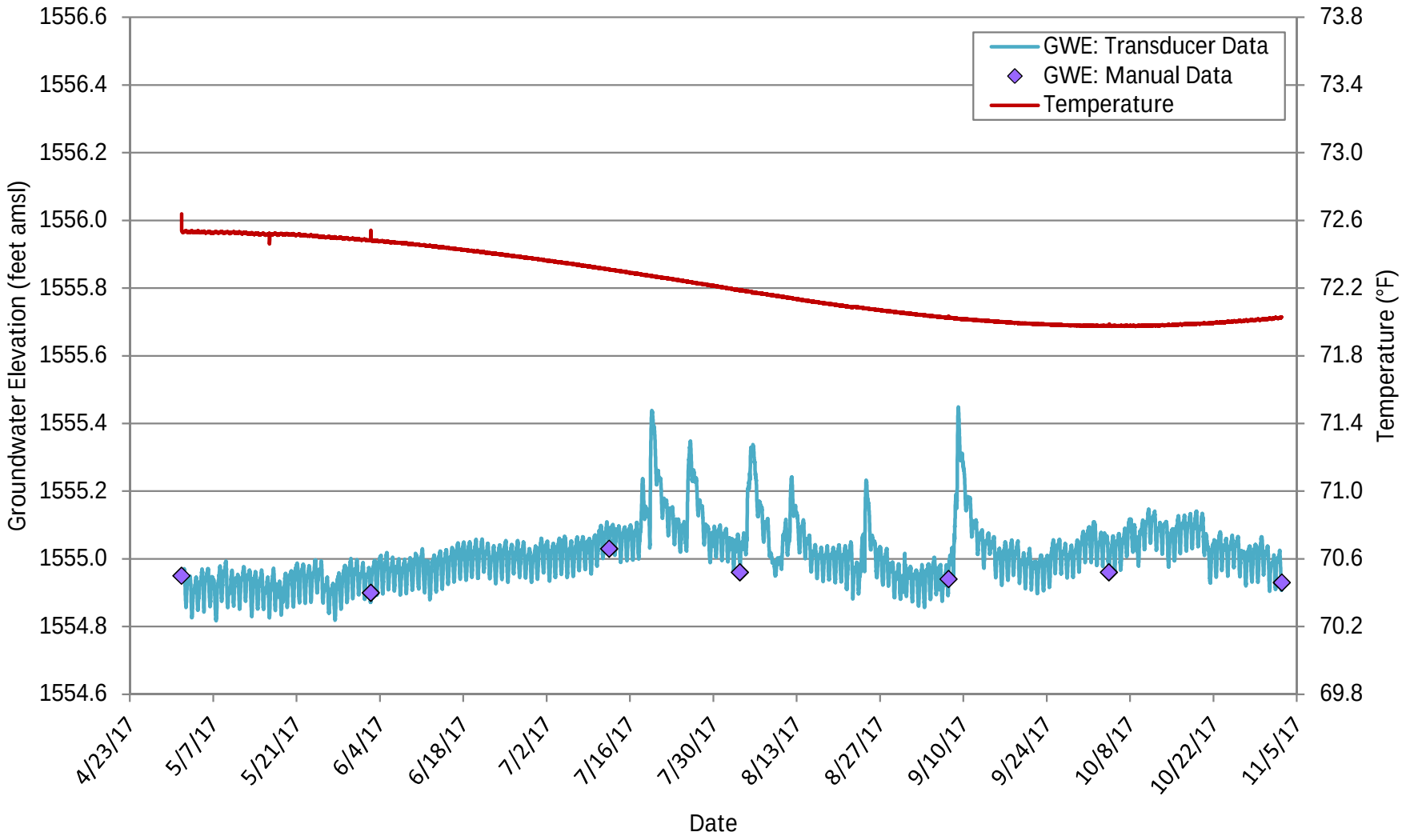
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were calculated using field-estimated depth of the transducer.

WMW6.55S Hydrograph



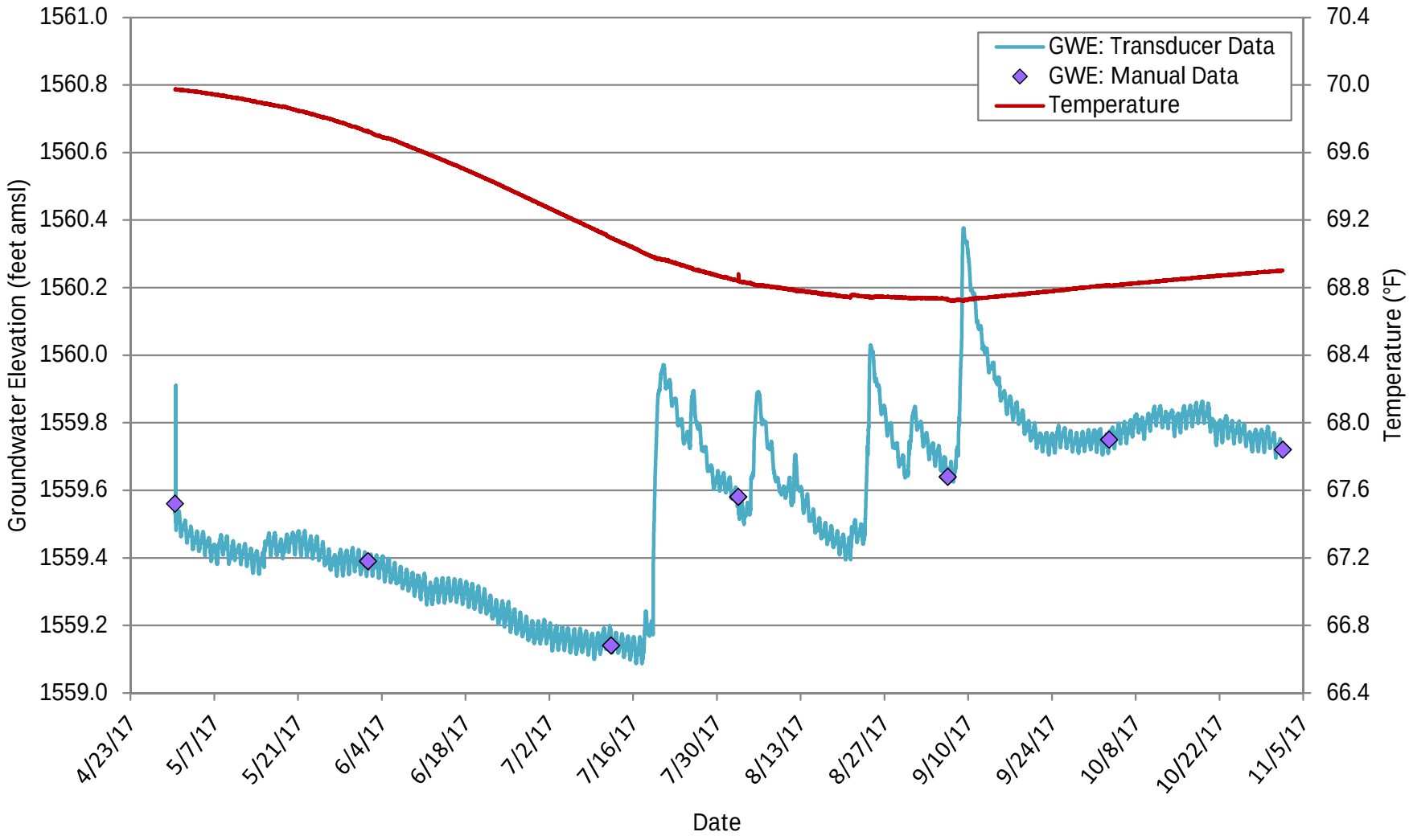
Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW6.9N Hydrograph



Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

WMW6.9S Hydrograph



Notes:
1. Transducer data has been corrected for barometric pressure.
2. Groundwater elevations based on transducer data were corrected to correlate with manual data using water level meter.

Appendix D

Daily Field Reports

DAILY ACTIVITY REPORT

DATE:	4/28/2017
PROJECT NAME:	NERT Regional Groundwater RI - Transducers
SITES / LOCATIONS:	Various

Day:	S	M	T	W	Th	**F**	S
Weather:	**Sunny**	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	65 to 72						
Wind:	Still	**Moderate**	High	Direction:	NE		
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind and humidity

PERSONNEL ON-SITE	Employer	Job Title
Andrea Christian	AECOM	Staff Engineer
Eric Wang	GES	Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out
Carlton Parker	NDEP	Kickoff Meeting/Site Visit	0700	1100
Jeri Ruskowitz & coworker	McGinley & Associates	Site security; provide access	0900	By 1200

WORK COMPLETED

Conducted kickoff meeting at the GES Las Vegas office. Load AECOM rental truck with supplies for transducer installation. Meet with Jeri Ruskowitz of McGinley & Associates to discuss access to two landfill wells. Drive to MW-20 and Jeri opened the well. Install transducer in MW-20 with Carlton present. Jeri opened MW-13 for us and left access gate open.

MW-20: Solinst slip cap for well (2") gets quite tight when slipped on completely. Since annual groundwater sampling event is coming up in May, placing the cap on completely may result in cap getting stuck, hindering the process. Measured about 1" difference from TOC mark to top of well cap access port. Will need McGinley to provide groundwater level measurement before/after sampling to compare to transducer level after they replace it (unless low flow tubing can fit through port?).

MW-13: Collected measurements and tied transducer & quick link. This is a 4" well in a steel monument, and there are only about 4.5 inches of clearance from the top of casing to the monument. The Solinst 2" well cap and 4" adaptor are too tall for this well (wouldn't be able to close monument). Also tried placing the access port piece (which fits into 2" cap) onto 4" adaptor, but the well monument lid would barely be able to close over it, and it would not stay secure (rests loosely). This may occur for other wells. Notified Carmen.

Left site to look for well caps that would work; tried House of Hose, Ferguson, and Home Depot. Found orange test well caps (with ability to hang equipment from bottom) at Silver State Labs. Picked up Landwell Co key and locked up landfill gate before heading to Silver State (running out of time for day). Jeri said she can provide access again on Monday morning. Picked up several caps (2" and 4") from Silver State, in case more wells have issues.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health and Safety Plan and JHA (Transducer Installation), biological awareness sign. Completed THA on-site.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Water level meter (GES)	04/28/17	

Material/Supplies Received at the Site: None

Field Activities and Remarks Not Presented Above:

Meeting at hotel in the morning and will depart from there. Plan on starting with AA-30 (Landwell) in the morning, and continue with wells on the south side of the wash, east of Pabco trailhead (targeting 5 wells). Will come back to MW-13 on Monday morning at about 8AM (meeting Jeri at main landfill access gate).

Measurements for transducer depth (length of rope, fittings, etc.) are recorded as accurately as possible, but there could be minor variations to about 0.05 feet (estimated). Solinst well caps work well for hanging transducers and providing access ports, but unless it fits on securely without too much struggle, the precise elevation of the cap could change if removed and replaced. Also, water level measurement collected through port will vary from the actual top of well casing, so this difference will have to be measured when the Solinst caps are used.

Emailed safety forms and notes.

Name: Andrea Christian Date: 4/28/2017

DAILY ACTIVITY REPORT

DATE:	4/29/2017
PROJECT NAME:	NERT Regional Groundwater RI - Transducers
SITES / LOCATIONS:	Various

Day:	S	M	T	W	Th	F	**S**
Weather:	**Sunny**	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	65 to 78						
Wind:	Still	**Moderate**	High	Direction:	various		
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind and humidity

PERSONNEL ON-SITE	Employer	Job Title
Andrea Christian	AECOM	Staff Engineer
Eric Wang	GES	Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Conducted tailgate safety meeting on site. Installed transducers in three wells in morning – AA-30, WMW5.5S, and WMW5.58S1. Did not see dedicated tubing in AA-30.

Wasp nest was observed in top locking cover of WMW5.58S1 monument; placed about 5 to 10 feet away from well. Within a few minutes, wasp returned to look for nest; waited for the wasp to leave before working on well (about 10 minutes). After transducer was installed, wasp was observed on the nest in the locking monument cover. Called Carmen; left alone for now, planned to return later.

Tried to leave WMW5.58S1 area by pulling ahead to turn around in open area. Did not notice that the area ahead consisted of soft gravelly sand. Truck started having trouble getting through the surface, and during the turn the truck got stuck in one spot. Rear passenger wheel kept digging deeper into gravelly sand as we tried to drive out. At this point, realized that truck was not a four wheel drive vehicle as indicated by rental company. Stopped work and called Carmen. Truck needed to get towed by a third party towing company (Enterprise and AAA would not come out due to distance from paved road). Filled out near miss report.

After truck was successfully towed to solid ground (dirt road), we continued work. Installed transducer in one more well – COH2B1. Locked all gates and well caps, except for WMW5.58S1 (will check on wasp situation tomorrow).

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health and Safety Plan and JHA (Transducer Installation), biological awareness sign. Completed THA on-site. Stop work for near miss (truck needed tow).	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Water level meter (GES)	04/28/17	

Material/Supplies Received at the Site: None

Field Activities and Remarks Not Presented Above:

Using existing well caps when the transducer is able to hang from the bottom of the cap. This will avoid potential changes/adjustments in transducer depth due to Solinst well cap either fitting too tight (around outside of PVC) or using the port on top of the Solinst cap. Checking each transducer using Leveloader to make sure that the transducer is running. The only transducer that was not checked was MW-20 (from the first day of work).

After departing from the site, contacted rental company and switched vehicles (switched to a four wheel drive truck, same make and model).

Plan for tomorrow is to install transducers on the south side of the wash, starting with wells on the west side, and moving east.

Emailed safety forms and notes.

Name: Andrea Christian Date: 4/29/2017

DAILY ACTIVITY REPORT

DATE:	4/30/2017
PROJECT NAME:	NERT Regional Groundwater RI - Transducers
SITES / LOCATIONS:	Various

Day:	**S**	M	T	W	Th	F	S
Weather:	**Sunny**	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	65 to 85						
Wind:	**Still**	Moderate	High	Direction:	NE		
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind and humidity

PERSONNEL ON-SITE	Employer	Job Title
Andrea Christian	AECOM	Staff Engineer
Eric Wang	GES	Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out
Jordan	NV Division of Wildlife	Patrolling	1115	1116

WORK COMPLETED

Conducted safety tailgate meeting on site. Installed transducers in four wells in the morning – WMW6.55S, WMW6.9S, PC-74, and PC-77. WMW6.9S was still surrounded by a small area of vegetation, but there was a bit of a path available to access the well. Walked to PC-74 in wetland (no vehicle access, as indicated in well reconnaissance notes). PC-74 and PC-77 well covers were not bolted. Found gecko inside PC-77 well box – was not disturbed, and installed transducer successfully while gecko stayed inside well box.

While at PC-74, a ranger from the Nevada Division of Wildlife (Jordan, from nametag) stopped by to check what work we were conducting. He was mostly concerned with people collecting reptiles from the wetlands park. Explained we were working for NDEP installing transducers in wells. He left after about a minute.

After lunch, a transducer and barometer were installed in WMW4.9S. Checked on WMW5.58S1; wasp was still present. Will see if we can contact SNWA tomorrow to ask for preferred action. Installed transducer in LNDMW-1. Change in conditions at LNDMW-1 – aboveground irrigation piping now runs along the bike path, so that we could not drive the vehicle up to the well. Need to walk to well from bike path. Left the site through east single-chain fence at Galleria Road.

After finishing work on site, stopped at Home Depot for more rope clips (ran out at end of day).

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health and Safety Plan and JHA (Transducer Installation), biological awareness sign. Completed THA on-site. Discussed near miss from previous days, extra steps to avoid repeating the near miss.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Water level meter (GES)	04/28/17	

Material/Supplies Received at the Site: None

Field Activities and Remarks Not Presented Above:

All wells accessed today had existing "test well caps" that transducers could easily hang from. Used existing well caps to avoid confusion with gauging wells, and to avoid having Solinst well caps stuck on PVC well casing. Checked all six wells with Leveloader.

Plan for tomorrow is to meet Jeri Ruskowitz at COH Landfill at 8AM to access MW-13. Will need to take additional groundwater measurements before and after installing transducer. The transducer is already tied off; just need to secure with clips and check that the transducer is running (using the Leveloader). Then start wells on the north side of the wash, starting from the west.

Emailed safety forms and notes.

Name: Andrea Christian Date: 4/30/2017

DAILY ACTIVITY REPORT

DATE:	5/1/2017
PROJECT NAME:	NERT Regional Groundwater RI - Transducers
SITES / LOCATIONS:	Various

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	75 to 90						
Wind:	Still	**Moderate**	High	Direction:	NE		
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind and humidity

PERSONNEL ON-SITE	Employer	Job Title
Andrea Christian	AECOM	Staff Engineer
Eric Wang	GES	Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out
Carlton Parker	NDEP	Kickoff Meeting/Site Visit	0800	1130
Jeri Ruskowitz & coworker	McGinley & Associates	Provide access	0800	0810

WORK COMPLETED

Met Carlton Parker and Jeri Ruskowitz at the main COH Landfill gate. The gate was open when we arrived. Carlton mentioned that he saw a water department vehicle driving around the landfill. Jeri lent us the gate key in case we got locked in. Conducted safety tailgate meeting at MW-13 with Carlton present, and deployed transducer.

Discussed entry route to north side of the wash with Carlton. According to Carlton, there is a way to access the north wells near three kids weir (under the NE access bridge?), but he has rarely ever seen the gate open. Does not have access through the gate. Suggested starting on the west side of the wash near duck creek, driving to the east side, and working back towards the west side. Installed transducers in WMW3.5N, WMW4.9N, LNDMW-2, WMW5.7N, WMW6.15N, and WMW6.9N. Carlton accompanied us for installation at WMW3.5N, and drove with us to WMW4.9N (left after arrival at well).

Called Carmen to update progress before leaving wetlands park.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health and Safety Plan and JHA (Transducer Installation), biological awareness sign. Completed THA on-site. Discussed safety while driving off-road.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Water level meter (GES)	04/28/17	

Material/Supplies Received at the Site: None

Field Activities and Remarks Not Presented Above:
Most wells accessed today had existing "test well caps" that transducers could easily hang from. Used existing well caps and new test well caps to avoid confusion with gauging wells, and to avoid having Solinst well caps stuck on PVC well casing. Checked all seven transducers with Leveloader.

North side of the wash consists of some rugged terrain, and several areas with soft ground cover near the wells visited. The four wheel drive truck, as recommended, was very helpful in navigating the different pathways and getting close to the wells.

Plan for tomorrow is to install a transducer in the last well (WMW3.5S), lock up WMW5.58S1 (kill wasp with wasp spray if needed), dispose of waste at NERT facility, and return access keys (NDEP, Landwell, and McGinley).

Emailed safety forms and notes.

