NewRange Copper Nickel LLC
Head Office and NorthMet Project Office
6500 Kensington Drive
Hoyt Lakes, MN USA 55750
+1 218 471 2150 Tel
www.newrangecoppernickel.com

Mesaba Project Office
23 Commerce Road
Babbitt, MN USA 55706
+1 218 827 0923 Tel

Submitted via MPARS

March 31, 2025

Martin Van Oort
MN Dept of Natural Resources
Division of Lands and Minerals
1525 3rd Ave E
Hibbing, MN 55746

Dear Mr. Van Oort:

Reference: 2024 Annual Report for Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260

NewRange Copper Nickel, LLC is pleased to submit to the Minnesota Department of Natural Resources our 2024 Water Appropriations (WA) Annual Report. The report covers Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260.

Following a conversion and name change under Minnesota Statutes §§ 302A.682-692 in February 2023, Poly Met Mining, Inc. is now NewRange Copper Nickel LLC (NewRange). NewRange is "for all purposes the same entity that existed before the conversion." Minn. Stat § 302A.691, subd.1. Notice of this name change was sent to the DNR March 8, 2023. The WA Permits still list PolyMet as the Permittee, but this report references NewRange as the Permittee.

In addition to the updated WA Annual Report, please find these separate electronic attachments:

- Appendix B – Monitoring Well Survey Data
- Appendix C – Groundwater Level Monitoring Data
- Locational Data in ArcGIS compatible format
- NewRange 2024 WA Annual Report Excel Data Tables
- Appendix E - Standard Operation Procedures for Ground Water Monitoring and Data Management
- Appendix E.1 - 2024 Field Data Sheets
- DNR correspondence regarding the review of the 2023 Annual Report and September 17, 2024 site visit.

If you have any questions regarding this report or require further information, please contact me at 218-471-2168 or by email at Jason.lieffring@newrangecoppernickel.com

Warm regards,

Jason Lieffring

Jason Lieffring
Environmental Compliance Coordinator
NewRange Copper Nickel LLC

Attachments:
2024 Annual Report Electronic Data Submittal (.zip)

NorthMet: 2024 Annual Report

Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260

March 2025

NEWRANGE COPPER NICKEL

Contents

List of Tables

List of Large Tables

List of Large Figures

List of Appendices

Abbreviations and Acronyms

DNR	Minnesota Department of Natural Resources
FTB	Flotation Tailings Basin
HRF	Hydrometallurgical Residue Facility
MSL	mean sea level
NGVD	National Geodetic Vertical Datum
Permits	Individual Non-Irrigation Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260
QAPPs	Quality Assurance Project Plans

Document Control: Revision History

Version	Description	Date
1.0	Initial Version	March 28, 2025

1 Introduction

NewRange Copper Nickel LLC (NewRange; formerly Poly Met Mining, Inc.) was issued six Individual Non-Irrigation Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260 (Permits) on November 1, 2018 and then amended and re-issued July 11, 2019. An additional amendment request was made December 8, 2020 to allow for a temporary pause in aquatic biota sampling until the commencement of construction activities and for review of the newly installed remote well monitoring system. The December 2020 amendment request was partially approved on January 19, 2021 to allow for quarterly data logger calibration for groundwater well monitoring and fully approved on June 11, 2021, which also included further administrative amendments by the DNR to create individual Quality Assurance Project Plans (QAPPs) for each Permit.

Following a conversion and name change under Minnesota Statutes §§ 302A.682-692 in February 2023, Poly Met Mining, Inc. is now NewRange Copper Nickel LLC (NewRange). NewRange is "for all purposes the same entity that existed before the conversion." Minn. Stat § 302A.691, subd.1. Notice of this name change was sent to you March 8, 2023. NewRange asks the DNR to use NewRange Copper Nickel LLC on the reissued permit. The Permits still list Poly Met Mining, Inc. as the Permittee, but this report references NewRange as the Permittee.

The Permits and associated QAPPs require that an annual report be submitted electronically to the DNR by March 31 of each year. The requirements for the Annual Report are specified in the Permits, and the associated QAPPs. Large Table 1 details the permit requirements and cross references where the required information is provided in this Annual Report.

In response to the 2023 Annual Report and a September 17, 2024, site visit, the DNR instructed NewRange to include additional items in future reporting (Appendix F). Additional items included in this report are NewRange's Groundwater Monitoring Standard Operating Procedures (SOPs), and 2024 field data sheets (Appendix E).

The 2024 Annual Report is limited in scope because NewRange has not begun appropriating water. However, this report includes the sections that will be included in future annual reports and outlines the information that will be provided. The structure of the Water Appropriation Annual Report, including what will be provided in future versions, is as follows:

- Section 1: The introduction provides an overview of the Annual Report content.
- Section 2: The overview of flows and points of taking and discharge section provides the flow rates and total monthly appropriation volumes for water movement on site or discharged off site after NewRange has begun appropriating water. It also documents the points of taking and points of discharge.
- Section 3: The construction dewatering summary section provides a description of temporary dewatering methods and locations, instantaneous rates, and total monthly appropriation volumes after NewRange begins construction.
- Section 4: The mine pit data summary section provides mine pit appropriation flow rates and

monthly volumes, the mine pit water levels, and the mine pit elevations and volumes after NewRange initiates dewatering of the mine pits.

- Section 5: The waste streams data summary section provides flow rates and monthly appropriation volumes from the waste streams. It also describes the methods used to record instantaneous rates and total monthly volumes from certain waste streams.

- Section 6: This section provides the Flotation Tailings Basin (FTB) and Hydrometallurgical Residue Facility (HRF) Pond water levels, flow rates, and monthly appropriation volumes, as well as the elevation data and maps for the FTB.

- Section 7: This section provides the water levels of Colby Lake and Whitewater Reservoir, the volume of water transferred between Colby Lake and Whitewater Reservoir, and the flow rates and total volume of water appropriated from Colby Lake.

- Section 8: This section summarizes the monthly volumes appropriated from primary sources and volumes appropriated from holding ponds.

- Section 9: The groundwater level monitoring section provides the water level elevations from groundwater monitoring wells.

- Section 10: The streamflow monitoring summary section provides continuous and manual stage and discharge measurements, daily average discharges, staff gage survey information, staff gage water level elevation measurements, and streamflow monitoring data.

- Section 11: The macroinvertebrate monitoring section provides the results of the annual macroinvertebrate survey.

- Section 12: The fish community monitoring section provides the results of the biannual fish community survey.

- Section 13: The weather data summary section summarizes precipitation and air temperature data at the Mine Site and the Plant Site

- Section 14: The stream augmentation monitoring section integrates monitoring results to evaluate hydrologic and ecologic conditions in Trimble Creek, Unnamed Creek, Second Creek, and Unnamed (Mud Lake) Creek.

- Section 15: The discussion and recommendations section includes a narrative analyzing monitoring data for short-term and long-term trends, provides a comparison of data trends to short-term and long-term predictions, describes the effects of dewatering or pumping activities, and discusses the effectiveness of the Monitoring Plans. It also presents any recommendations for monitoring changes, adaptive management, or contingency mitigation.

Annual monitoring data is being provided separately in a Microsoft Excel-compatible format, in accordance with the QAPPs.

2 Overview of Flows and Points of Taking and Discharge

In future Annual Reports, this section will summarize flow rates and total monthly volumes for water movement on site or discharged off site during the report year. It will provide an updated process flow diagram depicting water movement on site and off site for the report year. Finally, it will document the current configuration of the points of taking, points of discharge, truck-fill stations, flow meters, and monitoring locations.

NewRange has not begun appropriating water, and thus, there are no flows or points of taking to discuss in this Annual Report.

3 Construction Dewatering Summary

In future Annual Reports, this section will summarize construction dewatering, including a description of temporary dewatering methods and locations, instantaneous rates, and total monthly volumes after NewRange begins construction.

NewRange has not begun construction yet, and thus, there is no construction dewatering to discuss in this Annual Report.

4 Mine Pit Data Summary

This section will summarize the appropriation flow rates and monthly volumes from the mine pits, the mine pit water levels, and the mine pit elevations and volumes once mine pits have been established and pit dewatering has begun.

However, NewRange has not yet opened the mine pits, and thus, there is no data to present in this Annual Report.

4.1 Flow Rate and Volume Summary

In future Annual Reports, this section will summarize the appropriation rates and monthly volumes from the mine pits after dewatering is initiated.

4.2 Pit Level Water Summary

In future Annual Reports, this section will summarize the monthly water levels in the mine pits after dewatering is initiated.

4.3 Mine Pit Elevations and Volumes

In future Annual Reports, this section will present the most current one-foot contour elevation data and maps for each pit and provide stage-area relationship data based on either mine survey information or aerial photography. This information will be updated every other year after blasting within the pit boundary begins.

5 Waste Streams Data Summary

This section will describe waste stream flow rates and monthly appropriation volumes at the Mine Site and Plant Site. It will also describe any alternative methods used to calculate these flows.

NewRange has not begun operations, and thus, there is no data to present in this Annual Report.

5.1 Flow Rate and Volume Summary

5.1.1 MINE SITE WASTE STREAMS

In future Annual Reports, this section will summarize the flow rates and monthly appropriation volumes from the Mine Site waste streams after dewatering is initiated.

5.1.2 PLANT SITE WASTE STREAMS

In future Annual Reports, this section will summarize the flow rates and monthly appropriation volumes from Plant Site waste streams after dewatering is initiated or after water movement is initiated.

5.2 Description of Water Recording Methods

In future Annual Reports, this section will describe the methods used to record instantaneous rates and total monthly volumes for SW050, WS004, WS009, WS031, WS051, WS081 through WS087, and WS089.

6 Flotation Tailings Basin and Hydrometallurgical Residue Facility Requirements

This section will describe the FTB and HRF Pond water levels, flow rates, and monthly appropriation volumes. It will also present the elevation data and maps for the FTB.

NewRange has not begun water appropriation or water movement under the Permits, and thus, there is no data to present in this Annual Report.

6.1 FTB and HRF Pond Water Level and Volume Summary

In future Annual Reports, this section will summarize the daily water levels and monthly volumes of FTB Cells 1E and 2E and the HRF Pond once water movement in these areas is initiated.

6.2 FTB Elevation and Volumes

In future Annual Reports, this section will present the most current one-foot contour elevation data and maps for the FTB and provide stage-area relationship data based on either survey information or aerial photography. This information will be updated every other year.

7 Colby Lake and Whitewater Reservoir Requirements

This section describes the water levels of Colby Lake and Whitewater Reservoir, and the volume of water moved between Colby Lake and Whitewater Reservoir. In future Annual Reports, it will also present the flow rates and total volume of water appropriated from Colby Lake.

7.1 Water Levels

Colby Lake and Whitewater Reservoir water levels are provided in Large Table 2 and Large Table 3 respectively. This data is being provided separately in a Microsoft Excel-compatible format, in accordance with the QAPPs.

7.2 Water Transfer

During 2024, 1,271.037 million gallons was moved from Colby Lake to Whitewater Reservoir, as shown in Appendix A. No water was moved from Whitewater Reservoir back to Colby Lake. NewRange, Cliffs Erie LLC, and Minnesota Power, Inc. (Minnesota Power) hold water appropriation permits for managing water levels in these two water bodies. The water movement between Colby Lake and Whitewater Reservoir is performed by Minnesota Power. These water movements were in compliance with permit requirements for all parties.

7.3 Colby Lake Appropriation

This section will provide the flow rate and monthly volume of appropriation from Colby Lake, once appropriation begins.

NewRange has not begun pumping from Colby Lake, and thus, there is no data to present in this Annual Report.

8 Summary of Volumes Appropriated from Primary Sources and Holding Pond

In future Annual Reports, this section will describe the monthly volumes of appropriation from a primary water source (i.e., surface water or groundwater) to a holding pond/pit that is then used as a source of water for other activities.

NewRange has not begun construction or operations, and thus, there are no data to present in this Annual Report.

9 Groundwater Level Monitoring

This section describes the groundwater levels from the surficial aquifer and bedrock monitoring wells during the report year.

Groundwater levels measured in 2024 are summarized as follows:

- Mine Site surficial monthly average groundwater levels are presented in Large Table 4
- Mine Site bedrock monthly average groundwater levels are presented in Large Table 5
- Plant Site surficial monthly average groundwater levels are presented in Large Table 6

This data is being provided separately in a Microsoft Excel-compatible format, in accordance with the QAPPs.

Permit monitoring locations for groundwater for the report year at the Mine Site and Plant Site are shown on Large Figure 1 and Large Figure 2, respectively. These Permit monitoring wells were installed as of December 31, 2024.

Additional Permit monitoring wells will be installed at the Plant Site during construction of the FTB Seepage Containment System, as listed on Large Table 6, which are integral to that construction.

Locational data for the Permit monitoring locations is required to be transmitted to the DNR in an ArcGIS compatible format. An ArcGIS compatible shapefile of the monitoring locations is included with this annual report submittal.

Appendix B presents the survey data for the monitoring wells. As required by the QAPPs, Appendix B provides the date and time of survey, surveyed elevation (NGVD 1929), site name, survey method used, and survey accuracy. This data is also provided separately in a Microsoft Excel-compatible format, in accordance with the QAPPs.

Groundwater level monitoring data for 2024 is provided in Appendix C for all Permit monitoring wells. Both raw and corrected data is included as well as an explanation of all applied corrections. This data is also being provided separately in a Microsoft Excel-compatible format, in accordance with the QAPPs.

Several data logger files were unable to be successfully recovered in 2024 due to instrumentation malfunctions (e.g., firmware updates, power loss, cable damage), and transitions in personnel managing the data loggers.

In a continuing effort to minimize the number of occurrences of missing data going forward, NewRange developed SOPs and continues to implement increased oversight of data retrieval, data quality assurance and improved overall groundwater well program management. This includes monthly evaluations of data with consistent review of downloaded data for missing data and data that may appear suspect, and to ensure at minimum a manual level measurement is taken monthly when logger data is missing or suspect.

Data collected after the last manual field measurement in 2024 has not been validated yet and is qualified as “provisional.” Provisional data will be validated and provided again with the next Annual Report. Provisional data is noted, if applicable, in the individual data tabs of the Groundwater Level Monitoring Data spreadsheet and on hydrographs. Provisional data is also notated in, Large Tables 4, 5 and 6, by italicized data.

10 Streamflow Monitoring Summary

This section summarizes the 2024 streamflow monitoring data and provides continuous and manual stage and discharge measurements and daily average discharges.

NewRange has two contracts with the DNR[1] to install, maintain, and monitor stream gages as listed in Table 10-1 and to take regular spot measurements on Trimble Creek and Bear Creek on a "40-to-60-day interval to collect necessary field data and ensure the equipment is working properly." Table 10-1 lists the streamflow monitoring stations required by the Permits and describes their status as of December 31, 2024. Existing streamflow monitoring station locations are shown on Large Figure 3.

Table 10-1 Streamflow Monitoring Station Summary as of December 31, 2024

Streamflow Monitoring Station		Permit Number	Station Type	Stream	Status in 2024
Permit ID	DNR ID				
SW005	H03153002	2016-1369	Continuous gage	Embarrass River	Operating
SW041	H03157002	2016-1369	Continuous gage	Embarrass River	Operating
SW042	H03158002	2016-1369	Continuous gage	Unnamed (Mud Lake) Creek	Operating
SW043	H03153001	2016-1369	Continuous gage	Embarrass River	Operating
SW044	H03150003	2016-1369	Continuous gage	Second Creek	Operating
SW045	H03158001	2016-1369	Manual monitoring	Trimble Creek	Monitored manually
SW046	H03160001	2016-1369	Manual monitoring	Bear Creek	Monitored manually
SW430	H03155005	2016-1367	Continuous gage	Partridge River	Operating
SW431	H03155006	2016-1367	Continuous gage	Partridge River	Operating
SW432	H03145003	2016-1367	Continuous gage	South Branch Partridge River	Operating
SW433	H03155007	2016-1367	Continuous gage	Unnamed Creek (West Pit Outfall)	Removed July 20, 2023 No longer required
	H03155002	2016-1367	Continuous gage	Partridge River	Operating

[1] Contract No. 228914 and 228912

In accordance with NewRange's contracts, the DNR informed NewRange on March 22, 2024 that the streamflow monitoring data was available on the DNR's Cooperative Stream Gaging (CSG) website: https://www.dnr.state.mn.us/waters/csg/index.html

Data for 2024 are available on the CSG website for the stations listed in Table 10-1 with the exception of the two manually monitored stations, SW045 and SW046, which are retained on file by DNR. Specific web addresses to access the data and year end summaries for 2024 are provided in Appendix D.1 for these stations.

11 Macroinvertebrate Monitoring

This section will describe the results of macroinvertebrate monitoring in accordance with Permit 2016-1369. In 2021, NewRange requested and the DNR approved a temporary pause in macroinvertebrate and fish community monitoring until the start of construction of the NorthMet Project.

NewRange has not begun construction yet, and thus, there is no macroinvertebrate monitoring to discuss in this Annual Report.

12 Fish Community Monitoring

This section will describe the results of fish community monitoring in accordance with Permit 2016-1369. In 2021, NewRange requested and the DNR approved a temporary pause in macroinvertebrate and fish community monitoring until the start of construction of the NorthMet Project.

NewRange has not begun construction yet, and thus, there is no fish community monitoring to discuss in this Annual Report.

13 Weather Data Summary

Weather data was historically collected at the stream gages for Second Creek (H03150003) and Unnamed Creek (H03155007). On July 20, 2023, the gaging station at Unnamed Creek (H03155007) was removed. The gaging Station at the Partridge River (H03155006) was selected to use in place of Unnamed Creek for the purposes of weather data collection. The weather data collected at these locations is included in Appendix D.1.

A climate summary was provided to NewRange by the DNR as part of the year end summaries for each stream gage in accordance with Contract No. 228914 and 228912. The 2024 climate summary is as follows:

> *The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.*

14 Stream Augmentation Monitoring

Once stream augmentation begins, this section will bring together various monitoring results related to the hydrologic and ecologic conditions in the creeks that will receive stream augmentation flows from the Project: Trimble Creek, Unnamed Creek, Second Creek, and Unnamed (Mud Lake) Creek (the streams).

The Permits state that the objective of stream augmentation is to maintain average annual flows in these streams within ±20% of existing conditions before the implementation of the tailings basin pumpback systems. However, these streams flow at very low velocity through wetlands with only intermittent channels, which results in low precision for stream gages. In addition, water levels are largely influenced by beaver activities (which frequently change in location and configuration), causing flow variability at any potential surface water monitoring station. Because of the variability and uncertainty associated with streamflow data, a more holistic assessment of monitoring data is appropriate to assess Project performance in maintaining ecologic and hydrologic conditions in the streams.

Once stream augmentation begins, this section will include discussion of the following:

- seepage flow monitoring, which documents the amount of water collected by the FTB seepage capture systems from the headwater area of each creek

- augmentation flow monitoring, which documents the amount of water the Project delivers to the headwater area of each creek

NewRange has not begun stream augmentation, and thus, there is no data to present in this Annual Report.

15 Discussion and Recommendations

Once appropriation begins, this section will include a narrative analyzing monitoring data for short-term and long-term trends, compare the data trends to short-term and long-term predictions, describe the effects of dewatering or pumping activities, and discuss the effectiveness of the Monitoring Plans. It will also present any recommendations for monitoring changes, adaptive management, or contingency mitigation as a result of the evaluations included in this Annual Report.

After receiving Permits in November 2018, NewRange installed additional monitoring wells and continued conducting baseline groundwater and streamflow monitoring. As of December 31, 2024, NewRange has not begun Project construction, water appropriation, or water movement. NewRange is currently in ongoing litigation, and some of these cases are restricting construction from starting. Once NewRange has a more defined schedule for construction, this schedule will be provided to the DNR for review and discussion.

Large Tables

Large Table 1 Index to Permit Requirements

Annual Report Section	Permit Requirement	Permit Number, page number	Permit Heading
2.0: Overview of Flows and Points of Taking	Flow rates and total monthly volumes for all water movement on-site or discharged off-site. Instantaneous rates, when relevant, shall be recorded when the total monthly volumes (totalizer readings) are collected. This information will allow for the development of a comprehensive water balance.	2016-1363, p. 3 2016-1364, p. 3 2016-1365, p. 3 2016-1367, p. 5-6 2016-1369, p. 4 2017-0260, p. 4	Water Movement Reporting
	Annual report will include: 1) an updated process flow diagram depicting all water movement on-site and off-site and 2) documentation showing the current configuration of all points of taking, points of discharge, pipe alignments, truck-fill stations, flow meters, and monitoring locations.	QAPP, p. 1 (all permits)	Reporting Requirements
3.0: Construction Dewatering	Description of temporary dewatering methods and locations, with instantaneous rates and total monthly volumes	2016-1367, p. 13 2016-1369, p. 11	Monitoring Plan – Rates and Monthly Water Volumes
4.0: Mine Pit Data Summary			
4.1: Flow Rate and Volume Summary	Flow rates and monthly volumes after dewatering is initiated at WS401 (East Pit) and after water movement is initiated at WS900 (East Pit outfall structure to West Pit)	2016-1363, p. 7	Monitoring Plan – Rates and Monthly Water Volumes
	Flow rates and monthly volumes after dewatering is initiated at WS404 (Central Pit)	2016-1364, p.7	Monitoring Plan – Rates and Monthly Water Volumes
	Flow rates and monthly volumes after dewatering is initiated at WS402 (West Pit) and WS403 (West Pit) and after water movement is initiated at SD401 (West Pit outfall structure to Unnamed Creek)	2016-1365, p. 7	Monitoring Plan – Rates and Monthly Water Volumes
4.2: Pit Level Water Summary	Monthly water levels after dewatering is initiated at WS401 (East Pit)	2016-1363, p. 7	Monitoring Plan – Pit Water Levels
	Monthly water levels after dewatering is initiated at WS404 (Central Pit).	2016-1364, p. 7	Monitoring Plan – Pit Water Levels
	Monthly water levels after dewatering is initiated at WS402 (West Pit) and WS403 (West Pit)	2016-1365, p. 7	Monitoring Plan – Pit Water Levels
4.3: Mine Pit Elevations and Volumes	One-foot contour elevation data and maps for each pit, including stage-area relationship data based on either mine survey information or aerial photography	2016-1363, p. 4 2016-1364, p. 4 2016-1365, p. 4	Mine Pit Elevations and Volumes
Section 5.0: Waste Streams Data Summary			
5.1: Flow Rate and Volume Summary	Flow rates and monthly volumes after dewatering is initiated at WS411 (Category 1 Stockpile Groundwater Containment System), WS412 (Category 1 Stockpile Groundwater Containment System), WS413 (OLSA Pond), WS414 (Construction Mine Water), WS415 (Low Concentration Mine Water), WS416 (High Concentration Mine Water), WS421 (Category 2/3 Waste Rock Stockpile Mine Water Drainage), WS422 (Category 2/3 Waste Rock Stockpile Mine Water Drainage), WS423 (Category 2/3 Waste Rock Stockpile Mine Water Drainage), WS424 (Category 4 Waste Rock Stockpile Mine Water Drainage), WS425 (Ore Surge Pile Mine Water Drainage), WS441 (Construction Mine Water and OLSA Runoff), WS442 (Low Concentration Mine Water), WS443 (Low Concentration Mine Water), WS444 (High Concentration Mine Water), GW491 (Category 2/3 Waste Rock Stockpile Underdrain), GW492 (Category 2/3 Waste Rock Stockpile Underdrain), GW493 (Category 2/3 Waste Rock Stockpile Underdrain), GW494 (Category 4 Waste Rock Stockpile Underdrain), and GW495 (Ore Surge Pile Underdrain).	2016-1367, p. 13	Monitoring Plan – Rates and Monthly Water Volumes
	Continuous monitoring after water movement is initiated at the truck fill stations	2016-1367, p. 13	Monitoring Plan – Rates and Monthly Water Volumes
	Flow rates and monthly volumes after dewatering is initiated at WS003 (Second Creek), WS006 (Unnamed (Mud Lake) Creek), WS007 (Trimble Creek), WS008 (Unnamed Creek), WS012 (Tailings discharge to FTB), WS013 (Total pumping from FTB to Beneficiation Plant), WS014 (Total pumping from FTB Seepage Capture System to FTB), WS015 (Total pumping from FTB Seepage Capture System to WWTS), WS061 (Total pumping from WWTS), WS062 (Total pumping from WWTS to East Pit), WS063 (Total pumping from WWTS to West Pit), SD002 (Unnamed Creek), SD003 (Unnamed Creek), SD004 (Trimble Creek), SD005 (Trimble Creek), SD006 (Trimble Creek), SD007 (Trimble Creek), SD008 (Trimble Creek), SD009 (Trimble Creek), SD010 (Trimble Creek), and SD011 (Second Creek).	2016-1369, p. 10	Monitoring Plan – Rates and Monthly Volumes

Annual Report Section	Permit Requirement	Permit Number, page number	Permit Heading
	Flow rates and monthly volumes after water movement is initiated at SW050 (Unnamed (Mud Lake) Creek via swale), WS004 (HRF Pond during ice-free conditions), WS009 (Sewage Treatment System Ponds during ice-free conditions), WS051 (WWTS Basin during ice-free conditions), WS031 (Plant Reservoir during ice-free conditions), WS081 (Plant Reservoir to Beneficiation Plant), WS082 (Plant Reservoir to Hydrometallurgical Plant once constructed), WS083 (Plant Reservoir to FTB), WS084 (Plant Reservoir to Potable Water Treatment Plant), WS085 (Plant Reservoir to Fire Water System), WS086 (Plant Reservoir to air emission scrubber system), WS087 (Plant Reservoir to miscellaneous water needs), and WS089 (Plant Reservoir to truck fill stations).	2016-1369, p. 10-11	Monitoring Plan – Rates and Monthly Volumes
5.2: Description of Water Volume Calculation Methods	Methodologies used to record instantaneous rates and total monthly volumes for SW050, WS004, WS009, WS051, WS031, WS081 through WS087, and WS089.	2016-1369, p. 10-11 2016-1369, p. 13	Monitoring Plan – Rates and Monthly Volumes, and Annual Report, Re-evaluation of Monitoring Plan, Closure and Temporary Idle
6.0: Flotation Tailings Basin and Hydrometallurgical Residue Facility Requirements			
6.1: FTB and HRF Pond Water Level and Volume Summary	Daily water levels and total monthly volumes at WS010 (FTB Cell 1E), WS011 (FTB Cell 2E), and WS016 (HRF Pond), once water movement is initiated	2016-1369, p. 11	Monitoring Plan – Pond Water Levels and Volumes
6.2: FTB Elevations and Volumes	One-foot contour elevation data and maps for the entire tailings basin, including stage-area relationship data based on either survey information or aerial photography	2016-1369, p. 5	Tailings Basin Elevations and Volumes
7.0: Colby Lake and Whitewater Reservoir Requirements			
7.1: Water Levels	Daily water levels at Colby Lake (DNR Lake ID# 69-0249) and Whitewater Reservoir (DNR Lake ID# 69-0376)	2017-0260, p. 7	Monitoring Plan – Lake Water Levels
7.2: Water Transfer	Total volume of water moved from Colby Lake to Whitewater Reservoir and total volume of water pumped from Whitewater Reservoir to Colby Lake. Report all water moved/pumped with the start and end date and time. Monitor water levels before and after each time water is moved/pumped at Colby Lake (DNR Lake ID# 69-0249) and Whitewater Reservoir (DNR Lake ID# 69-0376).	2017-0260, p. 7	Monitoring Plan – Colby Lake and Whitewater Reservoir Water Movement
	The Permittee may transfer water from Colby Lake into Whitewater Reservoir, except that no such transfer is permitted when the water elevation in Colby Lake is below 1439 ft msl or the water elevation in Whitewater Reservoir is above 1442 ft msl. If the water elevation of Colby Lake is below 1439 ft msl, Permittee may only pump water from Colby Lake if water is being transferred at an equal or higher rate from Whitewater Reservoir to Colby Lake. The Permittee may transfer water from Whitewater Reservoir to Colby Lake when the water elevation of Whitewater Reservoir exceeds 1410 ft msl.	2017-0260, p. 4	Colby Lake and Whitewater Reservoir Water Level Requirements
7.3 Colby Lake Appropriation	Flow rates and monthly volumes at SW047 (Colby Lake)	2017-0260, p. 7	Monitoring Plan – Rates and Monthly Water Volumes
8.0: Summary of Volumes Appropriated from Primary Sources and Volumes Appropriated from Holding Ponds	Monthly volumes of water appropriated from each primary source and the volume of water appropriated from each holding pond/pit	2016-1367, p. 4 2016-1369, p. 3 2017-0260, p. 2	Primary Waters to Holding Ponds
9.0: Groundwater Level Monitoring	Monthly groundwater levels at GW403, GW417, GW430, GW431, GW470, GW471, GW472, GW473, GW499, GW501, GW504, GW505, GW506, GW509, GW510, GW521, GW522, GW523, GW530, and GW531. Downhole geophysical testing, flow logging, and aquifer testing will take place at the new bedrock wells (GW509, GW510, GW521, GW522, and GW523).	2016-1363, p. 7-8	Monitoring Plan – Groundwater Well Monitoring
	Monthly groundwater levels at GW407, GW419, and GW525	2016-1364, p. 7	Monitoring Plan – Groundwater Well Monitoring
	Monthly groundwater levels at GW402, GW408, GW409, GW416, GW418, GW477, GW478, GW479, GW502, GW507, GW516, GW517, GW518, GW519, GW524, and GW532. Downhole geophysical testing, flow logging, and aquifer testing will take place at the new bedrock wells (GW517, GW518, and GW519).	2016-1365, p. 7-8	Monitoring Plan – Groundwater Well Monitoring

Annual Report Section	Permit Requirement	Permit Number, page number	Permit Heading
	Monthly groundwater levels at GW412, GW414, GW415, GW468, GW508, GW512, GW514, and GW515. Downhole geophysical testing, flow logging, and aquifer testing will take place at the new bedrock wells (GW508, GW512, GW514, and GW515).	2016-1367, p.14	Monitoring Plan – Groundwater Well Monitoring
	Monthly groundwater levels at GW200, GW201, GW202, GW203, GW204, GW205, GW206, GW207, GW208, GW209, GW210, GW211, GW212, GW213, GW214, GW215, GW216, GW217, GW218, GW219, GW220, GW221, GW222, GW223, GW236, and GW237.	2016-1369, p. 11-12	Monitoring Plan – Groundwater Well Monitoring
10.0: Stream Flow Monitoring Summary	Detailed summary of collected data and data processing for all continuous and manual stage and discharge measurements and daily average discharges.	QAPP, p. 4 (all permits)	Streamflow Monitoring
	Streamflow measurements at the following locations: Partridge River (H03155002), SW430 (Partridge River), SW431 (Partridge River), SW432 (South Branch of Partridge River), and SW433 (Unnamed Creek at West Pit Outfall).	2016-1363, p. 8 2016-1364, p. 7 2016-1365, p. 8 2016-1367, p. 14	Monitoring Plan – Streamflow Monitoring
	Streamflow measurements at the following locations: SW005 (Embarrass River), SW041 (Embarrass River), SW042 (Unnamed (Mud Lake) Creek), SW043 (Embarrass River), and SW044 (Second Creek).	2016-1369, p. 12	Monitoring Plan – Streamflow Monitoring
	Streamflow measurements at the following locations: SW045 (Trimble Creek) and SW046 (Bear Creek).	2016-1369, p. 12	Monitoring Plan – Streamflow Monitoring
11.0: Macroinvertebrate Monitoring	Annual macroinvertebrate surveys at SW003 (Unnamed Creek), SW009 (Bear Creek), SW020 (Second Creek), SW048 (Unnamed (Mud Lake) Creek), and SW049 (Trimble Creek)	2016-1369, p. 12	Monitoring Plan – Macroinvertebrate Monitoring
12.0: Fish Community Monitoring	Fish community surveys every two years at SW003 (Unnamed Creek), SW009 (Bear Creek), and SW049 (Trimble Creek)	2016-1369, p. 12	Monitoring Plan – Fish Community Monitoring
13.0: Weather Data Summary	Hourly precipitation and air temperature data at the Mine Site	2016-1367, p. 13	Monitoring Plan – Mine Site Weather Station
	Hourly precipitation and air temperature data at the Plant Site	2016-1369, p. 10	Monitoring Plan – Plant Site Weather Station
14.0: Stream Augmentation Monitoring	Streamflow in Trimble Creek, Unnamed Creek, Second Creek, and Unnamed (Mud Lake) Creek must be augmented to maintain the mean annual streamflow within ±20% of existing conditions.	2016-1369, p. 5	Stream Augmentation
15.0: Discussion and Recommendations	Narrative analyzing monitoring data for short-term and long-term trends, comparison of data trends to short-term and long-term predictions, effects of dewatering or pumping activities, effectiveness of the Monitoring Plan, and recommendations for any monitoring changes	QAPP, p. 1 (all permits)	Reporting Requirements
	If monitoring data and/or modeling results show unacceptable impacts to public health, to public safety, or to the public interests in lands and waters are being, or could potentially be, caused by the appropriation, recommendations/work plan for adaptive management or contingency mitigation.	2016-1363, p. 4 2016-1364, p. 4 2016-1365, p. 4 2016-1367, p. 6 2016-1369, p. 5 2017-0260, p. 4	Adaptive Management

Large Table 2 **Colby Lake 2024 Water Level Elevation (ft, NGVD29)**

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	1440.31	1439.55	1439.44	1439.28	1440.06	1440.18	1440.70	1439.70	1439.30	1439.43	1439.53	1439.55
2	1440.19	1439.55	1439.43	1439.27	1440.17	1440.05	1440.62	1439.70	1439.30	1439.42	1439.54	1439.55
3	1440.08	1439.56	1439.42	1439.28	1440.62	1439.96	1440.59	1439.70	1439.30	1439.42	1439.52	1439.54
4	1439.96	1439.55	1439.41	1439.28	1440.89	1440.01	1440.46	1439.70	1439.30	1439.41	1439.53	1439.54
5	1439.88	1439.54	1439.41	1439.28	1440.88	1440.36	1440.48	1439.67	1439.30	1439.41	1439.53	1439.51
6	1439.84	1439.52	1439.41	1439.37	1440.84	1440.63	1440.44	1439.70	1439.30	1439.40	1439.54	1439.51
7	1439.80	1439.52	1439.41	1439.41	1440.86	1440.73	1440.48	1439.70	1439.30	1439.40	1439.54	1439.57
8	1439.76	1439.55	1439.38	1439.40	1440.70	1440.74	1440.47	1439.70	1439.30	1439.42	1439.57	1439.52
9	1439.75	1439.53	1439.41	1439.52	1440.61	1440.59	1440.63	1439.70	1439.17	1439.40	1439.56	1439.52
10	1439.73	1439.55	1439.41	1439.67	1440.54	1440.46	1440.70	1439.52	1439.16	1439.39	1439.56	1439.53
11	1439.72	1439.57	1439.40	1439.67	1440.50	1440.32	1440.76	1439.51	1439.27	1439.41	1439.57	1439.54
12	1439.70	1439.55	1439.41	1439.93	1440.36	1440.22	1440.73	1439.51	1439.27	1439.42	1439.55	1439.56
13	1439.69	1439.55	1439.43	1439.94	1440.34	1440.22	1440.60	1439.42	1439.28	1439.52	1439.54	1439.55
14	1439.67	1439.54	1439.42	1439.95	1440.21	1440.22	1440.47	1439.41	1439.27	1439.52	1439.54	1439.53
15	1439.66	1439.53	1439.44	1439.95	1440.08	1440.22	1440.33	1439.41	1439.25	-	1439.54	1439.53
16	1439.65	1439.53	1439.44	1439.12	1440.10	1440.18	1440.23	1439.41	1439.28	1439.56	1439.52	1439.54
17	1439.62	1439.54	1439.44	1439.56	1440.07	1440.10	1440.20	1439.41	1439.30	1439.54	1439.52	1439.53
18	1439.61	1439.54	1439.43	1439.66	1440.08	1440.06	1440.09	1439.41	1439.39	1439.54	1439.64	1439.53
19	1439.59	1439.56	1439.39	1439.70	1440.05	1441.78	1439.95	1439.41	1439.39	1439.54	-	1439.53
20	1439.57	1439.54	1439.37	1439.70	1440.07	1443.68	1439.95	1439.41	1439.42	1439.55	-	1439.52
21	1439.55	1439.54	1439.39	1439.70	1440.08	1444.18	1439.89	1439.41	1439.39	1439.52	1439.68	1439.51
22	1439.55	1439.55	1439.40	1439.44	1440.57	1443.66	1439.83	1439.41	1439.40	1439.57	1439.70	1439.51
23	1439.54	1439.54	1439.38	1439.43	1440.97	1442.98	1439.80	1439.41	1439.40	1439.55	1439.64	1439.52
24	1439.55	1439.53	1439.38	1439.41	1441.38	1442.32	1439.70	1439.41	1439.43	-	1439.65	1439.43
25	1439.54	1439.53	1439.41	1439.79	1441.66	1441.82	1439.70	1439.41	1439.40	1439.53	1439.65	1439.43
26	1439.54	1439.53	1439.43	1439.96	1441.64	1441.41	1439.70	1439.41	1439.40	1439.52	1439.64	-
27	1439.54	1439.54	1439.43	1440.08	1441.51	1441.13	1439.70	1439.41	1439.41	1439.52	1439.67	1439.43
28	1439.54	1439.52	1439.42	1440.24	1441.16	1440.97	1439.70	1439.41	1439.43	1439.52	1439.66	1439.55
29	1439.54	1439.41	1439.43	1440.11	1440.87	1440.76	1439.70	1439.30	1439.38	1439.51	1439.65	1439.56
30	1439.54	-	1439.40	1439.95	1440.86	1440.75	1439.70	1439.30	1439.38	1439.56	1439.64	1439.53
31	1439.54	-	1439.34	-	1440.86	-	1439.70	1439.30	-	1439.54	-	1439.54

Large Table 3 **Whitewater Reservoir 2024 Water Level Elevation (ft, NGVD29)**

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	1437.32	1437.12	1436.89	1436.65	1439.07	1439.31	1440.08	1439.73	1439.22	1438.62	1438.21	1437.94
2	1437.30	1437.11	1436.87	1436.64	1439.42	1439.30	1440.07	1439.70	1439.22	1438.54	1438.19	1437.93
3	1437.30	1437.11	1436.87	1436.63	1439.42	1439.30	1440.09	1439.69	1439.18	1438.51	1438.18	1437.91
4	1437.29	1437.10	1436.86	1436.62	1439.43	1439.40	1440.06	1439.70	1439.15	1438.51	1438.19	1437.93
5	1437.29	1437.08	1436.85	1436.61	1439.43	1439.53	1440.06	1439.70	1439.13	1438.49	1438.18	1437.90
6	1437.30	1437.08	1436.84	1436.60	1439.42	1439.55	1440.07	1439.64	1439.10	1438.45	1438.16	1437.90
7	1437.29	1437.08	1436.83	1436.58	1439.40	1439.53	1440.15	1439.62	1439.07	1438.43	1438.15	1437.90
8	1437.28	1437.08	1436.82	1436.59	1439.40	1439.50	1440.22	1439.64	1439.05	1438.41	1438.13	1437.89
9	1437.29	1437.09	1436.81	1436.60	1439.38	1439.48	1440.22	1439.64	1439.04	1438.39	1438.12	1437.91
10	1437.29	1437.09	1436.80	1436.59	1439.37	1439.46	1440.20	1439.69	1439.02	1438.38	1438.12	1437.90
11	1437.29	1437.08	1436.79	1436.59	1439.37	1439.47	1440.19	1439.57	1439.00	1438.35	1438.10	1437.89
12	1437.29	1437.07	1436.78	1436.57	1439.36	1439.46	1440.18	1439.51	1438.99	1438.34	1438.08	1437.88
13	1437.28	1437.06	1436.77	1436.57	1439.34	1439.49	1440.15	1439.54	1438.95	1438.36	1438.07	1437.87
14	1437.27	1437.05	1436.76	1436.56	1439.32	1439.48	1440.13	1439.51	1438.93	1438.37	1438.06	1437.86
15	1437.27	1437.05	1436.76	1436.55	1439.29	1439.47	1440.11	1439.54	1438.91	-	1438.05	1437.85
16	1437.26	1437.04	1436.74	1437.03	1439.31	1439.45	1440.08	1439.54	1438.94	1438.41	1438.04	1437.84
17	1437.26	1437.02	1436.74	1437.09	1439.31	1439.43	1440.06	1439.53	1438.92	1438.39	1438.02	1437.83
18	1437.25	1437.01	1436.72	1437.08	1439.31	1439.45	1440.03	1439.51	1438.90	1438.37	1438.04	1437.82
19	1437.23	1437.00	1436.70	1437.07	1439.27	1440.10	1440.00	1439.48	1438.89	1438.35	1438.03	1437.82
20	1437.22	1436.99	1436.69	1437.06	1439.29	1440.14	1439.99	1439.46	1438.87	1438.34	-	1437.80
21	1437.21	1436.98	1436.67	1437.02	1439.36	1440.13	1439.97	1439.43	1438.85	1438.32	1438.03	1437.80
22	1437.20	1436.97	1436.66	1437.04	1439.45	1440.13	1439.95	1439.41	1438.82	1438.31	1438.01	1437.79
23	1437.20	1436.96	1436.65	1437.60	1439.46	1440.12	1439.93	1439.40	1438.80	1438.29	1438.01	1437.77
24	1437.19	1436.95	1436.64	1437.80	1439.48	1440.11	1439.91	1439.38	1438.76	-	-	1437.76
25	1437.18	1436.94	1436.67	1437.78	1439.44	1440.11	1439.90	1439.38	1438.74	1438.30	1438.00	-
26	1437.17	1436.93	1436.70	1437.75	1439.43	1440.09	1439.85	1439.34	1438.73	1438.28	1438.00	1437.77
27	1437.17	1436.93	1436.70	1437.83	1439.42	1440.06	1439.84	1439.34	1438.72	1438.26	1437.99	1437.74
28	1437.16	1436.91	1436.69	1437.88	1439.39	1440.09	1439.81	1439.33	1438.69	1438.25	1437.99	1437.77
29	1437.14	1436.89	1436.67	1438.29	1439.38	1440.12	1439.79	1439.30	1438.67	1438.24	1437.97	1437.77
30	1437.13	-	1436.67	1438.77	1439.37	1440.09	1439.77	1439.28	1438.65	1438.24	1437.95	1437.76
31	1437.13	-	1436.66	-	1439.34	-	1439.75	1439.26	-	1438.22	-	1437.75

Large Table 4 **Mine Site Surficial Aquifer Groundwater Levels (ft, NGVD29)**

All groundwater elevations reported as monthly averages unless otherwise noted. Provisional data italicized.

