Lamberts North Ash Placement Project

Annual Water Quality Monitoring Report 2022 - 2023

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment Conservation Council
ANZG	Australian and New Zealand Guidelines
ARI	Average Recurrence Interval
BCA	Brine Conditioned Ash
C	Degrees Celsius
CEMP	Construction Environmental Management Plan
CSP	Coal Settling Pond
DO	Dissolved Oxygen
DPE	NSW Department of Planning and Environment
EC	Electrical Conductivity
EMR	Environmental Monitoring Report
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
ERM	Environmental Resources Management
FHP	Final Holding Pond

Acronyms	Description
GCB	Groundwater Collection Basin
GMMP	Groundwater Management and Monitoring Plan
ha	hectare
HDPE	High Density-Polyethylene
km	kilometres
LCC	Lithgow City Council
LDP	Licenced Discharge Point
LGA	Local Government Area
LMP	Licenced Monitoring Point
LNAR	Lamberts North Ash Repository
LOR	Limit of Reporting
LSAR	Lamberts South Ash Repository
m	metre
mg/L	milligrams per litre
mm	millimetre
ML	megalitre
MPAR	Mt Piper Ash Repository
MPPS	Mt Piper Power Station
MW	Megawatt
Nalco	Nalco Water – Ecolab
NHMRC	National Health and Medical Research Council
NSW	New South Wales
OEMP	Operation Environmental Management Plan
QAQC	Quality Assurance Quality Control
RL	Relative Level
SSD	State Significant Development
SWTP	Springvale Water Treatment Project
TDS	Total Dissolved Solids
WAL	Water Access Licence
WCA	Water Conditioned Ash
µg/L	micrograms per litre
µS/cm	microSiemens per centimetre

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by EnergyAustralia NSW Pty Limited (EnergyAustralia) to prepare an Environmental Monitoring Report (EMR) for the Lamberts North Ash Repository (LNAR) at the Mt Piper Power Station facility located at 350 Boulder Road, Portland, New South Wales (MPPS, or the site). Refer to Figure 1, Appendix A for the location and setting of the site in a regional context.

This EMR presents the results of water quality monitoring conducted in accordance with the Lamberts North Ash Placement Project Operational Environmental Management Plan (the OEMP; EnergyAustralia, 2022) over the period of 1 September 2022 to 31 August 2023 (i.e. the reporting period). The OEMP includes a surface water management plan, a groundwater management plan, and a leachate management plan that stipulate monitoring and reporting requirements for each, the outcomes of which are presented in this report.

Results from the monitoring program are reported to key stakeholders including WaterNSW, NSW Environment Protection Authority (EPA), Lithgow City Council (LCC) and NSW Department of Planning and Environment (DPE).

This EMR has been prepared in accordance with Conditions E15 and E16 of project approval 09_0186 which was originally granted under the Environmental Planning and Assessment Act 1979 (NSW) on 16 February 2012 (the Project Approval). In September 2021, PA 09_0186 was modified to authorise amendments to the design and operations of the LNAR (LNAR MOD 1). Principally, the LNAR MOD 1 allows for the installation of a leachate barrier and leachate management system within the LNAR below relative level (RL) 946 m Australia Height Datum (AHD) to capture and subsequently treat leachate moving through the ash placed above the liner. Details regarding the installation of the leachate barrier system are discussed in the Lamberts North Ash Repository Modification Report (the Modification Report; ERM, 2021a).

This EMR should be read in conjunction with the Statement of Limitations presented Section 11.

1.1 PROJECT BACKGROUND

EnergyAustralia owns and operates the MPPS. The MPPS was built between 1984 and 1993 and comprises two coal-fired steam turbine generators, with a generating capacity of 700 MW and 730 MW. The MPPS is located within the Lithgow Local Government Area (LGA), approximately 110 kilometres (km) west of Sydney, 18 km north-west of Lithgow, and 5 km east of Portland.

The MPPS is fuelled using black coal sourced from the local area. Ash is produced as a result of coal combustion by the transformation of the non-combustible matter present in the coal. The ash constituents comprise bottom furnace ash and fly ash. Bottom furnace ash, which makes up approximately 10% of the total ash product, is typically coarse and wet. Fly ash typically makes up 90% of the total ash product and is finer with a moisture content of 0%.

Together, bottom furnace ash and fly ash is referred to as 'ash.' Ash produced by MPPS can either be reused (sold on the open market) or placed in purpose-built ash placement repositories.

EnergyAustralia has two approved and operating ash placement repositories as described below.

- The Mt Piper Ash Repository (MPAR), approved under the MPPS development consent (80-10060), as modified (the Mt Piper Consent). The majority of the ash produced at MPPS to date has been placed within the MPAR in accordance with the conditions of the Mt Piper Consent. Ash produced at the MPPS is now placed within the LNAR.
- The Mt Piper Ash Placement Project consists of two ash placement repository areas, the LNAR and the Lamberts South Ash Repository (LSAR). The LSAR is currently not available as the LSAR approval area is being used by Springvale Coal Pty Ltd (Centennial) for approved coal mining and processing activities. Since commissioning of the LNAR, ash placement had occurred within the northern portion of the LNAR only (i.e. Stage 1a / Stage 1b), however operations commenced in the southern portion of LNAR during the current reporting period (i.e. Stage 2).

Together the LNAR and the MPAR are referred to as the Ash Repositories. This report is limited to the LNAR, as required by the Project Approval. The annual environmental monitoring conducted in relation to the MPAR is reported separately, in line with the separate development consents that apply to the MPAR. Refer to Figure 2, Appendix A for a plan showing relevant site features of LNAR and surrounds.

The wet bottom furnace ash is placed directly into the Ash Repositories, either temporarily (i.e., recovered and reused) or permanently. Prior to the placement of fly ash within the Ash Repositories, it is conditioned to increase its moisture content. This is undertaken to achieve required compaction rates and to maintain geotechnical stability of the Ash Repositories; it also assists in dust suppression.

Fly ash is conditioned by the addition of either:

- Water, sourced in accordance with MPPS existing water licences and allocations including recycled process water and fresh (non-potable) water. Fly ash treated with water is referred to as Water Conditioned Ash (WCA); or
- Brine, a by-product from
  - Treatment of evaporative cooling water from the cooling towers of MPPS to remove salts and impurities. Treatment occurs at the MPPS Brine Concentrators under the Mt Piper Consent, and
  - The desalination process of the nearby Springvale Water Treatment Project (SWTP), Significant Development (SSD) 7592.
- Fly ash treated with brine is referred to as Brine Conditioned Ash (BCA).

The conditioning of fly ash as WCA or BCA occurs within the power block of the MPPS, away from the Ash Repositories. The BCA or the WCA is then transported separately (via conveyor) to the repository silos located at the MPAR. From the silos, the conditioned ash is loaded into trucks and transported to approved placement areas.

The relevant conditions of the Project Approval to operate the LNAR require:

- Implementation of the OEMP (Conditions D2, D3 and D3A) which contains a detailed environmental management framework, and practices and procedures to be adopted as part of operations at the LNAR. The OEMP includes:
  - A Groundwater Management Plan (Section 5.5 of the OEMP, to address Conditions D3 (b), B2, B3, E15 and E17 of the Project Approval),
  - A Soil and Surface Water Management Plan (Section 5.6 of the OEMP, to address Conditions D3 (c) and E16 of the Project Approval), and
  - A Leachate Management Plan (Section 5.11 of the OEMP, to address Condition D5); and
- The carrying out of groundwater and surface water monitoring programs required by Conditions E15 and E16 respectively and as specified in the OEMP.

The OEMP (EnergyAustralia, 2022) is applicable to the 2022/23 reporting period. BCA placement in the LNAR lined placement areas commenced in accordance with LNAR Mod 1 from 13 May 2022.

A separate and broader investigation of surface and groundwater conditions (the independent investigation) in the vicinity of the Ash Repositories, including the LNAR area, has recently been completed in line with the contingency measures identified in the OEMP.

1.2 OBJECTIVES

The objectives of this report are to meet the reporting requirements of the Groundwater Management and Monitoring Plan, Soil and Surface Water Management Plan and Leachate Management Plan presented in the OEMP.

1.3 CONTACTS

The key contact for compliance associated with the LNAR is Mr Ben Eastwood, NSW Environment Leader, EnergyAustralia, (02) 6354 8111.

1.4 SCOPE OF WORKS

In order to meet the objectives of this report, the following scope of works has been implemented:

- Import of environmental monitoring data provided by EnergyAustralia to the existing environmental database for the site;
- Export of summary tables for available water quality collected by EnergyAustralia from the monitoring conducted in accordance with the OEMP;
- Export of graphs of selected data collected by EnergyAustralia from the monitoring conducted in accordance with the OEMP;
- Review of monitoring data at the six existing surface water quality monitoring sites in Wangcol Creek at LMP01, NC01, WX22, SW_C, SW_E, and SW_G (Appendix B), with comparison to the Environmental Goals;

- Review of groundwater quality and depth to the water table at groundwater monitoring wells outlined in the OEMP (Appendix C and Appendix D, respectively), with comparison to the Environmental Goals;
- Comparison of surface water and groundwater data with the modelled groundwater elevation predictions in the OEMP;
- Assessment of trends in surface water and groundwater quality (comparison between reporting years) presented in Appendix E and Appendix F respectively;
- Assessment of climate observations during the reporting period, obtained from the MPPS Weather Station (Appendix G);
- Review of the Ash Repositories elevation survey (Appendix H);
- Review of leachate monitoring data in accordance with the leachate monitoring plan set out in the OEMP;
- An update on contingency and mitigation measures currently being implemented in accordance with the OEMP;
- Presenting figures of key findings of the assessment (Appendix A); and
- Preparation of this report to present the results of the surface water and groundwater quality monitoring, and leachate management. This includes the interpretation and discussion of results, as required under the Project Approval and the OEMP for the reporting period.

1.5 DOCUMENTATION REVIEWED

The reports listed below have been reviewed as part of this report, and information within them has been relied upon:

- Sinclair Knight Merz, September 2009. Mt Piper Power Station Ash Placement Project, Project Description and Preliminary Environmental Assessment;
- Sinclair Knight Merz, August 2010, Mt Piper Power Station Ash Placement Project Environmental Assessment;
- Sinclair Knight Merz, March 2011, Mt Piper Power Station Ash Placement Project Submissions Report;
- CDM Smith, December 2012 (2012a), Delta Electricity, Lamberts North Ash Placement Project Construction Environmental Management Plan (CEMP);
- ERM, March 2019. Lamberts North Ash Placement Water Quality Monitoring, Annual Water Quality Monitoring Report 2018/2019. Final Version 02, 15 March 2019;
- ERM, November 2020. Lamberts North Ash Placement Project, Annual Water Quality Monitoring Report 2019/2020. Final Version, 09 November 2020;
- ERM, November 2021. Lamberts North Ash Placement Water Quality Monitoring, Annual Water Quality Monitoring Report 2020/2021. Final Version, 22 November 2021;
- ERM, 2021a. Mt Piper Ash Placement Project – Lamberts North Ash Repository Modification Report – Modification 1, dated May 2021;
- EnergyAustralia NSW Pty Ltd (EnergyAustralia) (2022), Lamberts North Ash Placement Project – Operational Environmental Management Plan (the OEMP), Revision 6, May 2022; and

- The LNAR MOD 1 Conditions of Approval (relevant consent requirements included in Appendix I).

In addition to the above, the information presented in this report was prepared using data and information provided by EnergyAustralia, including:

- Water quality data (Appendix B and Appendix C);
- Gauging data, presented as hydrographs, for groundwater wells as supplied by EnergyAustralia for the reporting period (Appendix D);
- Local climate data from Mt Piper Weather Station (Appendix G); and
- LNAR operations summary (Section 2 and Appendix H).

2. OPERATIONS SUMMARY

Ash placement operations for MPPS, including within the LNAR authorised by the Project Approval, are undertaken by a specialist ash placement contractor. Service Stream is the current service provider for EnergyAustralia in relation to aspects of ash placement and dust management at the MPPS.

93,342 tonnes of ash was placed during the 2021/2022 reporting period. During this reporting period, 421,768 tonnes of ash was placed. A summary of operations at the LNAR area for the current reporting period is presented in Table 2-1, based on the information provided by EnergyAustralia.

Figure 2 and Figure 3, Appendix A provide the layout of site features and the current ash placement plan, respectively.

TABLE 2-1 LAMBERTS NORTH ASH REPOSITORY – OPERATIONS SUMMARY

Activity	Previous Reporting Period (2021/22)	This Reporting Period (2022/23)
Ash delivered to the site (T)	93,342 BCA (delivered) 128,609 WCA (removed) 35,267 (net)	214,848 BCA 206,920 WCA
Water co-placed (ML)	0	0
Brine co-placed (ML)	20.15	12.8
Total LNAR ash footprint (ha)	16.7	16.7
Area of LNAR capped (ha)	1.3	1.3

2.1 LEACHATE BARRIER SYSTEM INSTALLATION

During the previous reporting period, a leachate barrier system was installed in the LNAR Stage 1a and Stage 1b. The leachate barrier system is supported by a leachate management system to capture, store and transfer leachate generated from the lined areas to ponds LNAR 2 – LNAR 5 as required based on site operations. The leachate management system is operated in accordance with standards presented by NSW Environment Protection Authority (NSW EPA) (2016), as described in Section 8.

2.2 ASH PLACEMENT AND GEOMETRY

This subsection presents a summary of the intended ash placement procedure and geometry, as summarised from the OEMP, with a discussion of the ash placement activities that occurred over the reporting period.

Ash placement at the LNAR includes the handling of WCA, BCA and furnace bottom ash. Ash placement occurs within the perimeter embankment along the northern and eastern boundary of the LNAR, as prepared during the construction phase. Ash placement has occurred in the most northerly and eastern parts of the LNAR, continuing towards the southern parts of the active LNAR ash placement area.

BCA and Solid Mixed Salts are co-placed above the installed leachate barrier system, with only WCA placed below the liner. WCA may also be placed above the liner as and when required. Ash is placed to the desired height (0.5 – 1 m lifts, or less) in pads. The ash is treated to an average compaction of 95%, relative to its maximum standard compaction, through a controlled combination of moisture addition and machine compacting with the use of rollers, compactors and rubber-tyred vehicles. Moisture, referred to above, is generally water. However, within lined areas, collected leachate from the leachate management system may also be used to increase moisture content as required.

Ash is placed in layers and as each part of the ash repository meets its proposed RL for ash placement, the placed ash will be capped with a welded low permeability liner and suitable soil cover layer, including revegetation media. Ash will then continue to be placed beside the capped area. The process will be repeated until the LNAR is filled to its maximum permissible height and extent.

Figure 3, Appendix A (as supported by Appendix H) indicates that the elevation achieved by ash placement operations in the LNAR Stage 1 up to 26 September 2023 was approximately 955 m AHD at the highest point. The height of ash placement in the LNAR at that time remained below the maximum approved final landform height for the LNAR of 966-980 m AHD, depending on location.

3. ENVIRONMENTAL SETTING

Details of the environmental site setting are presented in the following sections to provide context to the surface water and groundwater assessments (Sections 5 and 6 respectively). The surface water and groundwater monitoring locations are presented in Figure 4, Appendix A.

3.1 CLIMATE

The climate data presented in Table 3-1 was provided by EnergyAustralia and is sourced from the weather station at MPPS. A copy of the data is provided in Appendix G.

TABLE 3-1 LOCAL CLIMATE DATA FOR 2022/23

Month	Rainfall Total (mm)	Min. Temperature (°C)	Max. Temperature (°C)
September 2022	131	-2	16.6
October 2022	157.8	-0.1	19.1
November 2022	110	1.0	25.3
December 2022	15.6	3.1	29.4
January 2023	108.6	7.0	31.2
February 2023	28.4	7.3	32.7
March 2023	83.6	3.7	34.3
April 2023	70.2	2.4	19.9
May 2023	5.2	-4.9	17.9
June 2023	30.0	-7.5	16.6
July 2023	23.6	-7.0	16.1
August 2023	44.4	-3.5	18.5
TOTAL/MIN/MAX	**808.4**	**-7.5**	**34.3**

Data from MPPS Weather Station

The total rainfall for the reporting period was 808.4 mm, which is lower than the total reported rainfall period for the 2021/22 reporting period of 1,127.1 mm, however, remains above the average annual rainfall between 2012 and 2017 which was reported by Aurecon (2017) to be 756.5 mm.

This is a continuation of a trend of higher than average rainfall that commenced generally between December 2020 and March 2021. This higher than average rainfall period broke the period of relative drought previously experienced at the site, and more broadly in NSW, between 2017 and 2020.

3.2 GEOLOGY

The LNAR is located on an outcrop of the Illawarra Coal Measures. The Illawarra Coal Measures overlie the Shoalhaven Group and host the coal seams that were previously mined out in and around the LNAR. The Narrabeen Group, comprised of sandstones, overlies the Illawarra Coal Measures and forms the surrounding hillsides (NSW Government, 1992). Characteristics of the local geologic units are listed in Table 3-2.

TABLE 3-2 LOCAL GEOLOGICAL UNITS

Narrabeen Group	Illawarra Coal Measures	Shoalhaven Group
• Sandstones, shale and claystone. • Up to approximately 800 m thick in parts, although generally absent in the immediate vicinity of the Ash Repositories. • Deposition in estuarine/alluvial, fluvial, and fluvial-deltaic environments. • Unconformably overlies Illawarra Coal Measures (Danis et al., 2011).	• Interbedded shale, sandstone, conglomerate, and coal. • Dips 1 - 2 degrees to the east. • Outcrops extensively just east of Portland, exposing the Lidsdale and Lithgow coal seams close to the surface with approximately 15-25 m of sandstone overburden (CDM Smith, 2012b). • Mined coal seams at and in the vicinity of the Ash Repositories (underground and open cut mining). • Upper portions extensively weathered.	• Siltstones, lithic sandstones and conglomerate. • Marine sediments. • Berry Sandstone/ Formation (earlier) & Snapper Point Formation (later). • Contains sulfide-bearing material and is acid- generating in places where exposed via rock cuttings (SKM, 2010).

Whilst the majority of the area beneath and around the LNAR has been mined using open cut methods, there are small areas near the western boundary of the LNAR with remnant underground bord and pillar remains.

3.3 HYDROGEOLOGY

Groundwater beneath the LNAR is present within the Illawarra Coal Measures. The natural stratigraphy of the Illawarra Coal Measures in the vicinity of the LNAR is generally as follows:

- Bunnyong Sandstone (Long Swamp Formation) – massive sandstone;
- Lidsdale Coal Seam – interbedded high ash coal and shale;
- Blackmans Flat Conglomerate – coarse sandstone and conglomerate;
- Lithgow Coal Seam; and
- Marrangaroo Conglomerate – massive sandstone and conglomerate.

Considering the former mining in the area, and the current ash placement activities, anthropogenic lithologies in the vicinity of the LNAR include ash, fill and placed overburden, and mined out workings which may be voids, or may contain fill or collapsed overlying lithologies.

Prior to 2012, a former mined out void located to the east of the MPAR and beneath the footprint of the northern part of LNAR was used to extract groundwater (SKM 2010). The void was referred to as the Groundwater Collection Basin (GCB) and, in 2012, it was filled in as part of the construction of the LNAR. Aurecon (2017) noted that, prior to the placement of ash on the footprint of the former GCB, the former void (Huons Void) was filled and compacted to a maximum level of 917 m AHD, with ash placed above that elevation. Historically, groundwater seepage from beneath the MPAR would have been collected in the former GCB (SKM, 2010).

Groundwater elevations, contours, and inferred flow directions for the reporting period are presented in Figure 5, Appendix A series (i.e. Figure 5A to Figure 5D). During the reporting period, the water table elevation range was approximately 904 m AHD to 916.7 m AHD in the vicinity of the LNAR. This, and other groundwater monitoring results indicate that, near the Ash Repositories, the water table occurs variably in the former below ground mined out areas and open cuts (ERM, 2021a). Away from the Ash Repositories the water table occurs predominantly in the overlying Bunnyong Sandstone. The maximum water table elevation during the reporting period (916.7 m AHD) exceeded the maximum groundwater level in the southern end of the LNAR of 912.5 m AHD as modelled by CDM Smith (2012b).

Groundwater elevation contours indicate primary groundwater flow directions beneath the LNAR are to the east and north-east. Groundwater elevations generally declined over the monitoring period, however, groundwater flow directions remained relatively consistent throughout the reporting period based on groundwater contour plans prepared for each season as presented in the Figure 5 series.

3.4 HYDROLOGY

The LNAR is located within the former Huons Gully catchment. The former Huons Gully is a part of the Wangcol Creek catchment, which is part of the upper Coxs River Catchment. Wangcol Creek is located to the north of the LNAR and flows from the north-west towards the south-east. The creek joins the Coxs River approximately 3.2 km east of the LNAR. At its closest point, Wangcol Creek is approximately 150 m north-east of the LNAR.

Currently, the following surface water management and mitigation measures are implemented at the LNAR:

- Clean water is diverted from external areas (i.e. areas not exposed to ash placement activities) around the LNAR to avoid interaction with ash materials, as shown on Figure 2;
- Stormwater runoff from the west and south-west of the LNAR is captured by the existing clean water drain and is diverted into the clean water system;
- Stormwater from the south of the LNAR falls onto the existing mining operations of Centennial and is managed by Centennial through a series of ponds and drains in the vicinity of the Lamberts Gully Creek; and
- Stormwater falling on areas to the east and north of the LNAR largely drains naturally to the east into Wangcol Creek following the general lay of the land away from the LNAR.

The LNAR has been designed to contain and detain water on site by diverting water into the centre of the LNAR to on-site retention and sediment basins. This allows for:

- Re-use and recycling of runoff from within the LNAR (i.e. for dust suppression);
- Cover and revegetation of completed external batters, diverting clean water to drainage systems; and
- Separation of clean and dirty water systems as described in the OEMP.

4. ENVIRONMENTAL GOALS

The Environmental Goals for groundwater and surface water monitoring associated with LNAR for the reporting period are consistent with both the OEMP and those applied to monitoring of the MPAR, as approved in the Water Management and Monitoring Plan[1]. The Environmental Goals were developed by Aurecon (2009) to account for hardness corrected guideline values, as presented by CDM Smith (2013).

The Environmental Goals utilise the 95% ecosystem protection values, stock watering, irrigation water or drinking water values based on the Australian and New Zealand Guidelines (ANZG, 2018) water quality guidelines (formerly Australia and New Zealand Environment Conservation Council, ANZECC, 2000), in combination with the 90th percentile pre-BCA placement local environmental (groundwater/surface water) data, whichever is greater. The local guideline values incorporated into the Environmental Goals are based upon the 90th percentile pre-ash placement water quality results, as measured at surface water quality point WX22 (for surface water) or the former GCB (for groundwater).

Aurecon (2017) present additional baseline values for copper and nickel which were developed to capture potential changes that occurred since the operation of the MPAR, but prior to the commencement of operation of the LNAR. Guideline values presented in ANZG (2018) have been applied where available for other analytes that were added as part of OEMP Revision 6 completed as part of the LNAR Mod 1.

It is noted that, where the Environmental Goals for groundwater are based on the ANZG (2018) water quality guidelines, these guidelines are applicable to receiving waters and not to groundwater. However, these form an appropriate basis for undertaking a conservative initial screening assessment.

The Environmental Goals adopted for this assessment are presented with the surface water and groundwater data in Appendix B and Appendix C respectively.

4.1 GROUNDWATER MODEL PREDICTIONS

Groundwater modelling prepared by CDM Smith (2012b) presented the following conclusions:

- Ash placement was considered highly unlikely to adversely affect the two aquifers underlying the LNAR. The project design was modified to reduce the likelihood of groundwater contamination resulting from the LNAR, including provision of a sufficient separation distance between maximum groundwater level and the base of ash placement (CDM Smith, 2013);
- Groundwater modelling demonstrated that the water present in the former GCB and Huon Gully is largely groundwater from the intersection of Huon Void with the water table (CDM Smith, 2013);
- The maximum modelled groundwater level in the southern end of the LNAR was identified as 912.5 m AHD, 2.5 m above RL 910 m AHD (CDM Smith, 2012b);

[1] Approved for the Mt Piper Brine Conditioned Fly Ash Co-Placement Project in accordance with development consent DA80/10060 (as modified) and dated 28 February 2020.

- The model results indicated that groundwater levels across the site were at maximum levels during wet weather patterns. Accordingly, the model results indicated that groundwater levels would remain at least 4 m below the base of the LNAR under a 1:100 year Average Recurrence Interval (ARI) event and steady state normal conditions (CDM Smith, 2012b);
- The model indicated that LNAR operations were not expected to impact on background groundwater and surface water quality parameters (CDM Smith, 2012b); and
- Preliminary predictions based on sulfate and total dissolved solids (TDS) concentrations indicated that impacts from the LNAR associated with compounds such as boron, manganese, nickel, zinc, molybdenum, copper, arsenic and barium on the surrounding environment were unlikely (CDM Smith, 2012b).

5. SURFACE WATER ASSESSMENT

5.1 OBJECTIVE

The objective of the surface water monitoring program is to identify changes in the water quality of Wangcol Creek at an early stage so that potential causes can be investigated and, if necessary, effects mitigated. The surface water data is compared between locations and to the established Environmental Goals to assess changes in water quality, the extent to which changes may be related to activities associated with the LNAR, and to assess whether contingency measures should be considered and/or implemented.

5.2 SURFACE WATER MONITORING LOCATIONS

In order to assess for potential effects on surface water quality in the receiving environment adjacent to the LNAR, Environmental Goals for surface water are set out in the OEMP. The Environmental Goals have been applied to the following surface water monitoring sites (blue squares in Figure 4, Appendix A):

- Licenced Discharge Point (LDP12) under Environment Protection Licence (EPL) 13007, is used to monitor discharge from the Coal Settling Pond (CSP), and the data from this location is not representative of instream surface water conditions. Discharge from LDP12 enters the Western Drain, which is part of the upstream Wangcol Creek catchment, before flowing into the Final Holding Pond (FHP). Data from LDP12 is not regulated by the Environmental Goals and is provided in this report for comparison only;
- Licenced Monitoring Point (LMP01[2]) is located in Wangcol Creek, downstream of the FHP. The FHP holds storm water from the clean water diversions from around the MPPS and can be closed in the event of an environmental incident to limit the likelihood of adverse impacts to the downstream surface water environment. The FHP was approved by the EPA and constructed within Wangcol Creek; it operates as the final pollution control structure for surface water associated with the MPPS. Surface water monitoring location LMP01 is representative of instream conditions downstream of the FHP and upstream of the Ash Repositories;
- Surface water monitoring locations NC01 and SW_C are located within the midstream of the monitored area of Wangcol Creek, upstream of the LNAR; and
- Surface water monitoring locations SW_E, WX22 and SW_G are located in Wangcol Creek to the east/downstream of the Ash Repositories. WX22 is also WaterNSW stream gauge and monitoring point 212055.

5.3 SURFACE WATER MONITORING FREQUENCY

The surface water monitoring locations allow comparison of the condition of surface water in Wangcol Creek downstream of the LNAR with upstream surface water quality conditions to assess for potential changes in surface water quality. With reference to Figure 4, a summary of the surface water monitoring site locations is presented in Table 5-1.

[2] Historically, LMP01 was referred to as LDP01 within the OEMP (2019) and prior versions of the OEMP (CDM Smith, 2013).

TABLE 5-1 SURFACE WATER MONITORING SITE NETWORK AND FREQUENCY

Site ID	Location Description	Frequency	No. of Samples in 2022/23
LDP12	Monitors the discharge from the CSP.	As required by EPL 13007 during discharge.	9
LMP01	Located north-west of the MPAR in an upstream position relative to the Ash Repositories and is the location where flow from the headwaters of Wangcol Creek leaves the MPPS operational area, downstream of the FHP.	Monthly	12[1]
NC01	Located midstream in the monitored area of Wangcol Creek, upstream of the Ash Repositories.	Quarterly	12
SW_C	Located in Wangcol Creek, north-east of MPAR and adjacent to groundwater well D107.	Quarterly	12
SW_E	Located in Wangcol Creek, north-east of LNAR. Downstream of former open cut areas.	Quarterly	12
WX22	Located in Wangcol Creek at a stream gauge to the east and down-stream of the Ash Repositories. Also serves as WaterNSW stream gauge monitoring station 212055.	Monthly	12
SW_G	Located in Wangcol Creek, downstream of LNAR and of WX22. Located within former open cut mine footprint.	Quarterly	12

[1] Only sampling events where the full analytical suite was reported were counted in the above frequency

The number of samples in Table 5-1 indicates the number of occasions where a complete, or near complete suite of analysis was conducted. LMP01 was monitored 12 times for a full suite of analytes, with 12 additional monitoring events consisting of a limited analytical suite.

5.4 SURFACE WATER MONITORING METHODOLOGY

Surface water quality monitoring was undertaken by Nalco Water – Ecolab (Nalco) on behalf of EnergyAustralia. Details regarding the Nalco sampling method and quality assurance and quality control (QA/QC) program are presented in Appendix J, and these are understood to be in accordance with the sampling methodology outlined in the OEMP.

5.5 SURFACE WATER QUALITY DATASET

Samples were obtained by Nalco for either field or laboratory analysis in accordance with the analytes listed in the OEMP, and additional analytes, as follows:

- Physical and other parameters:
  - pH, total alkalinity, phenolphthalein alkalinity, bicarbonate alkalinity, Total Kjeldahl Nitrogen (TKN),
  - TDS, turbidity,
  - Electrical conductivity (EC), dissolved oxygen (DO), and
  - Nitrogen, Total phosphorus, filterable reactive phosphorus;
- Major and minor ions:
  - Chloride, sulfate as SO_4, fluoride, nitrite, nitrate, potassium, sodium; and
- Metals:
  - Al, As (III, V, III+V), Ba, B, Cd, Cr (III, VI, III+VI), Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, Se, Ag, and Zn.

It is noted that Ba, Cd, Cr, Pb, Mg, Hg, Mo, Se, Ag and Na were only analysed for total (unfiltered) concentrations during the current reporting period, although the OEMP specifies analysis of both total and dissolved (filtered) metals for surface water.

Evidence of the collection of field QC samples (i.e. rinsate, trip blanks or trip spikes) during the field based programs was not provided. Results of laboratory QC measures including laboratory duplicate, triplicate, method blanks or spike data were not presented for review and are not considered in this report.

5.6 SURFACE WATER RESULTS

A summary of the surface water analytical results obtained for the 2022/23 reporting period against the Environmental Goals for surface water is presented in Table 5-2 along with the data ranges presented for each analyte.

The complete set of tabulated results for each monitoring point is presented in Appendix B. Figures 6A and 6B present a selection of results for the current monitoring period, including EC, TDS, chloride, sulfate, and other analytes for which concentrations at one or more locations were reported above the Environmental Goals.

TABLE 5-2 SURFACE WATER MONITORING RESULTS – 2022/23

Analyte /Location	Surface Water Concentration Ranges							Surface Water Environmental Goal
	LDP12	LMP01	NC01	SW_C	SW_E	WX22	SW_G	
pH (field)	7.34 – 7.7	7.04 – **8.91**	6.83 – **8.02**	**6.28** – 7.96	6.63 – 7.47	7.02 – 7.56	6.65 – 7.98	6.5 – 8.0[a]
EC (µS/cm)	148.2 – 362	146 – 587	110 – 438	101 – 321	130 – 1790	168 – 1,970	167 – 1970	2,200[b]
TDS, Major and Minor Ions (mg/L)								
TDS (mg/L)	110 – 340	44 – 1020	144 – 294	94 – 203	134 – 1250	168 – 1,400	174 – 1330	1,500[c]
Sulfate (as SO_4) (mg/L)	15.17 – 74.9	16.18 – 256.7	19.5 – 109	14.3 – 77.3	26.1 – 678	38.4 – 704	38.4 – 776	1,000[d]
Chloride (mg/L)	20.77 – 38	20.77 – 64.29	4.45 – 17.1	5.19 – 13.6	6.96 – 144	9.18 – 154	9.16 – 172	350[e]
Fluoride (mg/L)	0.056 – 0.14	0.07 – 0.234	0.062 – 0.144	0.044 – 0.078	<0.05 – <0.2	0.05 – <0.5	0.051 – <0.5	1.5[f]
Trace Metals (µg/L)								
Arsenic (total) (µg/L)	<1	<1 – 18	<1 – 3	<1 – 4	<1 – 1	<1 – 2	<1 – 1	24[g]
Arsenic (µg/L)	<1	<1 – 1	<1	<1	<1	<1	<1	24[g]
Arsenic (III) (total) (µg/L)	<1	<1	<1	<1	<1	<1	<1	24

Analyte /Location	Surface Water Concentration Ranges							Surface Water Environmental Goal
	LDP12	LMP01	NC01	SW_C	SW_E	WX22	SW_G	
Arsenic (V) (total) (µg/L)	<1	<1	<1	<1	<1	<1	<1	13
Barium (µg/L)	4 – 11	6 – 271	15 – 33	18 – 29	18 – 42	14 – 38	14 – 34	700[f]
Beryllium (µg/L)	<1	<1 – 9	<1	<1 – 3	<1	<1	<1	100[i]
Boron (total) (µg/L)	<50 – 80	<50 – 100	<50	<50	<50 – 300	<50 – 320	<50 – 330	370[g]
Boron (µg/L)	<50 – 100	<50 – 70	<50 – 110	<50	<50 – 300	<50 – 340	<50 – 320	370[g]
Cadmium (µg/L)	<0.1	<0.1 – **0.9**	<0.1 – 0.4	<0.1 – **1.1**	<0.1	<0.1	<0.1	0.85[h]
Chromium (µg/L)	<1	<1 – **22**	<1 – **4**	<1 – **2**	<1 – **2**	<1 **– 2**	<1 – **2**	2[h]
Chromium (III) (total) (µg/L)	**<10***	**<10***	**<10***	**<10***	**<10***	**<10***	**<10***	3.3
Chromium (VI) (total) (µg/L)	**<10***	**<10***	**<10***	**<10***	**<10***	**<10***	**<10***	1
Copper (total) (µg/L)	<1	<1 – 22	<1 – **8**	<1 – **6**	<1 – 6	<1 – **8**	<1 – 7	3.5[h] / 5[j]
Copper (µg/L)	<1	<1 – 6	<1 – 3	<1 – 2	<1 – 2	<1 – 2	<1 – 2	3.5[h] / 5[j]
Iron (total) (µg/L)	<50 – 50	140 – **46,000**	**480 – 2,170**	300 – **2,130**	**460 – 3,840**	80 – **2,230**	50 – **2,320**	300[e]

Analyte /Location	Surface Water Concentration Ranges							Surface Water Environmental Goal
	LDP12	LMP01	NC01	SW_C	SW_E	WX22	SW_G	
Iron (µg/L)	<50	<50 – **3,770**	<50 – **350**	60 – **330**	250 – **2,800**	<50 – 270	<50 – **310**	300[e]
Lead (µg/L)	<1	<1 – **160**	<1 – **5**	<1 – 4	<1 – 4	<1 – **5**	<1 - 4	5[g]
Manganese (total) (µg/L)	13 – 124	42 – 1140	114 – 1160	52 – 247	119 – **2990**	97 – **2,150**	97 – 1,770	1,900[g]
Manganese (µg/L)	11 – 127	28 – 271	46 – 420	46 – 200	119 – **2840**	62 – 1,650	41 – 1,650	1,900[g]
Mercury (µg/L)	<0.04	<0.01 – 0.05	<0.04 – 0.26	<0.04	<0.04 – 0.06	<0.04 – 0.05	<0.04	0.06
Molybdenum (µg/L)	1 - 9	<1 – **181**	<1 – **25**	<1 – 17	<1 – 1	<1 – 3	<1 – 1	10[i]
Nickel (total) (µg/L)	<1 - 3	<1 – **40**	2 – 8	1 – 7	8 – **117**	12 – **152**	11 – **153**	17[g] / 15[j]
Nickel (µg/L)	<1 - 3	<1 – 15	1 - 5	<1 – 5	6 – **173**	6 – **153**	3 – **151**	17[g] / 15[j]
Selenium (µg/L)	**<10***	**<10* - 10**	<0.2 - **10**	<0.2 - **40**	<0.2 - **<10***	<0.2 - **<10***	<0.2	5[g]
Silver (µg/L)	**<1***	**<1***	**<1***	**<1***	**<1***	**<1***	**<1***	0.05[g]
Zinc (total) (µg/L)	<5	7 – **685**	<5 – 34	<5 – 27	<5 – 22	<5 – 30	<5 – 24	116[k]
Zinc (µg/L)	<5	<5 – **155**	<5 – 12	<5 – 6	<5 – 11	<5 – 10	<5 – 8	116

Analyte /Location	Surface Water Concentration Ranges							Surface Water Environmental Goal
	LDP12	LMP01	NC01	SW_C	SW_E	WX22	SW_G	

Notes:
NA: Not Available
Both unfiltered (total) and filtered (dissolved) metal concentrations shown where available.
Shaded cell indicates value is equal to or above the Environmental Goal
Bold indicates result is 1 - <10 times the Environmental Goal
Bold and shaded indicates result is >10 times the Environmental Goal
** Laboratory limit of reporting exceeds the Environmental Goal*
a. ANZECC (2000) pH values presented are for groundwater systems and based on aesthetic considerations such as corrosion and fouling of pumping, irrigation and stock watering systems) for primary industries
b. ANZECC 2000 – EC range for lowland rivers in slightly disturbed ecosystems in south-east Australia is 125-2200 µS/cm
c. 1,500 mg/L based on a conversion factor of 0.68 and an EC of 2200 µS/cm lowland river conductivity for slightly disturbed ecosystems
d. ANZECC (2000) Livestock
e. ANZECC (2000) Irrigation for moderately tolerant crops
f. ANZECC (2000) Drinking water guidelines
g. ANZECC 2000 for Freshwater Slightly-Moderately disturbed aquatic ecosystems (B 90th, Pb 90th, Ni 80th, Se 90th, Ag 90th)
h. Concentrations of cadmium, chromium and copper modified due to consideration of water hardness. Cd from 0.001 mg/L to 0.00085 mg/L; Cr from 0.001 mg/L to 0.002 mg/L and Cu from 0.0025 mg/L to 0.0035 mg/L
i. ANZECC (2000) Irrigation LTV
j. Lamberts North pre-placement 90th percentile baseline data from October 2012 to August 2013 and Wangcol Creek at WX22 as presented in Aurecon (2017)
k. Local guideline based on 90th percentile pre-brine placement.

5.7 DISCUSSION OF RESULTS

The surface water data from the reporting period is presented in Appendix B, where the results are compared to the Surface Water Environmental Goals. Figure 6A summarises the surface water data collected during the reporting period.

5.7.1 FIELD PARAMETERS, MAJOR AND MINOR IONS

EC, TDS, sulfate (as SO_4), and chloride concentrations at downstream monitoring locations (SW_E, WX22 and SW_G) were slightly higher than those at upstream and midstream monitoring locations (LMP01, NC01, SW_C); however, there were no concentrations reported above the adopted Surface Water Environmental Goals for these parameters.

These downstream detections are not considered to be due to ash placement activities occurring at the LNAR. As reported in the Environmental Monitoring Report – Water Management and Monitoring for the Mt Piper Power Station Brine Conditioned Fly Ash Co-Placement Project (ERM, 2020, 2021, 2022, 2023) which focuses on the MPAR, these results are considered to be primarily related to BCA placement activities at the MPAR, with some contributions from conditions related to historical mining.

pH values were relatively consistent at the monitoring locations, with only six values reported above the Surface Water Environmental Goal. Four were at LMP01 in December 2022, April 2023, May 2023 and June 2023, one at SW_C in September 2022, and one at NC01 in July 2023 all of which are upstream and midstream locations.

5.7.2 METALS

Higher concentrations of boron and nickel were reported at downstream monitoring locations (SW_E, WX22 and SW_G) compared to upstream and midstream monitoring locations (LMP01, NC01, SW_C).

Concentrations were below the Surface Water Environmental Goal for boron, however nickel concentrations were above the Environmental Goal at all three downstream monitoring locations (WX22, SW_E and SW_G) throughout the reporting period (except September - November 2022) and at LMP01 during the September 2022, May - June 2023 monitoring events.

Chromium III and chromium VI were reported with a laboratory limit of reporting (LOR) of 10 µg/L. This is above the Environmental Goals of 3.3 µg/L and 1 µg/L respectively; however, the LOR for total chromium is 1 µg/L. Total chromium concentrations above the Environmental Goal were reported at the monitored surface water locations during the September 2022 sampling event and at LMP01 and NC01 on other occurrences throughout the reporting period. This indicates that, when the speciated concentrations were each <10 ug/L, the actual concentrations of speciated chromium would also be below the respective Environmental Goal.

Mercury was reported at a concentration marginally (less than 10 percent) above the Surface Water Environmental Goal for NC01 on one occasion during the reporting period and at the Environmental Goal at SW_E on one occasion.

Cadmium and selenium were reported above the respective Surface Water Environmental Goals at LMP01 and SW_C during the September monitoring event and total copper was reported above the Environmental Goal at all locations (except for LDP12) also during the September monitoring event. Lead concentrations were reported at or above the Surface Water Environmental Goal during the September monitoring event for monitoring locations NC01, WX22 and LMP01; lead concentrations at LMP01 were above the Environmental Goal throughout the reporting period.

Zinc was reported above the Surface Water Environmental Goal at LMP01 on four occurrences and manganese concentrations reported at SW_E during the February – September 2023 monitoring periods were above the Surface Water Environmental Goal as was concentrations during the March monitoring period at WX22.

Concentrations of iron in Wangcol Creek above the Surface Water Environmental Goal that were identified during the 2022/23 reporting period are considered to be comparable to background surface water quality in the area, based on the surface water results from LMP01 and NC01 which are located upstream of the Ash Repositories.

5.8 REVIEW OF SURFACE WATER CONCENTRATION TRENDS

A review of concentration trends in surface water with respect to key analytes including chloride, TDS, sulfate, selenium, molybdenum and nickel is presented below. These constituents were selected as they are considered to be indicators of potential changing conditions resulting from operations at the Ash Repositories, based on historic concentrations above the Environmental Goals for surface water and/or trends identified in previous annual monitoring reports. Surface water trend graphs for the last ten years (to the end of the current reporting period) are presented in Appendix E for LMP01, NC01, SW_C, SW_E, WX22 and SW_G. Due to the varying laboratory LORs used throughout monitoring rounds, non-detects have been assigned a value of zero for the purposes of the trend graph and do not represent actual concentrations.

5.8.1 UPSTREAM MONITORING RESULTS

LMP01 is located upstream of the Ash Repositories and water quality at this location is not considered to be influenced by activities at the LNAR. However, other aspects of the MPPS (e.g. brine transfer pipelines and brine waste holding ponds) are located within the catchment upstream of LMP01. Data for LMP01 is presented in Appendix B, Appendix E, and summarised in Figure 6A.

5.8.1.1 MAJOR AND MINOR IONS

Throughout the reporting period, concentrations of major and minor ions for which there are Environmental Goals (chloride, sulfate and fluoride) at LMP01 (and LDP01) were below the relevant Environmental Goals for surface water.

Graphs of concentrations over the last 10 years for LMP01 show fluctuations of sulfate and chloride over time; however, the concentrations for the current reporting period appear generally steady and within the historical range.

5.8.1.2 METALS

Throughout the reporting period cadmium, chromium, copper, iron, lead, molybdenum, nickel, selenium and zinc were identified on one or more occasions at concentrations above the relevant Environmental Goals for surface water at LMP01.