Name: Andrea Christian Date: 5/1/2017

DAILY ACTIVITY REPORT

DATE:	5/02/2017
PROJECT NAME:	NERT Regional Groundwater RI - Transducers
SITES / LOCATIONS:	Various

Day:	S	M	**T**	W	Th	F	S
Weather:	**Sunny**	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	75 to 93						
Wind:	Still	**Moderate**	High	Direction:	Various; light breezes		
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind and humidity

PERSONNEL ON-SITE	Employer	Job Title
Andrea Christian	AECOM	Staff Engineer
Eric Wang	GES	Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Conducted safety tailgate meeting on site. Installed transducer in final well – WMW3.5S. It was a bit challenging to find a safe spot to access WMW3.5S. Needed to drive over the curb on Galleria Rd since there was no driveway nearby. There's also a ditch along the curb in the vicinity of the well, so need to drive in at the right angle. After installing transducer, showed Eric how to download data and restart transducer using Leveloader.

Went back to WMW5.58S1 to lock the well back up. No wasps were observed in the locking well monument cap when we arrived, so the wasp nest was shaken off onto the nearby brush, and the well was locked. Drove to Pabco Road and departed to the NERT facility to dispose of decon waste. Met with Steve Clough and he showed us were to pour the buckets of decon water into the pond.

After leaving the NERT facility, returned keys to Landwell, and returned to the hotel to unpack GES's supplies from the truck. AECOM returned keys to McGinley & Associates and to NDEP (left key with the front desk of the NDEP office on E Flamingo Road).

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health and Safety Plan and JHA (Transducer Installation), biological awareness sign. Reviewed portion of JHS related to disposal of decon water at NERT facility. Completed THA on-site.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Water level meter (GES)	04/28/17	5/2/2017

Material/Supplies Received at the Site: None

Field Activities and Remarks Not Presented Above:

Checked last well with Leveloader. GES will hold onto Leveloader and associated cables (including optical reader for computer), transducer cases, and extra Kevlar rope.

Emailed safety forms and notes.

Name: Andrea Christian Date: 5/2/2017

Field Measurements - Transducer Installation
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Expected Transducer Depth (feet)	Expected Rope Length (feet)	Date & Time of Install	PRE-Depth to Groundwater (feet)	POST-Depth to Groundwater (feet)	Measured Well Depth (feet)	Measured Transducer Depth BTOC (feet)	Measured Transducer Depth Below GW (feet)	Comments
AA-30	32	37	~~4/28/17~~ 4/27/17 9:30	19.64 BTPVC 20.19 BTOSC	19.64 BTPVC	34.10 BTPVC	~32	~12.5'	Stick Soft bottom Need to lift cap to use WLM SN# 42069913
COH2B1	37	42	4/29/17 16:~~30~~ AC 18	16.37 BTPVC	16.37 BTPVC	~~67.35~~ 66.37 BTPVC	~36.5'	~20.13'	Hard Bottom SN# 42069892
LNDMW1	57	62	4/30/17 16:00	36.99 BTABS	36.99 BTABS	61.62 BTABS	~57' ~~BTABS~~ AC BTABS	~20'	Soft bottom SN# 42069896
LNDMW2	53	58	5/1/17 1254	34.46 BTPVC	~~34.46 BTPVC~~ AC 34.46 BTPVC	55.13 BTPVC	~52.8' BTPVC	~18.3' ~~BTPVC~~ AC	Soft Bottom SN# 42069894
See end of table MW-13	47	52	4/28/17	35.32 BTPVC 35.71 BTOSC	—	49.55 BTPVC 49.94 BTOSC	~47.5	~12.2'	Soft bottom SN: 42069903 || Not installed 4/28/17 (Lower)
MW-20	53	58	4/28/17 11:20	32.99 ~~BTOC~~ BTPVC	33.16 BTOCap 34.33 BTOSC	67.95 BTPVC	~52.5'	~20'	Hard bottom 42069901 (SN)
PC-74	32	37	4/30/17 11:15	11.33 BTPVC	11.34 BTPVC	48.44 BTPVC	~31.5'	~20.2'	Soft bottom SN# 42067239
PC-77	28	33	4/30/17 12:15	6.73 BTPVC	6.73 BTPVC	38.90 BTPVC	~27 BTPVC	~20.3 AC ~~BTPVC~~	Soft bottom SN# 42063359
WMW3.5N	54	59	5/1/2017 11:00	35.62 BTPVC	35.62 BTPVC	55.90 BTPVC	~53.78 ~~BTPVC~~ BTPVC	~18.16 AC ~~BTPVC~~	Soft bottom SN# 42069895
WMW3.5S	57	62	5/2/2017 0849	43.66 BTPVC	43.68 BTPVC	59.99 BTPVC	~57.7 BTPVC	~14'	Soft bottom SN 42065098
WMW4.9N	51	56	5/1/2017 12:00	31.79 BTPVC	31.81 BTPVC	53.02 BTPVC	~50.9 BTPVC	~19' AC ~~BTPVC~~	Soft bottom SN# 42069885
WMW4.9S	44	49	4/30/17 14:36	26.48 BTPVC	26.45 BTPVC	46.81 BTPVC	~44.25'	~17.8'	Soft bottom SN# 42069899
WMW4.9S Barometer	5	10	4/30/17 14:36	—	—	—	~5'2" BTPVC (5.17')	—	SN# 12069737
WMW5.58S1	31	36	4/29/17 11:45	9.37 BTPVC	9.38 BTPVC	41.08 BTPVC	~29.8'	~20.4'	Soft Bottom SN# 42069897
WMW5.5S	36	41	4/29/17 10:30	14.69 BTPVC	14.69 BTPVC	38.29 BTPVC	~34.7	~20'	Hard Bottom SN# 42069900

BTOSC = Below top of steel casing
BTOCap = Below top of new cap
BTPVC = Below top of PVC casing

Note: For BAT Total depth, add 0.27 ft (length from sounder to tip)

Scanned by CamScanner

Field Measurements - Transducer Installation
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Expected Transducer Depth (feet)	Expected Rope Length (feet)	Date & Time of Install	PRE-Depth to Groundwater (feet)	POST-Depth to Groundwater (feet)	Measured Well Depth (feet)	Measured Transducer Depth BTOC (feet)	Measured Transducer Depth Below GW (feet)	Comments
WMW5.7N	19	24	5/1/2017 1422	8.31 BTPVC	8.29 BTPVC	21.01 BTPVC	~ 18'10" (18.8') BTPVC	~ 10.5 ~~BTPVC~~ AC	Soft bottom SN 42069904
WMW6.15N	36	41	5/1/2017 1512	22.35 BTPVC	22.35 BTPVC	38.79 BTPVC	~ 36.4'	~ 14' ~~BTPVC~~ AC	Soft bottom, felt obstruction SN 42069891
WMW6.15S									
WMW6.55S	36	41	4/30/17 9:13 AM	15.99 BTPVC	16.00 BTPVC	40.69 BTPVC	~36'	~20'	Soft bottom SN# 42069889
WMW6.9N	39	44	5/1/17 1550	18.18 BTPVC	18.21 BTPVC	48.59 BTPVC	~37.9'	~ 19.75'	Soft bottom SN 42068798
WMW6.9S	32	37	4/30/17 9:55 AM	11.04 BTPVC	11.04 BTPVC	51.36 BTPVC	~31'	~20'	Soft bottom SN# 42067219
~~MW-13 SPARE-1~~	47	52	5/1/2017 0858	35.31 BTPVC	35.31 BTPVC	49.55 BTPVC	~47.5	~12.2	SN# 42069903
SPARE-2									

Notes: 879
Length of transducer is approximately 5.5" from the "zero point" to the top of the eyelet (where kevlar rope is tied).

Total Depth: Add 0.27' to measurement
(length of probe end to sounder sensor)

Scanned by CamScanner

DAILY ACTIVITY REPORT

DATE:	6-1-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	LV wash

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	95					
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite @ 0730 to begin monitoring well depth-to-water gauging, started at WMW3.5S. meet with Geri From McGinnley & Associates to recieve the key for the Henderson Landfill. Performed 3 additional gauging on the southeast side of the wash before heading to the North side of the wash. At 1135, I reached WMW3.5N to find it locked, 2 other North side wells were also locked. left the North side of the wash at 1302 for the southwest side of the wash to find a new padlock on the swing gate. Returned Landfill Key @ 1330. At 1520, Robert From SNWA arrived and unlocked the rest of wells and showed me the back way into the SW side. Performed last gauging @ 1555 @ well WMW6.5S, offsite for the office @ 1609.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health Safety Plan and THAs, and biological awareness document.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist water meter		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang / Eric R Wang Date: 6-1-17

DAILY ACTIVITY REPORT

DATE:	6-2-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	LV Wash

Day:	S	**M**	T	W	Th	F S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow	
Temp °F:	degrees	95				
Wind:	Still	**Moderate**	High	Direction:		
Humidity:	**Dry**	Moderate	Humid	Rain		

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric R Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite @ 0730 to perform the monthly monitoring well gauging. I continued on the SE side of the wash and finished up the SW and north side. A total of 9 transducers were spot checked during gauging event. A total of 20 monitoring wells were gauged. I left the site @ 1240 for McGinnley & Associates to return the Henderson Landfill Keys and then returned to the GES office for demobilization.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang / Eric R. Wang Date: 6-2-17

DAILY ACTIVITY REPORT

DATE:	7-11-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	

Day:	S	**M**	(T)	W	Th	F	S
Weather:	(Sunny)	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	86° – 102°					
Wind:	(Still)	**Moderate**	High	Direction:			
Humidity:	(Dry)	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Huang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite at 0820 to perform monthly transducer monitoring and spot checking. Started at well WMW355. Proceeded to the Henderson landfill to check MW-13 & MW-20. After the landfill I continued to gauge and check all the wells located on the SE side of the wash. Gaining access to the SW side of the wash, I gauged 3 of the 5 wells, leaving 2 wells on the SW side and all 6 wells on the North side of the wash for tommorrow. All of the transducers had some time wandering between -25 seconds to +95 seconds, but all were recording at their progremed 15 minute increments. offsite @ 1630 for the office.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health Safety Plan and THAs, and biological awareness document.	(Yes) No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist water meter		
Solonst level logger/loader		
Material/Supplies Received at the Site:		
Field Activities and Remarks Not Presented Above:		

Name: Eric Huang / Eric R Huang Date: 7-11-17

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up? (If so, note time) (1)	Inspect Transducer? (2) (3)	Download Data? (4)	Data Log #	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	07/11/17	1204	19.71	yes, 1209	yes	No		Transducer in Excellent condition, Time off by -4 secs, but recording every 15 mins
COH2B1	36.0863473	-114.9861928	07/11/17	1501	16.56	No	No	No		
LNDMW1	36.0932094	-114.9572109	07/11/17	1046	37.01	No [redacted] (2)	No [redacted] (2)	No		
LNDMW2	36.0959057	-114.9581419								
MW-13	36.0893990	-114.9668492	07/11/17	0931	35.26	yes, 0933	yes	NO		Transducer in Excellent condition Time off by -21 secs, but recording every 15 mins
MW-20	36.0913381	-114.9591051	07/11/17	1005	33.05	yes, 1008	yes	No		Transducer in Excellent condition Time off by +30 secs, but recording every 15 mins
PC-74	36.0875307	-114.9976758	07/11/17	1616	7.66	yes, 1619	yes	No		Transducer in Excellent Condition Time off by +95 secs, but recording every 15 mins
PC-77	36.0863375	-114.9982664								
WMW3.5N	36.0976828	-114.9480654								
WMW3.5S	36.0962514	-114.9451632	07/11/17 [redacted] (2)	0846	43.62	yes, 0849	yes	NO		Transducer in Excellent condition Time off by -25 secs, but recording every 15 mins
WMW4.9N	36.0949374	-114.9664624								
WMW4.9S	36.0909079	-114.9664822	07/11/17	1116	26.41	yes, 1119	yes	NO		Transducer in Excellent condition Time off by +37 secs, but recording every 15 mins
WMW4.9S Barometer	36.0909079	-114.9664822	"	"	"	—	—	—		
WMW5.58S1	36.0891989	-114.9778061	07/11/17	1416	9.34	No	No	No		
WMW5.5S	36.0873319	-114.9754580	07/11/17	1255	14.71	No	No	No		
WMW5.7N	36.0886006	-114.9798359								
WMW6.15N	36.0912006	-114.9865133								

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up? (If so, note time) (1)	Inspect Transducer? (2) (3)	Download Data? (4)	Data Log #	Comments / Condition of Transducer
WMW6.15S										
WMW6.55S	36.0884676	-114.9942317	07/11/17	1546	16.08	yes, 1550	yes	no		Transducer was in excellent condition Time off by +22 secs, but recording every 15 mins
WMW6.9N	36.0918121	-114.9986259								
WMW6.9S	36.0890141	-115.0002799								

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November)

DAILY ACTIVITY REPORT

DATE:	7-12-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	NERT

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees 95						
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain	20%		

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite @ 0700 to continue and finish up the NERT Transducer monitoring and well gauging. started on the Southwest side at PC-77 and finished the SW side of the wash with WMW6.9S. Traveled to the North side of the wash and started on the NE side with WMW3.5N and worked west to finishup at WMW6.9N. Offsite for the office at 1302.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
(Yes) No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist water meter		
Solonist Transducer level logger		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang Date: 7-12-17

DAILY ACTIVITY REPORT

DATE:	8-2-2017
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	South side of wetlands Park

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees 106						
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED onsite @ 0800 to gain access to the COH Landfill for MW-13 & MW-20. Performed water level measurements on groundwater monitoring wells located on the south side of the wetlands park, which also include wells located inside the COH Landfill (MW-13 & 20). Monitoring well MW 4.95 was locked, so it will be ganged tomorrow. GES also downloaded all the transducer data from each well visited today. offsite @ 1500 to return Landwell keys and to GES office to download data. Will return to the single S. side well and all 6 N-side wells.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist water level meter		
n Level loader		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric Wang Date: 8-2-17

DAILY ACTIVITY REPORT

DATE:	8-3-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	wetlands Park

Day:	S	M	T	W	Th	F	S
Weather:	Sunny	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	degrees	100					
Wind:	Still	Moderate	High	Direction:			
Humidity:	Dry	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED Onsite on the north side of the wetlands Park @ 0800. Performed monthly water level measurements on all six monitoring wells with transducers located inside them. Performed the quarterly transducer downloading on all six N. side wells as well. Returned to the S. side of the wetlands park to gauge wmw 4.95 and download both the transducer and barometer located inside this well. offsite @ 1300 for the office to transfer all data collected.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes / No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist water level meter		
Solonist Level loader		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang / Eric R Wang Date: 8-3-17

DAILY ACTIVITY REPORT

DATE:	9-6-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	NERT- S. side of LV wash

Day:	S	M	T	W	Th	F	S
Weather:	Sunny	Partly Sunny	Cloudy	Rain	Snow		
Temp °F:	degrees	95					
Wind:	Still	Moderate	High	Direction:			
Humidity:	Dry	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED Onsite @ 0745 to perform the monthly monitoring well water gauging and transducer spot checking. The transducer inside mw-13 @ the Henderson Land Fill was recording in 15 min increments, but @ 0850, 0905, 0920, etc. The Barometer inside WMW 4.95 was pulled out of the well and left inside the vault For an unknown time period. The data from the Barometer was downloaded for further analysis of the event. All of the monitoring wells on the south side of the Las Vegas wash were completed today. offsite @ 1530 to return the Landwell Key For AA-30 and return to the GES office.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes / No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solinist water level meter		
" Level loader		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang Date: 9-6-17

DAILY ACTIVITY REPORT

DATE:	9-7-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	

Day:	S	**M**	T	W	(Th)	F	S
Weather:	(Sunny)	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	92°					
Wind:	(Still)	**Moderate**	High	Direction:			
Humidity:	**Dry**	(Moderate)	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED Performed the monthly monitoring well water gauging and transducer spot checking on the Northside of the Las Vegas wash for the NERT project. onsite @ 0745 and began traveling to ~~www~~ 3.5 N. Performed transducer testing at LNDMW2 For quality checking purposes per AECOM. completed all monitoring wells on the North side of the wash by 1235 then was offsite to pick up the landfill key to access MW-13 for transducer time updating. offsite to return the key @ 1400 and to return to the GES office.
* LNDmw2 Details: The transducer was removed from the well to download and save current data. the transducer was placed inside a 5-gal. bucket of water @ approx 2¼" below the water surface. → cont: ↓

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above: cont: the transducer sampling interval was changed to 1 minute for a series of tests inside the bucket & outside. The transducer was reseted and placed back into the well @ 15min. Intervals
- mw-13: the transducer was pulled, and data was saved & downloaded. the time was reset to the proper interval of 15mins on the hour.

Name: Eric R Wang

Date: 9-7-17

DAILY ACTIVITY REPORT

DATE:	10/3/17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	NERT - S. side of LV wash

Day:	S	M	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	75°					
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric R Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite @ 0800 to perform monthly groundwater gauging and transducer spot checking on the south side of the Las Vegas Wash and City of Henderson Landfill monitoring well locations. All transducers that were spot checked were in excellent condition and running properly. GES completed all monitoring wells on the southside of the wash @ 1452. Offsite for the GES office @ 1515.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solinst level loader		
" water level meter		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric R Wang Date: 10/3/17

DAILY ACTIVITY REPORT

DATE:	10/4/17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	85°					
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED

Onsite on the north side of the Las Vegas Wash @ 0830 and proceeded to WMW3JN. Upon arriving at the monitoring well, GES noticed that the well casing was still locked. AECOM was notified and I proceeded to the next monitoring well. Two additional monitoring wells (MWW5.7N+ WMW6.15N) were also still locked. AECOM contacted SNWA in regards to the issue and the response was that the technician could not unlock the well casing locks. These wells will be skipped and postponed until next month per AECOM. Site to the Land Wall office to return AA#30 well Key @ 1130.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:
Reviewed Health Safety Plan and THAs, and biological awareness document.