Well Number	Permit Number	Top of Casing Elevation[1]	2023					2024											
			August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
GW402	2016-1365	1584.86	--[2]	--[2]	--[2]	--[2]	--[2]	1577.69	1577.58	1577.12	1578.60	1579.93	1580.25	1579.22	1576.88	1575.85	1593.25	--[5]	*1576.56*
GW403	2016-1363	1561.43	--[2]	--[2]	--[2]	--[2]	--[2]	1555.14	1555.15	--[5]	1557.19	1557.16	1556.99	1555.89	1553.61	1552.27	*1552.00*	*1552.69*	*1552.78*
GW407	2016-1364	1544.26	--[2]	1537.21 [6]	1538.24 [6]	1538.86 [6]	1538.90[6]	1538.94	1538.83	1538.40	1539.09	1539.89	1540.05	1539.25	1537.84	1536.72	1536.98	1538.06	*1538.12*
GW408	2016-1365	1611.19	--[2]	--[2]	--[2]	--[2]	--[2]	1606.19	1606.20	1605.85	1606.25	1606.70	1607.20	1607.42	1605.50	1604.45	*1604.52*	*1605.26*	*1605.46*
GW409	2016-1365	1554.16	--[2]	--[2]	--[2]	--[2]	--[2]	1540.41	1540.25	1539.85	1539.90	1541.65	1544.90	1546.05	1543.71	1541.80	1540.70	1540.31	*1539.94*
GW412	2016-1367	1602.78	--[2]	--[2]	--[2]	--[2]	--[2]	1599.37	1599.25	1599.09	1599.52	1600.27	1600.92	1600.33	1598.88	1597.90	1597.71	1598.48	*1598.66*
GW414	2016-1367	1615.06	--[2]	--[2]	--[2]	--[2]	--[2]	1612.98	1612.98	1612.88	1612.92	1613.99	1614.90	1614.19	1612.74	1612.10	1612.09	1612.32	*1612.20*
GW415	2016-1367	1606.54	--[2]	--[2]	--[2]	--[2]	--[2]	1604.78	1603.86	1603.72	1603.87	1603.96	1604.10	1604.07	1603.81	1603.59	1603.58	1603.76	*1603.86*
GW416	2016-1365	1549.10	--[2]	--[2]	--[2]	--[2]	--[2]	--[5]	--[5]	--[5]	1546.40	1546.29	1546.17	1545.56	1544.43	1543.53	1543.89	1544.45	*1544.36*
GW417	2016-1363	1583.19	--[2]	--[2]	--[2]	--[2]	--[2]	1580.47	1580.53	--[5]	1580.68	1580.72	1580.75	1580.40	1579.49	1578.56	*1579.40*	*1580.08*	*1579.99*
GW418	2016-1365	1629.31[3] 1628.58[4] 1628.57[7]	--[2]	1625.25 [6]	1624.89 [6]	1625.24 [6]	--[5]	1624.56	1624.75	1624.24	1625.42	1625.53	--[5]	1624.01	1623.83	1623.14	*1623.75*	*1624.74*	*1624.40*
GW419	2016-1364	1597.19	1592.87 [6]	1592.72 [6]	1593.22 [6]	1593.63 [6]	1593.65 [6]	1593.90	1593.81	1593.58	1594.00	1594.17	1594.18	1593.82	1592.98	*1592.06*	*1592.26*	*1593.10*	*1593.21*
GW430	2016-1363	1603.71	--[2]	--[2]	--[2]	--[2]	--[2]	1593.23	1592.79	1592.32	1592.82	1595.83	1596.27	1594.98	1592.23	1590.52	1589.79	1590.48	*1590.82*
GW468	2016-1367	1616.78	--[2]	--[2]	--[2]	--[2]	--[2]	1609.00	1609.14	1608.18	1609.15	1611.72	1611.43	1610.13	1607.90	1607.63	1607.59	1607.54	*1607.65*
GW470	2016-1363	1601.75	--[2]	--[2]	--[2]	--[2]	--[2]	--[5]	--[5]	--[5]	1599.32	1599.40	1599.50	1599.34	1598.87	1597.79	1597.81	1598.37	*1598.35*
GW471	2016-1363	1601.09	--[2]	--[2]	--[2]	--[2]	--[2]	1597.39	1597.36	--[5]	1597.32	1597.38	1597.47	1597.41	1597.14	1596.87	1596.74	1596.95	*1597.07*
GW472	2016-1363	1607.97	--[2]	--[2]	--[2]	--[2]	--[2]	1597.02	1597.01	1596.94	1597.09	1597.22	1597.40	1597.33	1596.91	1596.68	1596.78	*1596.91*	*1596.96*
GW473	2016-1363	1617.21	--[2]	--[2]	--[2]	--[2]	--[2]	1602.57	1602.55	1602.45	1602.54	1602.66	1602.75	1602.67	1602.43	1602.27	1602.29	*1604.16*	*1602.41*
GW477	2016-1365	1607.30	--[2]	--[2]	--[2]	--[2]	--[2]	1604.43	1604.50	1604.46	1604.69	1604.73	1604.84	1604.76	1604.42	1604.13	1604.09	1604.29	*1604.22*
GW478	2016-1365	1622.25	--[2]	1605.51 [6]	1605.78 [6]	1605.95 [6]	1605.89 [6]	1605.87	1605.81	1605.67	1605.98	1606.28	1606.28	1606.22	1605.84	1605.54	1605.63	*1605.93*	*1605.04*
GW479	2016-1365	1628.07	--[2]	1611.12 [6]	1611.60 [6]	1612.00 [6]	1611.84 [6]	1611.86	1611.59	1611.45	1612.88	1613.96	1613.94	1613.42	1611.95	1611.51	1611.35	*1611.45*	*1611.49*
GW499	2016-1363	1604.57	--[2]	--[2]	--[2]	--[2]	--[2]	1601.48	1601.46	1601.42	1601.57	1601.68	1601.70	1601.59	1601.28	1600.69	1600.64	1601.11	*1601.13*

(1) See Appendix B for survey details

(2) Final data provided in prior reporting year Annual Report

(3) Original well casing damaged discovered May 5, 2024

(4) Well casing repaired and surveyed July 25, 2024

(5) No data available

(6) Provisional data from prior reporting year is shown as final in this table; final data may or may not be equivalent to prior provisional data

(7) Well casing resurveyed October 7, 2024

Large Table 5 **Mine Site Bedrock Groundwater Levels (ft, NGVD29)**

All groundwater elevations reported as monthly averages unless otherwise noted. Provisional data italicized.

Well Number	Permit Number	Top of Casing Elevation[1]	2023					2024											
			August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
GW501	2016-1363	1579.21	1563.57 [5]	1563.26 [5]	1565.65 [5]	1566.40 [5]	1565.99 [5]	1565.77	1565.31	--[3]	1568.07	1568.92	1568.38	1566.70	1565.37	1563.62	*1563.01*	*1565.33*	*1565.50*
GW502	2016-1365	1584.20	--[2]	--[2]	--[2]	--[2]	--[2]	1577.74	1577.66	1577.36	1578.17	1579.07	1579.96	1579.42	1577.39	1576.30	1576.24	1576.64	*1576.85*
GW504	2016-1363	1619.11	1604.33 [5]	1604.13 [5]	1604.45 [5]	1605.14 [5]	1606.10 [5]	1607.22	1607.04	1606.67	1607.77	1611.01	1611.28	1609.66	1606.55	1605.03	1604.09	1604.23	*1604.43*
GW505	2016-1363	1609.78	--[2]	--[2]	--[2]	--[2]	--[2]	1602.43	1602.25	1601.71	1603.02	1606.06	1606.08	1604.62	1601.48	1599.47	1598.36	1598.55	*1598.84*
GW506	2016-1363	1561.02	--[2]	--[2]	--[2]	--[2]	--[2]	1555.16	1555.16	--[3]	1556.41	1556.49	1556.50	1555.56	1553.47	1552.30	*1552.15*	*1552.81*	*1552.90*
GW507	2016-1365	1611.43	--[2]	1599.88 [5]	1599.54 [5]	1600.08 [5]	1601.06 [5]	1601.34	1601.12	1600.85	1601.63	1604.10	1604.39	1603.02	1600.69	1599.53	1599.02	1599.46	*1599.64*
GW508	2016-1367	1616.70	--[2]	--[2]	--[2]	--[2]	--[2]	1608.57	1608.67	1601.59	1608.68	1608.84	1608.85	1608.59	1608.07	1607.19	1607.25	1608.06	*1608.14*
GW509	2016-1363	1605.29	--[2]	--[2]	--[2]	--[2]	--[2]	1602.08	1602.07	1602.03	1602.21	1602.25	1602.29	1602.14	1601.75	1601.11	1601.17	1601.66	*1601.64*
GW510	2016-1363	1603.98	--[2]	--[2]	--[2]	--[2]	--[2]	--[3]	--[3]	--[3]	1599.70	1599.80	1599.83	1599.65	1599.13	1598.07	1598.08	1598.63	*1598.65*
GW512	2016-1367	1602.92	--[2]	--[2]	--[2]	--[2]	--[2]	1599.09	1599.04	1598.90	1599.29	1599.87	1590.55	1599.89	1598.65	1598.01	1597.88	1598.50	*1598.62*
GW514	2016-1367	1614.58	--[2]	--[2]	--[2]	--[2]	--[2]	1612.97	1612.97	1612.90	1613.29	1613.99	1614.07	1614.21	1612.97	1612.37	1612.36	1612.59	*1612.44*
GW515	2016-1367	1606.23	--[2]	--[2]	--[2]	--[2]	--[2]	1604.20	1603.57	1603.47	1603.69	1603.90	1604.00	1603.94	1603.63	1603.34	1603.31	1603.51	*1603.53*
GW516	2016-1364	1548.76	--[2]	--[2]	--[2]	--[2]	--[2]	--[3]	--[3]	--[3]	1545.91	1546.01	1546.19	1546.31	1546.26	1545.96	1545.82	1545.72	*1545.57*
GW517	2016-1365	1608.15	--[2]	--[2]	--[2]	--[2]	--[2]	1605.04	1605.05	1605.02	1605.22	1605.23	1605.35	1605.27	1604.95	1604.65	1604.63	1604.86	*1604.81*
GW518	2016-1365	1621.99	--[2]	1607.75 [5]	1607.96 [5]	1608.06 [5]	1607.89 [5]	1607.86	1607.79	1607.70	1608.02	1608.26	1608.36	1608.39	1608.15	1607.77	1607.79	*1607.93*	*1607.90*
GW519	2016-1365	1627.42	--[2]	1611.68 [5]	1612.19 [5]	1612.52 [5]	1612.40 [5]	1612.17	1612.16	1611.97	1612.54	1613.29	1614.14	1614.61	1613.49	1612.95	1612.40	*1612.41*	*1612.16*
GW521	2016-1363	1599.92	--[2]	--[2]	--[2]	--[2]	--[2]	1596.80	1596.78	--[3]	1597.05	1597.09	1597.19	1596.93	1596.47	1596.38	1596.47	1596.63	*1596.69*
GW522	2016-1363	1607.72	--[2]	--[2]	--[2]	--[2]	--[2]	1596.98	1596.96	1596.89	1597.04	1597.20	1597.37	1597.31	1596.84	1596.60	1596.69	*1596.82*	*1596.89*
GW523	2016-1363	1616.97	--[2]	--[2]	--[2]	--[2]	--[2]	1602.62	1602.60	1602.49	1602.59	1602.69	1602.79	1602.73	1602.47	1602.30	1602.32	*1602.39*	*1602.45*
GW524	2016-1365	1554.37	--[2]	--[2]	--[2]	--[2]	--[2]	1536.15	1536.05	1535.61	1535.77	1536.90	1538.13	1538.44	1537.11	1536.03	1535.62	1535.80	*1535.67*
GW525	2016-1365	1598.41	1593.02 [5]	1593.23 [5]	1593.98 [5]	1594.82 [5]	1594.94 [5]	1595.06	1594.86	1594.51	1595.29	1595.60	1595.61	1595.06	1593.61	*1592.40*	*1592.61*	*1593.60*	*1593.76*
GW530	2016-1363	1604.11	--[2]	--[2]	--[2]	--[2]	--[2]	1593.16	1592.66	1592.19	1592.69	1595.54	1595.94	1594.69	1592.01	1590.33	1589.63	1590.32	*1590.68*
GW531	2016-1363	1609.38	1599.41 [5]	1598.8 [5]	1598.61 [5]	1600.24 [5]	1601.09 [5]	1602.71	1602.06	1601.48	1603.52	1605.90	1605.72	1601.69	1600.62	1599.56	*1598.58*	*1598.31*	*1598.37*
GW532	2016-1365	1600.65	--[2]	--[2]	--[2]	--[2]	--[2]	1597.46	1597.44	1597.37	1597.76	1598.10	1598.15	1597.91	1597.24	1596.44	1596.63	1596.98	*1596.89*

(1) See Appendix B for survey details

(2) Final data provided in prior reporting year Annual Report

(3) No data available

(4) Well installed January 21, 2023

(5) Provisional data from prior reporting year is shown as final in this table; final data may or may not be equivalent to prior provisional data

Large Table 6 **Plant Site Surficial Aquifer Groundwater Levels (ft, NGVD29)**

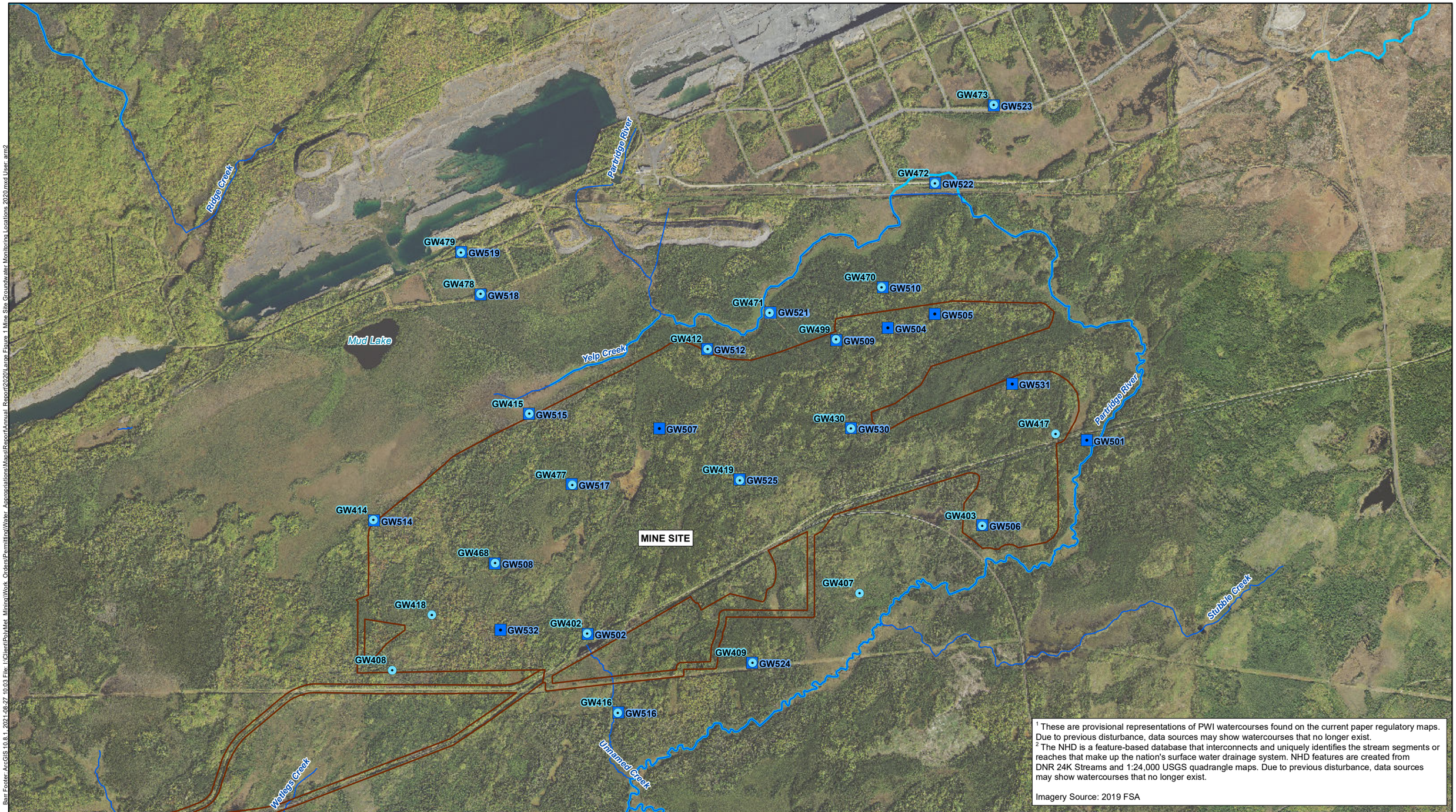
All groundwater elevations reported as monthly averages unless otherwise noted. Provisional data italicized.

Well Number	Permit Number	Top of Casing Elevation[1]	2024											
			January	February	March	April	May	June	July	August	September	October	November	December
GW200	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW201	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW202	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW203	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW204	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW205	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW206	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW207	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW208	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW209	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW210	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW211	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW212	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW213	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW214	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW215	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW216	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW217	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW218	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW219	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW220	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW221	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW222	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW223	2016-1369	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]	--[2]
GW236	2016-1369	1670.76	1666.06	1666.17	1665.73	1666.11	1666.59	1666.83	1666.50	1665.48	1664.49	1664.03	1663.98	*1663.70*
GW237	2016-1369	1680.10	1668.19	1668.27	1668.07	1668.61	1669.51	1670.25	1669.42	1667.87	1666.99	1666.88	1667.17	*1667.11*

(1) See Appendix B for survey details

(2) Scheduled for installation during construction

Large Figures



[1] These are provisional representations of PWI watercourses found on the current paper regulatory maps. Due to previous disturbance, data sources may show watercourses that no longer exist.
[2] The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from DNR 24K Streams and 1:24,000 USGS quadrangle maps. Due to previous disturbance, data sources may show watercourses that no longer exist.

Imagery Source: 2019 FSA

Mining Area
Dunka Road
Installed Well Location
Surficial Well
Bedrock Well
Public Waters Inventory (PWI) Watercourses[1]
National Hydrography Dataset (NHD) Rivers & Streams[2]

0 1,250 2,500 5,000
Feet

MINE SITE GROUNDWATER MONITORING LOCATIONS IN REPORT YEAR
NorthMet Project
NewRange Copper Nickel LLC

Large Figure 1
Water Appropriation Annual Report

[1] These are provisional representations of PWI watercourses found on the current paper regulatory maps. Due to previous disturbance, data sources may show watercourses that no longer exist.
[2] The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from DNR 24K Streams and 1:24,000 USGS quadrangle maps. Due to previous disturbance, data sources may show watercourses that no longer exist.

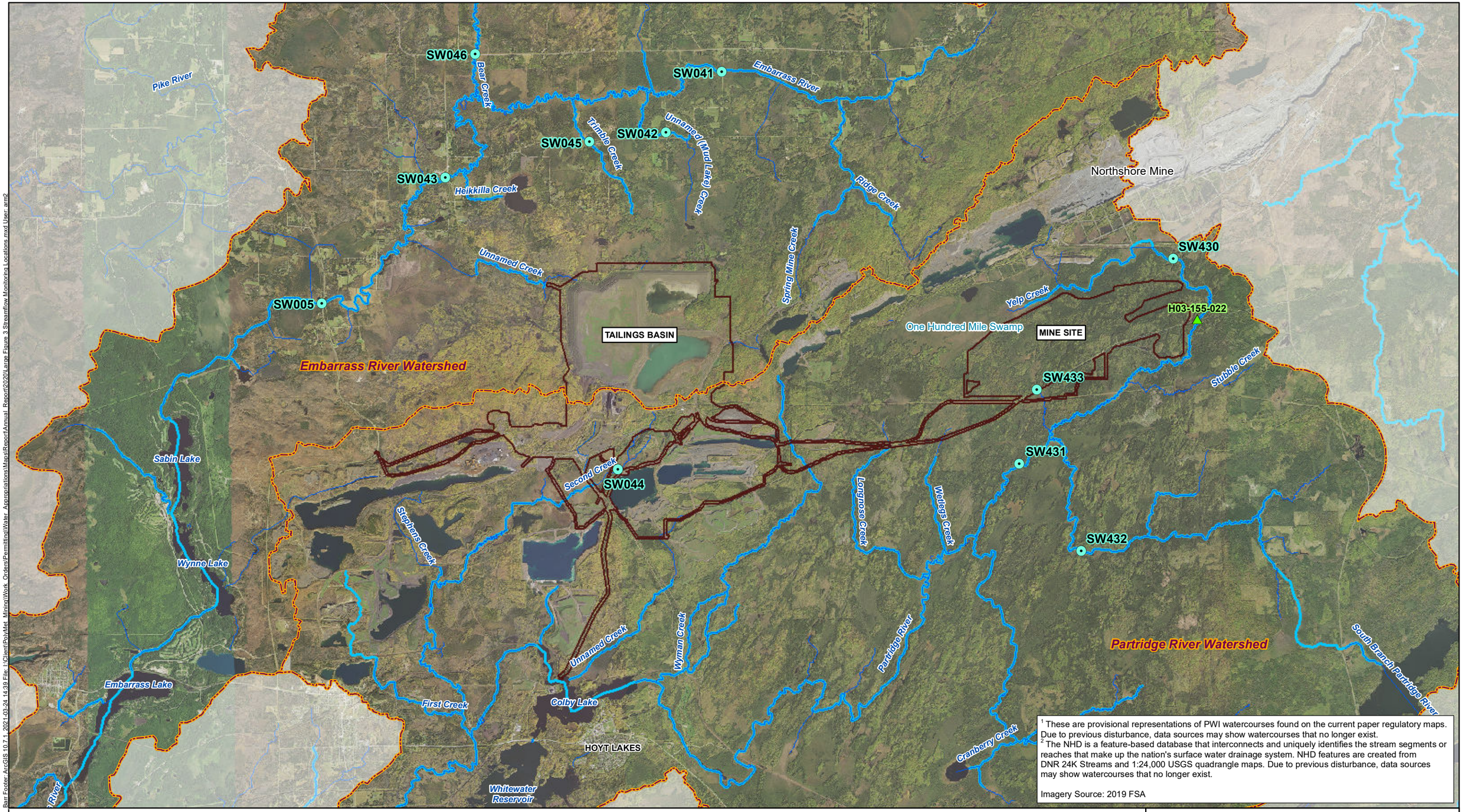
Imagery Source: 2019 St. Louis County Pictometry

- Surficial Aquifer Monitoring Wells
- Mining Area
- Dunka Road
- Public Waters Inventory (PWI) Watercourses[1]
- National Hydrography Dataset (NHD) Rivers & Streams[2]

0 1,000 2,000 4,000
Feet

PLANT SITE GROUNDWATER MONITORING LOCATIONS IN REPORT YEAR
NorthMet Project
NewRange Copper Nickel LLC

Large Figure 2
Water Appropriation Annual Report



[1] These are provisional representations of PWI watercourses found on the current paper regulatory maps. Due to previous disturbance, data sources may show watercourses that no longer exist.
[2] The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from DNR 24K Streams and 1:24,000 USGS quadrangle maps. Due to previous disturbance, data sources may show watercourses that no longer exist.

Imagery Source: 2019 FSA

- Streamflow Monitoring Locations
- Mining Area
- Watershed Divide
- Public Waters Inventory (PWI) Watercourses[1]
- National Hydrography Dataset (NHD) Rivers & Streams[2]

Note 1: Other water appropriation monitoring stations not shown on this figure include:
- Colby Lake water level and volume to Whitewater Reservoir
- Whitewater Reservoir water level and volume to Colby Lake

Note 2: SW433 removed on July 20, 2023

0 0.75 1.5 3
Miles

STREAMFLOW AND LAKE LEVEL MONITORING STATIONS IN REPORT YEAR
NorthMet Project
NewRange Copper Nickel LLC

Large Figure 3
Water Appropriation Annual Report

Appendices

Appendix A

Colby Lake to Whitewater Reservoir Diversion

NEWRANGE COPPER NICKEL

DEPARTMENT OF NATURAL RESOURCES

MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)

2024 WATER USE REPORT

Permit: 1949-0135
Project Name: COLBY LAKE DIVERSION
Landowner: Cliffs Erie LLC; Minnesota Power, a Division of ALLETE, Inc (represented by Crystal Tokarczyk
Lessee: -

Report Completed Date: 01/16/2025
County: St. Louis
Authorized Volume: 4,507.2 MGY
Number of Installations: 1
Status: Active

2024 Water Use Reported

Installation / Use-Type: 1 / Mine Processing (excludes sand/gravel)

Pump Rate (gpm): 7,850
Measurement Method: Timing Device with Hour Meter

Monthly Water Use (in whole gallons)

January	February	March	April	May	June	July	August	September	October	November	December
0	0	0	1,271,036,878	0	0	0	0	0	0	0	0

Total (in whole gallons): 1,271,036,878

Appendix B

Monitoring Well Survey Data

Appendix B **Monitoring Well Survey Data**

Well Number	Date	Time	MN State Plane North Northing (USFT, NAD83)	MN State Plane North Easting (USFT, NAD83)	St. Louis County Central Northing (USFT, NAD83)	St. Louis County Central Easting (USFT, NAD83)	Top of Casing Elevation (USFT, NAVD88)	Top of Casing Elevation (USFT, NGVD29)	Ground Elevation (USFT, NAVD88)	Ground Elevation (USFT, NGVD29)	Antenna Height (FT)	Top of Casing Horizontal Precision (1 Std Dev, USFT)	Top of Casing Vertical Precision (1 Std Dev, USFT)	Epochs	Satellites	RMS	Comment
GW236	2/5/2019	16:28:15	736675.55	2872466.20	233643.27	587514.78	1671.46	1670.76	1668.23	1667.52	3.14	0.03	0.05	31	17	0.03	
GW237	2/5/2019	16:33:38	736824.13	2873306.02	233784.78	588355.96	1680.80	1680.10	1677.49	1676.78	3.14	0.04	0.06	31	15	0.03	
GW402	2/5/2019	11:48:22	732780.67	2899806.95	229517.30	614826.00	1585.56	1584.86	1582.97	1582.27	3.14	0.05	0.07	61	13	0.05	Repair made 10/15/2024. Set to original TOC elevation
GW403	2/5/2019	15:19:50	735820.06	2910882.08	232463.59	625928.12	1562.14	1561.43	1559.79	1559.08	3.14	0.03	0.05	31	15	0.02	
GW407	2/5/2019	14:17:41	733917.33	2907446.20	230589.62	622475.77	1544.97	1544.26	1541.95	1541.25	3.14	0.04	0.05	32	14	0.03	
GW408	2/5/2019	10:24:19	731736.22	2894335.36	228518.89	609344.93	1611.61	1610.90	1609.36	1608.65	3.14	0.02	0.04	16	16	0.03	
	11/1/2023	9:27:58	731735.52	2894335.36	228518.18	609344.93	1611.90	1611.19	1609.17	1608.46	6.56	0.04	0.05	16	17	0.03	Original well casing damaged 2/21/2023; casing repaired 9/11/2023
GW409	2/5/2019	13:17:41	731964.93	2904444.35	228662.32	619457.08	1554.87	1554.16	1552.44	1551.73	3.14	0.02	0.04	61	15	0.02	
GW412	2/5/2019	12:11:25	740763.83	2903175.92	237473.00	618262.75	1603.49	1602.78	1600.55	1599.85	3.14	0.04	0.06	61	14	0.03	
GW414	2/5/2019	10:50:52	735957.48	2893794.92	232745.22	608840.04	1615.77	1615.06	1613.00	1612.29	3.14	0.04	0.05	16	15	0.03	
GW415	2/5/2019	11:12:39	738943.83	2898168.95	235695.03	613239.81	1607.25	1606.54	1604.90	1604.20	3.14	0.05	0.07	16	13	0.04	
GW416	2/5/2019	12:58:44	730557.82	2900665.58	227286.93	615665.98	1549.80	1549.10	1547.20	1546.49	3.14	0.03	0.04	61	16	0.03	
GW417	2/5/2019	15:33:37	738400.36	2912939.50	235026.83	628007.58	1583.90	1583.19	1581.36	1580.65	3.14	0.03	0.04	16	18	0.03	
GW418	2/5/2019	10:14:28	733296.75	2895445.92	230070.23	610468.79	1629.28	1628.57	1627.66	1626.95	3.14	0.04	0.07	17	16	0.03	Repair made 10/7/2024.
GW419	3/20/2019	12:16:46	737089.41	2904078.98	233790.51	619134.91	1597.89	1597.19	1595.90	1595.19	3.14	0.06	0.07	15	11	0.06	
GW430	3/20/2019	15:13:55	738537.24	2907196.70	235212.21	622265.23	1604.41	1603.71	1601.48	1600.78	3.14	0.03	0.05	17	10	0.02	
GW468	3/25/2019	12:07:11	734748.41	2897214.93	231507.14	612250.26	1617.49	1616.78	1614.72	1614.01	3.14	0.03	0.03	17	14	0.02	
GW470	3/20/2019	14:15:41	742511.13	2908053.09	239179.36	623155.27	1602.45	1601.75	1601.02	1600.31	3.14	0.04	0.07	16	12	0.04	
GW471	3/26/2019	12:47:54	741784.24	2904910.51	238478.90	620006.16	1601.79	1601.09	1599.65	1598.94	3.14	0.03	0.06	17	12	0.02	
GW472	4/18/2019	9:56:14	745427.59	2909544.29	242083.59	624671.26	1608.68	1607.97	1606.26	1605.55	3.14	0.05	0.07	16	16	0.05	
GW473	4/24/2019	10:54:33	747631.68	2911195.40	244274.01	626341.18	1617.92	1617.21	1615.89	1615.19	3.14	0.04	0.07	17	13	0.06	
GW477	3/25/2019	14:35:50	736949.16	2899382.60	233689.87	614436.77	1608.01	1607.30	1605.92	1605.21	3.14	0.03	0.04	16	14	0.02	
GW478	3/27/2019	10:48:33	742301.58	2896795.21	239064.78	611894.23	1622.96	1622.25	1620.74	1620.03	3.14	0.03	0.04	17	14	0.02	
GW479	3/27/2019	11:16:31	743472.69	2896247.15	240240.66	611355.98	1628.78	1628.07	1626.51	1625.81	3.14	0.03	0.05	16	11	0.03	
GW499	3/20/2019	13:47:46	741036.71	2906779.62	237715.50	621869.19	1605.27	1604.57	1603.39	1602.68	3.14	0.04	0.07	16	14	0.04	
GW501	3/26/2019	12:08:09	738221.58	2913813.28	234840.66	628879.95	1579.92	1579.21	1577.10	1576.39	3.14	0.04	0.07	16	11	0.04	
GW502	2/5/2019	15:44:30	732764.83	2899817.28	229501.37	614836.19	1584.91	1584.20	1583.64	1582.93	3.14	0.04	0.06	16	17	0.03	
GW504	2/5/2019	15:03:11	741357.24	2908229.83	238023.83	623322.28	1619.82	1619.11	1618.38	1617.68	3.14	0.04	0.07	31	13	0.03	
GW505	2/5/2019	14:52:49	741751.08	2909540.95	238406.65	624636.90	1610.49	1609.78	1608.88	1608.17	3.14	0.06	0.11	30	13	0.09	
GW506	3/26/2019	11:48:03	735829.72	2910889.03	232473.19	625935.16	1561.72	1561.02	1560.01	1559.31	3.14	0.03	0.04	16	15	0.02	
GW507	2/5/2019	12:28:39	738532.69	2901820.12	235253.03	616887.95	1612.13	1611.43	1609.96	1609.25	3.14	0.05	0.08	61	12	0.05	
GW508	3/25/2019	12:12:16	734737.55	2897212.31	231496.31	612247.56	1617.40	1616.70	1615.29	1614.59	3.14	0.04	0.06	16	12	0.02	
GW509	3/13/2020	9:38:08	741019.88	2906789.21	237698.59	621878.64	1606.00	1605.29	1603.34	1602.63	3.14	0.03	0.05	16	13	0.02	
GW510	3/13/2020	10:05:28	742504.50	2908083.16	239172.47	623185.28	1604.69	1603.98	1601.37	1600.66	3.14	0.06	0.09	16	10	0.03	
GW512	3/13/2020	9:07:27	740762.45	2903156.39	237471.79	618243.21	1603.63	1602.92	1600.88	1600.18	3.14	0.05	0.10	16	10	0.04	
GW514	3/25/2019	12:56:12	735935.58	2893816.07	232723.13	608861.02	1615.29	1614.58	1614.19	1613.48	3.14	0.04	0.07	17	13	0.03	
GW515	3/25/2019	13:46:49	738937.34	2898157.19	235688.63	613227.99	1606.93	1606.23	1605.37	1604.66	3.14	0.02	0.05	16	13	0.02	
GW516	5/8/2019	10:51:35	730563.19	2900679.53	227292.19	615679.98	1549.47	1548.76	1547.28	1546.57	3.14	0.02	0.04	17	13	0.02	
GW517	3/13/2020	11:05:33	736961.36	2899361.28	233702.25	614415.55	1608.86	1608.15	1606.27	1605.56	3.14	0.04	0.05	16	12	0.03	
GW518	4/18/2019	10:42:10	742287.28	2896801.11	239050.43	611900.00	1622.70	1621.99	1620.46	1619.75	3.14	0.04	0.06	16	14	0.05	
GW519	4/18/2019	10:15:49	743476.41	2896258.31	240244.29	611367.18	1628.12	1627.42	1626.88	1626.18	3.14	0.05	0.06	16	13	0.03	
GW521	2/21/2023	11:43:44	741770.07	2904897.20	238464.84	619992.73	1600.62	1599.92	--	--	6.56	0.04	0.06	16	19	0.02	
GW522	4/18/2019	9:52:43	745428.09	2909555.07	242084.00	624682.05	1608.43	1607.72	1606.42	1605.71	3.14	0.04	0.06	15	12	0.05	
GW523	4/18/2019	9:37:11	747616.80	2911197.67	244259.12	626343.33	1617.67	1616.97	1615.97	1615.27	3.14	0.04	0.05	17	14	0.03	
GW524	4/16/2019	10:57:33	731959.33	2904432.43	228656.83	619445.11	1555.08	1554.37	1552.45	1551.74	3.14	0.04	0.07	16	13	0.06	
GW525	3/28/2019	10:50:16	737103.12	2904073.77	233804.27	619129.82	1599.12	1598.41	1596.40	1595.69	3.14	0.03	0.06	194	10	0.04	
GW530	3/28/2019	10:15:20	738547.11	2907200.19	235222.05	622268.80	1604.82	1604.11	1602.10	1601.40	3.14	0.03	0.07	317	10	0.07	
GW531	3/28/2019	9:31:25	739800.52	2911720.78	236437.45	626800.52	1610.08	1609.38	1607.04	1606.33	3.14	0.04	0.07	16	11	0.03	
GW532	4/25/2019	11:37:35	732879.65	2897369.94	229636.85	612389.53	1601.36	1600.65	1598.81	1598.10	3.14	0.02	0.05	16	14	0.02	

Notes:
- All data collected utilizing GPS and MnCORS VRS
- MnDOT GSID station #28656 (L20) utilized to assess NAVD88 to NGVD29 transformation; NAVD88 to NGVD29 transformation = -0.706 ft

Surveys were calibrated to MnCORS VRS, checked against NewRange Copper Nickel Permanent Control Point BM #5 to ensure accuracy.

Appendix C

Groundwater Level Monitoring Data

NEWRANGE COPPER NICKEL

Appendix C: 2024 Groundwater Level Monitoring Data

As described in Section 9, NewRange monitors groundwater levels from the surficial aquifer and bedrock Permit monitoring locations at the Mine Site and Plant Site. Hydrographs showing the measured groundwater levels are included in this appendix. Table C1 summarizes the manual groundwater level measurements obtained in 2024 using an electronic tape and directly compares manual measurements with data logger readings. Table C2 summarizes the groundwater level data collected with data loggers in 2023-2024 and provides an explanation of all applied corrections.

Manual groundwater level measurements using an electronic tape are taken by measuring the depth to water from a designated measuring point on the well casing. Data loggers are installed at all Permit monitoring wells, and all loggers are calibrated with a manual water level measurement at least one time during the 12-month period. Data loggers are downloaded via telemetry and verified for accuracy monthly. Any observed problems with the data loggers are corrected in a timely manner. A detailed Standard Operating Procedure was developed by NewRange and can be found in Appendix E. Field notes for each site visit have been assembled and can be found in Appendix E.1.

In 2024, Newrange's Environmental Department brought on new staff who transitioned the data management and field activities of the groundwater monitoring program from Northeast Technical Services (NTS).

Several data logger files were unable to be successfully recovered in 2024 due to instrumentation malfunctions (e.g., firmware updates, power loss, cable damage), and transitions in personnel managing the data loggers.

In a continuing effort to minimize the number of occurrences of missing data going forward, NewRange developed SOPs and continues to implement increased oversight of data retrieval, data quality assurance and improved overall groundwater well program management. This includes monthly evaluations of data with consistent review of downloaded data for missing data and data that may appear suspect, and to ensure at minimum a manual level measurement is taken monthly when logger data is missing or suspect.

Data logger readings were post corrected using an "offset correction factor" if the data logger and manual measurement differed by greater than 0.1 feet. In general, the offset correction factor is applied consistently throughout the entire continuous data logging period to align all future logged readings with the initial manual measurement.

A "drift correction factor" was applied to raw data logger readings using a linear function over time to account for instrumentation drift if the data logger and manual measurement differed by greater than 0.1 feet. In general, the drift correction factor maximum magnitude is evaluated by comparison of the final logged reading during a continuous logging period to the next recorded manual measurement. If a manual measurement was not obtained at the beginning and end of a data logger deployment period, a comment has been added in Table C2 to indicate that the dataset was not validated for instrumentation drift.

If a manual measurement was not obtained at any time during the data logger continuous recording period, a comment has been added in Table C2 to indicate that the dataset was not validated.

Data collected after the last manual field measurement in 2024 has not been validated yet and is therefore qualified as “provisional.” Provisional data will be validated and provided again with the next Annual Report. Provisional data is noted, if applicable, in the individual data tabs of the Groundwater Level Monitoring Data spreadsheet and on hydrographs. Provisional data is also notated in Large Tables 4, 5 and 6, by italicized data.

Raw data logger readings that were clear outliers or instrumentation errors were removed from the corrected dataset. If instrumentation was adjusted in the monitoring well, a large shift in the raw dataset is evident, and the corrected dataset was shifted accordingly to account for instrumentation adjustment. The majority of the monitoring wells are also known to form an ice cap in the winter as noted in Table C2.

The groundwater level data loggers are absolute pressure instruments that require barometric pressure compensation to provide accurate water level readings. The data logging equipment is designed to provide automatic barometric compensation. However, if equipment is not fully functional, a manual post correction for barometric pressure is required. Manual post corrections are often less precise than automatic corrections and may introduce additional variability. An example of this data variability is seen on the attached graph for GW478 in data reported after May 1, 2024. In general, automatic barometric compensation data is reported rather than manual post correction data whenever possible.