Selenium was reported below 10 µg/L laboratory limit of reporting (LOR), which is noted to be above the Environmental Goal (5 µg/L) for the majority of surface water samples analysed during the reporting period. The concentration during the September 2022 monitoring period was reported at or above 10 µg/L, and therefore also above the Environmental Goal. Non-detects were assigned a value of zero for the trend graphs in Appendix E. The raised laboratory LOR above the Environmental Goal was due to a changed laboratory LOR part way through the previous reporting period (2021/22), and the laboratory LOR will be amended for future monitoring periods.

For all samples throughout the reporting period silver concentrations were reported below the laboratory LOR (<1 µg/L), which was above the Environmental Goal for silver (0.05 µg/L). ERM understands that a laboratory LOR that is lower than the Environmental Goal for silver is unachievable by the laboratory. Based on the results of previous monitoring, including concentrations of silver in brine (<10 µg/L during 2021/22) and in groundwater (<1 µg/L), silver is not considered to represent a primary constituent of concern for monitoring as presented in ERM (2022).

Data from the last 10 years for LMP01 (Appendix E) show fluctuations of nickel concentrations over time, however the concentrations measured during the current reporting period appear generally consistent and within the historical range.

Decreasing concentrations of molybdenum since July 2020 were apparent in surface water from LMP01, with a spike reported during this reporting period during the February 2023 sampling event. Concentrations have since returned back to within the historical range.

5.8.2 MIDSTREAM MONITORING RESULTS

Locations NC01, SW_C and SW_E represent midstream conditions relative to the LNAR in the monitored area of Wangcol Creek.

Locations NC01 and SW_C are located north of the LNAR along an area of Wangcol Creek that is not known to have been subject to open cut mining operations. SW_E is located further downstream of NC01 and SW_C, to the east of the Ash Repositories and immediately downstream from an area of Wangcol Creek that was historically subject to open cut mining activities.

The surface water field and analytical results obtained from sample points NC01, SW_C and SW_E, for the reporting period are presented in Appendix B, Appendix E, and summarised in Figure 6A.

5.8.2.1 MAJOR AND MINOR IONS

Graphs of concentrations over the last 10 years for chloride and sulfate are consistent with those for TDS and show that chloride and sulfate concentrations at NC01 and SW_C have remained low and stable over this period. Consistent with increased TDS and EC values, concentrations of chloride and sulfate in surface water from SW_E spiked during 2019/20 but returned to concentrations below the Environmental Goals during the 2020/21 reporting period. Concentrations at SW_E remained below the respective Environmental Goals for TDS, chloride and sulfate for the current reporting period, however an increasing trend is apparent at SW_E for sulfate, chloride and TDS during the 2022/23 monitoring period.

Consistent with EC and TDS, the major ion concentrations at SW_E were generally higher compared to those further upstream at NC01 and SW_C.

5.8.2.2 METALS

For midstream surface water monitoring locations, the selenium laboratory LOR was <10 µg/L for the September 2022 sampling event, which was above the Environmental Goal of 5 ug/L, however for the remainder of the period the LOR was reported at <0.2 µg/L. The selenium concentrations in September 2022 were above the Environmental Goal at NC01 and SW_C, however, concentrations were below the Environmental Goal for all other sampling events during this monitoring period, consistent with historical values.

For all samples throughout the reporting period silver concentrations were reported below the laboratory LOR (<1 µg/L), which was above the Environmental Goal for silver (0.05 µg/L). Refer to Section 5.8.1.2 for commentary relating to the laboratory limits of reporting versus the Environmental Goals for surface water.

Consistent with major ion concentrations and TDS and EC values, the nickel concentrations were higher at SW_E than at NC01 and SW_C, and SW_E accounted for the majority of nickel results above the Environmental Goal from the midstream monitoring locations.

Graphs of concentrations over the last 10 years for nickel (Appendix E) are consistent with TDS, and show that concentrations of nickel at NC01 and SW_C have remained low and stable. Nickel concentrations at SW_E spiked during the 2019/20 reporting period, but decreased to within the historical range during the 2020/21 reporting period. Nickel concentrations from SW_E were above the Environmental Goals for surface water in nine of the 12 samples analysed during the previous reporting period (2021/22) and continued to rise from late 2022 although they remained below the highest concentrations that were measured in the 2019/20 reporting period.

Concentrations of molybdenum were reported below the LOR or Environmental Goal in surface water at NC01, SW_C and SW_E for the current reporting period with the exception of concentrations reported at NC01 during the July 2023 sampling round and at SW_C and NC01 during the August 2023 sampling round.

5.8.3 DOWNSTREAM MONITORING RESULTS

Locations WX22 and SW_G are considered to represent downstream conditions relative to the LNAR in the monitored area of Wangcol Creek.

Both WX22 and SW_G are located east of the LNAR along an area of Wangcol Creek that is downstream of and, in the case of SW_G, has been subject to, open cut mining operations.

The surface water field and analytical results obtained from sample points WX22 (SW_F) and SW_G for the reporting period are presented in Appendix B, Appendix E, and summarised in Figure 6A.

5.8.3.1 MAJOR AND MINOR IONS

Graphs of concentrations over the last 10 years for WX22 and SW_G (Appendix E) show chloride and sulfate concentrations have fluctuated over time and are consistent with TDS trends. As per TDS concentrations, chloride and sulfate concentrations were highest during February 2014, February 2018 and January 2020. Increasing trends were apparent at WX22 and SW_G for sulfate, chloride and TDS concentrations during the 2022/23 monitoring period; however, concentrations have remained below the Environmental Goals since at least March 2020.

5.8.3.2 METALS

For downstream surface water monitoring locations, the selenium laboratory LOR was <10 µg/L for the September 2022 sampling event, which was above the Environmental Goal, however for the remainder of the period the LOR was reported at <0.2 µg/L. Selenium concentrations at the downstream locations were below the Environmental Goal and/or the LORs. For all samples throughout the reporting period silver concentrations were reported below the laboratory LOR (<1 µg/L) exceeding the Environmental Goal for silver (0.05 µg/L). Refer to Section 5.8.1.2 for commentary relating to the laboratory limits of reporting versus the Environmental Goals for surface water.

Graphs of concentrations over the last 10 years for WX22 and SW_G (Appendix E) show nickel concentrations have fluctuated over time and are generally consistent with TDS trends. Concentrations of nickel fluctuated throughout the reporting period and exceeded the Environmental Goal consistently throughout the reporting period from December 2022.

Concentrations of molybdenum were generally reported below the LOR of <1 µg/L, with periodical detections throughout the reporting period; however, all concentrations were below the Environmental Goal.

6. GROUNDWATER

6.1 OBJECTIVES

The objective of the groundwater monitoring program is to identify groundwater quality changes at an early stage so that potential causes can be investigated and, if necessary, effects mitigated. The groundwater data is compared between locations, to historical data, and to the established Environmental Goals to assess changes in water quality, the extent to which changes may be related to activities associated with the LNAR, and to assess whether contingency measures should be considered and/or implemented.

6.2 GROUNDWATER MONITORING LOCATIONS

To summarise the groundwater data, the groundwater wells have been categorised into five groups based on their hydraulic location in relation to the LNAR as described in Table 6-1. The groundwater monitoring zones are summarised as follows:

- Upgradient / background: D4 and D5;
- Upgradient / adjacent MPAR: D3, D106, D107, D119;
- Within / immediately adjacent LNAR North: D10, D11, D20, D110, D117;
- Within / immediately adjacent LNAR South: D15, D16A, D17, D18; and,
- Cross- and downgradient of LNAR / adjacent Wangcol Creek: D1, D2, D8, D9, D19, D102, D103, D104, D105, D113.

6.3 GROUNDWATER MONITORING FREQUENCY

A summary of the groundwater monitoring locations is presented in Table 6-1 and Figure 4, Appendix A.

TABLE 6-1 GROUNDWATER MONITORING NETWORK AND FREQUENCY

Well ID	Monitoring Zone	Screened Lithology	Frequency[1]	No. of Samples
MPGM4/D1	Cross- and downgradient of LNAR / adjacent Wangcol Creek)	Mudstone, sandstone and coal	Quarterly	4
MPGM4/D3	Upgradient / adjacent MPAR	Bedrock (sedimentary)	Quarterly	4
MPGM4/D4	Upgradient / background	Bedrock (sedimentary)	Quarterly	4
MPGM4/D5	Upgradient / background	Bedrock (sedimentary)	Quarterly	4
MPGM4/D8	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Alluvial deposits	Quarterly	4
MPGM4/D9	Cross- and downgradient of LNAR / adjacent Wangcol Creek)	Alluvial deposits	Quarterly	4
MPGM4/D10	Within / immediately adjacent LNAR North)	Fill beneath the ash	Quarterly	4

Well ID	Monitoring Zone	Screened Lithology	Frequency[1]	No. of Samples
MPGM4/D11	Within / immediately adjacent LNAR North	Fill beneath the ash	Quarterly	3
MPGM4/D15	Within / immediately adjacent LNAR South	Sandstone and/or shale	Quarterly	4
MPGM4/D17	Within / immediately adjacent LNAR South	Sandstone and/or shale	Quarterly	4
MPGM4/D18	Within / immediately adjacent LNAR South	Sandstone and/or shale	Quarterly	4
MPGM4/D19	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Fill (mine spoil)	Quarterly	4
D20	Within / immediately adjacent LNAR North	Fill (mine spoil)	Quarterly	4
D102	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Bedrock (sedimentary)	Quarterly	4
D103	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Bedrock (sedimentary)	Quarterly	4
D104	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Bedrock (sedimentary)	Quarterly	4
D105	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Bedrock (sedimentary)	Quarterly	4
D106	Upgradient / adjacent MPAR	Bedrock (sedimentary)	Quarterly	4
D107	Upgradient / adjacent MPAR	Bedrock (sedimentary)	Quarterly	4
D110	Within / immediately adjacent LNAR North	Bedrock (sedimentary)	Quarterly	4
D113	Cross- and downgradient of LNAR / adjacent Wangcol Creek	Bedrock (sedimentary)	Quarterly	4
D117	Within / immediately adjacent LNAR North	Fill (mine spoil)	Quarterly	3
D119	Upgradient / adjacent MPAR	Bedrock (sedimentary)	Quarterly	4
D16A	Within / immediately adjacent LNAR South	Bedrock (sedimentary)	Quarterly	3

[1]Monitoring frequency as specified in the OEMP

Well D16 has been decommissioned, and was replaced by D16A in April 2022. Additionally well D11 was decommissioned in February 2023 as part of the LNAR 1B Liner Installation works.

6.4 GROUNDWATER MONITORING METHODOLOGY

Groundwater quality monitoring was undertaken by Nalco on behalf of EnergyAustralia. Details regarding the Nalco sampling method and QAQC program are presented in Appendix J, and these are understood to be in accordance with the sampling methodology outlined in the OEMP.

6.5 GROUNDWATER QUALITY DATASET

Groundwater samples were obtained for analysis in accordance with the following:

- Physical and other parameters:
  - pH, total alkalinity, phenolphthalein alkalinity, bicarbonate alkalinity, TKN,
  - TDS, turbidity, and
  - EC, DO;
- Major and minor anions:
  - Chloride, sulfate as SO4, fluoride, potassium and sodium; and
- Metals (dissolved):
  - As, Ba, B, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, Se, Ag, and Zn.

It is noted that for Ba, Cd, Cr, Pb, Mg, Hg, Mo, Se, and Ag only total (unfiltered) metal concentrations were analysed; however, the OEMP specifies that metal concentrations for groundwater be analysed as dissolved (filtered) instead of total.

Evidence of the collection of field QC samples (i.e., rinsate, trip blanks or trip spikes) during the field-based programs was not provided. Results of laboratory QC measures including laboratory duplicate, triplicate, internal duplicates, method blanks or spike data were not presented for review and are not considered in this report.

6.6 GROUNDWATER RESULTS

6.6.1 GROUNDWATER LEVELS AND INFERRED FLOW DIRECTION

Water levels measured during the reporting period were generally highest at the start of the reporting period (October – November 2022) before decreasing during the remainder of the period. The exception to this were wells D117 and D107 in which water levels spiked during May 2023 (noting highly variable reported water levels in well D117). The overall declining groundwater elevations are considered to be related to the low rainfall that occurred over the reporting period. The lowest groundwater elevations at each monitoring location were generally recorded towards the end of the reporting period. Hydrographs showing the rainfall data overlaid by groundwater level as measured at each of the groundwater wells are presented in Appendix D.

Groundwater levels in the monitored wells adjacent to and within LNAR North (i.e. D10, D11, D20, D110 and D117) and LNAR South (i.e. D15, D17 and D18) remained below the base of ash placement in the LNAR (917 m AHD), although D15 peaked at 916.77 m AHD.

Groundwater levels were used to infer local groundwater flow directions in spring (September 2022), summer (November 2022), autumn (March 2023), and winter (June 2023), as shown in Figures 5A – 5D, Appendix A. The water levels recorded from well D11 were not included in the calculation as this well was decommissioned and capped in February 2023. Further, water levels recorded from D119 were not included in groundwater contouring due to the spatial isolation of this location relative to the remainder of the groundwater monitoring network. Water levels from well D117 were also excluded from contouring due to the high variability in the groundwater levels during the reporting period.

Throughout the reporting period, groundwater was generally inferred to flow to the east / north-east. Groundwater in the northern half of the LNAR appears to flow more towards the north-east and in the southern half of the LNAR slightly more towards the south-east. The groundwater flow direction remained relatively consistent throughout the seasons and with previous reporting periods.

6.6.2 GROUNDWATER ANALYTICAL RESULTS SUMMARY

A summary of groundwater analytical results obtained for the 2022/23 reporting period against the Environmental Goals is presented in Table 6-2 along with the data ranges presented for each analyte. The complete set of tabulated results for each groundwater monitoring well are presented in Appendix C.

TABLE 6-2 SUMMARY OF GROUNDWATER CONCENTRATIONS - 2022/23 REPORTING PERIOD

Analyte / Location	Groundwater Concentration Range (2022/23)					Screening Criteria	
	Upgradient / background	Upgradient / adjacent MPAR	Within / immediately adjacent LNAR North	Within / immediately adjacent LNAR South	Cross- and down gradient of LNAR / adjacent Wangcol Creek	Groundwater Collection Basin Pre-Ash Placement 90th Percentile [a]	Groundwater Environmental Goal[a b,c,e]
pH (field)	**3.36 – 5.98**	**5.47-6.43**	**5.78 – 6.09**	**5.26** – 6.77	**5.06** – 6.5	NA	6.5 – 8.0[a]
EC (µS/cm)	690 – 1220	269 – **15,560**	**3,880 – 9,250**	670 – **2,790**	206 – **12,370**	1,576	2,600[a]
TDS, Major and Minor Ions (mg/L)							
TDS (mg/L)	494 – 946	184 – **13,600**	**3,260 – 8,010**	343 – **2,220**	163 – **11, 000**	1,306	1,500[a]
Sulfate (as SO_4) (mg/L)	272 – 552	51.9 – **8,540**	**2180 – 4,880**	9 – **1,290**	17 – **6,330**	824	1,000[a]
Chloride (mg/L)	14.2 – 27	31.5 – **1,730**	104 – **1,310**	7.83 – 149	5.76 – **1,520**	31.5	350[a]
Fluoride (mg/L)	<0.1 – <0.2	<0.05 – 0.317 (LOR < 0.1, < 0.5, < 1, < 2)	< 0.5 – **3.73** (LOR < 1)	< 0.2 – 0.468 (LOR < 0.5)	< 0.01 – 0.363 (LOR < 0.2, 0.5, < 1, < 2)	0.435	1.5[d]
Trace Metals (µg/L)							
Arsenic (µg/L)	<1 – **33**	<1 – **24**	<1 – 8	< 1 – 23	<1 – 23	1	24[b]
Barium (total) (µg/L)	14 – 22	16 – 85	12 – 45	12 – **747**	11 – 451	37	700[f]
Boron (µg/L)	<50 – 70	<50 – **5,390**	**1,580- 13,300**	< 50 – 180	< 50 – **3,660**	244	370[b]

Analyte / Location	Groundwater Concentration Range (2022/23)					Screening Criteria	
	Upgradient / background	Upgradient / adjacent MPAR	Within / immediately adjacent LNAR North	Within / immediately adjacent LNAR South	Cross- and down gradient of LNAR / adjacent Wangcol Creek	Groundwater Collection Basin Pre-Ash Placement 90th Percentile [a]	Groundwater Environmental Goal[a b,c,e]
Cadmium (total) (µg/L)	<0.1 – 0.3	<0.1 – 1.4	< 0.01 – **43.6**	< 0.1 – 0.2	< 0.1 – 0.3	2	2[d,e]
Chromium (total) (µg/L)	< 1 – 2	< 1 – **38**	< 1 – **37**	< 1 – **70**	< 1 – **234**	1	5[d]
Copper (µg/L)	<1 – **24**	<1 – **5**	< 1 – 1	< 1 – 1	< 1 – **35**	1	5[a]
Iron (µg/L)	**31,200 – 62,400**	33 – **39,500**	80 – **52,000**	11 – **23,500**	< 50 – **65,300**	664	664[e]
Manganese (µg/L)	583 - 7,740	25 - **26,100**	**5790 - 30,200**	79 – 2,160	130 – **24,000**	5,704	5,704[e]
Mercury (total) (µg/L)	<0.04	< 0.04 – **0.3**	< 0.04 – 0.05	< 0.04	< 0.04 – **0.36**	<0.1	0.06[c]
Molybdenum (total) (µg/L)	<1	< 1 - **12**	< 1 – **350**	< 1 – 3	< 1 - **11**	1	10[a]
Nickel (µg/L)	10-61	7 – **2,920**	330- **2,160**	3 – 391	28 – **2,230**	550.9	550.9[e]
Lead (total) (µg/L)	<1 - 16	< 1 - **46**	< 1 – **17**	< 1 -**7**	< 1 – **7**	1	5[f]
Selenium (total) (µg/L)	< 0.2 – 0.3 (LOR <10)	< 0.2 – 1.4 (LOR < 10)	< 10 – **129**	< 0.2 – 0.2 (LOR <10)	< 0.2 - 0.4 (LOR < 10)	2	5[c]

Analyte / Location	Groundwater Concentration Range (2022/23)					Screening Criteria	
	Upgradient / background	Upgradient / adjacent MPAR	Within / immediately adjacent LNAR North	Within / immediately adjacent LNAR South	Cross- and down gradient of LNAR / adjacent Wangcol Creek	Groundwater Collection Basin Pre-Ash Placement 90th Percentile [a]	Groundwater Environmental Goal[a b,c,e]
Silver (total) (µg/L)	**<1**	**<1**	**< 1**	**<1**	**<1**	**<1**	0.05[b]
Zinc (µg/L)	30-162	<5 - **412**	248 – **1,270**	17 – 616	9 – 774	908	908[e]

Notes:
NA: Not Available
***Bold** indicates result is 1 - <10 times the Environmental Goal*
***Bold** and **shaded** indicates result is >10 times the Environmental Goal*
Dissolved metals presented above as per the OEMP, unless otherwise specified
** Laboratory limit of reporting exceeds the Environmental Goal*
[a] Criteria from OEMP.
[b] OEMP Criteria - ANZECC (2000) 95% Level of species protection for freshwater aquatic ecosystems.
[c] OEMP Criteria - ANZECC (2000) 99% Level of species protection for freshwater aquatic ecosystems.
[d] OEMP Criteria - NHMRC (2011) Australian Drinking Water Guidelines.
[e] OEMP Criteria - adopted from Groundwater Collection Basin Pre-Ash Placement 90th Percentile
[f] OEMP Criteria - NHMRC (2008) Guidelines for Managing Risks in Recreational Waters.
[g] Lamberts North pre-placement 90th Percentile baseline data from October 2012 to August, 2013 and Neubecks Creek (now referred to as Wangcol Creek) at WX22 (Aurecon, 2017).

6.7 DISCUSSION OF RESULTS

The following subsections provide a discussion of groundwater results in each of the monitoring zones. The groundwater data from the reporting period is presented in Appendix C, where the results are compared to the groundwater Environmental Goals. Figure 6B to Figure 6F present a selection of groundwater results (per monitoring zone) for the current monitoring period, including EC, TDS, chloride, sulfate, and others for which reported measurements at one or more locations were above the Environmental Goals.

6.7.1 UPGRADIENT / BACKGROUND WELLS

pH values in groundwater from upgradient wells, D4 and D5, were consistently below the Environmental Goal range (6-8.5). Groundwater conditions at D4 were acidic and consistently reported at or below pH 3.5. Groundwater from D5 was less acidic and ranged from pH 5.83 to 5.98. The rest of the physical parameters and major ions analysed in groundwater from these wells were within the Environmental Goals.

Elevated iron (dissolved) concentrations were reported in groundwater from D4 and D5, with a concentration range of 31,200 – 62,400 µg/L during the current reporting period. These values are two orders of magnitude above the Environmental Goal, indicating elevated background concentrations of iron upgradient of the Ash Repositories.

Manganese (dissolved) concentrations were consistently above the Environmental Goal of 5,704 µg/L in groundwater from well D5 (maximum 7,740 µg/L), but were significantly lower than the Environmental Goal in groundwater from well D4.

Lead concentrations in groundwater from well D4 were consistently above the Environmental Goal of 5 µg/L, with a maximum concentration of 16 µg/L during the reporting period. Concentrations of lead in groundwater from well D5 were below the LOR. It is noted that only total, rather than total and dissolved, lead concentrations were reported for groundwater, and these have been conservatively compared to the Environmental Goal.

Additionally arsenic concentrations in groundwater from well D4 were consistently above the Environmental Goal of 24 µg/L, with a maximum concentration of 33 µg/L during the reporting period for both total and dissolved arsenic. Concentrations of arsenic in groundwater from well D5 were below the LOR.

Given the hydraulic gradient observed, with an inferred local groundwater flow direction towards the east, concentrations recorded at D4 and D5 are not considered to be associated with the activities at the LNAR and are taken to be background concentrations that may also be influenced by historical mining and other activities within the upgradient surrounding area.

6.7.2 WELLS UPGRADIENT / ADJACENT MPAR

Wells upgradient of / adjacent to the MPAR include D106, D107, D3 (north of MPAR) and D119 (south of MPAR). pH measured in groundwater from these wells was slightly acidic, with all measurements recorded below the range of the Environmental Goal for pH (6.5-8).

Groundwater from wells D106 and D107 was characterised by the highest EC values, and TDS, sulfate and chloride concentrations compared to groundwater from the other wells sampled for this reporting period.

TDS, which is a marker for solutes, including elevated chloride, sulfate and related dissolved metals, was consistently recorded above the Environmental Goal by an order of magnitude at D106 and D107. TDS values at D3, which is the most hydraulically upgradient (west) of these wells relative to the Ash Repositories, did not exceed the Environmental Goal. Sulfate and chloride concentrations indicated similar trends to TDS, with the most elevated concentrations at D106 and D107 above the Environmental Goals. Sulfate and chloride concentrations in groundwater from D3 were below the Environmental Goals. EC, TDS, sulfate and chloride concentrations in groundwater from D119 were higher than in groundwater from D3 and the background monitoring wells, however concentrations remained below the Environmental Goals for these parameters throughout the monitoring period. The concentrations of EC, TDS, sulfate and chloride from D119 were lower than in the previous reporting period, declining to values below the relevant Environmental Goals.

Fluoride concentrations in groundwater from D106 and D107 were reported below the LOR (<2 mg/L); however, it is noted that the LOR is higher than the Environmental Goal of 1.5 mg/L. This was due to the increased EC of the samples, requiring additional laboratory dilution for analysis. Fluoride concentrations in groundwater from D3 and D119 were below the Environmental Goal.

Arsenic concentrations were above the Environmental Goal in groundwater from three out of four monitoring events at D119. Arsenic concentrations at remaining wells within this monitoring group (D106, D107 and D3) remained below the Environmental Goal.

Boron concentrations were above the Environmental Goal by an order of magnitude in groundwater from wells D106 and D107, and were above the Environmental Goal in three of the four monitoring events at D119. Concentrations in groundwater from well D3 remained below the Environmental Goal. Iron exceeded the Environmental Goal, with the maximum concentration recorded at D107 (44,200 µg/L) being approximately half the maximum concentration of the hydraulically upgradient / background wells. Manganese and nickel consistently exceeded the Environmental Goal in groundwater from D106 and D107 by an order of magnitude for both analytes. At times during the reporting period, mercury concentrations were above the Environmental Goal in groundwater from D106, D107 and D119, although concentrations were reported within the same order of magnitude as the Environmental Goal. Copper concentrations were reported above the Environmental Goal intermittently throughout the reporting period in groundwater from all monitoring well locations upgradient / adjacent MPAR. Lead concentrations were consistently above the Environmental Goal in groundwater from D107 and intermittently at D106 and D119, noting that only total mercury and total lead concentrations were analysed, so this screening may be conservative as the Environmental Goals are intended to apply to dissolved concentrations. Molybdenum concentrations were reported above the Environmental Goal in groundwater from D119 on one occasion. Silver concentrations were consistently reported below the LOR (<1 µg/L) at all monitoring wells however the LOR is above the Environmental Goal.

Considering the hydraulic gradient, the concentrations recorded above the Environmental Goals in groundwater from these wells, which are upgradient of the LNAR / adjacent to the MPAR, are not associated with activities at the LNAR.

6.7.3 WELLS WITHIN / IMMEDIATELY ADJACENT LNAR NORTH

Wells within / immediately adjacent to LNAR north are D10, D11, D110, D117, and D20. D117 is screened in compacted fill in the footprint of the former GCB.

pH measured from in groundwater from these wells was slightly acidic, with measurements recorded below the range of the Environmental Goal for pH (6.5-8). This is considered to be consistent with background conditions.

EC and TDS values were above the Environmental Goal in groundwater from each of these wells, with the highest concentrations measured in groundwater from D11. Sulfate concentrations showed a similar trend, with all reported values above the Environmental Goals and the highest concentrations recorded for groundwater from D11. Chloride concentrations in groundwater from D10, D11 and D110 were above the Environmental Goals throughout the reporting period. The EC, TDS, sulfate and chloride concentrations in groundwater from these bores were within the historical ranges.

Fluoride concentrations were consistently above the Environmental Goal in groundwater from D117, with concentrations in the other wells within this area consistently below the LOR, with the exception of the March 2023 sampling event where fluoride was detected in samples collected from D10, D11 and D20.

Boron concentrations were consistently above the Environmental Goal for groundwater from each of the wells within this monitoring zone. The maximum concentration of 13,300 µg/L, measured in groundwater from D117, was three times the maximum upgradient concentration of D106 and D107. Boron concentrations at D117 were consistently an order of magnitude above the rest of the wells monitored for the reporting period. Cadmium concentrations were also consistently above the Environmental Goal in groundwater from D20 and D117. This group of wells was the only one to report elevated cadmium concentrations, noting that only total cadmium concentrations were analysed. Chromium was reported above the Environmental Goal intermittently at D20 and D110 during the reporting period. Iron was reported above the Environmental Goal, consistent with the elevated background concentrations. Molybdenum and selenium were consistently recorded above the respective Environmental Goals in groundwater from D117, and during the June 2023 monitoring event concentrations at D10 reported an exceedance. Mercury, molybdenum, and selenium were only analysed for total concentrations. Nickel concentrations were above the Environmental Goal in groundwater from these bores for most monitoring events except at D117, although the maximum concentrations in this monitoring zone were lower than nickel concentrations recorded upgradient / adjacent to the MPAR. Lead concentrations exceeded the Environmental Goal in groundwater from D20 and D10 and were generally below the LOR in groundwater from D11, D110 and D117, noting that similar to above, only total lead concentrations were analysed. Concentrations of zinc exceeded the Environmental Goal in groundwater from D117; zinc concentrations in groundwater from the other wells in this area remained below the Environmental Goal.

Considering the relative chloride concentrations and the reported chloride to sulfate ratios at D117, the concentrations of fluoride, selenium, molybdenum, zinc, cadmium and boron reported in groundwater from D117 are unlikely to be related to the LNAR, but also may not be related to BCA in MPAR. The elevated concentrations of these analytes in groundwater from D117 may be related to localised fill compacted in place to fill the GCB.

When groundwater quality in the remaining wells in this area is compared to the groundwater quality up hydraulic gradient, the concentrations recorded above the Environmental Goals are not considered to be related to activities at the LNAR.

6.7.4 WELLS WITHIN / IMMEDIATELY ADJACENT LNAR SOUTH

Wells discussed in this section include D15, D16A, D17, and D18 which are located within / immediately adjacent to LNAR South (i.e. south of LN Pond 2 and bore D10). It is noted that Bore D16A was only commissioned in 2022, therefore has a limited data set (3 sampling events).

Consistent with the majority of groundwater monitoring wells, pH values in groundwater from wells D15, and D17 were slightly acidic, below the Environmental Goal range. pH values in groundwater from D18 and D16a were neutral, falling within the Environmental Goal range.

EC values and concentrations of TDS and sulfate in groundwater from D17 were above the respective Environmental Goals for at least some of the reporting period, and declined throughout the reporting period. Within this monitoring zone, concentrations of chloride and fluoride remained below the Environmental Goals.

Total arsenic and barium measured in groundwater from D18 in March 2023 slightly exceeded the respective Environmental Goals. The rest of the barium results in groundwater from well D18 were elevated and an order of magnitude higher than the results from all other wells monitored during the reporting period. It is noted that only total barium concentrations were analysed. Filtered arsenic concentrations were below the Environmental Goal in groundwater from all monitoring wells within this monitoring zone. Copper concentrations were reported above the Environmental Goal in groundwater from bore D15 during November and March and in groundwater from bore D18 during March. Iron concentrations were also above the Environmental Goal in groundwater from monitoring wells in this monitoring zone, consistent with background conditions. The lead concentration in groundwater from D15 above the Environmental Goal during one monitoring event, noting that only total lead concentrations were analysed.

6.7.5 WELLS CROSS AND DOWNGRADIENT OF LNAR / ADJACENT WANGCOL CREEK

Wells located cross- and downgradient of LNAR / adjacent LNAR include of D1, D2, D8, D9, D19, D102, D103, D104, D105, and D113.

Consistent with the majority of groundwater monitoring wells, pH values in groundwater from all wells in this monitoring zone were slightly acidic, below the Environmental Goal range.

EC, TDS and sulfate concentrations were above the Environmental Goal in groundwater from all wells except for D104, D2 and D8. Chloride concentrations exceeded the Environmental Goal in groundwater from D1, D9 and D102. Maximum concentrations of EC, TDS, sulfate and chloride, in particular at D1, D9 and D102, were similar to measurements from wells within / immediately adjacent to LNAR north (D11 and D110) and adjacent to the MPAR (D106 and D107).

Boron concentrations were consistently above the Environmental Goal in groundwater from wells in this monitoring zone except for D104, D2 (exceedance reported during one sampling event), and D8.

Iron concentrations were consistently one to two orders of magnitude above the Environmental Goal, except for D8; however, these concentrations appear consistent with background concentrations. Manganese was reported up to two orders of magnitude higher than the Environmental Goal in groundwater from D1, D102, D103, D105, D9, D113 and D19 with maximum manganese concentrations being similar to those recorded adjacent to the MPAR and within LNAR north.

Total mercury concentrations in groundwater from D102, D9 and D1 were above the Environmental Goal at various times throughout the year; concentrations in groundwater from other wells were consistently below the Environmental Goal. Nickel concentrations were above the Environmental Goal in groundwater from D1, D102, D103, D105, D113 and D9, with maximum nickel concentrations being similar to those recorded adjacent to the MPAR and within LNAR north. Total lead concentrations were, at times, above the Environmental Goal in groundwater from D2 and D19. Similarly, copper concentrations were, at times reported above the Environmental Goal in groundwater from D104, D113, D2, D8, D9 and D1. Arsenic concentrations were reported above the Environmental Goal on one occurrence at D104; concentrations at other times and in other wells were reported below the Environmental Goal. Chromium concentrations were consistently above the Environmental Goal throughout the reporting period at D113, and occasionally above the Environmental Goal at D19 and D103.

6.8 REVIEW OF GROUNDWATER CONCENTRATION TRENDS

A review of concentration trends in groundwater with respect to key indicators including EC, TDS, sulfate, chloride, boron, iron, nickel and manganese is presented below. These constituents were selected as they are considered to be indicators of potential changing conditions resulting from operations at the Ash Repositories, based on historic concentrations reported above the Environmental Goals for groundwater and/or trends identified in previous annual monitoring reports. Appendix F presents graphed groundwater concentrations for the last ten years (to the end of the current reporting period) for wells from each of the monitoring zones, with data from the current reporting period summarised in Section 6.7, Appendix C and Figure 6B to Figure 6F.

6.8.1 UPGRADIENT / BACKGROUND WELLS

Data obtained from wells MPGM4/D4 and MPGM4/D5 located to the north-west and up hydraulic gradient (background) of the LNAR, is outlined below and compared to the Environmental Goals for groundwater. Wells MPGM4/D4 and MPGM4/D5 are considered to represent background groundwater conditions in the area and, based on their location up hydraulic gradient of MPAR, are not considered to have been affected by activities at LNAR.

6.8.1.1 TDS AND EC

Graphs of concentrations over the last 10 years for up gradient (background) wells MPGM4/D4 and MPGM4/D5 show concentrations of TDS (and EC) in groundwater have been stable and below the Environmental Goal for groundwater throughout the historical dataset.

6.8.1.2 MAJOR AND MINOR IONS

Graphs of concentrations over the last 10 years for up gradient (background) wells MPGM4/D4 and MPGM4/D5 show concentrations of chloride and sulfate are consistent with TDS and have been stable and below the Environmental Goals for groundwater throughout the historical dataset.

6.8.1.3 METALS

Graphs of concentrations over the last 10 years (Appendix F) for up gradient (background) wells MPGM4/D4 and MPGM4/D5 show concentrations of boron and nickel are consistent with trends in TDS values and have remained stable and below the Environmental Goal for groundwater throughout the historical dataset.
Concentrations of iron for upgradient (background) wells have remained stable but consistently above the Environmental Goal, similarly concentrations of manganese at the upgradient (background) wells remained stable, however were consistently above the Environmental Goal throughout the historical dataset at MPGM5/D5.

6.8.2 WELLS UPGRADIENT / ADJACENT THE MPAR

Groundwater data obtained from groundwater wells MPGM4/D3, D106, D107 and D119 upgradient of the LNAR / adjacent the MPAR are summarised with reference to the Environmental Goals for groundwater below.

6.8.2.1 TDS AND EC

Graphs of concentrations over the last 10 years show the concentrations of TDS and EC in groundwater from well MPGM4/D3 have been stable and below the relevant Environmental Goals for groundwater throughout the historical dataset. This is consistent with data from up gradient (background) wells MPGM4/D4 and MPGM4/D5.

Graphs of concentrations since September 2018 for wells D107 and D106 (noting these wells were installed in mid-2018) show concentrations of TDS and EC in groundwater are higher and variable and have remained above the respective Environmental Goals since September 2018, when these wells were first sampled.

Graphs of concentrations since monitoring began in May 2020 for well D119 (well installed in February 2020) show concentrations of TDS and EC in groundwater that were lower than those in D106 and D107 and were variable, being marginally below the respective Environmental Goals during this reporting period.

6.8.2.2 MAJOR AND MINOR IONS

Consistent with TDS, graphs of concentrations over the last up to 10 years of chloride and sulfate in groundwater from wells MPGM4/D3 and D119 indicate that concentrations have been stable and below the Environmental Goals throughout (some exceedances of sulfate were reported at D119 during the previous 2021/22 reporting period). This is generally consistent with groundwater conditions from up gradient (background) wells MPGM4/D4 and MPGM4/D5.

Also consistent with TDS, chloride and sulfate concentrations in groundwater from wells D107 and D106 have remained above the Environmental Goals for groundwater since they were first sampled in September 2018.

6.8.2.3 METALS

Graphs of concentrations over the last several years for wells MPGM4/D3, D106, D107 and D119 show concentrations of boron, manganese and nickel are generally consistent with trends in TDS values. Concentrations of nickel, manganese and boron in groundwater from well MPGM4/D3 have been stable and remained below the Environmental Goals for groundwater throughout the historical dataset, consistent with up gradient (background) wells MPGM4/D4 and MPGM4/D5.

Concentrations of boron, manganese and nickel in groundwater from wells D106 and D107 were higher and have been above the Environmental Goals for groundwater since these wells were first sampled in September 2018.

Concentrations of boron, manganese and nickel in groundwater from well D119 were lower than D106 and D107 and stable, being marginally above (boron) and below (manganese and nickel) the Environmental Goal since monitoring commenced in May 2020.

Concentrations of iron in groundwater from these wells were above the Environmental Goal during the current reporting period (with the exception of total iron at D3 for two sampling rounds). These concentrations are consistent with historical ranges for iron at the wells upgradient / adjacent to MPAR.

6.8.3 WELLS WITHIN / IMMEDIATELY ADJACENT LNAR NORTH

Data obtained from groundwater wells situated within the MPAR or in the mine disturbance area immediately to the west (D10, D11, D20, D110, D117) are summarised below and compared to the Environmental Goals for groundwater.

6.8.3.1 TDS AND EC

Graphs of concentrations over the last 10 years for data from wells within this area show TDS concentrations in groundwater have fluctuated over time, with a general increase in concentrations to above the Environmental Goal for groundwater from well D10 prior to 2013 and from D11 in 2013. The TDS concentrations in groundwater within this area no longer appear to be increasing, with the exception of D10 which increased in the March and June 2023 monitoring events. However, they have remained below historical maximum concentrations. Concentrations of TDS and EC within / immediately adjacent LNAR north have remain above the Environmental Goal for groundwater.

6.8.3.2 MAJOR AND MINOR IONS

Graphs of concentrations over the last 10 years for wells within this area show chloride and sulfate concentrations have fluctuated over time. Consistent with TDS trends, chloride and sulfate concentrations increased from prior to 2013 to approximately 2017 in groundwater from wells D10 and D11 after which concentrations declined; however, concentrations in these wells increased during this reporting period, remaining within historical ranges, but returning to concentrations above the Environmental Goals. Concentrations of chloride and sulfate in groundwater from D110 (installed in 2018) remain above the Environmental Goal and increased from 2019 to 2021 and have declined slightly overall since then. Although concentrations of sulfate typically remain above the Environmental Goals for groundwater, chloride concentrations have been below the Environmental Goal at wells D20 and D117 generally throughout the dataset (except a potentially anomalous concentration reported at D117 in August 2020).

6.8.3.3 METALS

Graphs of concentrations over the last 10 years for wells within this area show boron, manganese and nickel concentrations have fluctuated over time. These selected metals were first reported at concentrations above the Environmental Goals for groundwater before 2013 in groundwater from well D10. Concentrations remain consistently above the Environmental Goals for boron, manganese and nickel in groundwater from all wells, except nickel at D117.

Concentrations of boron, manganese and nickel in groundwater appear relatively stable during the current reporting period at all locations, except D117 which is more variable.

Concentrations of iron in groundwater from these wells were above the Environmental Goal during the current reporting period (with the exception of D117). These concentrations are consistent with historical ranges for iron at the wells immediately adjacent to LNAR North.

6.8.4 WELLS WITHIN / IMMEDIATELY ADJACENT LNAR SOUTH

Data obtained from groundwater wells that are situated within the mine disturbance area within / immediately adjacent LNAR South is summarised below and compared to the groundwater Environmental Goals. Wells in this area include D15, D16a, D17 and D18. There is a limited dataset available for bore D16a due to this bore only being commissioned in late 2022.

6.8.4.1 TDS AND EC

Graphs of concentrations over the last 10 years for wells within this area show concentrations of TDS and EC in groundwater from wells D15 and D17 have been increasing over time and have typically been above the groundwater Environmental Goals since mid-2013. However, since mid-2021 EC and TDS concentrations in these wells have declined; TDS and EC concentrations have been below the Environmental Goals for groundwater at D15 since March 2022 and at D17 since March 2023. EC and TDS concentrations in groundwater from well D18 and D16a appear stable and have remained below the Environmental Goals for groundwater.

6.8.4.2 MAJOR AND MINOR IONS

Graphs of concentrations over the last 10 years for wells within this area show concentrations of chloride and sulfate in groundwater that are consistent with the TDS observations. Concentrations of chloride and sulfate increased in groundwater from wells D15 and D17 from about 2013 or 2014 until 2019 and sulfate concentrations in groundwater from well D15 have been consistently above the Environmental Goal for groundwater since monitoring began in 2013, and for D17 since mid-2014. However, since midway through the previous monitoring period concentrations of chloride and sulfate have decreased in groundwater from wells D15 and D17. Although sulfate concentrations remain above the Environmental Goal at D17, concentrations at D15 have dropped below the Environmental Goal since November 2022. Concentrations of chloride and sulfate in groundwater at D18 and D16a appear stable and have remained below the Environmental Goals for groundwater.

6.8.4.3 METALS

Graphs of concentrations over the last 10 years for wells within this area show that concentration trends for boron, manganese and nickel in groundwater are different from the trends for TDS, chloride and sulfate.

Boron concentrations appear to have remained relatively stable, fluctuating within a similar concentration range at each monitoring well in this area. The exception is for intermittent spikes in boron concentrations at D15 from approximately 2014 to 2019. Concentrations of boron in groundwater from D15 and the other wells in this area were below the Environmental Goal during the reporting period.

Concentrations of manganese appear relatively stable, although variable, at each location in this area. The highest manganese concentrations were reported in groundwater from D15 and D17. These were similar in magnitude to each other, and higher than concentrations reported in groundwater from well D18. Manganese concentrations in groundwater from wells D15 and D17 have, overall, declined since approximately mid-2019. Manganese concentrations in groundwater from all wells in this area have remained below the Environmental Goal for groundwater throughout the historical dataset and the reporting period.

Concentrations of nickel appear stable, although variable, since at least 2014. Concentrations in groundwater from well D15 were higher than in groundwater from the other wells in this area and remained above the Environmental Goal from 2017 to late 2021. Nickel concentrations in groundwater from D15 have, overall, decreased since 2019 and continued to decrease during the current reporting period, with concentrations below the Environmental Goal. Concentrations of nickel in groundwater from D17 and D18 appear generally stable since at least 2014 and have remained below the Environmental Goal for groundwater throughout the historical dataset. Since its commission in 2022, concentrations of nickel within bore D16a have remained below the Environmental Goal.

6.8.5 WELLS CROSS AND DOWNGRADIENT OF LNAR / ADJACENT WANGCOL CREEK

Groundwater data obtained from groundwater wells MPGM4/D1 (D1), MPGM4/D9 (D9), D102, D105, MPGM4/D8 (D8), D104, D103, MPGM4/D2 (D2), D19 and D113, located down hydraulic gradient of the LNAR and adjacent to Wangcol Creek is summarised below with reference to the Environmental Goals for groundwater.

6.8.5.1 TDS AND EC

Concentrations graphs for the last 10 years show that, in groundwater from several wells in this area, concentrations of TDS in groundwater have increased over time, commencing with D1 and D9 since around 2011. TDS concentrations in groundwater from D1 have consistently been reported above the Environmental Goal for groundwater since before the data set begins (2013). TDS concentrations in groundwater from D9 were above or near the Environmental Goal from 2013 to early 2018 and have increased since 2018. From late 2020 to March 2022 (D9) and June 2022 (D1), TDS concentrations in groundwater from D1 and D9 remained relatively stable or declined slightly before increasing throughout this monitoring period, remaining above the Environmental Goal. In November 2022, the TDS concentration in D1 was the highest reported in the last 10 years, but concentrations subsequently declined to previous values.

Graphs for wells D19, D102, D103, D105 and D113 show the concentrations of TDS in groundwater from these wells have remained above the Environmental Goal for the last ten years, or since September 2018 when several of these wells were first sampled after their installation in mid-2018.

TDS concentrations in groundwater from well D2 decreased in early 2020 and remained stable and below the Environmental Goal during the reporting period.