SAFETY REQUIREMENTS HAVE BEEN MET
Yes No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist level logger		
" water level meter		

Material/Supplies Received at the Site:

Field Activities and Remarks Not Presented Above:

Name: Eric A Wang

Date: 10/4/17

DAILY ACTIVITY REPORT

DATE:	11/1/17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	NERT - S. side of LV wash

Day:	S	M	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	85°					
Wind:	**Still**	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric R. Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED Onsite @ 0815 to perform the monthly groundwater well gauging and quarterly transducer downloading. For all the wells located on the south side of the Las Vegas Wash. The Henderson Landfill gate was inaccessible on the Gallena roadside due to someone locking the inner locks together. I had to hike from MW-20 to MW-13 to perform the well gauging & downloading. Upon performing the downloading of MW-13, the level loader froze up. I hiked back to the truck to retrieve the screw driver for the level loader to pause off the device to restart the process. 3 readings from 1015-1045 will be omitted from the records since the transducer was not inside the well. All south side wells were gauged and transducers downloaded and I was offsite for the office @ 1300.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health Safety Plan and THAs, and biological awareness document.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist Level loader		
" water level meter		
Material/Supplies Received at the Site:		
Field Activities and Remarks Not Presented Above:		

Name: Eric R. Wang Date: 11/1/17

DAILY ACTIVITY REPORT

DATE:	11-2-17
PROJECT NAME:	NERT Regional Groundwater RI – Geophysical Pilot Test
SITES / LOCATIONS:	NERT - N. side of LV wash

Day:	S	**M**	T	W	Th	F	S
Weather:	**Sunny**	**Partly Sunny**	Cloudy	Rain	Snow		
Temp °F:	degrees	82°					
Wind:	Still	**Moderate**	High	Direction:			
Humidity:	**Dry**	Moderate	Humid	Rain			

Circle or shade the appropriate day, weather, wind, and humidity

PERSONNEL ON-SITE	Employer	Job Title
Eric Wang	GES	Staff Geologist

VISITORS ON-SITE	Employer	Purpose of Visit	Time In	Time Out

WORK COMPLETED onsite @ the North side entrance to the Las Vegas Wash @ 0800, to perform the monthly groundwater well monitoring and quarterly transducer downloading. The level loader has continuously been sluggish & freezes during its operations, may need calibrating. Monitoring well LNDMW2 transducer did not record any readings since last download check 2 months ago. Will check the transducer next month to ensure proper operation after today's reset. All 6 monitoring wells on the North side of the Las Vegas Wash was gauged & downloaded. Offsite to the Landwell office to return the key to AA-30 @ 1200 and returns to the GES office.

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED:	SAFETY REQUIREMENTS HAVE BEEN MET
Reviewed Health Safety Plan and THAs, and biological awareness document.	**Yes** No

Equipment at the Site (includes Subcontractor supplied equipment):	Date Arrived	Date Removed
Solonist level loader		
" water level meter		
Material/Supplies Received at the Site:		
Field Activities and Remarks Not Presented Above:		

Name: Eric R Wang

Date: 11/2/17

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up? (If so, note time) (1)	Inspect Transducer? (2) (3)	Download Data? (4)	Data Log #	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	6-1-17	1001	19.68	NO	NO	NO		
COH2B1	36.0863473	-114.9861928	6-2-17	0832	16.52	yes 0835	yes	NO		Excellent condition, recording every 15 minutes
LNDMW1	36.0932094	-114.9572109	6-1-17	0902	37.00	yes 0905	yes	NO		Excellent condition, recording every 15 minutes
LNDMW2	36.0959057	-114.9581419	6-1-17	1146	34.44	yes 1148	yes	NO		" "
MW-13	36.0893990	-114.9668492	6-1-17	0817	35.29	NO	NO	NO		
MW-20	36.0913381	-114.9591051	6-1-17	0839	32.99	NO	NO	NO		
PC-74	36.0875307	-114.9976758	6-2-17	1026	11.57	NO	NO	NO		
PC-77	36.0863375	-114.9982664	6-2-17	0901	7.10	yes 0903	yes	NO		Excellent condition, recording every 15 minutes
WMW3.5N (LOCKED 6-1-17)	36.0976828	-114.9480654	6-2-17	1208	35.65	yes 1210	yes	NO		" " "
WMW3.5S	36.0962514	-114.9451632	6-1-17	0752	43.62	NO	NO	NO		
WMW4.9N	36.0949374	-114.9664624	6-1-17	1210	31.79	NO	NO	NO		
WMW4.9S	36.0909079	-114.9664822	6-2-17	0801	26.42	NO	NO	NO		
WMW4.9S Barometer	36.0909079	-114.9664822	"	"	"	NO	NO	NO		
WMW5.58S1	36.0891989	-114.9778061	6-2-17	0816	9.31	yes 0820	yes	NO		Excellent condition, recording every 15 minutes
WMW5.5S	36.0873319	-114.9754580	6-1-17	0946	14.71	yes 0948	yes	NO		Excellent condition, recording every 15 minutes
WMW5.7N (LOCKED 6-1-17)	36.0886006	-114.9798359	6-2-17	1146	8.36	NO	NO	NO		
WMW6.15N	36.0912006	-114.9865133	6-1-17	1240	22.54	NO	NO	NO		

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up? (If so, note time) (1)	Inspect Transducer? (2) (3)	Download Data? (4)	Data Log #	Comments / Condition of Transducer
WMW6.15S										
WMW6.55S	36.0884676	-114.9942317	6-2-17	1038	16.09	NO	NO	NO		
WMW6.9N	36.0918121	-114.9986259	6-2-17	1131	18.26	yes 1133	yes	NO		Excellent condition, recorded every 15 minutes
WMW6.9S	36.0890141	-115.0002799	6-1-17	1555	11.21	yes 1601	yes	NO		Excellent condition, recorded every 15 minutes

Locked 6-1-17

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November)

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up? (If so, note time) (1)	Inspect Transducer? (2) (3)	Download Data? (4)	Data Log #	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	07/11/17	1204	19.71	yes, 1209	yes	No		Transducer in Excellent condition, Time off by -4 secs, but recording every 15 mins
COH2B1	36.0863473	-114.9861928	07/11/17	1501	16.56	No	No	No		
LNDMW1	36.0932094	-114.9572109	07/11/17	1046	37.01	No [illegible] (2)	No [illegible] (2)	No		
LNDMW2	36.0959057	-114.9581419	07/12/17	0949	34.39	No	No	No		
MW-13	36.0893990	-114.9668492	07/11/17	0931	35.26	yes, 0933	yes	No		Transducer in Excellent condition Time off by -21 secs, but recording every 15 mins
MW-20	36.0913381	-114.9591051	07/11/17	1005	33.05	yes, 1008	yes	No		Transducer in Excellent condition Time off by +30 secs, but recording every 15 mins
* PC-77 ~~PC-74~~	~~36.0875307~~	~~-114.9976758~~	07/11/17	1616	7.66	yes, 1619	yes	No		Transducer in Excellent condition Time off by +95 secs, but recording every 15 mins
* PC-74 ~~PC-77~~	~~36.0863375~~	~~-114.9982684~~	07/12/17	0702	11.81	No	No	No		
WMW3.5N	36.0976828	-114.9480654	07/12/17	0910	35.65	No	No	No		
WMW3.5S	36.0962514	-114.9451632	07/11/17 [illegible] (2)	0846	43.62	yes, 0849	yes	No		Transducer in Excellent condition Time off by -25 secs, but recording every 15 mins
WMW4.9N	36.0949374	-114.9664624	07/12/17	1018	31.74	yes, 1023	yes	No		Transducer in Excellent condition Time off by +8 secs, but recording every 15 mins
WMW4.9S	36.0909079	-114.9664822	07/11/17	1116	26.41	yes, 1119	yes	No		Transducer in Excellent condition Time off by +37 secs, but recording every 15 mins
WMW4.9S Barometer	36.0909079	-114.9664822	"	"	"	—	—	—		
WMW5.58S1	36.0891989	-114.9778061	07/11/17	1416	9.34	No	No	No		
WMW5.5S	36.0873319	-114.9754580	07/11/17	1255	14.71	No	No	No		
WMW5.7N	36.0886006	-114.9798359	07/12/17	1116	8.22	yes, 1120	yes	No		Transducer in Excellent condition Time off by -1 sec, but recording every 15 mins.
WMW6.15N	36.0912006	-114.9865133	07/12/17	1155	22.52	yes, 1202	yes	No		Transducer in Excellent condition Time off by +10 secs, but recording every 15 mins

(GES)
* Phone conversation w/ Eric on 7/25/17: He pulled the transducer from PC-77 ("near the rock piles"), not from PC-74 ("in the wetlands"). Switch data.

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	8-2-17	1108	19.49	yes 1109	Yes	2069913	Yes	111300 / 111306 -6 sec diff	yes	(Log #10) Restart for 113000 Transducer in Excellent condition
COH2B1	36.0863473	-114.9861928	8-2-17	1155	16.57	yes 1201	Yes	2069892	Yes	120500 / 120436 +24 sec diff	yes	(Log # 12) Restart for 121500 Transducer in Excellent condition
LNDMW1	36.0932094	-114.9572109	8-2-17	1012	36.98	yes 1016	Yes	2069896	Yes	101924 / 101900 +24	yes	(Log #8) Restart for 103000 Transducer in excellent condition
LNDMW2	36.0959057	-114.9581419	8-3-17	0916	34.39	yes 0918	Yes	2069894	yes	092200 / 092139 +21 sec diff	yes	(Log #18) Restart for Transducer in excellent condition
MW-13	36.0893990	-114.9668492	8-2-17	0837	35.17	0840 yes	yes	2069903	yes	084209 / 084134 -26 sec diff	yes	(Log # 5) Restarted for 09000 Transducer in excellent condition
MW-20	36.0913381	-114.9591051	8-2-17	0935	32.95 BTOPVC	0840 yes	Yes	2069901	yes	094538 / 094500 +38 sec diff	yes	(Log #4) Restart for 10000 Transduce in excellent condition
PC-74	36.0875307	-114.9976758	8-2-17	1346	11.49	1348 yes	yes	2067239	yes	135100 / 135202 -62 secs diff	yes	(Log #14) Restarted for 140000 Transducer in Excellent condition
PC-77	36.0863375	-114.9982664	8-2-17	1420	7.10	1422 yes	yes	2063359	Yes	142800 / 142559 +121 sec diff	yes	(Log #16) Restarted for 143 Transducer in Excellent condition
WMW3.5N	36.0976828	-114.9480654	8-3-17	0831	35.61	0833 yes	yes	2069895	yes	084000 / 084033 / 091460 -33sec diff	yes	(Log # 17) Restarted for 08450 Transducer in Excellent condition
WMW3.5S	36.0962514	-114.9451632	8-2-17	0909	43.64	0912 yes	yes	2065098	yes	091400 / 091432 -32 sec	yes	(Log #6) Restart @ 093000 Transducer in excellent condition
WMW4.9N	36.0949374	-114.9664624	8-3-17	0947	31.71	0950 yes	yes	2069885	yes	095400 / 095351 +9 secs diff	yes	(Log #19) Restart for 100000 Transducer in Excellent condition
WMW4.9S	36.0909079	-114.9664822	8-3-17	1212	26.36	yes 1216	Yes	2069899	yes	122100 / 122011 +49 sec diff	yes	(Log #23) Restart for 12300 Transducer in Excellent condit

BTOPVC = Below top of PVC casing

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
WMW4.9S Barometer	36.0909079	-114.9664822	8-3-17	* 1212	* 26.36	yes 1221	yes	2069737	yes	122400 / 122440 -40sec diff	yes	(Log #24) Restart for 123000 Barometer in Excellent condition
WMW5.58S1	36.0891989	-114.9778061	8-2-17	1046	9.45	yes 1049	yes	2069897	yes	105300 / 105242 +18 sec diff	yes	(Log #9) Restarted for 110000 Transducer in excellent condition
WMW5.5S	36.0873319	-114.9754580	8-2-17	1131	14.64	yes 1133	yes	2069900	yes	113500 / 113836 -36sec diff	yes	(Log #11) Restarted for 114500 Transducer in Excellent Condition
WMW5.7N	36.0886006	-114.9798359	8-3-17	1016	8.32	yes 1017	yes	2069904	yes	102000 / 102003 -3sec diff	yes	(Log #20) Restart for 103000 Transducer in Excellent condition
WMW6.15N	36.0912006	-114.9865133	8-3-17	1046	22.37	yes 1048	yes	2069891	yes	105200 / 105149 +11 secs diff	yes	(Log #21) Restart for 110000 Transducer in Excellent condition
WMW6.55S	36.0884676	-114.9942317	8-2-17	1328	16.00	yes 1331	yes	2069889	yes	133500 / 133431 +31sec diff	yes	(Log #13) Restarted for 134500 Transducer in Excellent condition
WMW6.9N	36.0918121	-114.9986259	8-3-17	1103	18.20	yes 1105	yes	2068798	yes	110800 / 110938 -98sec diff	yes	(Log #22) Restart for 111500 Transducer in Excellent condition
WMW6.9S	36.0890141	-115.0002799	8-2-17	1402	11.02	yes 1408	yes	2067219	yes	141200 / 141113 +47sec diff	yes	(Log #15) Restarted for 141500 Transducer in Excellent condition

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November).
5. Verify that the serial number for the Log ID downloaded matches the serial number of the transducer, and that data appears complete (should have data starting in April/May, recording every 15 minutes.
6. Record transducer time, time of reference clock, and difference in time between the two.
7. Synchronize transducer to Leveloader, and restart the transducer (erase previous data) so that a future start time is set to a 15-minute interval (10:15:00, etc.).

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
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Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	9-6-17	1110	19.50	NO	—	—	—	—	—	—
COH2B1	36.0863473	-114.9861928	9-6-17	1216	16.71	NO	—	—	—	—	—	—
LNDMW1	36.0932094	-114.9572109	9-6-17	0950	37.00	NO	—	—	—	—	—	—
LNDMW2	36.0959057	-114.9581419	9-7-17	0916	34.43	Yes	yes	2069894 Log # 26+27	yes	092200 092148 +12sec diff	Yes 1030	Testing every min @ 0924 Transducer test: 2'½" inside water bucket
* MW-13	36.0893990	-114.9668492	9-6-17	0840	35.13	yes	No 9/6 yes 9/7	2069903	yes	084751 084800 -9sec diff	No 9/6 yes 9/7	Transducer is in excellent condition * Record time is every 15min but at 850, 905 929 etc.
MW-20	36.0913381	-114.9591051	9-6-17	0920	32.39	yes	NO	—	—	092000 091947 +13sec diff	NO	1c 11
PC-74	36.0875307	-114.9976758	9-6-17	1347	11.54	NO	—	—	—	—	—	—
PC-77	36.0863375	-114.9982664	9-6-17	1505	7.10	NO	—	—	—	—	—	—
WMW3.5N	36.0976828	-114.9480654	9-7-17	0810	35.49	NO	—	—	—	—	—	—
WMW3.5S	36.0962514	-114.9451632	9-6-17	0805	43.58	No	No	—	—	—	—	[illegible]
WMW4.9N	36.0949374	-114.9664624	9-7-17	1040	31.71	No	~~No~~	—	—	—	—	—
** WMW4.9S	36.0909079	-114.9664822	9-6-17	1016	26.35	yes	NO	—	—	102217 102200 +17secs	NO	Transducer + Barometer in excellent condition.

** The Barometer was removed from the well and laid inside the vault. Data was downloaded to see how long it has been removed for. Time is off by -27secs (Log ID #25 - 2069737)

Field Measurements - Transducer Monitoring
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Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
WMW4.9S Barometer	36.0909079	-114.9664822	9-6-17	1005	—	Pulled out yes	yes	2069737	YES	-27 sec diff	NO	see above
WMW5.58S1	36.0891989	-114.9778061	9-6-17	1140	9.63	yes	NO	—	—	114200 114123 +33sec diff	NO	Transducer is in excellent condition
WMW5.5S	36.0873319	-114.9754580	9-6-17	1035	14.71	yes	NO	—	—	103847 103900 -13sec diff	NO	Transducer in excellent condition
WMW5.7N	36.0886006	-114.9798359	9-7-2017 ~~9-6-17~~	1121	8.46	NO	—	—	—	—	—	—
WMW6.15N	36.0912006	-114.9865133	9-7-17	1201	22.61	yes	NO	—	—	120500 120458 +2 sec diff	NO	Transducer in excellent condition
WMW6.55S	36.0884676	-114.9942317	9-6-17	1305	16.09	yes	NO	—	—	130900 130850 +10secs diff	NO	Transducer is in excellent condition
WMW6.9N	36.0918121	-114.9986259	9-7-17	1236	18.22	yes	—	—	—	123800 123833 -33secs	NO	" " " "
WMW6.9S	36.0890141	-115.0002799	9-6-17	1420	10.96	yes	NO	—	—	142300 142246 +14secs diff	NO	Transducer is in excellent condition

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November).
5. Verify that the serial number for the Log ID downloaded matches the serial number of the transducer, and that data appears complete (should have data starting in April/May, recording every 15 minutes.
6. Record transducer time, time of reference clock, and difference in time between the two.
7. Synchronize transducer to Leveloader, and restart the transducer (erase previous data) so that a future start time is set to a 15-minute interval (10:15:00, etc.).

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	10/3/17	1155	19.33	yes 1158	NO	—	—	115800/ 115803 -3 sec diff.	NO	Transducer in excellent condition
COH2B1	36.0863473	-114.9861928	10/3/17	1236	16.66	NO	—	—	—	—	—	—
LNDMW1	36.0932094	-114.9572109	10/3/17	0949	37.03	yes 0953	NO	—	—	094900/ 094844 +16sec diff	NO	Transducer in excellent condition
LNDMW2	36.0959057	-114.9581419	10/4/17	0932	34.49	NO	—	—	—	—	—	—
MW-13	36.0893990	-114.9668492	10/3/17	0840	35.13	NO	—	—	—	—	—	—
MW-20	36.0913381	-114.9591051	10/3/17	0916	32.88	yes 0919	NO	—	—	091600/ 091537 +23sec diff	NO	Transducer in excellent condition
PC-74	36.0875307	-114.9976758	10/3/17	1349	11.35	NO	—	—	—	—	—	—
PC-77	36.0863375	-114.9982664	10/3/17	1457	6.84	NO	—	—	—	—	—	—
WMW3.5N	36.0976828	-114.9480654	—	—	—	—	—	—	—	—	—	Postponed until next month per AECOM
WMW3.5S	36.0962514	-114.9451632	10/3/17	0803	43.69	NO	—	—	—	—	—	—
WMW4.9N	36.0949374	-114.9664624	10/4/17	1016	31.74	yes 1018	NO	—	—	101800/ 101759 +1 sec diff	No	Transducer in excellent condition
WMW4.9S	36.0909079	-114.9664822	10/3/17	1023	26.36	NO	—	—	—	—	—	—

Locked *

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
WMW4.9S Barometer	36.0909079	-114.9664822	—	—	—	—	—	—	—	—	—	—
WMW5.58S1	36.0891989	-114.9778061	10/3/17	1054	9.74	yes 1057	No	—	—	105900/ 105557 +63 sec diff	NO	Transducer in excellent condition
WMW5.5S	36.0873319	-114.9754580	10/3/17	1122	14.67	yes 1127	NO	—	—	112700/ 112724 -24 sec Diff	NO	" " " "
locked * WMW5.7N	36.0886006	-114.9798359	—	—	—	—	—	—	—	—	—	Postponed until next month per AECOM
locked * WMW6.15N	36.0912006	-114.9865133	—	—	—	—	—	—	—	—	—	"
WMW6.55S	36.0884676	-114.9942317	10/3/17	1425	15.94	No	No	—	—	—	—	—
WMW6.9N	36.0918121	-114.9986259	10/4/17	1101	18.20	yes 1103	No	—	—	110300 110358 -58 sec diff	No	Transducer in excellent condition
WMW6.9S	36.0890141	-115.0002799	10/3/17	1309	10.85	Yes 1313	No	—	—	130900/ 130835 +25 sec diff	No	Transducer in excellent condition

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November).
5. Verify that the serial number for the Log ID downloaded matches the serial number of the transducer, and that data appears complete (should have data starting in April/May, recording every 15 minutes.
6. Record transducer time, time of reference clock, and difference in time between the two.
7. Synchronize transducer to Leveloader, and restart the transducer (erase previous data) so that a future start time is set to a 15-minute interval (10:15:00, etc.).