Table C1 2024 Manual Groundwater Elevation Measurements and Logger Calibrations

Well Number	Measurement Date & Time (CST)	Top of Casing Elevation (ft, NGVD29)	Depth to Water (ft)	Groundwater Elevation (ft, NGVD29)		Note
				Manual Reading	Logger Reading [1]	
GW236	1/29/2024 10:23	1670.76	4.72	1666.04	1666.11	
	4/25/2024 11:10		4.46	1666.30	1666.28	
	12/2/2024 14:35		6.96	1663.80	1663.84	
GW237	1/30/2024 8:40	1680.1	11.93	1668.17	1668.17	
	4/25/2024 10:40		11.42	1668.68	1668.70	
	12/2/2024 14:04		12.99	1667.11	1667.19	
GW402	2/12/2024 12:36	1584.86	6.89	1577.97	1578.02	
	10/7/2024 13:25		--	--	--	(4)
	12/5/2024 12:16		8.50	1576.36	1576.36	
GW403	1/24/2024 9:26	1561.43	6.28	1555.15	1546.65	
	4/22/2024 9:50		4.23	1557.2	1557.20	
	10/22/2024 10:23		9.23	1552.2	1553.17	
GW407	9/25/2023 10:40	1544.26	6.13	1538.13	1538.23	
	1/25/2024 9:07		5.47	1538.79	1538.83	
	4/22/2024 13:20		4.73	1539.53	1539.44	
	12/8/2024 12:57		6.13	1538.12	1538.13	
GW408	1/25/2024 9:32	1611.19	5.03	1606.16	1606.16	
	5/5/2024 10:00		4.15	1607.04	1607.00	
	5/20/2024 13:45		4.4	1606.79	1606.54	
	6/28/2024 9:10		3.85	1607.34	1606.79	
	10/7/2024 10:50		7.35	1603.80	1603.76	(2)
GW409	1/24/2024 13:25	1554.16	13.69	1540.47	1536.17	
	4/30/2024 10:30		18.73	1535.43	1540.43	(2)
	12/2/2024 12:00		14.05	1540.11	1535.11	
GW412	1/24/2024 12:00	1602.78	--	--	--	(3)
	5/2/2024 12:29		2.54	1600.24	1600.20	
	6/12/2024 12:00		2.7	1600.08	1600.16	
	6/28/2024 7:55		1.83	1600.95	1600.97	
	8/13/2024 12:17		3.88	1598.9	1598.91	
	12/6/2024 11:40		4.14	1598.64	1598.71	
GW414	1/25/2024 10:42	1615.06	--	--	--	(3)
	4/24/2024 12:30		1.73	1613.33	1612.93	
	8/8/2024 11:30		2.08	1612.98	1612.97	
	12/7/2024 10:24		2.83	1612.23	1643.91	
	12/10/2024 11:24		2.87	1612.19	1612.41	
GW415	1/25/2024 12:10	1606.54	--	--	--	(3)
	4/24/2024 11:30		2.58	1603.96	1602.08	
	12/7/2024 11:15		2.73	1603.81	1603.76	

Table C1 2024 Manual Groundwater Elevation Measurements and Logger Calibrations

Well Number	Measurement Date & Time (CST)	Top of Casing Elevation (ft, NGVD29)	Depth to Water (ft)	Groundwater Elevation (ft, NGVD29)		Note
				Manual Reading	Logger Reading [1]	
GW416	1/24/2024 12:55	1549.1	--	--	--	(3)
	4/30/2024 7:15		2.7	1546.40	--	(4)
	5/2/2024 8:30		2.67	1546.43	--	(4)
	5/20/2024 12:40		3.36	1545.74	1545.73	
	5/28/2024 9:47		2.9	1546.20	1546.22	
	5/29/2024 9:06		3	1546.10	--	(4)
	8/13/2024 10:06		4.96	1544.14	--	(4)
	8/19/2024 10:07		4.97	1544.13	--	(4)
	9/20/2024 10:20		5.35	1543.75	1543.75	
	12/2/2024 11:17		4.85	1544.25	1544.37	
GW417	1/24/2024 9:50	1583.19	--	--	--	(3)
	2/12/2024 9:47		--	--	--	(3)
	4/22/2024 11:13		2.54	1580.65	1580.84	
	10/22/2024 0:58		3.53	1579.66	1579.63	
GW418	9/25/2023 14:43	1629.31	3.75	1625.56	1625.48	
	7/11/2024 8:04		4.08	1625.23	--	(4)
	7/25/2024 10:20	1628.58	4.39	1624.19	1624.90	
	9/16/2024 11:37		5.83	1622.75	1623.09	
	10/7/2024 11:45	1628.57	6.04	1622.53	1623.25	
GW419	8/30/2023 11:53	1597.19	4.91	1592.28	1589.69	
	2/12/2024 11:41		3.22	1593.97	1594.16	
	4/30/2024 12:35		4.55	1592.64	1594.24	(2)
	9/13/2024 8:20		5.2	1591.99	1590.35	
	9/17/2024 10:08		5.39	1591.81	1592.09	
	9/17/2024 11:11		5.39	1591.80	1592.08	
GW430	2/12/2024 10:51	1603.71	10.74	1592.97	1593.17	
	4/23/2024 7:19		9.99	1593.72	1593.66	
	12/5/2024 13:10		12.99	1590.72	1590.77	
GW468	1/25/2024 11:12	1616.78	7.75	1609.03	1609.03	
	4/24/2024 14:17		5.26	1611.52	--	(4)
	12/7/2024 13:00		9.30	1607.48	1607.52	
GW470	1/24/2024 10:52	1601.75	--	--	--	(3)
	4/23/2024 9:37		2.43	1599.32	--	(4)
	5/1/2024 14:00		2.35	1599.40	1599.43	
	6/12/2024 9:12		2.43	1599.32	1599.35	
	12/3/2024 12:43		3.41	1598.34	1598.43	
GW471	1/24/2024 11:10	1601.09	--	--	--	(3)
	4/23/2024 12:37		3.82	1597.27	1597.34	
	12/6/2024 10:40		4.05	1597.04	1597.06	
GW472	1/30/2024 12:00	1607.97	10.95	1597.02	1597.02	
	4/29/2024 12:45		10.75	1597.22	1597.20	
	8/7/2024 8:55		10.98	1596.99	1596.99	
	11/27/2024 12:50		11.02	1596.95	1596.93	

Table C1 2024 Manual Groundwater Elevation Measurements and Logger Calibrations

Well Number	Measurement Date & Time (CST)	Top of Casing Elevation (ft, NGVD29)	Depth to Water (ft)	Groundwater Elevation (ft, NGVD29)		Note
				Manual Reading	Logger Reading [1]	
GW473	1/30/2024 12:45	1617.21	14.65	1602.56	1602.68	
	4/29/2024 11:35		14.55	1602.66	1602.58	
	11/27/2024 11:56		14.84	1602.37	1602.38	
GW477	1/25/2024 12:53	1607.3	--	--	--	(3)
	4/24/2024 11:30		2.59	1604.71	1604.71	
	12/7/2024 11:54		3.05	1604.25	1604.35	
GW478	9/26/2023 10:30	1622.25	16.30	1605.95	1605.88	
	1/30/2024 11:20		16.44	1605.81	1605.91	
	4/29/2024 14:37		15.89	1606.36	1606.30	
	6/28/2024 11:20		16.14	1606.11	1606.42	
	8/7/2024 10:03		16.34	1605.91	1606.11	
	11/27/2024 10:45		16.32	1605.93	1606.00	
GW479	9/26/2023 9:25	1628.07	16.54	1611.53	1611.39	
	1/30/2024 11:40		--	--	--	(3)
	4/29/2024 13:49		14.59	1613.48	1613.27	
	11/27/2024 11:18		16.69	1611.38	1610.87	
GW499	4/23/2024 12:04	1604.57	2.91	1601.66	1602.66	
	12/5/2024 13:50		3.43	1601.14	1601.26	
GW501	8/29/2023 10:00	1579.21	16.06	1563.15	1563.08	
	2/12/2024 9:37		13.9	1565.31	1566.07	
	4/22/2024 10:06		11.67	1567.54	1565.31	
	10/22/2024 11:26		16.0	1563.21	1563.18	
GW502	2/12/2024 12:35	1584.2	6.31	1577.89	1577.90	
	5/2/2024 15:14		5.34	1578.86	1578.86	
	10/7/2024 13:29		8.42	1575.78	1575.80	
	12/5/2024 12:20		7.48	1576.72	1576.72	
GW504	8/30/2023 7:29	1619.11	14.59	1604.52	1604.52	
	1/24/2024 10:40		11.84	1607.27	1607.32	
	4/23/2024 8:47		9.35	1609.76	1609.71	
	12/3/2024 13:19		14.75	1604.36	1604.30	
	12/10/2024 13:11		14.68	1604.43	1604.36	
GW505	1/24/2024 10:05	1609.78	7.26	1602.52	1603.11	
	4/23/2024 8:08		5.11	1604.67	1604.61	
	12/3/2024 13:45		10.97	1598.81	1598.74	
GW506	1/24/2024 9:25	1561.02	5.84	1555.18	1555.35	
	4/22/2024 9:40		4.69	1556.33	1555.43	
	10/22/2024 10:25		8.70	1552.32	1552.42	
GW507	8/30/2023 11:11	1611.43	11.85	1599.58	1599.58	
	1/24/2024 12:25		10.07	1601.36	1601.42	
	5/2/2024 13:44		7.64	1603.79	1603.50	
	12/5/2024 14:30		11.80	1599.63	1599.65	

Table C1 2024 Manual Groundwater Elevation Measurements and Logger Calibrations

Well Number	Measurement Date & Time (CST)	Top of Casing Elevation (ft, NGVD29)	Depth to Water (ft)	Groundwater Elevation (ft, NGVD29)		Note
				Manual Reading	Logger Reading [1]	
GW508	1/25/2024 11:12	1616.7	8.14	1608.56	1680.67	
	4/24/2024 14:14		7.99	1608.71	1608.73	
	12/7/2024 12:53		8.50	1608.20	1608.19	
GW509	4/23/2024 12:02	1605.29	3.11	1602.18	1602.30	
	12/5/2024 13:55		3.66	1601.63	1601.70	
GW510	4/23/2024 9:35	1603.98	4.28	1599.70	1599.85	
	5/1/2024 14:00		4.18	1599.80	1599.70	
	6/12/2024 9:16		4.3	1599.68	1599.74	
	12/3/2024 12:41		5.30	1598.68	1600.53	
GW512	5/2/2024 12:29	1602.92	3.1	1599.82	1599.85	
	6/12/2024 11:15		3.31	1599.61	1599.74	
	6/28/2024 7:45		2.35	1600.57	1600.91	
	8/13/2024 12:15		4.15	1598.77	1599.31	
	12/6/2024 23:37		4.30	1598.62	1598.67	
GW514	4/24/2024 13:45	1614.58	1.21	1613.37	1613.05	
	8/8/2024 9:58		1.54	1613.04	1614.20	
	12/7/2024 10:28		2.30	1612.28	1644.19	
	12/10/2024 11:26		2.36	1612.22	1612.61	
GW515	4/24/2024 10:25	1606.23	2.42	1603.81	1605.28	
	12/7/2024 11:10		2.73	1603.50	1603.61	
GW516	4/30/2024 7:15	1548.76	2.86	1545.90	1546.36	
	5/2/2024 8:30		2.86	1545.90	1545.92	
	5/20/2024 12:35		2.75	1546.01	1546.03	
	5/28/2024 9:44		2.87	1545.89	1546.10	(2)
	5/29/2024 9:05		2.89	1545.87	1546.58	(2)
	8/13/2024 10:04		2.52	1546.24	1546.90	
	8/19/2024 10:05		2.52	1546.24	1546.24	
	9/20/2024 10:20		2.77	1545.99	1546.24	
	12/2/2024 11:16		3.16	1545.60	1545.67	
GW517	4/24/2024 11:30	1608.15	2.97	1605.18	1605.19	
	12/7/2024 11:57		3.31	1604.84	1604.84	
GW518	9/26/23 9:50	1621.99	13.93	1608.06	1608.02	
	1/30/2024 11:20		14.16	1607.83	1608.01	
	4/29/2024 14:37		13.72	1608.27	1608.22	
	6/28/2024 11:17		13.54	1608.45	1608.30	
	8/7/2024 10:10		13.77	1608.22	1608.45	
	11/27/2024 10:50		14.13	1607.86	1607.93	
GW519	9/26/2023 9:38	1627.42	15.09	1612.33	1612.35	
	1/30/2024 11:40		15.38	1612.04	1612.12	
	4/29/2024 13:49		14.5	1612.92	1612.70	
	11/27/2024 11:19		15.05	1612.37	1612.13	

Table C1 2024 Manual Groundwater Elevation Measurements and Logger Calibrations

Well Number	Measurement Date & Time (CST)	Top of Casing Elevation (ft, NGVD29)	Depth to Water (ft)	Groundwater Elevation (ft, NGVD29)		Note
				Manual Reading	Logger Reading [1]	
GW521	1/24/2024 11:30	1599.92	3.14	1596.78	1596.96	
	4/23/2024 12:35		2.96	1596.96	1596.80	
	12/6/2024 10:35		3.23	1596.69	1596.80	
GW522	1/30/2024 12:00	1607.72	10.75	1596.97	1597.10	
	4/29/2024 12:45		10.52	1597.2	1597.15	
	8/7/2024 8:36		10.8	1596.92	1596.97	
	11/27/2024 12:49		10.84	1596.88	1596.84	
GW523	1/30/2024 12:45	1616.97	14.36	1602.61	1602.68	
	4/29/2024 11:35		14.3	1602.67	1602.64	
	11/27/2024 23:58		14.55	1602.42	1602.41	
GW524	1/24/2024 13:25	1554.37	18.18	1536.19	1536.36	
	4/30/2024 10:33		18.1	1536.27	1536.34	
	12/2/2024 12:01		18.63	1535.74	1535.74	
GW525	8/30/2023 11:50	1598.41	5.79	1592.62	1592.6	
	4/30/2024 12:35		2.7	1595.71	1595.76	
	9/13/2024 8:20		6.13	1592.28	1592.19	
	9/17/2024 10:11		6.24	1592.17	1592.03	
GW530	2/12/2024 10:50	1604.11	11.25	1592.86	1590.67	
	4/23/2024 7:45		10.56	1593.55	1593.52	
	12/5/2024 13:12		13.52	1590.59	1590.61	
GW531	8/29/2023 12:05	1609.38	10.2	1599.18	1599.03	
	2/12/2024 10:11		7.27	1602.11	1602.12	
	4/22/2024 12:02		4.16	1605.22	1605.38	
	7/29/2024 12:00		7.69	1601.69	1637.33	
	8/5/2024 11:19		8.24	1601.14	1601.13	
	10/22/2024 10:45		10.96	1598.42	1598.45	
GW532	5/5/2024 7:53	1600.65	2.49	1598.16	1598.40	
	12/7/2024 13:48		3.73	1596.92	1596.79	

(1) Logger reading closest in time to manual measurement and prior to recalibration

(2) Suspect manual recording error

(3) -- Well Frozen During Site Visit

(4) Equipment inoperable/damaged preventing measurements

Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW236	Jan 1-29	January 29, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024. Update required; no data from Jan 1-29, 2024.
		April 25, 2024			
		December 2, 2024			
GW237	Jan 1-30	January 30, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-30, 2024.
		April 25, 2024			
		December 2, 2024			
GW402	Jan 1-11	January 11, 2024	Yes	Barometrically Corrected Data from GW502 VuLink between Aug 5 - Oct 16, 2024	VuLink firmware issue at transition between 2023 and 2024. Update required; no data from Jan 1-11, 2024.
	Aug 4-Dec 5	October 7, 2024			Loss of communication with the datalogger from Aug 4 – Dec 5. Cable damage was discovered on the October 7 site visit. An animal chewed through the cable. It was also discovered that the PVC well was also damaged such that a manual measurement could not be obtained.
		December 5, 2024			New PVC well was installed and surveyed on the Dec 5 visit, elevation matching the original TOC elevation. A new 40' cable was installed, and a water level reading was collected 15 min after deploying logger.
GW403	Jan 1-24	January 24, 2024	Unverified	Drift Correction: -0.97 ft April 22, 2024 - Oct 21, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
	Feb 8 - Apr 22	April 22, 2024			Loss of communication with the datalogger on Feb 8, missing data from Feb 8 - Apr 22. New batteries installed on 4/22, issues resolved.
		October 22, 2024			Raw logger data corrected to align with manual measurements.
GW407		September 25, 2023	Unverified		New batteries installed and firmware update Dec 6.
		January 25, 2024			
		April 22, 2024			
		December 6, 2024			
GW408	Jan 1-25	January 25, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
	Feb 3-Nov 21	May 5, 2024		Offset Correction: 0.22ft May 20, 2024 - June 28,2024	VuLink malfunction, could not connect - Intermittent data missing on datalogger from Feb 4 - May 5.
		May 20, 2024		Drift Correction: 0.33ft May 20, 2024 - June 28, 2024	VuLink malfunctioned, could not connect - Intemittent data missing on datalogger From May 5 - May 20.
		June 28, 2024		Offset Correction: 0.55ft June 28, 2024 - Oct 7, 2024	VuLink malfunctioned, could not connect - Intemittent data missing on datalogger from May 20 - June 28.
		October 7, 2024		Drift Correction: -0.47ft June 28, 2024 - Oct 7, 2024	Required firmware update on Oct 7 site visit. Cleared the old data remaining on logger, syncing issue resolved. Intermittent data missing from June 28 to Nov 22. No alarm notifications were found associated with this logger on Hydro-Vu. Issue was addressed with In-Situ tech support. Intermittent logger communication issues continued in Oct-Nov, Anamolous Data removed. Raw logger data corrected to align with manual measurements.
GW409	Jan 1-24	January 24, 2024	Unverified	Offset Correction: 5ft April 30, 2024 - Dec 2, 2024	VuLink firmware issue at transition between 2023 and 2024. Update required; no data from Jan 1-24, 2024.
		April 30, 2024			Suspect Manual Reading April 30
		December 2, 2024			Raw logger data corrected to align with manual measurements.
GW412	Jan 1-24	January 24, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
		May 2, 2024			
	May 14-Jun 11	June 12, 2024			Vulink communication issue, data missing from May 12 - June 12, Rplaced batteries and reset VuLink settings to restore communication to resolve issue.
		June 28, 2024			
		August 13, 2024			
		December 6, 2024			

Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW414	Jan 1-25	January 24, 2024	Yes	Drift Correction: -0.22ft Dec 7, 2024 -Dec 9, 2024	VuLink firmware issue at transition between 2023 and 2024. Update required; no data from Jan 1-25, 2024.
	Mar 2-8; Apr 3-May 3	April 24, 2024			Intermittent communication issues Mar 2-8 and Mar 15-23, Loss of communication with the cloud service, missing data from Apr 3 - May 3. Replaced VuLink on Apr 24.
	May 10-Jun 30	August 8, 2024			Loss of barometric pressure readings causing suspect data from May 10 - 18 and June 13 - 15, anamolous data points removed . Missing data from June 15-23, July 1 - Aug 8. Batteries were 100% when new VuLink installed, but were found at 0% on Aug 8. Bad batteries. Updated VuLink firmware on Aug 8. Intermittent VuLink communication issues Sept 12-20 resulting in a few missing data points Sept 19-20.
	May 10-Aug 8	December 7, 2024			
	Sep 12-20	December 10, 2024			Intermittent communication issues Sep 19-20, and Nov 4-Dec 6 resulting in missing data.
					Raw logger data corrected to align with manual measurements.
GW415	Jan 1-24, 28-30	January 25, 2024	Yes	Offset Correction: 1.88ft Jan 1, 2024 - April 24, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024. Intermittent loss of VuLink barometric pressure corrections causing suspect data from Jan-28-30 that was removed from data set.
		April 24, 2024			
		December 7, 2024			Raw logger data corrected to align with manual measurements.
GW416	Jan 1 – May 20	January 24, 2024	Yes	Barometrically corrected data from May 29 - Aug 13, 2024	No communication to cloud service at the transition of 2023 and 2024. Discovered connection issue between VuLink and Leveltroll Jan 24. No data for Jan, Feb or March. Equipment was frozen in place preventing repairs.
	Jun 27-Sep 20	April 30, 2024			
		May 2, 2024			Replaced VuLink Antenna 5/2, discovered damaged cable between VuLink and leveltroll.
		May 20, 2024			Replaced splitter cable, repairs completed May 16, 2024
		May 28, 2024			Communication issues persit.
		May 29, 2024			
		August 13, 2024			Cable was found damaged 8/13, data gaps from June 26-July 7, July 8-Aug 3. Cable replaced Aug 19, 2024.
		August 19, 2024			
		September 20, 2024			Replaced antenna and VuLink with a new unit, data gaps from Aug 8- Sept 20.
		December 2, 2024			Data gaps from Oct 30 - Nov 2, and Nov 29 - Dec 1 - Unknown reason.
GW417	Jan 1-11	January 11, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
	Feb 14-Apr 21	January 24, 2024			
	Oct 31-Nov 8	February 12, 2024			Low batteries 2/12, unable to replace due to equipment frozen in place.
		April 22, 2024			Power loss to VuLink; no data from Feb 14 - Apr 22. Batteries replaced Apr 22.
		October 22, 2024			Suspect data points removed June 18 - 20, Nov 6 - 7. and Dec 25.
GW418	Jan 1-Sept 16	September 25, 2023	Yes	Barometrically corrected data from Jan 25, 2024 - May 5, 2024	VuLink firmware issue at transition between 2023 and 2024.Logger malfunction, no data from Jan 1 -May 5.
		January 25, 2024			PVC well damage discovered May 5, leveltroll broke off and stuck down the well. VuLink found not communicating to cloud service, required registration code setup. Unable to retreive code as equipment stuck in well casing. No data from May 5 - July 25.
		May 5, 2024		Offset Correction: -0.43ft July 24, 2024 - Sep 15, 2024	Well casing repaired, retrieved equipment and registration code on July 11.
		July 11, 2024			New equipment installed on July 11, 2024, TOC elevation surveyed.
		July 25, 2024		Offset Correction: -0.34ft Sep 16, 2024 - Oct 7, 2024	Suspect data points on Aug 6-7 removed from data set.
		September 16, 2024		Drift Correction: -0.38ft Sep 16, 2024 - Oct 7, 2024	Resurveyed TOC elevation on Sep 16, 2024
		October 7, 2024			Raw logger data corrected to align with manual measurements.
GW419		August 30, 2023	Yes	Drift Correction: -0.19ft Aug 30, 2023 - Feb 11, 2024	Raw logger data corrected to align with manual measurements.
		January 11, 2024			
		February 12, 2024			
		April 30, 2024		Offset Correction: 1.60 April 29, 2024 - Sep 12. 2024	Suspect Manual Reading April 30, 2024
		September 13, 2024		Drift Correction: -0.28ft Sep 13, 2024 - Sep 27, 2024	
		September 17, 2024			

Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW430	Jan 1-11	January 11, 2024	Yes	Offset Correction: Jan 1 - Feb 12, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		February 12, 2024			Raw logger data corrected to align with manual measurements.
		April 23, 2024			
		December 5, 2024			
GW468	Jan 1-25	January 25, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
	Feb 14 - May 3	April 24, 2024			Intermittent connection issues causing missing data from Apr 24 - May 3
		December 7, 2024			
GW470	Jan 1-Apr 30	January 24, 2024	Yes		No communication to cloud service at the transition of 2023 and 2024. Discovered batteries drained on Jan 24, unable to replace as equipment frozen in place. No data for Jan, Feb, March 2024.
	May 10-Jun 12	April 23, 2024			Anamolous data point removed May 4, 2024
		May 1, 2024			
		June 12, 2024			Intermittent communication issue causing missing data May 9-June 12, 2024
		December 3, 2024			
GW471	Jan 1-24	January 24, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
	Feb 16- Apr 22	April 23, 2024			No communication to the cloud service beginning Feb 15. Equipment frozen in place, unable to troubleshoot issue. Missing data from Feb 15 - Apr 23. Batteries replaced Apr 23. Anamolous data point removed Apr 24.
		December 6, 2024			
GW472	Jan 1-30	January 30, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-30, 2024.
		April 29, 2024			
		August 7, 2024			
		November 27, 2024			
GW473	Jan 1-30	January 30, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-30, 2024.
		April 29, 2024			
		November 27, 2024			
GW477	Jan 1-25	Jan 25, Apr 24	Yes	Drift Correction: -0.10 Apr 24, 2024 - Dec 6, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
		April 24, 2024			
		December 7, 2024			Raw logger data corrected to align with manual measurements.
GW478	May 1- Aug 7	September 26, 2023	No	Barometrically Corrected Data May 1 - Aug 7, 2024	No communication to cloud service beginning May 1, batteries reporting 43%.
		January 30, 2024			
		April 29, 2024			No reading since last manual measurement, missing data from May 1 - Aug 7; batteries replaced.
		June 28, 2024			
		August 7, 2024			
		November 27, 2024			
GW479		September 25, 2023	Yes	Offset Correction: 0.14ft Sep 1, 2023 - Apr 28, 2024	Raw logger data corrected to align with manual measurements.
		January 30, 2024			
		April 29, 2024		Offset Correction: 0.56ft Apr 29, 2024 - Nov 26, 2024	
		November 27, 2024		Offset Correction Nov 27, 2024 - Dec 31, 2024	
GW499	Jan 1-11	January 11, 2024	Yes	Offset Correction: -1ft Jan 11, 2024 - Apr 23, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		April 23, 2024		Drift Correction: -0.12ft Apr 23, 2024 - Dec 4, 2024	
		December 5, 2024		Offset Correction: -0.14ft Dec 5, 2024 - Dec 31, 2024	Raw logger data corrected to align with manual measurements.
GW501	Jan 11 - Apr 22	August 29, 2023	Unverified	Drift Correction: -0.76 Jan 1, 2024 - Jan 11, 2024	VuLink firmware issue at transition between 2023 and 2024. Update required; no data from Jan 11-Apr 22, 2024.
		January 11, 2024			
		February 12, 2024			Replaced VuLink Apr 22
		April 22, 2024			
		October 22, 2024			Raw logger data corrected to align with manual measurements.

Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

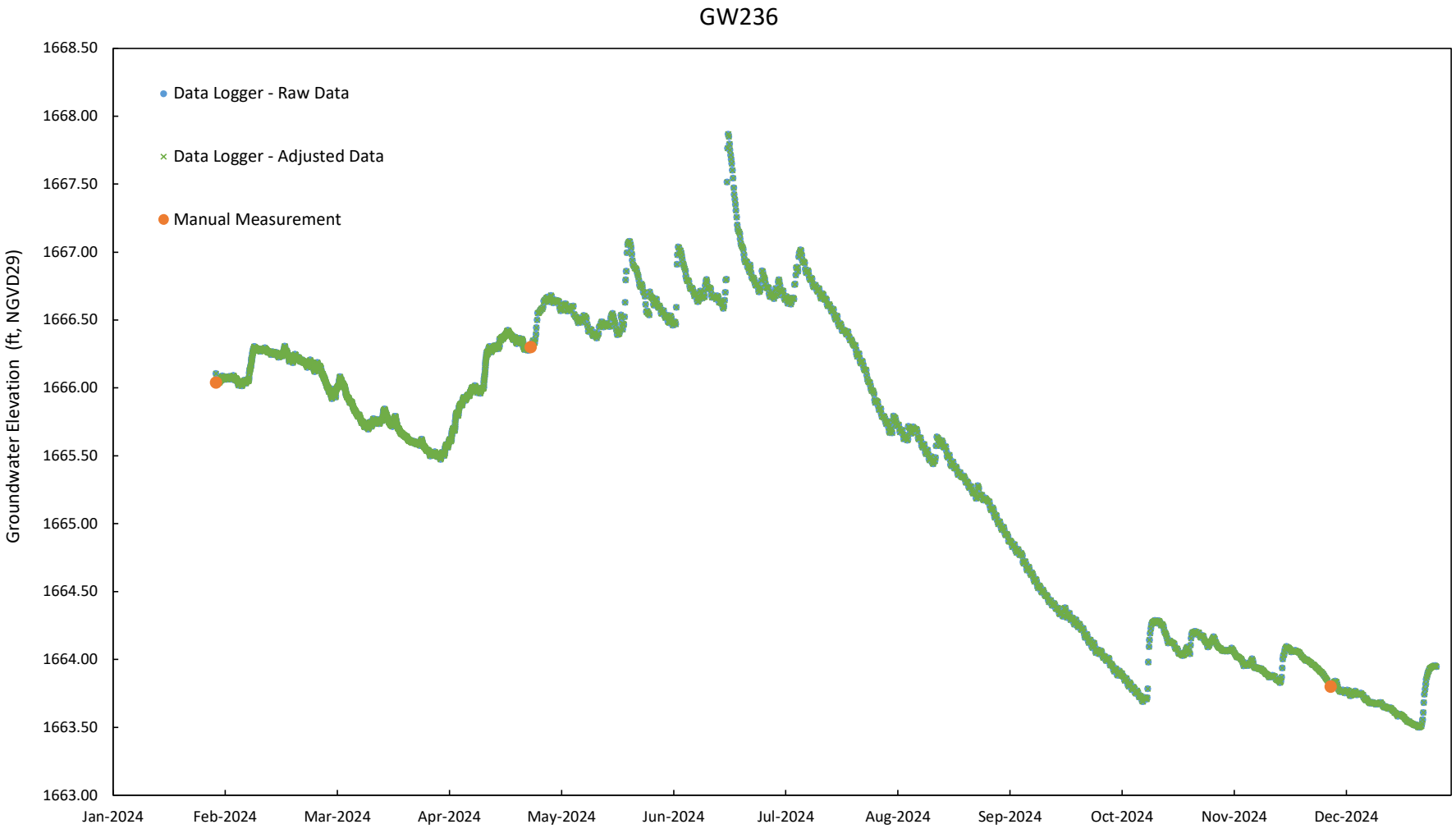
Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW502	Jan 1 - 11	January 11, 2024	Yes	Drift Correction: -0.22 Oct 7, 2024 - Dec 5, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		February 12, 2024			
		May 2, 2024			Raw logger data corrected to align with manual measurements.
		October 7, 2024			
		December 5, 2024			
GW504	Jan 2, 4-5, 7	August 30, 2023	Yes	Offset Correction: 0.25 Aug 1 - Aug 30, 2023	VuLink firmware issue at transition between 2023 and 2024.Update required; intermittent data gaps in early Jan 2024.
		January 24, 2024			
		April 23, 2024			Raw logger data corrected to align with manual measurements.
		December 3, 2024			
		December 10, 2024			
GW505	Jan 1-24	Jan 24, Apr 23	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
		April 23, 2024			
		December 3, 2024			
GW506	Jan 1-24	January 24, 2024	Unverified		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
	Feb 8-Apr 22	April 22, 2024			No communication to the cloud service beginning on Feb 8 - Apr 22, Batteries replaced, last reported at 64%.
		October 22, 2024			
GW507	Mar 2 - May 19	August 29, 2023	Yes	Drift Correction: 0.29ft Jan 24, 2024 - May 1, 2024	Anaomolous data points removed Mar 2 and 3, 2024
		January 24, 2024			Intermittent communication issues Mar 18, 2024, Apr 18-25 and May 12- 19, 2024
		May 2, 2024			Raw logger data corrected to align with manual measurements.
		December 5, 2024			
GW508	Jan 1-25	Jan 25, Apr 24	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
	Mar 29-Apr 4	April 24, 2024			Intermittent communication issue Mar 10, 22, 28 and Apr 22, 2024.
		December 7, 2024			Anamolous data points removed Mar 18, 25, and Apr 4-16, 2024.
GW509	Jan 1-11	January 11, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		April 23, 2024			
		December 5, 2024			
GW510	Jan 1–May 1	January 24, 2024	Yes	Offset Correction: -1.84ft June 12- Dec 3, 2024	No communication to cloud service at the transition of 2023 and 2024. Batteries last reported 84%. Batteries found drained on Jan 24. Unable to replace due to equipment frozen in place. Replaced VuLink on April 23. No data until May 1.
	May 9-Jun 12	April 23, 2024			
		May 1, 2024			Anamolous data point removed May 4, 2024. Intermittent communication issue May 9 - June 12, no data.
		June 12, 2024			Raw logger data corrected to align with manual measurements.
		December 3, 2024			
GW512	Jan 1-23	January 24, 2024	Yes	Offset Correction: -0.53ft June 12, 2024 - June 28, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
	May 13-Aug 13	May 2, 2024			
		June 12, 2024		Drift Correction: 0.32ft June 12, 2024 - June 28, 2024	Intermittent communication issue May 12 - June 12, 2024, no data.
		June 28, 2024		Offset Correction: -0.34ft June 28, 2024 - Aug 13, 2024	
		August 13, 2024		Drift Correction: -0.54ft June 28, 2024 - Aug 13, 2024	Raw logger data corrected to align with manual measurements.
		December 6, 2024			
GW514	Jan 1-25	January 25, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024. Anamolous data points removed Mar 4, 12 and 30, 2024.
	Apr 6-May 2	April 24, 2024			No communication to the cloud service after Apr 6, discovered Apr 24; Replaced VuLink on Apr 24; Intermittent loss of VuLink barometric corrections after May 10; No communication to cloud service from June 16-22, then again after July 1; Missing data from May 10-18, July 1-Aug 8, and Nov 4-Dec 7.
	May 10-18	August 8, 2024			Raw logger data corrected to align with manual measurements.
	Jun 13-25	December 7, 2024			
	Sept 12-16	December 10, 2024		Offset Correction: -0.21ft Dec 10-31, 2024	Anamolous data point removed Dec 9, 2024.

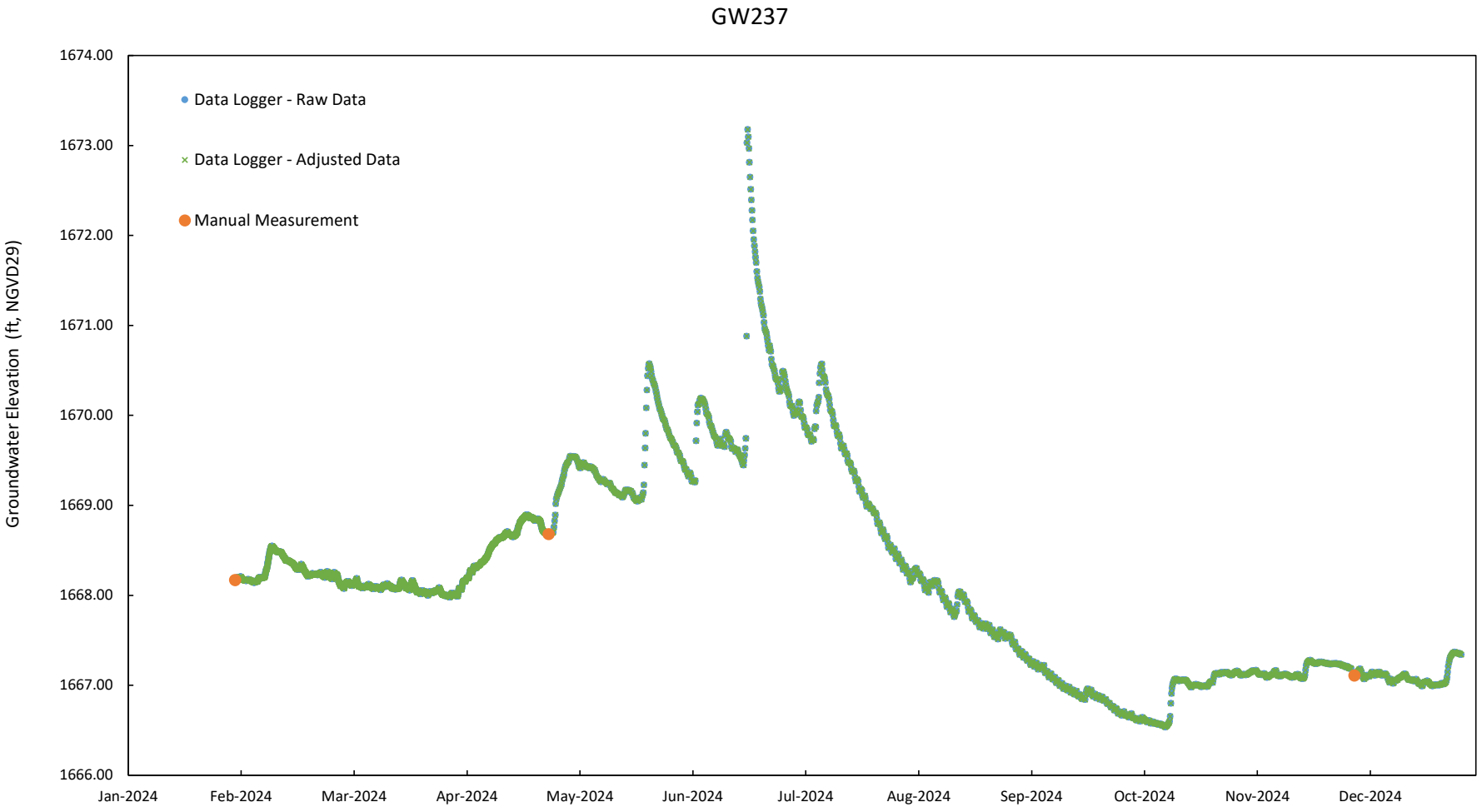
Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW515	Jan 2-30	January 25, 2024	Yes	Offset Correction: -1.47ft Jan 1, 2024 - Apr 23, 2024.	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		April 24, 2024		Drift Correction: -0.11 Apr 24, 2024 - Dec 7, 2024	
		December 7, 2024			Raw logger data corrected to align with manual measurements.
GW516	Jan 1-Apr 29	January 24, 2024	Unverified		No communication to cloud service at the transition of 2023 and 2024. Discovered connection issue between VuLink and leveltroll on Jan 24. Equipment frozen in place preventing repairs. No data for Jan, Feb or March. Able to connect to LevelTroll directly on Apr 30.
	May 28 - Nov 2	April 30, 2024		Drift Correction: 0.50ft May 20 - May 28, 2024	
		May 2, 2024		Offset Correction: -0.48 May 29, 2024 - Aug 13, 2024	
		May 20, 2024		Drift Correction: -0.31 May 29, 2024 - Aug 13, 2024	
		May 28, 2024		VuLink Logger data used June 28, 2024 - Aug 13, 2024 to fill in data gaps.	Suspect Manual Measurements May 28 and 29, 2024
		May 29, 2024			Anamolous data points removed June 17 - 20, 2024
		August 13, 2024			Anamolous data points removed Aug 4 - 13, 2024
		August 19, 2024			Intermittent communication issue Aug 19 - Sep 20, 2024, Replaced splitter cable on Aug 19.
		September 20, 2024			Intermittent communication issue Oct 30 - Nov 2, 2024
		December 2, 2024			Raw logger data corrected to align with manual measurements.
GW517	Jan 1-25	January 25, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024. Anamolous data point removed Jan 25, 2024.
		April 24, 2024			
		December 7, 2024			
GW518	May 1- Aug 7	September 25, 2023	Yes	Drift Correction: -0.18 Sep 26, 2023 - Jan 29, 2024	Raw logger data corrected to align with manual measurements.
		January 30, 2024			
		April 29, 2024		Barometrically Corrected data May 2 - Aug 7, 2024	No communication to the cloud from May 1 - Aug 7, depleted batteries, last reported 43%; Missing June and July Data.
		June 28, 2024			
		August 7, 2024			
		November 27, 2024			
GW519		September 26, 2023	Yes	Drift Correction: 0.22ft Jan 30, 2024 - Apr 28, 2024	Raw logger data corrected to align with manual measurements.
		January 30, 2024			
		April 29, 2024		Offset Correction: 0.50ft Apr 28, 2024 - Nov 27, 2024	Anamolous data points removed Dec 31, 2024
		November 27, 2024		Drift Correction: -0.24ft Apr 28, 2024 - Nov 27, 2024	
GW521	Jan 1-24	Jan 24, Apr 23	Unverified	Drift Correction: -0.11ft Apr 23, 2024 - Dec 5, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
	Feb 16-Apr 22	April 23, 2024			Intermittent communication issue Feb 15 - Apr 23, 2024, anamolous data point removed Apr 23, 2024
		December 6, 2024			Raw logger data corrected to align with manual measurements.
GW522	Jan 1-30	Jan 30, Apr 29	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-30, 2024.
		April 29, 2024			
		August 7, 2024			
		November 27, 2024			
GW523	Jan 1-30	January 30, 2024	Yes		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-30, 2024.
		April 29, 2024			
		November 27, 2024			