TDS concentrations in groundwater from wells D104 and D8 show fluctuating although stable TDS concentrations over time. Concentrations at these locations have remained below the Environmental Goal throughout the historical dataset.

6.8.5.2 MAJOR AND MINOR IONS

Since at least early 2020, concentrations of major and minor ions, including sulfate and chloride, in groundwater from D2, D104, and D8 have remained below Environmental Goals. Concentrations were generally lower in groundwater from wells D19, D113, D103 and D105 than in groundwater from wells D1, D9 and D102. The difference in groundwater quality between these locations is considered likely to be due to the spatial distribution of these locations relative to the Ash Repositories and related groundwater flow paths.

Graphs of concentrations over the last 10 years for wells within this area show concentrations of chloride and sulfate in groundwater are consistent with the behaviour of TDS, as described above. Sulfate concentrations have been above the Environmental Goal in groundwater from D1 and D9 since early 2013, while chloride concentrations have typically been above the Environmental Goals in groundwater from D1 since early 2015 and from D9 since 2018. During the current reporting period chloride and sulfate concentrations in groundwater from each of these wells have fluctuated over the monitoring period, remaining above the Environmental Goals.

Chloride concentrations in groundwater from well D2 generally increased, exceeding the Environmental Goal in mid-2019. Concentrations have subsequently declined, remaining below the Environmental Goal since October 2019. Similar trends are apparent in sulfate concentrations in groundwater from D2 although sulfate concentrations increased above the Environmental Goal in 2013 and, have declined to concentrations below the Environmental Goal since January 2020.

Concentrations of sulfate in groundwater from well D103 have remained above the Environmental Goal since September 2018 when the well was first sampled; however, they have declined consistently since August 2020. Concentrations of chloride in groundwater from this well have declined since monitoring commenced and have been below the Environmental Goal since October 2019.

Sulfate concentrations in groundwater from D19, D105 and D113 appear to be generally stable noting a slightly upward trend in concentrations during this reporting period for D19 and D113. Sulfate concentrations in groundwater from these wells remain above the Environmental Goal for groundwater. Chloride concentrations in groundwater from D19, D105 and D113 are relatively stable since decreasing below the Environmental Goal in 2020.

Graphs of concentrations over the last 10 years for wells D104 and D8 show fluctuating but stable chloride and sulfate concentrations over time, with concentrations of these analytes consistently reported below the Environmental Goals for groundwater through the historical dataset.

6.8.5.3 METALS

Graphs of concentrations over the last 10 years show concentrations of boron, manganese and nickel are generally consistent with TDS values. Concentrations of boron, manganese and nickel have remained stable and below the Environmental Goals in groundwater from D8 and D104. In groundwater from well D2, concentrations have fluctuated around the Environmental Goals, but have decreased since early 2020 and are stable below the Environmental Goals for boron (except for July 2023 sampling event), manganese and nickel.

Over the last 10 years concentrations of boron, manganese and nickel in groundwater have increased over time at D1 and D9 to concentrations that are above the Environmental Goals for groundwater. Although the two highest nickel concentrations were reported in groundwater from well D1 during this reporting period, concentrations have returned to historic values. Boron and manganese concentrations in groundwater from well D1 appear to have stabilised. Concentrations of these metals in groundwater from well D102 behaved similarly to concentrations in groundwater from well D9.

Concentrations of boron in groundwater from wells D103 and D105 have remained relatively stable and above the Environmental Goal for groundwater since these wells were first sampled in September 2018. Concentrations of manganese and nickel have also remained generally above the Environmental Goals for groundwater; however, concentrations have declined in groundwater from these two monitoring wells since 2020, including one nickel concentration that was below the Environmental Goal in groundwater from well D105 during the current reporting period.

Over the last 10 years, concentrations of boron, manganese and nickel in groundwater from wells D19 and D113 have varied; however, concentrations have decreased since approximately February 2020. Nickel and manganese concentrations decreased to below the Environmental Goals during the previous monitoring period, however concentrations at D113 have fluctuated around the Environmental Goal during this reporting period, with some concentrations near or above the Environmental Goal, but within historic values.

7. EARLY WARNING ASSESSMENT

In addition to comparing results with the Environmental Goals for surface water and groundwater, an early warning assessment of the groundwater and surface water monitoring data is required as part of the OEMP. This assessment includes assessment of concentration plots through time, including statistical analysis where appropriate.

7.1 TREND ASSESSMENT APPROACH

Trends in target analyte concentrations in groundwater and surface water were assessed through a combination of graphical and statistical tools.

Firstly, graphs of concentrations over the last 10 years (depending on available data) were created for target analyte concentrations for individual monitoring locations to evaluate temporal trends of solute concentrations. Descriptions of historical concentrations over the last ten years (since 2013) and Environmental Goals are provided in Section 5 (for surface water) and Section 6 (for groundwater). The graphs of concentrations over the last 10 years also include adopted Environmental Goals and are presented for surface water and groundwater in Appendix E and Appendix F respectively.

7.2 STATISTICAL ASSESSMENT OF TRENDS

For both groundwater and surface water, data covering the last two reporting periods was adopted for the statistical assessment to indicate recent conditions. Statistical tools were applied and included the use of linear regression (for surface water) and the Mann-Kendall method (for groundwater) to evaluate trends in target analyte concentrations in groundwater and surface water from each individual monitoring location. Statistical trend plots from the statistical assessment for surface water and groundwater are presented in Appendix K and Appendix L respectively. Further details of the Mann-Kendall and data assessment methodology are provided in Appendix M.

7.2.1 SURFACE WATER

Surface water statistical trend plots (linear regression graphs) comparing concentrations in surface water vs time for the last two years were generated for each individual monitoring location for selected analytes. Where surface water concentrations were reported below the laboratory LOR, half the laboratory LOR concentration was used for the statistical trend assessment.

Due to the variability within the data set for surface water, linear regression graphs were identified to be the most appropriate statistical assessment tool for the two-year dataset. The outputs in Appendix K include data from the beginning of the 2021/22 reporting period and the linear regression trend assessment. For the purposes of this assessment identified trends were considered positive (increasing trend) when the R was reported between 0.5 and 1, and negative (decreasing trend) when the R was reported between -0.5 and -1.

For identified surface water trends, the R^2 value presented in the surface water statistical trend plots evaluates the scatter of the data points around a fitted regression line (presented as a solid blue line on the trend graphs). The R^2 value is reported between 0 and 1, where the R^2 value closer to 1, indicates a stronger trend, with more of the variability explained by the model.

Table 7-1 Presents a summary from the statistical assessment of trends assessed for LMP01, NC01, WX22, SW_C, SW_E and SW_G for analytes with concentrations above the relevant Environmental Goal during the reporting period. For consistency, only total (unfiltered) metal concentrations have been used for the surface water trend analysis. Linear regressions performed for the remaining analytes and locations did not indicate significant trends.

TABLE 7-1 SUMMARY OF STATISTICAL ASSESSMENT OF SURFACE WATER FOR TARGET ANALYSIS

Monitoring Location	EC	Chloride	Nickel (total)	Sulfate	TDS	Boron (total)	Iron Total
LMP01	**0.20**	**0.32**	**0.17**	**0.15**	**0.16**	**0.33**	**-0.11**
NC01	**0.66**	**0.68**	**0.69**	**0.68**	**0.49**	**0.65**	**0.00**
WX22	**0.68**	**0.53**	**-0.09**	**0.61**	**0.38**	**-0.3**	**0.04**
SW_C	**0.43**	**0.50**	**-0.03**	**0.43**	**0.06**	**0.00**	**-0.22**
SW_E	**0.71**	**0.71**	**0.69**	**0.71**	**0.5**	**0.71**	**0.66**
SW_G	**0.69**	**0.67**	**0.69**	**0.67**	**0.47**	**0.64**	**-0.25**

Unshaded cells indicate no identified increasing or decreasing trend.

7.2.2 GROUNDWATER

Groundwater statistical trend plots (concentrations in groundwater vs time) were generated for each individual monitoring location for selected analytes by the ERM Mann-Kendall application which was developed by the Data Science and Visualisation Group to facilitate Mann-Kendall trend analysis and reporting. As for surface water, data from the last two monitoring periods is assessed.

The outputs include data from the beginning of the 2021/22 reporting period, and the statistical trend assessment. For the groundwater trends, the p-value presented in the trend plots indicates the level of statistical significance that can be attributed to the trend. A p-value of less than 0.05 relates to a statistical significance of 95%, i.e. if a trend has a p-value of less than 0.05 there is a 95% level of confidence that the data presents a statistically significant trend and not a random distribution of data. The 95% confidence level has been adopted by ERM as an indicator of statistical significance in trends, and trends with these characteristics are shown in a solid black line, those that are not statistically significant do not include a solid black line.

For consistency, only total (unfiltered) metal concentrations have been used for the Mann-Kendall trend analysis.

Where no p-value is provided on the graphical outputs, a sufficient number of data points were not available to identify a statistically significant trend through the Mann-Kendall test. Concentrations both above and below the LOR and with respect to the relevant adopted background concentration (where available) are shown.

Further details on the Mann-Kendall procedure are presented in the Western Australia Department of Environment's guidance document entitled *Use of Monitored Natural Attenuation for Groundwater Remediation* (2004).

Table 7-2 presents a summary from the statistical assessment of trends assessed for groundwater monitoring locations.

TABLE 7-2 SUMMARY OF MANN-KENDALL ASSESSMENT OF GROUNDWATER FOR TARGET ANALYTES

Monitoring Location	Boron	Chloride	EC	Iron	Manganese	Nickel	Sulfate	TDS
Upgradient / background								
D4	ID	NT	Decreasing	NT	NT	NT	NT	NT
D5	NT	NT	NT	NT	NT	Increasing	NT	NT
Upgradient / adjacent MPAR								
D106	NT	NT	NT	NT	NT	NT	NT	NT
D107	NT	NT	NT	NT	NT	NT	NT	NT
D119	NT	Decreasing	Decreasing	NT	NT	Decreasing	NT	Decreasing
D3	NT	Increasing	NT	**Increasing**	NT	NT	NT	NT
Within / immediately adjacent LNAR North								
D10	NT	NT	NT	NT	NT	NT	NT	NT
D11	NT	NT	NT	NT	NT	NT	NT	NT
D110	NT	NT	NT	NT	NT	NT	NT	**Decreasing**
D117	NT	NT	NT	NT	NT	Decreasing	NT	NT
D20	NT	NT	NT	NT	NT	NT	NT	NT
Within / immediately adjacent LNAR South								
D15	NT	Decreasing	Decreasing	**Decreasing**	Decreasing	Decreasing	Decreasing	Decreasing
D16A*	Not enough data points							
D17	NT	Decreasing	**Decreasing**	NT	Decreasing	NT	**Decreasing**	**Decreasing**
D18	Decreasing	NT	Decreasing	NT	Decreasing	Decreasing	Decreasing	NT

Monitoring Location	Boron	Chloride	EC	Iron	Manganese	Nickel	Sulfate	TDS
Cross- and downgradient of Ash Repositories / adjacent Wangcol Creek								
D1	NT	NT	NT	NT	NT	NT	NT	NT
D102	**Decreasing**	**Decreasing**	**Decreasing**	NT	NT	NT	**Decreasing**	**Decreasing**
D103	NT	Decreasing	**Decreasing**	NT	**Decreasing**	**Decreasing**	**Decreasing**	**Decreasing**
D104	NT	Decreasing	NT	NT	NT	Increasing	NT	NT
D105	NT	Decreasing	**Decreasing**	NT	NT	**Decreasing**	**Decreasing**	**Decreasing**
D113	NT	NT	NT	NT	NT	NT	NT	NT
D19	NT	NT	NT	NT	NT	NT	NT	NT
D2	**Increasing**	NT	NT	**Increasing**	NT	NT	NT	Increasing
D8	ID	NT	NT	NT	Increasing	NT	NT	NT
D9	NT	NT	NT	NT	NT	NT	NT	NT

Notes:
ID: Insufficient data
NT: No significant trend
** not yet sampled*
***Bold: c**oncentration during reporting period at / or above Environmental Goal*
Metal concentrations presented are total (unfiltered) concentrations.

7.3 STATISTICAL ASSESSMENT SUMMARY

From the identified statistically significant trends, the majority of the target analytes were found to be decreasing for groundwater however for surface water the trends of target analytes were increasing. The increasing trends are likely due to the lower rainfall experienced during the current reporting period when compared to the previous 2021/22 reporting period.

7.4 IMPLEMENTATION OF CONTINGENCY AND MITIGATION MEASURES

The OEMP outlines that changes in water quality will be reviewed by comparing results with the Environmental Goals for surface water and groundwater. Further, early warning monitoring will be conducted by assessment of concentration trends through time at each location, including statistical analysis where appropriate, and assessment of observed groundwater conditions with comparison to the NGM.

Those wells with increasing target analyte concentrations were not in consistent locations and were typically up gradient or cross gradient from LNAR. As such the increases are not considered to be related to the LNAR. Concentrations of multiple target analytes in groundwater from wells particularly cross- and downgradient of Ash Repositories / adjacent to Wangcol Creek indicated decreasing trends over the last two monitoring periods, potentially related to the high rainfall that has occurred over that time.

While the concentrations reported above the Environmental Goals noted in this report are considered to be unrelated to the LNAR, in accordance with the contingency planning measures outlined in the OEMP, a separate and broader independent investigation into surface and groundwater impacts in the vicinity of the Ash Repositories has been recently completed. Planning for implementation of additional controls at the adjacent MPAR is currently underway.

8. LEACHATE MANAGEMENT

8.1 OBJECTIVES

The objective of the leachate monitoring program is to assess the management of generated stormwater run-off from active ash placement areas and leachate at the LNAR and to minimise the potential for adverse impacts to the environment.

8.2 LEACHATE MANAGEMENT SYSTEM

To manage the risk of vertical and lateral movement of BCA leachate, a leachate barrier system was included as an integral component of the LNAR MOD 1. As described in the OEMP, the leachate barrier system comprises three primary components as summarised below:

- A liner comprising a geotechnical base layer and sidewall liner. The liner includes a leachate collection system through drainage aggregate, leachate sumps and connecting pipework;
- A capping liner welded to the sidewall liner overlain with fill material, growth medium and erosion protection measures as necessary; and
- Leachate storage ponds and ancillary multipurpose high-density polyethylene (HDPE) double lined storage ponds to manage BCA leachate and water intercepted from other areas of the LNAR
  - Leachate storage ponds: LNAR3, LNAR4, LNAR5[3], and
  - Multipurpose storage ponds: Settling Pond D, and LNAR2 (referred to as LN Pond 2 in the OEMP).

The leachate management system includes internal drains that follow the general subgrade gradient to direct leachate to collection sumps. Leachate is then pumped out from the risers and transferred to leachate storage ponds.

The volume of stored leachate is managed via reuse for dust suppression within the lined BCA placement areas of the LNAR.

8.3 LEACHATE MONITORING PLAN

A summary of the leachate monitoring plan is presented in Table 8-1.

TABLE 8-1 LEACHATE MONITORING PLAN

Location Description	Monitoring Parameters	Frequency	Target
Leachate storage	Storage volume / capacity. Available freeboard. Leachate quality as measured from leachate storage	Monthly for leachate quality monitoring for the first 24 months, then quarterly.	Suitable freeboard / pumping capacity available with account for seasonal weather and forecasting. To be defined by contractor.
Leachate storage	Monitoring for leachate within the space between storage liners and	Monthly as part of routine inspections.	No leaks.

[3] Referred to as Pond BWA, BWB, and BWC respectively in the OEMP.

Location Description	Monitoring Parameters	Frequency	Target
	within underlying sump.		
Lined ash placement areas	Leachate level monitoring as measured from leachate collection sumps and leak detection system.	Monthly as part of routine inspections.	Level to be maintained no more than 300 mm above the upper surface of the base liner. No leaks.
Leachate transfer pipelines	Monitoring volume and operational integrity.	Weekly as part of routine inspections.	Visual inspection and documentation to assess the integrity of the transfer system. Record of volumes via flow totaliser meter.

8.4 LEACHATE MONITORING OUTCOMES

Evidence of leachate monitoring conducted in accordance with the OEMP's leachate monitoring plan is presented in Appendix N, and includes the following.

- Daily LNAR leachate system inspection and leachate collection sump pump out records (blank example).
- LNAR lined pond storage summary examples for January and July 2023, as extracted from the Service Stream Monthly Client Report – Mt Piper (Contract CW2228375). These storage records are presented in each monthly client report from Service Stream to EnergyAustralia.
- LNAR lined pond storage and transfer tracking spreadsheet, presenting January to September 2023 data, as provided by Service Stream via email (Service Stream, 2023).
- LNAR lined pond storage, leachate collection pipeline and leachate collection sump annual monitoring summary spreadsheet, as provided by Service Stream via email (Service Stream, 2023). It is noted that 12,000 L of leachate is recorded as being collected from LNAR Stage 1A Liner Leachate Pipeline Sump 2 (liner sump 2) in September 2022. It is understood that liner sump 2 is above the upper liner and based on information provided by Service Stream via email, the 12,000 L pumped from the above liner sump 2 was attributed to a false reading due to issues with their metres. More accurate metres are currently being installed. It was also noted that 21L of leachate was collected from under liner sump 2, however Service Stream indicated that it was likely due to runoff from installation as all other volumes from under both liners were consistently zero.
- LNAR lined pond storage analytical data summary, with Surface Water Environmental Goals provided alongside for comparison purposes only as these Environmental Goals do not apply to leachate or water collected from this system.

In summary, based on the evidence of monitoring presented in Appendix N, leachate monitoring has been conducted in general accordance with the requirements of the OEMP. Operational management and monitoring of the leachate management system has been reported to be consistent with the design intent, and implementation of contingency or mitigation measures has not been required.

9. CONCLUSIONS

Based on the review of the surface water and groundwater quality data at the LNAR for the 2022/23 reporting period, the following conclusions can be made.

- Several target analytes were reported at concentrations above the adopted Environmental Goals (as set out in the OEMP) for surface water and groundwater during the reporting period. These were generally consistent with results from previous reporting periods and, based on historical reporting and trend analysis, these elevated concentrations are unlikely to be related to ash placement activities at LNAR.
- In surface water samples collected at locations described in the OEMP, sporadic exceedances of the Environmental Goals for surface water were identified at LMP01, NC01 and SW_C, which are located upstream of the Ash Repositories. Based on the position of the LNAR relative to these surface water monitoring locations, activities at the LNAR are not considered to have contributed to exceedances at these locations.
- Concentrations of select target analytes from surface water monitoring locations SW_E, WX22 and SW_G were more consistently above the Environmental Goals for surface water, and generally the concentrations of analytes reported were higher in samples collected from these sampling locations compared to those from surface water sampling locations located further upstream. The reported water quality results are unlikely to be related to the LNAR and have been assessed as part of an independent investigation.
- Concentrations of target analytes in groundwater have been reported above the Environmental Goals at monitoring locations within and immediately downgradient to the east of the LNAR. A review of groundwater concentrations and trends indicate that activities at the LNAR are not significantly impacting the groundwater as elevated concentrations are comparable to concentrations and trends identified at well locations upgradient of the LNAR. The elevated concentrations of key analytes are unlikely to be related to the LNAR based on reported groundwater conditions across the monitoring network, particularly up hydraulic gradient of LNAR.
- Mann-Kendall analysis of groundwater concentrations over the past two years has identified that the majority of the target analytes across the well network (for those with statistically significant trends) are showing a decreasing trend, particularly in groundwater from wells within / immediately adjacent LNAR South and wells cross- and downgradient of the Ash Repositories / adjacent to Wangcol Creek. Surface water quality over the last two years, which is characterised by predominantly stable or increasing trends, is likely to have been influenced by the decline in rainfall during the current reporting period compared to the previous higher rainfall conditions.
- The reported groundwater levels at certain wells in the southern end of the LNAR exceeded the maximum predicted groundwater level (912.5 m AHD) from CDM Smith (2012b). Groundwater levels remained below the base of ash placement (917 m AHD) at the LNAR, although D15, which is upgradient and to the west of LNAR Stage 2, reported a maximum groundwater level of 916.77 m AHD.
- Leachate monitoring has been conducted in general accordance with the requirements of the OEMP. Operational management and monitoring of the leachate management system has been reported to be consistent with the design intent, and implementation of contingency or mitigation measures has not been required in relation to leachate management for LNAR MOD 1.

While the concentrations above the Environmental Goals noted in this report are not considered to be related to the LNAR, in accordance with the contingency planning measures outlined in the OEMP, a separate and broader independent investigation into surface and groundwater impacts in the vicinity of the Ash Repositories has been completed. Planning for implementation of mitigation measures is underway.

Where required in relation to the LNAR, the OEMP and the associated monitoring and reporting requirements may be revised following implementation of those mitigation measures to reflect the key findings of the independent investigation. A summary of the Project Approval and OEMP requirements pertaining to water quality monitoring and reporting, and how each item is addressed is provided in Appendix I.

10. REFERENCES

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11. STATEMENT OF LIMITATIONS

1. This report is based solely on the scope of work described in our proposal P0533074 dated 20/3/20, confirmed via email on 24/4/20, and Contract Extension approved 10/9/2021 (Scope of Work) and performed by Environmental Resources Management Australia Pty Ltd (ERM) for EnergyAustralia NSW Pty Ltd (the Client). The Scope of Work was governed by a contract between ERM and the Client (Contract).
2. No limitation, qualification or caveat set out below is intended to derogate from the rights and obligations of ERM and the Client under the Contract.
3. The findings of this report are solely based on, and the information provided in this report is strictly limited to that required by, the Scope of Work. Except to the extent stated otherwise, in preparing this report ERM has not considered any question, nor provides any information, beyond that required by the Scope of Work.
4. This report was prepared between 1 September 2023 and 24 November 2023 is based on conditions encountered and information reviewed at the time of preparation. The report does not, and cannot, take into account changes in law, factual circumstances, applicable regulatory instruments or any other future matter. ERM does not, and will not, provide any on-going advice on the impact of any future matters unless it has agreed with the Client to amend the Scope of Work or has entered into a new engagement to provide a further report.
5. Unless this report expressly states to the contrary, ERM's Scope of Work was limited strictly to identifying typical environmental conditions associated with the subject site(s) and does not evaluate the condition of any structure on the subject site nor any other issues. Although normal standards of professional practice have been applied, the absence of any identified hazardous or toxic materials or any identified impacted soil or groundwater on the site(s) should not be interpreted as a guarantee that such materials or impacts do not exist.
6. This report is based on one or more site inspections conducted by ERM personnel, the sampling and analyses described in the report, and information provided by the Client or third parties (including regulatory agencies). All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved. Whilst normal checking of data accuracy was undertaken, except to the extent expressly set out in this report ERM:
    a. did not, nor was able to, make further enquiries to assess the reliability of the information or independently verify information provided by;
    b. assumes no responsibility or liability for errors in data obtained from,
    c. the Client, any third parties or external sources (including regulatory agencies).
7. Although the data that has been used in compiling this report is generally based on actual circumstances, if the report refers to hypothetical examples those examples may, or may not, represent actual existing circumstances.
8. Only the environmental conditions and or potential contaminants specifically referred to in this report have been considered. To the extent permitted by law and except as is specifically stated in this report, ERM makes no warranty or representation about:
    a. the suitability of the site(s) for any purpose or the permissibility of any use;
    b. the presence, absence or otherwise of any environmental conditions or contaminants at the site(s) or elsewhere; or
    c. the presence, absence or otherwise of asbestos, asbestos containing materials or any hazardous materials on the site(s).

9. Use of the site for any purpose may require planning and other approvals and, in some cases, environmental regulator and accredited site auditor approvals. ERM offers no opinion as to the likelihood of obtaining any such approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environment works.
10. The ongoing use of the site or use of the site for a different purpose may require the management of or remediation of site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
11. This report should be read in full and no excerpts are to be taken as representative of the whole report. To ensure its contextual integrity, the report is not to be copied, distributed or referred to in part only. No responsibility or liability is accepted by ERM for use of any part of this report in any other context.
12. Except to the extent that ERM has agreed otherwise with the Client in the Scope of Work or the Contract, this report:
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    b. must not to be relied upon or used by any other party;
    c. has not been prepared nor is intended for the purpose of advertising, sales, promoting or endorsing any Client interests including raising investment capital, recommending investment decisions, or other publicity purposes;
    d. does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in or in relation to the site(s); and
    e. does not purport to provide, nor should be construed as, legal advice.

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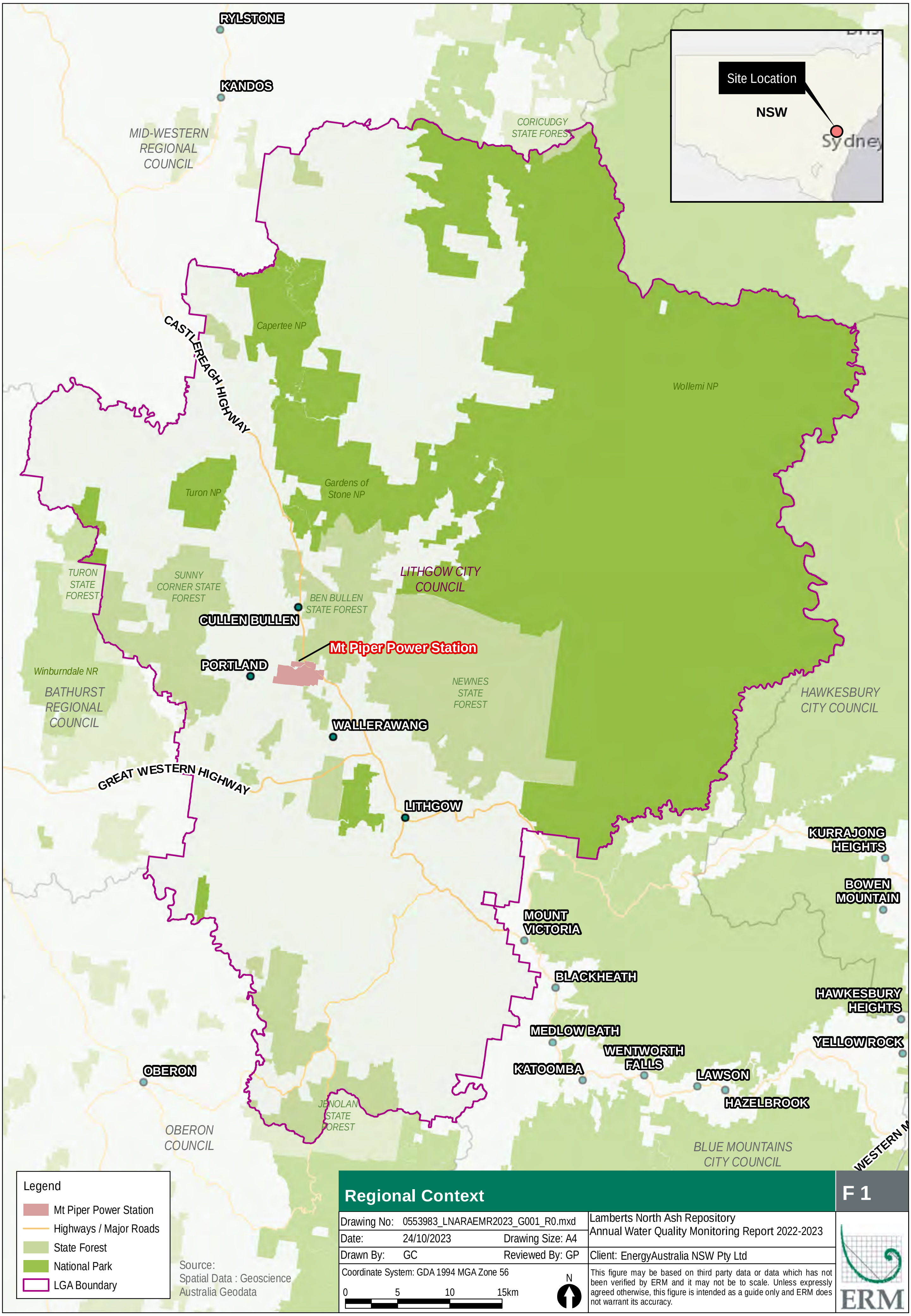
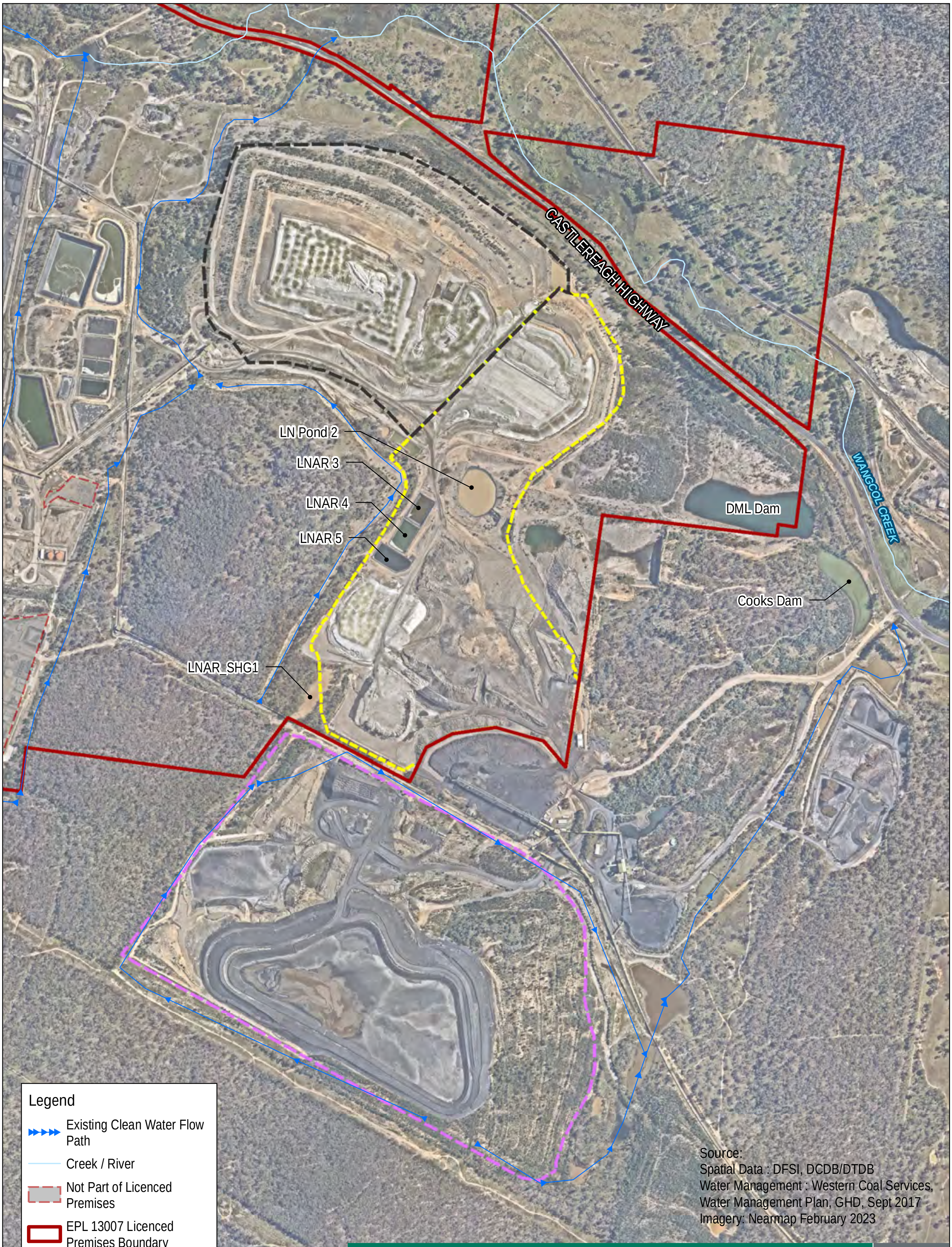
APPENDIX A FIGURES



Regional Context F 1

Drawing No: 0553983_LNARAEMR2023_G001_R0.mxd		Lamberts North Ash Repository Annual Water Quality Monitoring Report 2022-2023
Date: 24/10/2023	Drawing Size: A4	
Drawn By: GC	Reviewed By: GP	Client: EnergyAustralia NSW Pty Ltd
Coordinate System: GDA 1994 MGA Zone 56		This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM



Lamberts North Ash Repository and Surrounds

F 2

Drawing No:	0553983_LNARAEMR2023_G002_R0.mxd		Lamberts North Ash Repository Annual Water Quality Monitoring Report 2022-2023
Date:	13/11/2023	Drawing Size: A4	
Drawn By:	GC	Reviewed By: GP	Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

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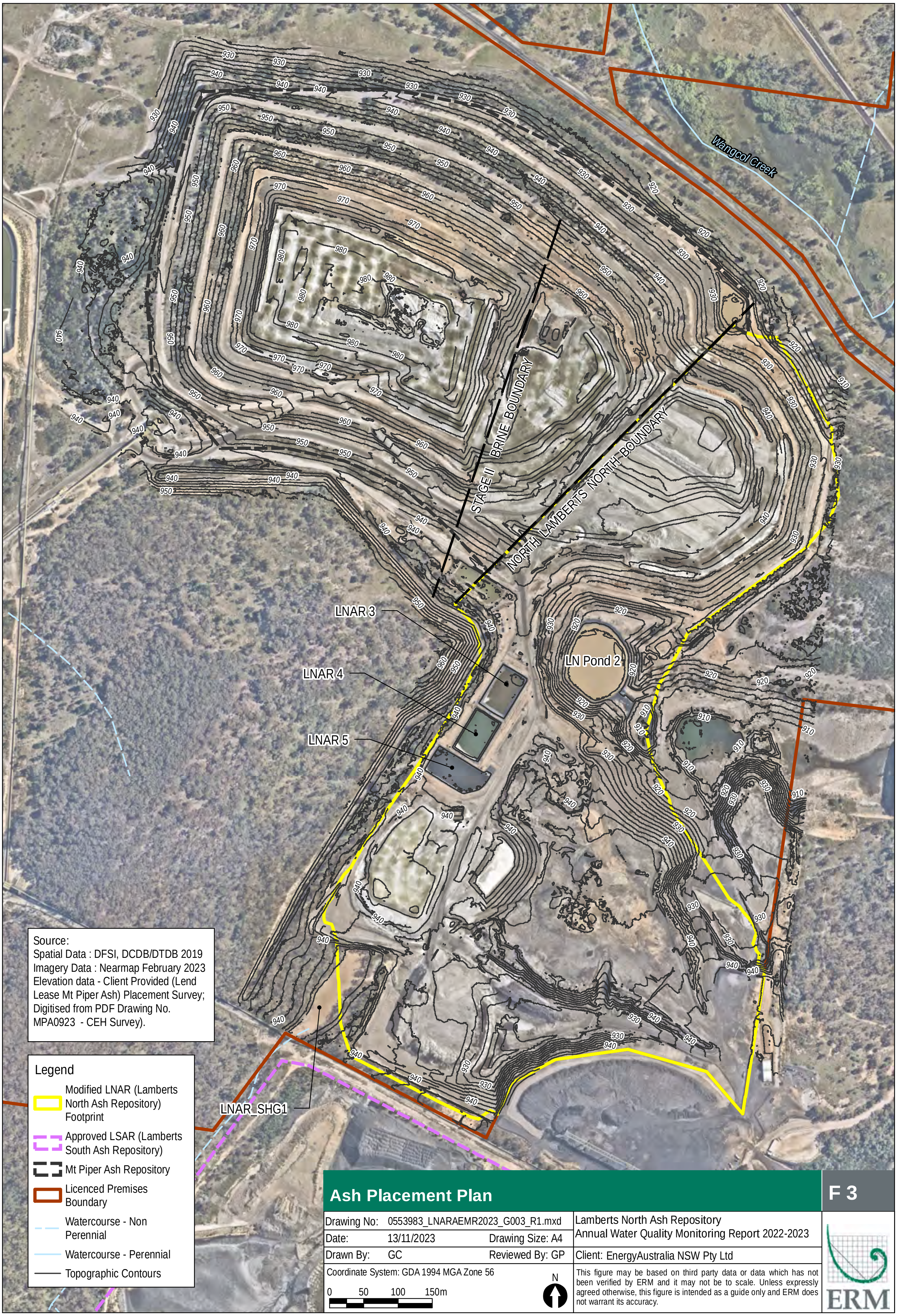
ERM

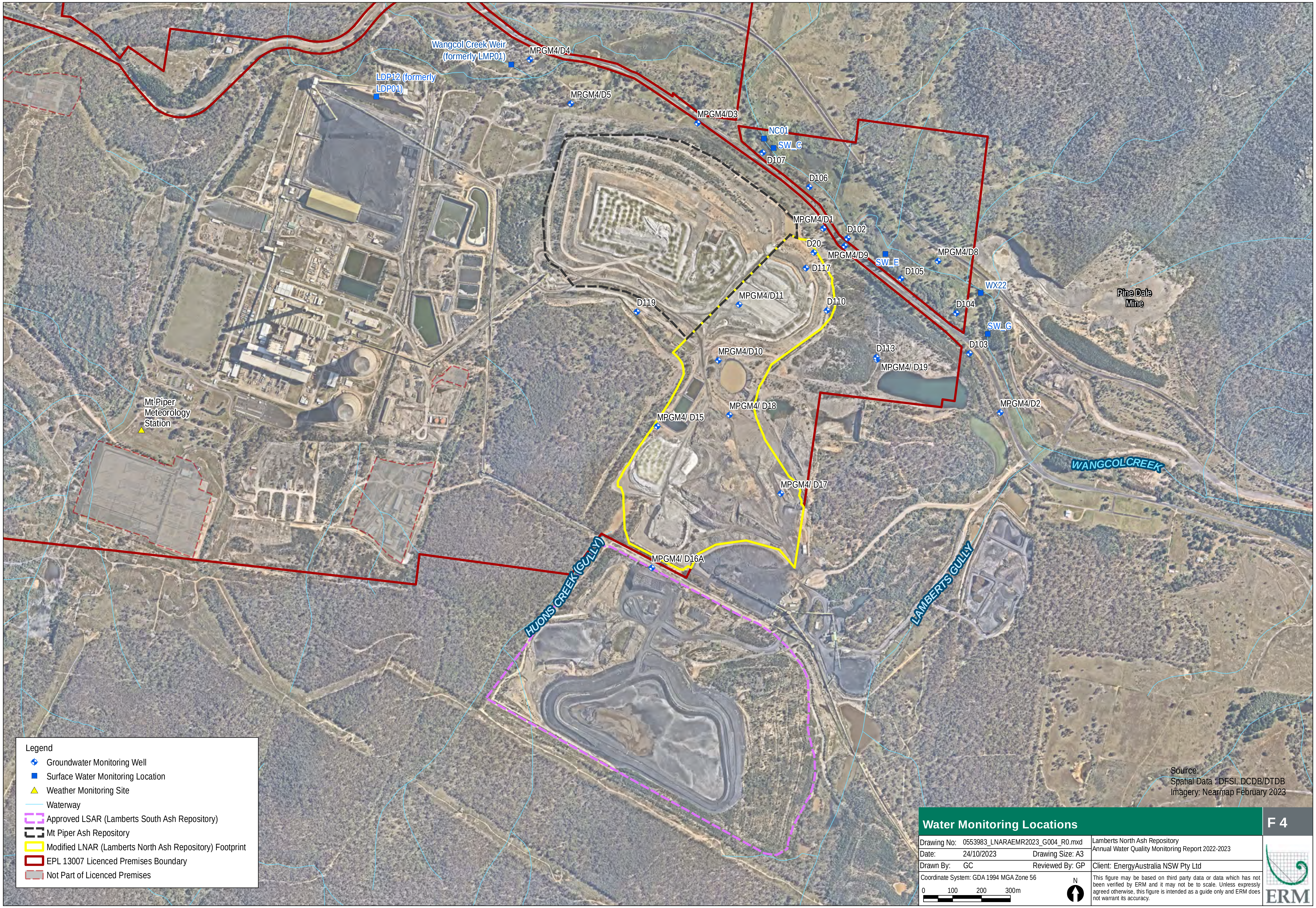


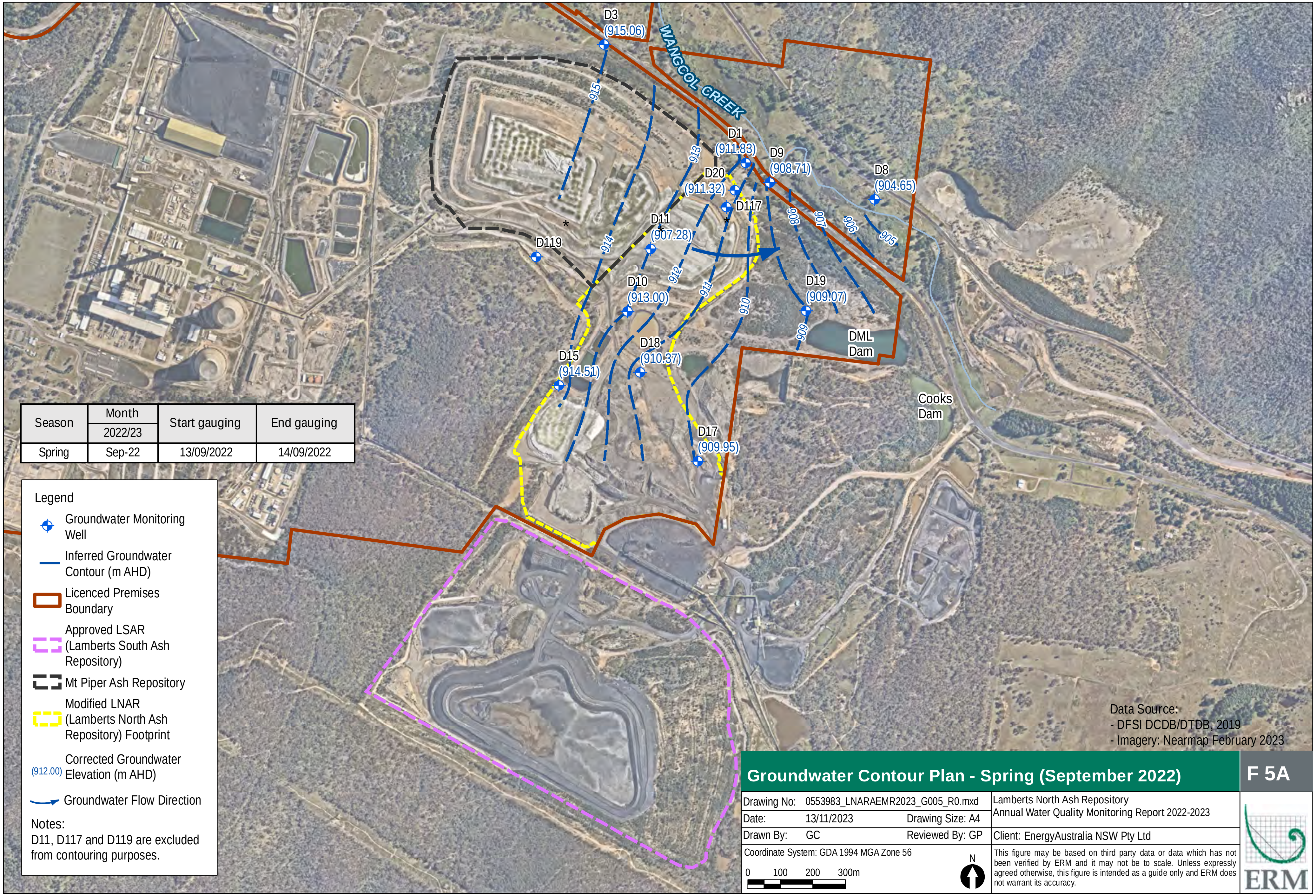
Ash Placement Plan

F 3

Drawing No: 0553983_LNARAEMR2023_G003_R1.mxd	Lamberts North Ash Repository Annual Water Quality Monitoring Report 2022-2023
Date: 13/11/2023 Drawing Size: A4	
Drawn By: GC Reviewed By: GP	Client: EnergyAustralia NSW Pty Ltd
Coordinate System: GDA 1994 MGA Zone 56	This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM


Wangcol Creek Weir
(formerly LMP01)
MPGM4/D4
LDP12 (formerly
LDP01)
MPGM4/D5
MPGM4/D3
NC01
SW_C
D107
D106
MPGM4/D1
D102
D20
MPGM4/D9
SW_E
MPGM4/D8
D117
D105
WX22
Pine Dale
Mine
D119
MPGM4/D11
D110
D104
SW_G
D103
MPGM4/D10
D113
MPGM4/ D19
Mt Piper
Meteorology
Station
MPGM4/ D15
MPGM4/ D18
MPGM4/D2
WANGCOLCREEK
MPGM4/ D17
HUONS CREEK (GULLY)
MPGM4/ D16A
LAMBERTS GULLY
Legend
Groundwater Monitoring Well
Surface Water Monitoring Location
Weather Monitoring Site
Waterway
Approved LSAR (Lamberts South Ash Repository)
Mt Piper Ash Repository
Modified LNAR (Lamberts North Ash Repository) Footprint
EPL 13007 Licenced Premises Boundary
Not Part of Licenced Premises
Source:
Spatial Data : DFSI, DCDB/DTDB
Imagery: Nearmap February 2023
Water Monitoring Locations
F 4
Drawing No: 0553983_LNARAEMR2023_G004_R0.mxd
Date: 24/10/2023
Drawing Size: A3
Drawn By: GC
Reviewed By: GP
Coordinate System: GDA 1994 MGA Zone 56
0 100 200 300m
N
Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023
Client: EnergyAustralia NSW Pty Ltd
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM



Season	Month 2022/23	Start gauging	End gauging
Spring	Sep-22	13/09/2022	14/09/2022

Legend

- Groundwater Monitoring Well
- Inferred Groundwater Contour (m AHD)
- Licenced Premises Boundary
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- (912.00) Corrected Groundwater Elevation (m AHD)
- Groundwater Flow Direction

Notes:
D11, D117 and D119 are excluded from contouring purposes.