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
Henderson Nevada

Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
AA-30	36.0865571	-114.9742534	11/1/17	1308	19.41	yes 1309	yes	2069913 #37	yes	131400 131406	yes	Excellent condition Restarted @ 133000
COH2B1	36.0863473	-114.9861928	11/1/17	1323	16.72	yes 1324	yes	2069892 #38	yes	-6sec 132900 132847 +13sec	yes	Excellent condition Restarted @ 134500
LNDMW1	36.0932094	-114.9572109	11/1/17	114100	32.03	yes 1142	yes	2069896 #32	yes	114700 114636 +24sec	yes	Excellent condition Restarted @ 120000
LNDMW2	36.0959057	-114.9581419	11/2/17	0936	34.52	yes 0937	* NO	2069894	NO	094300 094236 +24 secs	yes	Excellent condition Restarted @ 094500 * NO Readings were recorded
MW-13	36.0893990	-114.9668492	11/1/17	1001	35.16	yes 1002	yes	2069903 #31	yes	110200 110214 -14sec	yes	Excellent condition Restarted @ 111500 — Level loggers Froze * See daily Report for Add'l info
MW-20	36.0913381	-114.9591051	11/1/17	0916	32.94	yes 0918	yes	2069901 #30	yes	092100 092029 +31sec	yes	Excellent condition Restarted @ 094500
PC-74	36.0875307	-114.9976758	11/1/17	1406	11.30	yes 1407	yes	2067239 #40	yes	141200 141251	-51sec yes	Excellent condition Restarted @ 1415 1500 @
PC-77	36.0863375	-114.9982664	11/1/17	1435	6.78	yes 1438	yes	2063359 #42	yes	144600 144409	+171sec yes	Excellent condition Restarted @ 150000
WMW3.5N	36.0976828	-114.9480654	11/2/17	0856	35.38	yes 0901	yes	2069895 #43	yes	091500 091530 -30 secs	yes	Excellent condition Restarted @ 093000
WMW3.5S	36.0962514	-114.9451632	11/1/17	0839	43.69	yes 0839	yes	2065098/ #29	yes	084500 084532 -32sec	yes	Excellent condition. Restarted @ 090000
WMW4.9N	36.0949374	-114.9664624	11/2/17	0955	31.75	yes 0956	yes	2069885 #44	yes	100400 100358 +2 sec	yes	Excellent condition Restarted @ 101500
WMW4.9S	36.0909079	-114.9664822	11/1/17	120100	26.39	yes	yes	2069899 #33	yes	121000 120915 +45sec	yes	Excellent Condition Restarted @ 121500

Field Measurements - Transducer Monitoring
NERT RI - Downgradient Study Area
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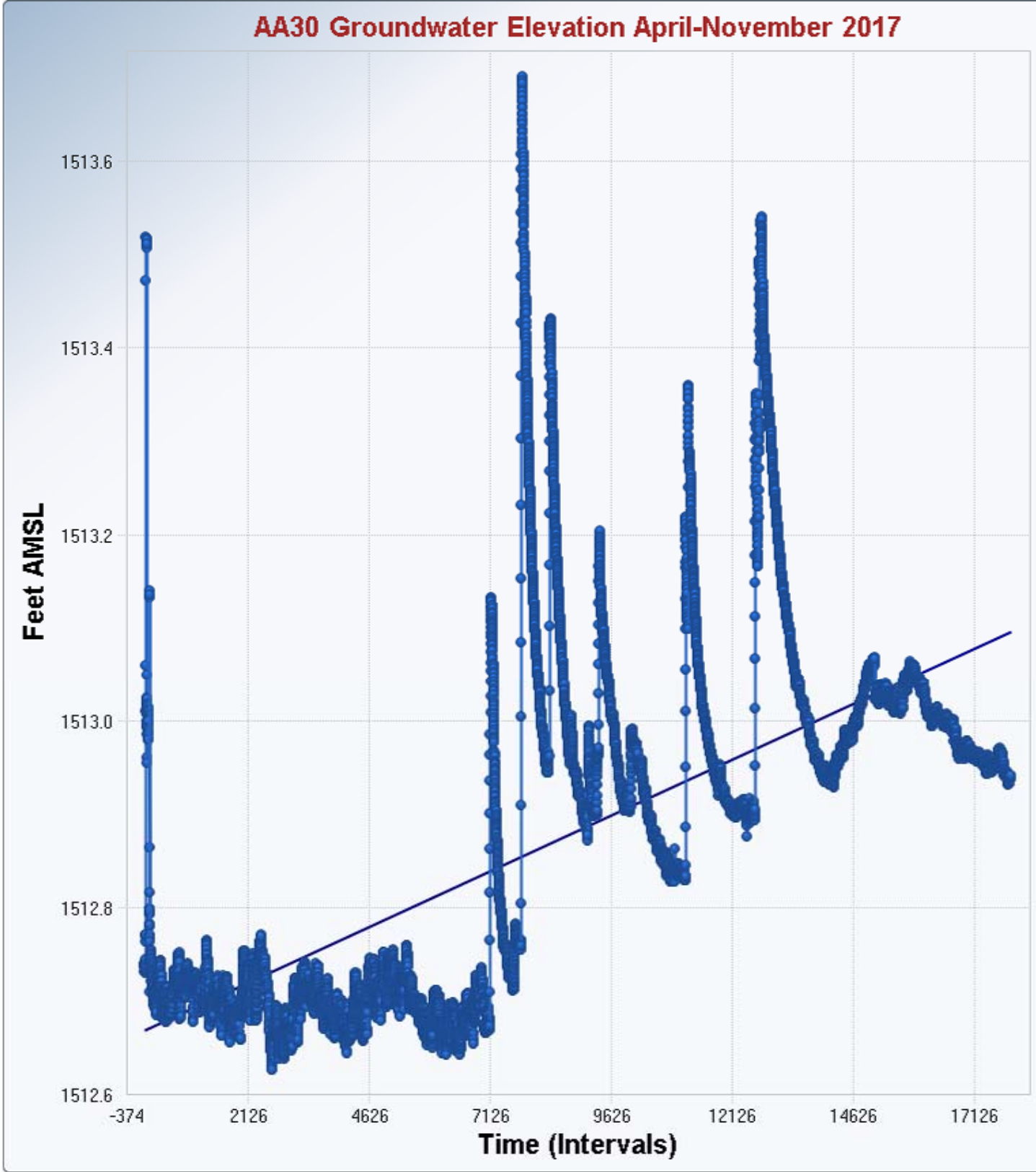
Well ID	Latitude	Longitude	Date of DTW Measurement (mm/dd/yy)	Time of DTW Measurement (hh:mm)	Depth to Groundwater (feet)	Transducer pulled up & inspected? (Note time) (1) (2) (3)	Download Data? (4)	Data Log #	Verified Data? (5)	Record Time: Transducer / Reference / Difference (hh:mm:ss) (6)	Transducer Synchronized & Reset? (7)	Comments / Condition of Transducer
WMW4.9S Barometer	36.0909079	-114.9664822	11/1/17	121100	11	yes 121100	yes	2069737 #34	yes	121300 121358	yes	Barometer in Excellent condition Restarted @ 123000
WMW5.58S1	36.0891989	-114.9778061	11/1/17	124600	9.84	yes 124800	yes	2069897 #36	yes	-58sec 125700 125529 +91secs	yes	Excellent condition Restarted @ 130000
WMW5.5S	36.0873319	-114.9754580	11/1/17	123100	14.78	yes 123200	yes	2069900 #35	yes	123600 123635 -35sec	yes	Excellent condition Restarted @ 124500
WMW5.7N	36.0886006	-114.9798359	11/2/17	1022	8.61	yes 1023	yes	2069404 #45	yes	102700 -8secs 102708	yes	Excellent Condition Restarted @ 104500
WMW6.15N	36.0912006	-114.9865133	11/2/17	1046	22.72	yes 1047	yes	2069891 #46	yes	105100 +6secs 105054	yes	Excellent condition Restarted @ 110000
WMW6.55S	36.0884676	-114.9942317	11/1/17	1424	15.91	yes 1425	yes	2069889 #41	yes	142900 +27secs 142833	yes	Excellent Condition Restarted @ 144500
WMW6.9N	36.0918121	-114.9986259	11/2/17	1102	18.23	yes 1104	yes	2068798 #47	yes	110700 -87secs 110827	yes	Excellent condition Restarted @ 111500
WMW6.9S	36.0890141	-115.0002799	11/1/17	1350	10.88	yes 1351	yes	2067219 #39	yes	135700 +36sec 135624	yes	Excellent condition Restared @ 140000

Notes:
1. Note the time that the transducer was pulled out and replaced, so that the appropriate data can be ignored.
2. Note conditions of the rope and transducer; clean transducer if necessary.
3. When checking transducer, compare the transducer's time to the Leveloader time, and calibrate if needed.
4. Data to be downloaded quarterly (approx. beginning of August and November).
5. Verify that the serial number for the Log ID downloaded matches the serial number of the transducer, and that data appears complete (should have data starting in April/May, recording every 15 minutes.
6. Record transducer time, time of reference clock, and difference in time between the two.
7. Synchronize transducer to Leveloader, and restart the transducer (erase previous data) so that a future start time is set to a 15-minute interval (10:15:00, etc.).

Appendix E

Trend Tests



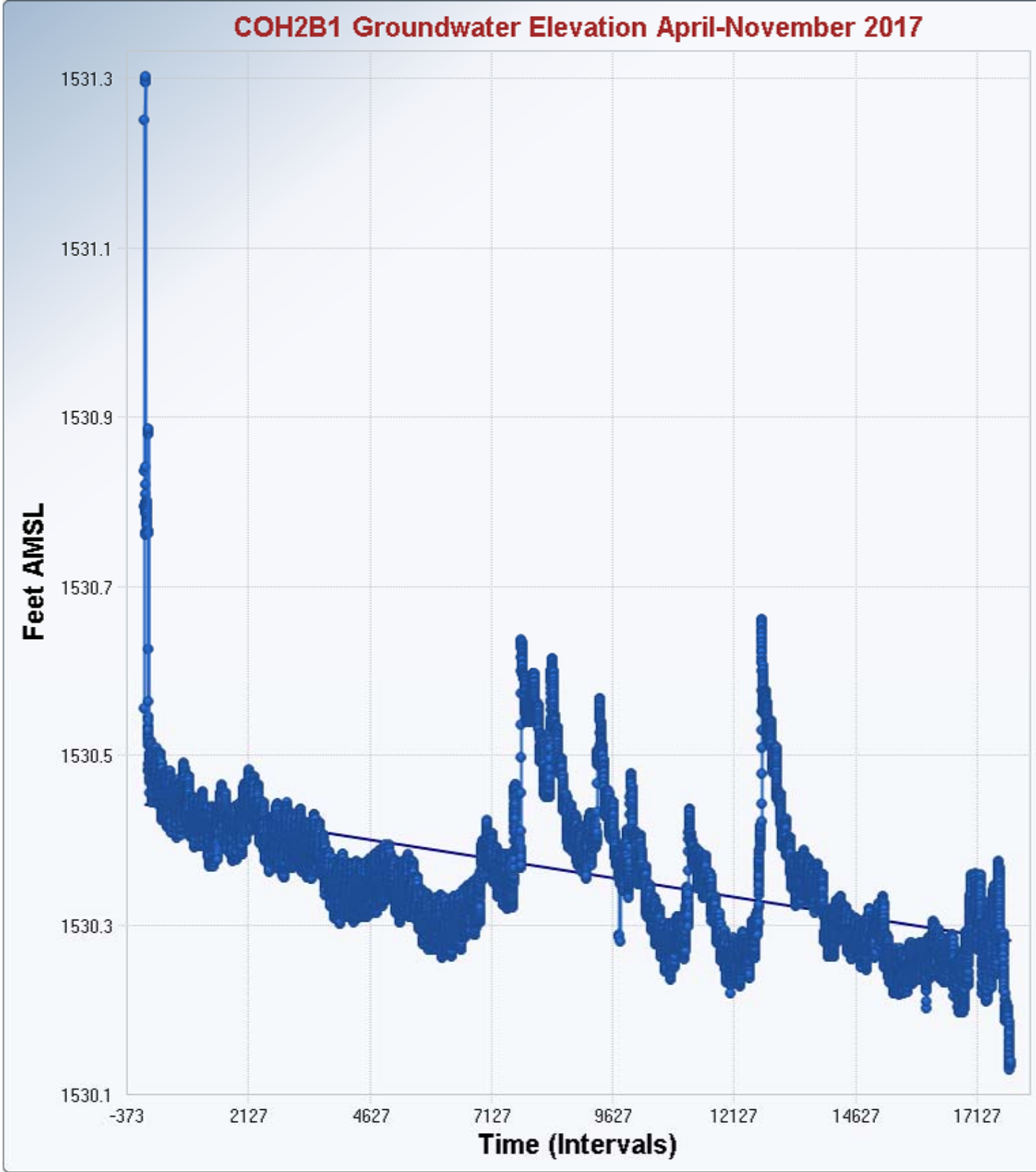
Mann-Kendall Trend Analysis

n	17,869
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	796,246.0967
Standardized Value of S	92.2035
M-K Test Value (S)	73,416,674
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,512.6378

Statistically significant evidence of an increasing trend at the specified level of significance.



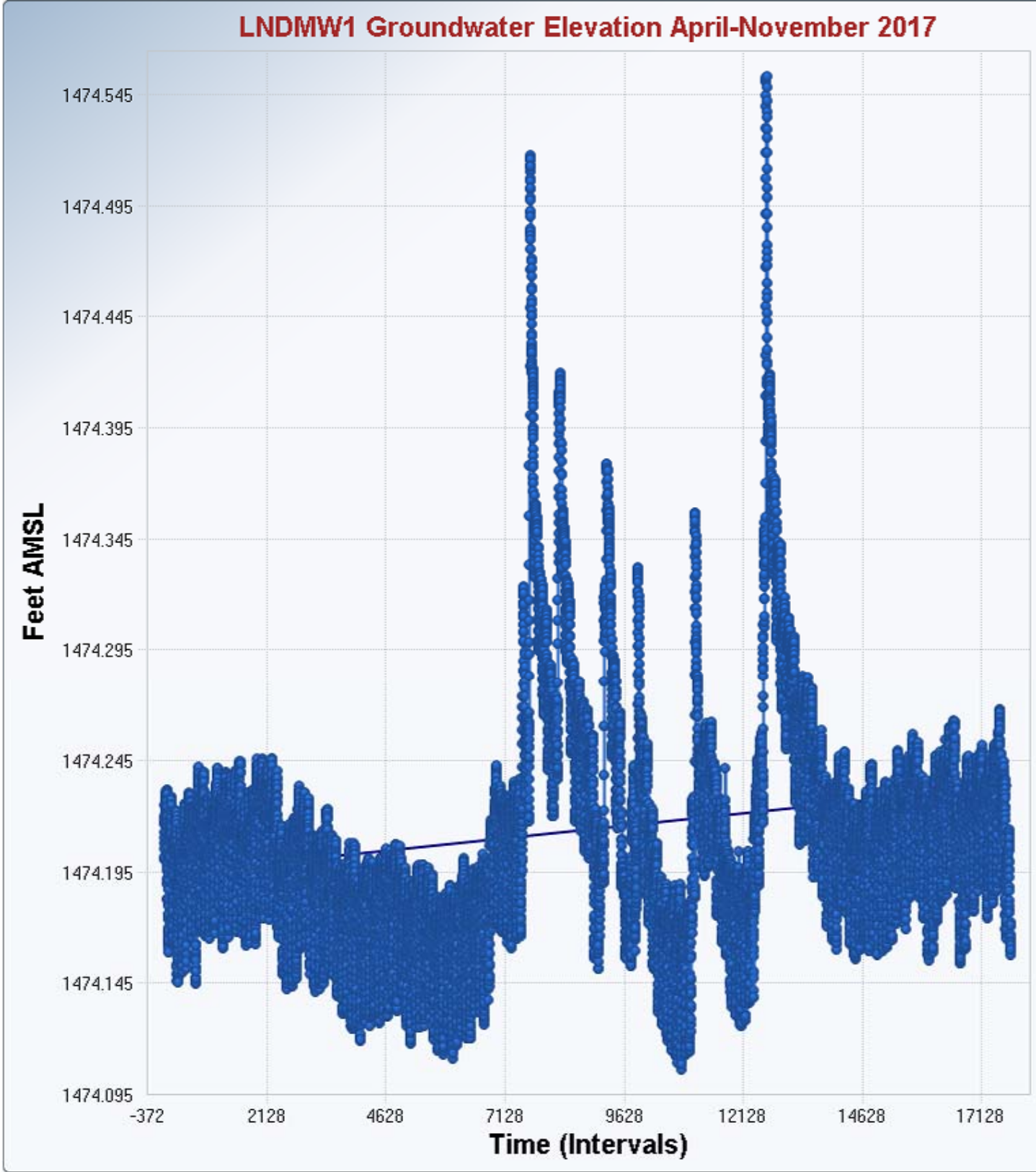
Mann-Kendall Trend Analysis

n	17,814
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	792,572.8173
Standardized Value of S	-91.9658
M-K Test Value (S)	-72,889,621
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,530.4669

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	17,737
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,439.7045
Standardized Value of S	30.7330
M-K Test Value (S)	24,200,390
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,474.1942

Statistically significant evidence of an increasing trend at the specified level of significance.