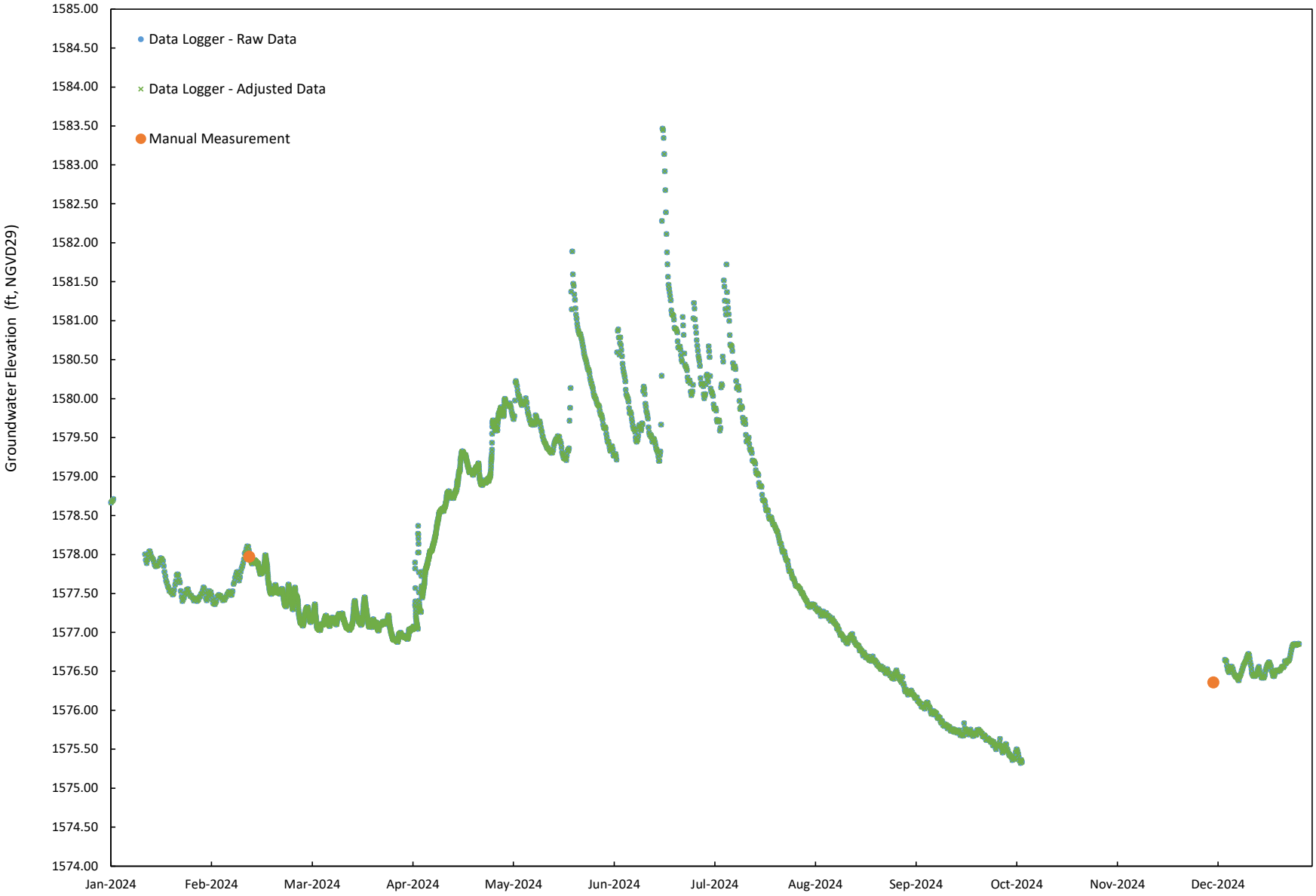
Table C2 2024 Data Logger Groundwater Elevation Monitoring Summary

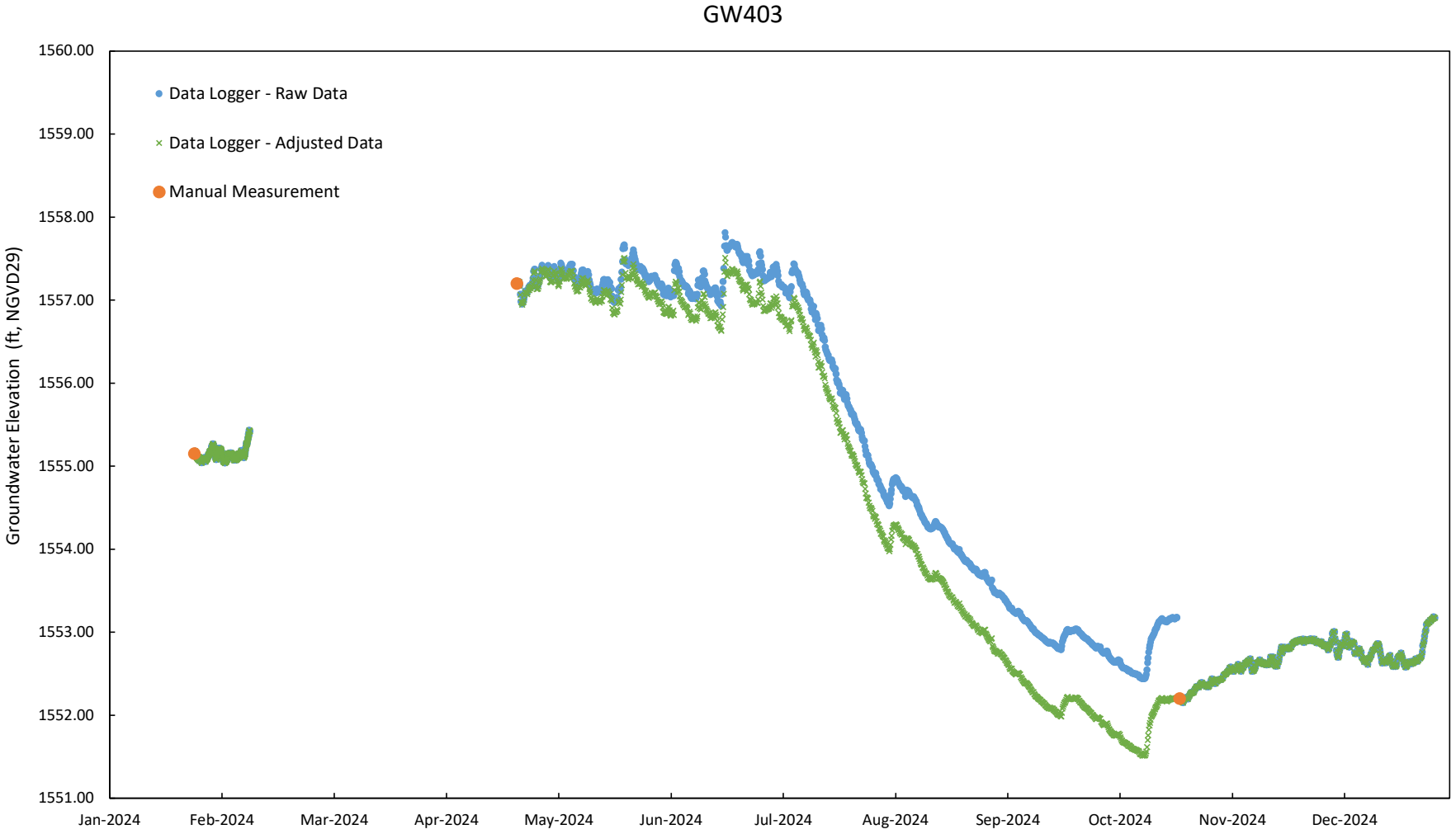
Well Number	Dates of Equipment Malfunction	Field Visit/Recalibration Dates	Frozen in Winter [2]	Data Correction	Comment/Explanation
GW524	Jan 1-24	January 24, 2024	Unverified		VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-24, 2024.
		April 30, 2024			
		December 2, 2024			
GW525		Jan 11, Feb 12, Apr 30	Yes	Offset Correction: -0.49ft Apr 30, 2024 - Sep 12, 2024	Raw logger data corrected to align with manual measurements.
		February 12, 2024			
		April 30, 2024			
		September 13, 2024			
		September 17, 2024			
GW530	Jan 1-11	Jan 11, Feb 12, Apr 23	Yes	Offset Correction: -0.21ft Jan 1, 2024 - Feb 11, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-11, 2024.
		February 12, 2024			
		Aprill 23			Raw logger data corrected to align with manual measurements.
		December 5, 2024			
GW531	Mar 14-17	August 28, 2023	Yes	Drift Correction: -0.16ft Mar 17, 2024 - Apr 21, 2024	Raw logger data corrected to align with manual measurements.
		February 12, 2024			Intermittent communication issues Mar 14-17, 2024
		April 22, 2024			
		July 29, 2024			
		August 5, 2024			
		October 22, 2024			
GW532	Jan 1-24	Jan 25, May 5	Yes	Offset Correction: -0.24ft Jan 25, 2024 - May 5, 2024	VuLink firmware issue at transition between 2023 and 2024.Update required; no data from Jan 1-25, 2024.
		May 5, 2024		Drift Correction: 0.13ft May 5, 2024 - Dec 6, 2024	
		December 7, 2024			Raw logger data corrected to align with manual measurements.

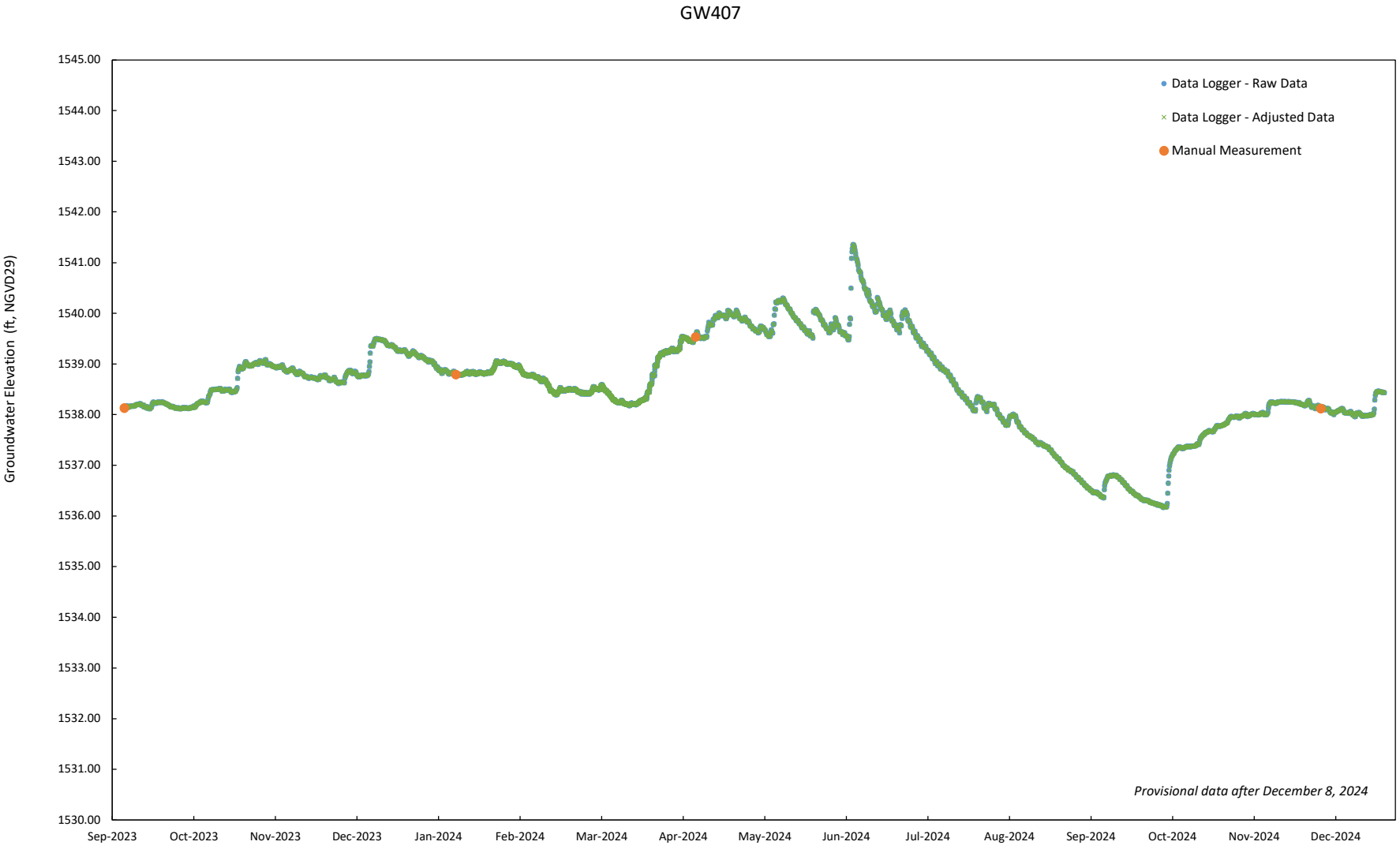

GW236
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1668.50
1668.00
1667.50
1667.00
1666.50
1666.00
1665.50
1665.00
1664.50
1664.00
1663.50
1663.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

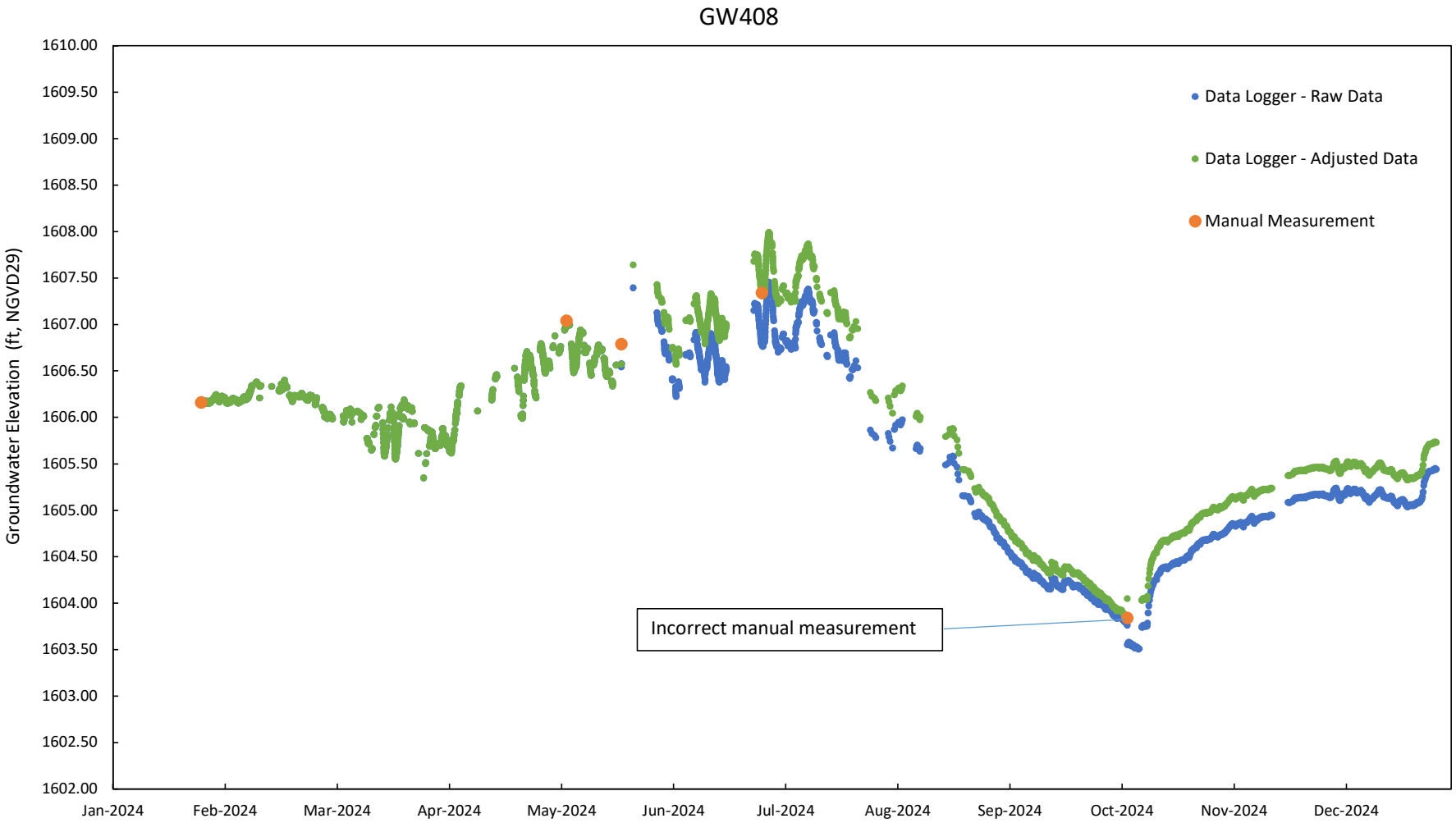

GW237
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1674.00
1673.00
1672.00
1671.00
1670.00
1669.00
1668.00
1667.00
1666.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

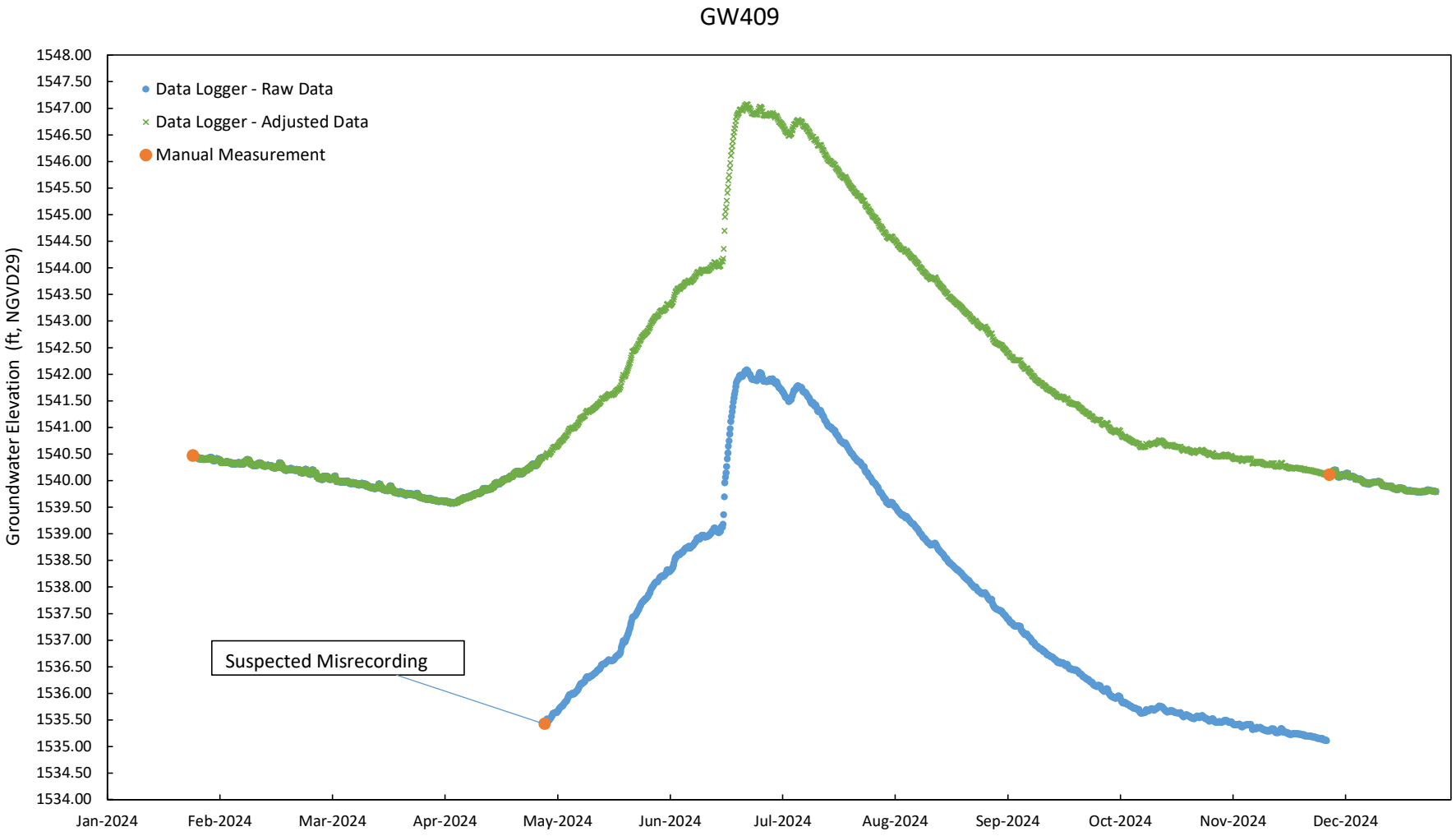
GW402

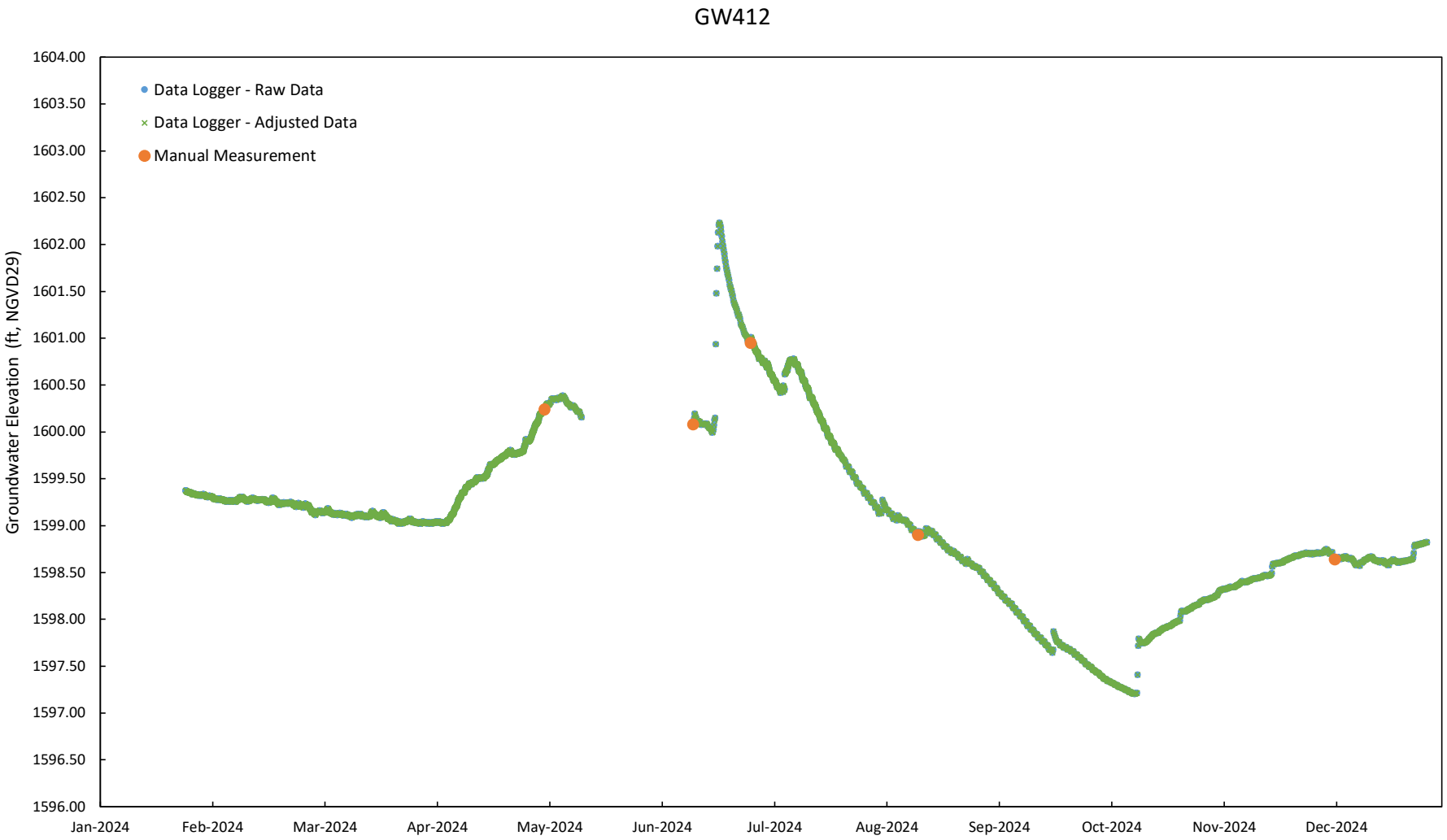

Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1585.00
1584.50
1584.00
1583.50
1583.00
1582.50
1582.00
1581.50
1581.00
1580.50
1580.00
1579.50
1579.00
1578.50
1578.00
1577.50
1577.00
1576.50
1576.00
1575.50
1575.00
1574.50
1574.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024


GW403
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1560.00
1559.00
1558.00
1557.00
1556.00
1555.00
1554.00
1553.00
1552.00
1551.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

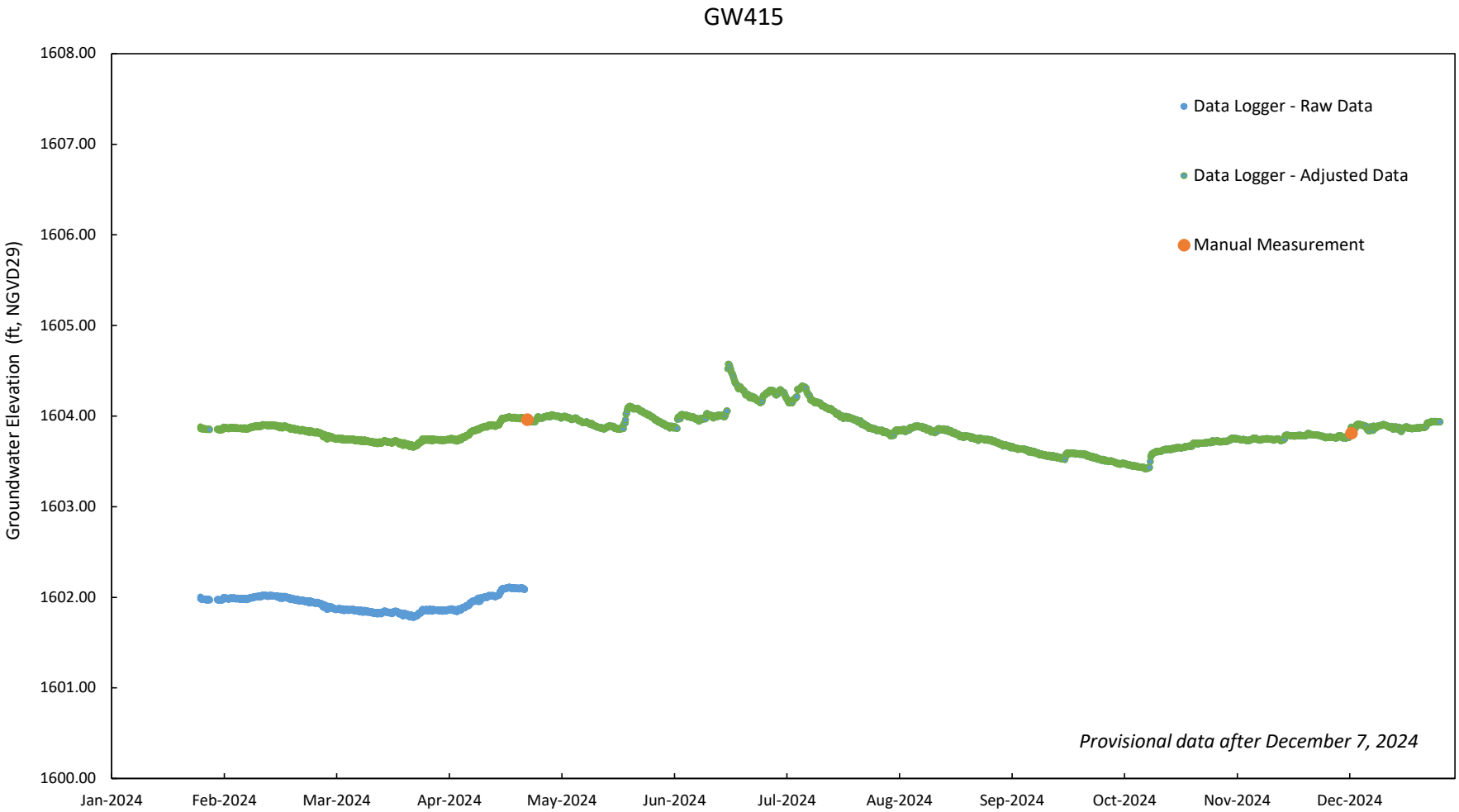

GW407
Groundwater Elevation (ft, NGVD29)
1545.00
1544.00
1543.00
1542.00
1541.00
1540.00
1539.00
1538.00
1537.00
1536.00
1535.00
1534.00
1533.00
1532.00
1531.00
1530.00
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after December 8, 2024

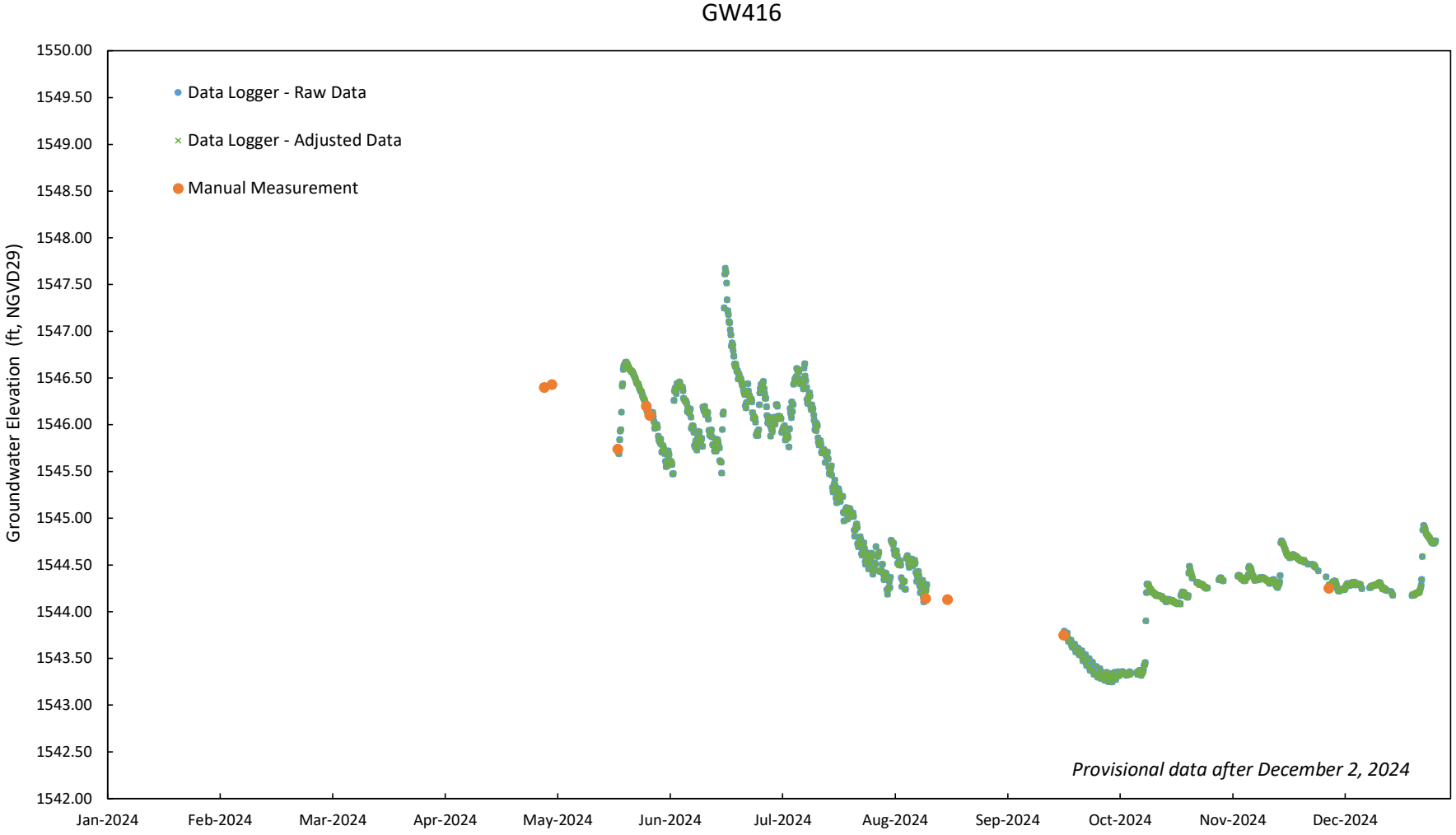

GW408
Groundwater Elevation (ft, NGVD29)
1610.00
1609.50
1609.00
1608.50
1608.00
1607.50
1607.00
1606.50
1606.00
1605.50
1605.00
1604.50
1604.00
1603.50
1603.00
1602.50
1602.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Incorrect manual measurement

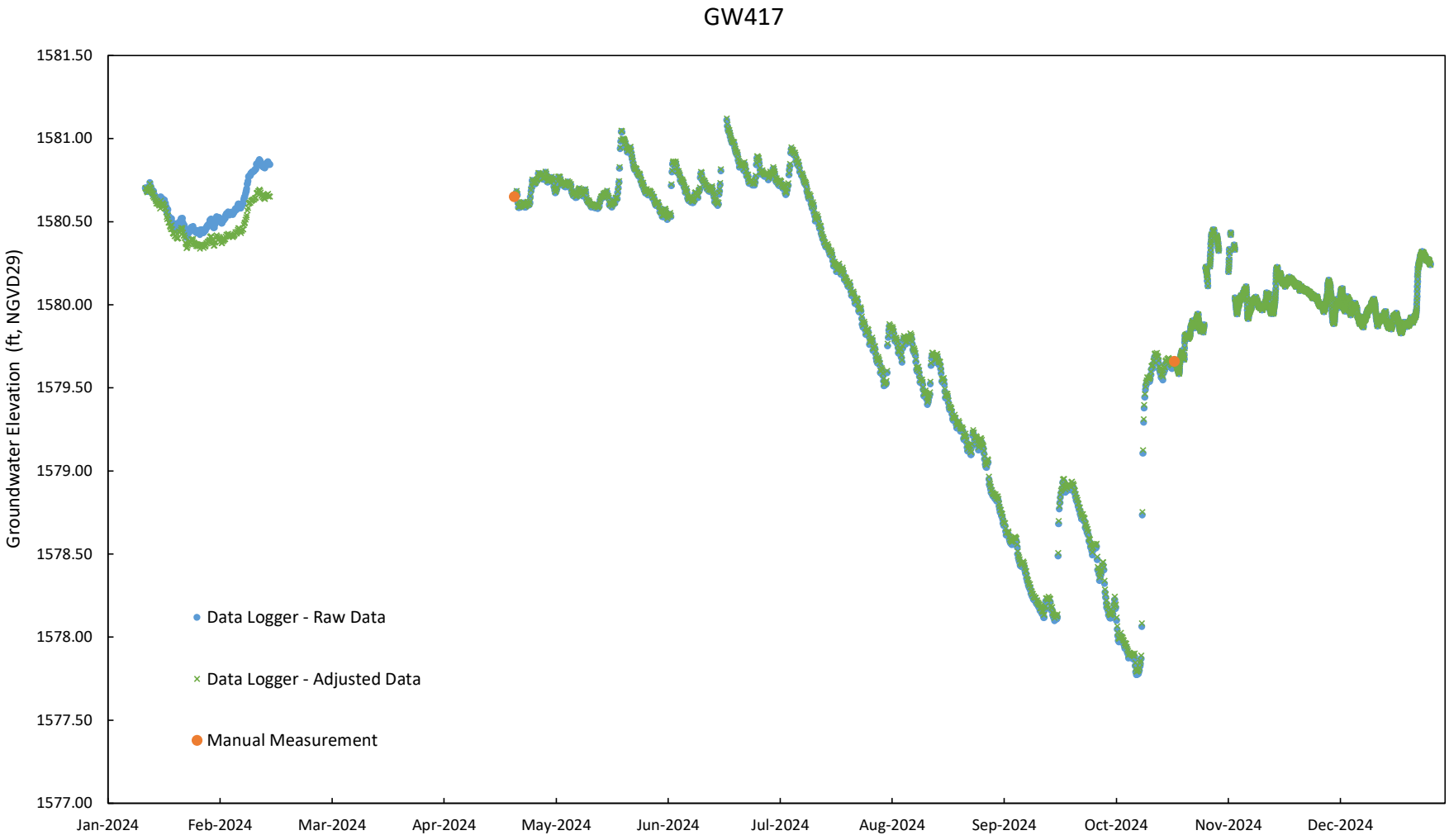

GW409
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Suspected Misrecording
Groundwater Elevation (ft, NGVD29)
1548.00
1547.50
1547.00
1546.50
1546.00
1545.50
1545.00
1544.50
1544.00
1543.50
1543.00
1542.50
1542.00
1541.50
1541.00
1540.50
1540.00
1539.50
1539.00
1538.50
1538.00
1537.50
1537.00
1536.50
1536.00
1535.50
1535.00
1534.50
1534.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

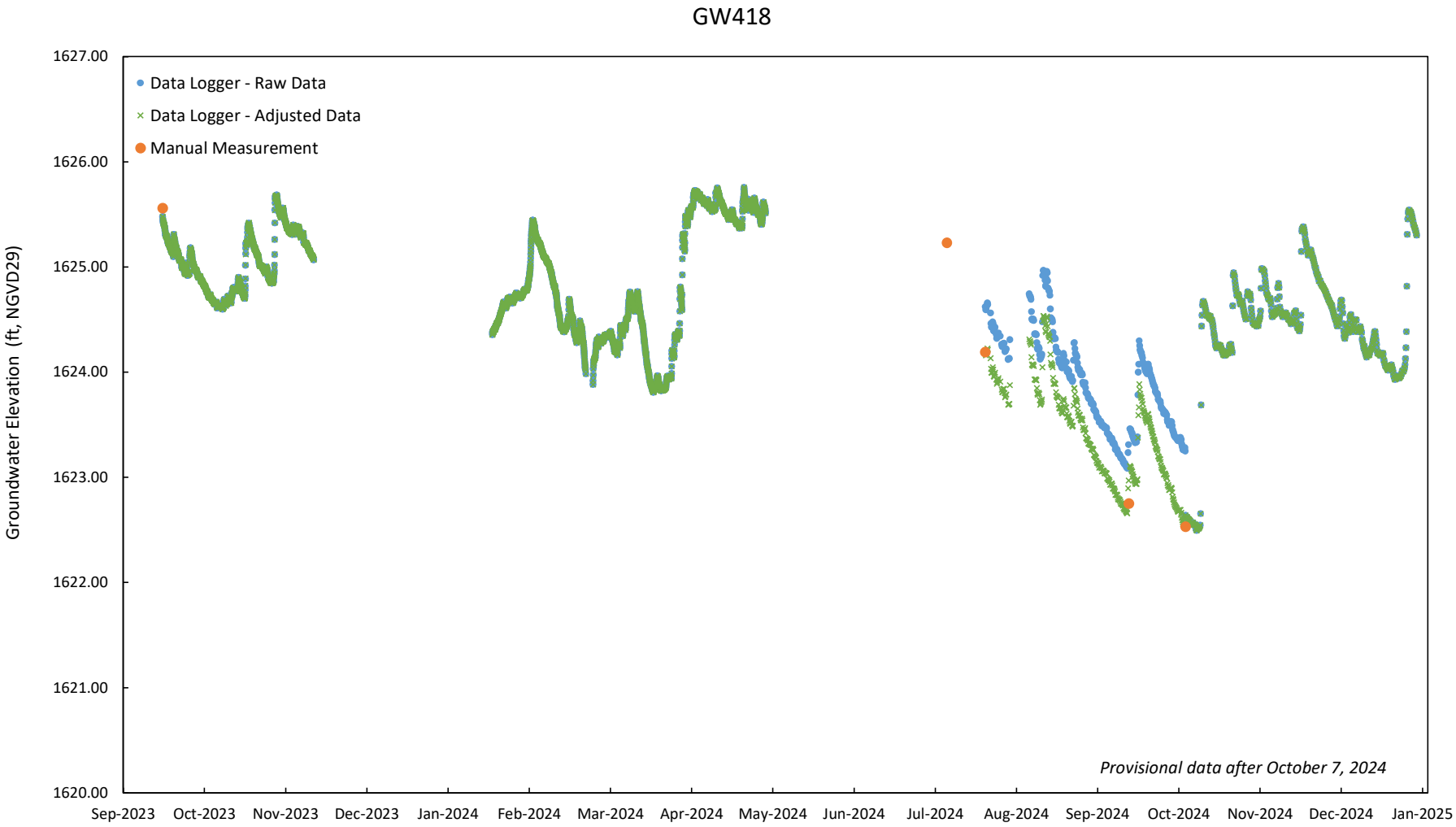

GW412
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
1599.50
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