Groundwater Contour Plan - Spring (September 2022)

F 5A

Drawing No:	0553983_LNARAEMR2023_G005_R0.mxd		Lamberts North Ash Repository Annual Water Quality Monitoring Report 2022-2023
Date:	13/11/2023	Drawing Size: A4	
Drawn By:	GC	Reviewed By: GP	Client: EnergyAustralia NSW Pty Ltd

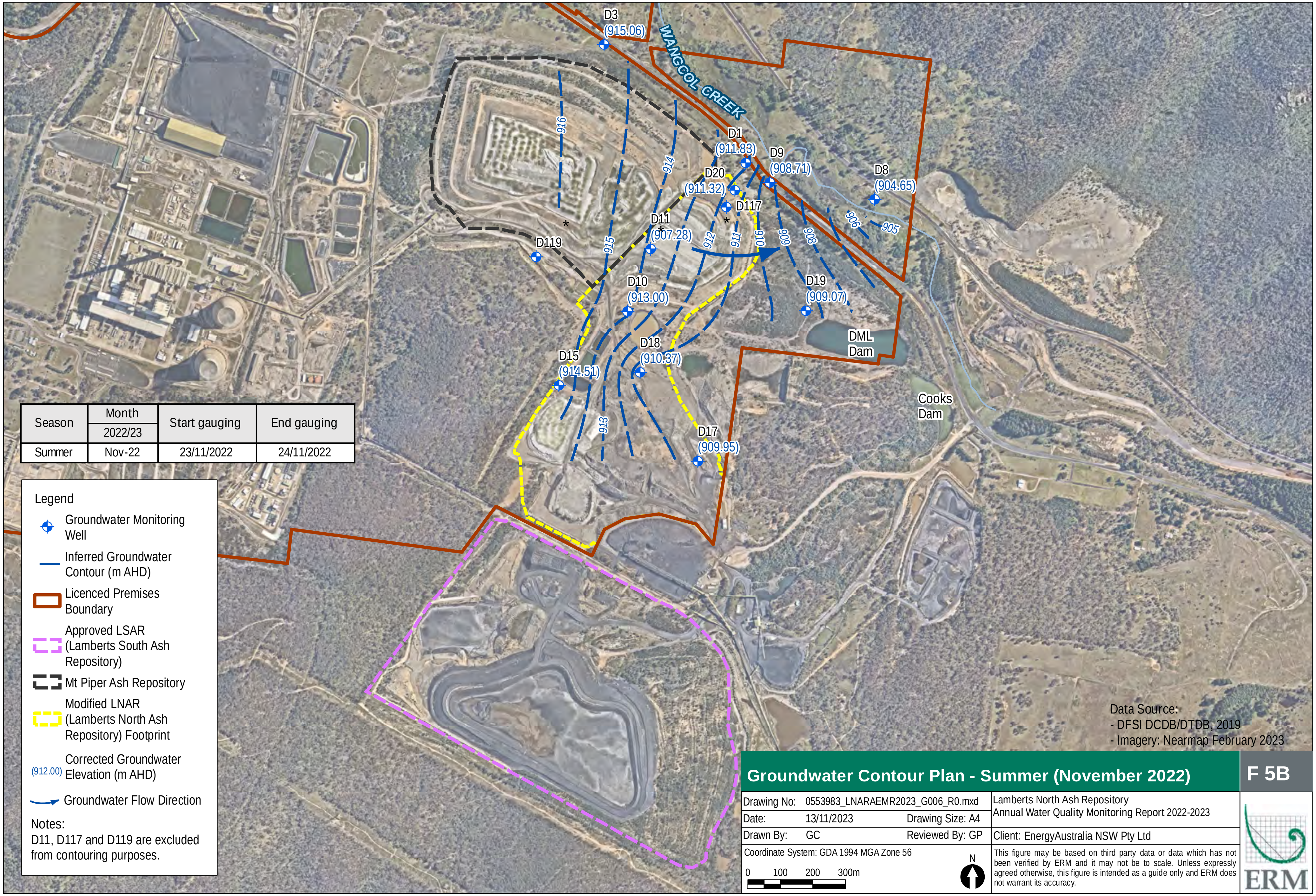
Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM



Season	Month	Start gauging	End gauging
	2022/23		
Summer	Nov-22	23/11/2022	24/11/2022

Legend

- Groundwater Monitoring Well
- Inferred Groundwater Contour (m AHD)
- Licenced Premises Boundary
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- (912.00) Corrected Groundwater Elevation (m AHD)
- Groundwater Flow Direction

Notes:
D11, D117 and D119 are excluded from contouring purposes.

Groundwater Contour Plan - Summer (November 2022)

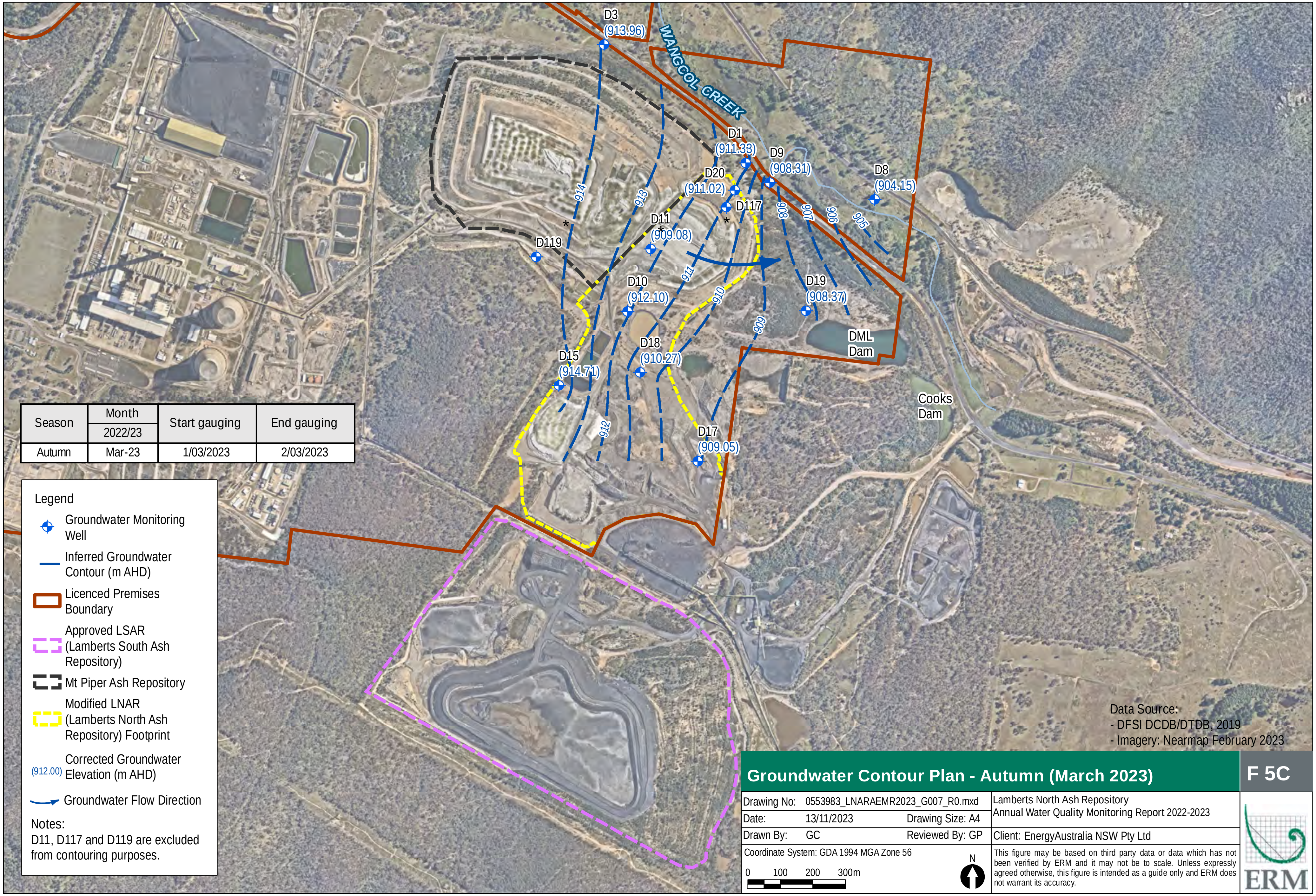
F 5B

Drawing No:	0553983_LNARAEMR2023_G006_R0.mxd		Lamberts North Ash Repository Annual Water Quality Monitoring Report 2022-2023
Date:	13/11/2023	Drawing Size: A4	
Drawn By:	GC	Reviewed By: GP	Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM



Season	Month 2022/23	Start gauging	End gauging
Autumn	Mar-23	1/03/2023	2/03/2023

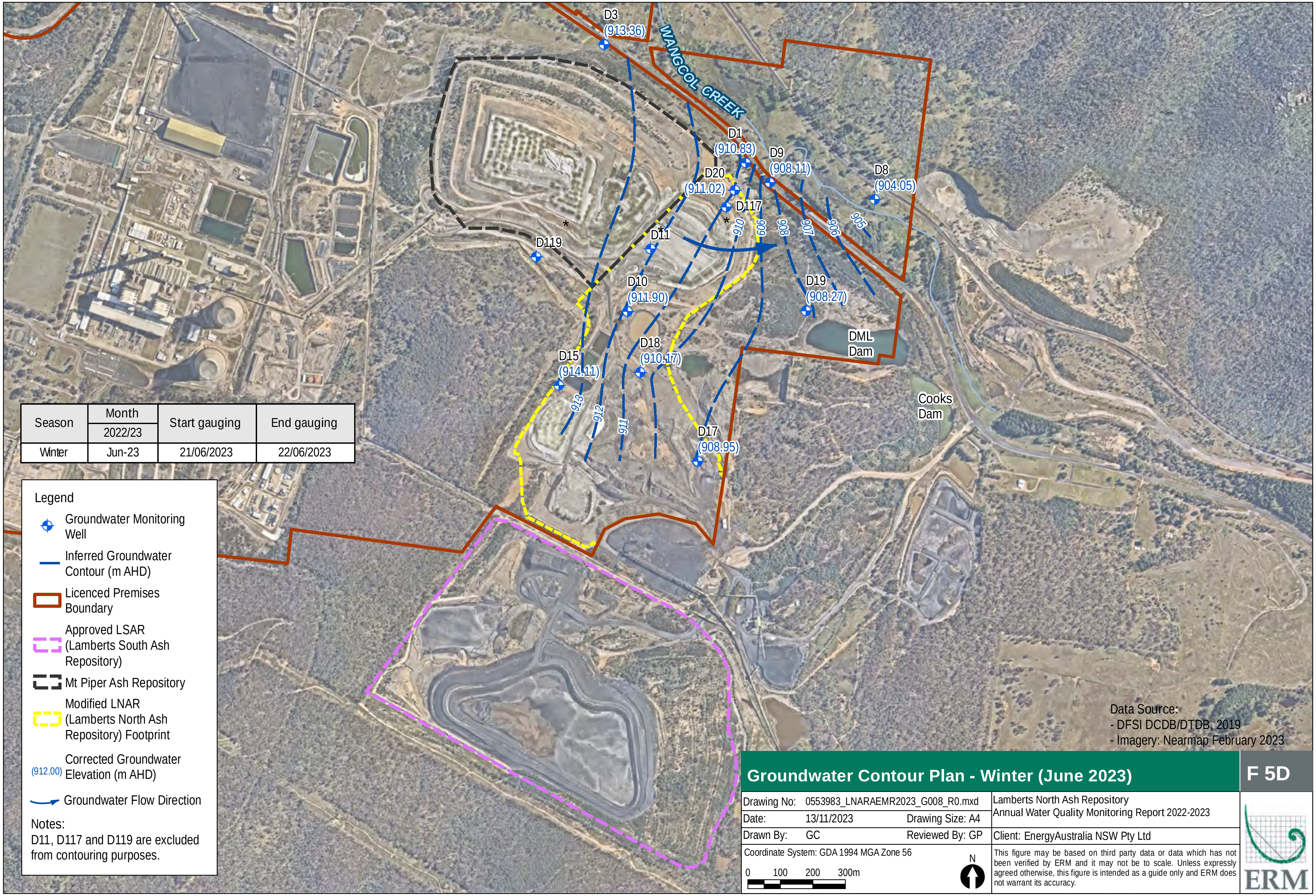
Groundwater Contour Plan - Autumn (March 2023)

F 5C

Drawing No:	0553983_LNARAEMR2023_G007_R0.mxd		
Date:	13/11/2023	Drawing Size:	A4
Drawn By:	GC	Reviewed By:	GP

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Client: EnergyAustralia NSW Pty Ltd



Season	Month	Start gauging	End gauging
	2022/23		
Winter	Jun-23	21/06/2023	22/06/2023

Legend
- Groundwater Monitoring Well
- Inferred Groundwater Contour (m AHD)
- Licenced Premises Boundary
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- (912.00) Corrected Groundwater Elevation (m AHD)
- Groundwater Flow Direction

Notes:
D11, D117 and D119 are excluded from contouring purposes.

Data Source:
- DFSI DCDB/DTDB, 2019
- Imagery: Nearmap February 2023

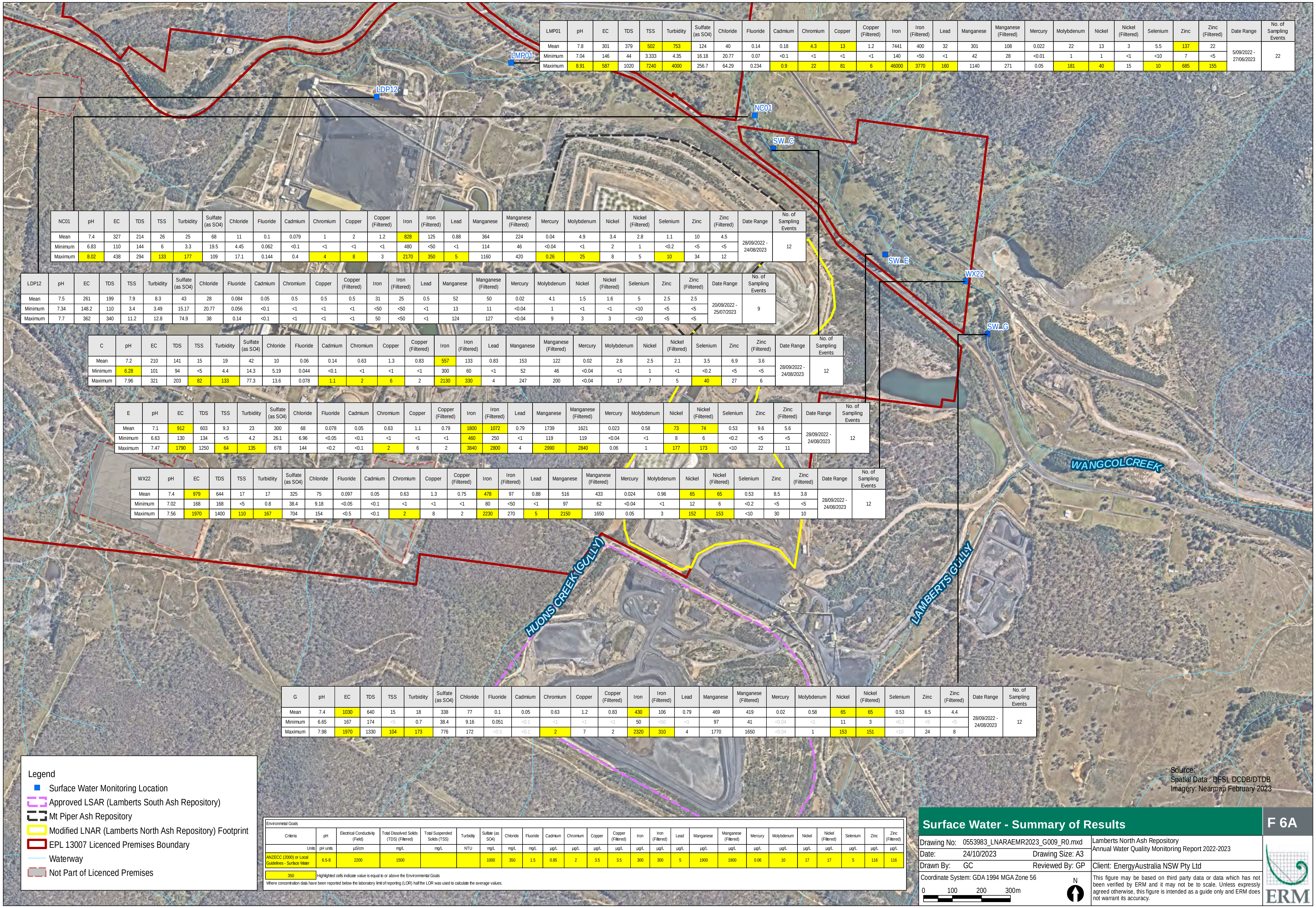
Groundwater Contour Plan - Winter (June 2023)

F 5D

Drawing No: 0553983_LNARAEMR2023_G008_R0.mxd
Date: 13/11/2023 Drawing Size: A4
Drawn By: GC Reviewed By: GP
Coordinate System: GDA 1994 MGA Zone 56
0 100 200 300m
N

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023
Client: EnergyAustralia NSW Pty Ltd

ERM



LMP01	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.8	301	379	502	753	124	40	0.14	0.18	4.3	13	1.2	7441	400	32	301	108	0.022	22	13	3	5.5	137	22	5/09/2022 - 27/06/2023	22
Minimum	7.04	146	44	3.333	4.35	16.18	20.77	0.07	<0.1	<1	<1	<1	140	<50	<1	42	28	<0.01	1	1	<1	<10	7	<5		
Maximum	8.91	587	1020	7240	4000	256.7	64.29	0.234	0.9	22	81	6	46000	3770	160	1140	271	0.05	181	40	15	10	685	155		

NC01	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.4	327	214	26	25	68	11	0.1	0.079	1	2	1.2	828	125	0.88	364	224	0.04	4.9	3.4	2.8	1.1	10	4.5	28/09/2022 - 24/08/2023	12
Minimum	6.83	110	144	6	3.3	19.5	4.45	0.062	<0.1	<1	<1	<1	480	<50	<1	114	46	<0.04	<1	2	1	<0.2	<5	<5		
Maximum	8.02	438	294	133	177	109	17.1	0.144	0.4	4	8	3	2170	350	5	1160	420	0.26	25	8	5	10	34	12		

LDP12	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.5	261	199	7.9	8.3	43	28	0.084	0.05	0.5	0.5	0.5	31	25	0.5	52	50	0.02	4.1	1.5	1.6	5	2.5	2.5	20/09/2022 - 25/07/2023	9
Minimum	7.34	148.2	110	3.4	3.49	15.17	20.77	0.056	<0.1	<1	<1	<1	<50	<50	<1	13	11	<0.04	1	<1	<1	<10	<5	<5		
Maximum	7.7	362	340	11.2	12.8	74.9	38	0.14	<0.1	<1	<1	<1	50	<50	<1	124	127	<0.04	9	3	3	<10	<5	<5		

C	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.2	210	141	15	19	42	10	0.06	0.14	0.63	1.3	0.83	557	133	0.83	153	122	0.02	2.8	2.5	2.1	3.5	6.9	3.6	28/09/2022 - 24/08/2023	12
Minimum	6.28	101	94	<5	4.4	14.3	5.19	0.044	<0.1	<1	<1	<1	300	60	<1	52	46	<0.04	<1	1	<1	<0.2	<5	<5		
Maximum	7.96	321	203	82	133	77.3	13.6	0.078	1.1	2	6	2	2130	330	4	247	200	<0.04	17	7	5	40	27	6		

E	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.1	912	603	9.3	23	300	68	0.078	0.05	0.63	1.1	0.79	1800	1072	0.79	1739	1621	0.023	0.58	73	74	0.53	9.6	5.6	28/09/2022 - 24/08/2023	12
Minimum	6.63	130	134	<5	4.2	26.1	6.96	<0.05	<0.1	<1	<1	<1	460	250	<1	119	119	<0.04	<1	8	6	<0.2	<5	<5		
Maximum	7.47	1790	1250	64	135	678	144	<0.2	<0.1	2	6	2	3840	2800	4	2990	2840	0.06	1	177	173	<10	22	11		

WX22	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.4	979	644	17	17	325	75	0.097	0.05	0.63	1.3	0.75	478	97	0.88	516	433	0.024	0.96	65	65	0.53	8.5	3.8	28/09/2022 - 24/08/2023	12
Minimum	7.02	168	168	<5	0.8	38.4	9.18	<0.05	<0.1	<1	<1	<1	80	<50	<1	97	62	<0.04	<1	12	6	<0.2	<5	<5		
Maximum	7.56	1970	1400	110	167	704	154	<0.5	<0.1	2	8	2	2230	270	5	2150	1650	0.05	3	152	153	<10	30	10		

G	pH	EC	TDS	TSS	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Mean	7.4	1030	640	15	18	338	77	0.1	0.05	0.63	1.2	0.83	430	106	0.79	469	419	0.02	0.58	65	65	0.53	6.5	4.4	28/09/2022 - 24/08/2023	12
Minimum	6.65	167	174	<5	0.7	38.4	9.16	0.051	<0.1	<1	<1	<1	50	<50	<1	97	41	<0.04	<1	11	3	<0.2	<5	<5		
Maximum	7.98	1970	1330	104	173	776	172	<0.5	<0.1	2	7	2	2320	310	4	1770	1650	<0.04	1	153	151	<10	24	8		

Legend
- Surface Water Monitoring Location
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- EPL 13007 Licenced Premises Boundary
- Waterway
- Not Part of Licenced Premises

Environmetal Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	Sulfate (as SO4)	Chloride	Fluoride	Cadmium	Chromium	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Zinc	Zinc (Filtered)
Units	pH units	µS/cm	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Surface Water	6.5-8	2200	1500			1000	350	1.5	0.85	2	3.5	3.5	300	300	5	1900	1900	0.06	10	17	17	5	116	116

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Surface Water - Summary of Results

F 6A

Drawing No: 0553983_LNARAEMR2023_G009_R0.mxd
Date: 24/10/2023 Drawing Size: A3
Drawn By: GC Reviewed By: GP

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

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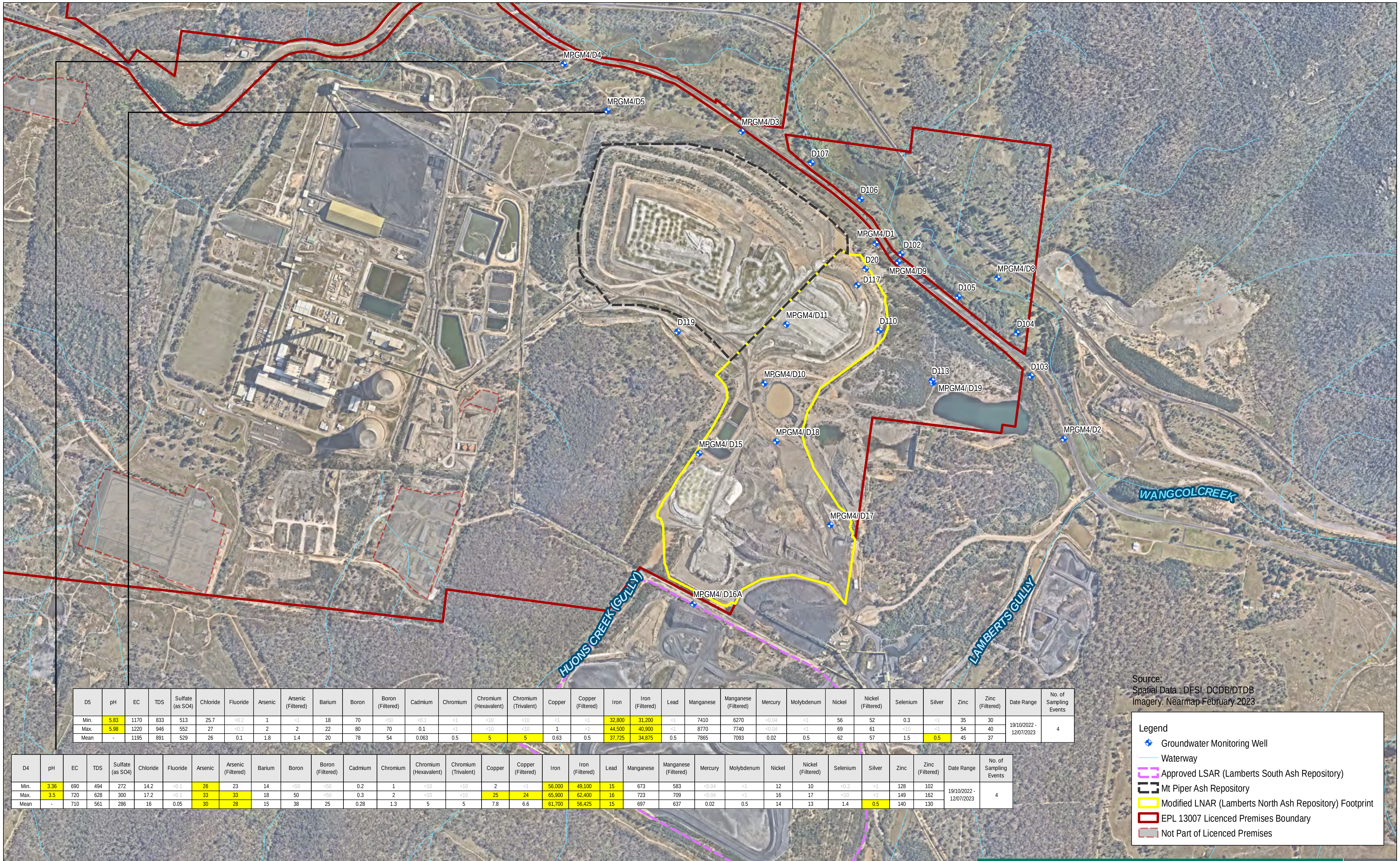
ERM



D5	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.83	1170	833	513	25.7	<0.2	1	<1	18	70	<50	<0.1	<1	<10	<10	<1	<1	32,800	31,200	<1	7410	6270	<0.04	<1	56	52	0.3	<1	35	30	19/10/2022 - 12/07/2023	4
Max.	5.98	1220	946	552	27	<0.2	2	2	22	80	70	0.1	<1	<10	<10	1	<1	44,500	40,900	<1	8770	7740	<0.04	<1	69	61	<10	<1	54	40		
Mean	-	1195	891	529	26	0.1	1.8	1.4	20	78	54	0.063	0.5	5	5	0.63	0.5	37,725	34,875	0.5	7865	7093	0.02	0.5	62	57	1.5	0.5	45	37		

D4	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	3.36	690	494	272	14.2	<0.1	26	23	14	<50	<50	0.2	1	<10	<10	2	<1	56,000	49,100	15	673	583	<0.04	<1	12	10	<0.2	<1	128	102	19/10/2022 - 12/07/2023	4
Max.	3.5	720	628	300	17.2	<0.1	33	33	18	50	<50	0.3	2	<10	<10	25	24	65,900	62,400	16	723	709	<0.04	<1	16	17	<10	<1	149	162		
Mean	-	710	561	286	16	0.05	30	28	15	38	25	0.28	1.3	5	5	7.8	6.6	61,700	56,425	15	697	637	0.02	0.5	14	13	1.4	0.5	140	130		

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results Upgradient / Background

F 6B

Drawing No: 0553983_LNARAEMR2023_G010_R0.mxd

Date: 25/10/2023 Drawing Size: A3

Drawn By: GC Reviewed By: GP

Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Client: EnergyAustralia NSW Pty Ltd

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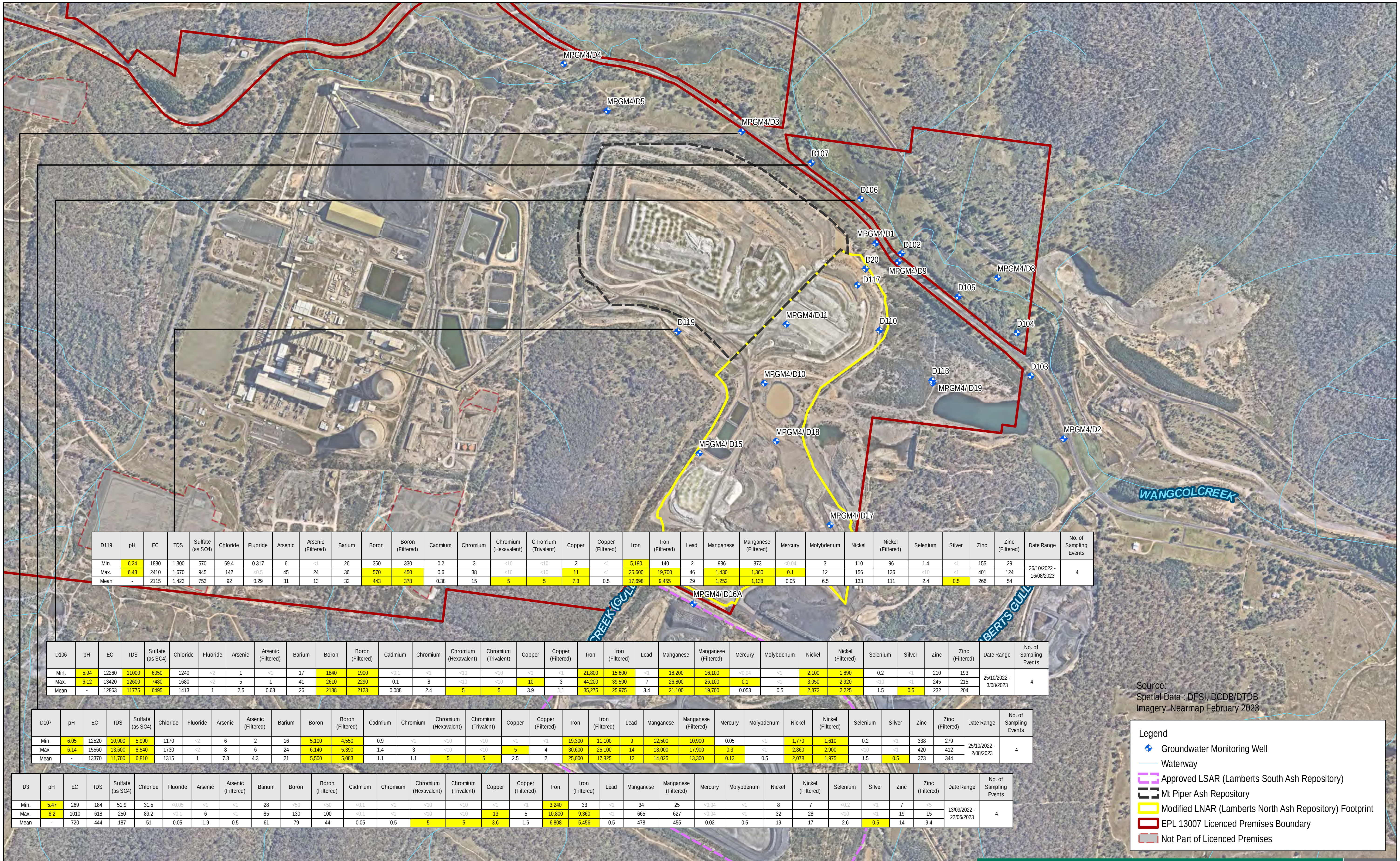
ERM



D119	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.24	1880	1,300	570	69.4	0.317	6	<1	26	360	330	0.2	3	<10	<10	2	<1	5,190	140	2	986	873	<0.04	3	110	96	1.4	<1	155	29	26/10/2022 - 16/08/2023	4
Max.	6.43	2410	1,670	945	142	<0.5	45	24	36	570	450	0.6	38	<10	<10	11	<1	25,600	19,700	46	1,430	1,360	0.1	12	156	136	<10	<1	401	124		
Mean	-	2115	1,423	753	92	0.29	31	13	32	443	378	0.38	15	5	5	7.3	0.5	17,698	9,455	29	1,252	1,138	0.05	6.5	133	111	2.4	0.5	266	54		

D106	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.94	12260	11000	6050	1240	<2	1	<1	17	1840	1900	<0.1	<1	<10	<10	<1	<1	21,800	15,600	<1	18,200	16,100	<0.04	<1	2,100	1,890	0.2	<1	210	193	25/10/2022 - 3/08/2023	4
Max.	6.12	13420	12600	7480	1680	<2	5	1	41	2610	2290	0.1	8	<10	<10	10	3	44,200	39,500	7	26,800	26,100	0.1	<1	3,050	2,920	<10	<1	245	215		
Mean	-	12863	11775	6495	1413	1	2.5	0.63	26	2138	2123	0.088	2.4	5	5	3.9	1.1	35,275	25,975	3.4	21,100	19,700	0.053	0.5	2,373	2,225	1.5	0.5	232	204		

D107	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.05	12520	10,900	5,990	1170	<2	6	2	16	5,100	4,550	0.9	<1	<10	<10	<1	<1	19,300	11,100	9	12,500	10,900	0.05	<1	1,770	1,610	0.2	<1	338	279	25/10/2022 - 2/08/2023	4
Max.	6.14	15560	13,600	8,540	1730	<2	8	6	24	6,140	5,390	1.4	3	<10	<10	5	4	30,600	25,100	14	18,000	17,900	0.3	<1	2,860	2,900	<10	<1	420	412		
Mean	-	13370	11,700	6,810	1315	1	7.3	4.3	21	5,500	5,083	1.1	1.1	5	5	2.5	2	25,000	17,825	12	14,025	13,300	0.13	0.5	2,078	1,975	1.5	0.5	373	344		

D3	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.47	269	184	51.9	31.5	<0.05	<1	<1	28	<50	<50	<0.1	<1	<10	<10	<1	<1	3,240	33	<1	34	25	<0.04	<1	8	7	<0.2	<1	7	<5	13/09/2022 - 22/06/2023	4
Max.	6.2	1010	618	250	89.2	<0.1	6	<1	85	130	100	<0.1	<1	<10	<10	13	5	10,800	9,360	<1	665	627	<0.04	<1	32	28	<10	<1	19	15		
Mean	-	720	444	187	51	0.05	1.9	0.5	61	79	44	0.05	0.5	5	5	3.6	1.6	6,808	5,456	0.5	478	455	0.02	0.5	19	17	2.6	0.5	14	9.4		

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results Upgradient / Adjacent MPAR

F 6C

Drawing No: 0553983_LNARAEMR2023_G011_R0.mxd
Date: 25/10/2023 Drawing Size: A3
Drawn By: GC Reviewed By: GP

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023
Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

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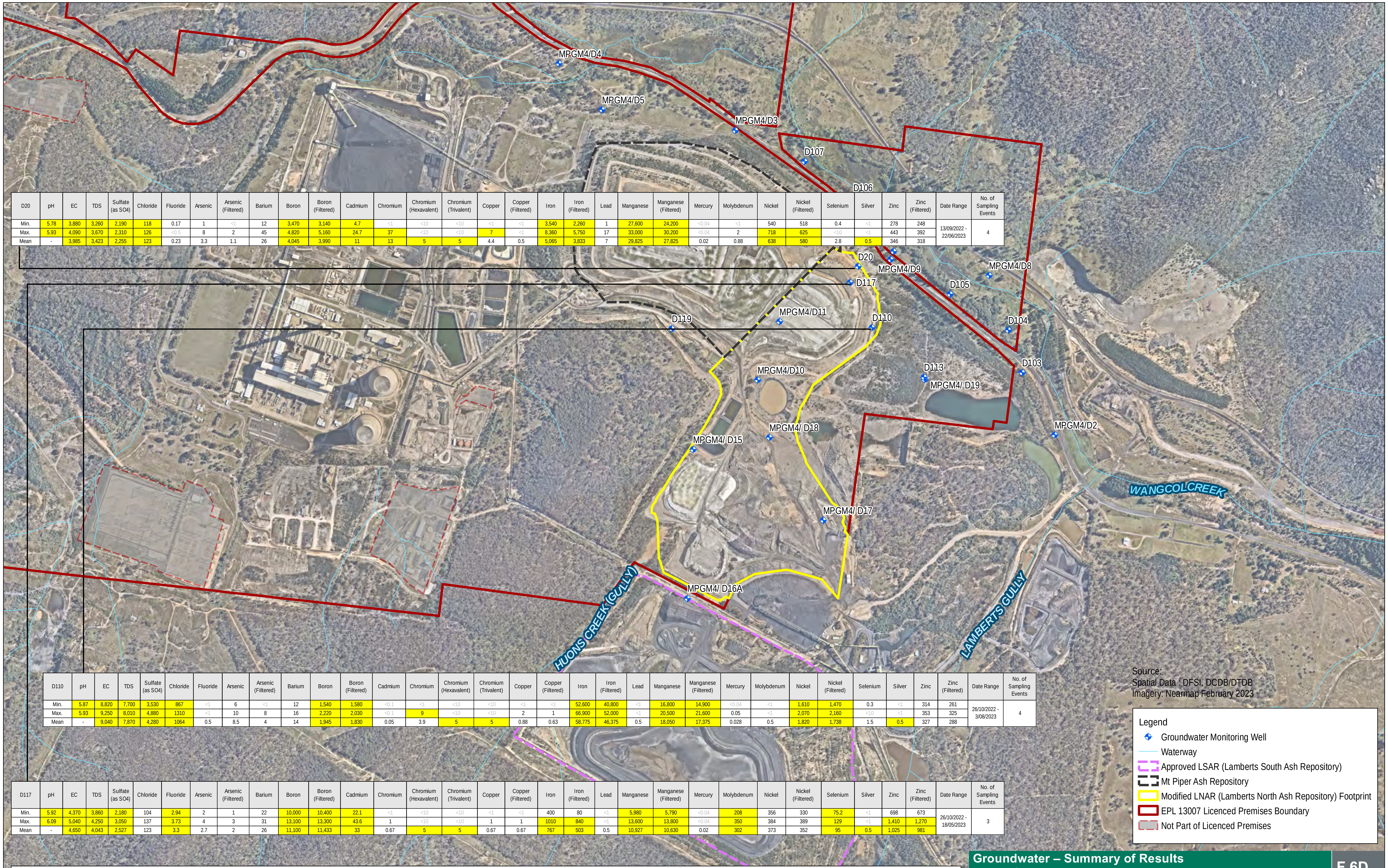
ERM



D20	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.78	3,880	3,260	2,190	118	0.17	1	<1	12	3,470	3,140	4.7	<1	<10	<10	<1	<1	3,540	2,260	1	27,600	24,200	<0.04	<1	540	518	0.4	<1	278	248	13/09/2022 - 22/06/2023	4
Max.	5.93	4,090	3,670	2,310	126	<0.5	8	2	45	4,820	5,160	24.7	37	<10	<10	7	<1	8,360	5,750	17	33,000	30,200	<0.04	2	718	625	<10	<1	443	392		
Mean	-	3,985	3,423	2,255	123	0.23	3.3	1.1	26	4,045	3,990	11	13	5	5	4.4	0.5	5,065	3,833	7	29,825	27,825	0.02	0.88	638	580	2.8	0.5	346	318		

D110	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.87	8,820	7,700	3,530	867	<1	6	<1	12	1,540	1,580	<0.1	<1	<10	<10	<1	<1	52,600	40,800	<1	16,800	14,900	<0.04	<1	1,610	1,470	0.3	<1	314	261	26/10/2022 - 3/08/2023	4
Max.	5.93	9,250	8,010	4,880	1310	<1	10	8	16	2,220	2,030	<0.1	9	<10	<10	2	1	66,900	52,000	<1	20,500	21,600	0.05	<1	2,070	2,160	<10	<1	353	325		
Mean	-	9,040	7,870	4,280	1064	0.5	8.5	4	14	1,945	1,830	0.05	3.9	5	5	0.88	0.63	58,775	46,375	0.5	18,050	17,375	0.028	0.5	1,820	1,738	1.5	0.5	327	288		

D117	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.92	4,370	3,860	2,180	104	2.94	2	1	22	10,000	10,400	22.1	<1	<10	<10	<1	<1	400	80	<1	5,980	5,790	<0.04	208	356	330	75.2	<1	698	673	26/10/2022 - 18/05/2023	3
Max.	6.09	5,040	4,250	3,050	137	3.73	4	3	31	13,100	13,300	43.6	1	<10	<10	1	1	1010	840	<1	13,600	13,800	<0.04	350	384	389	129	<1	1,410	1,270		
Mean	-	4,650	4,043	2,527	123	3.3	2.7	2	26	11,100	11,433	33	0.67	5	5	0.67	0.67	767	503	0.5	10,927	10,630	0.02	302	373	352	95	0.5	1,025	981		

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results Within / Immediately Adjacent LNAR North

F 6D

Drawing No: 0553983_LNARAEMR2023_G012_R0.mxd

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Date: 25/10/2023 Drawing Size: A3