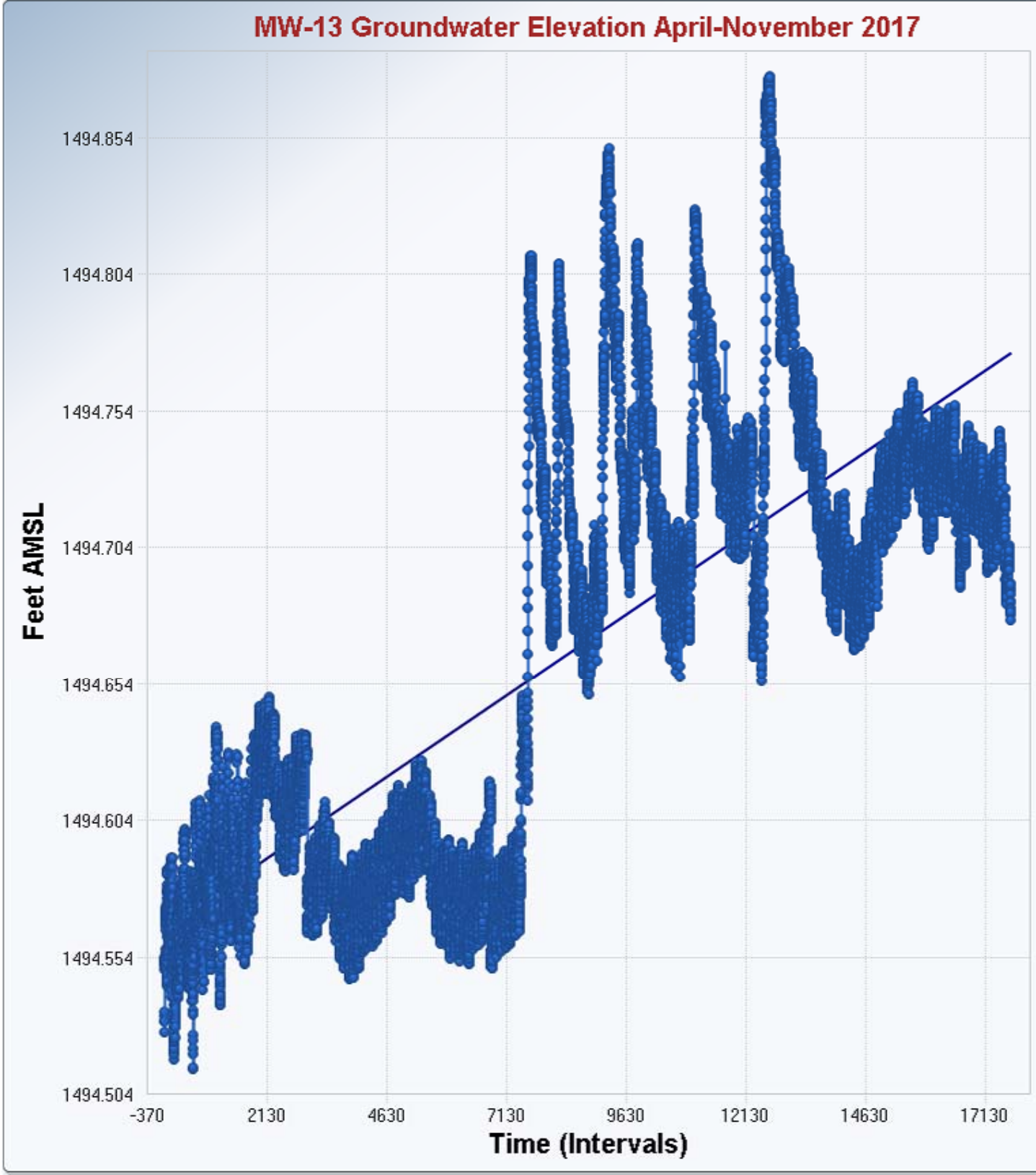
Mann-Kendall Trend Analysis

n	12,366
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	458,404.5077
Standardized Value of S	89.4395
M-K Test Value (S)	40,999,449
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,467.4894

Statistically significant evidence of an increasing trend at the specified level of significance.



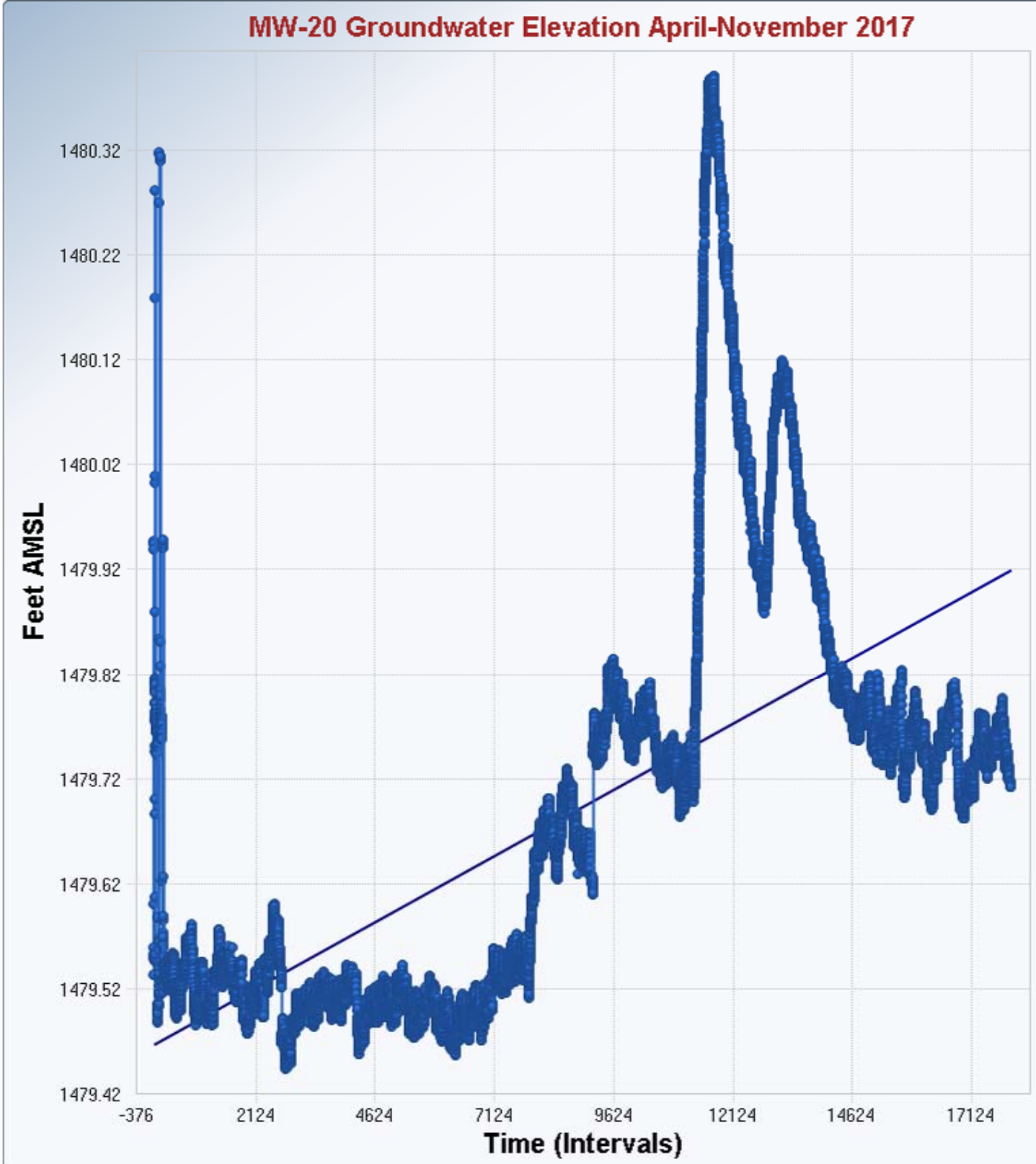
Mann-Kendall Trend Analysis

n	17,666
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	782,716.4485
Standardized Value of S	96.1047
M-K Test Value (S)	75,222,715
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,494.5646

Statistically significant evidence of an increasing trend at the specified level of significance.



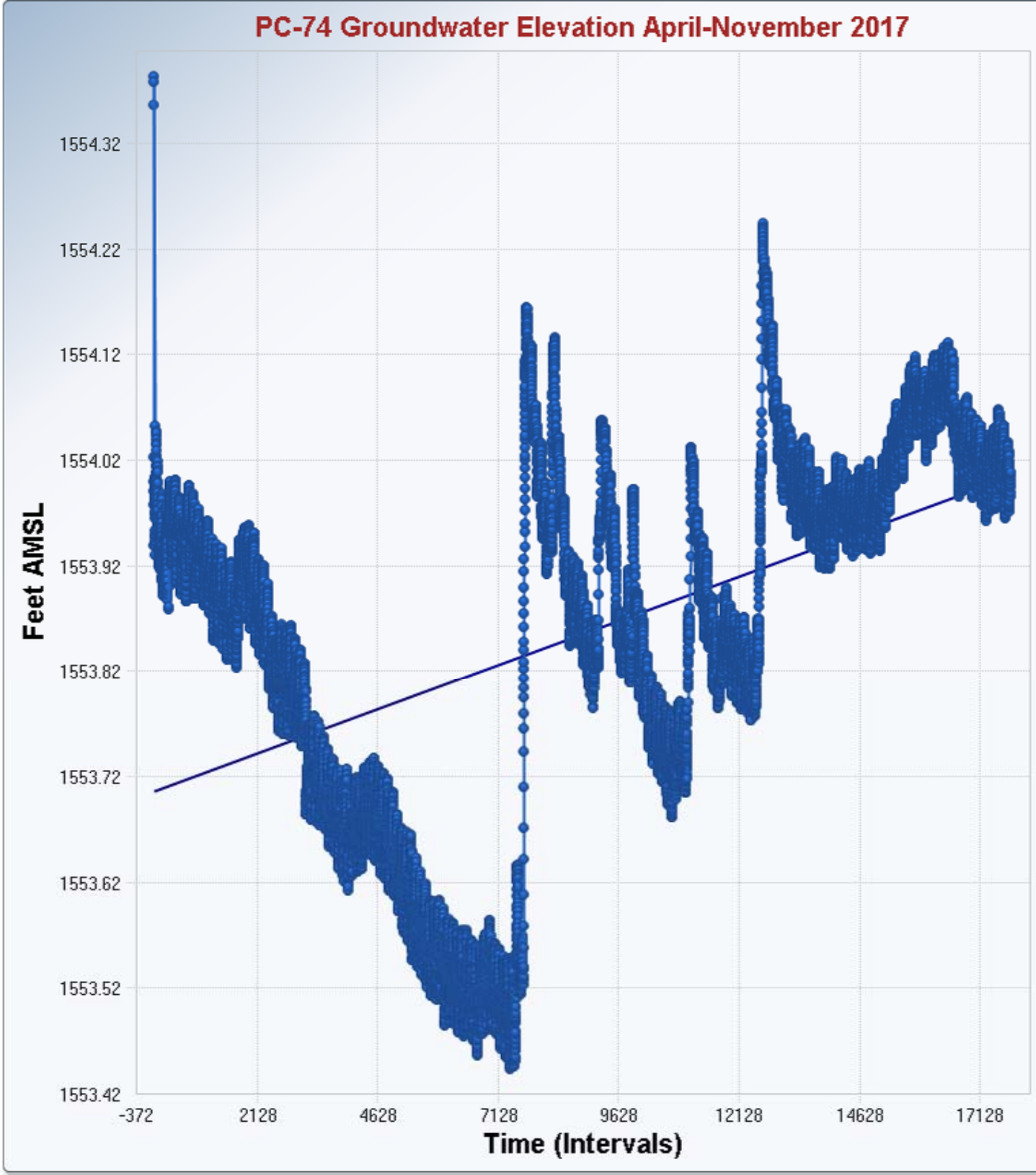
Mann-Kendall Trend Analysis

n	17,935
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	800,661.4924
Standardized Value of S	93.3402
M-K Test Value (S)	74,733,889
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,479.4705

Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	17,758
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	788,838.5986
Standardized Value of S	64.0746
M-K Test Value (S)	50,544,492
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,553.7088

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	17,750
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	788,305.6127
Standardized Value of S	54.9353
M-K Test Value (S)	43,305,804
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,559.5814

Statistically significant evidence of an increasing trend at the specified level of significance.

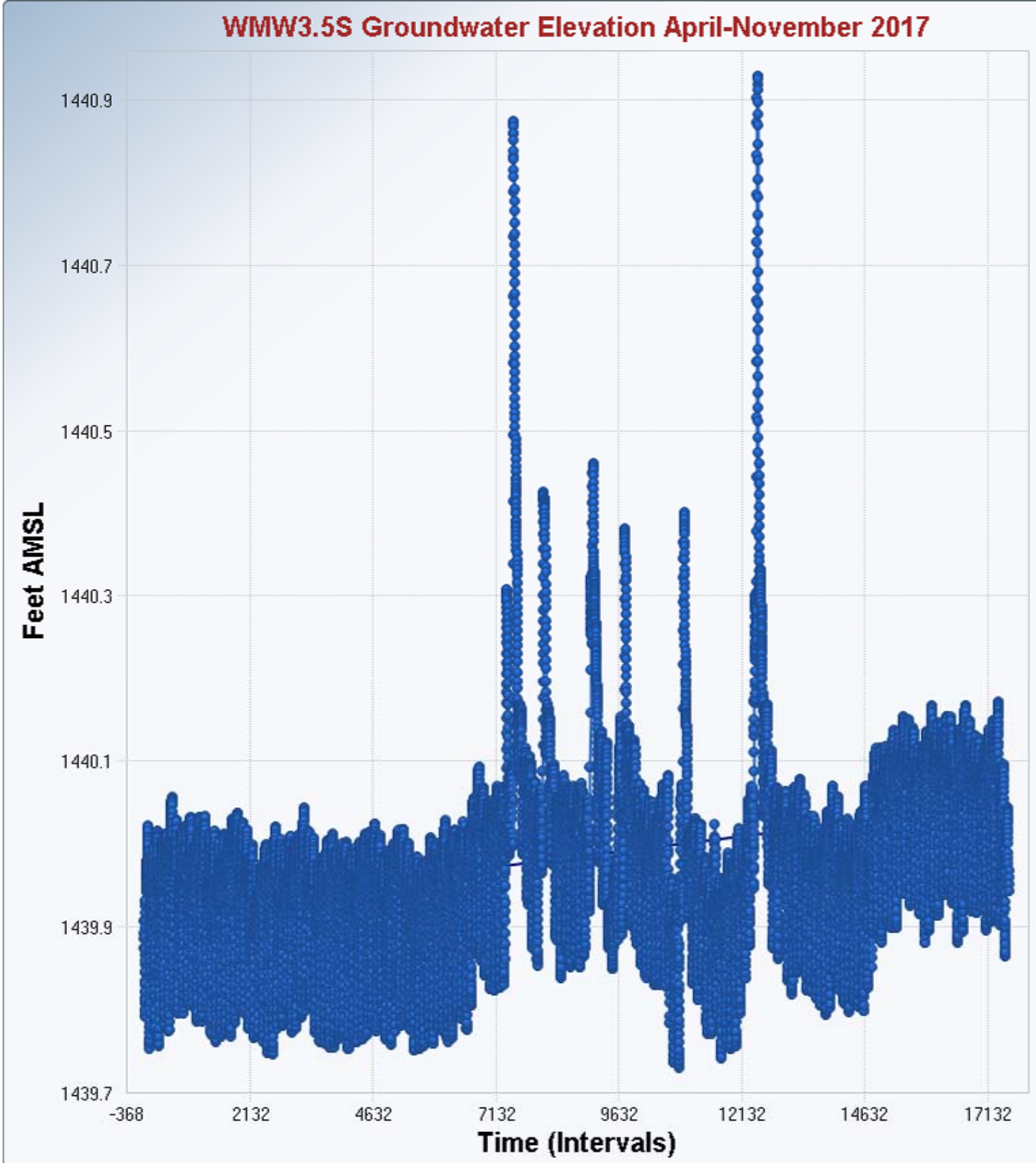
Mann-Kendall Trend Analysis

n	17,747
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	788,105.6824
Standardized Value of S	127.5852
M-K Test Value (S)	100,550,609
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,446.7993

Statistically significant evidence of an increasing trend at the specified level of significance.



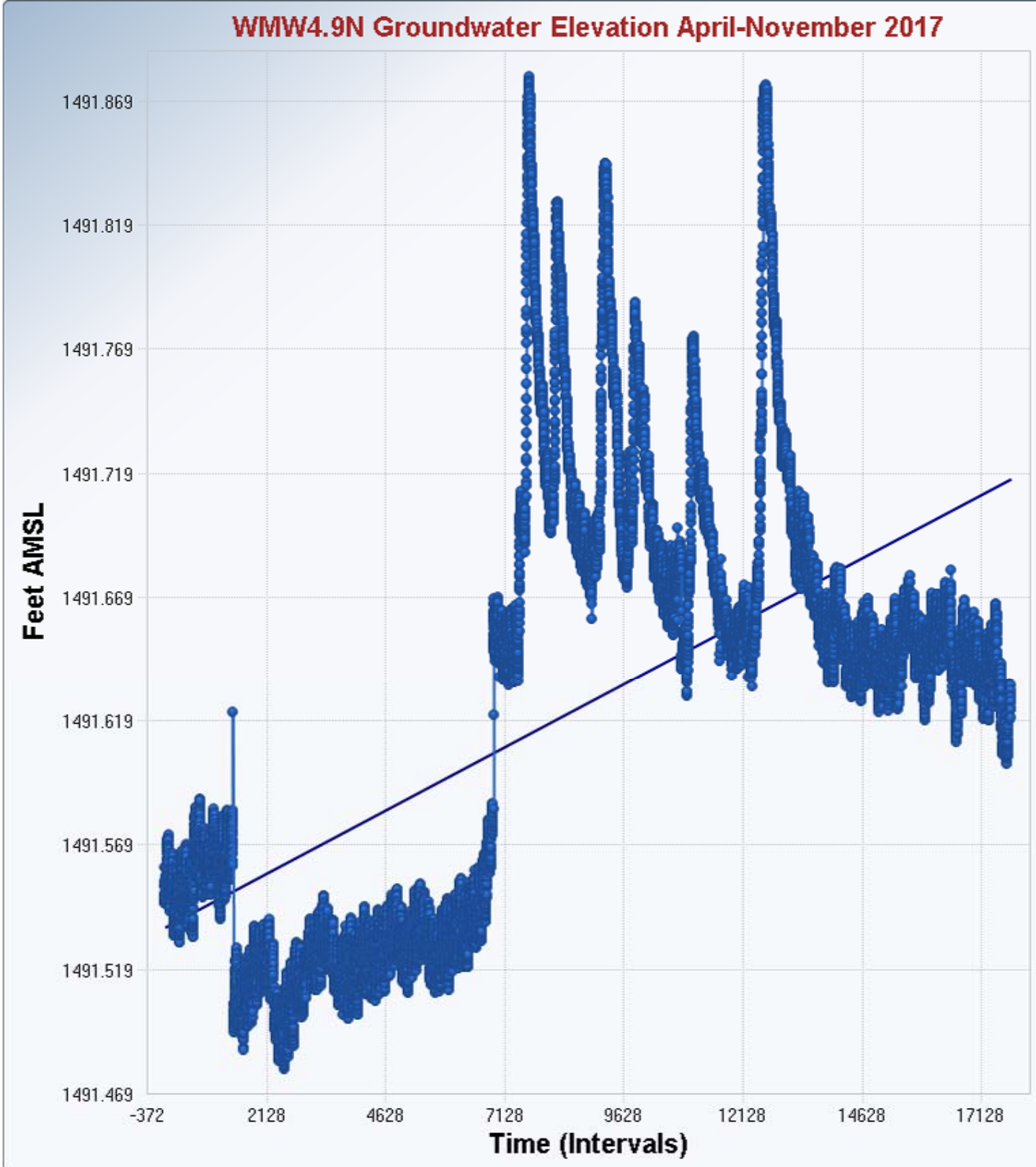
Mann-Kendall Trend Analysis

n	17,562
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	775,815.1142
Standardized Value of S	49.6263
M-K Test Value (S)	38,500,871
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,439.8733

Statistically significant evidence of an increasing trend at the specified level of significance.