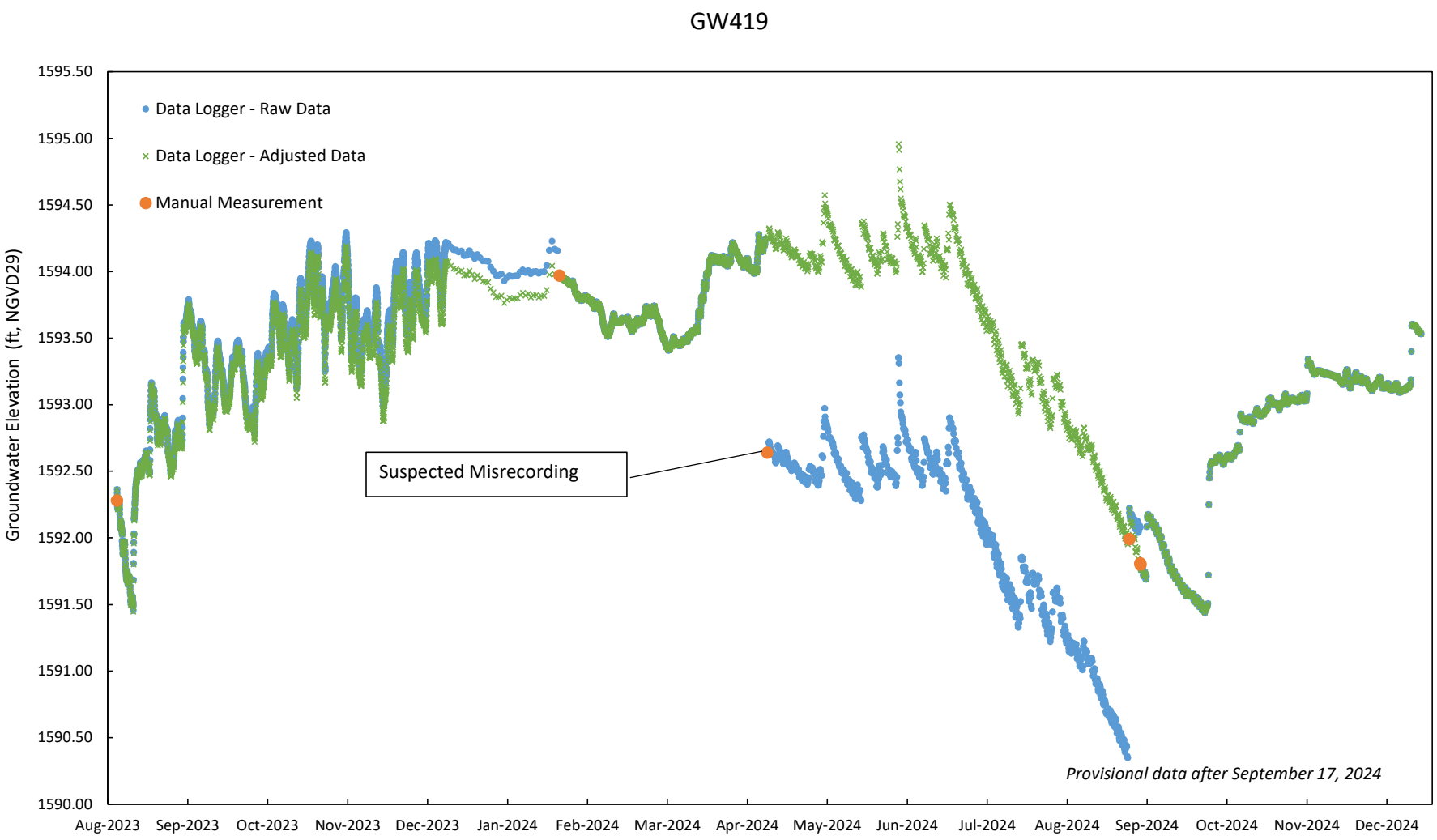

GW414
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1625.00
1620.00
1615.00
1610.00
1605.00
1600.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 10, 2024

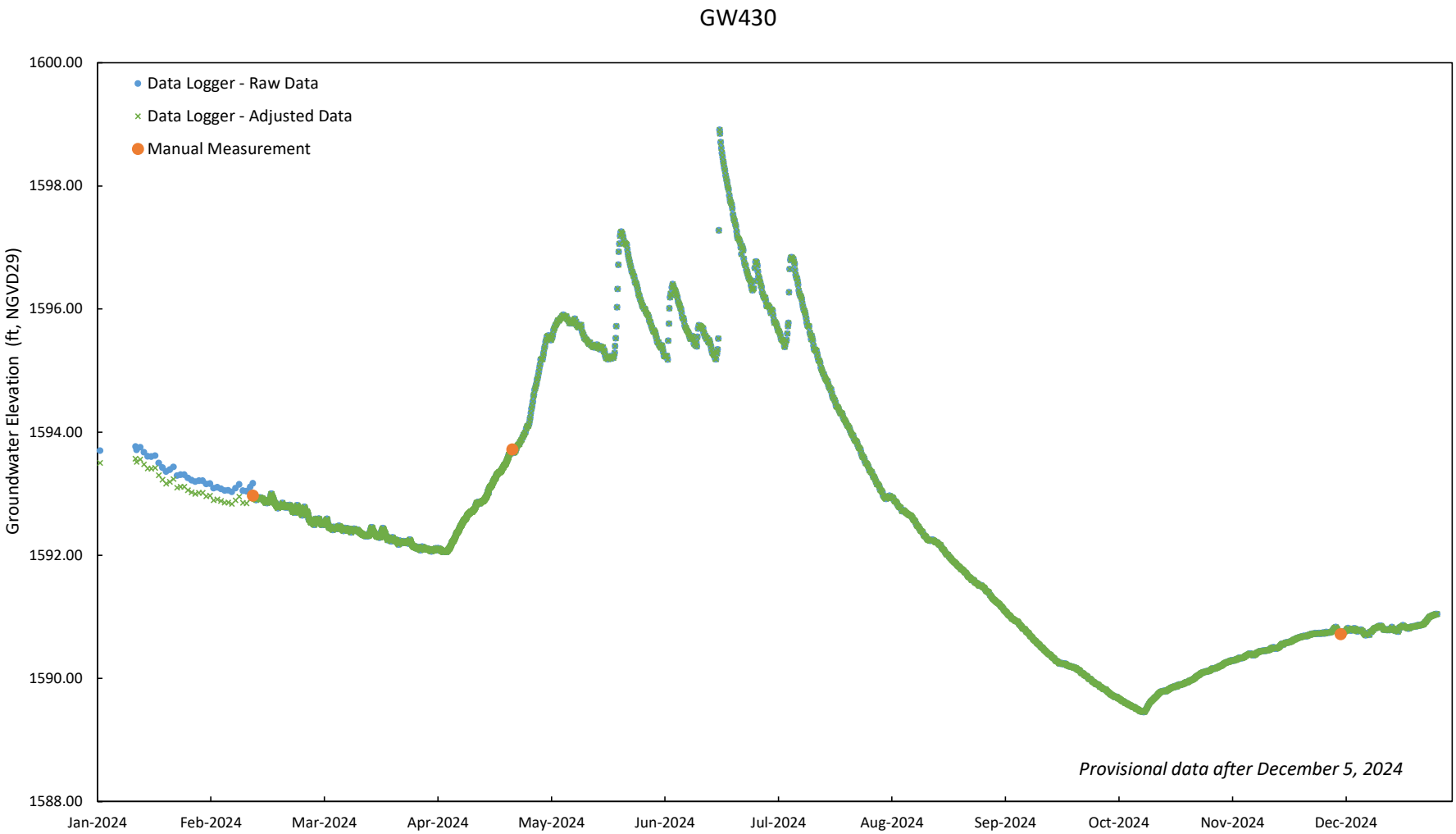

GW415
Groundwater Elevation (ft, NGVD29)
1608.00
1607.00
1606.00
1605.00
1604.00
1603.00
1602.00
1601.00
1600.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after December 7, 2024

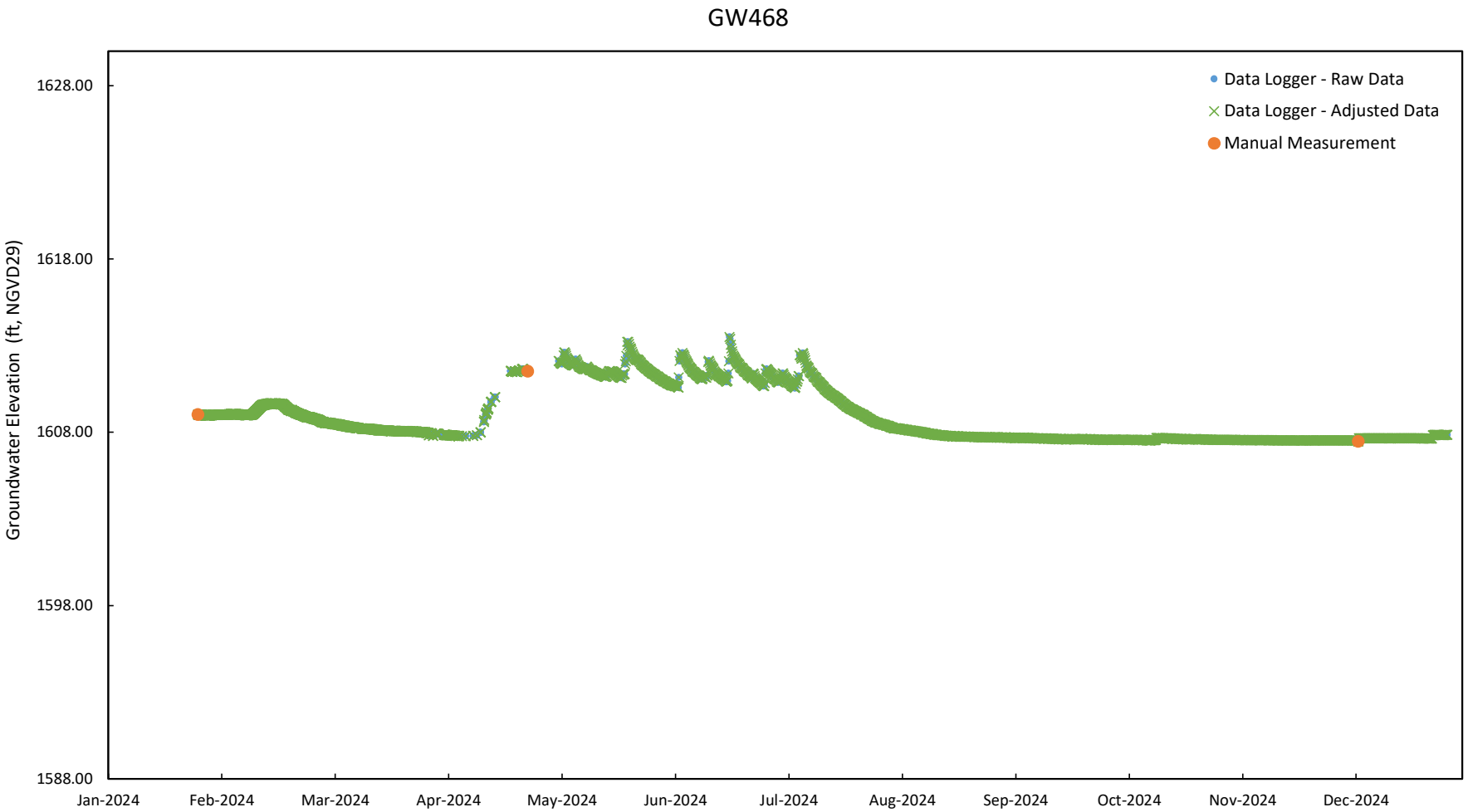

GW416
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1550.00
1549.50
1549.00
1548.50
1548.00
1547.50
1547.00
1546.50
1546.00
1545.50
1545.00
1544.50
1544.00
1543.50
1543.00
1542.50
1542.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 2, 2024

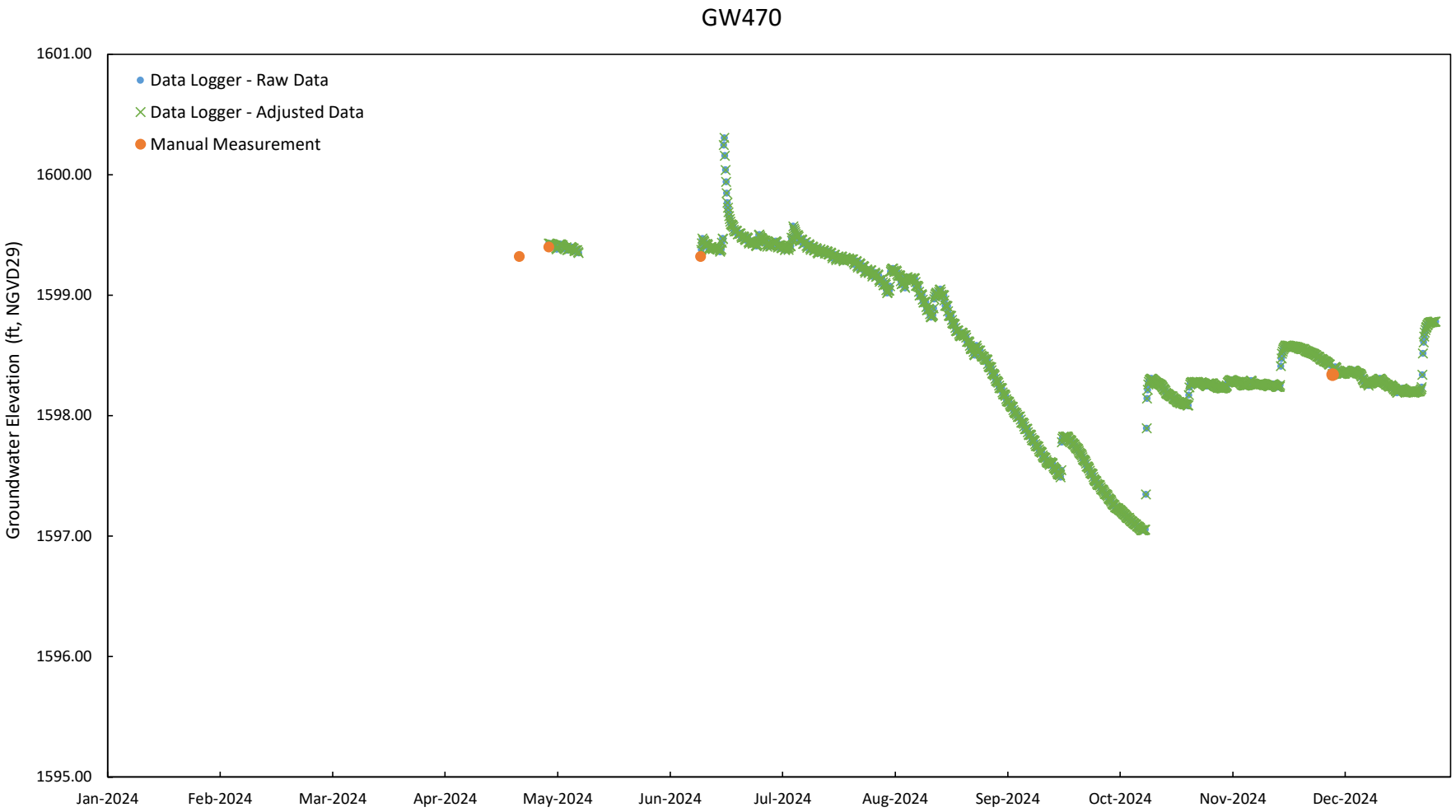

GW417
Groundwater Elevation (ft, NGVD29)
1581.50
1581.00
1580.50
1580.00
1579.50
1579.00
1578.50
1578.00
1577.50
1577.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement

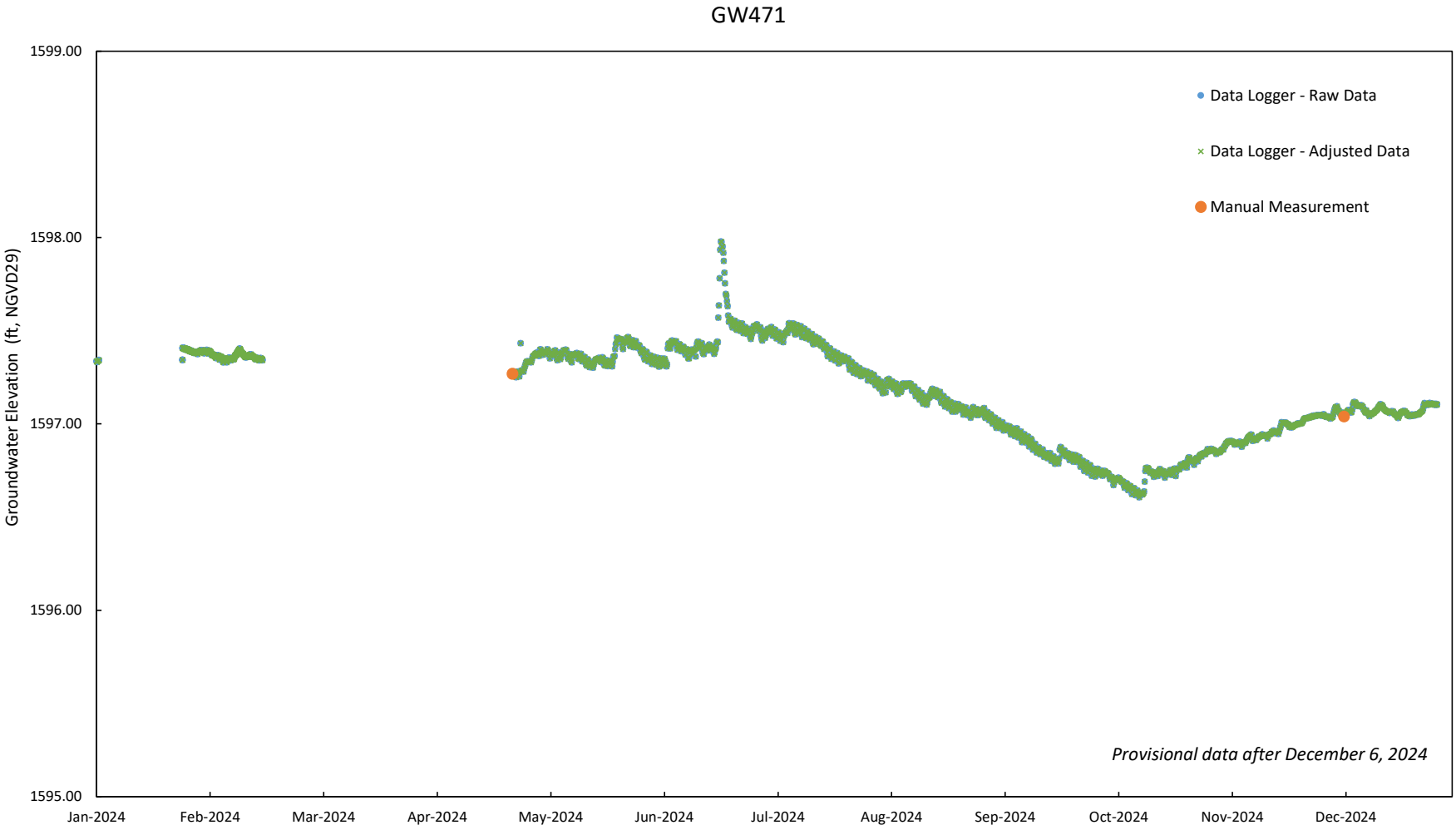

GW418
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1627.00
1626.00
1625.00
1624.00
1623.00
1622.00
1621.00
1620.00
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Jan-2025
Provisional data after October 7, 2024

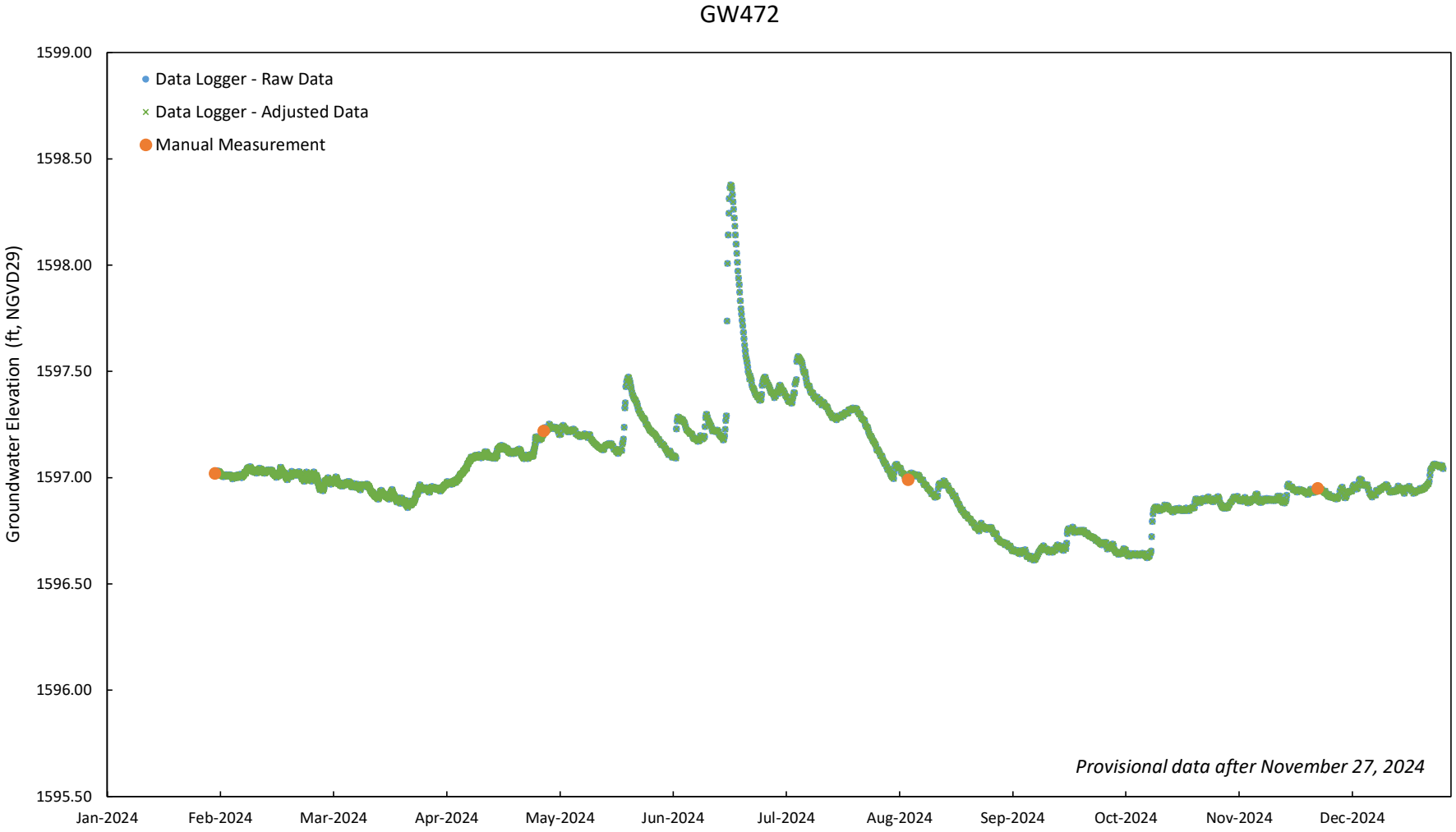

GW419
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Suspected Misrecording
Provisional data after September 17, 2024
Groundwater Elevation (ft, NGVD29)
1595.50
1595.00
1594.50
1594.00
1593.50
1593.00
1592.50
1592.00
1591.50
1591.00
1590.50
1590.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

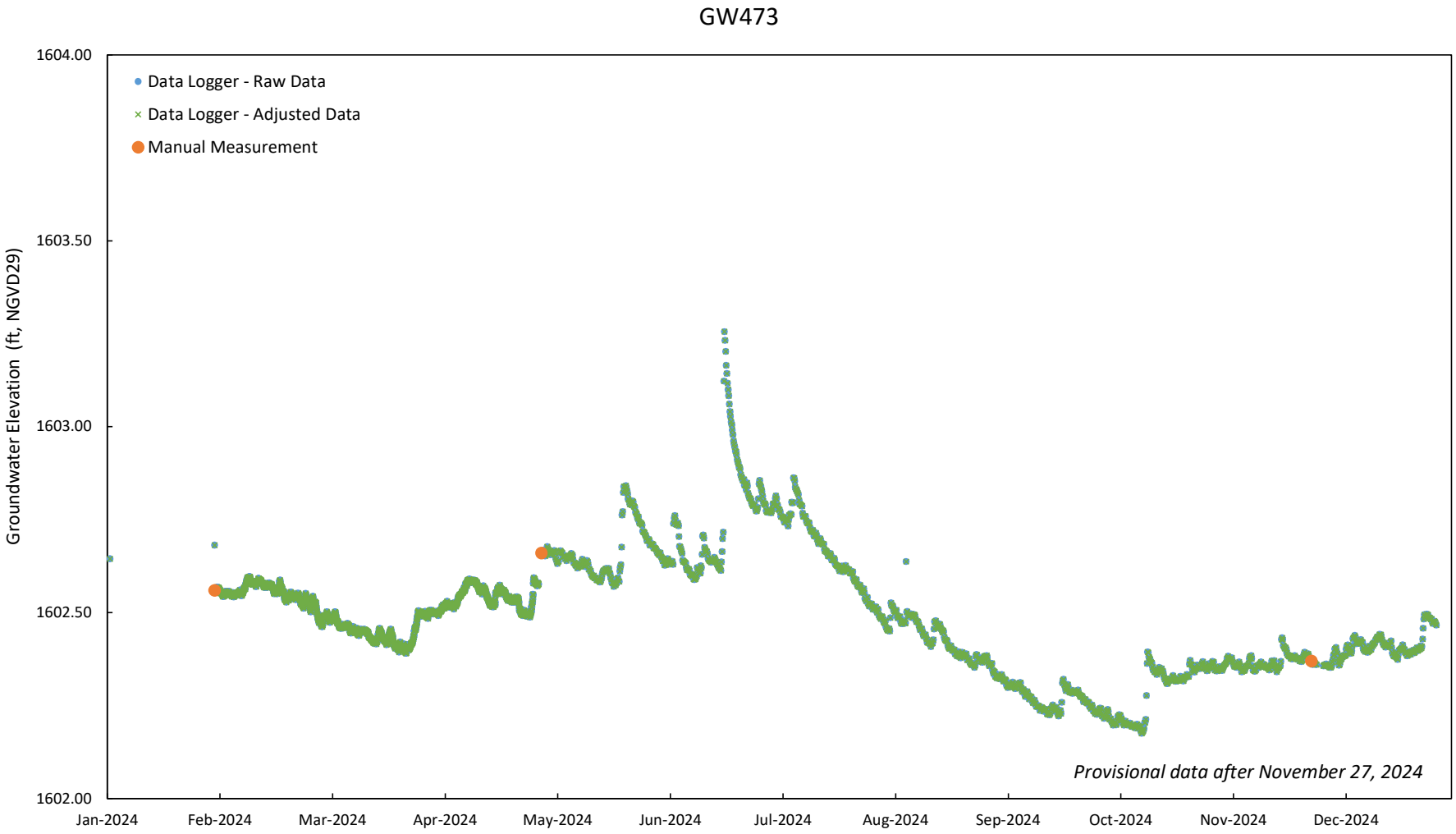

GW430
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1600.00
1598.00
1596.00
1594.00
1592.00
1590.00
1588.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 5, 2024

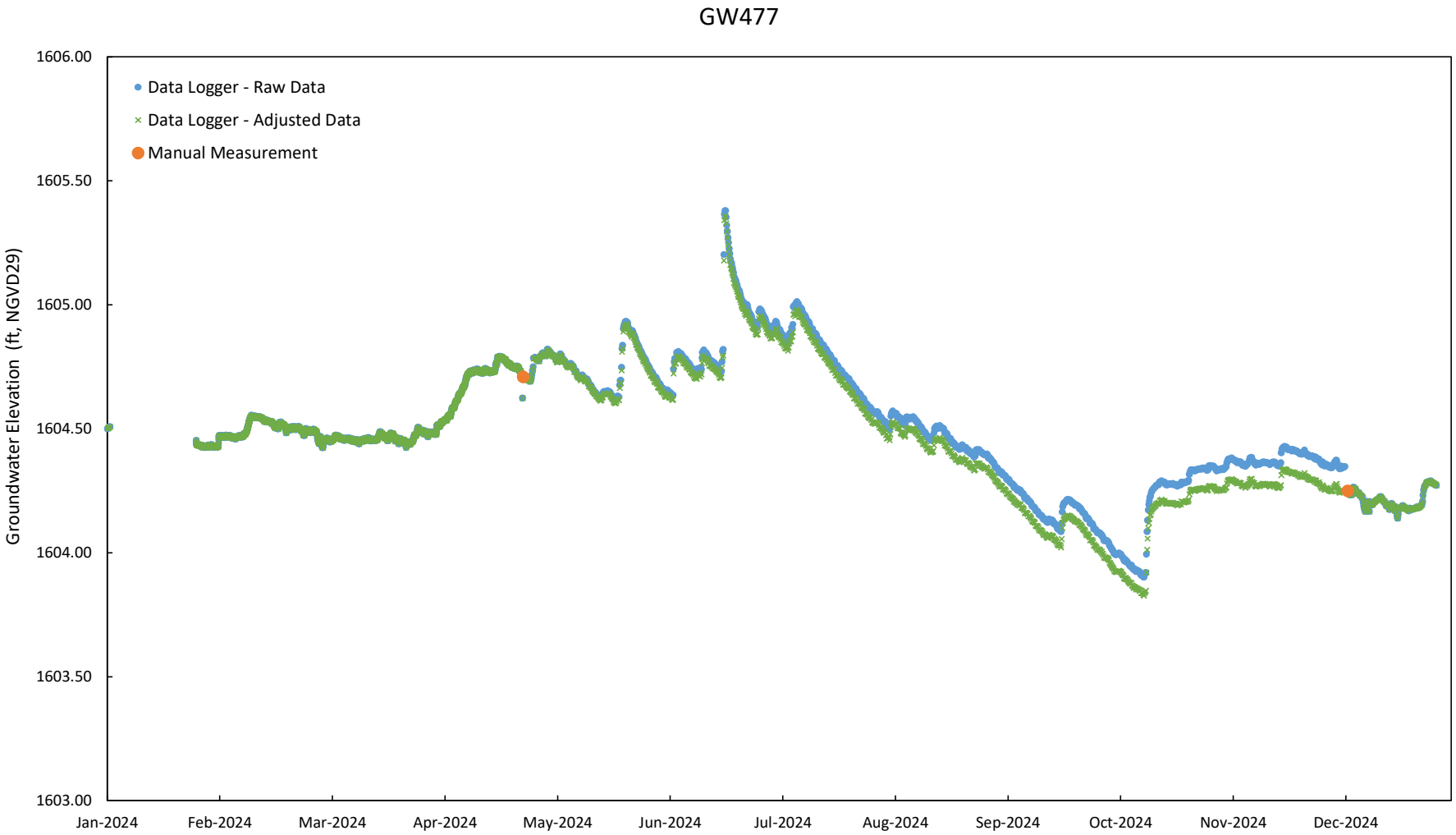

GW468
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1628.00
1618.00
1608.00
1598.00
1588.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

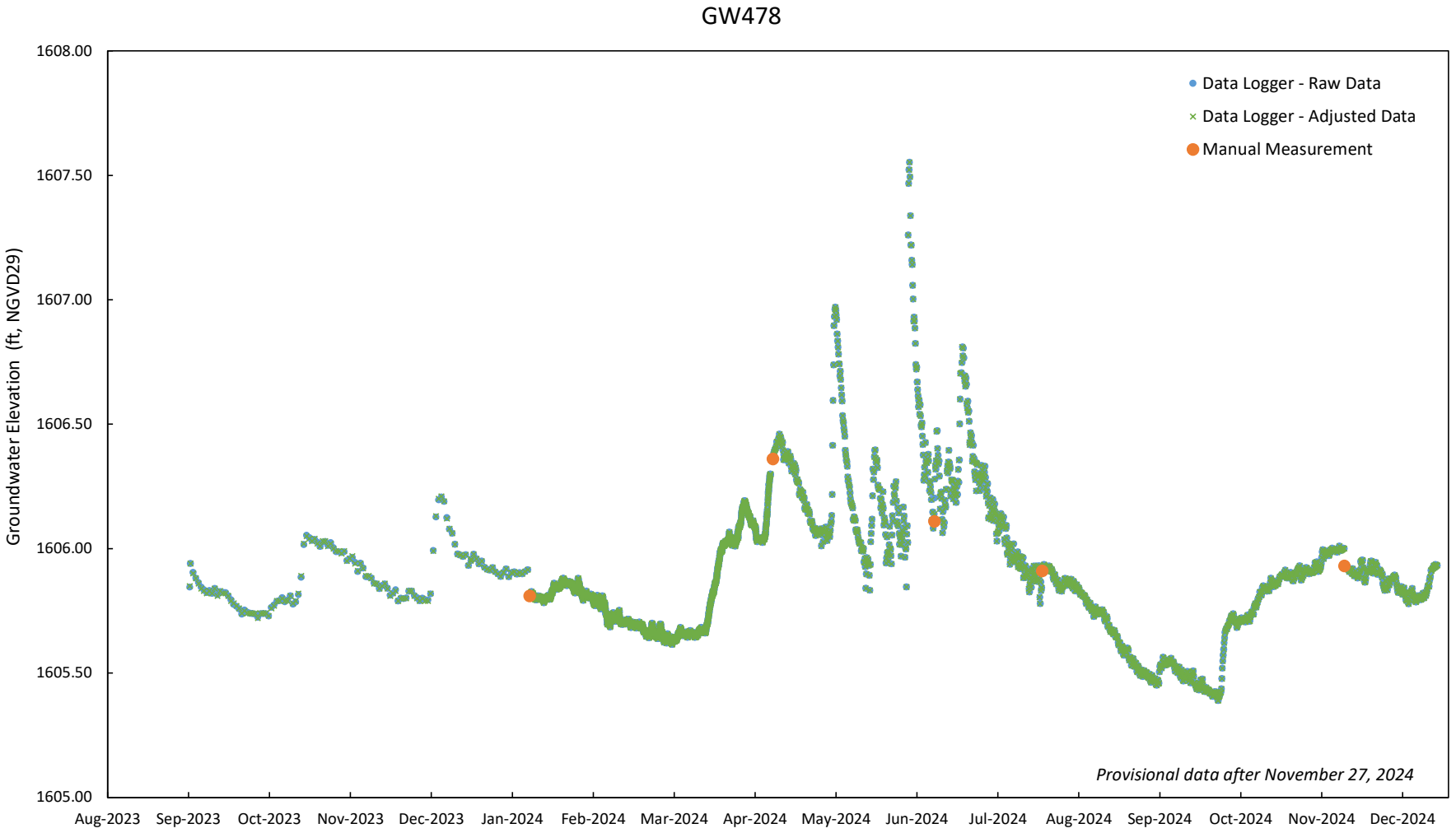

GW470
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1601.00
1600.00
1599.00
1598.00
1597.00
1596.00
1595.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

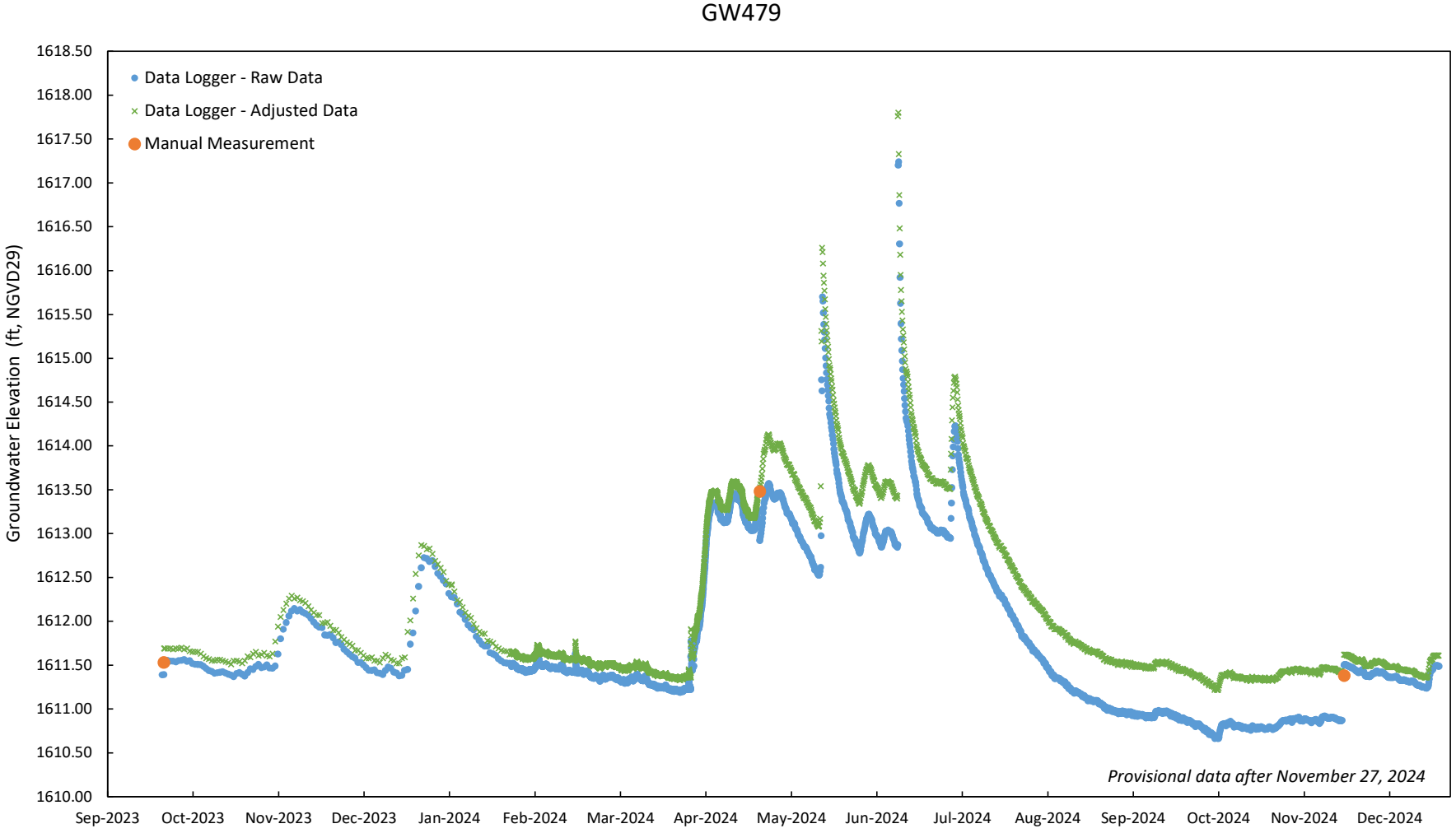

GW471
Groundwater Elevation (ft, NGVD29)
1599.00
1598.00
1597.00
1596.00
1595.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after December 6, 2024

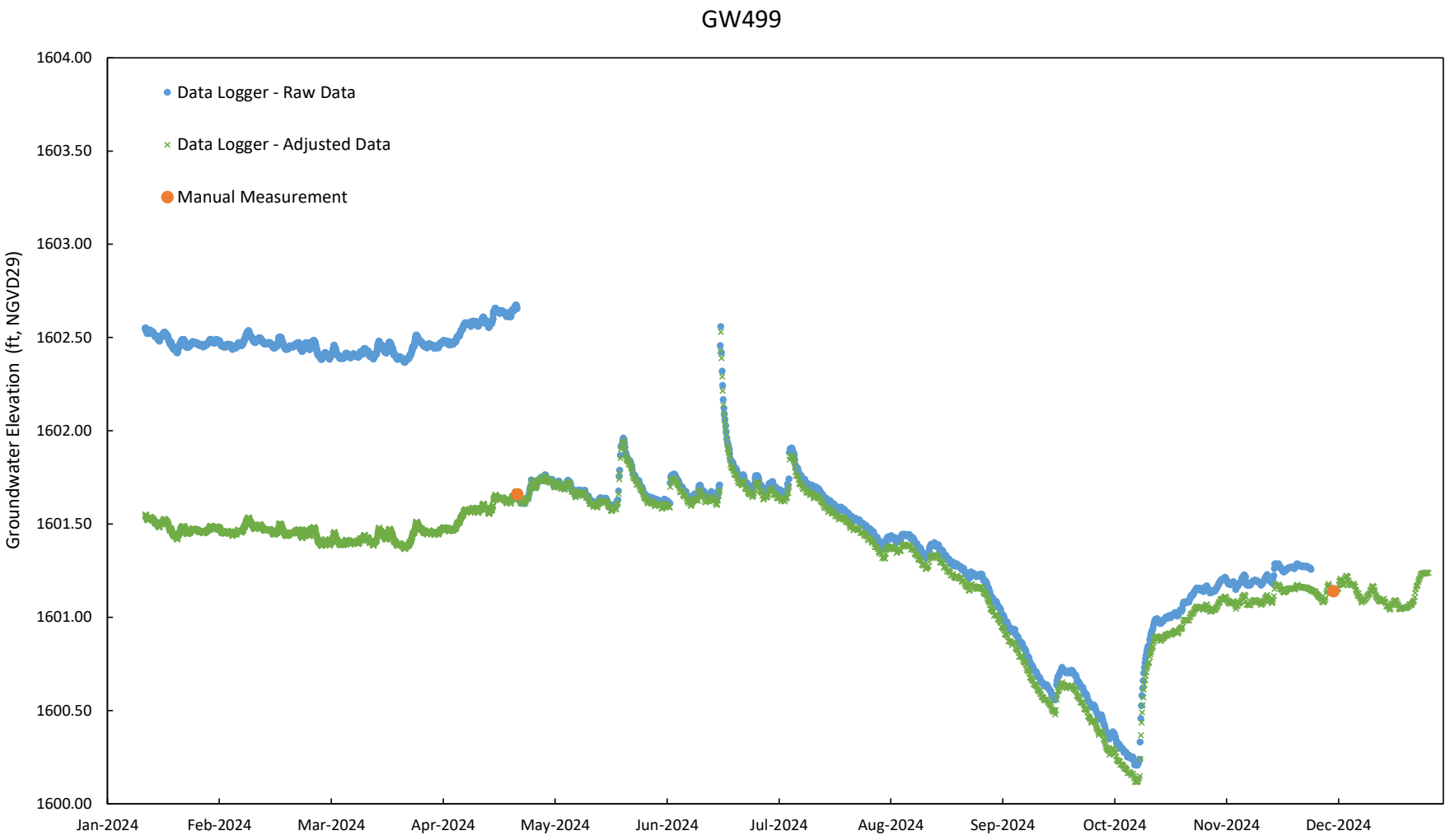

GW472
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
1595.50
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after November 27, 2024