Drawn By: GC Reviewed By: GP

Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

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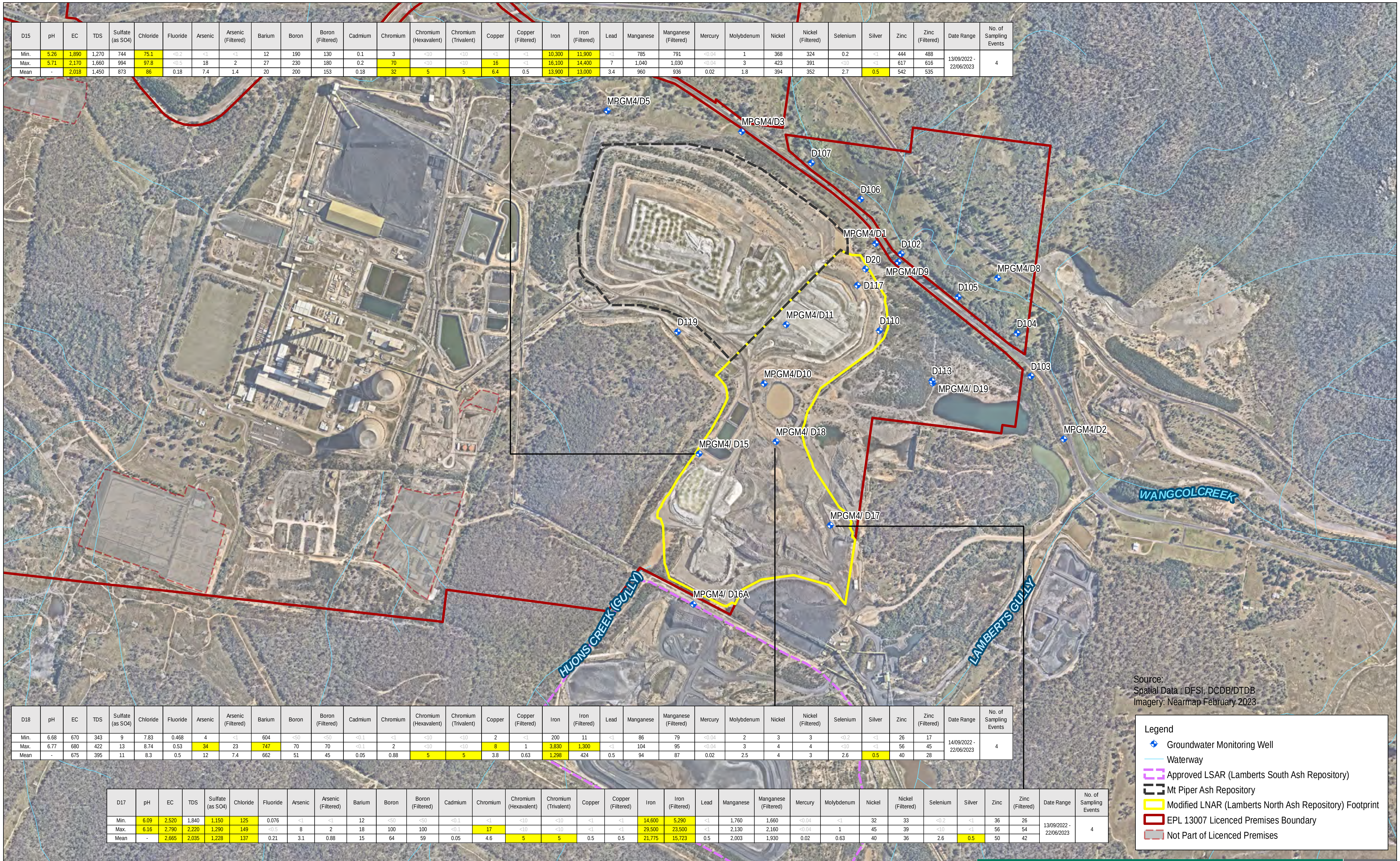
ERM



D15	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.26	1,890	1,270	744	75.1	<0.2	<1	<1	12	190	130	0.1	3	<10	<10	<1	<1	10,300	11,900	<1	785	791	<0.04	1	368	324	0.2	<1	444	488	13/09/2022 - 22/06/2023	4
Max.	5.71	2,170	1,660	994	97.8	<0.5	18	2	27	230	180	0.2	70	<10	<10	16	<1	16,100	14,400	7	1,040	1,030	<0.04	3	423	391	<10	<1	617	616		
Mean	-	2,018	1,450	873	86	0.18	7.4	1.4	20	200	153	0.18	32	5	5	6.4	0.5	13,900	13,000	3.4	960	936	0.02	1.8	394	352	2.7	0.5	542	535		

D18	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.68	670	343	9	7.83	0.468	4	<1	604	<50	<50	<0.1	<1	<10	<10	2	<1	200	11	<1	86	79	<0.04	2	3	3	<0.2	<1	26	17	14/09/2022 - 22/06/2023	4
Max.	6.77	680	422	13	8.74	0.53	34	23	747	70	70	<0.1	2	<10	<10	8	1	3,830	1,300	<1	104	95	<0.04	3	4	4	<10	<1	56	45		
Mean	-	675	395	11	8.3	0.5	12	7.4	662	51	45	0.05	0.88	5	5	3.8	0.63	1,298	424	0.5	94	87	0.02	2.5	4	3	2.6	0.5	40	28		

D17	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.09	2,520	1,840	1,150	125	0.076	<1	<1	12	<50	<50	<0.1	<1	<10	<10	<1	<1	14,600	5,290	<1	1,760	1,660	<0.04	<1	32	33	<0.2	<1	36	26	13/09/2022 - 22/06/2023	4
Max.	6.16	2,790	2,220	1,290	149	<0.5	8	2	18	100	100	<0.1	17	<10	<10	<1	<1	29,500	23,500	<1	2,130	2,160	<0.04	1	45	39	<10	<1	56	54		
Mean	-	2,665	2,035	1,228	137	0.21	3.1	0.88	15	64	59	0.05	4.6	5	5	0.5	0.5	21,775	15,723	0.5	2,003	1,930	0.02	0.63	40	36	2.6	0.5	50	42		

Source:
Spatial Data : DFSI, DCDB/DTDB
Imagery: Nearmap February 2023

Legend
- Groundwater Monitoring Well
- Waterway
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- EPL 13007 Licenced Premises Boundary
- Not Part of Licenced Premises

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results Within / immediately adjacent LNAR South

F 6E

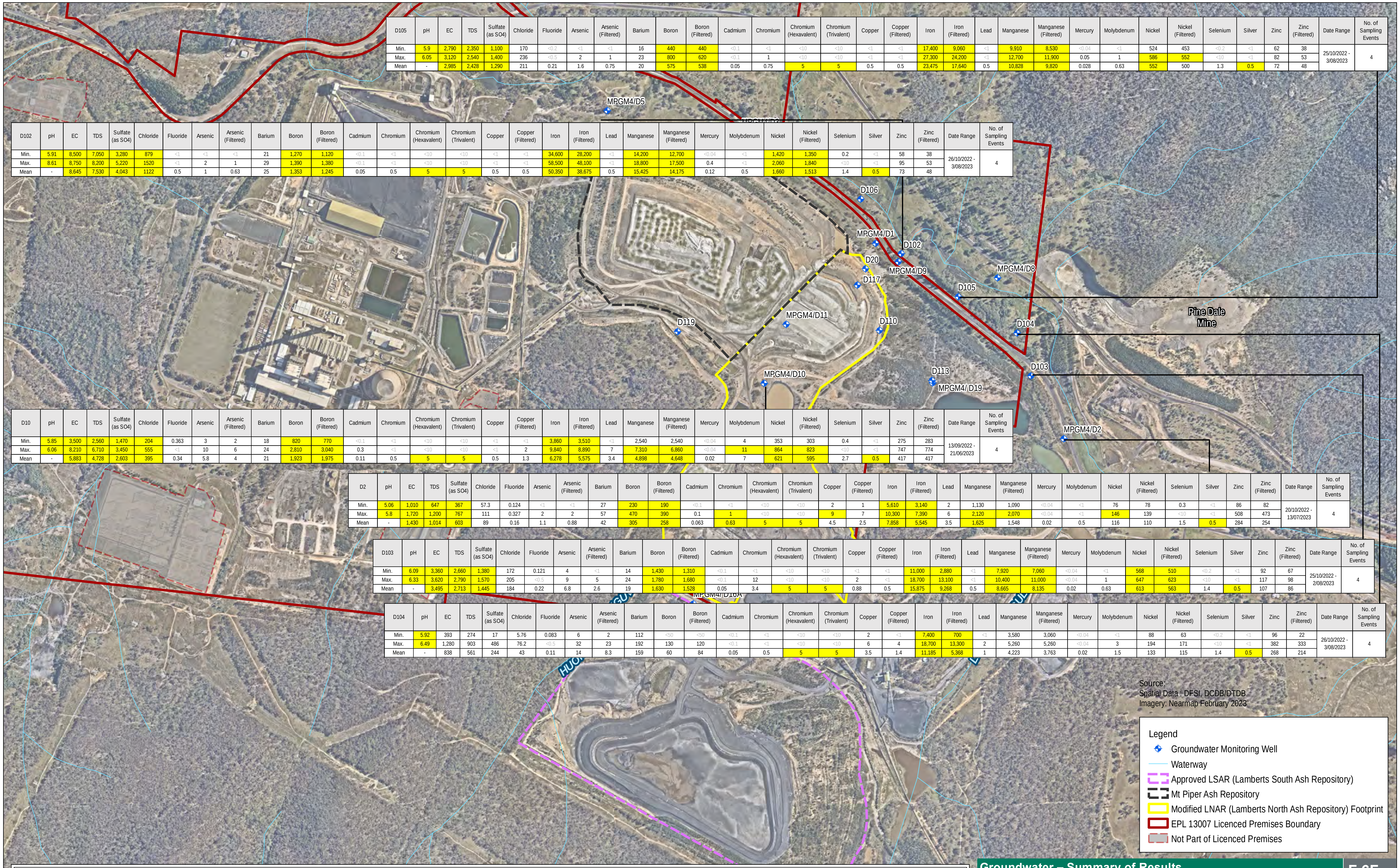
Drawing No: 0553983_LNARAEMR2023_G013_R0.mxd
Date: 25/10/2023 Drawing Size: A3
Drawn By: GC Reviewed By: GP
Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

N

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023
Client: EnergyAustralia NSW Pty Ltd

ERM



D105	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.9	2,790	2,350	1,100	170	<0.2	<1	<1	16	440	440	<0.1	<1	<10	<10	<1	<1	17,400	9,060	<1	9,910	8,530	<0.04	<1	524	453	<0.2	<1	62	38	25/10/2022 - 3/08/2023	4
Max.	6.05	3,120	2,540	1,400	236	<0.5	2	1	23	800	620	<0.1	1	<10	<10	<1	<1	27,300	24,200	<1	12,700	11,900	0.05	1	586	552	<10	<1	82	53		
Mean	-	2,985	2,428	1,290	211	0.21	1.6	0.75	20	575	538	0.05	0.75	5	5	0.5	0.5	23,475	17,640	0.5	10,828	9,820	0.028	0.63	552	500	1.3	0.5	72	48		

D102	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.91	8,500	7,050	3,280	879	<1	<1	<1	21	1,270	1,120	<0.1	<1	<10	<10	<1	<1	34,600	28,200	<1	14,200	12,700	<0.04	<1	1,420	1,350	0.2	<1	58	38	26/10/2022 - 3/08/2023	4
Max.	8.61	8,750	8,200	5,220	1520	<1	2	1	29	1,390	1,380	<0.1	<1	<10	<10	<1	<1	58,500	48,100	<1	18,800	17,500	0.4	<1	2,060	1,840	<10	<1	95	53		
Mean	-	8,645	7,530	4,043	1122	0.5	1	0.63	25	1,353	1,245	0.05	0.5	5	5	0.5	0.5	50,350	38,675	0.5	15,425	14,175	0.12	0.5	1,660	1,513	1.4	0.5	73	48		

D10	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.85	3,500	2,560	1,470	204	0.363	3	2	18	820	770	<0.1	<1	<10	<10	<1	<1	3,860	3,510	<1	2,540	2,540	<0.04	4	353	303	0.4	<1	275	283	13/09/2022 - 21/06/2023	4
Max.	6.06	8,210	6,710	3,450	555	<1	10	6	24	2,810	3,040	0.3	<1	<10	<10	<1	2	9,840	8,890	7	7,310	6,860	<0.04	11	864	823	<10	<1	747	774		
Mean	-	5,883	4,728	2,603	395	0.34	5.8	4	21	1,923	1,975	0.11	0.5	5	5	0.5	1.3	6,278	5,575	3.4	4,898	4,648	0.02	7	621	595	2.7	0.5	417	417		

D2	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.06	1,010	647	367	57.3	0.124	<1	<1	27	230	190	<0.1	<1	<10	<10	2	1	5,610	3,140	2	1,130	1,090	<0.04	<1	76	78	0.3	<1	86	82	20/10/2022 - 13/07/2023	4
Max.	5.8	1,720	1,200	767	111	0.327	2	2	57	470	390	0.1	1	<10	<10	9	7	10,300	7,390	6	2,120	2,070	<0.04	<1	146	139	<10	<1	508	473		
Mean	-	1,430	1,014	603	89	0.16	1.1	0.88	42	305	258	0.063	0.63	5	5	4.5	2.5	7,858	5,545	3.5	1,625	1,548	0.02	0.5	116	110	1.5	0.5	284	254		

D103	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.09	3,360	2,660	1,380	172	0.121	4	<1	14	1,430	1,310	<0.1	<1	<10	<10	<1	<1	11,000	2,880	<1	7,920	7,060	<0.04	<1	568	510	<0.2	<1	92	67	25/10/2022 - 2/08/2023	4
Max.	6.33	3,620	2,790	1,570	205	<0.5	9	5	24	1,780	1,680	<0.1	12	<10	<10	2	<1	18,700	13,100	<1	10,400	11,000	<0.04	1	647	623	<10	<1	117	98		
Mean	-	3,495	2,713	1,445	184	0.22	6.8	2.6	19	1,630	1,528	0.05	3.4	5	5	0.88	0.5	15,875	9,268	0.5	8,665	8,135	0.02	0.63	613	563	1.4	0.5	107	86		

D104	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.92	393	274	17	5.76	0.083	6	2	112	<50	<50	<0.1	<1	<10	<10	2	<1	7,400	700	<1	3,580	3,060	<0.04	<1	88	63	<0.2	<1	96	22	26/10/2022 - 3/08/2023	4
Max.	6.49	1,280	903	486	76.2	<0.5	32	23	192	130	120	<0.1	<1	<10	<10	6	4	18,700	13,300	2	5,260	5,260	<0.04	3	194	171	<10	<1	382	333		
Mean	-	838	561	244	43	0.11	14	8.3	159	60	84	0.05	0.5	5	5	3.5	1.4	11,185	5,368	1	4,223	3,763	0.02	1.5	133	115	1.4	0.5	268	214		

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results
Cross and Downgradient of LNAR / Adjacent Wangcol Creek

F 6F

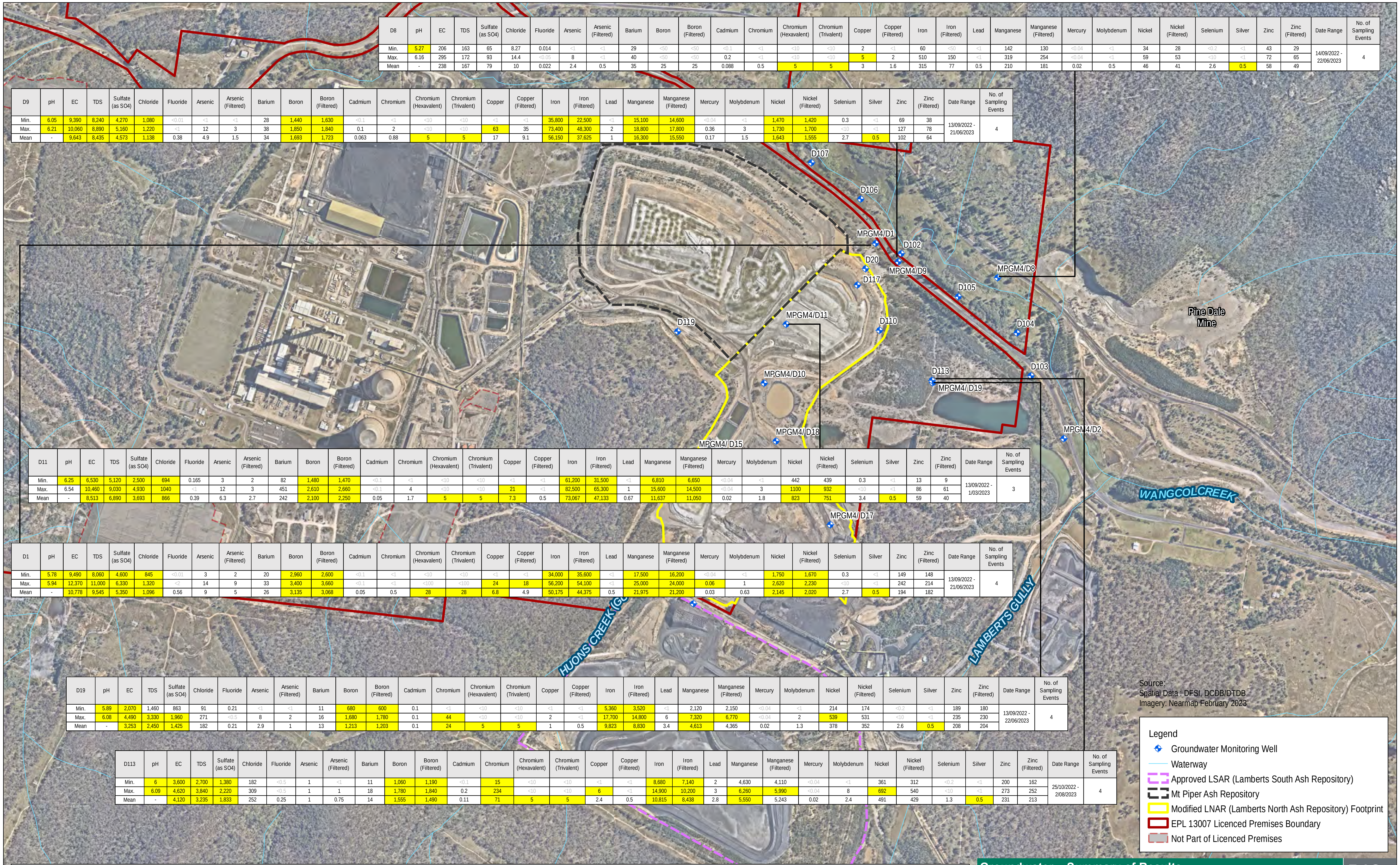
Drawing No: 0553983_LNARAEMR2023_G014_R0.mxd
Date: 26/10/2023 Drawing Size: A3
Drawn By: GC Reviewed By: GP
Coordinate System: GDA 1994 MGA Zone 56
0 100 200 300m
N

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Client: EnergyAustralia NSW Pty Ltd

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM



D8	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.27	206	163	65	8.27	0.014	<1	<1	29	<50	<50	<0.1	<1	<10	<10	2	<1	60	<50	<1	142	130	<0.04	<1	34	28	<0.2	<1	43	29	14/09/2022 - 22/06/2023	4
Max.	6.16	295	172	93	14.4	<0.05	8	<1	40	<50	<50	0.2	<1	<10	<10	5	2	510	150	<1	319	254	<0.04	<1	59	53	<10	<1	72	65		
Mean	-	238	167	79	10	0.022	2.4	0.5	35	25	25	0.088	0.5	5	5	3	1.6	315	77	0.5	210	181	0.02	0.5	46	41	2.6	0.5	58	49		

D9	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.05	9,390	8,240	4,270	1,080	<0.01	<1	<1	28	1,440	1,630	<0.1	<1	<10	<10	<1	<1	35,800	22,500	<1	15,100	14,600	<0.04	<1	1,470	1,420	0.3	<1	69	38	13/09/2022 - 21/06/2023	4
Max.	6.21	10,060	8,890	5,160	1,220	<1	12	3	38	1,850	1,840	0.1	2	<10	<10	63	35	73,400	48,300	2	18,800	17,800	0.36	3	1,730	1,700	<10	<1	127	78		
Mean	-	9,643	8,435	4,573	1,138	0.38	4.9	1.5	34	1,693	1,723	0.063	0.88	5	5	17	9.1	56,150	37,625	1	16,300	15,550	0.17	1.5	1,643	1,555	2.7	0.5	102	64		

D11	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6.25	6,530	5,120	2,500	694	0.165	3	2	82	1,480	1,470	<0.1	<1	<10	<10	<1	<1	61,200	31,500	<1	6,810	6,650	<0.04	<1	442	439	0.3	<1	13	9	13/09/2022 - 1/03/2023	3
Max.	6.54	10,460	9,030	4,930	1040	<1	12	3	451	2,610	2,660	<0.1	4	<10	<10	21	<1	82,500	65,300	1	15,600	14,500	<0.04	3	1100	932	<10	<1	86	61		
Mean	-	8,513	6,890	3,693	866	0.39	6.3	2.7	242	2,100	2,250	0.05	1.7	5	5	7.3	0.5	73,067	47,133	0.67	11,637	11,050	0.02	1.8	823	751	3.4	0.5	59	40		

D1	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.78	9,490	8,060	4,600	845	<0.01	3	2	20	2,960	2,600	<0.1	<1	<10	<10	<1	<1	34,000	35,600	<1	17,500	16,200	<0.04	<1	1,750	1,670	0.3	<1	149	148	13/09/2022 - 21/06/2023	4
Max.	5.94	12,370	11,000	6,330	1,320	<2	14	9	33	3,400	3,660	<0.1	<1	<100	<100	24	18	56,200	54,100	<1	25,000	24,000	0.06	1	2,620	2,230	<10	<1	242	214		
Mean	-	10,778	9,545	5,350	1,096	0.56	9	5	26	3,135	3,068	0.05	0.5	28	28	6.8	4.9	50,175	44,375	0.5	21,975	21,200	0.03	0.63	2,145	2,020	2.7	0.5	194	182		

D19	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	5.89	2,070	1,460	863	91	0.21	<1	<1	11	680	600	0.1	<1	<10	<10	<1	<1	5,360	3,520	<1	2,120	2,150	<0.04	<1	214	174	<0.2	<1	189	180	13/09/2022 - 22/06/2023	4
Max.	6.08	4,490	3,330	1,960	271	<0.5	8	2	16	1,680	1,780	0.1	44	<10	<10	2	<1	17,700	14,800	6	7,320	6,770	<0.04	2	539	531	<10	<1	235	230		
Mean	-	3,253	2,450	1,425	182	0.21	2.9	1	13	1,213	1,203	0.1	24	5	5	1	0.5	9,823	8,830	3.4	4,613	4,365	0.02	1.3	378	352	2.6	0.5	208	204		

D113	pH	EC	TDS	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)	Date Range	No. of Sampling Events
Min.	6	3,600	2,700	1,380	182	<0.5	1	<1	11	1,060	1,190	<0.1	15	<10	<10	<1	<1	8,680	7,140	2	4,630	4,110	<0.04	<1	361	312	<0.2	<1	200	162	25/10/2022 - 2/08/2023	4
Max.	6.09	4,620	3,840	2,220	309	<0.5	1	1	18	1,780	1,840	0.2	234	<10	<10	6	<1	14,900	10,200	3	6,260	5,990	<0.04	8	692	540	<10	<1	273	252		
Mean	-	4,120	3,235	1,833	252	0.25	1	0.75	14	1,555	1,490	0.11	71	5	5	2.4	0.5	10,815	8,438	2.8	5,550	5,243	0.02	2.4	491	429	1.3	0.5	231	213		

Legend
- Groundwater Monitoring Well
- Waterway
- Approved LSAR (Lamberts South Ash Repository)
- Mt Piper Ash Repository
- Modified LNAR (Lamberts North Ash Repository) Footprint
- EPL 13007 Licenced Premises Boundary
- Not Part of Licenced Premises

Environmental Goals

Criteria	pH	Electrical Conductivity (Field)	Total Dissolved Solids (TDS) (Filtered)	Sulfate (as SO4)	Chloride	Fluoride	Arsenic	Arsenic (Filtered)	Barium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Zinc	Zinc (Filtered)
Units	pH units	uS/cm	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater	6.5-8	2600	2000	1000	350	1.5	24	24	700	370	370	2	5	1	3.3	5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05	908	908

350 — Highlighted cells indicate value is equal to or above the Environmental Goals

Where concentration data have been reported below the laboratory limit of reporting (LOR) half the LOR was used to calculate the average values.

Groundwater – Summary of Results
Cross and Downgradient of LNAR / Adjacent Wangcol Creek

F 6G

Drawing No: 0553983_LNARAEMR2023_G015_R0.mxd
Date: 26/10/2023 Drawing Size: A3
Drawn By: GC Reviewed By: GP

Lamberts North Ash Repository
Annual Water Quality Monitoring Report 2022-2023

Client: EnergyAustralia NSW Pty Ltd

Coordinate System: GDA 1994 MGA Zone 56

0 100 200 300m

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APPENDIX B TABULATED SURFACE WATER DATA

			Field Parameters				Major Anions and Cations												NA		Nutrients											Physical Parameters				
			Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Redox (Field)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)	Dissolved Organic Carbon (mg/L) (Filtered)	Oil & Grease	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Nitrogen (N) - Kjeldahl	Nitrogen (N)	Total Phosphate (PO4)	Total Phosphate (PO4) (Filtered)	Phosphorus	Phosphorus (Filtered)	Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	Aluminium	Aluminium (Filtered)
			mg/L	uS/cm	pH units	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L
Environmental Goals - Surface Water				2200	6.5-8							350	1.5					1000														1500				
EPL 13007 - Discharge Limits (LDP12)				500	6.5-8.5																												50	25		
Monitoring_Zone	**LocCode**	**Sampled_Date-Time**																																		
Final Holding Pond Weir	LMP01	5/09/2022	8.3	305	7.56	194.8	-	73.63	19.9	15.5	73.63	49.45	0.07	7.39	0	13.3	50.7	55.9	8	0.32	540	22	250	<10	0.25	33.7	34	6.7	0.16	2.19	0.05	95	7240	>4000	54,300	90
Final Holding Pond Weir	LMP01	14/09/2022	-	236	7.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.33	-	-	-	-	-	-	-	-	-	-	-	-	12.4	22.1	-	-
Final Holding Pond Weir	LMP01	20/09/2022	-	181.6	7.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16	-	-	-	-	-	-	-	-	-	-	-	-	5.333	11.7	-	-
Final Holding Pond Weir	LMP01	26/09/2022	-	244	7.56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	3.333	4.72	-	-
Final Holding Pond Weir	LMP01	4/10/2022	8.3	186.2	7.64	355.8	-	36.82	3.14	5.99	36.82	20.77	0.127	1.37	0	3.42	33.8	16.18	1	0.31	170	9	220	10	0.23	0.4	0.6	<0.1	<0.1	0.02	<0.01	114	9	45.2	490	<10
Final Holding Pond Weir	LMP01	5/10/2022	-	178.9	7.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	5	7.81	-	-
Final Holding Pond Weir	LMP01	11/10/2022	-	155.9	7.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	13.2	12.7	-	-
Final Holding Pond Weir	LMP01	26/10/2022	-	235	7.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15	-	-	-	-	-	-	-	-	-	-	-	-	7.6	20.6	-	-
Final Holding Pond Weir	LMP01	7/11/2022	6.4	216	7.47	193.4	-	49.25	4.07	9.46	49.25	23.91	0.148	1.84	0	3.86	36.7	30.54	2	0.83	170	10	170	10	0.18	0.9	1.1	0.1	<0.1	0.03	0.02	132	42.57	35.7	480	<10
Final Holding Pond Weir	LMP01	15/11/2022	-	146	7.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	12.4	9.77	-	-
Final Holding Pond Weir	LMP01	5/12/2022	5.4	348	8.14	157.4	-	101.5	15.4	18.2	107.5	29.88	0.161	6.59	3.015	11.6	68.9	256.7	3	0.47	80	25	290	10	0.3	5.4	5.7	2.14	0.18	0.7	0.06	44	820	>4000	17,900	<10
Final Holding Pond Weir	LMP01	3/01/2023	5.6	587	7.82	162.7	-	60.3	14.3	39.7	60.3	64.29	0.103	5.79	0	8.35	64.2	145	3	0.14	5590	37	610	30	0.64	6.1	6.7	<0.1	<0.1	0.03	<0.01	370	9.333	29.2	60	<10
Final Holding Pond Weir	LMP01	6/02/2023	6.1	466	7.85	150.4	-	47.24	12.1	27.7	47.24	35.61	0.11	4.97	0	8.42	51	157.4	6	<5	7820	38	340	50	0.39	10.7	11.1	0.25	<0.1	0.08	0.02	265	100	198	1030	10
Final Holding Pond Weir	LMP01	6/03/2023	6.7	547	7.73	137.9	-	52	17.1	43.2	52	57.57	0.081	6.16	0	10	58.7	165	9	0.27	5610	37	310	20	0.33	6.8	7.1	<0.1	<0.1	<0.01	<0.01	740	80	128	480	20
Final Holding Pond Weir	LMP01	3/04/2023	6.2	387	8.91	125.7	5.6	44	11.2	22	49.6	37.72	0.158	4.02	2.8	7.95	49.2	173.2	4	0.05	1700	24	320	10	0.33	4.4	4.7	1.4	0.11	0.46	0.04	420	304	1487	4480	10
Final Holding Pond Weir	LMP01	4/04/2023	-	351	7.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	-	-	-	-	-	4.6	4.35	-	-
Final Holding Pond Weir	LMP01	18/04/2023	-	344	7.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	4.4	4.51	-	-
Final Holding Pond Weir	LMP01	1/05/2023	7.2	270	8.1	199.8	-	36.86	11.5	19.4	36.86	41.69	0.234	4.46	0	8.2	38.8	112.6	11	0.35	560	19	320	20	0.34	5.7	6	2.13	<0.1	0.7	<0.01	1020	843.3	2501	11,100	10
Final Holding Pond Weir	LMP01	4/05/2023	-	276	7.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15	-	-	-	-	-	-	-	-	-	-	-	-	15	12.9	-	-
Final Holding Pond Weir	LMP01	26/06/2023	9.8	310	7.97	110.5	-	48.23	11.7	-	48.23	39.56	0.16	4.92	0	12.5	47.6	127.4	4	0.23	200	24	490	<10	0.49	5.2	5.7	1.59	<0.1	0.52	0.02	588	-	>4000	9520	9950
Final Holding Pond Weir	LMP01	27/06/2023	-	339	8.75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-	16.6	-	-
Final Holding Pond Weir	LMP01	27/06/2023	-	315	7.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	13.8	-	-
Final Holding Pond Weir	LMP01	3/07/2023	10.8	415	8.3	134.1	<1	68	20.2	-	68	23.6	0.097	11.6	<1	5.48	41.8	93	-	-	30	30	260	<10	0.26	0.2	0.5	-	-	<0.01	-	254	6	14.2	150	<10
Final Holding Pond Weir	LMP01	7/08/2023	11.1	464	8.12	141.7	<1	89	29.2	-	89	18.5	0.104	17.9	<1	6.81	38.1	118	-	-	<10	40	80	<10	0.08	0.1	0.2	-	-	0.02	-	288	<5	2.3	40	<10
		Mean	7.7	313	7.8	172	2.2	59	14	22	60	37	0.13	6.4	0.57	8.3	48	121	5.1	0.31	1873	26	305	15	0.32	6.6	7	1.4	0.08	0.4	0.023	361	454	691	8336	843
		Minimum	5.4	146	7.04	110.5	<1	36.82	3.14	5.99	36.82	18.5	0.07	1.37	0	3.42	33.8	16	1	0.01	<10	9	80	<10	0.08	0.1	0.2	<0.1	<0.1	<0.01	<0.01	44	3.333	2.3	40	<10
		Maximum	11.1	587	8.91	355.8	5.6	101.5	29.2	43.2	107.5	64.29	0.234	17.9	3.015	13.3	68.9	257	11	<5	7820	40	610	50	0.64	33.7	34	6.7	0.18	2.19	0.06	1020	7240	4000	54300	9950
Coal Settling Pond Discharge	LDP12	20/09/2022	6.7	177.8	7.43	485	-	35.82	2.18	-	35.82	23.74	0.097	0.941	0	2.96	32	15.17	-	<5	150	8	220	<10	0.22	0.7	0.9	<0.1	<0.1	<0.01	<0.01	190	5.667	10.2	90	<10
Coal Settling Pond Discharge	LDP12	26/09/2022	8.4	207	7.49	181.6	-	36.82	2.69	-	36.82	25.72	0.083	1.22	0	3.63	34.4	31.18	-	<5	190	10	220	<10	0.22	0.4	0.6	<0.1	<0.1	<0.01	<0.01	264	7.667	10.21	540	<10
Coal Settling Pond Discharge	LDP12	5/10/2022	6.8	190.2	7.6	198.5	-	37.81	2.87	-	37.81	20.77	0.116	1.26	0	3.36	34.3	19.01	-	<5	170	10	220	10	0.23	0.4	0.6	<0.1	<0.1	0.01	<0.01	110	8.2	7.4	1120	10
Coal Settling Pond Discharge	LDP12	15/11/2022	6.2	148.2	7.49	43.5	-	33.17	1.07	-	33.17	21.3	0.056	0.551	0	2.89	28.1	17.4	-	<5	110	5	130	<10	0.13	0.2	0.3	<0.1	<0.1	<0.01	<0.01	122	9.2	10.4	1730	30
Coal Settling Pond Discharge	LDP12	4/04/2023	6.7	352	7.53	120.4	-	32.71	8.54	-	32.71	35.9	0.06	3.09	0	5.4	40.2	67.8	-	<5	1700	21	360	<10	0.36	2.5	2.9	<0.1	<0.1	0.02	0.02	196	11.2	5.73	2020	160
Coal Settling Pond Discharge	LDP12	18/04/2023	7.3	361	7.7	106.3	-	35	9.76	-	35	38	0.059	3.82	0	6.98	47.8	74.9	-	<5	1190	22	350	<10	0.35	1.3	1.6	<0.1	<0.1	0.02	0.03	340	3.4	3.49	480	20
Coal Settling Pond Discharge	LDP12	4/05/2023	7.9	242	7.34	190.6	-	31	4.66	-	31	23.4	0.14	1.97	0	4.46	37	47.4	-	<5	400	15	310	20	0.33	0.5	0.8	<0.1	<0.1	<0.01	<0.01	168	10	12.8	280	<10
Coal Settling Pond Discharge	LDP12	27/06/2023	8.9	307	7.55	103.6	-	48.5	5.14	-	48.5	30.7	0.082	1.96	0	4.75	47.6	57.8	-	<5	110	18	590	<10	0.59	0.3	0.9	<0.1	<0.1	<0.01	<0.01	132	-	10.2	2980	20
Coal Settling Pond Discharge	LDP12	25/07/2023	10.3	362	7.58	130.1	-	51.75	5.39	-	51.75	28.7	0.064	2.06	0	5.24	57.8	53.6	-	<5	80	20	720	<10	0.72	0.7	1.4	<0.1	<0.1	0.02	0.01	270	-	4.14	6260	180
		Mean	7.7	261	-	173		38	4.7		38	28	0.084	1.9	0	4.4	40	43		2.5	456	14	347	7.2	0.35	0.78	1.1	0.05	0.05	0.011	0.01	199	7.9	8.3	1722	48
		Minimum	6.2	148.2	7.34	43.5	-	31	1.07	-	31	20.77	0.056	0.551	0	2.89	28.1	15	-	<5	80	5	130	<10	0.13	0.2	0.3	<0.1	<0.1	<0.01	<0.01	110	3.4	3.49	90	<10
		Maximum	10.3	362	7.7	485	-	51.75	9.76	-	51.75	38	0.14	3.82	0	6.98	57.8	75	-	<5	1700	22	720	20	0.72	2.5	2.9	<0.1	<0.1	0.02	0.03	340	11.2	12.8	6260	180

			Field Parameters				Major Anions and Cations												NA		Nutrients											Physical Parameters				
			Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Redox (Field)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)	Dissolved Organic Carbon (mg/L) (Filtered)	Oil & Grease	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Nitrogen (N) - Kjeldahl	Nitrogen (N)	Total Phosphate (PO4)	Total Phosphate (PO4) (Filtered)	Phosphorus	Phosphorus (Filtered)	Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	Aluminium	Aluminium (Filtered)
			mg/L	uS/cm	pH units	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L
Environmental Goals - Surface Water				2200	6.5-8							350	1.5					1000														1500				
EPL 13007 - Discharge Limits (LDP12)				500	6.5-8.5																												50	25		
Monitoring_Zone	**LocCode**	**Sampled_Date-Time**																																		
Wangcol Creek (Midstream)	C	28/09/2022	10.1	101	6.28	220.5	<1	22	8.07	-	22	5.19	0.057	4.2	<1	3.73	6.64	17.1	-	-	210	5	70	<10	0.07	1.2	1.3	-	-	0.15	-	135	82	133	1960	300
Wangcol Creek (Midstream)	C	26/10/2022	7.6	196	7.16	96.9	<1	41	13.5	-	41	9.1	0.074	8.7	<1	4.15	11.6	40	-	-	<10	12	60	<10	0.06	0.4	0.5	-	-	0.05	-	150	7	14.5	230	160
Wangcol Creek (Midstream)	C	17/11/2022	10.8	192	6.56	194.7	<1	39	10.8	-	39	11.7	<0.05	7.65	<1	3.55	15.2	41.1	-	-	<10	12	180	<10	0.18	0.2	0.4	-	-	<0.01	-	138	6	7.6	240	90
Wangcol Creek (Midstream)	C	13/12/2022	9.4	234	7.4	174.4	<1	47	13.4	-	47	10.4	0.052	10.7	<1	3.73	13.1	50.8	-	-	20	18	20	<10	0.02	0.4	0.4	-	-	0.02	-	131	7	7.5	210	30
Wangcol Creek (Midstream)	C	11/01/2023	8	157	7.6	31.3	<1	39	9.69	-	39	8.52	0.044	6.8	<1	2.6	11.4	27.1	-	-	<10	9	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	101	8	7.2	250	80
Wangcol Creek (Midstream)	C	9/02/2023	6.9	127	7.01	175.6	<1	36	8.23	-	36	7.03	0.045	5.14	<1	2.34	9.55	14.3	-	-	<10	5	<10	<10	<0.01	0.3	0.3	-	-	0.01	-	94	10	9.1	300	70
Wangcol Creek (Midstream)	C	15/03/2023	7.1	220	7.19	152.4	<1	56	15.2	-	56	10.5	0.06	9.91	<1	3.74	14	37.8	-	-	<10	13	<10	<10	<0.01	0.2	0.2	-	-	0.01	-	134	6	9.5	210	60
Wangcol Creek (Midstream)	C	4/04/2023	6.4	178	7.21	167.8	<1	43	11.7	-	43	8.4	0.077	6.67	<1	3.03	10.1	28.4	-	-	<10	9	10	10	0.02	0.3	0.3	-	-	0.02	-	114	8	13.8	440	30
Wangcol Creek (Midstream)	C	10/05/2023	9.8	195	7.55	16.9	<1	42	10.5	-	42	12.3	0.073	6.32	<1	2.83	15.1	37.1	-	-	<10	11	40	<10	0.04	0.1	0.1	-	-	0.01	-	102	<5	5.2	60	30
Wangcol Creek (Midstream)	C	15/06/2023	10.7	320	7.46	188.3	<1	58	20.9	-	58	12.9	0.06	13.4	<1	4.2	20.8	77.3	-	-	100	25	50	<10	0.05	0.2	0.2	-	-	0.01	-	203	-	4.4	70	20
Wangcol Creek (Midstream)	C	27/07/2023	13.3	321	7.96	-40.3	<1	56	19	-	56	13.6	0.073	11.5	<1	4.5	25.9	73.8	-	-	10	24	30	<10	0.03	0.1	0.1	-	-	0.04	-	188	-	4.6	140	<10
Wangcol Creek (Midstream)	C	24/08/2023	8.8	277	7.56	63.9	<1	57	18.3	-	57	13.5	0.078	10.6	<1	4.9	20.9	64	-	-	<10	19	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	202	-	8.4	240	20
		Mean	9.1	210	-	120	0.5	45	13		45	10	0.06	8.5	0.5	3.6	15	42			32	14	40	5.4	0.041	0.32	0.35			0.028		141	15	19	363	75
		Minimum	6.4	101	6.28	-40.3	<1	22	8.07	-	22	5.19	0.044	4.2	<1	2.34	6.64	14	-	-	<10	5	<10	<10	<0.01	0.1	0.1	-	-	<0.01	-	94	<5	4.4	60	<10
		Maximum	13.3	321	7.96	220.5	<1	58	20.9	-	58	13.6	0.078	13.4	<1	4.9	25.9	77	-	-	210	25	180	10	0.18	1.2	1.3	-	-	0.15	-	203	82	133	1960	300
Wangcol Creek (Midstream)	E	28/09/2022	9.4	130	6.98	166.6	<1	26	9.23	-	26	6.96	0.063	5.3	<1	4.04	10	26.1	-	-	<10	8	60	<10	0.06	0.8	0.9	-	-	0.08	-	134	64	135	2000	210
Wangcol Creek (Midstream)	E	26/10/2022	6.7	257	7.12	39.5	<1	45	15.4	-	45	12.6	0.07	10.8	<1	4.75	20.5	51.7	-	-	<10	18	30	<10	0.03	0.3	0.3	-	-	0.04	-	174	<5	9	170	80
Wangcol Creek (Midstream)	E	18/11/2022	10.7	307	6.63	142.3	<1	44	15.9	-	44	19.7	<0.05	12.3	<1	4.25	25.6	81.6	-	-	<10	24	140	<10	0.14	0.2	0.3	-	-	<0.01	-	371	<5	4.5	110	50
Wangcol Creek (Midstream)	E	13/12/2022	9.9	528	7.26	106.6	<1	54	25	-	54	31.7	<0.1	22.6	<1	5.7	43.4	154	-	-	10	44	20	<10	0.02	0.4	0.4	-	-	0.01	-	296	<5	4.2	30	<10
Wangcol Creek (Midstream)	E	11/01/2023	6.6	940	7.07	14	<1	77	38.7	-	77	72.6	<0.1	36.3	<1	8.35	98.6	308	-	-	20	96	20	<10	0.02	0.3	0.3	-	-	0.01	-	596	<5	5.2	20	<10
Wangcol Creek (Midstream)	E	9/02/2023	7.2	950	7.03	83.4	<1	92	38.9	-	92	74.6	<0.2	34.7	<1	8.28	101	316	-	-	<10	95	<10	<10	<0.01	0.3	0.3	-	-	0.06	-	625	<5	5.4	30	<10
Wangcol Creek (Midstream)	E	15/03/2023	7.7	890	7.14	45.3	<1	112	38.6	-	112	67.1	<0.2	33.8	<1	7.87	93.3	256	-	-	10	81	40	<10	0.04	0.2	0.2	-	-	0.02	-	554	<5	6.8	20	<10
Wangcol Creek (Midstream)	E	4/04/2023	7.8	820	7.12	-13.9	<1	87	31.2	-	87	59.4	0.073	27.5	<1	7.35	78.3	234	-	-	<10	71	<10	10	0.01	0.2	0.2	-	-	<0.01	-	464	<5	5.8	20	<10
Wangcol Creek (Midstream)	E	10/05/2023	11.4	1290	7	75.6	<1	77	43.6	-	77	102	<0.2	42.5	<1	10.8	138	462	-	-	80	131	<10	<10	<0.01	0.2	0.2	-	-	0.01	-	778	<5	16.9	<10	<10
Wangcol Creek (Midstream)	E	15/06/2023	10.4	1440	6.96	41	<1	63	54.3	-	63	123	<0.2	51	<1	12.8	164	572	-	-	140	161	90	<10	0.09	0.3	0.4	-	-	0.01	-	968	-	24.1	<10	<10
Wangcol Creek (Midstream)	E	27/07/2023	12.8	1600	7.47	-99.3	<1	54	58	-	54	104	<0.2	55.8	<1	14.4	180	455	-	-	50	184	<10	<10	<0.01	0.2	0.2	-	-	0.04	-	1020	-	30.8	<10	<10
Wangcol Creek (Midstream)	E	24/08/2023	10.6	1790	7.24	-63.3	<1	62	64.5	-	62	144	<0.2	64.7	<1	18.6	212	678		-	40	212	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	1250		25.2	<10	<10
		Mean	9.3	912	-	45	0.5	66	36	-	66	68	0.078	33	0.5	8.9	97	300	-	-	31	94	35	5.4	0.036	0.3	0.33	-	-	0.025	-	603	9.3	23	202	32
		Minimum	6.6	130	6.63	-99.3	<1	26	9.23	-	26	6.96	<0.05	5.3	<1	4.04	10	26	-	-	<10	8	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	134	<5	4.2	<10	<10
		Maximum	12.8	1790	7.47	166.6	<1	112	64.5	-	112	144	<0.2	64.7	<1	18.6	212	678	-	-	140	212	140	10	0.14	0.8	0.9	-	-	0.08	-	1250	64	135	2000	210
Wangcol Creek (Downstream)	G	28/09/2022	9.4	167	7	194	<1	28	10.9	-	28	9.16	0.071	6.71	<1	4.18	13.5	38.4	-	-	20	12	80	<10	0.08	0.6	0.7	-	-	0.09	-	174	104	173	2140	360
Wangcol Creek (Downstream)	G	26/10/2022	6.8	307	7.15	78.4	<1	45	17.8	-	45	17.3	0.079	12.6	<1	5.18	24.6	79.7	-	-	<10	24	100	<10	0.1	0.3	0.4	-	-	0.04	-	228	6	12.1	150	70
Wangcol Creek (Downstream)	G	16/11/2022	9.9	269	6.65	227.3	<1	40	15.3	-	40	16	0.051	10.6	<1	4.34	20.7	72	-	-	20	21	90	<10	0.09	0.4	0.5	-	-	<0.01	-	189	7	13.7	390	160
Wangcol Creek (Downstream)	G	13/12/2022	9.4	680	7.49	197.1	<1	57	31.6	-	57	44.7	<0.1	29.2	<1	6.44	59.1	209	-	-	<10	67	10	<10	0.01	0.3	0.3	-	-	0.02	-	401	<5	2.5	20	<10
Wangcol Creek (Downstream)	G	11/01/2023	6.7	970	7.54	64.6	<1	73	42.2	-	73	76.1	<0.1	37.6	<1	8.16	97.5	329	-	-	20	100	10	<10	0.01	0.4	0.4	-	-	<0.01	-	614	<5	1.7	10	<10
Wangcol Creek (Downstream)	G	9/02/2023	7.7	1060	7.44	134.2	<1	89	45.7	-	89	88.3	<0.2	39.4	<1	9.28	113	378	-	-	<10	112	10	<10	0.01	0.3	0.3	-	-	0.01	-	688	<5	1.5	30	<10
Wangcol Creek (Downstream)	G	15/03/2023	7.8	1610	7.49	112.5	<1	113	66	-	113	136	<0.2	62.2	<1	13.7	185	556	-	-	10	176	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	1100	<5	1.5	<10	<10
Wangcol Creek (Downstream)	G	4/04/2023	8.1	750	7.52	91.8	<1	75	30	-	75	55.7	<0.1	25.7	<1	7.4	70.3	212	-	-	<10	65	10	<10	0.01	0.2	0.2	-	-	0.02	-	397	<5	1.7	30	<10
Wangcol Creek (Downstream)	G	10/05/2023	11.8	880	7.4	118	<1	68	33.8	-	68	67.1	<0.1	29.7	<1	7.72	89.3	279	-	-	120	87	30	<10	0.03	0.2	0.2	-	-	0.01	-	486	<5	1.3	<10	<10
Wangcol Creek (Downstream)	G	15/06/2023	11.3	1930	7.39	100.8	<1	63	76.3	-	63	172	<0.5	71.4	<1	16.5	224	776	-	-	220	228	40	<10	0.04	0.3	0.3	-	-	0.01	-	1320	-	0.7	<10	<10
Wangcol Creek (Downstream)	G	27/07/2023	10.9	1970	7.98	75.1	<1	76	78	-	76	150	<0.5	73.4	<1	17.4	228	695	-	-	20	239	30	<10	0.03	0.4	0.4	-	-	0.03	-	1330	-	0.8	<10	<10
Wangcol Creek (Downstream)	G	24/08/2023	10.1	1770	7.68	0.4	<1	55	47.1	-	55	95.7	<0.2	41.7	<1	12.8	125	436	-	-	<10	127	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	758	-	0.9	10	<10
		Mean	9.2	1030	-	116	0.5	65	41	-	65	77	0.1	37	0.5	9.4	104	338	-	-	38	105	35	5	0.035	0.32	0.34	-	-	0.021	-	640	15	18	233	53
		Minimum	6.7	167	6.65	0.4	<1	28	10.9	-	28	9.16	0.051	6.71	<1	4.18	13.5	38	-	-	<10	12	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	174	<5	0.7	<10	<10
		Maximum	11.8	1970	7.98	227.3	<1	113	78	-	113	172	<0.5	73.4	<1	17.4	228	776	-	-	220	239	100	<10	0.1	0.6	0.7	-	-	0.09	-	1330	104	173	2140	360