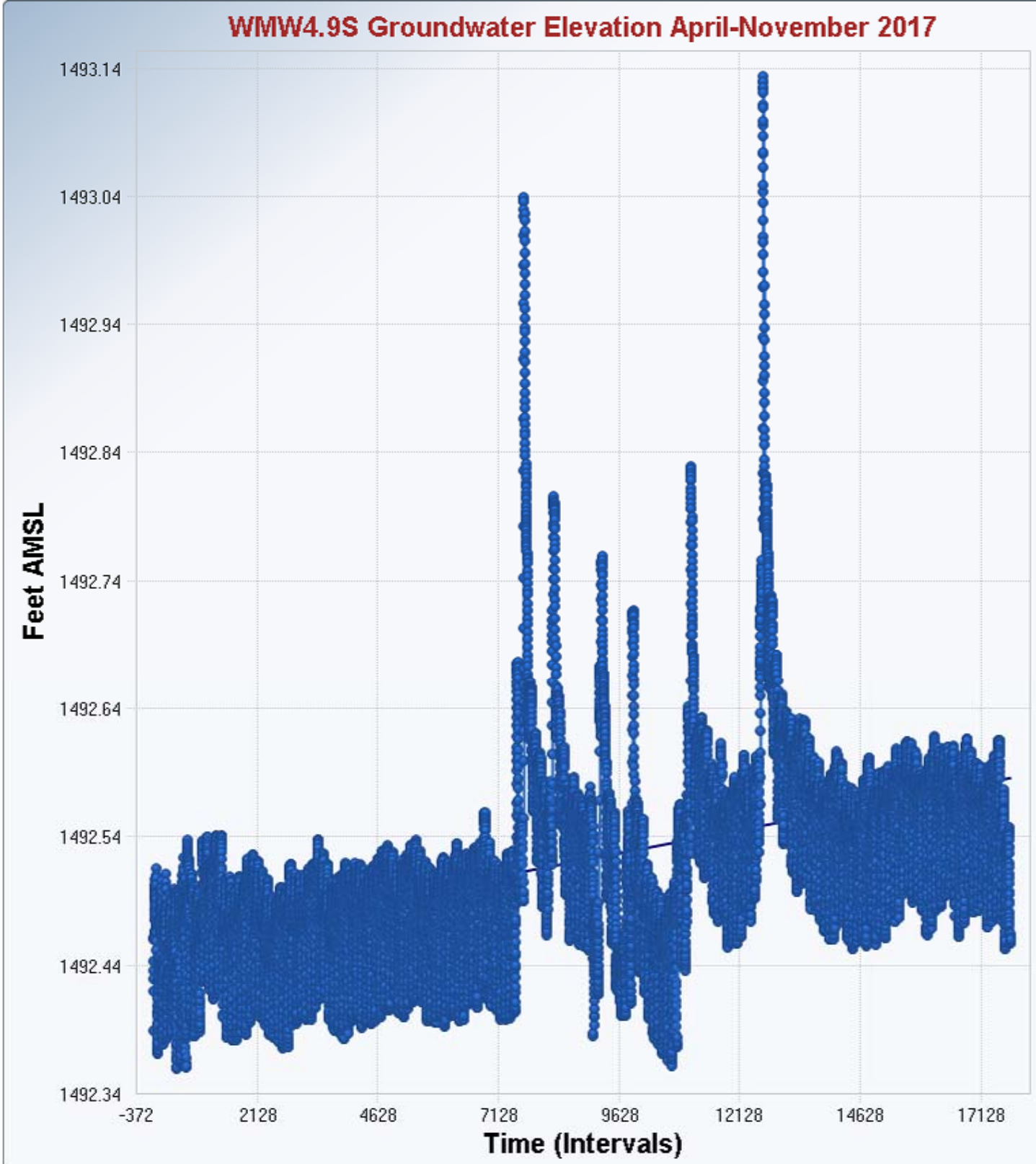
Mann-Kendall Trend Analysis

n	17,745
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,972.4501
Standardized Value of S	60.5016
M-K Test Value (S)	47,673,623
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,491.5358

Statistically significant evidence of an increasing trend at the specified level of significance.



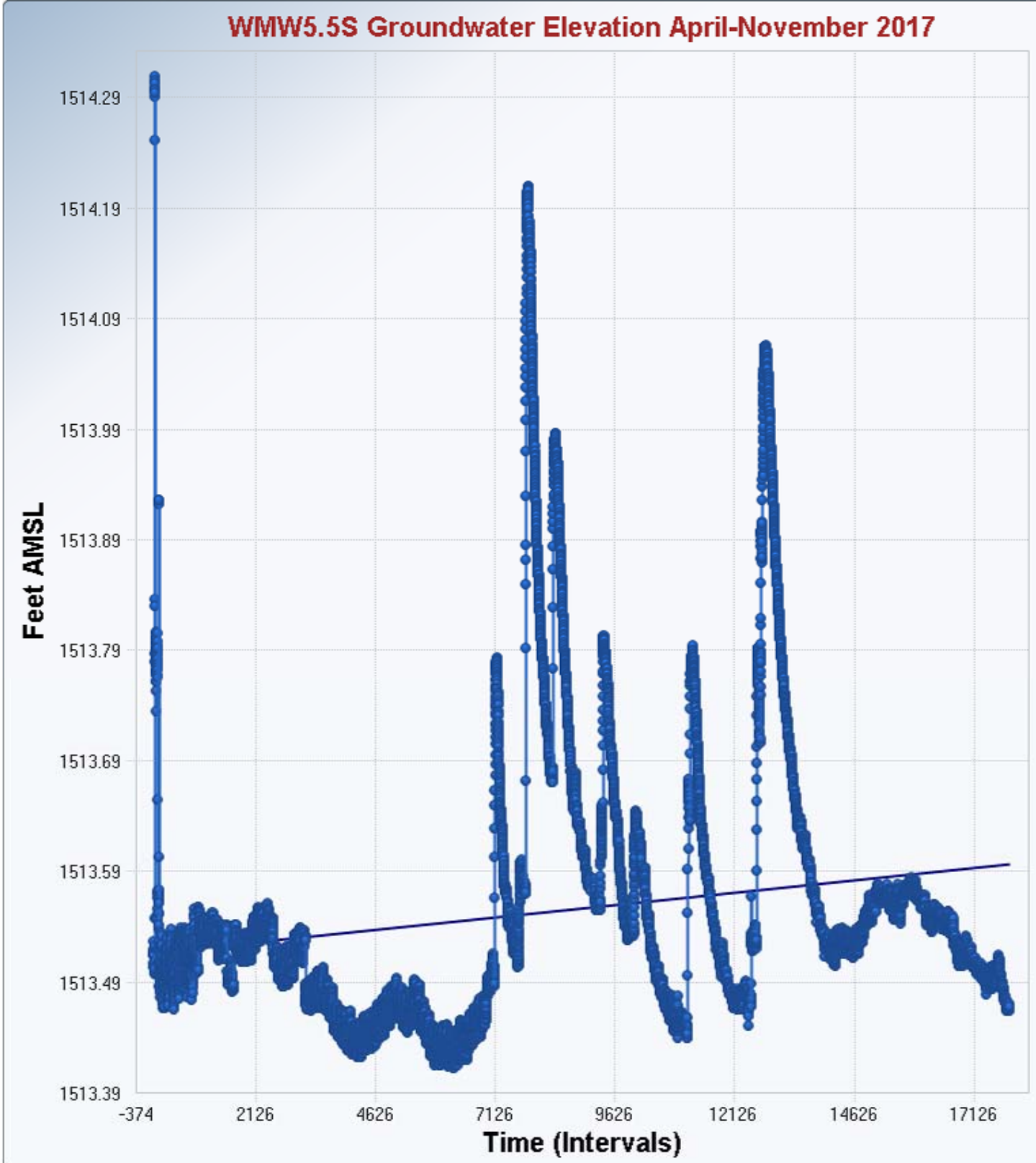
Mann-Kendall Trend Analysis

n	17,745
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,972.4703
Standardized Value of S	76.0713
M-K Test Value (S)	59,942,079
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,492.4588

Statistically significant evidence of an increasing trend at the specified level of significance.



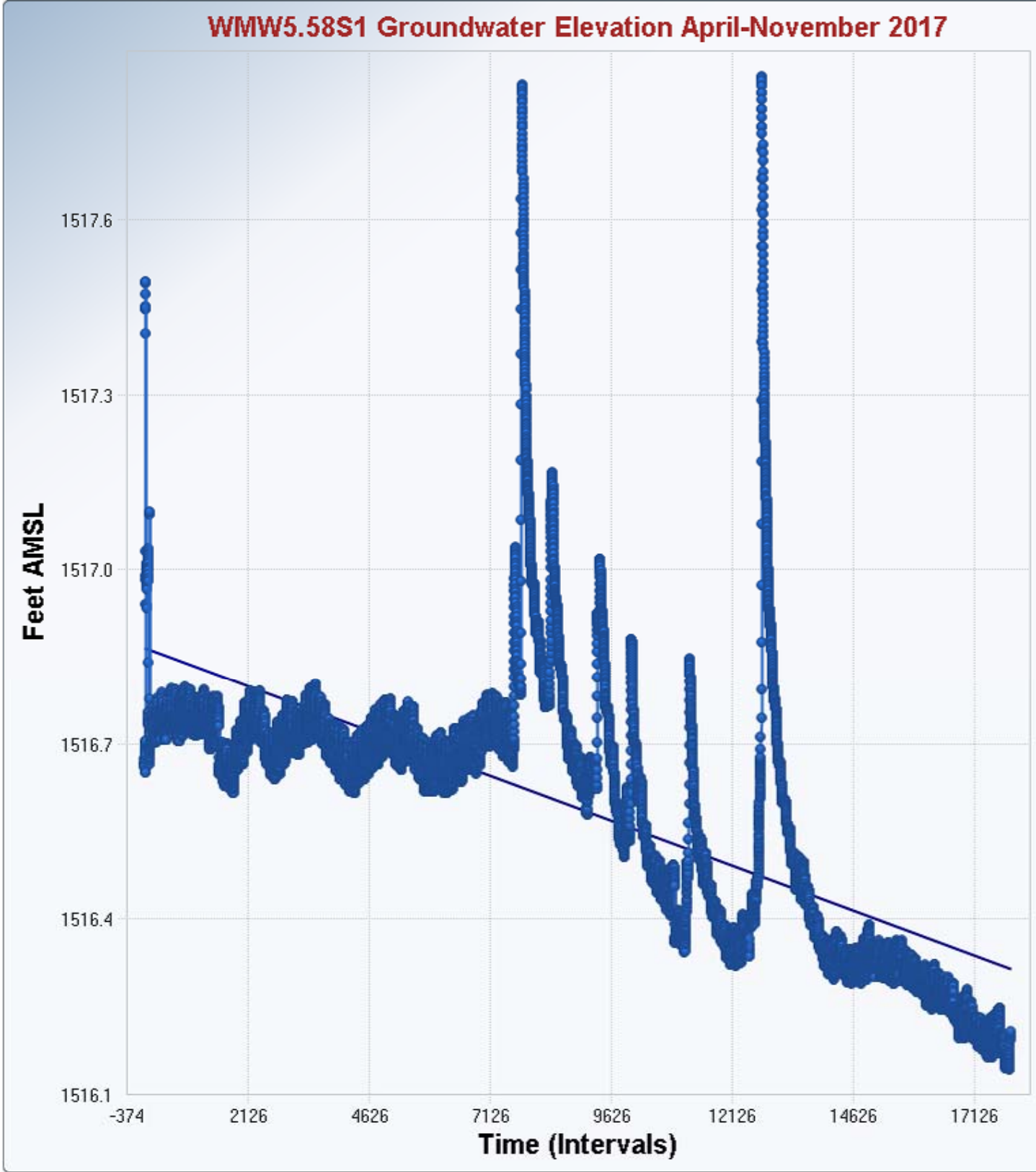
Mann-Kendall Trend Analysis

n	17,773
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	789,838.2256
Standardized Value of S	29.5307
M-K Test Value (S)	23,324,454
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,513.5201

Statistically significant evidence of an increasing trend at the specified level of significance.



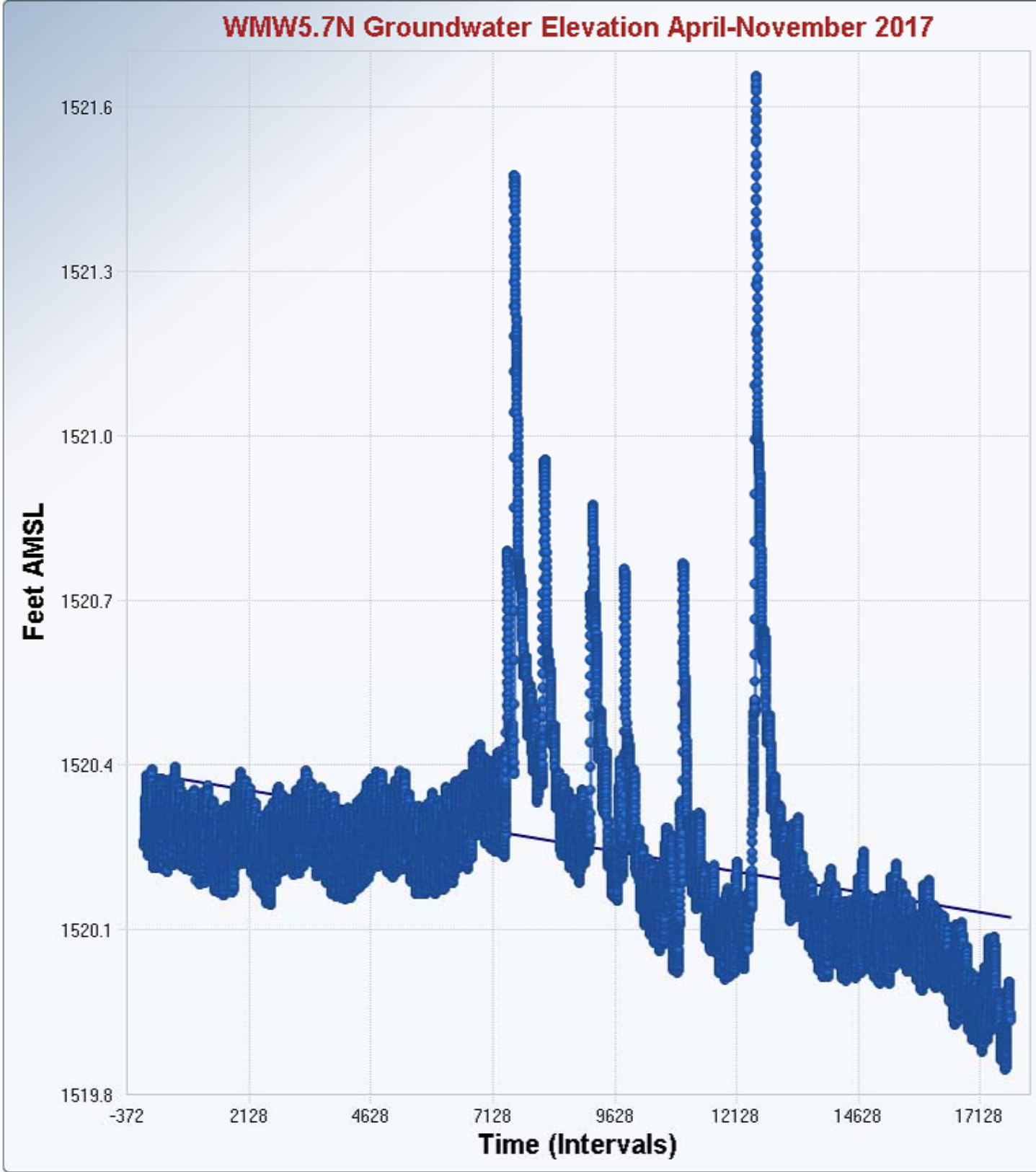
Mann-Kendall Trend Analysis

n	17,855
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	795,310.5626
Standardized Value of S	-117.6433
M-K Test Value (S)	-93,562,968
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,516.9008

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	17,742
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,772.7374
Standardized Value of S	-80.5887
M-K Test Value (S)	-63,485,620
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,520.3378

Statistically significant evidence of a decreasing trend at the specified level of significance.

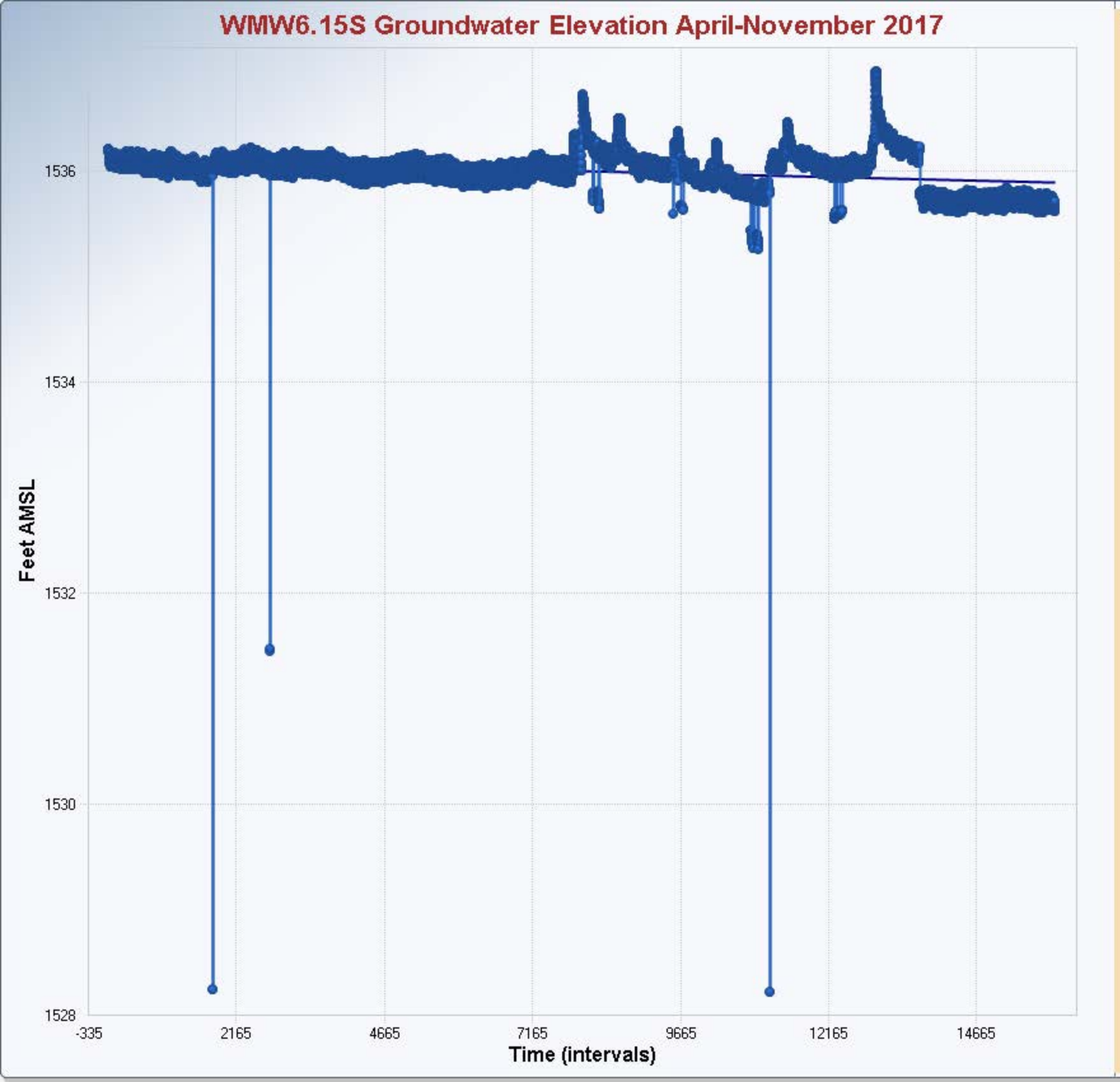
Mann-Kendall Trend Analysis

n	17,738
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,506.3122
Standardized Value of S	-67.3996
M-K Test Value (S)	-53,077,583
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,530.1108

Statistically significant evidence of a decreasing trend at the specified level of significance.