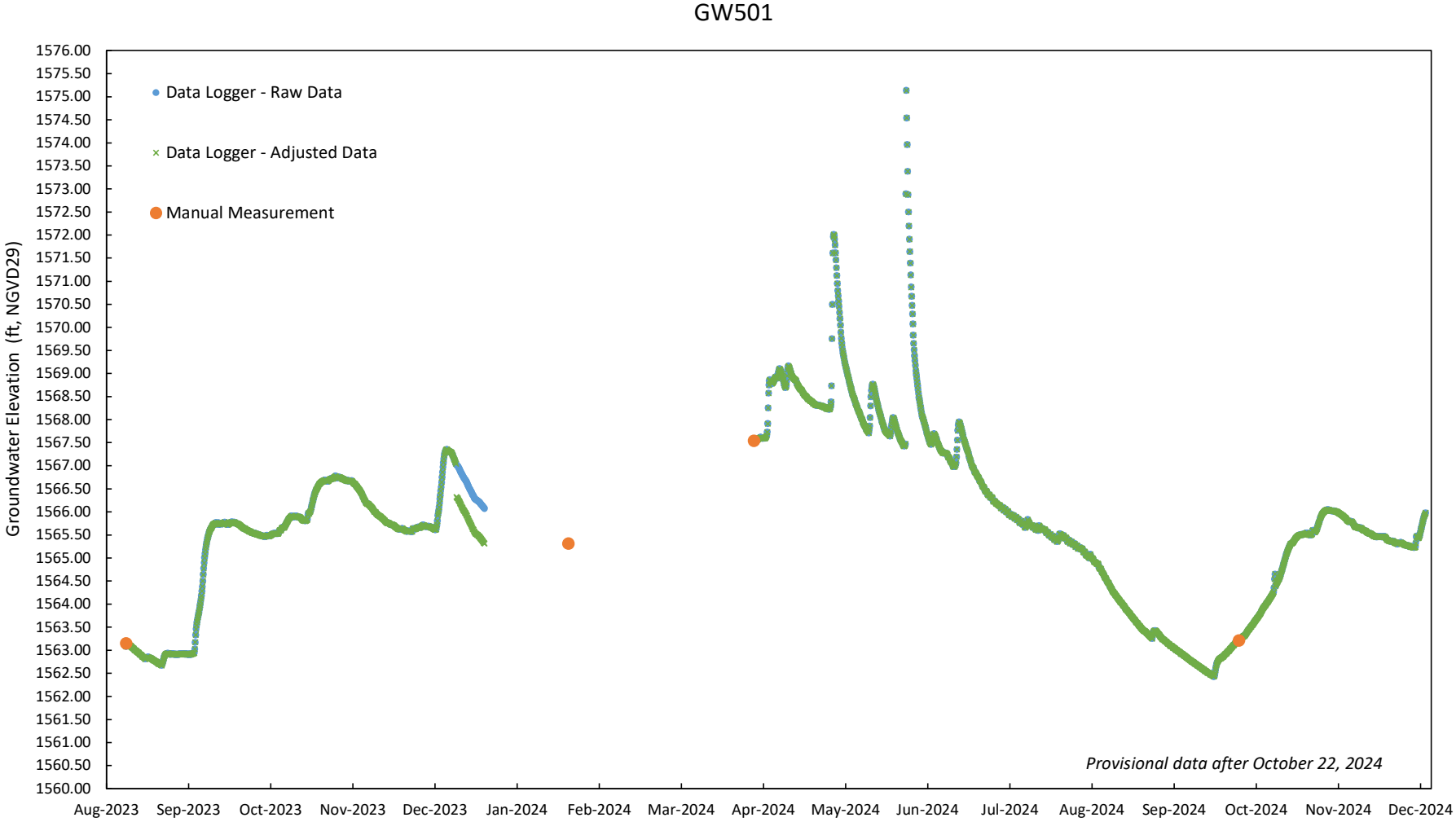

GW473
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1604.00
1603.50
1603.00
1602.50
1602.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after November 27, 2024


GW477
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1606.00
1605.50
1605.00
1604.50
1604.00
1603.50
1603.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

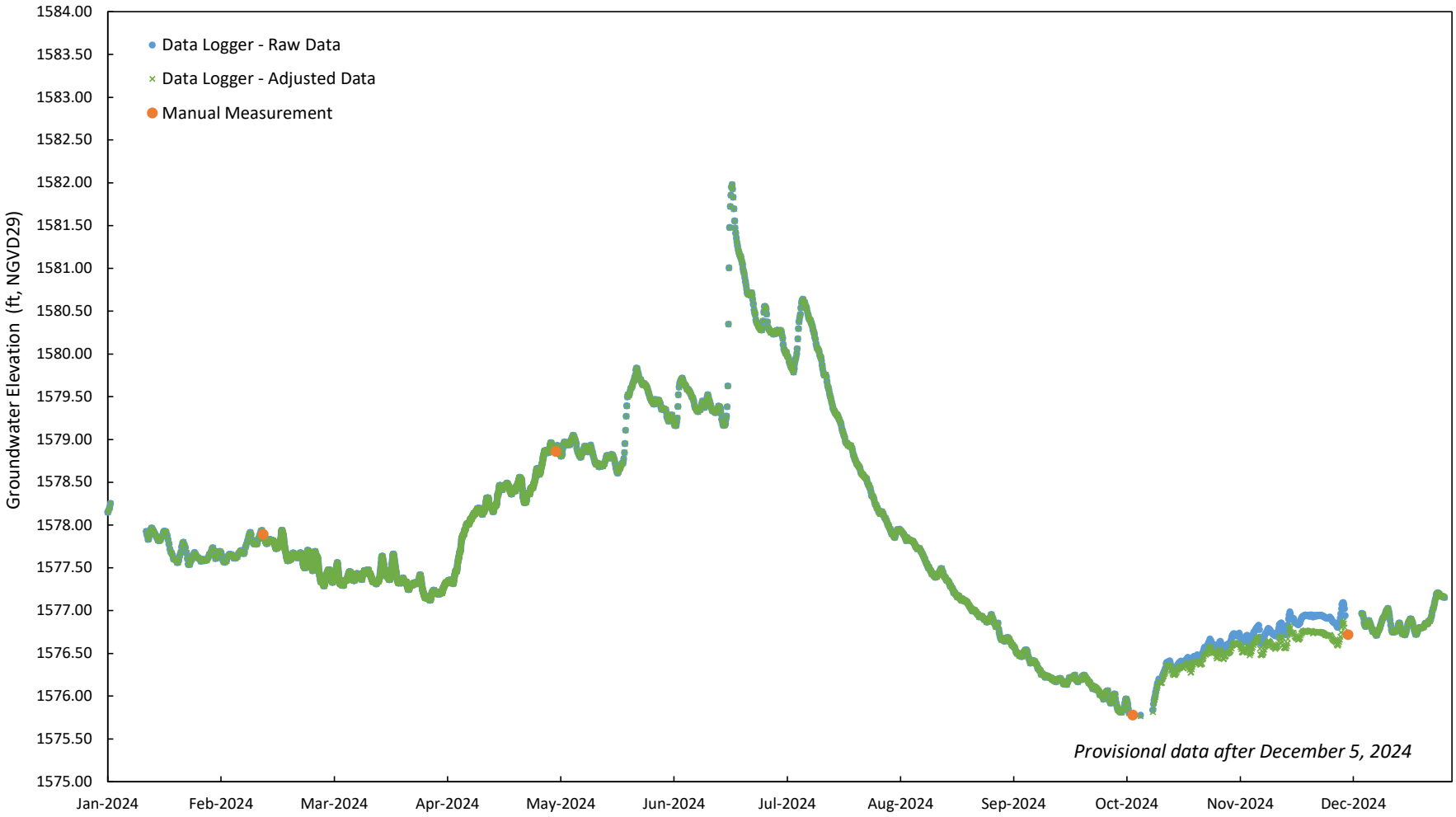

GW478
Groundwater Elevation (ft, NGVD29)
1608.00
1607.50
1607.00
1606.50
1606.00
1605.50
1605.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after November 27, 2024

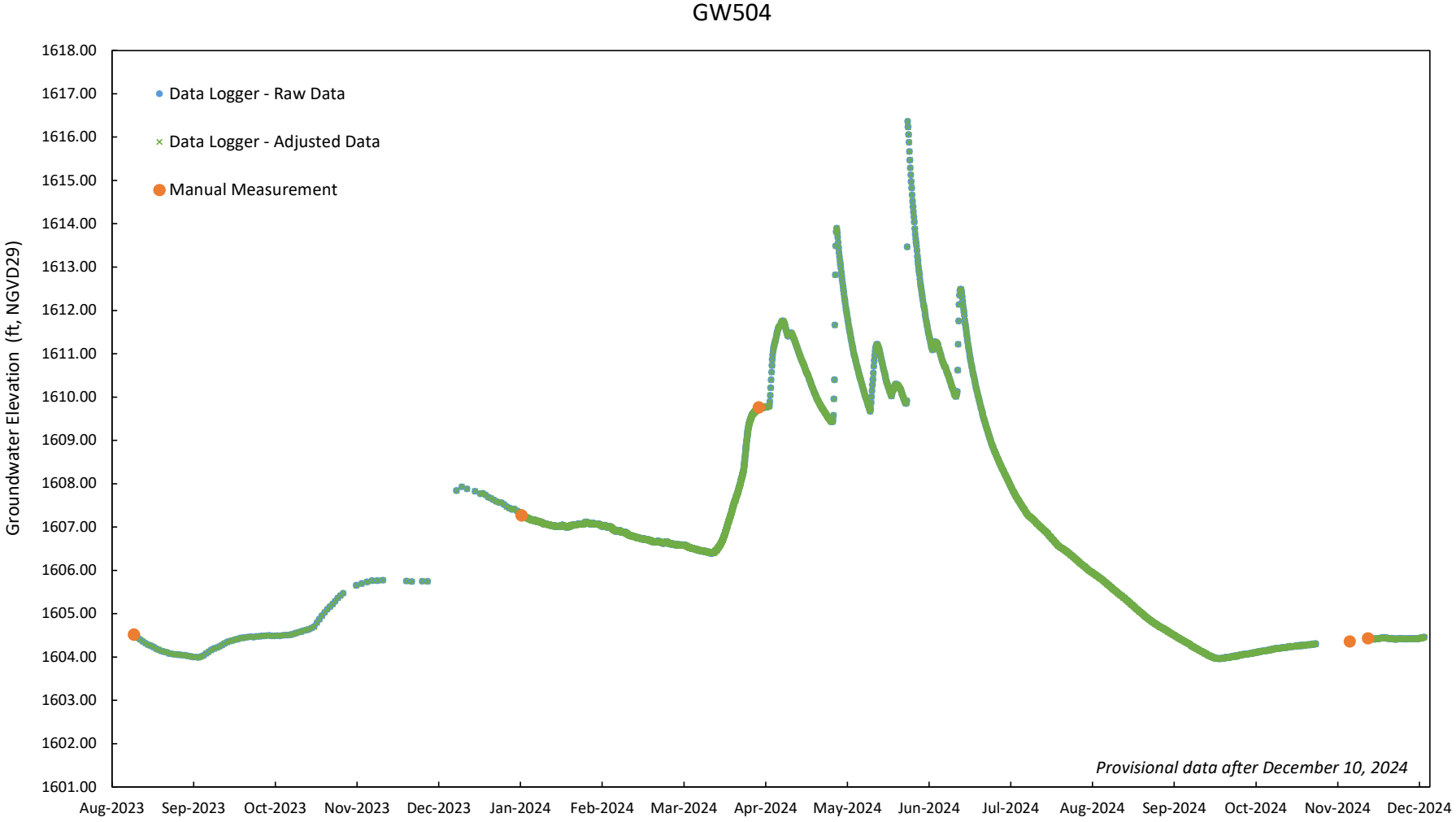

GW479
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1618.50
1618.00
1617.50
1617.00
1616.50
1616.00
1615.50
1615.00
1614.50
1614.00
1613.50
1613.00
1612.50
1612.00
1611.50
1611.00
1610.50
1610.00
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after November 27, 2024

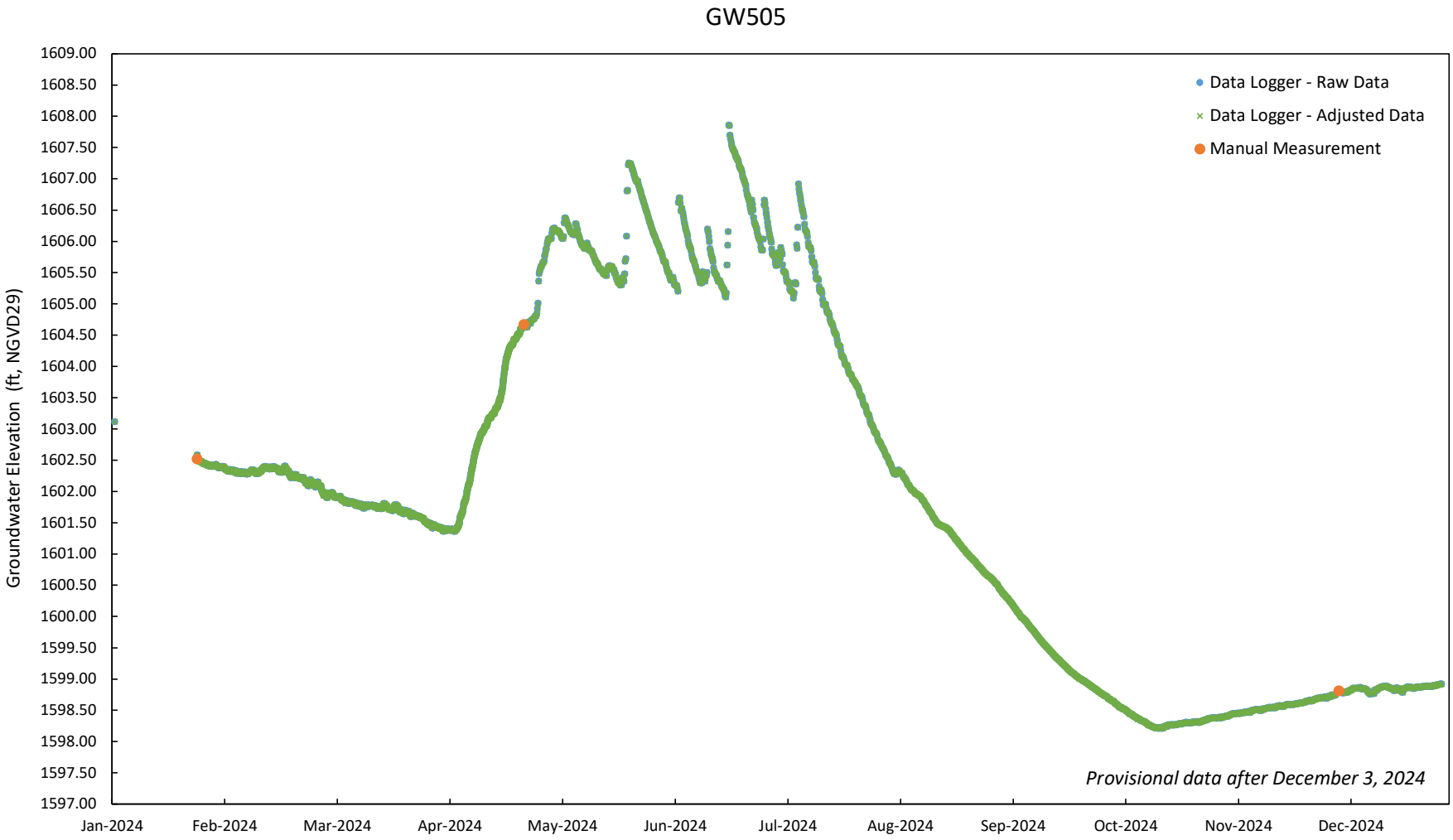

GW499
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

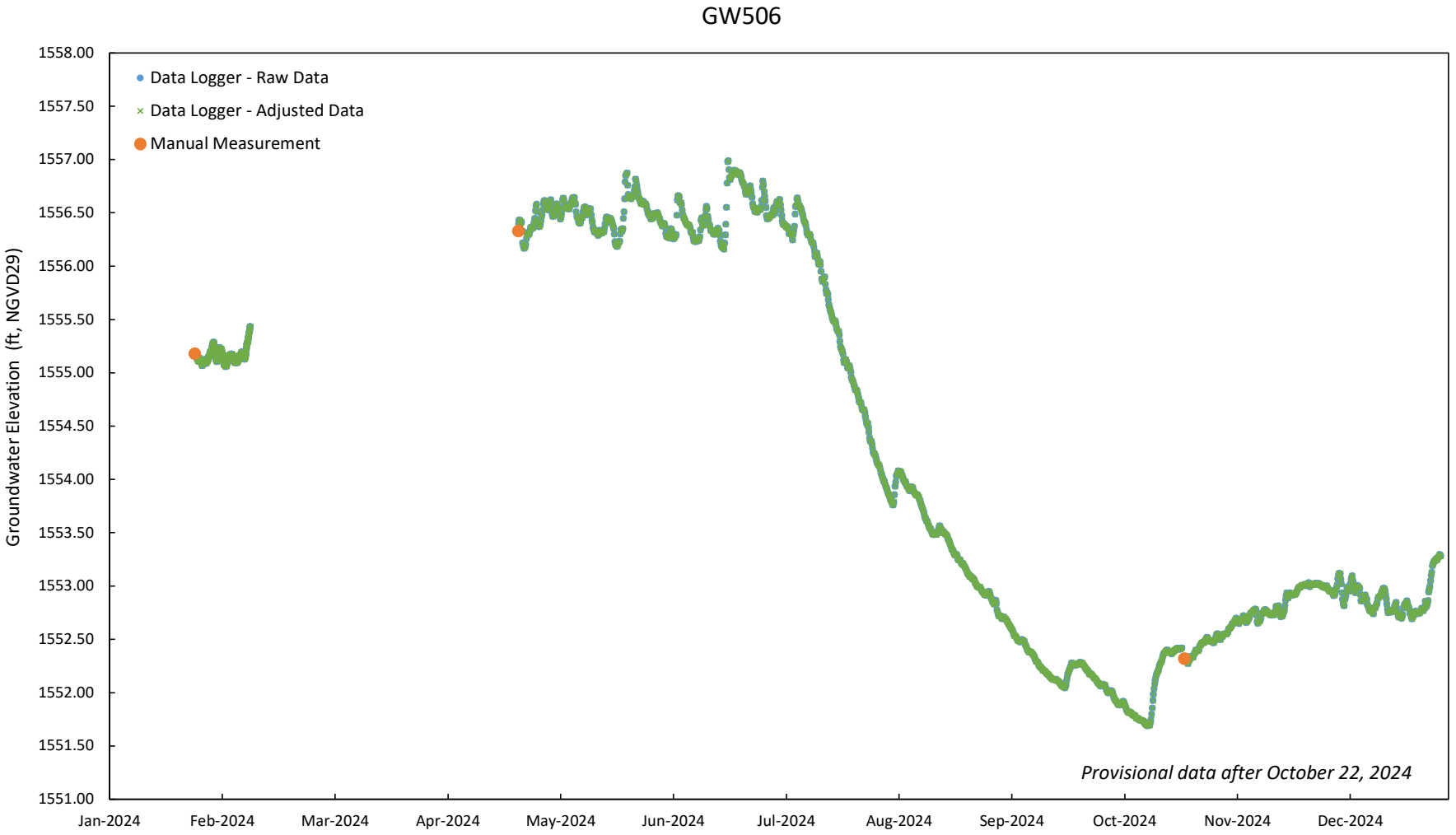

GW501
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1576.00
1575.50
1575.00
1574.50
1574.00
1573.50
1573.00
1572.50
1572.00
1571.50
1571.00
1570.50
1570.00
1569.50
1569.00
1568.50
1568.00
1567.50
1567.00
1566.50
1566.00
1565.50
1565.00
1564.50
1564.00
1563.50
1563.00
1562.50
1562.00
1561.50
1561.00
1560.50
1560.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after October 22, 2024

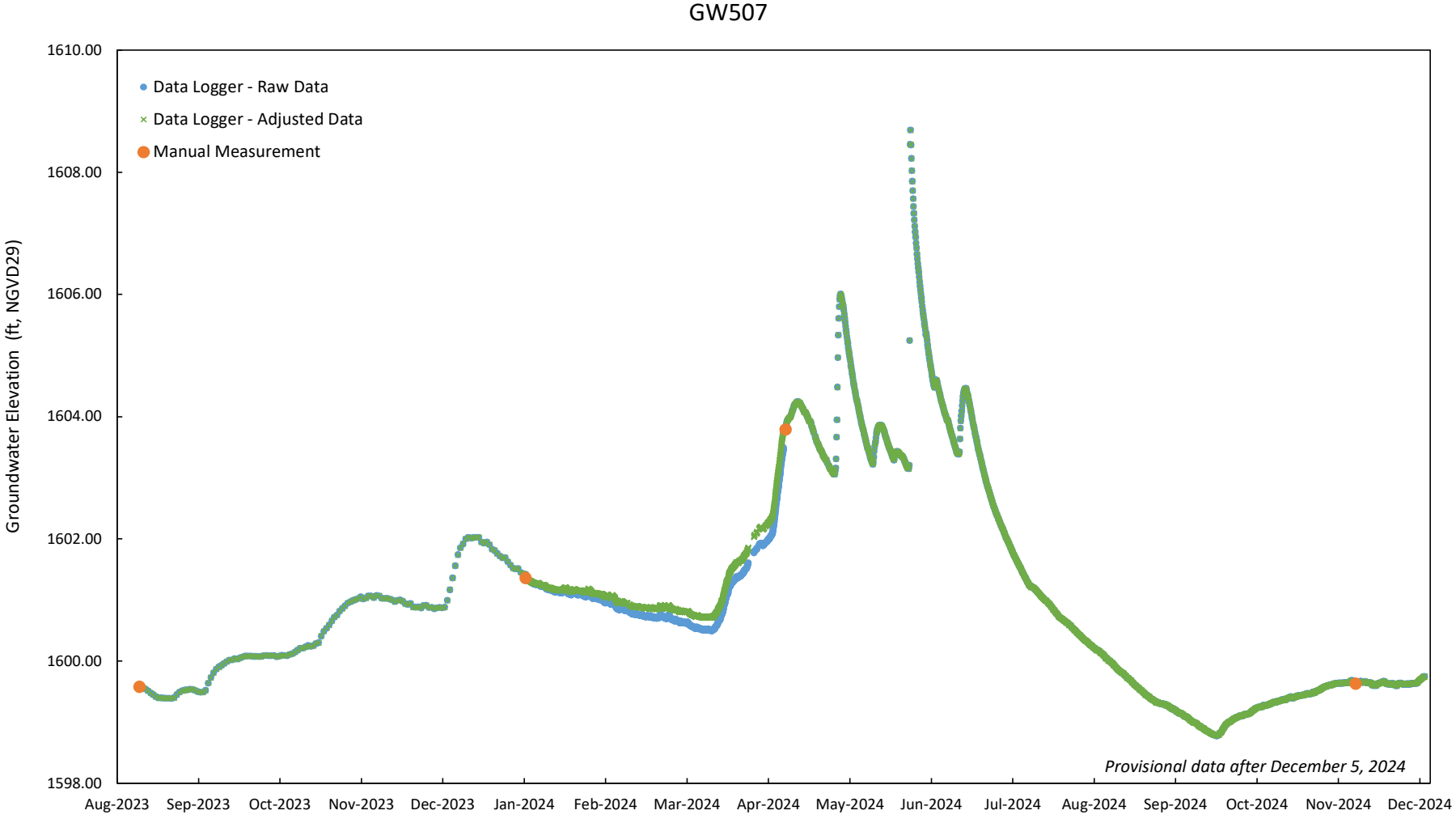
GW502

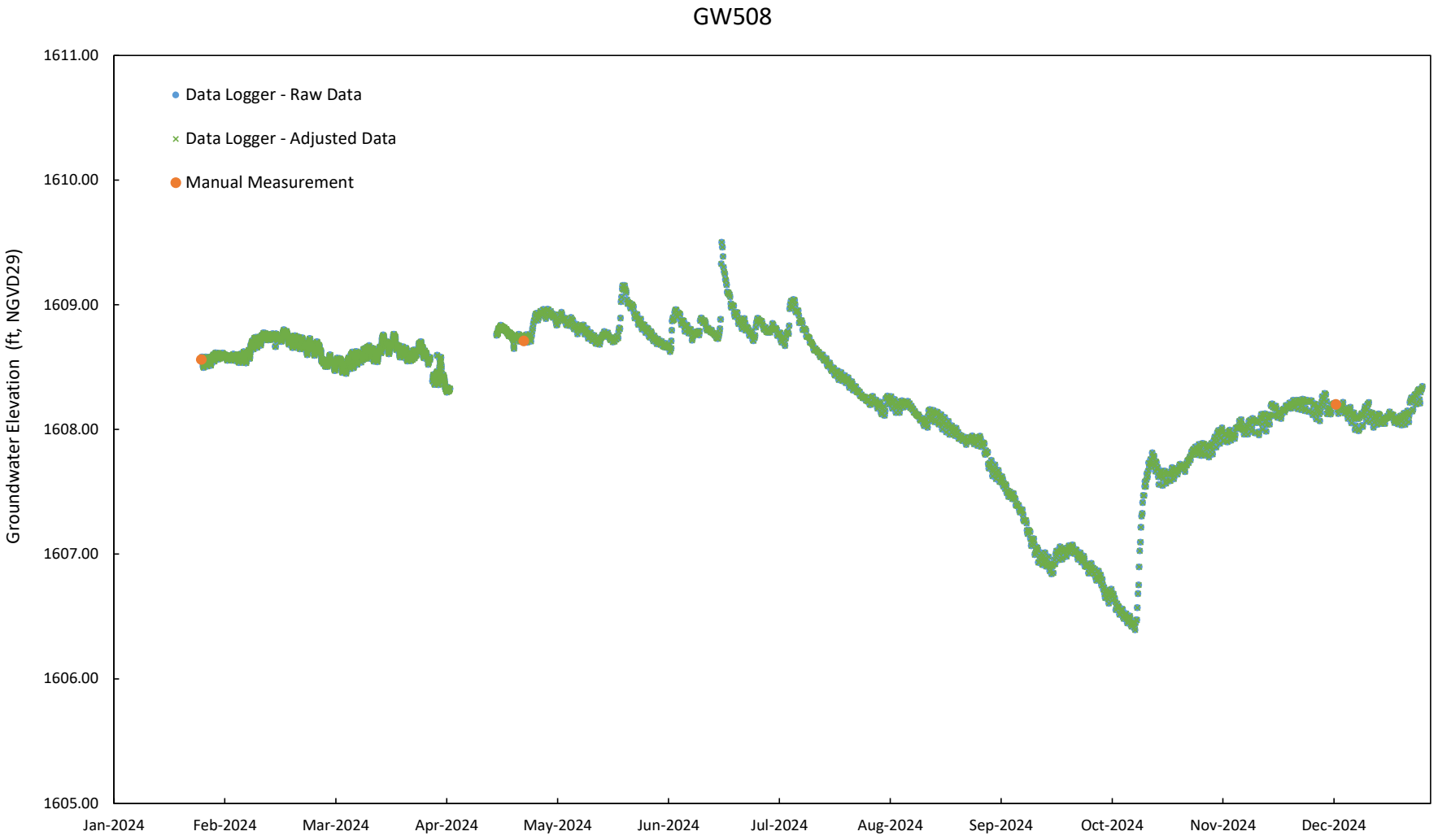

Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1584.00
1583.50
1583.00
1582.50
1582.00
1581.50
1581.00
1580.50
1580.00
1579.50
1579.00
1578.50
1578.00
1577.50
1577.00
1576.50
1576.00
1575.50
1575.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 5, 2024

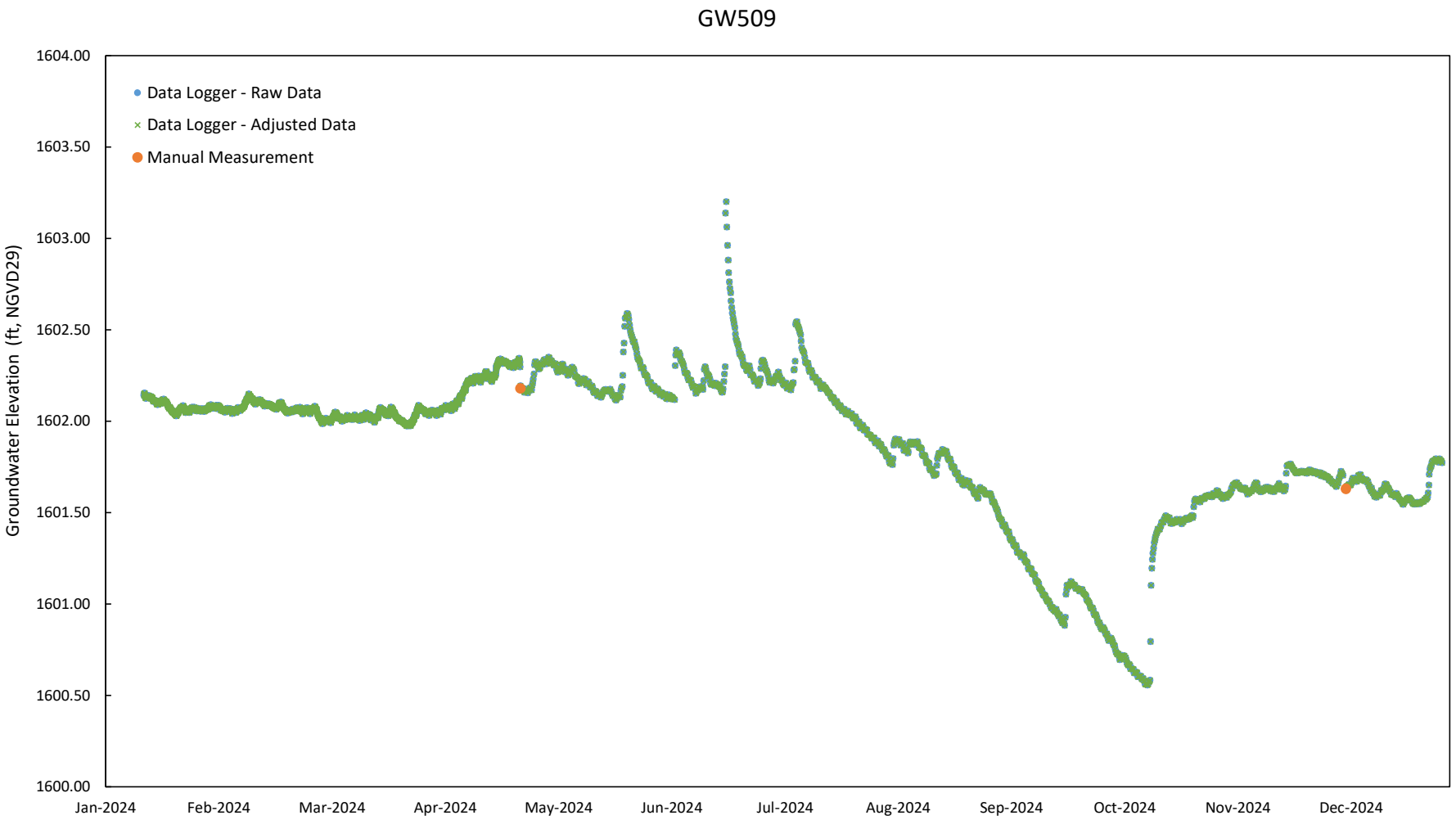

GW504
Groundwater Elevation (ft, NGVD29)
1618.00
1617.00
1616.00
1615.00
1614.00
1613.00
1612.00
1611.00
1610.00
1609.00
1608.00
1607.00
1606.00
1605.00
1604.00
1603.00
1602.00
1601.00
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after December 10, 2024
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

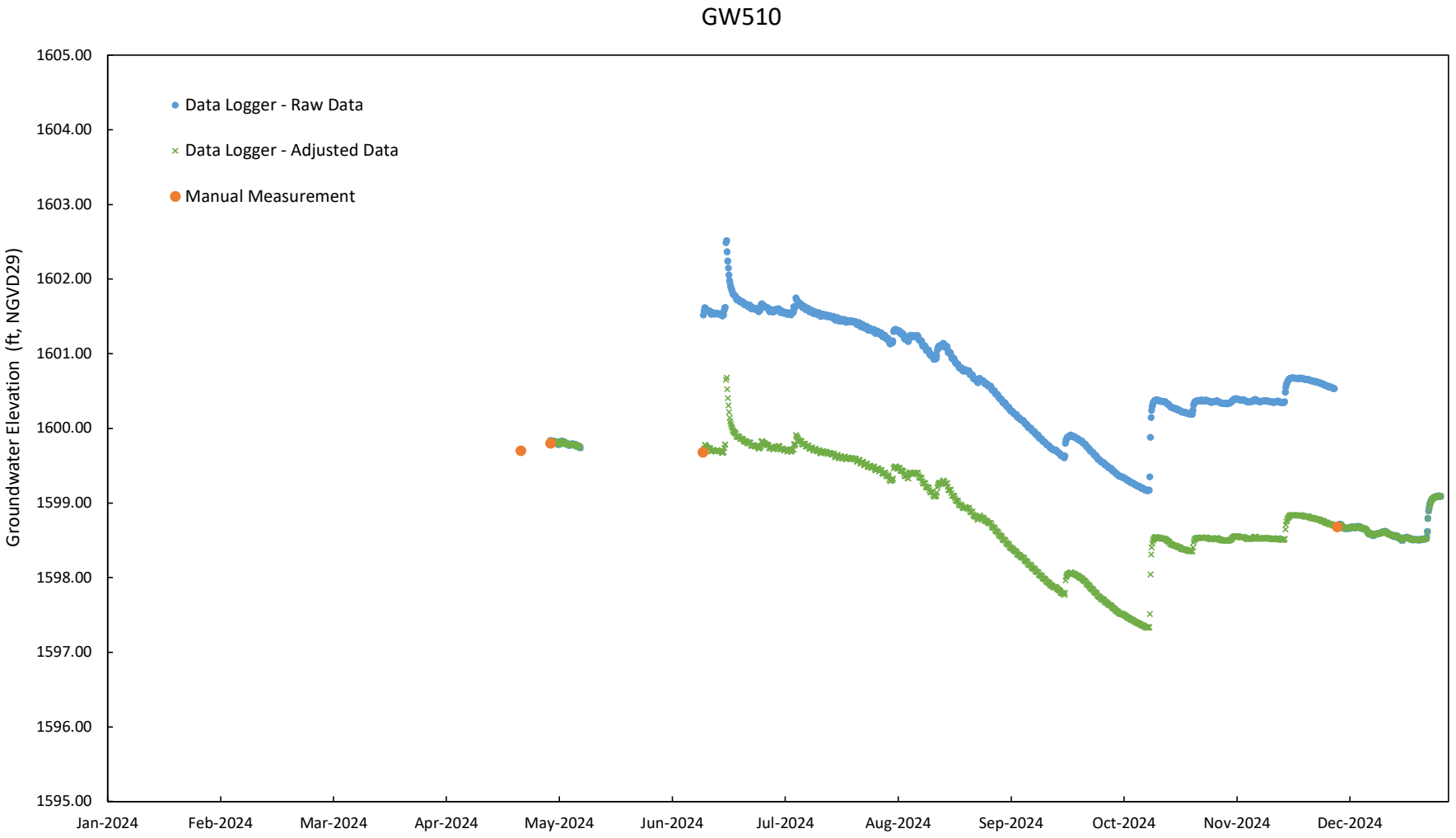

GW505
Groundwater Elevation (ft, NGVD29)
1609.00
1608.50
1608.00
1607.50
1607.00
1606.50
1606.00
1605.50
1605.00
1604.50
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
1599.50
1599.00
1598.50
1598.00
1597.50
1597.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after December 3, 2024

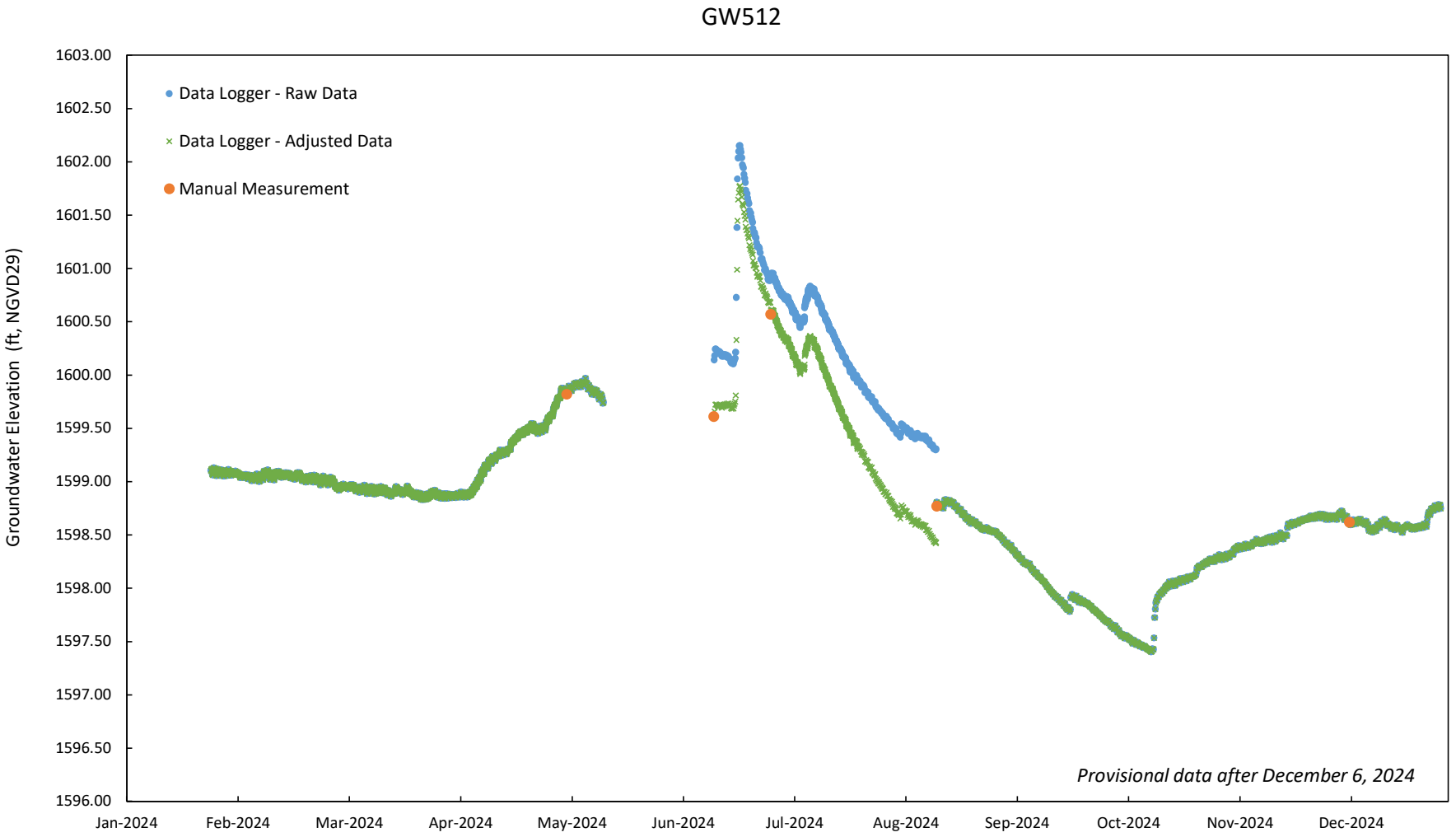

GW506
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1558.00
1557.50
1557.00
1556.50
1556.00
1555.50
1555.00
1554.50
1554.00
1553.50
1553.00
1552.50
1552.00
1551.50
1551.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after October 22, 2024