Monitoring_Zone	LocCode	Sampled_Date-Time	Field Parameters: Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Redox (Field)	Major Anions and Cations: Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)
			mg/L	uS/cm	pH units	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Environmental Goals - Surface Water				2200	6.5-8							350	1.5					1000
EPL 13007 - Discharge Limits (LDP12)				500	6.5-8.5													
Wangcol Creek (Stream Gauge)	WX22	28/09/2022	9.6	168	7.03	193.5	<1	28	11.1	-	28	9.18	0.071	6.79	<1	4.45	13.7	38.4
Wangcol Creek (Stream Gauge)	WX22	26/10/2022	6.9	306	7.13	70.7	<1	45	17.7	-	45	15.5	0.087	12.5	<1	5.17	24.4	77.7
Wangcol Creek (Stream Gauge)	WX22	16/11/2022	10	269	7.02	201	<1	39	15.9	-	39	15.9	<0.05	11	<1	4.58	21.3	71.4
Wangcol Creek (Stream Gauge)	WX22	13/12/2022	8	680	7.46	191.3	<1	57	30.8	-	57	44.6	<0.1	28.7	<1	6.44	58.4	209
Wangcol Creek (Stream Gauge)	WX22	11/01/2023	6.3	980	7.56	67	<1	72	42.7	-	72	73.6	<0.1	38	<1	8.31	97.6	316
Wangcol Creek (Stream Gauge)	WX22	9/02/2023	6.6	1060	7.39	137.3	<1	86	44.6	-	86	84.4	<0.2	38.6	<1	9.01	111	358
Wangcol Creek (Stream Gauge)	WX22	15/03/2023	7.8	1590	7.43	114.5	<1	113	66	-	113	131	0.078	62.7	<1	14	188	528
Wangcol Creek (Stream Gauge)	WX22	4/04/2023	7.7	750	7.48	88.2	<1	77	28.5	-	77	57.6	<0.1	24.4	<1	7.21	62.6	221
Wangcol Creek (Stream Gauge)	WX22	10/05/2023	10.5	880	7.4	114.4	<1	68	33.4	-	68	69.5	<0.1	29.4	<1	7.63	88.8	290
Wangcol Creek (Stream Gauge)	WX22	15/06/2023	10.4	1930	7.39	97.7	<1	64	76.9	-	64	153	<0.5	72.3	<1	16.7	226	678
Wangcol Creek (Stream Gauge)	WX22	27/07/2023	12.9	1970	7.46	85.1	<1	63	79.2	-	63	154	<0.5	74.6	<1	17.6	230	704
Wangcol Creek (Stream Gauge)	WX22	24/08/2023	10.7	1170	7.47	-0.5	<1	55	47.7	-	55	91.5	<0.2	42.6	<1	13	127	414
		Mean	9	979	-	113	0.5	64	41	-	64	75	0.097	37	0.5	9.5	104	325
		Minimum	6.3	168	7.02	-0.5	<1	28	11.1	-	28	9.18	<0.05	6.79	<1	4.45	13.7	38
		Maximum	12.9	1970	7.56	201	<1	113	79.2	-	113	154	<0.5	74.6	<1	17.6	230	704
Wangcol Creek (Midstream)	NC01	28/09/2022	9.7	110	7.26	210.3	<1	27	9.32	-	27	4.45	0.07	4.64	<1	3.87	6.61	19.5
Wangcol Creek (Midstream)	NC01	26/10/2022	7.7	281	7.26	109.5	<1	61	21.3	-	61	7.17	0.082	13.3	<1	5.25	14.5	48.1
Wangcol Creek (Midstream)	NC01	17/11/2022	10.6	284	6.83	174.4	<1	73	19.4	-	73	13.2	0.062	12.7	<1	4.55	19.1	55.7
Wangcol Creek (Midstream)	NC01	13/12/2022	7	416	7.54	148.5	<1	84	28.5	-	84	12.6	0.11	22.7	<1	5.88	20.6	104
Wangcol Creek (Midstream)	NC01	11/01/2023	4	397	7.47	44.1	<1	108	29.8	-	108	9.78	0.144	20.2	<1	4.85	20.3	78.7
Wangcol Creek (Midstream)	NC01	9/02/2023	3.7	285	7.18	188.9	<1	100	23.6	-	100	6.42	0.143	13.7	<1	4.14	14.8	38.8
Wangcol Creek (Midstream)	NC01	15/03/2023	4.3	400	7.27	159.7	<1	111	32.7	-	111	11.5	0.125	20.7	<1	5.69	20.6	79.3
Wangcol Creek (Midstream)	NC01	4/04/2023	5	272	7.02	228	<1	79	20.6	-	79	7.71	0.106	11.5	<1	4.44	13	46.8
Wangcol Creek (Midstream)	NC01	10/05/2023	8.5	276	7.45	40.5	<1	67	16.3	-	67	13.8	0.121	9.44	<1	3.79	20.8	53.2
Wangcol Creek (Midstream)	NC01	15/06/2023	8.5	438	7.36	195.1	<1	83	30.4	-	83	15.4	<0.1	19.4	<1	5.93	27.7	98.4
Wangcol Creek (Midstream)	NC01	27/07/2023	12	416	8.02	-11.3	<1	76	26.4	-	76	17.1	0.127	15.9	<1	5.93	33.3	109
Wangcol Creek (Midstream)	NC01	24/08/2023	8.9	349	7.76	65.2	<1	75	25.1	-	75	14.5	0.117	14.2	<1	5.92	25.7	83
		Mean	7.5	327	-	129	0.5	79	24	-	79	11	0.1	15	0.5	5	20	68
		Minimum	3.7	110	6.83	-11.3	<1	27	9.32	-	27	4.45	0.062	4.64	<1	3.79	6.61	20
		Maximum	12	438	8.02	228	<1	111	32.7	-	111	17.1	0.144	22.7	<1	5.93	33.3	109

Monitoring_Zone	LocCode	Sampled_Date-Time	NA: Dissolved Organic Carbon (mg/L) (Filtered)	Oil & Grease	Nutrients: Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Nitrogen (N) - Kjeldahl	Nitrogen (N)	Total Phosphate (PO4)	Total Phosphate (PO4) (Filtered)	Phosphorus	Phosphorus (Filtered)	Physical Parameters: Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	Aluminium	Aluminium (Filtered)
			mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L
Environmental Goals - Surface Water																1500				
EPL 13007 - Discharge Limits (LDP12)																	50	25		
Wangcol Creek (Stream Gauge)	WX22	28/09/2022	-	-	<10	12	80	<10	0.08	0.9	1	-	-	0.11	-	168	110	167	2450	180
Wangcol Creek (Stream Gauge)	WX22	26/10/2022	-	-	<10	24	30	<10	0.03	0.3	0.3	-	-	0.04	-	212	19	11.6	180	70
Wangcol Creek (Stream Gauge)	WX22	16/11/2022	-	-	<10	22	100	<10	0.1	0.4	0.5	-	-	0.01	-	194	5	13.3	390	160
Wangcol Creek (Stream Gauge)	WX22	13/12/2022	-	-	10	64	30	<10	0.03	0.2	0.2	-	-	0.01	-	392	<5	1.8	30	<10
Wangcol Creek (Stream Gauge)	WX22	11/01/2023	-	-	10	101	20	<10	0.02	0.3	0.3	-	-	0.02	-	590	<5	1.6	10	<10
Wangcol Creek (Stream Gauge)	WX22	9/02/2023	-	-	<10	110	<10	<10	<0.01	0.3	0.3	-	-	<0.01	-	692	<5	1.6	20	<10
Wangcol Creek (Stream Gauge)	WX22	15/03/2023	-	-	20	176	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	1080	<5	1.9	150	<10
Wangcol Creek (Stream Gauge)	WX22	4/04/2023	-	-	<10	63	10	<10	0.01	0.2	0.2	-	-	0.04	-	428	<5	1.8	20	<10
Wangcol Creek (Stream Gauge)	WX22	10/05/2023	-	-	10	96	<10	<10	<0.01	0.2	0.2	-	-	0.01	-	509	<5	4	<10	<10
Wangcol Creek (Stream Gauge)	WX22	15/06/2023	-	-	80	231	10	<10	0.01	0.2	0.2	-	-	0.02	-	1400	-	1.3	<10	<10
Wangcol Creek (Stream Gauge)	WX22	27/07/2023	-	-	40	241	<10	<10	<0.01	0.2	0.2	-	-	0.02	-	1310	-	0.8	<10	<10
Wangcol Creek (Stream Gauge)	WX22	24/08/2023	-	-	<10	129	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	750	-	0.9	10	<10
		Mean	-	-	17	106	25	5	0.025	0.3	0.32	-	-	0.025	-	644	17	17	273	38
		Minimum	-	-	<10	12	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	168	<5	0.8	<10	<10
		Maximum	-	-	80	241	100	<10	0.1	0.9	1	-	-	0.11	-	1400	110	167	2450	180
Wangcol Creek (Midstream)	NC01	28/09/2022	-	-	40	6	90	<10	0.09	1.2	1.3	-	-	0.09	-	189	133	177	2370	380
Wangcol Creek (Midstream)	NC01	26/10/2022	-	-	50	18	100	<10	0.1	0.6	0.7	-	-	0.06	-	211	12	21.8	400	120
Wangcol Creek (Midstream)	NC01	17/11/2022	-	-	20	16	120	<10	0.12	0.4	0.5	-	-	<0.01	-	198	6	8.8	390	80
Wangcol Creek (Midstream)	NC01	13/12/2022	-	-	10	31	<10	10	0.01	0.4	0.4	-	-	0.02	-	233	6	8.9	170	<10
Wangcol Creek (Midstream)	NC01	11/01/2023	-	-	20	25	<10	<10	<0.01	0.4	0.4	-	-	0.02	-	232	10	7.6	110	<10
Wangcol Creek (Midstream)	NC01	9/02/2023	-	-	10	12	<10	<10	<0.01	0.5	0.5	-	-	0.02	-	170	29	11.8	340	<10
Wangcol Creek (Midstream)	NC01	15/03/2023	-	-	10	28	20	<10	0.02	0.4	0.4	-	-	0.04	-	233	10	8.9	90	<10
Wangcol Creek (Midstream)	NC01	4/04/2023	-	-	10	15	20	<10	0.02	0.4	0.4	-	-	0.02	-	154	16	16.6	390	<10
Wangcol Creek (Midstream)	NC01	10/05/2023	-	-	20	16	20	<10	0.02	0.3	0.3	-	-	0.02	-	144	15	9.1	80	10
Wangcol Creek (Midstream)	NC01	15/06/2023	-	-	40	35	40	<10	0.04	0.2	0.2	-	-	0.02	-	294	-	7.4	50	<10
Wangcol Creek (Midstream)	NC01	27/07/2023	-	-	20	33	50	<10	0.05	0.2	0.2	-	-	0.03	-	273	-	3.3	280	<10
Wangcol Creek (Midstream)	NC01	24/08/2023	-	-	<10	26	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	242	-	13.1	210	<10
		Mean	-	-	21	22	40	5.4	0.04	0.43	0.46	-	-	0.029	-	214	26	25	407	53
		Minimum	-	-	<10	6	<10	<10	<0.01	0.2	0.2	-	-	<0.01	-	144	6	3.3	50	<10
		Maximum	-	-	50	35	120	10	0.12	1.2	1.3	-	-	0.09	-	294	133	177	2370	380

	Field Parameters				Major Anions and Cations												NA		Nutrients											Physical Parameters				
	Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Redox (Field)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)	Dissolved Organic Carbon (mg/L) (Filtered)	Oil & Grease	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Nitrogen (N) - Kjeldahl	Nitrogen (N)	Total Phosphate (PO4)	Total Phosphate (PO4) (Filtered)	Phosphorus	Phosphorus (Filtered)	Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	Aluminium	Aluminium (Filtered)
	mg/L	uS/cm	pH units	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L
Environmental Goals - Surface Water		2200	6.5-8							350	1.5					1000														1500				
EPL 13007 - Discharge Limits (LDP12)		500	6.5-8.5																												50	25		
Monitoring_Zone **LocCode** **Sampled_Date-Time**																																		
Statistical Summary																																		
Number of Results	102	114	114	102	83	102	102	30	102	102	102	102	102	102	102	102	33	52	102	102	102	102	102	102	102	39	39	102	41	102	98	114	102	102
Number of Detects	102	114	114	102	10	102	102	30	102	102	68	102	30	102	102	102	33	39	70	102	77	25	79	102	102	24	20	73	29	102	72	114	88	50
Minimum Concentration	3.7	101	6.28	-99.3	0.5	22	1.07	5.99	22	4.45	0.044	0.551	0	2.34	6.61	14.3	1	0.01	<10	5	<10	5	<0.01	0.1	0.1	0.05	0.05	<0.01	<0.01	44	3.333	0.7	<10	<10
Minimum Detect	3.7	101	6.28	ND	0.5	22	1.07	5.99	22	4.45	0.044	0.551	0.5	2.34	6.61	14.3	1	0.01	10	5	10	5	0.01	0.1	0.1	0.05	0.05	0.01	0.01	44	3.333	0.7	10	10
Maximum Concentration	13.3	1970	8.91	485	5.6	113	79.2	43.2	113	172	<0.5	74.6	3.015	18.6	230	776	11	<5	7820	241	720	50	0.72	33.7	34	6.7	0.18	2.19	0.06	1400	7240	4000	54300	9950
Maximum Detect	13.3	1970	8.91	485	5.6	113	79.2	43.2	113	172	0.234	74.6	3.015	18.6	230	776	11	2.5	7820	241	720	50	0.72	33.7	34	6.7	0.18	2.19	0.06	1400	7240	4000	54300	9950
Average Concentration	8.6	560	7.4	124	0.65	60	26	23	60	45	0.096	21	0.47	7.2	63	184	5.2	1.1	402	57	117	7.4	0.12	1.5	1.7	0.93	0.068	0.095	0.018	417	198	206	2123	258
Median Concentration	8.3	321	7.465	120.2	0.5	57	19.2	20.7	57	23.825	0.0815	11.95	0.5	5.695	37.55	79.5	4	0.32	20	24	40	5	0.04	0.3	0.38	0.05	0.05	0.02	0.01	248	7.6335	9.3	206	5
Standard Deviation	2.2	522	0.46	98	0.82	25	20	13	25	45	0.054	21	0.48	4.2	62	205	3.5	1.1	1348	66	163	7.3	0.17	4.9	4.9	1.9	0.042	0.32	0.018	367	1052	778	7843	1383
Number of Guideline Exceedances	0	36	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	25	0	0
Number of Guideline Exceedances(Detects Only)	0	36	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	25	0	0

			Metals																															
			Antimony	Arsenic	Arsenic (Filtered)	Arsenic III	Arsenic V	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
Environmental Goals - Surface Water				24	24	24	13	700	100	370	370	0.85	2	1	3.3		3.5	3.5	300	300	5	1900	1900	0.06	10	17	17	5	0.05				116	116
EPL 13007 - Discharge Limits (LDP12)																																		
Monitoring_Zone	**LocCode**	**Sampled_Date-Time**																																
Final Holding Pond Weir	LMP01	5/09/2022	<1	18	<1	<1	<1	271	9	<50	<50	0.9	22	<10	<10	16	81	<1	46,000	<50	160	1140	51	0.05	9	40	<1	10	<1	0.11	70	<10	685	5
Final Holding Pond Weir	LMP01	14/09/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	20/09/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	26/09/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	4/10/2022	<1	<1	<1	<1	<1	6	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	250	<50	1	42	34	<0.04	1	1	<1	<10	<1	0.008	<10	<10	7	<5
Final Holding Pond Weir	LMP01	5/10/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	11/10/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	26/10/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	7/11/2022	<1	<1	<1	<1	<1	10	<1	<50	<50	<0.1	<1	<10	<10	<1	1	<1	280	<50	<1	50	40	<0.04	4	2	<1	<10	<1	0.01	<10	<10	9	<5
Final Holding Pond Weir	LMP01	15/11/2022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	5/12/2022	<1	4	<1	<1	<1	99	3	<50	<50	0.2	7	<10	<10	5	12	<1	8780	<50	51	389	62	<0.04	7	12	2	<10	<1	0.052	20	<10	229	<5
Final Holding Pond Weir	LMP01	3/01/2023	<1	1	<1	<1	<1	26	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	140	<50	<1	208	192	<0.04	3	3	3	<10	<1	0.038	<10	<10	12	5
Final Holding Pond Weir	LMP01	6/02/2023	5	6	<1	<1	<1	31	<1	100	70	0.1	<1	<10	<10	3	6	<1	710	<50	4	238	186	<0.01	181	15	1	<10	<1	0.034	<10	<10	26	<5
Final Holding Pond Weir	LMP01	6/03/2023	1	<1	<1	<1	<1	28	<1	<50	70	<0.1	<1	<10	<10	<1	1	2	390	<50	2	224	162	<0.04	2	3	3	<10	<1	0.045	<10	<10	20	36
Final Holding Pond Weir	LMP01	3/04/2023	<1	2	<1	<1	<1	47	<1	<50	50	0.1	2	<10	<10	4	7	<1	4720	<50	22	150	28	<0.04	5	13	2	<10	<1	0.037	<10	<10	68	<5
Final Holding Pond Weir	LMP01	4/04/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	18/04/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	1/05/2023	<1	4	<1	<1	<1	72	2	<50	70	0.1	5	<10	<10	7	12	<1	7260	<50	39	273	51	<0.04	5	18	2	<10	<1	0.049	10	<10	136	<5
Final Holding Pond Weir	LMP01	4/05/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	26/06/2023	<1	2	1	<1	<1	69	3	<50	50	0.2	4	<10	<10	8	9	6	5880	3770	42	294	271	<0.04	7	19	15	<10	<1	0.039	10	<10	182	155
Final Holding Pond Weir	LMP01	27/06/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	27/06/2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Final Holding Pond Weir	LMP01	3/07/2023	<1	<1	<1	<1	<1	18	<1	<50	<50	<0.1	<1	<10	<10	<1	6	2	180	<50	<1	92	73	<0.04	18	7	3	0.8	<1	0.055	<10	<10	25	8
Final Holding Pond Weir	LMP01	7/08/2023	<1	<1	<1	<1	<1	23	<1	<50	<50	<0.1	<1	<10	<10	<10	<2	<1	120	<50	<1	67	40	<0.04	50	4	3	0.4	<1	0.09	<10	<10	8	<5
		Mean	0.92	3.3	0.54	0.5	0.5	58	1.8	31	40	0.16	3.6	5	5	4.2	11	1.2	6226	337	27	264	99	0.021	24	11	3	4.7	0.5	0.047	13	5	117	19
		Minimum	<1	<1	<1	<1	<1	6	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	120	<50	<1	42	28	<0.01	1	1	<1	0.4	<1	0.008	<10	<10	7	<5
		Maximum	5	18	1	<1	<1	271	9	100	70	0.9	22	<10	<10	16	81	6	46000	3770	160	1140	271	0.05	181	40	15	10	<1	0.11	70	<10	685	155
Coal Settling Pond Discharge	LDP12	20/09/2022	<1	<1	<1	<1	<1	4	<1	80	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	26	23	<0.04	2	<1	1	<10	<1	0.006	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	26/09/2022	<1	<1	<1	<1	<1	4	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	27	24	<0.04	2	<1	<1	<10	<1	0.007	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	5/10/2022	<1	<1	<1	<1	<1	4	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	39	36	<0.04	1	1	1	<10	<1	0.007	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	15/11/2022	<1	<1	<1	<1	<1	4	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	50	<50	<1	13	11	<0.04	3	<1	<1	<10	<1	0.004	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	4/04/2023	<1	<1	<1	<1	<1	10	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	52	59	<0.04	2	2	2	<10	<1	0.02	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	18/04/2023	1	<1	<1	<1	<1	11	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	124	127	<0.04	6	3	3	<10	<1	0.026	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	4/05/2023	<1	<1	<1	<1	<1	5	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	50	<50	<1	49	47	<0.04	4	2	2	<10	<1	0.012	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	27/06/2023	<1	<1	<1	<1	<1	6	<1	80	100	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	73	62	<0.04	8	2	2	<10	<1	0.015	<10	<10	<5	<5
Coal Settling Pond Discharge	LDP12	25/07/2023	1	<1	<1	<1	<1	5	<1	70	80	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	63	60	<0.04	9	2	2	<10	<1	0.014	<10	<10	<5	<5
		Mean	0.61	0.5	0.5	0.5	0.5	5.9	0.5	42	39	0.05	0.5	5	5	0.5	0.5	0.5	31	25	0.5	52	50	0.02	4.1	1.5	1.6	5	0.5	0.012	5	5	2.5	2.5
		Minimum	<1	<1	<1	<1	<1	4	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	<50	<50	<1	13	11	<0.04	1	<1	<1	<10	<1	0.004	<10	<10	<5	<5
		Maximum	1	<1	<1	<1	<1	11	<1	80	100	<0.1	<1	<10	<10	<1	<1	<1	50	<50	<1	124	127	<0.04	9	3	3	<10	<1	0.026	<10	<10	<5	<5

ERM

Monitoring_Zone	LocCode	Sampled_Date-Time	Metals																															
			Antimony	Arsenic	Arsenic (Filtered)	Arsenic III	Arsenic V	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
Environmental Goals - Surface Water				24	24	24	13	700	100	370	370	0.85	2	1	3.3		3.5	3.5	300	300	5	1900	1900	0.06	10	17	17	5	0.05				116	116
EPL 13007 - Discharge Limits (LDP12)																																		
Wangcol Creek (Midstream)	C	28/09/2022	<1	4	<1	<1	<1	25	3	<50	<50	1.1	2	<10	<10	1	6	2	2130	330	4	101	62	<0.04	<1	7	5	40	<1	0.027	<10	<10	27	6
Wangcol Creek (Midstream)	C	26/10/2022	<1	<1	<1	<1	<1	21	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	2	390	200	<1	76	65	<0.04	<1	4	3	0.2	<1	0.043	<10	<10	6	6
Wangcol Creek (Midstream)	C	17/11/2022	<1	1	<1	<1	<1	20	<1	<50	<50	<0.1	<1	<10	<10	<1	2	1	300	120	<1	52	46	<0.04	<1	3	3	0.6	<1	0.04	<10	<10	8	5
Wangcol Creek (Midstream)	C	13/12/2022	<1	<1	<1	<1	<1	26	<1	<50	<50	<0.1	<1	<10	<10	<1	2	1	320	60	1	138	104	<0.04	2	4	2	<0.2	<1	0.055	<10	<10	10	<5
Wangcol Creek (Midstream)	C	11/01/2023	<1	<1	<1	<1	<1	26	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	340	100	<1	137	98	<0.04	<1	1	1	<0.2	<1	0.035	<10	<10	<5	<5
Wangcol Creek (Midstream)	C	9/02/2023	<1	<1	<1	<1	<1	25	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	480	110	<1	168	116	<0.04	<1	1	2	<0.2	<1	0.034	<10	<10	<5	<5
Wangcol Creek (Midstream)	C	15/03/2023	<1	<1	<1	<1	<1	29	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	440	100	<1	247	154	<0.04	1	2	2	<0.2	<1	0.051	<10	<10	7	<5
Wangcol Creek (Midstream)	C	4/04/2023	<1	<1	<1	<1	<1	24	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	600	100	<1	227	133	<0.04	1	2	2	<0.2	<1	0.041	<10	<10	6	<5
Wangcol Creek (Midstream)	C	10/05/2023	<1	<1	<1	<1	<1	18	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	360	160	<1	128	137	<0.04	<1	1	2	0.3	<1	0.034	<10	<10	<5	<5
Wangcol Creek (Midstream)	C	15/06/2023	<1	<1	<1	<1	<1	25	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	350	110	<1	201	197	<0.04	1	2	<1	<0.2	<1	0.056	<10	<10	<5	<5
Wangcol Creek (Midstream)	C	27/07/2023	<1	<1	<1	<1	<1	25	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	440	80	<1	155	147	<0.04	9	1	1	<0.2	<1	0.06	<10	<10	<5	6
Wangcol Creek (Midstream)	C	24/08/2023	<1	<1	<1	<1	<1	29	<1	<50	<50	<0.1	<1	<10	<10	<1	1	<1	530	120	<1	205	200	<0.04	17	2	2	<0.2	<1	0.059	<10	<10	6	<5
		Mean	0.5	0.83	0.5	0.5	0.5	24	0.71	25	25	0.14	0.63	5	5	0.54	1.3	0.83	557	133	0.83	153	122	0.02	2.8	2.5	2.1	3.5	0.5	0.045	5	5	6.9	3.6
		Minimum	<1	<1	<1	<1	<1	18	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	300	60	<1	52	46	<0.04	<1	1	<1	<0.2	<1	0.027	<10	<10	<5	<5
		Maximum	<1	4	<1	<1	<1	29	3	<50	<50	1.1	2	<10	<10	1	6	2	2130	330	4	247	200	<0.04	17	7	5	40	<1	0.06	<10	<10	27	6
Wangcol Creek (Midstream)	E	28/09/2022	<1	1	<1	<1	<1	23	<1	<50	<50	<0.1	2	<10	<10	1	6	2	1630	260	4	119	123	<0.04	<1	8	6	<10	<1	0.033	<10	<10	22	6
Wangcol Creek (Midstream)	E	26/10/2022	<1	<1	<1	<1	<1	18	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	2	460	250	<1	123	119	<0.04	<1	9	9	<0.2	<1	0.055	<10	<10	6	<5
Wangcol Creek (Midstream)	E	18/11/2022	<1	<1	<1	<1	<1	20	<1	<50	<50	<0.1	<1	<10	<10	1	2	1	470	270	<1	174	166	<0.04	<1	12	12	0.4	<1	0.067	<10	<10	10	7
Wangcol Creek (Midstream)	E	13/12/2022	<1	<1	<1	<1	<1	24	<1	<50	70	<0.1	<1	<10	<10	3	1	<1	580	260	<1	502	418	<0.04	1	28	26	<0.2	<1	0.116	<10	<10	13	<5
Wangcol Creek (Midstream)	E	11/01/2023	<1	<1	<1	<1	<1	26	<1	110	140	<0.1	<1	<10	<10	8	<1	<1	1130	550	<1	1380	1280	<0.04	<1	71	71	<0.2	<1	0.188	<10	<10	6	8
Wangcol Creek (Midstream)	E	9/02/2023	<1	<1	<1	<1	<1	26	<1	100	100	<0.1	<1	<10	<10	7	<1	<1	1250	660	<1	2150	1840	<0.04	<1	79	72	<0.2	<1	0.21	<10	<10	8	<5
Wangcol Creek (Midstream)	E	15/03/2023	<1	<1	<1	<1	<1	36	<1	110	100	<0.1	<1	<10	<10	6	<1	<1	1310	570	<1	2950	2720	<0.04	<1	62	71	<0.2	<1	0.188	<10	<10	8	5
Wangcol Creek (Midstream)	E	4/04/2023	<1	<1	<1	<1	<1	32	<1	90	110	<0.1	<1	<10	<10	6	<1	<1	1530	1100	<1	2290	2200	0.06	<1	59	58	<0.2	<1	0.164	<10	<10	<5	<5
Wangcol Creek (Midstream)	E	10/05/2023	<1	<1	<1	<1	<1	30	<1	180	190	<0.1	<1	<10	<10	12	<1	<1	2590	2800	<1	2570	2680	<0.04	<1	102	112	<0.2	<1	0.238	<10	<10	<5	10
Wangcol Creek (Midstream)	E	15/06/2023	<1	<1	<1	<1	<1	37	<1	240	250	<0.1	<1	<10	<10	14	<1	<1	3050	950	<1	2840	2620	<0.04	<1	123	126	<0.2	<1	0.282	<10	<10	11	<5
Wangcol Creek (Midstream)	E	27/07/2023	<1	<1	<1	<1	<1	41	<1	270	230	<0.1	<1	<10	<10	17	<1	<1	3760	2520	<1	2780	2450	<0.04	<1	149	146	<0.2	<1	0.332	<10	<10	12	8
Wangcol Creek (Midstream)	E	24/08/2023	<1	<1	<1	<1	<1	42	<1	300	300	<0.1	<1	<10	<10	20	<1	<1	3840	2670	<1	2990	2840	<0.04	1	177	173	<0.2	<1	0.391	<10	<10	14	11
		Mean	0.5	0.54	0.5	0.5	0.5	30	0.5	125	130	0.05	0.63	5	5	8	1.1	0.79	1800	1072	0.79	1739	1621	0.023	0.58	73	74	0.53	0.5	0.19	5	5	9.6	5.6
		Minimum	<1	<1	<1	<1	<1	18	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	460	250	<1	119	119	<0.04	<1	8	6	<0.2	<1	0.033	<10	<10	<5	<5
		Maximum	<1	1	<1	<1	<1	42	<1	300	300	<0.1	2	<10	<10	20	6	2	3840	2800	4	2990	2840	0.06	1	177	173	<10	<1	0.391	<10	<10	22	11
Wangcol Creek (Downstream)	G	28/09/2022	<1	1	<1	<1	<1	24	<1	<50	<50	<0.1	2	<10	<10	2	7	2	2320	310	4	252	41	<0.04	<1	11	3	<10	<1	0.042	<10	<10	24	8
Wangcol Creek (Downstream)	G	26/10/2022	<1	<1	<1	<1	<1	17	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	1	510	180	<1	97	61	<0.04	<1	12	12	<0.2	<1	0.068	<10	<10	6	<5
Wangcol Creek (Downstream)	G	16/11/2022	<1	<1	<1	<1	<1	19	<1	<50	<50	<0.1	<1	<10	<10	<1	2	1	660	280	<1	100	74	<0.04	<1	12	11	0.3	<1	0.067	<10	<10	8	<5
Wangcol Creek (Downstream)	G	13/12/2022	<1	<1	<1	<1	<1	21	<1	<50	90	<0.1	<1	<10	<10	<1	<1	2	270	80	<1	447	350	<0.04	1	41	36	<0.2	<1	0.151	<10	<10	7	6
Wangcol Creek (Downstream)	G	11/01/2023	<1	<1	<1	<1	<1	21	<1	100	120	<0.1	<1	<10	<10	<1	<1	<1	200	50	<1	509	510	<0.04	<1	59	63	<0.2	<1	0.194	<10	<10	<5	<5
Wangcol Creek (Downstream)	G	9/02/2023	<1	<1	<1	<1	<1	21	<1	120	120	<0.1	<1	<10	<10	<1	<1	<1	200	<50	<1	847	732	<0.04	<1	72	66	<0.2	<1	0.228	<10	<10	9	6
Wangcol Creek (Downstream)	G	15/03/2023	<1	<1	<1	<1	<1	32	<1	220	250	<0.1	<1	<10	<10	1	<1	<1	210	<50	<1	1770	1650	<0.04	<1	117	123	<0.2	<1	0.353	<10	<10	5	<5
Wangcol Creek (Downstream)	G	4/04/2023	<1	<1	<1	<1	<1	14	<1	80	100	<0.1	<1	<10	<10	<1	<1	<1	260	100	<1	405	374	<0.04	<1	42	42	<0.2	<1	0.15	<10	<10	<5	<5
Wangcol Creek (Downstream)	G	10/05/2023	<1	<1	<1	<1	<1	16	<1	100	110	<0.1	<1	<10	<10	<1	<1	<1	190	70	<1	381	421	<0.04	<1	50	54	<0.2	<1	0.163	<10	<10	<5	8
Wangcol Creek (Downstream)	G	15/06/2023	<1	<1	<1	<1	<1	34	<1	320	320	<0.1	<1	<10	<10	1	<1	<1	50	<50	<1	305	317	<0.04	<1	134	148	<0.2	<1	0.383	<10	<10	<5	<5
Wangcol Creek (Downstream)	G	27/07/2023	<1	<1	<1	<1	<1	33	<1	330	320	<0.1	<1	<10	<10	2	<1	<1	160	60	<1	370	363	<0.04	<1	153	151	<0.2	<1	0.427	<10	<10	<5	<5
Wangcol Creek (Downstream)	G	24/08/2023	<1	<1	<1	<1	<1	18	<1	180	180	<0.1	<1	<10	<10	1	1	<1	130	70	<1	142	138	<0.04	1	73	71	<0.2	<1	0.25	<10	<10	7	7
		Mean	0.5	0.54	0.5	0.5	0.5	23	0.5	129	140	0.05	0.63	5	5	0.88	1.2	0.83	430	106	0.79	469	419	0.02	0.58	65	65	0.53	0.5	0.21	5	5	6.5	4.4
		Minimum	<1	<1	<1	<1	<1	14	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	50	<50	<1	97	41	<0.04	<1	11	3	<0.2	<1	0.042	<10	<10	<5	<5
		Maximum	<1	1	<1	<1	<1	34	<1	330	320	<0.1	2	<10	<10	2	7	2	2320	310	4	1770	1650	<0.04	1	153	151	<10	<1	0.427	<10	<10	24	8

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			Metals																																
			Antimony	Arsenic	Arsenic (Filtered)	Arsenic III	Arsenic V	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
Environmental Goals - Surface Water				24	24	24	13	700	100	370	370	0.85	2	1	3.3		3.5	3.5	300	300	5	1900	1900	0.06	10	17	17	5	0.05				116	116
EPL 13007 - Discharge Limits (LDP12)																																		
Monitoring_Zone	**LocCode**	**Sampled_Date-Time**																																
Wangcol Creek (Stream Gauge)	WX22	28/09/2022	<1	2	<1	<1	<1	26	<1	<50	<50	<0.1	2	<10	<10	2	8	2	2230	210	5	240	123	0.04	<1	12	6	<10	<1	0.043	<10	<10	30	7
Wangcol Creek (Stream Gauge)	WX22	26/10/2022	<1	<1	<1	<1	<1	16	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	2	550	190	<1	134	62	<0.04	<1	13	12	<0.2	<1	0.067	<10	<10	<5	6
Wangcol Creek (Stream Gauge)	WX22	16/11/2022	<1	<1	<1	<1	<1	20	<1	<50	<50	<0.1	<1	<10	<10	<1	2	<1	660	270	<1	97	72	0.05	<1	12	11	0.3	<1	0.066	<10	<10	7	<5
Wangcol Creek (Stream Gauge)	WX22	13/12/2022	<1	<1	<1	<1	<1	22	<1	<50	110	<0.1	<1	<10	<10	<1	<1	<1	280	90	<1	473	371	<0.04	3	40	38	<0.2	<1	0.156	<10	<10	9	<5
Wangcol Creek (Stream Gauge)	WX22	11/01/2023	<1	<1	<1	<1	<1	21	<1	120	120	<0.1	<1	<10	<10	<1	<1	<1	220	60	<1	530	500	<0.04	<1	61	58	<0.2	<1	0.2	<10	<10	<5	<5
Wangcol Creek (Stream Gauge)	WX22	9/02/2023	<1	<1	<1	<1	<1	21	<1	120	110	<0.1	<1	<10	<10	<1	<1	<1	210	<50	<1	888	751	<0.04	<1	72	66	<0.2	<1	0.23	<10	<10	<5	<5
Wangcol Creek (Stream Gauge)	WX22	15/03/2023	<1	<1	<1	<1	<1	38	<1	240	220	<0.1	<1	<10	<10	2	<1	<1	700	<50	<1	2150	1650	<0.04	1	119	124	<0.2	<1	0.364	<10	<10	22	10
Wangcol Creek (Stream Gauge)	WX22	4/04/2023	<1	<1	<1	<1	<1	14	<1	80	100	<0.1	<1	<10	<10	<1	<1	<1	270	100	<1	401	403	<0.04	<1	44	43	<0.2	<1	0.149	<10	<10	<5	<5
Wangcol Creek (Stream Gauge)	WX22	10/05/2023	<1	<1	<1	<1	<1	16	<1	110	120	<0.1	<1	<10	<10	<1	<1	<1	210	60	<1	403	420	<0.04	<1	50	53	<0.2	<1	0.163	<10	<10	<5	<5
Wangcol Creek (Stream Gauge)	WX22	15/06/2023	<1	<1	<1	<1	<1	34	<1	320	340	<0.1	<1	<10	<10	1	<1	<1	80	<50	<1	334	322	<0.04	<1	136	144	<0.2	<1	0.395	<10	<10	6	<5
Wangcol Creek (Stream Gauge)	WX22	27/07/2023	<1	<1	<1	<1	<1	34	<1	320	290	<0.1	<1	<10	<10	2	<1	<1	170	50	<1	394	381	<0.04	<1	152	153	<0.2	<1	0.436	<10	<10	6	<5
Wangcol Creek (Stream Gauge)	WX22	24/08/2023	<1	<1	<1	<1	<1	17	<1	180	200	<0.1	<1	<10	<10	1	<1	<1	160	60	<1	143	135	<0.04	3	73	69	<0.2	<1	0.25	<10	<10	9	<5
		Mean	0.5	0.63	0.5	0.5	0.5	23	0.5	133	140	0.05	0.63	5	5	0.96	1.3	0.75	478	97	0.88	516	433	0.024	0.96	65	65	0.53	0.5	0.21	5	5	8.5	3.8
		Minimum	<1	<1	<1	<1	<1	14	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	80	<50	<1	97	62	<0.04	<1	12	6	<0.2	<1	0.043	<10	<10	<5	<5
		Maximum	<1	2	<1	<1	<1	38	<1	320	340	<0.1	2	<10	<10	2	8	2	2230	270	5	2150	1650	0.05	3	152	153	<10	<1	0.436	<10	<10	30	10
Wangcol Creek (Midstream)	NC01	28/09/2022	2	3	<1	<1	<1	25	<1	<50	<50	0.4	3	<10	<10	1	8	3	2170	350	5	114	46	<0.04	2	8	4	10	<1	0.028	<10	<10	34	10
Wangcol Creek (Midstream)	NC01	26/10/2022	<1	<1	<1	<1	<1	20	<1	<50	<50	<0.1	<1	<10	<10	<1	2	3	710	230	<1	227	198	<0.04	1	5	5	0.4	<1	0.062	<10	<10	10	9
Wangcol Creek (Midstream)	NC01	17/11/2022	<1	<1	<1	<1	<1	19	<1	<50	<50	<0.1	4	<10	<10	<1	3	2	480	170	<1	399	361	<0.04	1	5	5	0.8	<1	0.069	<10	<10	16	12
Wangcol Creek (Midstream)	NC01	13/12/2022	<1	<1	<1	<1	<1	25	<1	<50	60	<0.1	<1	<10	<10	<1	2	2	540	80	<1	281	234	<0.04	4	4	2	0.4	<1	0.097	<10	<10	10	<5
Wangcol Creek (Midstream)	NC01	11/01/2023	<1	<1	<1	<1	<1	33	<1	<50	60	<0.1	<1	<10	<10	<1	<1	<1	690	120	<1	568	328	<0.04	3	3	3	<0.2	<1	0.091	<10	<10	<5	<5
Wangcol Creek (Midstream)	NC01	9/02/2023	1	<1	<1	<1	<1	33	<1	<50	<50	<0.1	<1	<10	<10	<1	3	<1	1280	100	<1	1160	420	<0.04	3	3	3	0.2	<1	0.075	<10	<10	12	<5
Wangcol Creek (Midstream)	NC01	15/03/2023	<1	<1	<1	<1	<1	31	<1	<50	50	<0.1	<1	<10	<10	<1	<1	<1	630	80	<1	510	288	<0.04	3	3	3	0.2	<1	0.098	<10	<10	6	<5
Wangcol Creek (Midstream)	NC01	4/04/2023	<1	<1	<1	<1	<1	20	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	850	120	<1	363	282	0.26	2	2	2	0.3	<1	0.064	<10	<10	8	<5
Wangcol Creek (Midstream)	NC01	10/05/2023	<1	<1	<1	<1	<1	15	<1	<50	<50	<0.1	<1	<10	<10	<1	1	<1	490	120	<1	119	68	<0.04	<1	2	2	0.5	<1	0.046	<10	<10	<5	<5
Wangcol Creek (Midstream)	NC01	15/06/2023	<1	<1	<1	<1	<1	27	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	560	80	<1	137	139	<0.04	<1	2	1	<0.2	<1	0.083	<10	<10	<5	<5
Wangcol Creek (Midstream)	NC01	27/07/2023	<1	<1	<1	<1	<1	24	<1	<50	<50	<0.1	<1	<10	<10	<1	1	<1	870	<50	<1	263	114	<0.04	14	2	2	0.2	<1	0.076	<10	<10	11	<5
Wangcol Creek (Midstream)	NC01	24/08/2023	<1	<1	<1	<1	<1	21	<1	<50	110	<0.1	<1	<10	<10	<1	2	1	670	<50	<1	224	209	<0.04	25	2	2	<0.2	<1	0.069	<10	<10	10	<5
		Mean	0.67	0.71	0.5	0.5	0.5	24	0.5	25	40	0.079	1	5	5	0.54	2	1.2	828	125	0.88	364	224	0.04	4.9	3.4	2.8	1.1	0.5	0.072	5	5	10	4.5
		Minimum	<1	<1	<1	<1	<1	15	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	480	<50	<1	114	46	<0.04	<1	2	1	<0.2	<1	0.028	<10	<10	<5	<5
		Maximum	2	3	<1	<1	<1	33	<1	<50	110	0.4	4	<10	<10	1	8	3	2170	350	5	1160	420	0.26	25	8	5	10	<1	0.098	<10	<10	34	12