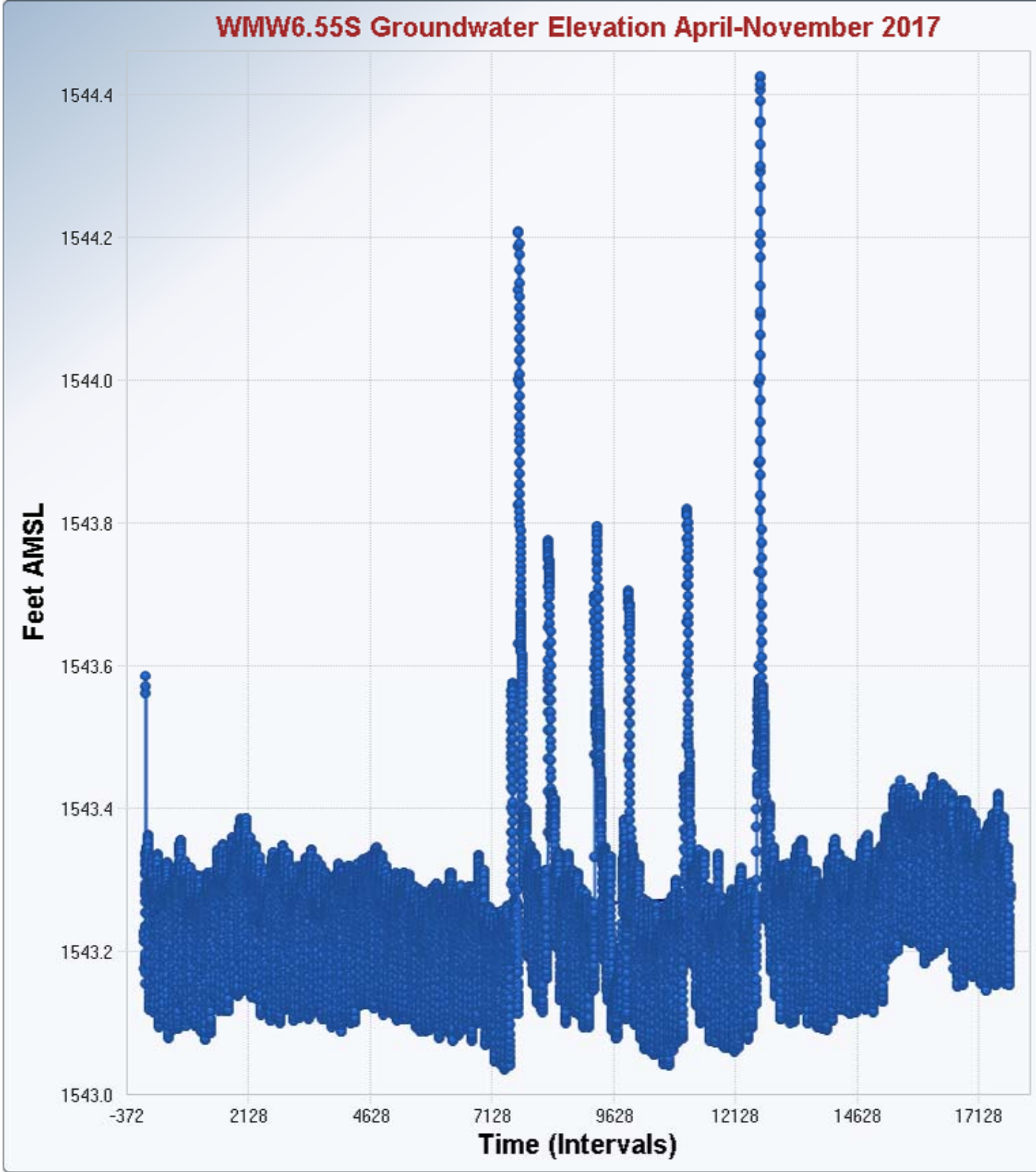
Mann-Kendall Trend Analysis

n	15,998
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	674,524.2833
Standardized Value of S	-47.3045
M-K Test Value (S)	-31,908,006
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,536.3407

Statistically significant evidence of a decreasing trend at the specified level of significance.



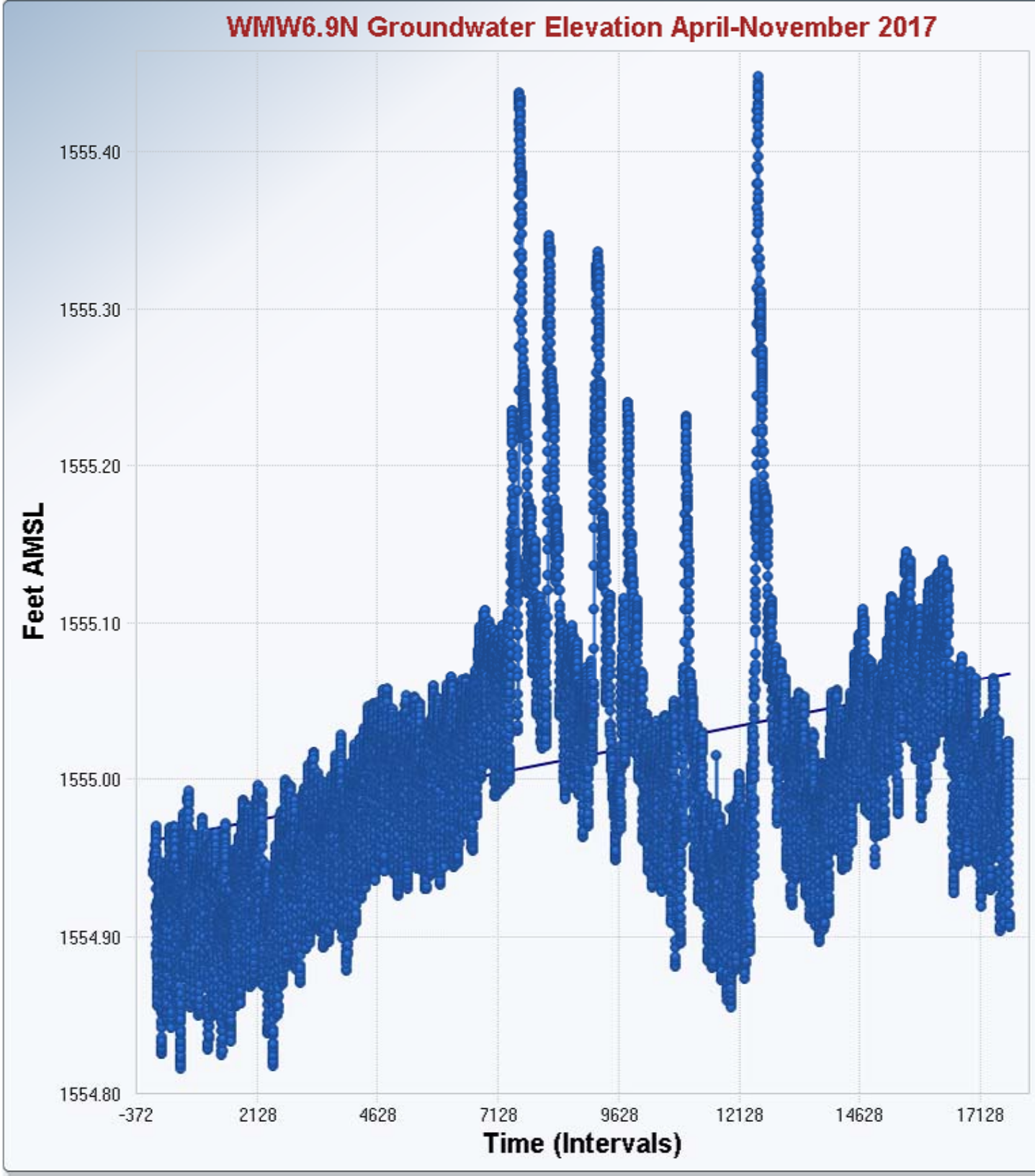
Mann-Kendall Trend Analysis

n	17,778
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	790,171.5282
Standardized Value of S	23.1343
M-K Test Value (S)	18,280,089
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,543.2562

Statistically significant evidence of an increasing trend at the specified level of significance.



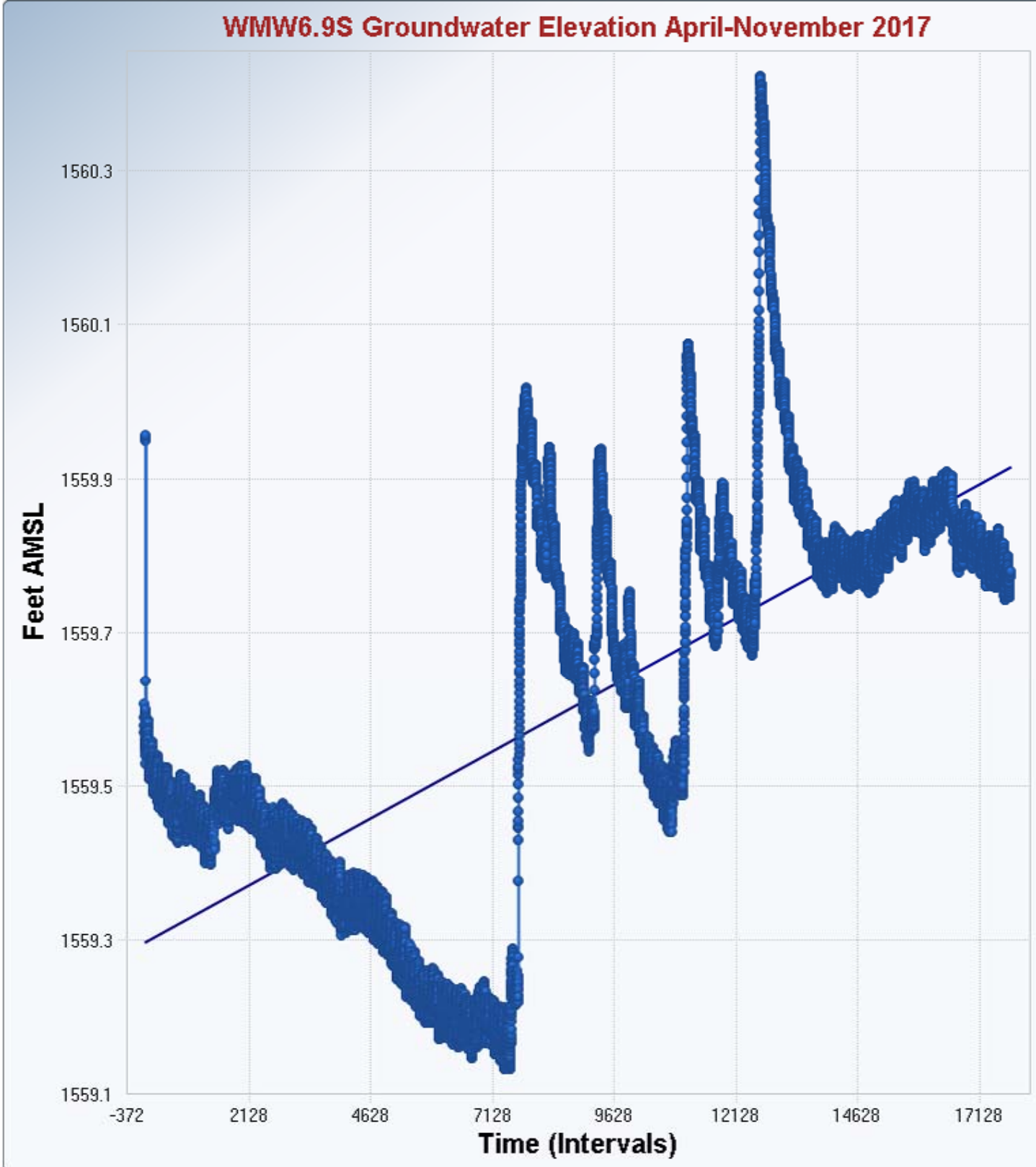
Mann-Kendall Trend Analysis

n	17,736
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	787,373.1618
Standardized Value of S	61.5115
M-K Test Value (S)	48,432,504
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	0.0000
OLS Regression Intercept	1,554.9622

Statistically significant evidence of an increasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	17,769
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	789,571.6451
Standardized Value of S	78.3928
M-K Test Value (S)	61,896,724
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

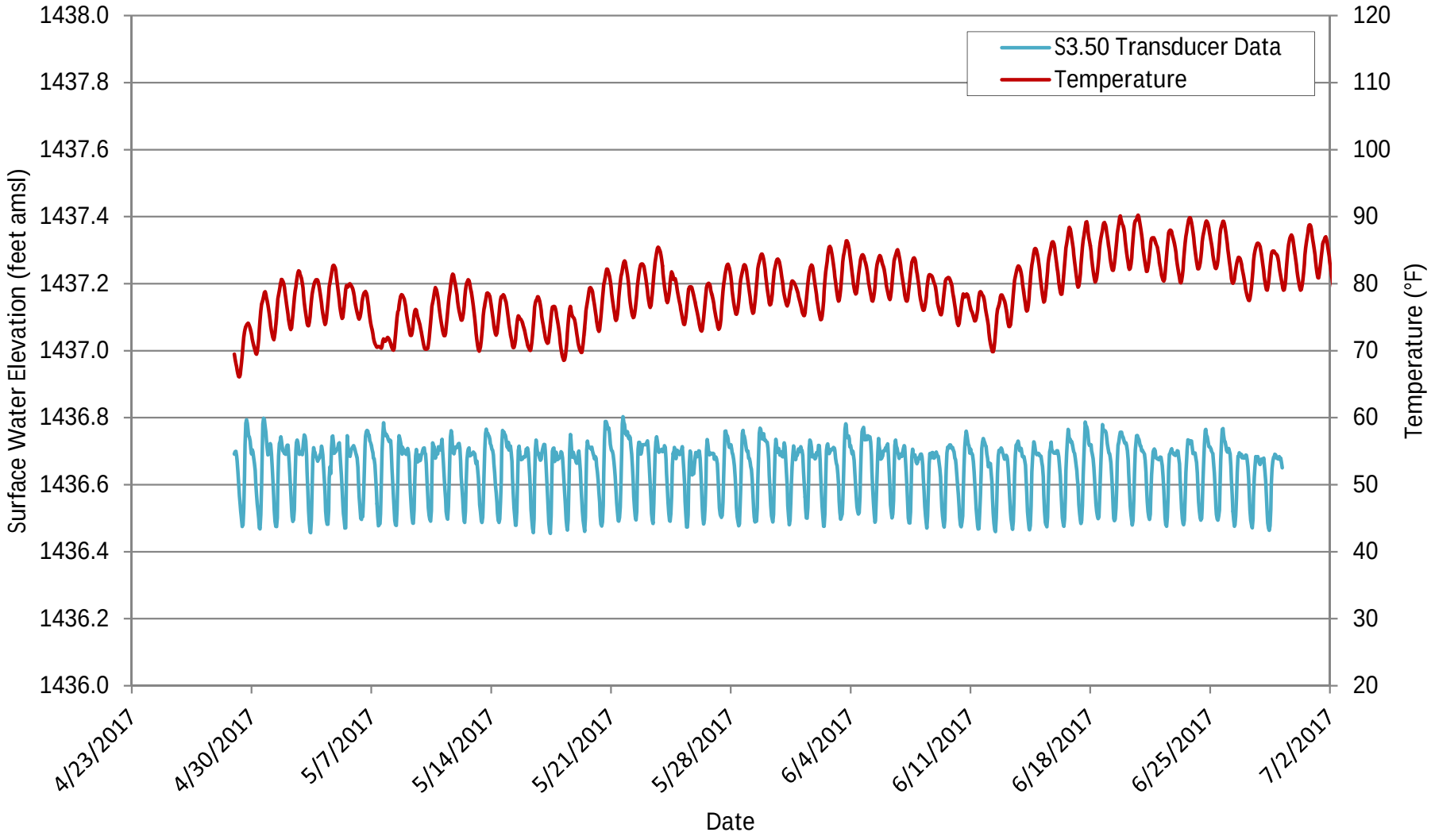
OLS Regression Slope	0.0000
OLS Regression Intercept	1,559.2510

Statistically significant evidence of an increasing trend at the specified level of significance.