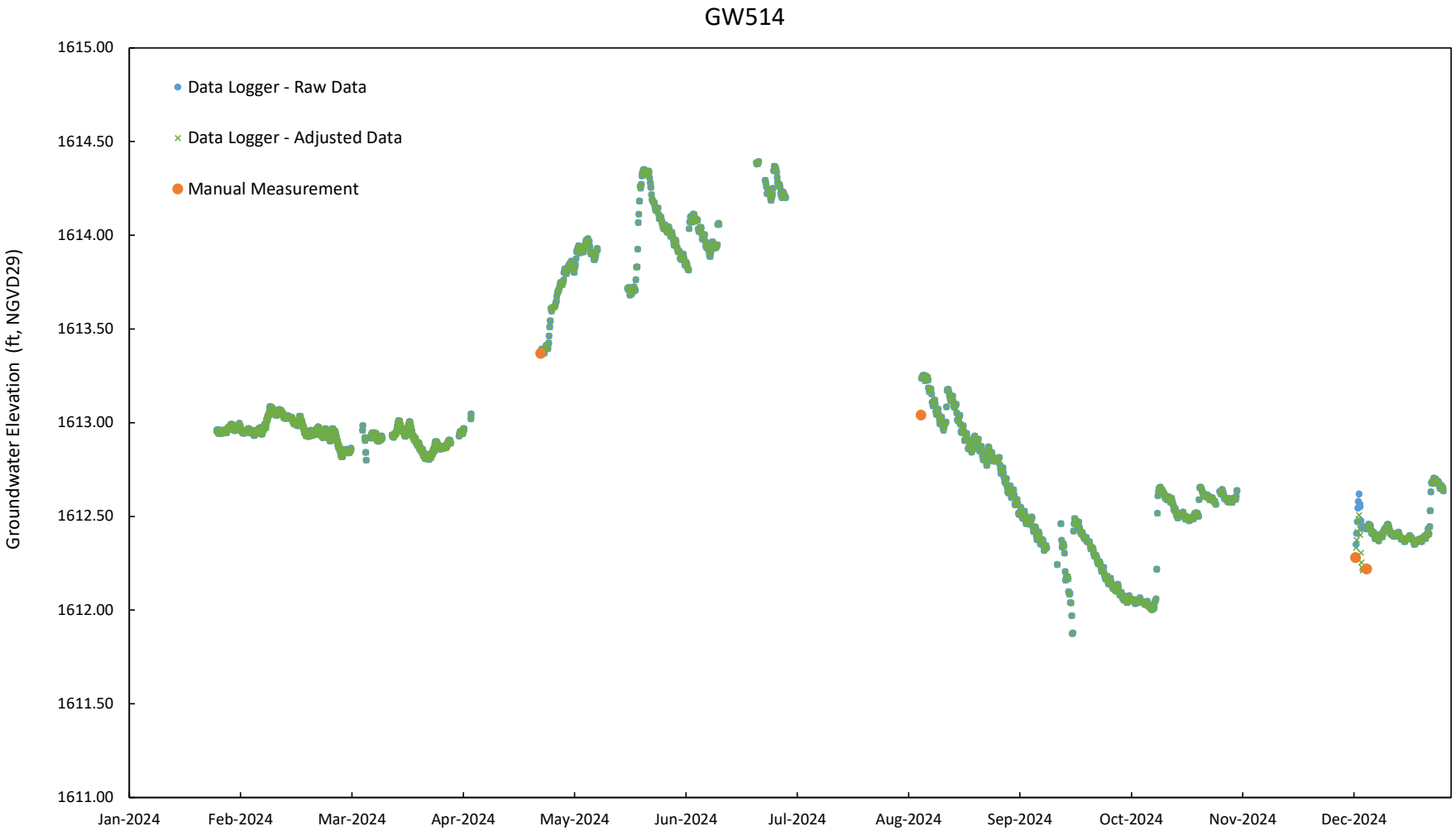

GW507
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1610.00
1608.00
1606.00
1604.00
1602.00
1600.00
1598.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 5, 2024

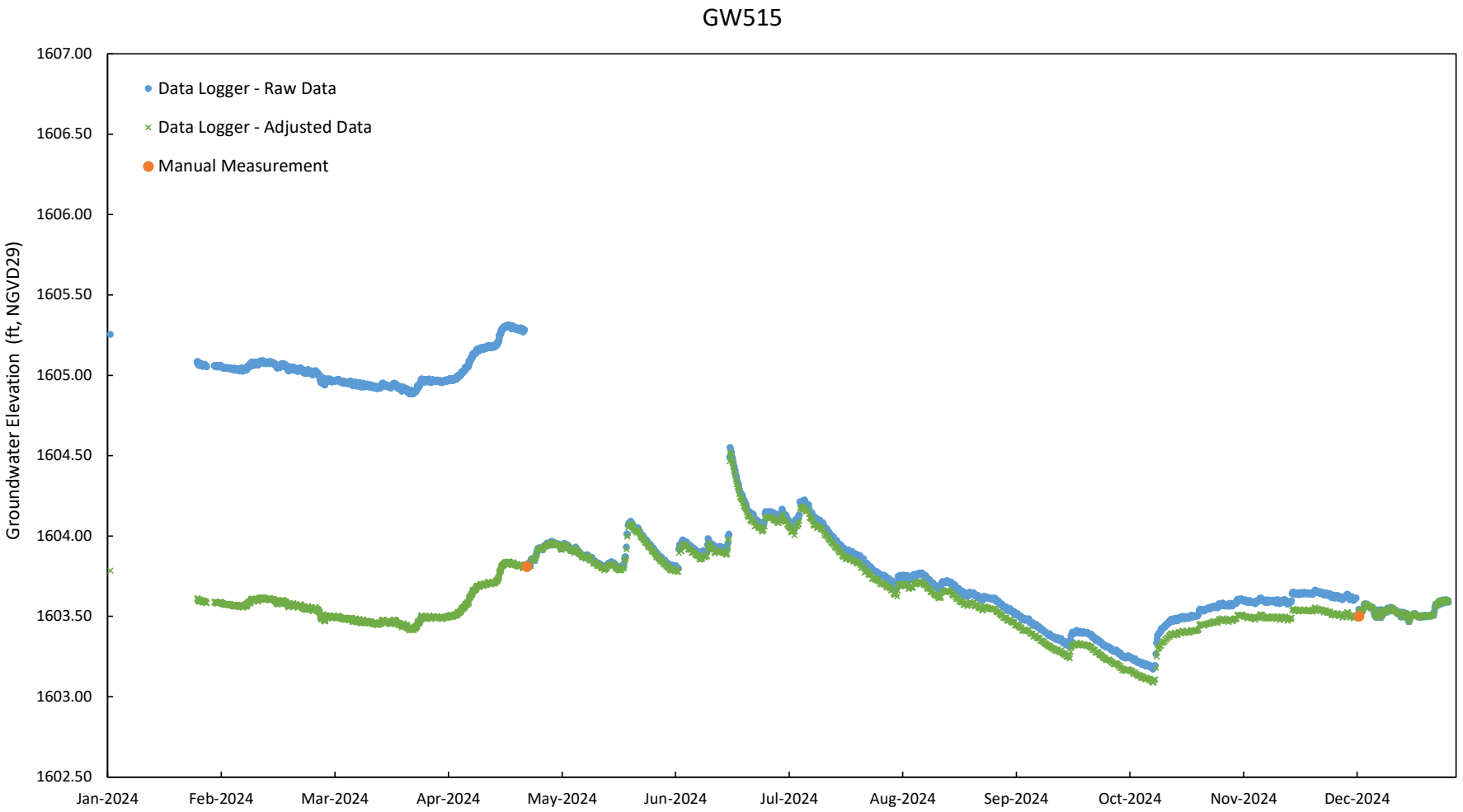

GW508
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1611.00
1610.00
1609.00
1608.00
1607.00
1606.00
1605.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

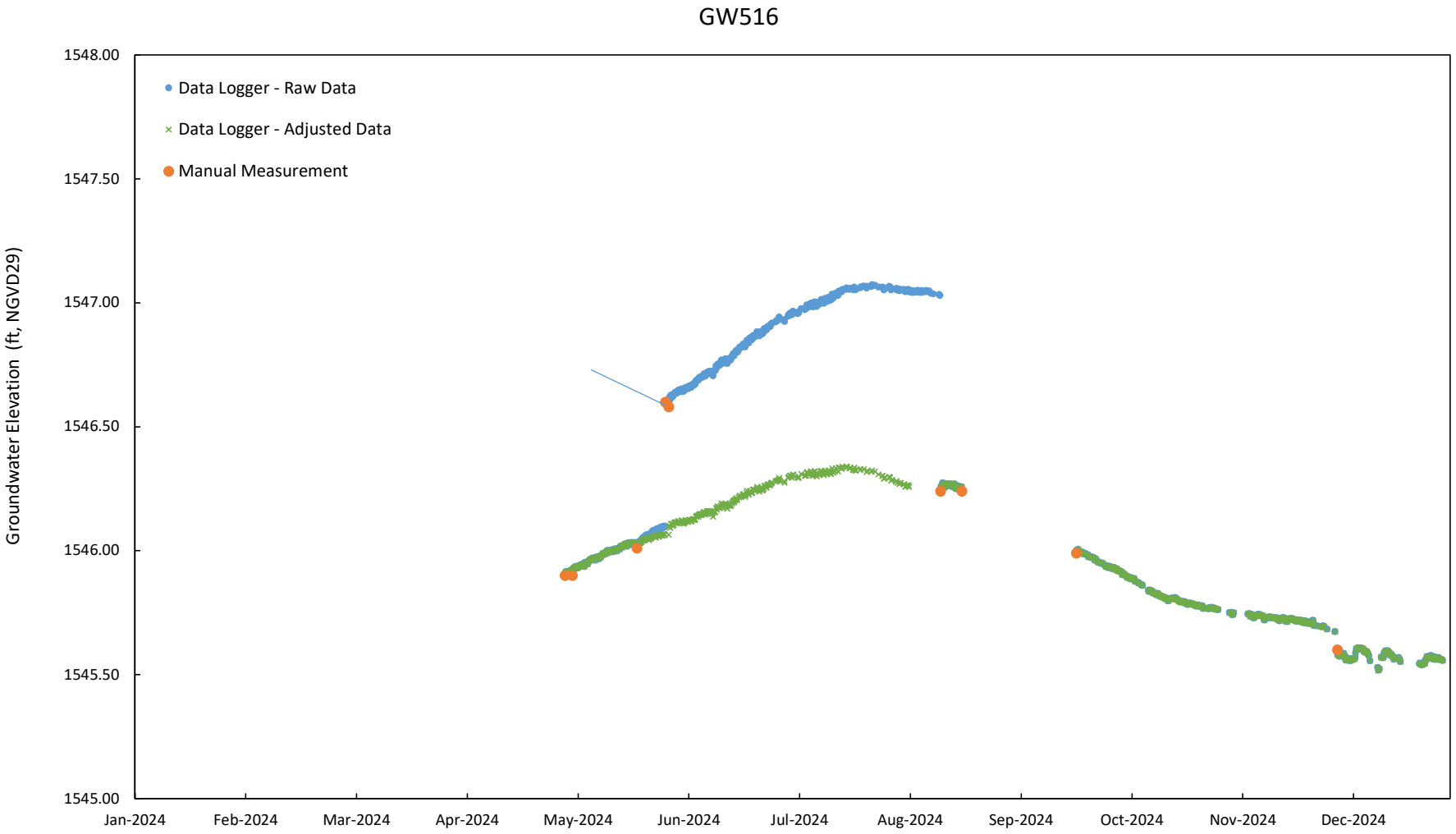

GW509
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

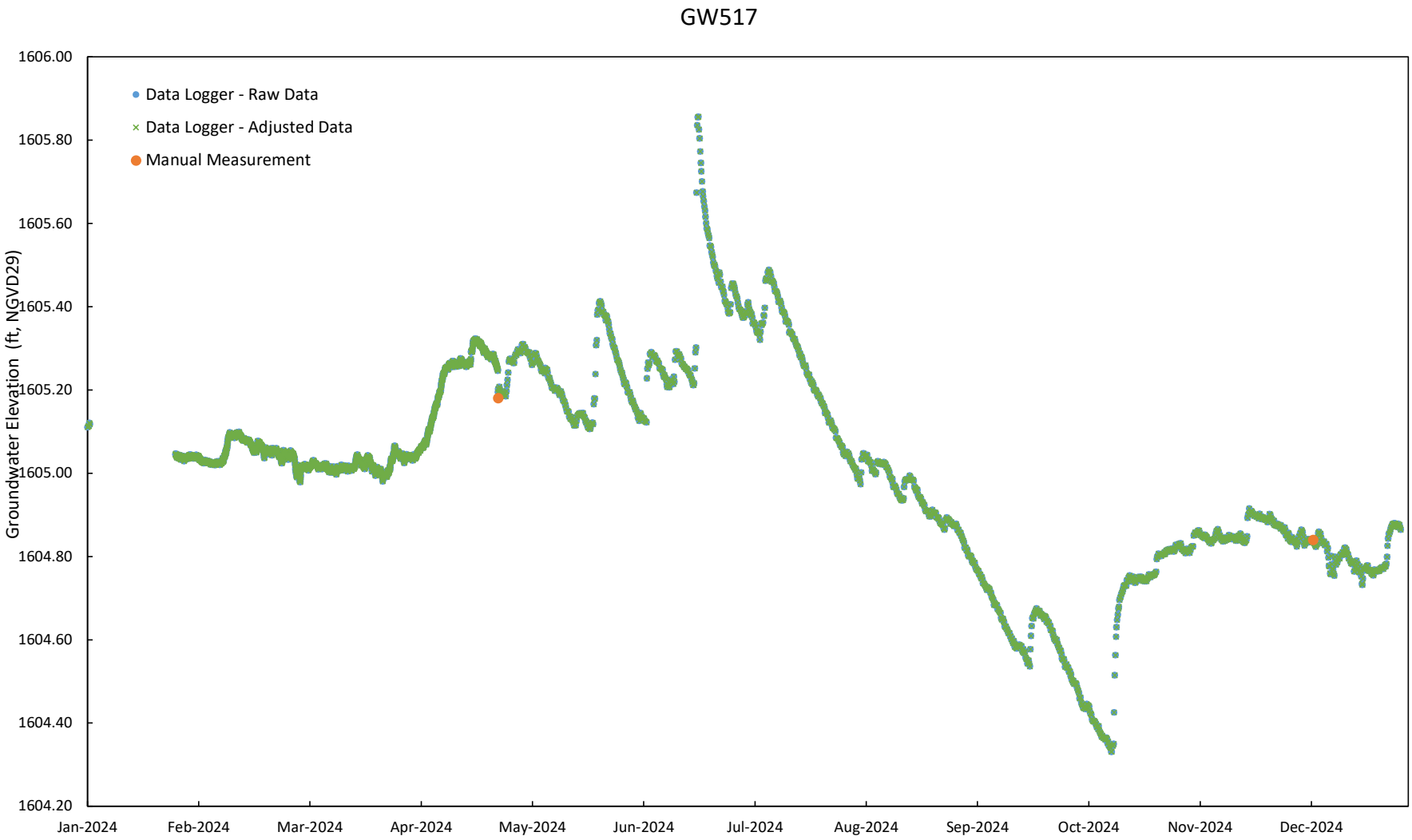

GW510
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1605.00
1604.00
1603.00
1602.00
1601.00
1600.00
1599.00
1598.00
1597.00
1596.00
1595.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

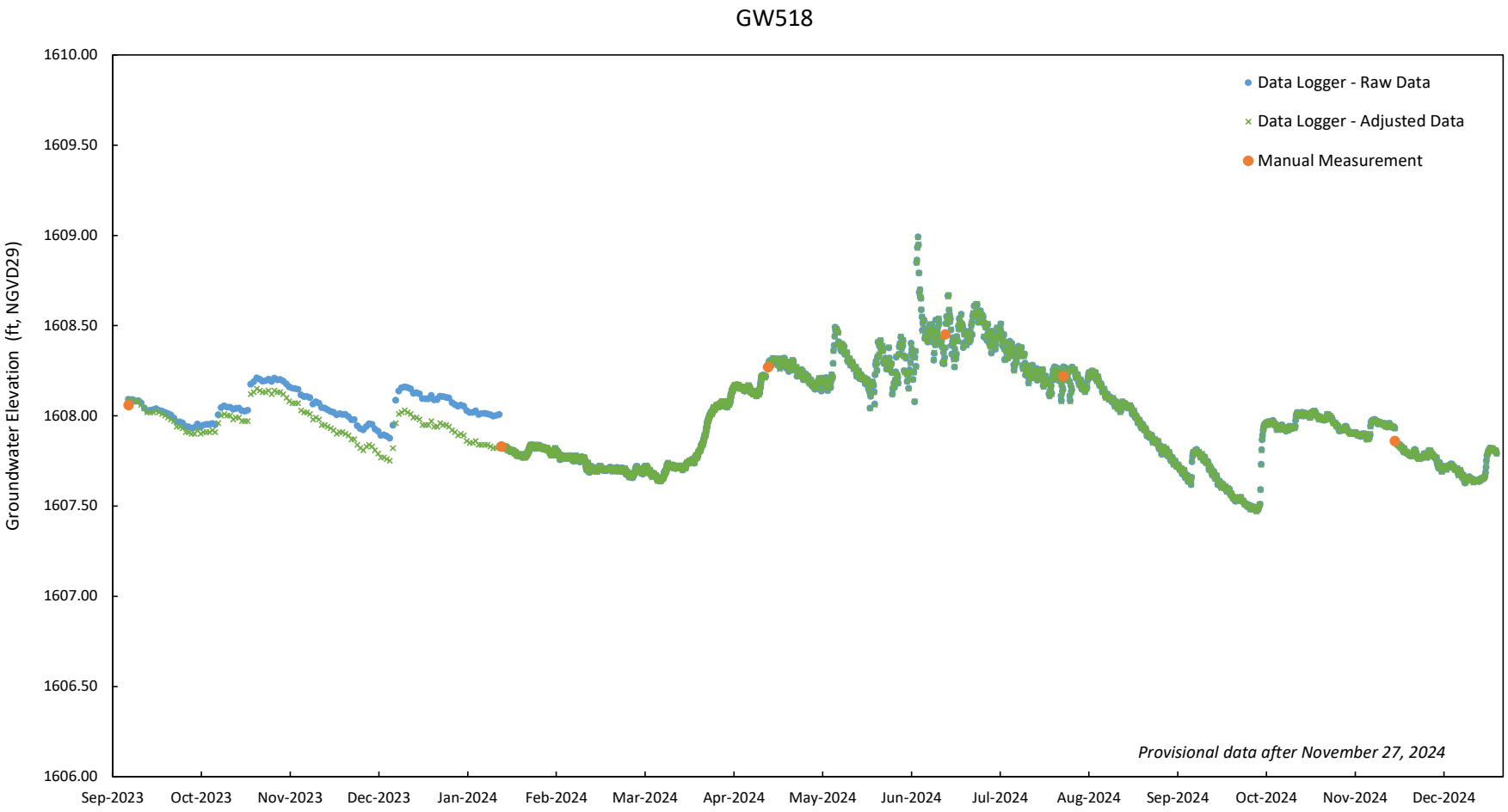

GW512
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
1599.50
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 6, 2024

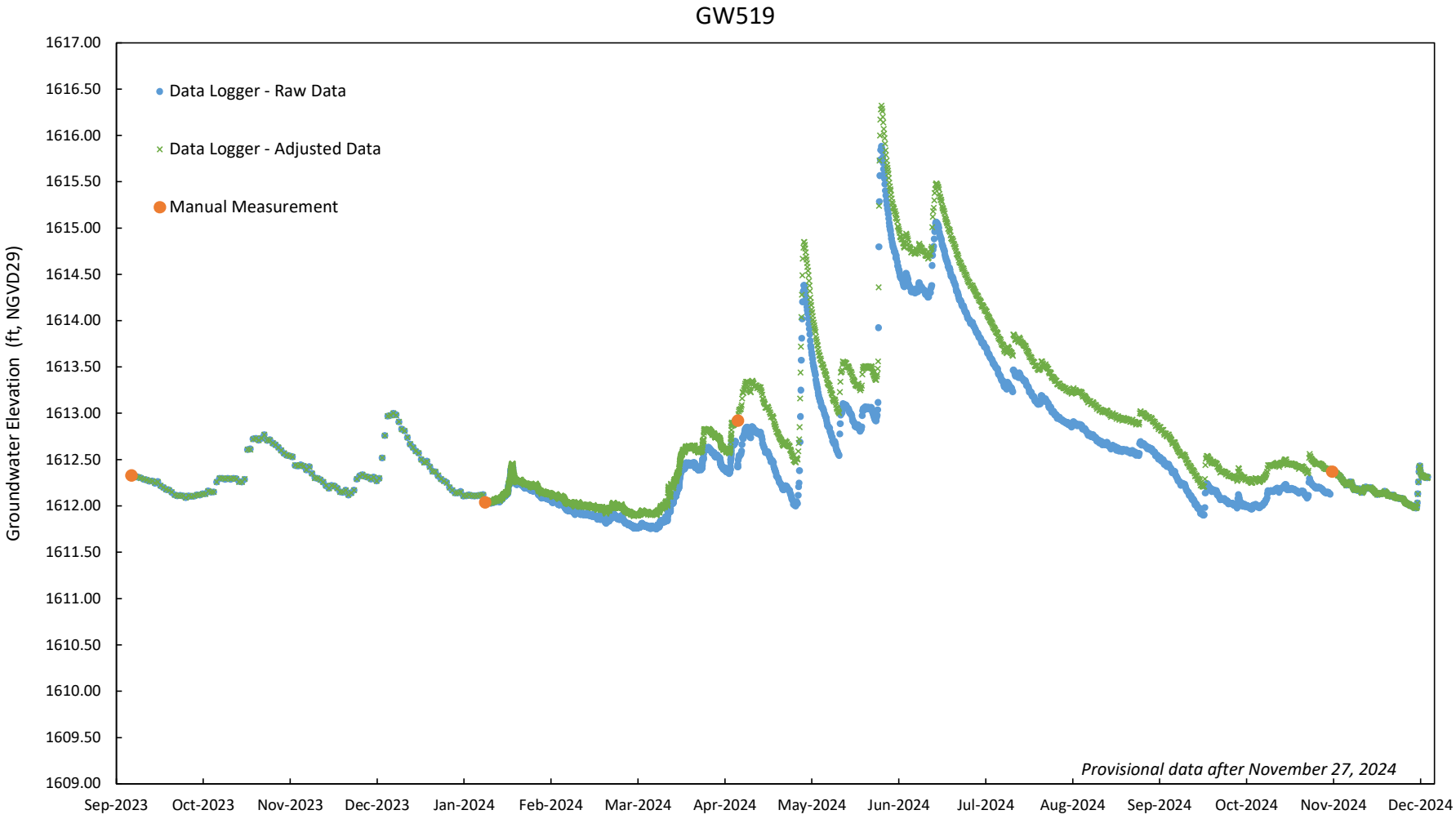

GW514
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1615.00
1614.50
1614.00
1613.50
1613.00
1612.50
1612.00
1611.50
1611.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

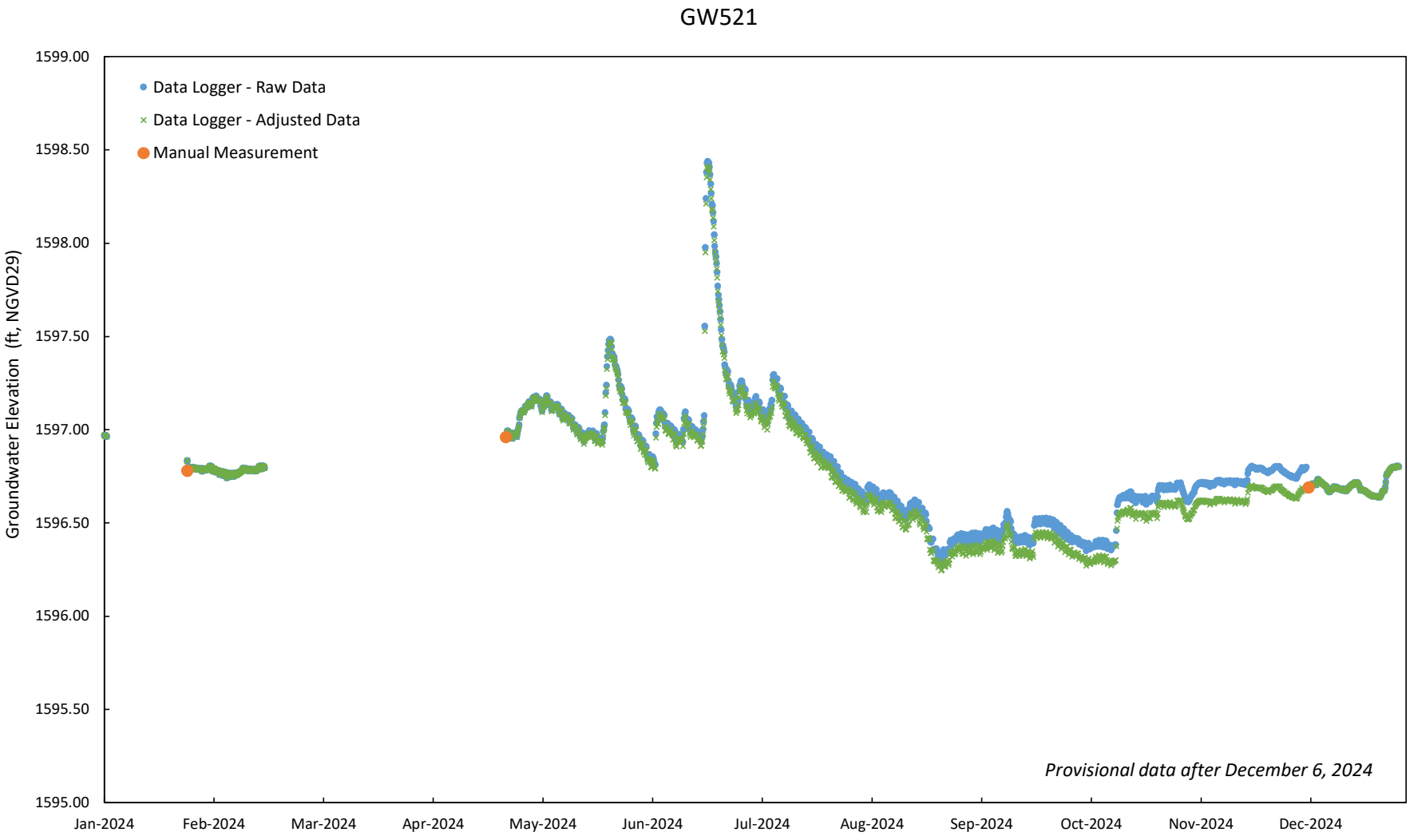

GW515
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1607.00
1606.50
1606.00
1605.50
1605.00
1604.50
1604.00
1603.50
1603.00
1602.50
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

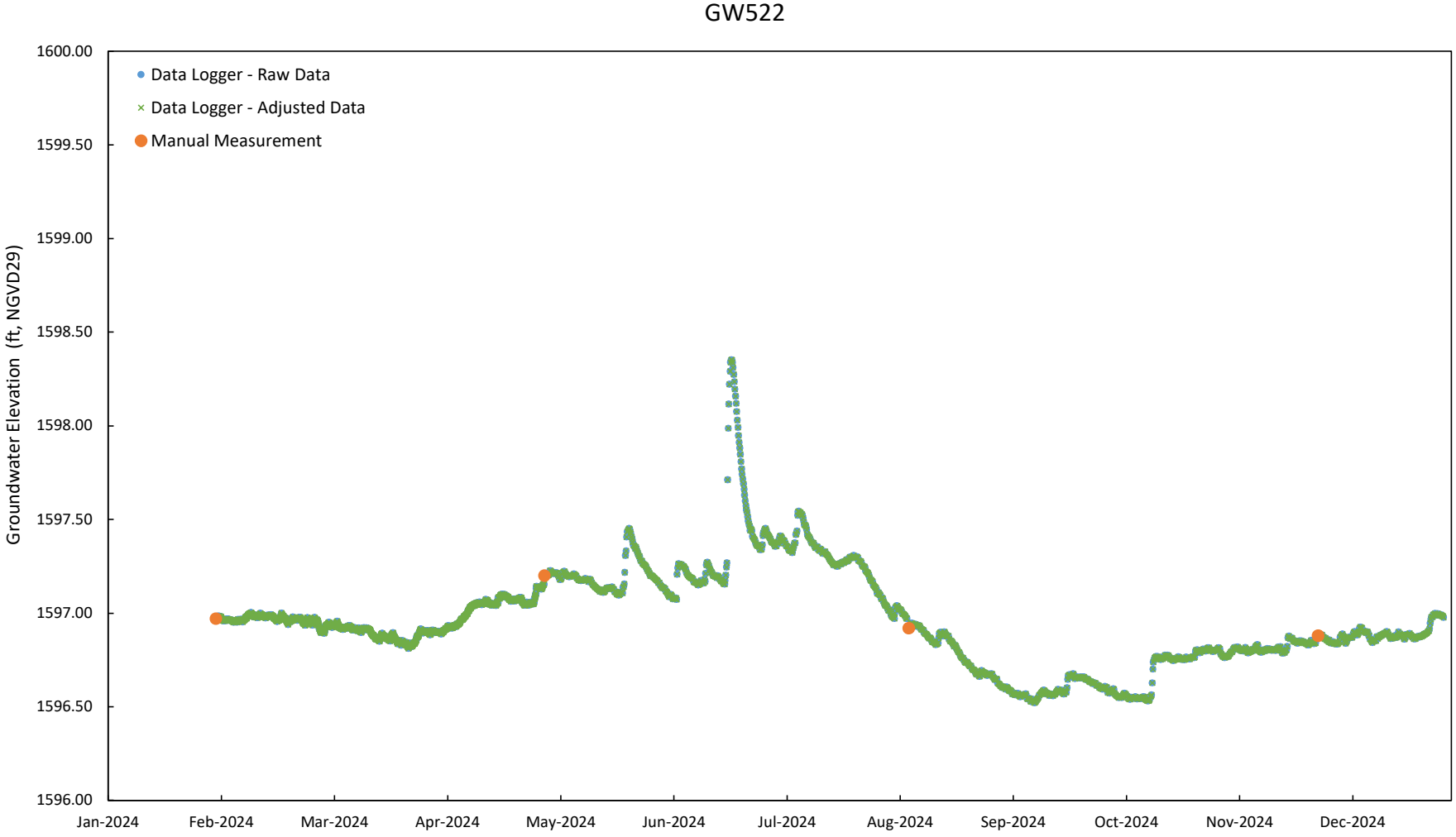

GW516
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1548.00
1547.50
1547.00
1546.50
1546.00
1545.50
1545.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

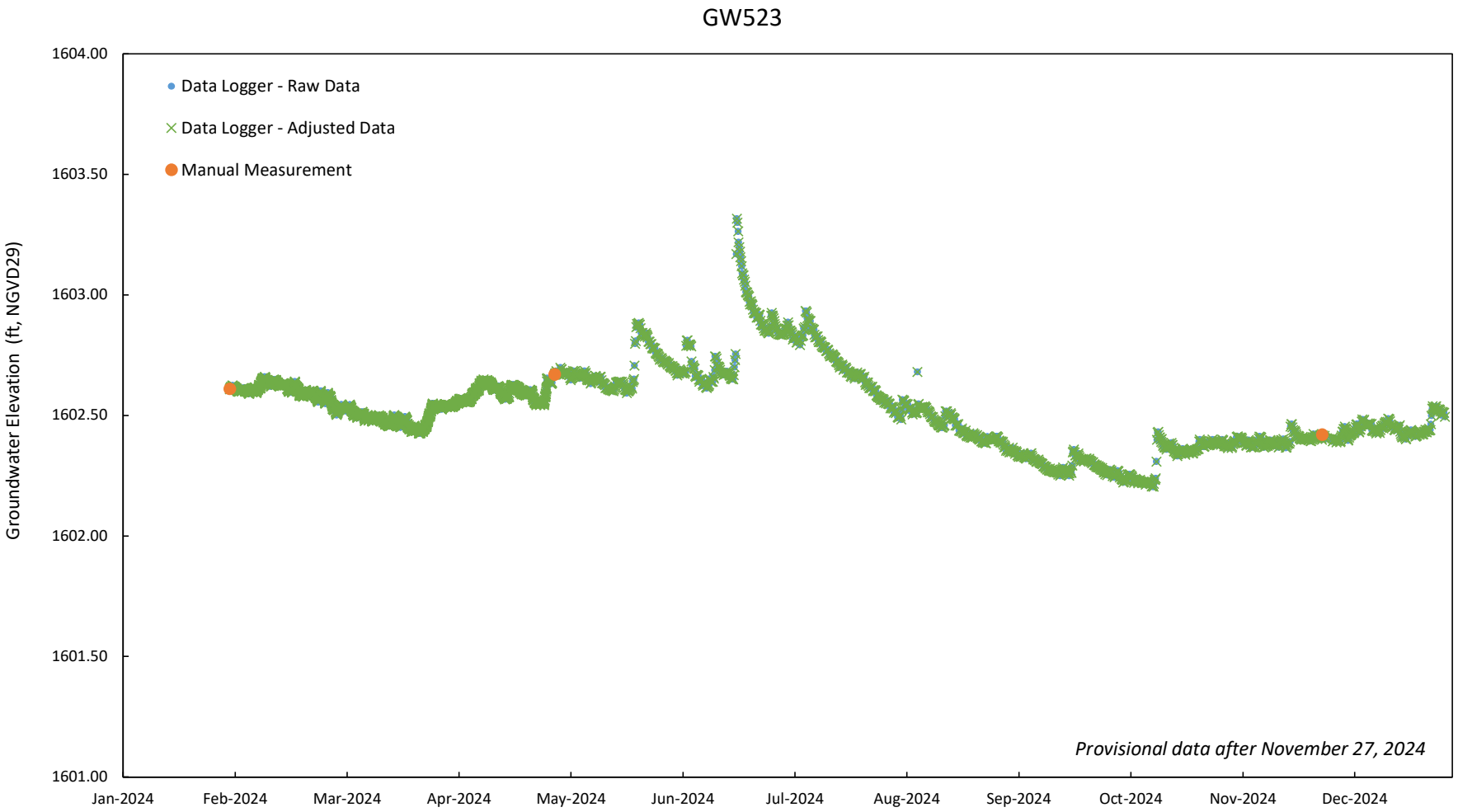

GW517
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1606.00
1605.80
1605.60
1605.40
1605.20
1605.00
1604.80
1604.60
1604.40
1604.20
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

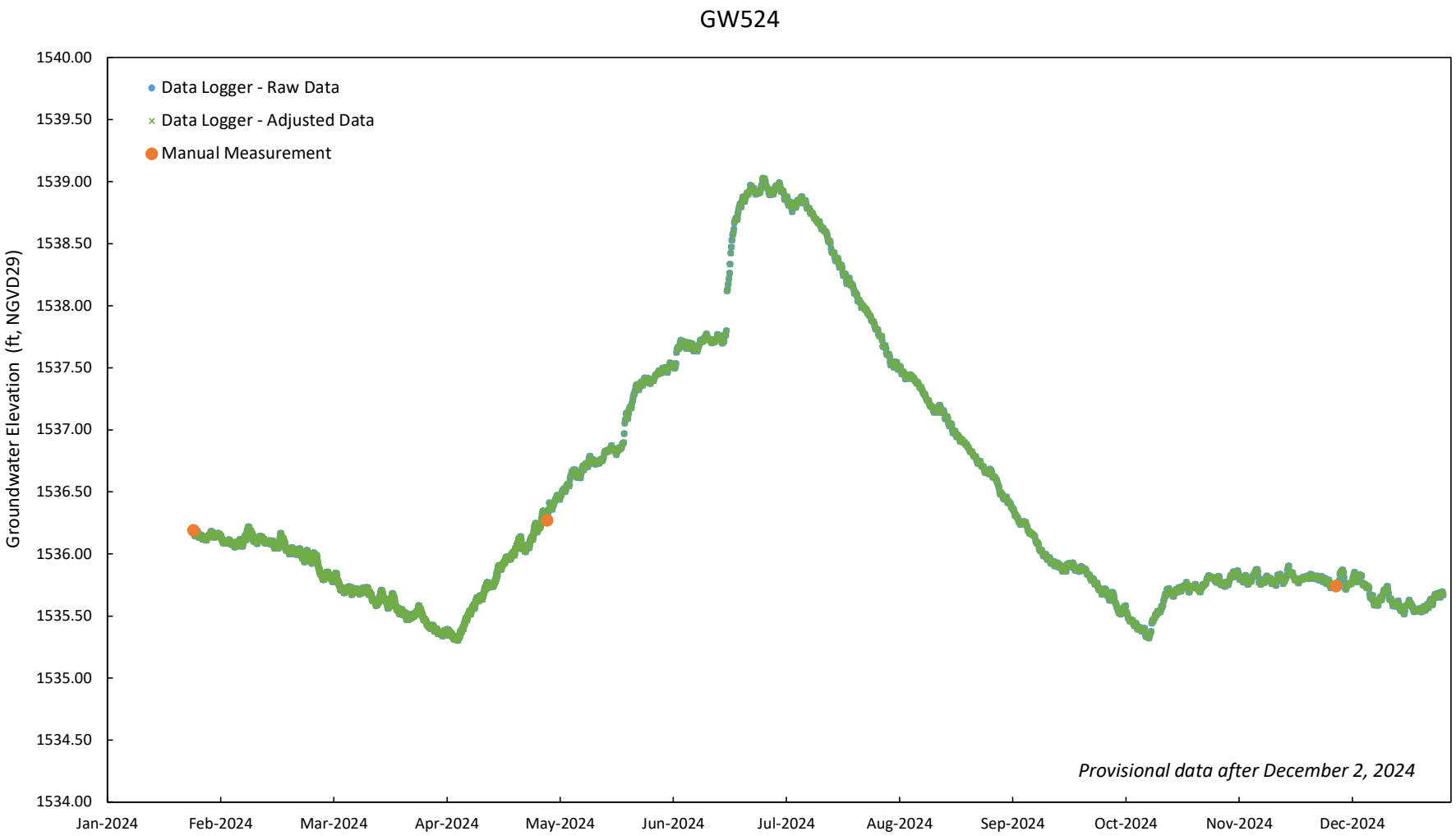

GW518
Groundwater Elevation (ft, NGVD29)
1610.00
1609.50
1609.00
1608.50
1608.00
1607.50
1607.00
1606.50
1606.00
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Provisional data after November 27, 2024

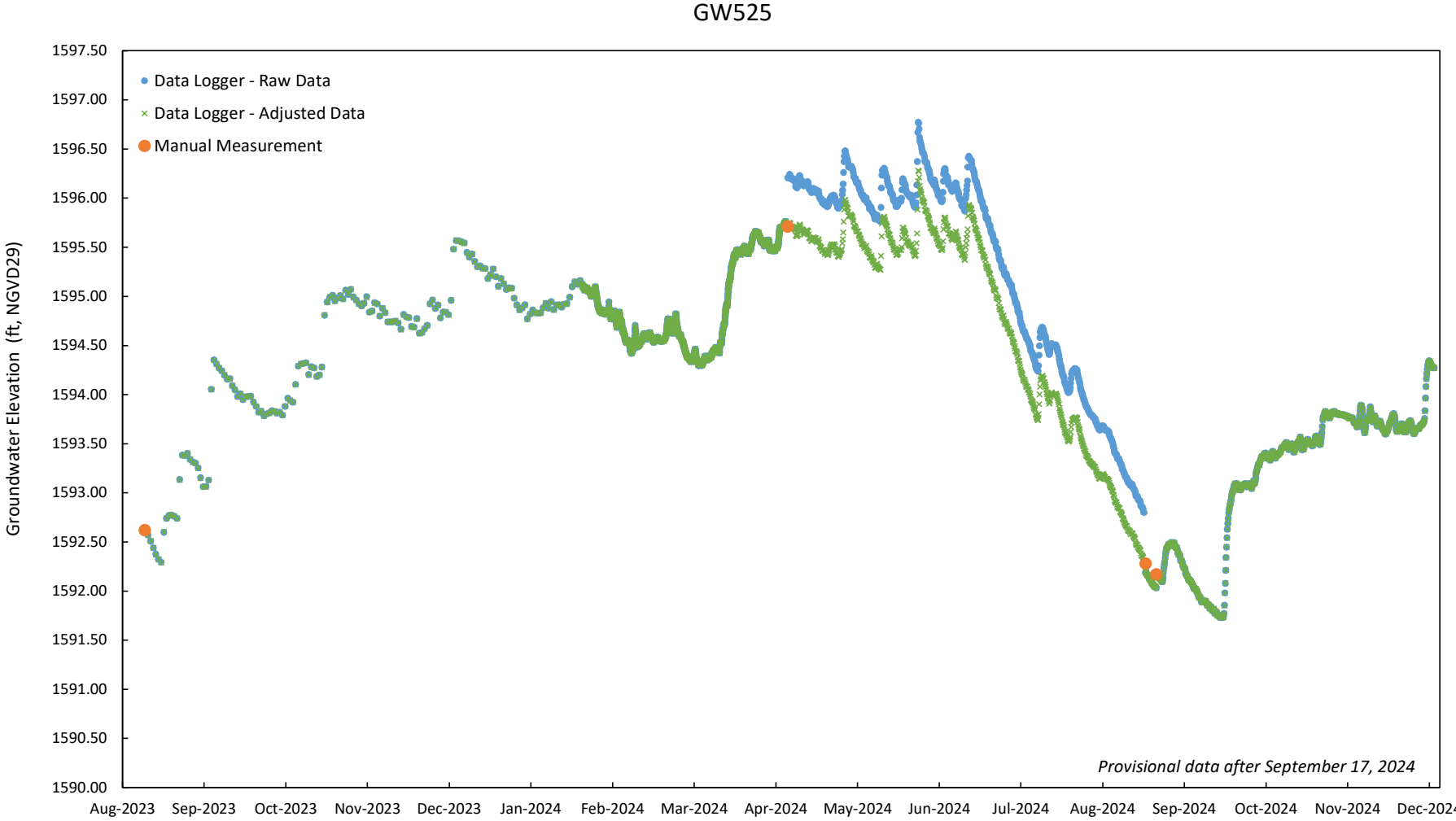

GW519
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1617.00
1616.50
1616.00
1615.50
1615.00
1614.50
1614.00
1613.50
1613.00
1612.50
1612.00
1611.50
1611.00
1610.50
1610.00
1609.50
1609.00
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after November 27, 2024