	Metals																															
	Antimony	Arsenic	Arsenic (Filtered)	Arsenic III	Arsenic V	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
Environmental Goals - Surface Water		24	24	24	13	700	100	370	370	0.85	2	1	3.3		3.5	3.5	300	300	5	1900	1900	0.06	10	17	17	5	0.05				116	116
EPL 13007 - Discharge Limits (LDP12)																																
Monitoring_Zone / **LocCode** / **Sampled_Date-Time**																																
Statistical Summary																																
Number of Results	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
Number of Detects	16	26	9	7	7	102	14	40	51	18	24	7	7	42	42	34	94	68	27	102	102	16	60	98	93	30	7	102	12	7	66	40
Minimum Concentration	0.5	0.5	0.5	0.5	0.5	4	0.5	25	25	0.05	0.5	5	5	0.5	0.5	0.5	31	25	0.5	13	11	<0.01	0.58	<1	<1	<0.2	0.5	0.004	5	5	2.5	2.5
Minimum Detect	0.5	0.5	0.5	0.5	0.5	4	0.5	25	25	0.05	0.5	5	5	0.5	0.5	0.5	31	25	0.5	13	11	0.02	0.58	1	1	0.2	0.5	0.004	5	5	2.5	2.5
Maximum Concentration	5	18	1	<1	<1	271	9	330	340	1.1	22	<10	<10	20	81	6	46000	3770	160	2990	2840	0.26	181	177	173	40	<1	0.436	70	<10	685	155
Maximum Detect	5	18	1	0.5	0.5	271	9	330	340	1.1	22	5	5	20	81	6	46000	3770	160	2990	2840	0.26	181	177	173	40	0.5	0.436	70	5	685	155
Average Concentration	0.65	1.2	0.51	0.5	0.5	29	0.79	77	84	0.1	1.3	5	5	2.4	3.5	0.97	1909	322	5.8	551	450	0.027	7.1	34	32	2.7	0.5	0.12	6.6	5	29	7.6
Median Concentration	0.5	0.5	0.5	0.5	0.5	23.5	0.5	25	25	0.05	0.5	5	5	0.5	0.5	0.5	474	93.5	0.5	232.5	151	0.02	1	8.5	3.5	0.3	0.5	0.065	5	5	7	2.5
Standard Deviation	0.66	2.6	0.07	0	0	37	1.3	89	88	0.19	3.1	0	0	4.3	11	0.97	6457	726	23	775	714	0.034	26	48	49	5.9	0	0.12	9.2	0	99	21
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	4	18	102	102	0	19	2	65	19	11	10	7	4	10	37	33	33	102	0	0	0	6	2
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	4	18	7	7	0	19	2	65	19	11	10	7	4	10	37	33	7	7	0	0	0	6	2

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APPENDIX C TABULATED GROUNDWATER DATA

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Monitoring_Zone	LocCode	Sampled_Date-Time	Field Parameters					Major Anions and Cations											Nutrients					Physical Parameters
			Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Purge Volume	Redox (Field)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Total Dissolved Solids (TDS) (Filtered)
			mg/L	uS/cm	pH units	L	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L
ANZECC (2000) or Local Guidelines - Groundwater				2600	6.5-8							350	1.5					1000						2000
Upgradient / background	D4	19/10/2022	1.1	720	3.36	135	301.3	<1	<1	13.2	<1	16.9	<0.1	6.34	<1	8.2	<0.01	300	170	91	<10	<10	<0.01	494
Upgradient / background	D4	10/01/2023	0.8	710	3.5	131	287.8	<1	<1	14.9	<1	17.2	<0.1	8.07	<1	8.51	23.6	295	420	95	<10	<10	<0.01	628
Upgradient / background	D4	27/04/2023	2	720	3.44	129	278.3	<1	<1	14.3	<1	14.2	<0.1	7.88	<1	8.58	21.3	272	200	95	<10	<10	<0.01	590
Upgradient / background	D4	12/07/2023	1.3	690	3.42	126	307.3	<1	<1	14	<1	17.1	<0.1	7.64	<1	8.03	19.9	278	210	86	<10	<10	<0.01	530
		Count Detect	4	4	4	4	4	0	0	4	0	4	0	4	0	4	3	4	4	4	0	0	0	4
		Min.	0.8	690	3.36	126	278.3	<1	<1	13.2	<1	14.2	<0.1	6.34	<1	8.03	<0.01	272	170	86	<10	<10	<0.01	494
		Max.	2	720	3.5	135	307.3	<1	<1	14.9	<1	17.2	<0.1	8.07	<1	8.58	23.6	300	420	95	<10	<10	<0.01	628
		Mean	1.3	710	-	130	294	0.5	0.5	14	0.5	16	0.05	7.5	0.5	8.3	16	286	250	92	5	5	0.005	561
Upgradient / background	D5	19/10/2022	1	1210	5.83	325	19.1	<1	72	96.4	72	27	<0.2	64.9	<1	10.1	8.79	552	160	168	<10	<10	<0.01	833
Upgradient / background	D5	10/01/2023	0.7	1170	5.91	311	20.9	<1	102	104	102	26.7	<0.2	69.4	<1	11.1	37.1	516	460	175	<10	<10	<0.01	946
Upgradient / background	D5	27/04/2023	2.1	1220	5.98	281	8.2	<1	80	101	80	26.5	<0.2	66.9	<1	10.7	32.7	535	420	173	<100	<100	<0.1	908
Upgradient / background	D5	12/07/2023	0.9	1180	5.87	274	24.6	<1	93	99.6	93	25.7	<0.2	64.9	<1	9.6	31.1	513	130	161	<10	<10	<0.01	876
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	0.7	1170	5.83	274	8.2	<1	72	96.4	72	25.7	<0.2	64.9	<1	9.6	8.79	513	130	161	<10	<10	<0.01	833
		Max.	2.1	1220	5.98	325	24.6	<1	102	104	102	27	<0.2	69.4	<1	11.1	37.1	552	460	175	<100	<100	<0.1	946
		Mean	1.2	1195	-	298	18	0.5	87	100	87	26	0.1	67	0.5	10	27	529	293	169	16	16	0.016	891
Upgradient / adjacent MPAR	D106	25/10/2022	2.4	13,420	5.94	-	65.2	<1	179	573	179	1240	<2	681	<1	122	2080	6050	340	2150	<100	<100	<0.1	12,100
Upgradient / adjacent MPAR	D106	11/01/2023	1.7	13,100	6.12	-	1.2	<1	216	568	216	1680	<2	690	<1	119	2090	7480	360	2290	<10	<10	<0.01	12,600
Upgradient / adjacent MPAR	D106	10/05/2023	1.1	12,670	6.03	25	37.9	<1	186	497	186	1410	<2	616	<1	93.2	2130	6200	360	1980	<10	<10	<0.01	11,400
Upgradient / adjacent MPAR	D106	3/08/2023	1.7	12,260	6.05	23	54.2	<1	192	511	192	1320	<2	634	<1	107	2100	6250	400	1920	<10	<10	<0.01	11,000
		Count Detect	4	4	4	2	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	1.1	12260	5.94	23	1.2	<1	179	497	179	1240	<2	616	<1	93.2	2080	6050	340	1920	<10	<10	<0.01	11000
		Max.	2.4	13420	6.12	25	65.2	<1	216	573	216	1680	<2	690	<1	122	2130	7480	400	2290	<100	<100	<0.1	12600
		Mean	1.7	12863	-		40	0.5	193	537	193	1413	1	655	0.5	110	2100	6495	365	2085	16	16	0.016	11775
Upgradient / adjacent MPAR	D107	25/10/2022	2.8	15,560	6.05	-	66.1	<1	223	433	223	1170	<2	650	<1	344	2690	5990	400	2470	<100	<100	<0.1	13,600
Upgradient / adjacent MPAR	D107	11/01/2023	1	12,720	6.1	-	7.5	<1	268	382	268	1730	<2	544	<1	269	2110	8540	390	2130	<10	<10	<0.01	11,200
Upgradient / adjacent MPAR	D107	10/05/2023	1.3	12,680	6.14	58	14.3	<1	238	373	238	1170	<2	497	<1	273	2320	6210	420	1950	<10	<10	<0.01	10,900
Upgradient / adjacent MPAR	D107	2/08/2023	1.4	12,520	6.08	44	40.5	<1	249	389	249	1190	<2	520	<1	291	2260	6500	480	2000	<10	<10	<0.01	11,100
		Count Detect	4	4	4	2	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	1	12520	6.05	44	7.5	<1	223	373	223	1170	<2	497	<1	269	2,110	5,990	390	1950	<10	<10	<0.01	10,900
		Max.	2.8	15560	6.14	58	66.1	<1	268	433	268	1730	<2	650	<1	344	2,690	8,540	480	2470	<100	<100	<0.1	13,600
		Mean	1.6	13370	-		32	0.5	245	394	245	1315	1	553	0.5	294	2,345	6,810	423	2138	16	16	0.016	11,700
Upgradient / adjacent MPAR	D119	26/10/2022	1.8	2160	6.24	48	-2.5	<1	180	58	180	69.4	<0.5	44.3	<1	42.4	320	570	450	234	<10	<10	<0.01	1400
Upgradient / adjacent MPAR	D119	18/01/2023	0.9	2010	6.28	37	37.1	<1	176	60.9	176	85.8	0.343	44.2	<1	42.4	290	753	330	238	<10	<10	<0.01	1300
Upgradient / adjacent MPAR	D119	18/05/2023	3.2	1880	6.43	32	-33.5	<1	158	87	158	72.1	0.317	46.6	<1	32	223	744	520	242	110	<10	0.11	1320
Upgradient / adjacent MPAR	D119	16/08/2023	1.3	2410	6.24	31	30.8	<1	167	91.6	167	142	<0.5	65.9	<1	54.8	346	945	140	318	20	20	0.04	1670
		Count Detect	4	4	4	4	4	0	4	4	4	4	2	4	0	4	4	4	4	4	2	1	2	4
		Min.	0.9	1880	6.24	31	-33.5	<1	158	58	158	69.4	0.317	44.2	<1	32	223	570	140	234	<10	<10	<0.01	1,300
		Max.	3.2	2410	6.43	48	37.1	<1	180	91.6	180	142	<0.5	65.9	<1	54.8	346	945	520	318	110	20	0.11	1,670
		Mean	1.8	2115	-	37	8	0.5	170	74	170	92	0.29	50	0.5	43	295	753	360	258	35	8.8	0.04	1,423
Upgradient / adjacent MPAR	D3	13/09/2022	2.5	269	5.47	264	188.4	<1	29	12.4	29	31.5	<0.05	9.98	<1	2.45	24.4	51.9	<10	16	20	<10	0.02	184
Upgradient / adjacent MPAR	D3	24/11/2022	1.3	730	5.75	274	57	<1	78	56.5	78	43.3	<0.1	33.5	<1	6.27	39.8	219	60	77	<10	<10	<0.01	444
Upgradient / adjacent MPAR	D3	1/03/2023	1.8	1010	6.2	239	26.9	<1	168	70.5	168	89.2	0.076	45	<1	7.81	56.9	227	80	71	30	<10	0.03	618
Upgradient / adjacent MPAR	D3	22/06/2023	0.7	870	6.11	245	22.6	<1	129	70.2	129	40.2	<0.1	38.6	<1	8.81	39.1	250	120	80	20	<10	0.02	530
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	3	4	3	0	3	4
		Min.	0.7	269	5.47	239	22.6	<1	29	12.4	29	31.5	<0.05	9.98	<1	2.45	24.4	51.9	<10	16	<10	<10	<0.01	184
		Max.	2.5	1010	6.2	274	188.4	<1	168	70.5	168	89.2	<0.1	45	<1	8.81	56.9	250	120	80	30	<10	0.03	618
		Mean	1.6	720	-	256	74	0.5	101	52	101	51	0.05	32	0.5	6.3	40	187	66	61	19	5	0.019	444
Within / immediately adjacent LNAR North	D10	13/09/2022	1.7	4700	6.01	181	47.5	<1	156	160	156	306	<0.5	139	<1	87.4	734	2080	320	680	10	<10	0.01	3690
Within / immediately adjacent LNAR North	D10	23/11/2022	0.7	3500	5.9	200	73.8	<1	154	129	154	204	<0.5	103	<1	62.5	516	1470	250	483	<10	<10	<0.01	2560
Within / immediately adjacent LNAR North	D10	1/03/2023	1	7120	5.85	168	70.2	<1	134	220	134	516	0.363	228	<1	125	1120	3410	360	1130	<10	<10	<0.01	5950
Within / immediately adjacent LNAR North	D10	21/06/2023	0.8	8210	6.06	165	51.6	<1	199	243	199	555	<1	252	<1	178	1320	3450	370	1220	<10	<10	<0.01	6710
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	4	4	1	0	1	4
		Min.	0.7	3,500	5.85	165	47.5	<1	134	129	134	204	0.363	103	<1	62.5	516	1,470	250	483	<10	<10	<0.01	2,560
		Max.	1.7	8,210	6.06	200	73.8	<1	199	243	199	555	<1	252	<1	178	1320	3,450	370	1220	10	<10	0.01	6,710
		Mean	1.1	5,883	-	179	61	0.5	161	188	161	395	0.34	181	0.5	113	923	2,603	325	878	6.3	5	0.006	4,728
Within / immediately adjacent LNAR North	D11	13/09/2022	1	6530	6.52	54	-81.9	<1	398	350	398	694	<1	253	<1	78.5	866	2500	390	824	<100	<100	<0.1	5120
Within / immediately adjacent LNAR North	D11	24/11/2022	1.1	10,460	6.25	70	-47	<1	196	521	196	1040	<1	448	<1	108	1770	4930	1050	1610	<100	<100	<0.1	9030
Within / immediately adjacent LNAR North	D11	1/03/2023	1.2	8550	6.54	81	-74.2	<1	398	368	398	864	0.165	315	<1	100	1270	3650	1100	1240	<10	<10	<0.01	6520
		Count Detect	3	3	3	3	3	0	3	3	3	3	1	3	0	3	3	3	3	3	0	0	0	3
		Min.	1	6,530	6.25	54	-81.9	<1	196	350	196	694	0.165	253	<1	78.5	866	2,500	390	824	<10	<10	<0.01	5,120
		Max.	1.2	10,460	6.54	81	0	<1	398	521	398	1040	<1	448	<1	108	1770	4,930	1100	1610	<100	<100	<0.1	9,030
		Mean	1.1	8,513	-	68	-68	0.5	331	413	331	866	0.39	339	0.5	96	1302	3,693	847	1225	35	35	0.035	6,890
Within / immediately adjacent LNAR North	D110	26/10/2022	1.2	9010	5.87	58	25.7	<1	131	584	131	867	<1	464	<1	93.6	1100	3530	290	1340	<100	<100	<0.1	7810
Within / immediately adjacent LNAR North	D110	12/01/2023	0.6	8820	5.91	54	18.3	<1	142	575	142	1310	<1	460	<1	96.8	1130	4880	230	1460	<10	<10	<0.01	7960
Within / immediately adjacent LNAR North	D110	11/05/2023	1.1	9250	5.93	52	27.5	<1	97	568	97	1060	<1	442	<1	93.7	1200	4340	270	1320	<100	<100	<0.1	7700
Within / immediately adjacent LNAR North	D110	3/08/2023	0.9	9080	5.89	51	22.7	<1	132	588	132	1020	<1	454	<1	89.2	1150	4370	300	1380	<10	<10	<0.01	8010
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	0.6	8,820	5.87	51	18.3	<1	97	568	97	867	<1	442	<1	89.2	1100	3,530	230	1320	<10	<10	<0.01	7,700
		Max.	1.2	9,250	5.93	58	27.5	<1	142	588	142	1310	<1	464	<1	96.8	1200	4,880	300	1460	<100	<100	<0.1	8,010
		Mean	0.95	9,040	-	54	24	0.5	126	579	126	1064	0.5	455	0.5	93	1145	4,280	273	1375	28	28	0.028	7,870
Within / immediately adjacent LNAR North	D117	26/10/2022	1.6	4540	5.92	402	136.1	<1	94	340	94	104	2.94	138	<1	140	482	2180	1020	765	660	<10	0.66	3860
Within / immediately adjacent LNAR North	D117	18/01/2023	0.9	4370	6.09	215	127.2	<1	143	334	143	129	3.37	153	<1	124	468	2350	770	785	510	<10	0.51	4020
Within / immediately adjacent LNAR North	D117	18/05/2023	3.1	5040	5.99	89	92.4	<1	52	389	52	137	3.73	102	<1	167	567	3050	1300	956	1550	<10	1.55	4250
		Count Detect	3	3	3	3	3	0	3	3	3	3	3	3	0	3	3	3	3	3	3	0	3	3
		Min.	0.9	4,370	5.92	89	92.4	<1	52	334	52	104	2.94	102	<1	124	468	2,180	770	765	510	<10	0.51	3,860
		Max.	3.1	5,040	6.09	402	136.1	<1	143	389	143	137	3.73	153	<1	167	567	3,050	1300	956	1550	<10	1.55	4,250
		Mean	1.9	4,650	-	235	119	0.5	96	354	96	123	3.3	131	0.5	144	506	2,527	1030	835	907	5	0.91	4,043
Within / immediately adjacent LNAR North	D20	13/09/2022	2.7	4040	5.81	17	90.8	<1	240	277	240	123	<0.5	291	<1	37	300	2250	340	709	<10	<10	<0.01	3670
Within / immediately adjacent LNAR North	D20	23/11/2022	3.2	4090	5.78	19	166	<1	257	303	257	124	<0.5	319	<1	33.5	315	2270	330	752	<10	<10	<0.01	3390
Within / immediately adjacent LNAR North	D20	2/03/2023	1.5	3880	5.88	16	111.7	<1	242	255	242	118	0.17	262	<1	34.9	304	2190	380	696	<10	<10	<0.01	3260
Within / immediately adjacent LNAR North	D20	22/06/2023	0.7	3930	5.93	16	76	<1	255	268	255	126	<0.5	283	<1	36.5	278	2310	370	698	<10	<10	<0.01	3370
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	4	4	0	0	0	4
		Min.	0.7	3,880	5.78	16	76	<1	240	255	240	118	0.17	262	<1	33.5	278	2,190	330	696	<10	<10	<0.01	3,260
		Max.	3.2	4,090	5.93	19	166	<1	257	303	257	126	<0.5	319	<1	37	315	2,310	380	752	<10	<10	<0.01	3,670
		Mean	2	3,985	-	17	111	0.5	249	276	249	123	0.23	289	0.5	35	299	2,255	355	714	5	5	0.005	3,423
Within / immediately adjacent LNAR South	D16A	21/12/2022	1.5	1100	6.7	140	14.1	<1	326	119	326	22.1	0.357	42.3	<1	20.5	28.4	224	270	74	<10	<10	<0.01	762
Within / immediately adjacent LNAR South	D16A	1/03/2023	1.1	1050	6.8	136	-31.2	<1	363	117	363	20.0	0.37	40.8	<1	20.8	29.2	213	300	65	<10	<10	<0.01	514
Within / immediately adjacent LNAR South	D16A	22/06/2023	2.3	950	6.8	132	9.7	<1	294	108	294	17.3	0.22	37	<1	19.5	29.1	174	230	62	80	<10	0.08	574
		Count Detect	3	3	3	3	3	0	3	3	3	3	3	3	0	3	3	3	3	3	1	0	1	3
		Min.	1.1	950	6.72	132	-31.2	<1	294	108	294	17.3	0.22	37	<1	19.5	28.4	174	230	62	<10	<10	<0.01	514
		Max.	2.3	1,100	6.81	140	14.1	<1	363	119	363	22.1	0.37	42.3	<1	20.8	29.2	224	300	74	80	<10	0.08	762
		Mean	1.6	1,033	6.8	136	-2.5	0.5	328	115	328	20	0.32	40	0.5	20	29	204	267	67	30	5	0.03	617
Within / immediately adjacent LNAR South	D15	13/09/2022	2.6	2170	5.26	25	131.6	<1	29	108	29	97.8	<0.2	48.6	<1	29.7	271	994	470	313	<10	<10	<0.01	1660
Within / immediately adjacent LNAR South	D15	23/11/2022	2.6	2110	5.35	34	144.8	<1	31	112	31	89.5	<0.5	49.4	<1	27.6	279	948	380	314	<10	<10	<0.01	1510
Within / immediately adjacent LNAR South	D15	2/03/2023	3.1	1900	5.71	26	142.8	<1	59	92.4	59	75.1	<0.2	40.2	<1	23.6	243	805	360	263	<10	<10	<0.01	1360
Within / immediately adjacent LNAR South	D15	22/06/2023	12.5	1890	5.47	23	129.9	<1	48	84.2	48	80.4	<0.5	37.1	<1	23.9	234	744	430	261	<10	<10	<0.01	1270
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	2.6	1,890	5.26	23	129.9	<1	29	84.2	29	75.1	<0.2	37.1	<1	23.6	234	744	360	261	<10	<10	<0.01	1,270
		Max.	12.5	2,170	5.71	34	144.8	<1	59	112	59	97.8	<0.5	49.4	<1	29.7	279	994	470	314	<10	<10	<0.01	1,660
		Mean	5.2	2,018	-	27	137	0.5	42	99	42	86	0.18	44	0.5	26	257	873	410	288	5	5	0.005	1,450

ERM

			Field Parameters					Major Anions and Cations											Nutrients					Physical Parameters
			Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Purge Volume	Redox (Field)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Phenolphthalein Alkalinity	Potassium	Sodium	Sulfate (as SO4)	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Total Dissolved Solids (TDS) (Filtered)
			mg/L	uS/cm	pH units	L	mV	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L
ANZECC (2000) or Local Guidelines - Groundwater				2600	6.5-8							350	1.5					1000						2000
Monitoring_Zone	**LocCode**	**Sampled_Date-Time**																						
Within / immediately adjacent LNAR South	D17	13/09/2022	2.6	2790	6.09	41	16	<1	132	200	132	149	<0.5	116	<1	21.8	245	1290	330	394	<10	<10	<0.01	2220
Within / immediately adjacent LNAR South	D17	23/11/2022	1.2	2780	6.1	46	12.8	<1	116	215	116	143	<0.5	123	<1	21.1	265	1270	120	417	<10	<10	<0.01	2100
Within / immediately adjacent LNAR South	D17	1/03/2023	0.6	2570	6.14	36	11.4	<1	137	183	137	131	0.076	105	<1	18.9	236	1200	190	382	<10	<10	<0.01	1980
Within / immediately adjacent LNAR South	D17	22/06/2023	0.7	2520	6.16	35	4.1	<1	137	178	137	125	<0.5	100	<1	19	212	1150	310	357	20	<10	0.02	1840
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	4	4	1	0	1	4
		Min.	0.6	2,520	6.09	35	4.1	<1	116	178	116	125	0.076	100	<1	18.9	212	1,150	120	357	<10	<10	<0.01	1,840
		Max.	2.6	2,790	6.16	46	16	<1	137	215	137	149	<0.5	123	<1	21.8	265	1,290	330	417	20	<10	0.02	2,220
		Mean	1.3	2,665	-	40	11	0.5	131	194	131	137	0.21	111	0.5	20	240	1,228	238	388	8.8	5	0.009	2,035
Within / immediately adjacent LNAR South	D18	14/09/2022	2.9	680	6.77	15	132.7	<1	341	78.8	341	8.74	0.506	28.2	<1	18.7	17.4	12.6	120	4	90	10	0.1	420
Within / immediately adjacent LNAR South	D18	24/11/2022	3.8	670	6.68	15	191.6	<1	358	84.4	358	7.83	0.53	30	<1	17.8	16.8	9.29	160	4	50	<10	0.05	422
Within / immediately adjacent LNAR South	D18	2/03/2023	2	680	6.71	15	27.1	<1	358	78	358	8.12	0.498	28.2	<1	17.4	16.8	10.9	230	4	<10	20	0.02	396
Within / immediately adjacent LNAR South	D18	22/06/2023	1.4	670	6.76	23	69.6	<1	337	76	337	8.65	0.468	27	<1	17	16.2	10.6	180	4	50	<10	0.05	343
		Count Detect	4	4	4	4	4	0	4	4	4	4	4	4	0	4	4	4	4	4	3	2	4	4
		Min.	1.4	670	6.68	15	27.1	<1	337	76	337	7.83	0.468	27	<1	17	16.2	9	120	4	<10	<10	0.02	343
		Max.	3.8	680	6.77	23	191.6	<1	358	84.4	358	8.74	0.53	30	<1	18.7	17.4	13	230	4	90	20	0.1	422
		Mean	2.5	675	-	17	105	0.5	349	79	349	8.3	0.5	28	0.5	18	17	11	173	4	49	10	0.055	395
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	26/10/2022	2.6	8720	5.91	15	50.7	<1	89	526	89	879	<1	465	<1	66.6	1030	3280	340	1250	<100	<100	<0.1	7190
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	11/01/2023	1.9	8610	8.61	60	13.1	<1	104	522	104	1520	<1	475	<1	71.1	1060	5220	300	1340	<10	<10	<0.01	8200
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	11/05/2023	2.2	8500	6.06	14	61.7	<1	70	512	70	1070	<1	452	<1	64.9	1090	3860	340	1160	<100	<100	<0.1	7050
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	3/08/2023	1.8	8750	6.08	15	54.8	<1	110	548	110	1020	<1	483	<1	80.5	1100	3810	310	1350	<10	<10	<0.01	7680
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	1.8	8,500	5.91	14	13.1	<1	70	512	70	879	<1	452	<1	64.9	1030	3,280	300	1160	<10	<10	<0.01	7,050
		Max.	2.6	8,750	8.61	60	61.7	<1	110	548	110	1520	<1	483	<1	80.5	1100	5,220	340	1350	<100	<100	<0.1	8,200
		Mean	2.1	8,645	-	26	45	0.5	93	527	93	1122	0.5	469	0.5	71	1070	4,043	323	1275	28	28	0.028	7,530
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	25/10/2022	1.8	3620	6.09	43	46.3	<1	206	152	206	172	<0.5	158	<1	29.9	488	1380	300	504	<10	<10	<0.01	2700
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	11/01/2023	1.4	3560	6.28	40	-16.1	<1	232	158	232	205	<0.5	154	<1	29.7	457	1570	240	557	40	<10	0.04	2790
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	10/05/2023	2	3360	6.33	38	42.5	<1	239	143	239	180	0.121	133	<1	24.6	438	1410	160	450	<10	<10	<0.01	2660
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	2/08/2023	1.4	3440	6.26	38	22.5	<1	252	154	252	180	<0.5	149	<1	32.6	449	1420	180	484	<10	<10	<0.01	2700
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	4	4	1	0	1	4
		Min.	1.4	3,360	6.09	38	-16.1	<1	206	143	206	172	0.121	133	<1	24.6	438	1,380	160	450	<10	<10	<0.01	2,660
		Max.	2	3,620	6.33	43	46.3	<1	252	158	252	205	<0.5	158	<1	32.6	488	1,570	300	557	40	<10	0.04	2,790
		Mean	1.7	3,495	-	40	24	0.5	232	152	232	184	0.22	149	0.5	29	458	1,445	220	499	14	5	0.014	2,713
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	26/10/2022	5.3	393	6.24	10	119.6	<1	159	51.4	159	5.76	0.083	10	<1	2.68	22	16.9	<10	7	<10	<10	<0.01	274
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	11/01/2023	1.4	750	6.49	8	-59.3	<1	140	68.3	140	31.3	<0.1	27.5	<1	5.01	49.8	184	200	60	<10	<10	<0.01	486
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	11/05/2023	1.9	1280	5.92	15	49	<1	65	104	65	76.2	<0.5	57.4	<1	7.57	80.5	486	100	160	20	<10	0.02	903
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	3/08/2023	1.8	930	6.1	10	49.5	<1	90	68.2	90	60.6	<0.1	38.4	<1	8.82	68.3	288	120	91	20	20	0.04	579
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	3	4	2	1	2	4
		Min.	1.4	393	5.92	8	-59.3	<1	65	51.4	65	5.76	0.083	10	<1	2.68	22	17	<10	7	<10	<10	<0.01	274
		Max.	5.3	1,280	6.49	15	119.6	<1	159	104	159	76.2	<0.5	57.4	<1	8.82	80.5	486	200	160	20	20	0.04	903
		Mean	2.6	838	-	11	40	0.5	114	73	114	43	0.11	33	0.5	6	55	244	106	80	13	8.8	0.018	561
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	25/10/2022	1	2790	5.9	37	50.7	<1	140	148	140	170	<0.5	152	<1	20.2	285	1100	310	385	<100	<100	<0.1	2350
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	11/01/2023	1	2960	6.05	37	16.5	<1	158	164	158	236	<0.5	158	<1	21.9	294	1400	260	422	<10	<10	<0.01	2540
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	10/05/2023	1.1	3070	6.04	32	28.6	<1	140	164	140	221	<0.2	151	<1	20	310	1340	280	423	<10	<10	<0.01	2440
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	3/08/2023	1.3	3120	5.99	31	36.4	<1	155	168	155	216	<0.5	162	<1	25.2	312	1320	130	446	<10	<10	<0.01	2380
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	1	2,790	5.9	31	16.5	<1	140	148	140	170	<0.2	151	<1	20	285	1,100	130	385	<10	<10	<0.01	2,350
		Max.	1.3	3,120	6.05	37	50.7	<1	158	168	158	236	<0.5	162	<1	25.2	312	1,400	310	446	<100	<100	<0.1	2,540
		Mean	1.1	2,985	-	34	33	0.5	148	161	148	211	0.21	156	0.5	22	300	1,290	245	419	16	16	0.016	2,428
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	25/10/2022	1	3690	6	61	56.2	<1	168	128	168	182	<0.5	113	<1	63.6	535	1380	240	495	<10	<10	<0.01	2700
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	12/01/2023	0.7	3600	6.09	57	30	<1	183	148	183	226	<0.5	124	<1	65.7	506	1690	250	524	30	<10	0.03	2770
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	10/05/2023	1	4570	6.03	55	46.5	<1	158	180	158	289	<0.5	147	<1	71.2	668	2040	300	657	<10	<10	<0.01	3840
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	2/08/2023	1.3	4620	6.02	53	33.8	<1	171	187	171	309	<0.5	159	<1	88.2	684	2220	250	699	<10	<10	<0.01	3630
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	1	0	1	4
		Min.	0.7	3,600	6	53	30	<1	158	128	158	182	<0.5	113	<1	63.6	506	1,380	240	495	<10	<10	<0.01	2,700
		Max.	1.3	4,620	6.09	61	56.2	<1	183	187	183	309	<0.5	159	<1	88.2	684	2,220	300	699	30	<10	0.03	3,840
		Mean	1	4,120	-	57	42	0.5	170	161	170	252	0.25	136	0.5	72	598	1,833	260	594	11	5	0.011	3,235
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	20/10/2022	2.3	1720	5.06	70	187.8	<1	5	84.6	5	111	0.327	84.4	<1	16	123	767	60	238	<10	<10	<0.01	1200
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	11/01/2023	1.8	1360	5.45	55	39.5	<1	1	65.8	1	88.2	<0.2	62	<1	14.2	122	577	80	184	<10	<10	<0.01	1080
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	28/04/2023	1.7	1010	5.8	62	75	<1	13	42.6	13	57.3	0.124	35.7	<1	10.8	94.1	367	70	123	10	<10	0.01	647
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	13/07/2023	1.4	1630	5.58	57	138.1	<1	7	78.6	7	101	<0.2	64.5	<1	14.4	183	702	60	229	<10	<10	<0.01	1130
		Count Detect	4	4	4	4	4	0	4	4	4	4	2	4	0	4	4	4	4	4	1	0	1	4
		Min.	1.4	1,010	5.06	55	39.5	<1	1	42.6	1	57.3	0.124	35.7	<1	10.8	94.1	367	60	123	<10	<10	<0.01	647
		Max.	2.3	1,720	5.8	70	187.8	<1	13	84.6	13	111	0.327	84.4	<1	16	183	767	80	238	10	<10	0.01	1,200
		Mean	1.8	1,430	-	61	110	0.5	6.5	68	6.5	89	0.16	62	0.5	14	131	603	68	194	6.3	5	0.006	1,014
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	13/09/2022	3.3	2350	5.89	21	82.3	<1	99	87.9	99	117	<0.25	72.1	<1	43.2	306	996	140	313	80	10	0.09	1730
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	23/11/2022	3.8	2070	5.95	25	126.8	<1	101	85.1	101	91	<0.5	66	<1	35.7	266	863	120	275	50	<10	0.05	1460
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	2/03/2023	1.7	4100	6.08	17	73.2	<1	172	162	172	250	0.21	143	<1	63.6	571	1880	260	602	<10	<10	<0.01	3280
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	22/06/2023	0.5	4490	6.03	17	39	<1	166	172	166	271	<0.5	148	<1	68	605	1960	360	654	<10	<10	<0.01	3330
		Count Detect	4	4	4	4	4	0	4	4	4	4	1	4	0	4	4	4	4	4	2	1	2	4
		Min.	0.5	2,070	5.89	17	39	<1	99	85.1	99	91	0.21	66	<1	35.7	266	863	120	275	<10	<10	<0.01	1,460
		Max.	3.8	4,490	6.08	25	126.8	<1	172	172	172	271	<0.5	148	<1	68	605	1,960	360	654	80	10	0.09	3,330
		Mean	2.3	3,253	-	20	80	0.5	135	127	135	182	0.21	107	0.5	53	437	1,425	220	461	35	6.3	0.038	2,450
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	14/09/2022	6.7	227	5.56	50	181.6	<1	11	16.7	11	8.29	<0.05	12.1	<1	1.8	6.24	81.5	<10	25	20	<10	0.02	172
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	24/11/2022	6.2	206	6.16	50	66.9	<1	13	14.2	13	8.27	0.025	9.79	<1	1.76	8.22	64.9	<10	20	10	<10	0.01	164
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	2/03/2023	4.3	224	5.27	43	154.8	<1	9	14.9	9	10.3	0.014	11.1	<1	1.82	6.43	77	90	24	20	<10	0.02	163
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	22/06/2023	5.6	295	5.34	30	101.7	<1	10	18.2	10	14.4	<0.05	13.4	<1	2.14	11.4	92.9	20	32	30	<10	0.03	170
		Count Detect	4	4	4	4	4	0	4	4	4	4	2	4	0	4	4	4	2	4	4	0	4	4
		Min.	4.3	206	5.27	30	66.9	<1	9	14.2	9	8.27	0.014	9.79	<1	1.76	6.24	65	<10	20	10	<10	0.01	163
		Max.	6.7	295	6.16	50	181.6	<1	13	18.2	13	14.4	<0.05	13.4	<1	2.14	11.4	93	90	32	30	<10	0.03	172
		Mean	5.7	238	-	43	126	0.5	11	16	11	10	0.022	12	0.5	1.9	8.1	79	30	25	20	5	0.02	167
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	13/09/2022	4.4	9420	6.05	21	53.2	<1	141	565	141	1100	<1	470	<1	71.7	1180	4270	560	1380	<100	<100	<0.1	8300
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	24/11/2022	3.2	9700	6.21	24	-33.2	<1	118	624	118	1150	<1	504	<1	74.2	1380	4440	290	1440	<100	<100	<0.1	8310
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	1/03/2023	2	9390	6.09	19	45.4	<1	109	536	109	1080	<0.01	448	<1	66.5	1200	4420	320	1440	<10	<10	<0.01	8240
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	21/06/2023	2.3	10,060	6.14	17	68.8	<1	126	564	126	1220	<1	477	<1	81.4	1350	5160	300	1510	10	<10	0.01	8890
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	1	0	1	4
		Min.	2	9,390	6.05	17	-33.2	<1	109	536	109	1,080	<0.01	448	<1	66.5	1180	4,270	290	1380	<10	<10	<0.01	8,240
		Max.	4.4	10,060	6.21	24	68.8	<1	141	624	141	1,220	<1	504	<1	81.4	1380	5,160	560	1510	<100	<100	<0.1	8,890
		Mean	3	9,643	-	20	34	0.5	124	572	124	1,138	0.38	475	0.5	73	1278	4,573	368	1443	29	28	0.029	8,435
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	13/09/2022	1.1	11,130	5.87	148	43.5	<1	174	534	174	1190	<1.5	560	<1	110	1650	5620	250	1800	<100	<100	<0.1	10,300
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	24/11/2022	1	12,370	5.78	156	22.7	<1	154	593	154	1320	<2	619	<1	124	2060	6330	480	2140	<100	<100	<0.1	11,000
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	1/03/2023	1	10,120	5.94	141	44.2	<1	161	411	161	1030	<0.01	427	<1	105	1500	4850	420	1540	<100	<100	<0.1	8820
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	21/06/2023	0.9	9490	5.93	134	32.8	<1	175	417	175	845	<1	420	<1	129	1440	4600	870	1460	<10	<10	<0.01	8060
		Count Detect	4	4	4	4	4	0	4	4	4	4	0	4	0	4	4	4	4	4	0	0	0	4
		Min.	0.9	9,490	5.78	134	22.7	<1	154	411	154	845	<0.01	420	<1	105	1440	4,600	250	1460	<10	<10	<0.01	8,060
		Max.	1.1	12,370	5.94	156	44.2	<1	175	593	175	1,320	<2	619	<1	129	2060	6,330	870	2140	<100	<100	<0.1	11,000
		Mean	1	10,778	-	145	36	0.5	166	489	166	1,096	0.56	507	0.5	117	1663	5,350	505	1735	39	39	0.039	9,545

Statistical Summary																						
Number of Results	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Number of Detects	80	80	80	80	80	20	80	80	80	80	33	80	20	80	80	80	75	80	39	24	39	80
Minimum Concentration	0.5	4	4	4	-59.3	0	1	4	1	4	0	4	0	1.76	4	4	2	4	0	0	0	4
Minimum Detect	0.5	4	4	4	ND	0.5	1	4	1	4	0.014	4	0.5	1.76	4	4	2	4	1	1	0.006	4
Maximum Concentration	6.7	12370	8.61	156	187.8	<1	252	624	252	1520	2	619	<1	129	2060	6330	870	2140	<100	<100	4	11000
Maximum Detect	6.7	12370	8.61	156	187.8	0.5	252	624	252	1520	2	619	0.5	129	2060	6330	870	2140	80	39	4	11000
Average Concentration	2.5	3979	5.7	41	49	0.44	105	206	105	381	0.31	185	0.44	41	527	1837	209	590	19	13	0.17	3336
Median Concentration	1.9	3120	5.97	31.5	43	0.5	116	148	116	181	0.25	134.5	0.5	27.1	312	1380	220	446	8.15	5	0.015	2495
Standard Deviation	1.6	3748	0.89	38	51	0.17	75	205	75	465	0.37	190	0.17	37	550	1873	179	592	20	17	0.57	3348
Number of Guideline Exceedances	0	46	70	0	0	0	0	0	0	21	4	0	0	0	0	46	0	0	0	0	0	46
Number of Guideline Exceedances(Detects Only)	0	46	70	0	0	0	0	0	0	21	2	0	0	0	0	46	0	0	0	0	0	46