Appendix F

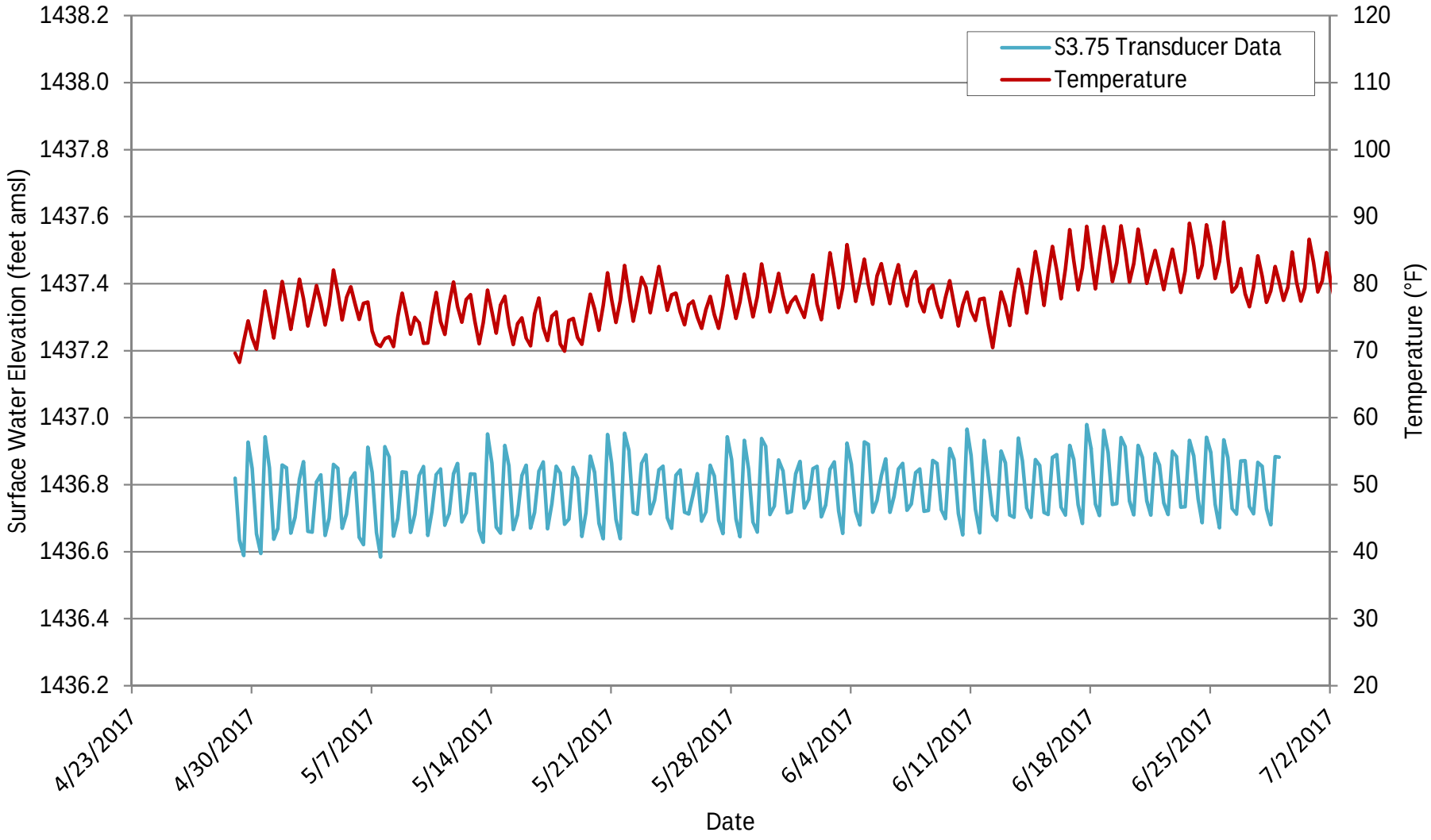
Surface Water Hydrographs

S3.50 Surface Water Hydrograph



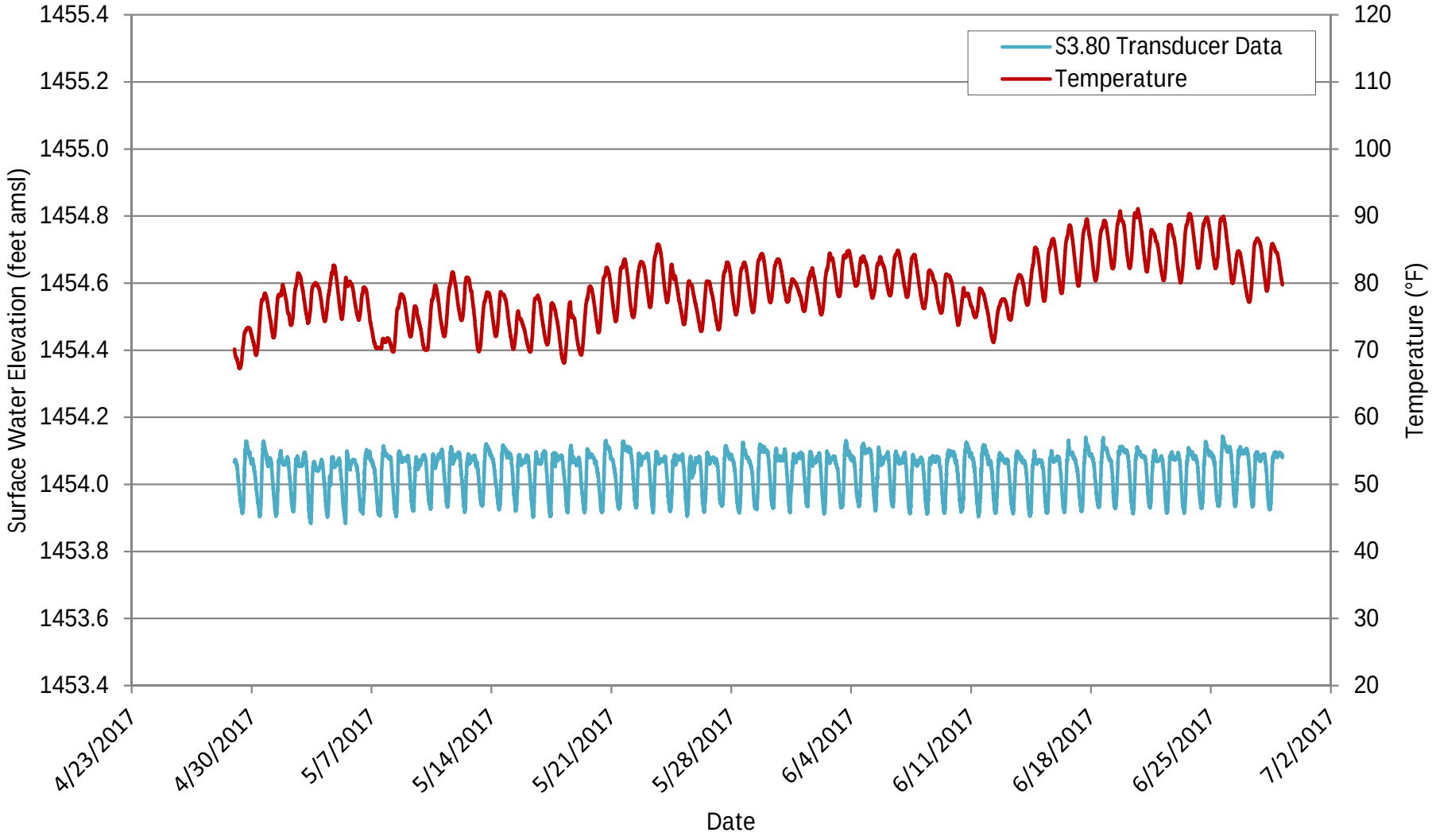
Notes: 1. Transducer data has been corrected for barometric pressure.

S3.75 Surface Water Hydrograph



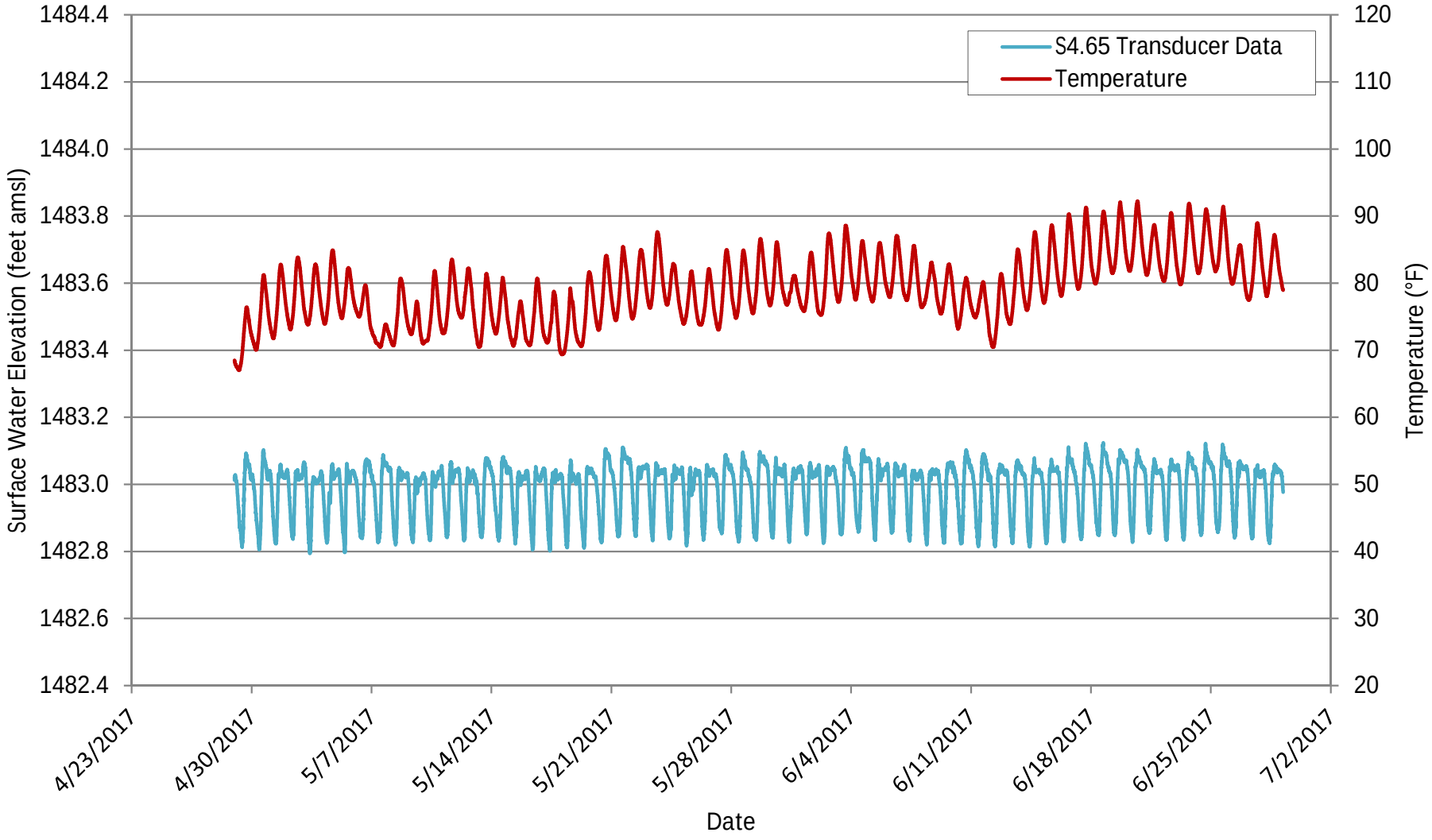
Notes: 1. Transducer data has been corrected for barometric pressure.

S3.80 Surface Water Hydrograph



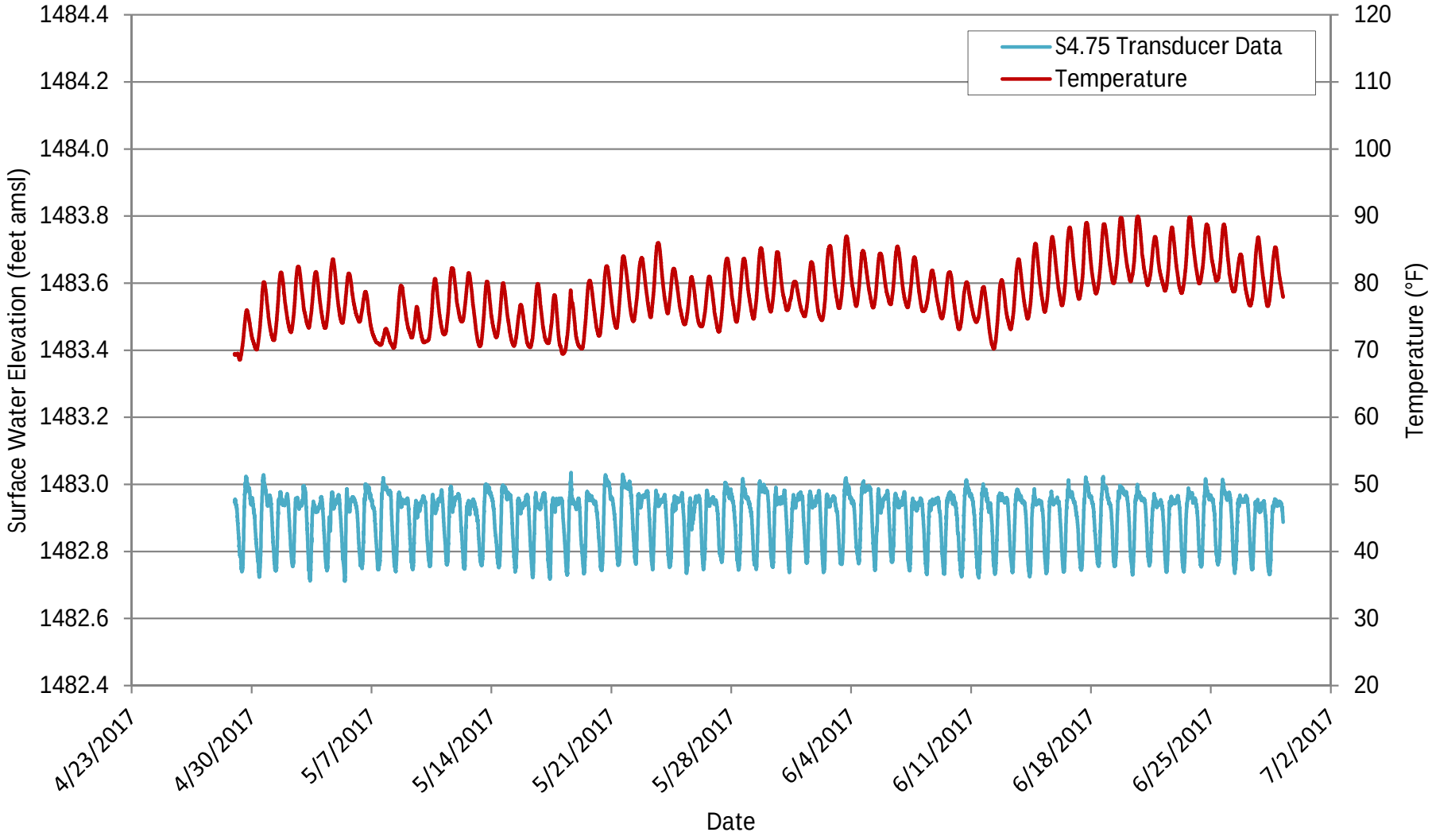
Notes: 1. Transducer data has been corrected for barometric pressure.

S4.65 Surface Water Hydrograph



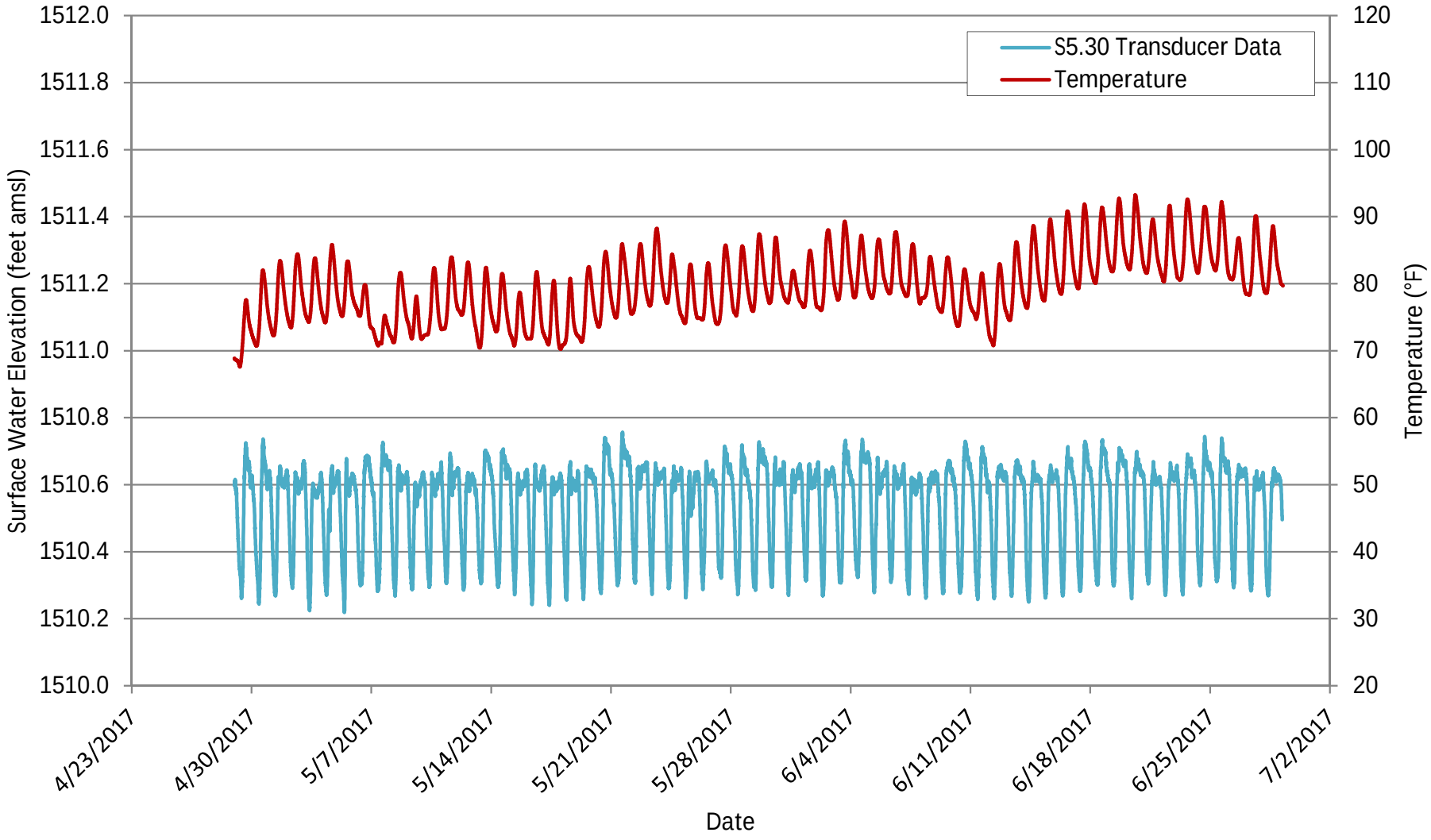
Notes: 1. Transducer data has been corrected for barometric pressure.

S4.75 Surface Water Hydrograph



Notes: 1. Transducer data has been corrected for barometric pressure.

S5.30 Surface Water Hydrograph



Notes: 1. Transducer data has been corrected for barometric pressure.