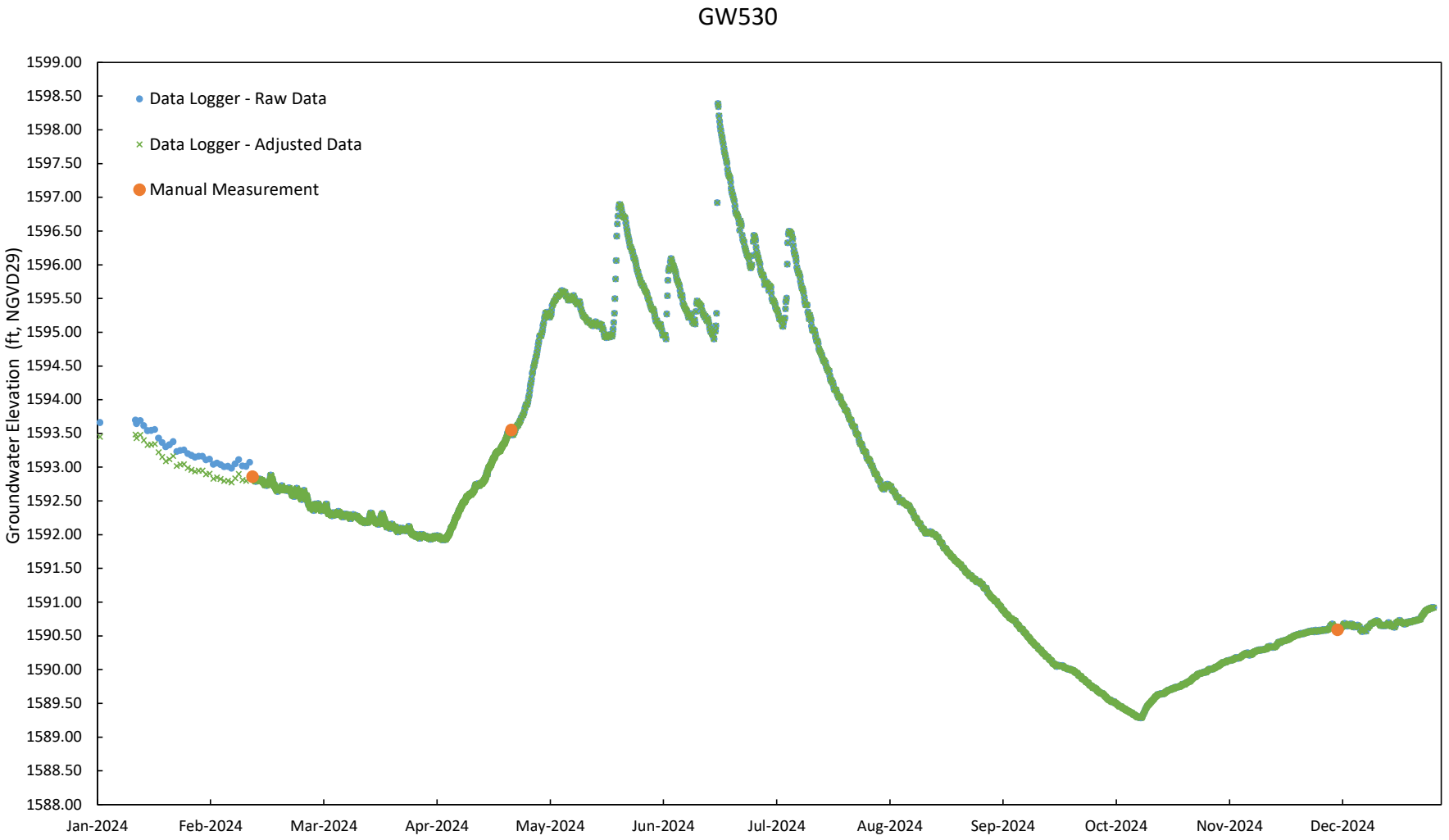

GW521
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
1595.50
1595.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 6, 2024


GW522
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1600.00
1599.50
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

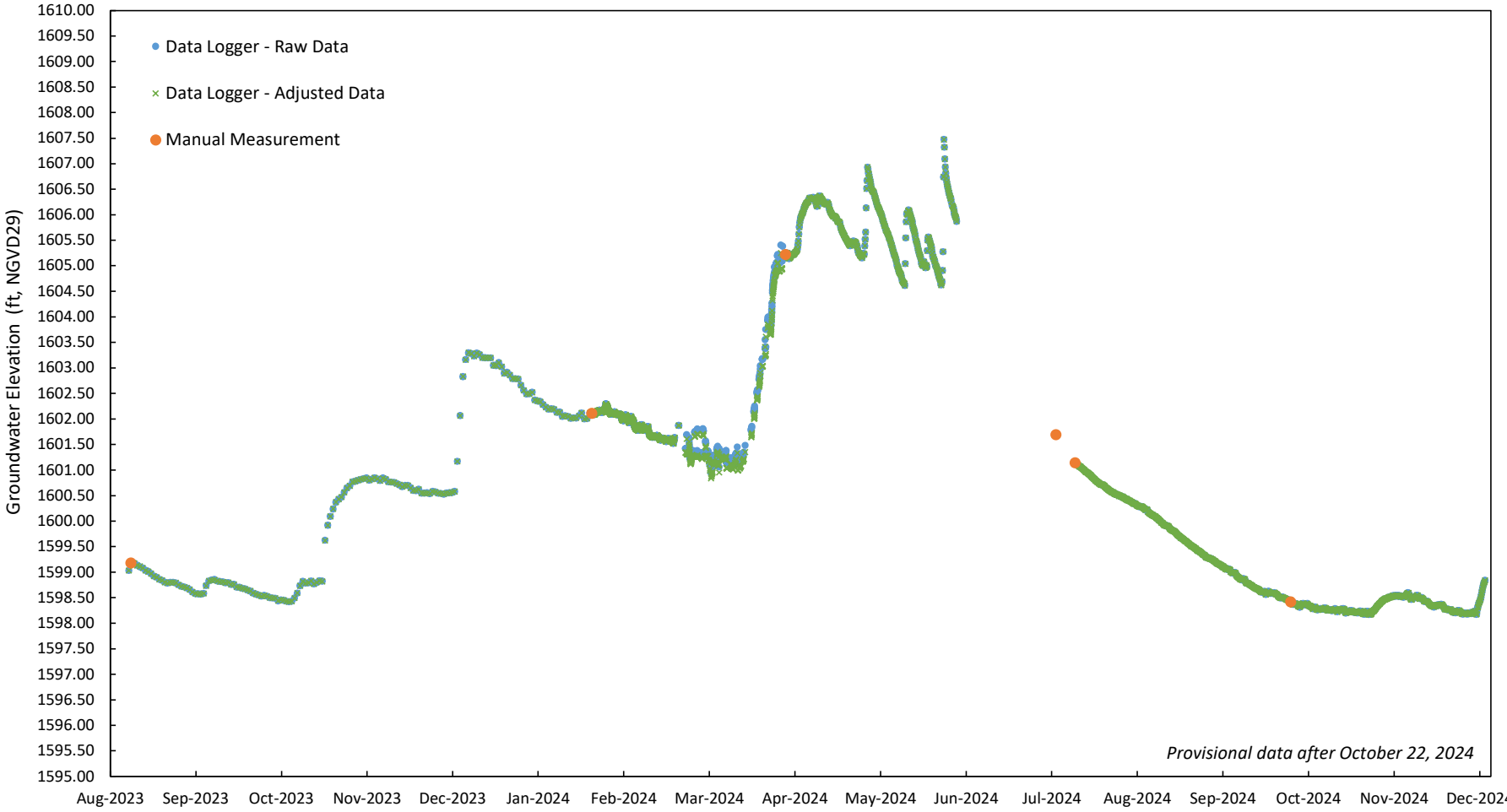

GW523
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after November 27, 2024

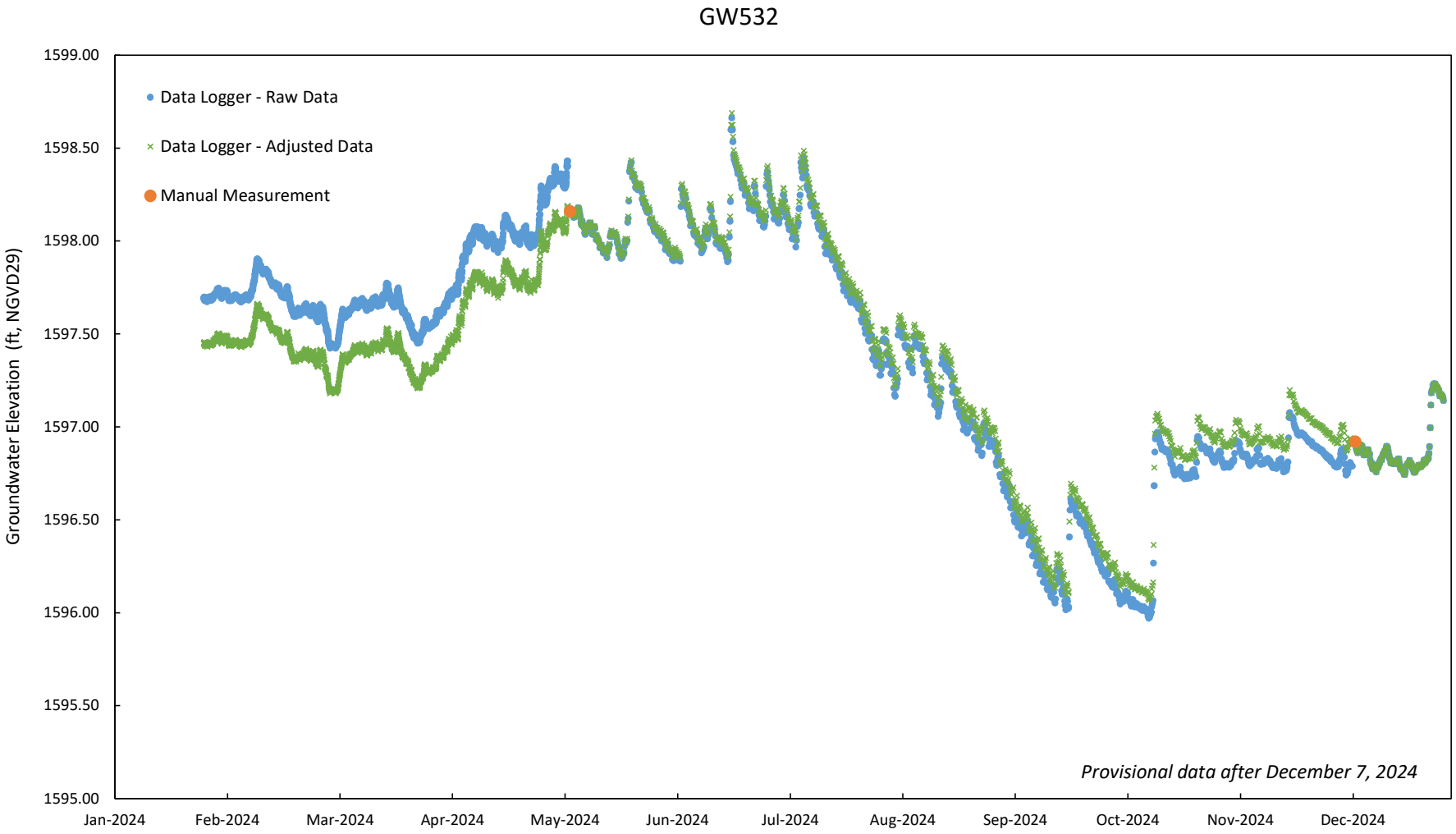

GW524
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1540.00
1539.50
1539.00
1538.50
1538.00
1537.50
1537.00
1536.50
1536.00
1535.50
1535.00
1534.50
1534.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 2, 2024


GW525
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1597.50
1597.00
1596.50
1596.00
1595.50
1595.00
1594.50
1594.00
1593.50
1593.00
1592.50
1592.00
1591.50
1591.00
1590.50
1590.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after September 17, 2024


GW530
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
1595.50
1595.00
1594.50
1594.00
1593.50
1593.00
1592.50
1592.00
1591.50
1591.00
1590.50
1590.00
1589.50
1589.00
1588.50
1588.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024

GW531


Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1610.00
1609.50
1609.00
1608.50
1608.00
1607.50
1607.00
1606.50
1606.00
1605.50
1605.00
1604.50
1604.00
1603.50
1603.00
1602.50
1602.00
1601.50
1601.00
1600.50
1600.00
1599.50
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
1595.50
1595.00
Aug-2023
Sep-2023
Oct-2023
Nov-2023
Dec-2023
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after October 22, 2024


GW532
Data Logger - Raw Data
Data Logger - Adjusted Data
Manual Measurement
Groundwater Elevation (ft, NGVD29)
1599.00
1598.50
1598.00
1597.50
1597.00
1596.50
1596.00
1595.50
1595.00
Jan-2024
Feb-2024
Mar-2024
Apr-2024
May-2024
Jun-2024
Jul-2024
Aug-2024
Sep-2024
Oct-2024
Nov-2024
Dec-2024
Provisional data after December 7, 2024

Appendix D

Streamflow Monitoring Data

Appendix D.1 Year End Summaries

NEWRANGE COPPER NICKEL

Appendix D: 2024 Stream Flow Data

As described in Section 10, NewRange has two contracts with the DNR[1] to install, maintain, and monitor stream gages that are required by Water Appropriation Permits 2016-1367 and 2016-1369, as well as to take regular spot measurements on Trimble Creek and Bear Creek.

In accordance with NewRange's contracts, the DNR informed NewRange on February 27, 2025, that the streamflow monitoring data was available on the DNR's Cooperative Stream Gaging (CSG) website: https://www.dnr.state.mn.us/waters/csg/index.html

Data for 2024 are available on the CSG website for each of the stations except the two manually monitored stations, SW045 and SW046, which are retained on file by DNR. Table D1 summarizes how to access available streamflow data. Year-end summaries are provided in Appendix D.1.

Table D1 2024 Streamflow Data Summary

Streamflow Monitoring Station		Permit Number	Station Type	Stream	Status in 2023	2024 Data	Link
Permit ID	DNR ID						
SW005	H03153002	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03153002
SW041	H03157002	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03157002
SW042	H03158002	2016-1369	Continuous gage	Unnamed (Mud Lake) Creek	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03158002
SW043	H03153001	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03153001
SW044	H03150003	2016-1369	Continuous gage	Second Creek	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03150003
SW045	H03158001	2016-1369	Manual monitoring	Trimble Creek	Monitored manually	Retained by DNR	
SW046	H03160001	2016-1369	Manual monitoring	Bear Creek	Monitored manually	Retained by DNR	
SW430	H03155005	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155005
SW431	H03155006	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155006
SW432	H03145003	2016-1367	Continuous gage	South Branch Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03145003
SW433	H03155007	2016-1367	Continuous gage	West Pit Outfall	Removed on July 20, 2023 No longer required	NA	
--	H03155002	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155002

Appendix D: 2024 Stream Flow Data

As described in Section 10, NewRange has two contracts with the DNR[1] to install, maintain, and monitor stream gages that are required by Water Appropriation Permits 2016-1367 and 2016-1369, as well as to take regular spot measurements on Trimble Creek and Bear Creek.

In accordance with NewRange's contracts, the DNR informed NewRange on February 27, 2025, that the streamflow monitoring data was available on the DNR's Cooperative Stream Gaging (CSG) website: https://www.dnr.state.mn.us/waters/csg/index.html

Data for 2024 are available on the CSG website for each of the stations except the two manually monitored stations, SW045 and SW046, which are retained on file by DNR. Table D1 summarizes how to access available streamflow data. Year-end summaries are provided in Appendix D.1.

Table D1 2024 Streamflow Data Summary

Streamflow Monitoring Station		Permit Number	Station Type	Stream	Status in 2023	2024 Data	Link
Permit ID	DNR ID						
SW005	H03153002	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03153002
SW041	H03157002	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03157002
SW042	H03158002	2016-1369	Continuous gage	Unnamed (Mud Lake) Creek	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03158002
SW043	H03153001	2016-1369	Continuous gage	Embarrass River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03153001
SW044	H03150003	2016-1369	Continuous gage	Second Creek	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03150003
SW045	H03158001	2016-1369	Manual monitoring	Trimble Creek	Monitored manually	Retained by DNR	
SW046	H03160001	2016-1369	Manual monitoring	Bear Creek	Monitored manually	Retained by DNR	
SW430	H03155005	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155005
SW431	H03155006	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155006
SW432	H03145003	2016-1367	Continuous gage	South Branch Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03145003
SW433	H03155007	2016-1367	Continuous gage	West Pit Outfall	Removed on July 20, 2023 No longer required	NA	
--	H03155002	2016-1367	Continuous gage	Partridge River	Operating	CSG Website	https://www.dnr.state.mn.us/waters/csg/site.html?id=03155002

Appendix D.1

Year End Summaries

NEWRANGE COPPER NICKEL

YEAR END SUMMARY

STATION NAME: Second Creek nr Hoyt Lakes, Pit 2W Mining Rd

STATION NUMBER: H03150003

YEAR: 2024

PREPARED BY: Jonathan Libbey, jonathan.libbey@state.mn.us

CLIMATE SUMMARY:

2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? Yes

Open water dates - estimated Ice out and Ice in: Estimated ice out 3/7/24, estimated ice in 12/19/24.

Summary of equipment - related factors that impacted data collection: Level spikes during extreme cold temperatures were removed from the record.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? No, low and moderate flows were well represented but the high flow June event was not measured.

Was a new rating developed? No

General summary of control changes/shifts needed: Site was impacted all year by a large beaver dam. Beaver dam was partially removed twice in early summer. It was built back again in late summer.

Quality of computed daily discharges: Daily discharges coded poor, estimated, and ice based on level, rating, or shift quality codes. Discharges for 06/18 to 06/19 are not computed due to high uncertainty with the high flow event.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? Yes.

Climatological liquid precipitation period: 4/1/2024 - 11/20/2024

Was there a complete and acceptable precipitation record for this period? Yes.

YEAR END SUMMARY

STATION NAME: Embarrass River nr Embarrass, MN135

STATION NUMBER: H03153002

YEAR: 2024

PREPARED BY: Jonathan Libbey; jonathan.libbey@state.mn.us

CLIMATE SUMMARY:2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? Yes

Open water dates - estimated Ice out and Ice in: Estimated ice out 4/3/24 and estimated ice in 11/25/24.

Summary of equipment - related factors that impacted data collection: No issues for 2024.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 9

Was the full range of flows measured for the season? No, Low and moderate flows were well represented with discharge measurements, but peak flows were not represented.

Was a new rating developed? No, continued use of rating curve 4.0.

General summary of control changes/shifts needed: Ice shifts were needed during times of ice cover, an out of bank vegetation shift was needed for the June high flow measurement, and low flow debris shifts were needed for the remainder of the open water season.

Quality of computed daily discharges: Daily discharges coded fair, poor, estimated, unreliable, and ice based on rating or level data quality coding.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? Yes

Climatological liquid precipitation period: 4/1/24 to 11/20/24

Was there a complete and acceptable precipitation record for this period? Yes

YEAR END SUMMARY

STATION NAME: Embarrass River nr Embarrass, Kaunonen Lake Rd.

STATION NUMBER: H03157002

YEAR: 2024

PREPARED BY: Ben Kiefer, ben.kiefer@state.mn.us

CLIMATE SUMMARY:

2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? YES

Open water dates - estimated Ice out and Ice in: Estimated ice out occurred on 4/6/24 and estimated ice in occurred on 11/26/24.

Open water sites ONLY. Period of data record (if different from ice out/ice in dates): N/A

Summary of equipment - related factors that impacted data collection: AVM malfunctioned all year, gauging pool has become too deep to access and repair it due to beaver dam increase. No other equipment related factors occurred in 2024.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? NO, no measurement was made during extreme flooding in June 2024 providing large enough uncertainty to not compute flows for the flooding event.

Was a new rating developed? NO

General summary of control changes/shifts needed: Varying levels of ice and beaver dam impacts required shifting during winter. Beaver dam impacts remained in varying degrees throughout open water monitoring in 2024.

Quality of computed daily discharges: The majority of days in 2024 were coded poor due to lack of rating development, as well as estimated during high flow event that exceeded the portion of the rating supported by measurements. Days were also coded ice during winter and missing during extreme flooding.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? NO

YEAR END SUMMARY

STATION NAME: Mud Creek nr Embarrass, Mattson Rd

STATION NUMBER: H03158002

YEAR: 2024

PREPARED BY: Jonathan Libbey, jonathan.libbey@state.mn.us | Kyle Percy, kyle.percy@state.mn.us

CLIMATE SUMMARY:

2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? Yes

Open water dates - estimated Ice out and Ice in: Estimated Ice Out 4/5/24, estimated Ice In 11/25/24.

Summary of equipment - related factors that impacted data collection: No equipment issues documented during this span.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? No, low and mid flows were well represented with flow measurements, but high flows were not measured. The June event was a site record but flows above 2x max measured flow from the rating curve were not computed due to high uncertainty.

Was a new rating developed? No

General summary of control changes/shifts needed: Ice shifts were needed during winter. Vegetation and algae shifts were needed throughout summer. From 9/21/24-11/5/24 the control was very unstable

due to algae buildup. Unit value discharges were not computed for this period and daily discharges were estimated.

Quality of computed daily discharges: Daily discharges coded poor, estimated, or ice based on rating or level data quality coding.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? Yes

Climatological liquid precipitation period: 4/1/2024 - 11/20/2024

Was there a complete and acceptable precipitation record for this period? Yes

YEAR END SUMMARY

STATION NAME: Embarrass River at Embarrass, Waisanen Rd

STATION NUMBER: H03153001

YEAR: 2024

PREPARED BY: Ryan Whittaker, ryan.whittaker@state.mn.us

CLIMATE SUMMARY:

2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? YES

Open water dates - estimated Ice out and Ice in: 4/10/2024 - 11/25/2024

Summary of equipment - related factors that impacted data collection: Orifice line was minorly impacted by debris from 4/14/24-4/23/24. Data quality was downgraded for the period.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? NO. Low and moderate flows were measured but no measurement was taken during the two high flow events. The highest measured flow was 255cfs on 6/6/2024, but the highest computed flow was 809cfs on 6/20/2024.

Was a new rating developed? NO, but the rating was extrapolated higher to cover the highest stages seen in 2024.

General summary of control changes/shifts needed: Ice impacted the control at the start of the year. Deposition impacted the March and April measurements, which was cleared out during the large May event. The mid-June event caused some scouring that impacted low levels only. Debris impacted the control from mid-October until the end of the year, with ice also having a minor impact at the end of the year.

Quality of computed daily discharges: Estimated quality during ice conditions and during very high flows. Low flows are poor quality and moderate to high flows are a mix of good, fair, and poor based on the rating quality.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? YES

Climatological liquid precipitation period: 4/1/2024 - 11/20/2024

Was there a complete and acceptable precipitation record for this period? NO. The rain bucket was incorrectly wired on 7/16/2024 resulting in no precipitation being recorded until wiring was fixed on 9/4/2024. Data from 7/16/2024 to 9/4/2024 field visits was removed from the record.

YEAR END SUMMARY

STATION NAME: Trimble Creek nr Embarrass, CR615

STATION NUMBER: H03158001

YEAR: 2024

PREPARED BY: Caitlin Noseworthy, caitlin.noseworthy@state.mn.us

CLIMATE SUMMARY: Division 3, 2024: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? NO

Open water dates - estimated Ice out and Ice in: Unknown.

Summary of equipment - related factors that impacted data collection: There is no continuous monitoring equipment at this location. Only open water discharge measurements are performed.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 5

Was the full range of flows measured for the season? It is unknown what the range of flow is at this location due to no continuous monitoring equipment on site.

Was a new rating developed? NO. There is no continuous monitoring equipment at this location. Only open water discharge measurements are performed.

General summary of control changes/shifts needed: Vegetation affects the channel most times of the year as well as remnant beaver dams at certain stages.

Quality of computed daily discharges: N/A

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? NO

YEAR END SUMMARY

STATION NAME: Bear Creek nr Embarrass, CSAH21

STATION NUMBER: H03160001

YEAR: 2024

PREPARED BY: Caitlin Noseworthy, caitlin.noseworthy@state.mn.us

CLIMATE SUMMARY: 2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? NO

Open water dates - estimated Ice out and Ice in: Unknown

Open water sites ONLY. Period of data record (if different from ice out/ice in dates): 04/24/24 - 10/15/24

Summary of equipment - related factors that impacted data collection: There is no continuous monitoring equipment at this location. Only open water discharge measurements are performed.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 5

Was the full range of flows measured for the season? It is unknown what the range of flow is at this location due to the lack of continuous data.

Was a new rating developed? No, there is no continuous monitoring equipment at this location. Only open water discharge measurements are performed.

General summary of control changes/shifts needed: Vegetation impacts this station during the warm months of the year.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? NO

YEAR END SUMMARY

STATION NAME: Partridge River nr Babbit, 0.5 mi DS Peter Mitchell Pit Rd

STATION NUMBER: H03155005

YEAR: 2024

PREPARED BY: Ben Kiefer, ben.kiefer@state.mn.us

CLIMATE SUMMARY:

2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? YES

Open water dates - estimated Ice out and Ice in: Estimated ice out occurred on 3/16/24 and estimated ice in occurred on 11/26/24.

Open water sites ONLY. Period of data record (if different from ice out/ice in dates): N/A

Summary of equipment - related factors that impacted data collection: No equipment related factors occurred in 2024.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? NO, although low and moderate levels were covered well by measurements in 2024, no high flow measurement was made during flooding in late June. The highest flow conditions from 6/19/24 - 6/21/24 were not computed due to high uncertainty in rating extrapolation and the highest measured flow was 86.5 cfs on 5/23/24.

Was a new rating developed? YES, upper and lower ends of the curve were adjusted slightly based on measurements in 2024.

General summary of control changes/shifts needed: Ice shifts were needed during winter as well as a minor deposition shift following flooding in late June. Deposition persisted until early September.

Quality of computed daily discharges: The majority of daily flows in 2024 were coded poor, as well as fair, estimated and unreliable based on varying levels of rating development and portions of the curve being unsupported by measurements.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? NO

YEAR END SUMMARY

STATION NAME: Partridge River nr Babbitt, 1mi DS confluence with SB

STATION NUMBER: H03155006

YEAR: 2024

PREPARED BY: Jim Pogorelc, jim.pogorelc@state.mn.us

CLIMATE SUMMARY:2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? YES

Open water dates - estimated Ice out and Ice in: Estimated ice out was 04/06/24 and ice in was 11/25/24.

Summary of equipment - related factors that impacted data collection: There were no equipment issues reported in 2024.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 6

Was the full range of flows measured for the season? NO. The highest measured discharge was 437 cfs and the highest computed discharge was 858 cfs. Discharges rose quite a bit higher than this during the June event, but computed discharges can only be computed to two times the maximum measured discharge. The minimum measured discharge was 1.42 cfs and the minimum computed discharge was 1.00 cfs.

Was a new rating developed? YES. Rating 2 was created to account for the newly collected high and low flow discharge measurement.

General summary of control changes/shifts needed: Only ice affected periods were shifted to account for changing control conditions.

Quality of computed daily discharges: Majority of the year is coded fair and poor due to the quality of the rating. There are a few small periods of estimated during real low flows or ice conditions. Flows for the June high flow event of 06/19/24 to 06/21/24 are not computed due to high uncertainty.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? YES

Climatological liquid precipitation period: 04/06/24 to 11/20/24

Was there a complete and acceptable precipitation record for this period? YES

YEAR END SUMMARY

STATION NAME: SB Partridge River nr Babbitt, 1.4mi DS of FR113

STATION NUMBER: H03145003

YEAR: 2024

PREPARED BY: Jonathan Libbey; jonathan.libbey@state.mn.us

CLIMATE SUMMARY:2024 – Division 3: The year began on a warm and dry note, with the first widespread subzero weather of the season not arriving until mid-January and only lasting 10 days. Record daily warmth was common late January through early March, with very dry conditions. Pattern flipped late March with major winter storm and heavy precipitation, followed by persistent wetness. March through June finished as 3rd wettest on record for the division with 5.6-inch (53%) precipitation surplus. Dry conditions resumed July, with 44% (5.9-inch deficits through October); September and October had just 44% of normal precipitation. April through August temperatures averaged about 0.8° F above the 1991-2020 normals, but September through October surged to 6° F above normal and September finished 1.7° F warmer than any other September in 130 years of record. November was wet and remained warm, with December on track to be wet as well. Severe convective weather was rare during the year, but the area was hit by extreme rainfall June 18 that led to major flooding and disaster declarations. By early December, snow cover had formed over most of the area.

STATION OPERATION SUMMARY:

Is this site monitored year round? Yes

Open water dates - estimated Ice out and Ice in: Estimated ice out 4/8/24, estimated ice in 11/27/24.

Summary of equipment - related factors that impacted data collection: No equipment issues.

DISCHARGE SUMMARY:

Number of flow measurements for monitoring season: 8

Was the full range of flows measured for the season? No, only low flows were captured in 2024. Moderate and high flows were not represented with flow measurements. Peak flows during the record June event eclipsed two times greater than the station’s highest flow measurement. These discharges were excluded from the record due to high uncertainty.

Was a new rating developed? No

General summary of control changes/shifts needed: Ice shifts were needed during the winter, light debris shifts were needed during the first half of summer, and heavy debris/beaver dam shifts were needed the last half of summer and into ice.

Quality of computed daily discharges: Daily discharges were coded poor, questionable, estimated, and ice based on rating or level data quality coding.

PRECIPITATION DATA OVERVIEW:

Was precipitation data collected at this site? No

Appendix E

Standard Operating Procedures

HydroVu System Procedures

Revision 0
February 2025

NewRange HydroVu System Procedure

Revision 0, 2/20/2025

The HydroVu System Procedure is applicable to groundwater monitoring wells at the NorthMet Site utilizing In-situ, Vu-link and LevelTroll instrumentation that is remotely monitored via InSitu's HydroVu cloud-based system.

Equipment Management Procedures

1. NewRange's Environmental Department staff will review data remotely via the HydroVu account at least once per month to confirm data is reporting properly.
    - Monthly checks are documented and saved in: **Monthly HydroVu QC checks** on SharePoint.
2. If an equipment issue is discovered or suspected, NewRange Environmental staff will schedule a site visit to troubleshoot or make repairs as soon as practical.
3. If repairs will be delayed (examples: replacement parts on back order, staff availability, etc.) NewRange Environmental staff will obtain a manual Static Water Level (SWL) reading to satisfy the Water Appropriation permit monthly measurement requirement.
    - Monthly manual SWL measurements will need to be obtained until repairs are made, and the data shows the unit is operating correctly.
4. NewRange staff will calibrate instrumentation equipment (Vulink and LevelTrolls) at least once annually.

Field Procedures

1. Bring spare equipment when conducting field work to allow for replacement of nonfunctional equipment.
2. Document any well or equipment issues observed on the **HydroVu Field Sheet.**
3. Connect to the VuSitu application with cell phone or iPad (ensure application has been downloaded to the device being used).
4. Record the live readings obtained from the application on the Field Sheet.
5. Stop and download all running logs (VuLink and LevelTroll(s)). Downloaded logs are saved to the cloud and available for viewing or download through the HydroVu portal online.
6. Record manual depth to water measurement and time on the Field Sheet.

- SWL measurements should be obtained from the top of the internal well casing at the designated mark (or north side of well if there is no mark). Do not obtain measurements from the top of the PVC coupling or metal mounting ring.

7. Replace any equipment or batteries as needed.

8. Document all models, serial numbers, and VuLink registration code if replacement equipment is deployed.

9. Calculate groundwater elevation (Top of Casing [TOC] minus SWL). This will be the new reference elevation used for calibration.

10. Set LevelTroll level mode to "elevation" and update reference depth to the new reference elevation.

11. Start the log

12. If location is a nested pair of wells, connect to the next level troll and follow procedures 5 through 9.

13. After LevelTroll logs are set, connect to the VuLink. Start new **VuLink** log.
    - Apply automatic barometric compensation.
    - Parameters to record:
        - VuLink – temp (°C), battery capacity, barometric pressure (psi)
        - LevelTroll – pressure (psi), temp (°C), elevation
    - Set data collection frequency to 4 hrs as indicated in Table 1.
    - Set to linear logging
    - Start log immediately

Upon returning to the office, scan Field Sheets and put them into their corresponding well folders. Update the **GW Equipment Status, Groundwater Manual Elevation Measurements, and Datalogger Status Summary** spreadsheets. These folders are located on the NewRange on Sharepoint in the Water Appropriations/Ground Water Monitoring folders.

Appendix F

DNR Correspondence

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Lands and Minerals
1525 3rd Ave East
Hibbing, MN 55746

December 13, 2024

Christie Kearney
Sustainability, Environmental and Regulatory Affairs (SERA) Director
NewRange Copper Nickel
P.O. Box 475
Hoyt Lakes, MN 55750

Dear Christie Kearney,

Re: 2023 Annual Report Review for Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260.

Thank you for responding to the July 29, 2024, DNR comments on Polymet Mining Inc's (Polymet) 2023 Annual Report for Water Appropriation Permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369, and 2017-0260 on September 27, 2024. After reviewing the information that was submitted, it has been determined that Polymet's 2023 Annual Report is now complete.

Follow up comments on the 2023 Annual Report data are included in the attached spreadsheet. These comments are for your information and for reference in preparing future reports. The 2023 data does not need to be resubmitted. The DNR does recommend that you consider these comments where applicable when reviewing and using data collected in 2023 and earlier.

Discussions with NewRange and NTS staff during the September site visit were very helpful in understanding previous field procedures and plans for improvements in data collection and management. The DNR provides the following general comments based on these discussions and review of the data.

- Developing and using a written SOP for monitoring and data management tasks helps maintain consistency, particularly when multiple staff are involved in these tasks or staff changes over time. SOP's should be attached to the Annual Report so that DNR can understand these procedures and provide feedback if necessary.
- Use of a field sheet/form during all field visits helps ensure all necessary information is collected when in the field. When recording field data, err on the side of more information vs less. Noting the time datum (CST/CDT) is particularly important for comparing field data to logger data. Some information from a field sheet may end up not being used, but this is preferable to not having data collected which is later

needed. Include copies of field sheets with the Annual Report, as these may provide answers to some of DNR's questions and reduce the need for comments.

- When performing any maintenance on a well or logger which involves or might cause the logger to move or the water level to change, a hand measurement should be taken before and after the maintenance if possible. The DNR does understand that this is not possible where the Vulink is in a two inch well casing and must be removed to make a hand measurement.
- Setting all groundwater level loggers and barologgers to operate on the same schedule will simplify data processing and eliminate many of the errors observed in the 2023 data. If a manual barocorrection is needed, logger data and barologger data must have the same timestamps to be accurate and valid. The DNR requests that both raw pressure data and barologger data be included when manual barocorrections are made.
- When post correcting data, provide detailed and specific comments on all corrections. No corrections should be made without a documented reason for the corrections. If documentation of the cause of an offset or anomalous data is not available, that data should be flagged as unreliable and not included in the final corrected dataset. This prevents data which may not be accurate from being used in future analyses.
- The DNR recommends implementing a peer review process into data management tasks. Having a second person independently review data entry and correction can catch simple human errors or oversights which inevitably occur.
- When monthly remote data checks show issues with a datalogger, a site visit should be made as soon as possible to minimize potential data loss. Site visits must be made monthly if the logging equipment is non-functional for greater than one month and unable to be repaired/replaced to maintain compliance with the minimum monitoring frequency required by the Monitoring Plan. Monthly visits are not necessary if the well is known to be typically frozen during a month.

The level of detail provided in the quarterly reports on equipment issues and corrective actions taken is very helpful for DNR when evaluating the data. Please include this information in the Annual Report. There was a notable reduction in data issues in 2024 Q3 compared to Q1 and Q2. Please continue to submit the quarterly reports in 2025. The DNR will use this data to evaluate if the corrective actions taken and SOPs established by NewRange are effective in minimizing data loss and errors and will notify you when this requirement can be discontinued.

Please feel free to contact me with any questions or for further discussion on the above comments.

Sincerely,

Martin Van Oort
Mining Hydrologist
DNR Division of Lands and Minerals
Martin.VanOort@state.mn.us
218-231-8444

Attachment: 2024-12-11 DNR 2023 WA Report Comment Response.xlsx

Minnesota Department of Natural Resources
Division of Lands and Minerals
1525 3rd Avenue East
Hibbing, MN 55746

October 7, 2024

Kevin Pylka
Permitting and Environment Manager
NewRange Copper Nickel, LLC
6500 County Road 665
Hoyt Lakes, MN 55750

Dear Kevin Pylka:

Re: Polymet/NewRange 2024 Water Appropriation Site Visit

A site visit was made to NewRange Copper Nickel LLC (NewRange) on September 17, 2024, for Polymet Mining Inc (Polymet) water appropriation permits 2016-1363, 2016-1364, 2016-1365, 2016-1367, 2016-1369 and 2017-0260 (Polymet mine and plant site), and NewRange water appropriation permit 2021-1129 (Spring Mine Lake). DNR Division of Lands and Minerals (DNR) staff Erika Herr, Martin Van Oort and Jacob Mickelson met with NewRange representatives Kevin Pylka, Bryan Harp and Jason Lieffring as well as John Novak representing Northeast Technical Services (NTS) to discuss questions or expected changes regarding water appropriations and to tour water appropriation permit installations and monitoring locations.

During the site visit NewRange staff accompanied DNR staff to the following sites:

1. Spring Mine Lake intake
2. Spring Mine Lake flowmeter
3. SD033 Outfall
4. GW525/419 Well Nest

Site Visit Notes

Spring Mine Lake Intake. A pump was being used as the siphon has not been effective. The pump was operating at 44 gpm. Bryan demonstrated connecting to the In-situ equipment the lake.

SD033 Outfall. NewRange staff discussed access issues for sampling near the discharge location. The Spring Mine Lake discharge mixes with seepage from stockpiles in the upper ponded area and flows through a culvert to SD033. Beaver dams downstream of SD033 location have been cleared lowering pool elevation considerably.

GW525/419 Well Nest. This well nest near the mine site was a short hike from a site road and Bryan gave a demonstration of a typical well visit that included connecting to VuLink, downloading, and manually measuring water elevation.

Discussion

At Spring Mine Lake, the pump and flowmeter are working as intended. The permit has been amended to reflect full time use of the pump going forward. While on site, it was noted that pressure transducer that is in Spring Mine Lake is currently unsecured. To minimize sources of error, it is recommended to anchor and secure instrumentation in all open water environments.

The nested well pair of GW525/GW419 was visited. NewRange staff informed the DNR that VuLink does not have the capability of instantaneous readings so the current plan of reprogramming with current elevation at each site visit is the best course of action. Logs are downloaded from VuLink and each Troll during the visit. The DNR suggested verifying the log download before deleting from Trolls and VuLink. Other suggestions included taking manual measurements as near to setting the logger value as possible and recording time for each measurement or reading (including whether time is CDT/CST) on the field sheet.

NewRange staff has indicated that multiple shallow wells are subject to freezing and questioned if these loggers could be pulled in the winter to prevent damage to equipment. Water levels, especially during seasons of variability like winter/spring transition, are important to a complete record. The DNR suggested housing the VuLink outside of the casing in a stable and secure housing to prevent unnecessary damage. If this is not possible, we can discuss other options to mitigate risks to equipment.

The HydroVu data management application was shared with the DNR staff. John Novak explained that the exports from the service are in UTC and a manual time offset is performed to transition to CST. Please continue to submit in CST and include the time datum so we know this offset has been made. NTS is currently managing the well data, but this task is planned to be transitioned to NewRange staff.

NewRange staff noted that responses to DNR's comments on the 2023 Annual Report are nearly complete and will be submitted by September 27. NewRange is also preparing the water appropriation permit application for the Area 5 project for submittal by the September 30 deadline in the Schedule of Compliance from MPCA.

Thank you for your cooperation and the opportunity to visit the site. Please feel free to contact me if you have any questions.

Sincerely,

Martin Van Oort
Mining Hydrologist
DNR Division of Lands and Minerals
218-231-8444
martin.vanoort@state.mn.us

CC: Christie Kearney, SERA Director, NewRange