ERM

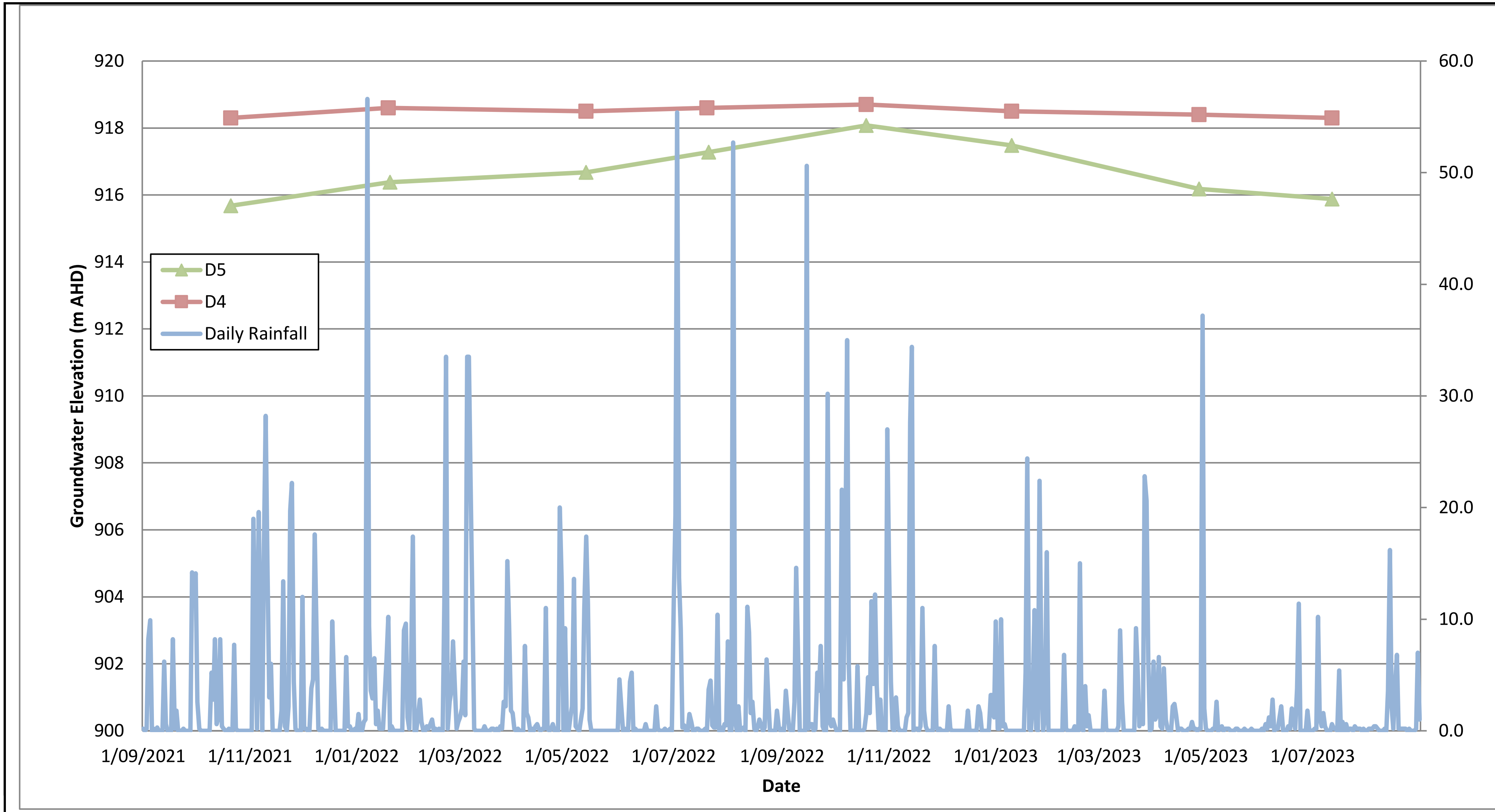
Monitoring_Zone	LocCode	Sampled_Date-Time	Metals: Aluminium	Aluminium (Filtered)	Antimony	Arsenic	Arsenic (Filtered)	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater						24	24	700	100	370	370	2	5	1	3.3		5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05				908	908
Upgradient / background	D4	19/10/2022	9840	9020	<1	26	23	15	2	<50	<50	0.3	1	<10	<10	4	2	1	56,000	56,400	16	723	709	<0.04	<1	14	13	<10	<1	0.082	<10	<10	143	130
Upgradient / background	D4	10/01/2023	8840	7430	<1	29	26	14	2	50	<50	0.3	2	<10	<10	4	2	<1	61,700	49,100	15	719	583	<0.04	<1	13	10	0.3	<1	0.075	<10	<10	128	102
Upgradient / background	D4	27/04/2023	8630	8420	<1	31	33	14	2	50	<50	0.3	1	<10	<10	4	25	24	65,900	62,400	15	673	655	<0.04	<1	16	17	<0.2	<1	0.074	<10	<10	149	162
Upgradient / background	D4	12/07/2023	8260	7530	<1	33	31	18	2	<50	<50	0.2	1	<10	<10	3	2	1	63,200	57,800	15	674	601	<0.04	<1	12	11	<0.2	<1	0.073	<10	<10	138	124
		Count Detect	4	4	0	4	4	4	4	2	0	4	4	0	0	4	4	3	4	4	4	4	4	0	0	4	4	1	0	4	0	0	4	4
		Min.	8,260	7,430	<1	26	23	14	2	<50	<50	0.2	1	<10	<10	3	2	<1	56,000	49,100	15	673	583	<0.04	<1	12	10	<0.2	<1	0.073	<10	<10	128	102
		Max.	9,840	9,020	<1	33	33	18	2	50	<50	0.3	2	<10	<10	4	25	24	65,900	62,400	16	723	709	<0.04	<1	16	17	<10	<1	0.082	<10	<10	149	162
		Mean	8,893	8,100	0.5	30	28	15	2	38	25	0.28	1.3	5	5	3.8	7.8	6.6	61,700	56,425	15	697	637	0.02	0.5	14	13	1.4	0.5	0.076	5	5	140	130
Upgradient / background	D5	19/10/2022	150	100	<1	1	<1	20	2	80	70	<0.1	<1	<10	<10	26	1	<1	35,400	32,700	<1	7850	7740	<0.04	<1	56	52	<10	<1	0.464	<10	<10	54	40
Upgradient / background	D5	10/01/2023	120	50	<1	2	1	19	2	80	<50	<0.1	<1	<10	<10	29	<1	<1	38,200	31,200	<1	7410	6270	<0.04	<1	62	54	0.5	<1	0.418	<10	<10	46	37
Upgradient / background	D5	27/04/2023	120	90	<1	2	2	18	2	80	60	<0.1	<1	<10	<10	27	<1	<1	44,500	40,900	<1	7430	6970	<0.04	<1	60	61	0.3	<1	0.413	<10	<10	45	40
Upgradient / background	D5	12/07/2023	100	40	<1	2	2	22	3	70	60	0.1	<1	<10	<10	31	<1	<1	32,800	34,700	<1	8770	7390	<0.04	<1	69	59	0.3	<1	0.451	<10	<10	35	30
		Count Detect	4	4	0	4	3	4	4	4	3	1	0	0	0	4	1	0	4	4	0	4	4	0	0	4	4	3	0	4	0	0	4	4
		Min.	100	40	<1	1	<1	18	2	70	<50	<0.1	<1	<10	<10	26	<1	<1	32,800	31,200	<1	7410	6270	<0.04	<1	56	52	0.3	<1	0.413	<10	<10	35	30
		Max.	150	100	<1	2	2	22	3	80	70	0.1	<1	<10	<10	31	1	<1	44,500	40,900	<1	8770	7740	<0.04	<1	69	61	<10	<1	0.464	<10	<10	54	40
		Mean	123	70	0.5	1.8	1.4	20	2.3	78	54	0.06	0.5	5	5	28	0.63	0.5	37,725	34,875	0.5	7865	7093	0.02	0.5	62	57	1.5	0.5	0.44	5	5	45	37
Upgradient / adjacent MPAR	D106	25/10/2022	<10	<10	2	2	<1	24	<1	2110	2290	<0.1	<1	<10	<10	485	<1	<1	44,200	39,500	3	26,800	26,100	<0.04	<1	3050	2920	<10	<1	5.22	<10	<10	231	215
Upgradient / adjacent MPAR	D106	11/01/2023	50	<10	<1	2	<1	22	<1	2610	2230	0.1	<1	<10	<10	332	1	<1	31,800	25,100	3	20,000	17,800	0.1	<1	2100	1890	0.3	<1	3.7	<10	<10	243	200
Upgradient / adjacent MPAR	D106	10/05/2023	20	<10	<1	1	<1	17	<1	1840	1900	0.1	<1	<10	<10	328	4	3	21,800	15,600	<1	19,400	18,800	<0.04	<1	2200	2000	0.3	<1	3.34	<10	<10	210	193
Upgradient / adjacent MPAR	D106	3/08/2023	1760	<10	<1	5	1	41	<1	1990	2070	0.1	8	<10	<10	342	10	<1	43,300	23,700	7	18,200	16,100	0.07	<1	2140	2090	0.2	<1	3.33	<10	<10	245	206
		Count Detect	3	0	1	4	1	4	0	4	4	3	1	0	0	4	3	1	4	4	3	4	4	2	0	4	4	3	0	4	0	0	4	4
		Min.	<10	<10	<1	1	<1	17	<1	1840	1900	<0.1	<1	<10	<10	328	<1	<1	21,800	15,600	<1	18,200	16,100	<0.04	<1	2,100	1,890	0.2	<1	3.33	<10	<10	210	193
		Max.	1,760	<10	2	5	1	41	<1	2610	2290	0.1	8	<10	<10	485	10	3	44,200	39,500	7	26,800	26,100	0.1	<1	3,050	2,920	<10	<1	5.22	<10	<10	245	215
		Mean	459	5	0.88	2.5	0.63	26	0.5	2138	2123	0.09	2.4	5	5	372	3.9	1.1	35,275	25,975	3.4	21,100	19,700	0.053	0.5	2,373	2,225	1.5	0.5	3.9	5	5	232	204
Upgradient / adjacent MPAR	D107	25/10/2022	270	<10	1	8	5	23	<1	5100	5390	1.4	<1	<10	<10	478	4	3	30,600	25,100	13	18,000	17,900	0.3	<1	2860	2900	<10	<1	5.95	<10	<10	420	412
Upgradient / adjacent MPAR	D107	11/01/2023	30	<10	<1	7	4	20	<1	5410	4550	1.1	<1	<10	<10	304	<1	<1	21,400	15,500	10	13,100	12,000	0.07	<1	1790	1610	0.3	<1	3.68	<10	<10	338	279
Upgradient / adjacent MPAR	D107	10/05/2023	<10	<10	<1	6	2	16	<1	5350	5210	0.9	<1	<10	<10	304	5	4	19,300	11,100	9	12,500	12,400	0.11	<1	1770	1650	0.4	<1	3.61	<10	<10	340	317
Upgradient / adjacent MPAR	D107	2/08/2023	100	<10	<1	8	6	24	<1	6140	5180	1.1	3	<10	<10	326	<1	<1	28,700	19,600	14	12,500	10,900	0.05	<1	1890	1740	0.2	<1	3.89	<10	<10	393	368
		Count Detect	3	0	1	4	4	4	0	4	4	4	1	0	0	4	2	2	4	4	4	4	4	4	0	4	4	3	0	4	0	0	4	4
		Min.	<10	<10	<1	6	2	16	<1	5,100	4,550	0.9	<1	<10	<10	304	<1	<1	19,300	11,100	9	12,500	10,900	0.05	<1	1,770	1,610	0.2	<1	3.61	<10	<10	338	279
		Max.	270	<10	1	8	6	24	<1	6,140	5,390	1.4	3	<10	<10	478	5	4	30,600	25,100	14	18,000	17,900	0.3	<1	2,860	2,900	<10	<1	5.95	<10	<10	420	412
		Mean	101	5	0.63	7.3	4.3	21	0.5	5,500	5,083	1.1	1.1	5	5	353	2.5	2	25,000	17,825	12	14,025	13,300	0.13	0.5	2,078	1,975	1.5	0.5	4.3	5	5	373	344
Upgradient / adjacent MPAR	D119	26/10/2022	4650	<10	<1	45	<1	36	1	420	340	0.3	38	<10	<10	47	10	<1	21,200	140	33	1310	1070	<0.04	6	151	110	<10	<1	0.376	<10	<10	276	29
Upgradient / adjacent MPAR	D119	18/01/2023	3750	<10	<1	31	24	26	2	420	450	0.4	10	<10	<10	38	6	<1	18,800	14,600	33	986	873	0.06	3	113	101	1.5	<1	0.363	<10	<10	231	31
Upgradient / adjacent MPAR	D119	18/05/2023	450	<10	<1	6	3	31	<1	360	330	0.2	3	<10	<10	48	2	<1	5190	3380	2	1280	1250	<0.04	12	110	96	1.5	<1	0.434	<10	<10	155	124
Upgradient / adjacent MPAR	D119	16/08/2023	6370	<10	<1	41	23	35	3	570	390	0.6	8	<10	<10	51	11	<1	25,600	19,700	46	1430	1360	0.1	5	156	136	1.4	<1	0.526	<10	<10	401	33
		Count Detect	4	0	0	4	3	4	3	4	4	4	4	0	0	4	4	0	4	4	4	4	4	2	4	4	4	3	0	4	0	0	4	4
		Min.	450	<10	<1	6	<1	26	<1	360	330	0.2	3	<10	<10	38	2	<1	5,190	140	2	986	873	<0.04	3	110	96	1.4	<1	0.363	<10	<10	155	29
		Max.	6,370	<10	<1	45	24	36	3	570	450	0.6	38	<10	<10	51	11	<1	25,600	19,700	46	1,430	1,360	0.1	12	156	136	<10	<1	0.526	<10	<10	401	124
		Mean	3,805	5	0.5	31	13	32	1.6	443	378	0.38	15	5	5	46	7.3	0.5	17,698	9,455	29	1,252	1,138	0.05	6.5	133	111	2.4	0.5	0.42	5	5	266	54
Upgradient / adjacent MPAR	D3	13/09/2022	100	<10	<1	<1	<1	62	<1	90	100	<0.1	<1	<10	<10	<1	<1	<1	3240	33	<1	34	25	<0.04	<1	20	20	<10	<1	0.101	<10	<10	17	12
Upgradient / adjacent MPAR	D3	24/11/2022	40	<10	<1	<1	<1	67	<1	130	<50	<0.1	<1	<10	<10	<1	<1	<1	6600	4810	<1	558	562	<0.04	<1	32	28	<10	<1	0.292	<10	<10	19	15
Upgradient / adjacent MPAR	D3	1/03/2023	10	<10	<1	6	<1	85	<1	70	<50	<0.1	<1	<10	<10	10	13	5	10,800	9360	<1	665	607	<0.04	<1	16	13	<0.2	<1	0.416	<10	<10	11	8
Upgradient / adjacent MPAR	D3	22/06/2023	<10	<10	<1	<1	<1	28	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	6590	7620	<1	655	627	<0.04	<1	8	7	<0.2	<1	0.303	<10	<10	7	<5
		Count Detect	3	0	0	1	0	4	0	3	1	0	0	0	0	1	1	1	4	4	0	4	4	0	0	4	4	0	0	4	0	0	4	3
		Min.	<10	<10	<1	<1	<1	28	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	3,240	33	<1	34	25	<0.04	<1	8	7	<0.2	<1	0.101	<10	<10	7	<5
		Max.	100	<10	<1	6	<1	85	<1	130	100	<0.1	<1	<10	<10	10	13	5	10,800	9,360	<1	665	627	<0.04	<1	32	28	<10	<1	0.416	<10	<10	19	15
		Mean	39	5	0.5	1.9	0.5	61	0.5	79	44	0.05	0.5	5	5	2.9	3.6	1.6	6,808	5,456	0.5	478	455	0.02	0.5	19	17	2.6	0.5	0.28	5	5	14	9.4
Within / immediately adjacent LNAR North	D10	13/09/2022	50	40	<1	6	6	24	<1	1440	1440	<0.1	<1	<10	<10	149	<1	2	5220	4440	3	3410	3230	<0.04	7	456	444	<10	<1	1.54	<10	<10	324	316
Within / immediately adjacent LNAR North	D10	23/11/2022	40	30	<1	3	2	18	<1	820	770	<0.1	<1	<10	<10	116	<1	<1	3860	3510	3	2540	2540	<0.04	4	353	303	<10	<1	1.18	<10	<10	323	283
Within / immediately adjacent LNAR North	D10	1/03/2023	100	80	<1	10	3	21	<1	2620	3040	0.3	<1	<10	<10	269	<1	2	9840	8890	7	7310	6860	<0.04	6	864	810	0.5	<1	3.64	<10	<10	747	774
Within / immediately adjacent LNAR North	D10	21/06/2023	40	40	<1	4	5	22	<1	2810	2650	<0.1	<1	<10	<10	206	<1	<1	6190	5460	<1	6330	5960	<0.04	11	810	823	0.4	<1	3.42	<10	<10	275	296
		Count Detect	4	4	0	4	4	4	0	4	4	1	0	0	0	4	0	2	4	4	3	4	4	0	4	4	4	2	0	4	0	0	4	4
		Min.	40	30	<1	3	2	18	<1	820	770	<0.1	<1	<10	<10	116	<1	<1	3,860	3,510	<1	2,540	2,540	<0.04	4	353	303	0.4	<1	1.18	<10	<10	275	283
		Max.	100	80	<1	10	6	24	<1	2,810	3,040	0.3	<1	<10	<10	269	<1	2	9,840	8,890	7	7,310	6,860	<0.04	11	864	823	<10	<1	3.64	<10	<10	747	774
		Mean	58	48	0.5	5.8	4	21	0.5	1,923	1,975	0.11	0.5	5	5	185	0.5	1.3	6,278	5,575	3.4	4,898	4,648	0.02	7	621	595	2.7	0.5	2.4	5	5	417	417
Within / immediately adjacent LNAR North	D11	13/09/2022	70	<10	<1	3	3	192	<1	1480	1470	<0.1	<1	<10	<10	34	<1	<1	75,500	31,500	<1	6810	6650	<0.04	3	442	439	<10	<1	2.33	<10	<10	13	9
Within / immediately adjacent LNAR North	D11	24/11/2022	<10	<10	<1	4	2	82	<1	2610	2660	<0.1	<1	<10	<10	160	<1	<1	61,200	44,600	<1	15,600	14,500	<0.04	<1	1100	932	<10	<1	4.68	<10	<10	78	61
Within / immediately adjacent LNAR North	D11	1/03/2023	150	<10	<1	12	3	451	<1	2210	2620	<0.1	4	<10	<10	150	21	<1	82,500	65,300	1	12,500	12,000	<0.04	2	926	881	0.3	<1	4.46	<10	<10	86	51
		Count Detect	2	0	0	3	3	3	0	3	3	0	1	0	0	3	1	0	3	3	1	3	3	0	2	3	3	1	0	3	0	0	3	3
		Min.	<10	<10	<1	3	2	82	<1	1,480	1,470	<0.1	<1	<10	<10	34	<1	<1	61,200	31,500	<1	6,810	6,650	<0.04	<1	442	439	0.3	<1	2.33	<10	<10	13	9
		Max.	150	<10	<1	12	3	451	<1	2,610	2,660	<0.1	4	<10	<10	160	21	<1	82,500	65,300	1	15,600	14,500	<0.04	3	1100	932	<10	<1	4.68	<10	<10	86	61
		Mean	75	5	0.5	6.3	2.7	242	0.5	2,100	2,250	0.05	1.7	5	5	115	7.3	0.5	73,067	47,133	0.67	11,637	11,050	0.02	1.8	823	751	3.4	0.5	3.8	5	5	59	40
Within / immediately adjacent LNAR North	D110	26/10/2022	160	<10	<1	10	<1	14	<1	1540	1760	<0.1	9	<10	<10	413	<1	<1	60,100	42,100	<1	20,500	21,600	<0.04	<1	2070	2160	<10	<1	4.58	<10	<10	314	261
Within / immediately adjacent LNAR North	D110	12/01/2023	230	<10	<1	9	7	14	<1	1990	1580	<0.1	3	<10	<10	331	<1	<1	55,500	50,600	<1	17,300	16,100	<0.04	<1	1610	1470	0.3	<1	3.63	<10	<10	318	273
Within / immediately adjacent LNAR North	D110	11/05/2023	<10	<10	<1	6	<1	12	<1	2030	1950	<0.1	<1	<10	<10	344	2	1	52,600	40,800	<1	17,600	16,900	<0.04	<1	1790	1630	0.3	<1	3.8	<10	<10	323	293
Within / immediately adjacent LNAR North	D110	3/08/2023	170	<10	<1	9	8	16	<1	2220	2030	<0.1	3	<10	<10	358	<1	<1	66,900	52,000	<1	16,800	14,900	0.05	<1	1810	1690	0.3	<1	3.9	<10	<10	353	325
		Count Detect	3	0	0	4	2	4	0	4	4	0	3	0	0	4	1	1	4	4	0	4	4	1	0	4	4	3	0	4	0	0	4	4
		Min.	<10	<10	<1	6	<1	12	<1	1,540	1,580	<0.1	<1	<10	<10	331	<1	<1	52,600	40,800	<1	16,800	14,900	<0.04	<1	1,610	1,470	0.3	<1	3.63	<10	<10	314	261
		Max.	230	<10	<1	10	8	16	<1	2,220	2,030	<0.1	9	<10	<10	413	2	1	66,900	52,000	<1	20,500	21,600	0.05	<1	2,070	2,160	<10	<1	4.58	<10	<10	353	325
		Mean	141	5	0.5	8.5	4	14	0.5	1,945	1,830	0.05	3.9	5	5	362	0.88	0.63	58,775	46,375	0.5	18,050	17,375	0.028	0.5	1,820	1,738	1.5	0.5	4	5	5	327	288
Within / immediately adjacent LNAR North	D117	26/10/2022	2960	3110	2	2	2	24	3	10,000	10,400	31.9	<1	<10	<10	134	<1	<1	890	840	<1	13,600	13,800	<0.04	348	380	389	80	<1	10.7	<10	<10	968	1000
Within / immediately adjacent LNAR North	D117	18/01/2023	4430	1610	1	2	1	22	4	10,200	10,600	22.1	1	<10	<10	124	<1	<1	1010	590	<1	13,200	12,300	<0.04	208	356	338	75.2	<1	6.7	<10	<10	698	673
Within / immediately adjacent LNAR North	D117	18/05/2023	3790	2770	4	4	3	31	5	13,100	13,300	43.6	<1	<10	<10	126	1	1	400	80	<1	5980	5790	<0.04	350	384	330	129	<1	9.87	<10	<10	1410	1270
		Count Detect	3	3	3	3	3	3	3	3	3	3	1	0	0	3	1	1	3	3	0	3	3	0	3	3	3	3	0	3	0	0	3	3
		Min.	2960	1610	1	2	1	22	3	10,000	10,400	22.1	<1	<10	<10	124	<1	<1	400	80	<1	5,980	5,790	<0.04	208	356	330	75.2	<1	6.7	<10	<10	698	673
		Max.	4430	3110	4	4	3	31	5	13,100	13,300	43.6	1	<10	<10	134	1	1	1010	840	<1	13,600	13,800	<0.04	350	384	389	129	<1	10.7	<10	<10	1,410	1,270
		Mean	3727	2497	2.3	2.7	2	26	4	11,100	11,433	33	0.67	5	5	128	0.67	0.67	767	503	0.5	10,927	10,630	0.02	302	373	352	95	0.5	9.1	5	5	1,025	981
Within / immediately adjacent LNAR North	D20	13/09/2022	920	30	<1	2	2	20	<1	4330	4140	7	2	<10	<10	305	6	<1	4230	3460	5	28,100	26,800	<0.04	<1	639	611	<10	<1	1.33	<10	<10	371	346
Within / immediately adjacent LNAR North	D20	23/11/2022	640	10	<1	2	<1	25	<1	3560	3520	7.1	14	<10	<10	294	4	<1	3540	2260	5	30,600	30,100	<0.04	<1	656	566	<10	<1	1.38	<10	<10	290	248
Within / immediately adjacent LNAR North	D20	2/03/2023	1560	40	<1	8	1	45	<1	4820	5160	24.7	37	<10	<10	344	7	<1	8360	5750	17	33,000	30,200	<0.04	2	718	625	0.4	<1	1.59	<10	<10	443	392
Within / immediately adjacent LNAR North	D20	22/06/2023	2440	40	<1	1	1	12	<1	3470	3140	4.7	<1	<10	<10	276	<1	<1	4130	3860	1	27,600	24,200	<0.04	<1	540	518	0.6	<1	1.49	<10	<10	278	287
		Count Detect	4	4	0	4	3	4	0	4	4	4	3	0	0	4	3	0	4	4	4	4	4	0	1	4	4	2	0	4	0	0	4	4
		Min.	640	10	<1	1	<1	12	<1	3,470	3,140	4.7	<1	<10	<10	276	<1	<1	3,540	2,260	1	27,600	24,200	<0.04	<1	540	518	0.4	<1	1.33	<10	<10	278	248
		Max.	2,440	40	<1	8	2	45	<1	4,820	5,160	24.7	37	<10	<10	344	7	<1	8,360	5,750	17	33,000	30,200	<0.04	2	718	625	<10	<1	1.59	<10	<10	443	392
		Mean	1,390	30	0.5	3.3	1.1	26	0.5	4,045	3,990	11	13	5	5	305	4.4	0.5	5,065	3,833	7	29,825	27,825	0.02	0.88	638	580	2.8	0.5	1.4	5	5	346	318
Within / immediately adjacent LNAR South	D16A	21/12/2022	260	<10	<1	<1	<1	32	<1	160	<50	<0.1	<1	<10	<10	<1	<1	<1	1,930	990	<1	70	57	<0.04	2	1	<1	<10	<1	0.628	<10	<10	8	<5
Within / immediately adjacent LNAR South	D16A	1/03/2023	20	<10	<1	7	<1	30	<1	<50	<50	<0.1	<1	<10	<10	10	<1	<1	1,790	1,580	<1	88	76	<0.04	<1	3	2	<10	<1	0.647	<10	<10	9	6
Within / immediately adjacent LNAR South	D16A	22/06/2023	20	<10	<1	<1	<1	29	<1	70	<50	<0.1	<1	<10	<10	1	<1	<1	520	450	<1	114	102	<0.04	3	5	4	<10	<1	0.478	<10	<10	37	27
		Count Detect	3	0	0	1	0	3	0	2	0	0	0	0	0	2	0	0	3	3	0	3	3	0	2	3	2	0	0	3	0	0	3	2
		Min.	20	<10	<1	<1	<1	29	<1	<50	<50	<0.1	<1	<10	<10	<1	<1	<1	520	450	<1	70	57	<0.04	<1	1	<1	<10	<1	0.478	<10	<10	8	<5
		Max.	260	<10	<1	7	<1	32	<1	160	<50	<0.1	<1	<10	<10	10	<1	<1	1,930	1,580	<1	114	102	<0.04	3	5	4	<10	<1	0.647	<10	<10	37	27
		Mean	100	5	0.5	2.7	0.5	30	0.5	85	25	0.05	0.5	5	5	3.8	1	1	1,413	1,007	0.5	91	78	0.02	1.8	3	2	5	0.5	0.58	5	5	18	12
Within / immediately adjacent LNAR South	D15	13/09/2022	860	50	<1	5	2	27	<1	190	180	0.2	23	<10	<10	289	4	<1	15,600	14,400	3	1040	992	<0.04	1	405	391	<10	<1	0.439	<10	<10	617	616
Within / immediately adjacent LNAR South	D15	23/11/2022	410	30	<1	6	2	16	<1	230	150	0.2	32	<10	<10	294	5	<1	13,600	11,900	3	1020	1030	<0.04	2	423	347	<10	<1	0.464	<10	<10	591	527
Within / immediately adjacent LNAR South	D15	2/03/2023	1410	10	<1	18	1	26	<1	190	150	0.2	70	<10	<10	246	16	<1	16,100	13,600	7	996	930	<0.04	3	378	324	0.6	<1	0.433	<10	<10	517	508
Within / immediately adjacent LNAR South	D15	22/06/2023	10	20	<1	<1	<1	12	<1	190	130	0.1	3	<10	<10	215	<1	<1	10,300	12,100	<1	785	791	<0.04	1	368	345	0.2	<1	0.335	<10	<10	444	488
		Count Detect	4	4	0	3	3	4	0	4	4	4	4	0	0	4	3	0	4	4	3	4	4	0	4	4	4	2	0	4	0	0	4	4
		Min.	10	10	<1	<1	<1	12	<1	190	130	0.1	3	<10	<10	215	<1	<1	10,300	11,900	<1	785	791	<0.04	1	368	324	0.2	<1	0.335	<10	<10	444	488
		Max.	1,410	50	<1	18	2	27	<1	230	180	0.2	70	<10	<10	294	16	<1	16,100	14,400	7	1,040	1,030	<0.04	3	423	391	<10	<1	0.464	<10	<10	617	616
		Mean	673	28	0.5	7.4	1.4	20	0.5	200	153	0.18	32	5	5	261	6.4	0.5	13,900	13,000	3.4	960	936	0.02	1.8	394	352	2.7	0.5	0.42	5	5	542	535

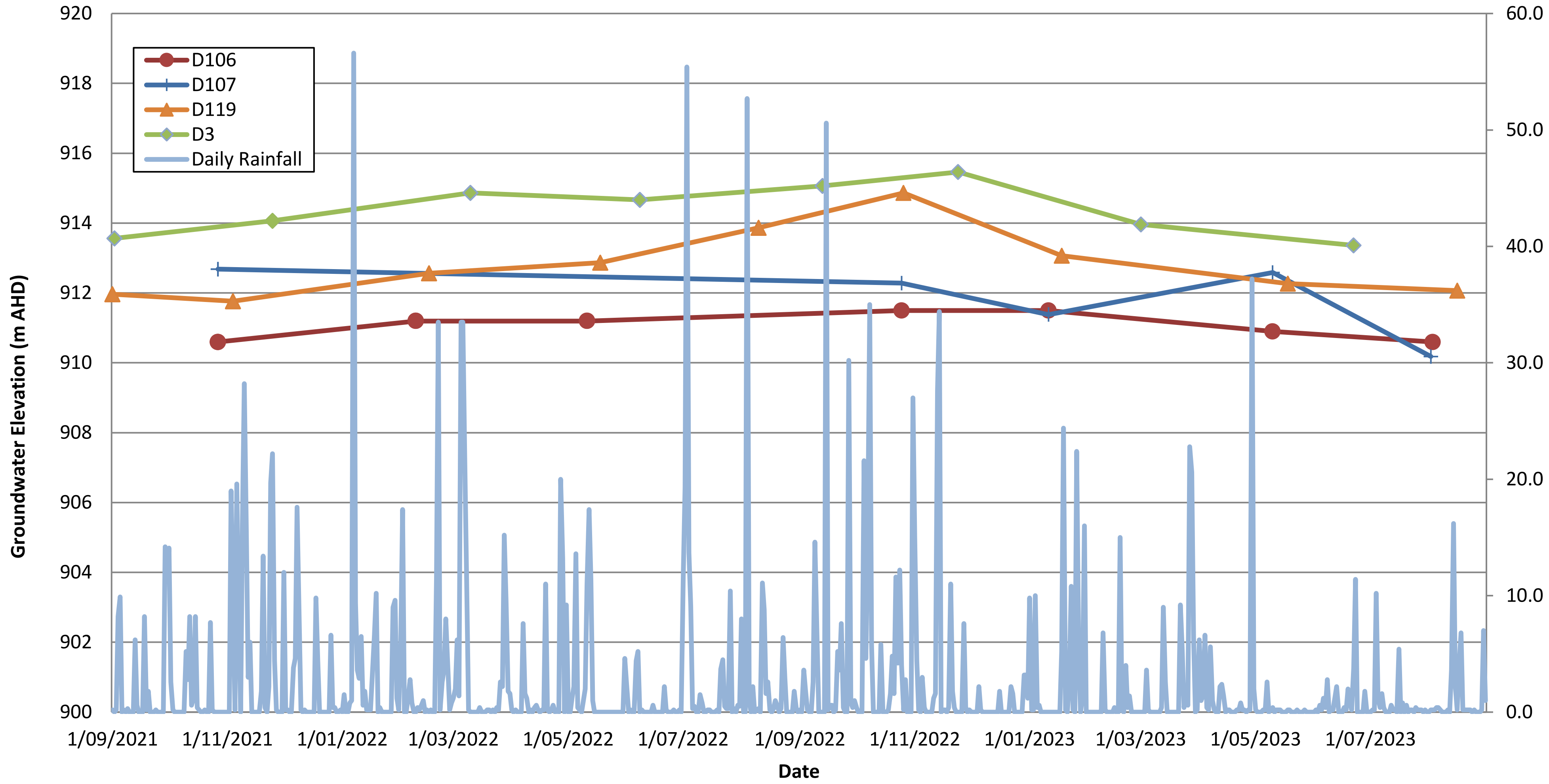
Monitoring_Zone	LocCode	Sampled_Date-Time	Metals																													
			Aluminium	Aluminium (Filtered)	Antimony	Arsenic	Arsenic (Filtered)	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Groundwater						24	24	700	100	370	370	2	5	1	3.3		5	5	664	664	5	5704	5704	0.06	10	550.9	550.9	5	0.05				908	908
Within / immediately adjacent LNAR South	D17	13/09/2022	20	<10	<1	2	2	12	<1	100	100	<0.1	<1	<10	<10	8	<1	<1	23,600	20,000	<1	2120	2040	<0.04	<1	38	39	<10	<1	0.754	<10	<10	56	54
Within / immediately adjacent LNAR South	D17	23/11/2022	60	<10	<1	2	<1	15	<1	70	<50	<0.1	<1	<10	<10	8	<1	<1	19,400	5290	<1	2130	2160	<0.04	<1	43	35	<10	<1	0.809	<10	<10	52	26
Within / immediately adjacent LNAR South	D17	1/03/2023	<10	<10	<1	8	<1	18	<1	<50	60	<0.1	17	<10	<10	16	<1	<1	29,500	23,500	<1	2000	1860	<0.04	1	45	35	<0.2	<1	0.801	<10	<10	56	54
Within / immediately adjacent LNAR South	D17	22/06/2023	<10	<10	<1	<1	<1	14	<1	60	50	<0.1	<1	<10	<10	5	<1	<1	14,600	14,100	<1	1760	1660	<0.04	<1	32	33	<0.2	<1	0.645	<10	<10	36	35
		Count Detect	2	0	0	3	1	4	0	3	3	0	1	0	0	4	0	0	4	4	0	4	4	0	1	4	4	0	0	4	0	0	4	4
		Min.	<10	<10	<1	<1	<1	12	<1	<50	<50	<0.1	<1	<10	<10	5	<1	<1	14,600	5,290	<1	1,760	1,660	<0.04	<1	32	33	<0.2	<1	0.645	<10	<10	36	26
		Max.	60	<10	<1	8	2	18	<1	100	100	<0.1	17	<10	<10	16	<1	<1	29,500	23,500	<1	2,130	2,160	<0.04	1	45	39	<10	<1	0.809	<10	<10	56	54
		Mean	23	5	0.5	3.1	0.88	15	0.5	64	59	0.05	4.6	5	5	9.3	0.5	0.5	21,775	15,723	0.5	2,003	1,930	0.02	0.63	40	36	2.6	0.5	0.75	5	5	50	42
Within / immediately adjacent LNAR South	D18	14/09/2022	60	<10	<1	5	1	629	<1	70	70	<0.1	<1	<10	<10	<1	2	<1	511	11	<1	87	83	<0.04	3	4	4	<10	<1	0.395	<10	<10	28	21
Within / immediately adjacent LNAR South	D18	24/11/2022	30	<10	<1	4	<1	667	<1	50	<50	<0.1	2	<10	<10	<1	3	<1	650	<50	<1	86	89	<0.04	2	4	3	<10	<1	0.429	<10	<10	26	17
Within / immediately adjacent LNAR South	D18	2/03/2023	80	<10	<1	34	23	747	<1	<50	60	<0.1	<1	<10	<10	7	8	1	3830	1300	<1	104	79	<0.04	2	3	3	<0.2	<1	0.445	<10	<10	56	28
Within / immediately adjacent LNAR South	D18	22/06/2023	10	<10	1	4	5	604	<1	60	<50	<0.1	<1	<10	<10	1	2	<1	200	360	<1	98	95	<0.04	3	4	3	0.4	<1	0.373	<10	<10	50	45
		Count Detect	4	0	1	4	3	4	0	3	2	0	1	0	0	2	4	1	4	3	0	4	4	0	4	4	4	1	0	4	0	0	4	4
		Min.	10	<10	<1	4	<1	604	<1	<50	<50	<0.1	<1	<10	<10	<1	2	<1	200	11	<1	86	79	<0.04	2	3	3	<0.2	<1	0.373	<10	<10	26	17
		Max.	80	<10	1	34	23	747	<1	70	70	<0.1	2	<10	<10	7	8	1	3,830	1,300	<1	104	95	<0.04	3	4	4	<10	<1	0.445	<10	<10	56	45
		Mean	45	5	0.63	12	7.4	662	0.5	51	45	0.05	0.88	5	5	2.3	3.8	0.63	1,298	424	0.5	94	87	0.02	2.5	4	3	2.6	0.5	0.41	5	5	40	28
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	26/10/2022	30	<10	<1	2	1	29	<1	1270	1380	<0.1	<1	<10	<10	245	<1	<1	58,500	48,100	<1	18,800	17,500	0.4	<1	2060	1840	<10	<1	4.23	<10	<10	68	52
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	11/01/2023	40	<10	<1	<1	<1	24	<1	1390	1120	<0.1	<1	<10	<10	229	<1	<1	49,900	34,100	<1	14,300	12,700	<0.04	<1	1500	1350	0.2	<1	3.27	<10	<10	58	38
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	11/05/2023	20	<10	<1	<1	<1	21	<1	1360	1140	<0.1	<1	<10	<10	211	<1	<1	34,600	28,200	<1	14,200	13,700	<0.04	<1	1420	1350	0.2	<1	3.18	<10	<10	70	48
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D102	3/08/2023	110	<10	<1	1	<1	25	<1	1390	1340	<0.1	<1	<10	<10	244	<1	<1	58,400	44,300	<1	14,400	12,800	<0.04	<1	1660	1510	0.2	<1	3.4	<10	<10	95	53
		Count Detect	4	0	0	2	1	4	0	4	4	0	0	0	0	4	0	0	4	4	0	4	4	1	0	4	4	3	0	4	0	0	4	4
		Min.	20	<10	<1	<1	<1	21	<1	1,270	1,120	<0.1	<1	<10	<10	211	<1	<1	34,600	28,200	<1	14,200	12,700	<0.04	<1	1,420	1,350	0.2	<1	3.18	<10	<10	58	38
		Max.	110	<10	<1	2	1	29	<1	1,390	1,380	<0.1	<1	<10	<10	245	<1	<1	58,500	48,100	<1	18,800	17,500	0.4	<1	2,060	1,840	<10	<1	4.23	<10	<10	95	53
		Mean	50	5	0.5	1	0.63	25	0.5	1,353	1,245	0.05	0.5	5	5	232	0.5	0.5	50,350	38,675	0.5	15,425	14,175	0.12	0.5	1,660	1,513	1.4	0.5	3.5	5	5	73	48
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	25/10/2022	220	<10	<1	8	3	19	<1	1430	1620	<0.1	12	<10	<10	169	2	<1	18,300	13,100	<1	10,400	11,000	<0.04	1	632	623	<10	<1	0.734	<10	<10	112	98
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	11/01/2023	920	<10	<1	9	2	24	<1	1670	1310	<0.1	<1	<10	<10	167	<1	<1	15,500	8090	<1	8350	7060	<0.04	<1	606	528	0.2	<1	0.762	<10	<10	117	83
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	10/05/2023	60	<10	<1	4	<1	14	<1	1640	1500	<0.1	<1	<10	<10	156	<1	<1	11,000	2880	<1	7990	7260	<0.04	<1	568	510	<0.2	<1	0.646	<10	<10	92	67
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D103	2/08/2023	260	<10	<1	6	5	17	<1	1780	1680	<0.1	<1	<10	<10	169	<1	<1	18,700	13,000	<1	7920	7220	<0.04	<1	647	592	<0.2	<1	0.836	<10	<10	107	97
		Count Detect	4	0	0	4	3	4	0	4	4	0	1	0	0	4	1	0	4	4	0	4	4	0	1	4	4	1	0	4	0	0	4	4
		Min.	60	<10	<1	4	<1	14	<1	1,430	1,310	<0.1	<1	<10	<10	156	<1	<1	11,000	2,880	<1	7,920	7,060	<0.04	<1	568	510	<0.2	<1	0.646	<10	<10	92	67
		Max.	920	<10	<1	9	5	24	<1	1,780	1,680	<0.1	12	<10	<10	169	2	<1	18,700	13,100	<1	10,400	11,000	<0.04	1	647	623	<10	<1	0.836	<10	<10	117	98
		Mean	365	5	0.5	6.8	2.6	19	0.5	1,630	1,528	0.05	3.4	5	5	165	0.88	0.5	15,875	9,268	0.5	8,665	8,135	0.02	0.63	613	563	1.4	0.5	0.74	5	5	107	86
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	26/10/2022	340	140	<1	6	5	112	<1	60	<50	<0.1	<1	<10	<10	59	4	4	7400	4240	<1	5260	5260	<0.04	<1	124	120	<10	<1	0.203	<10	<10	361	333
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	11/01/2023	210	20	<1	32	23	154	<1	<50	120	<0.1	<1	<10	<10	49	2	<1	18,700	13,300	1	3890	3310	<0.04	3	124	107	0.4	<1	0.267	<10	<10	96	22
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	11/05/2023	180	<10	<1	11	3	178	<1	<50	100	<0.1	<1	<10	<10	55	2	<1	9470	700	<1	3580	3060	<0.04	<1	194	171	<0.2	<1	0.396	<10	<10	382	331
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D104	3/08/2023	310	<10	<1	8	2	192	<1	130	90	<0.1	<1	<10	<10	48	6	<1	9170	3230	2	4160	3420	<0.04	2	88	63	<0.2	<1	0.336	<10	<10	234	169
		Count Detect	4	2	0	4	4	4	0	2	3	0	0	0	0	4	4	1	4	4	2	4	4	0	2	4	4	1	0	4	0	0	4	4
		Min.	180	<10	<1	6	2	112	<1	<50	<50	<0.1	<1	<10	<10	48	2	<1	7,400	700	<1	3,580	3,060	<0.04	<1	88	63	<0.2	<1	0.203	<10	<10	96	22
		Max.	340	140	<1	32	23	192	<1	130	120	<0.1	<1	<10	<10	59	6	4	18,700	13,300	2	5,260	5,260	<0.04	3	194	171	<10	<1	0.396	<10	<10	382	333
		Mean	260	43	0.5	14	8.3	159	0.5	60	84	0.05	0.5	5	5	53	3.5	1.4	11,185	5,368	1	4,223	3,763	0.02	1.5	133	115	1.4	0.5	0.3	5	5	268	214
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	25/10/2022	20	<10	<1	2	1	23	<1	440	510	<0.1	1	<10	<10	149	<1	<1	27,300	24,200	<1	12,700	11,900	<0.04	1	556	501	<10	<1	0.628	<10	<10	66	56
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	11/01/2023	30	<10	<1	2	<1	18	<1	540	440	<0.1	<1	<10	<10	143	<1	<1	21,900	16,700	<1	9910	8530	<0.04	<1	524	453	<0.2	<1	0.641	<10	<10	62	48
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	10/05/2023	<10	<10	<1	<1	<1	16	<1	520	580	<0.1	<1	<10	<10	148	<1	<1	17,400	9060	<1	10,200	9500	<0.04	<1	541	494	<0.2	<1	0.622	<10	<10	77	58
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D105	3/08/2023	20	<10	<1	2	1	23	<1	800	620	<0.1	1	<10	<10	159	<1	<1	27,300	20,600	<1	10,500	9350	0.05	<1	586	552	<0.2	<1	0.729	<10	<10	82	68
		Count Detect	3	0	0	3	2	4	0	4	4	0	2	0	0	4	0	0	4	4	0	4	4	1	1	4	4	0	0	4	0	0	4	4
		Min.	<10	<10	<1	<1	<1	16	<1	440	440	<0.1	<1	<10	<10	143	<1	<1	17,400	9,060	<1	9,910	8,530	<0.04	<1	524	453	<0.2	<1	0.622	<10	<10	62	48
		Max.	30	<10	<1	2	1	23	<1	800	620	<0.1	1	<10	<10	159	<1	<1	27,300	24,200	<1	12,700	11,900	0.05	1	586	552	<10	<1	0.729	<10	<10	82	68
		Mean	19	5	0.5	1.6	0.75	20	0.5	575	538	0.05	0.75	5	5	150	0.5	0.5	23,475	17,640	0.5	10,828	9,820	0.028	0.63	552	500	1.3	0.5	0.66	5	5	72	58
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	25/10/2022	170	10	<1	1	1	14	<1	1060	1190	<0.1	19	<10	<10	114	2	<1	9480	9100	3	5170	5360	<0.04	<1	374	371	<10	<1	1.42	<10	<10	200	201
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	12/01/2023	190	<10	<1	1	<1	14	<1	1690	1310	0.1	16	<10	<10	114	1	<1	8680	7140	3	4630	4110	<0.04	<1	361	312	<0.2	<1	1.13	<10	<10	200	162
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	10/05/2023	50	<10	<1	1	<1	11	<1	1690	1620	0.1	15	<10	<10	157	<1	<1	10,200	7310	2	6260	5990	<0.04	<1	538	494	<0.2	<1	1.43	<10	<10	250	237
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D113	2/08/2023	300	<10	4	1	1	18	<1	1780	1840	0.2	234	<10	<10	168	6	<1	14,900	10,200	3	6140	5510	<0.04	8	692	540	<0.2	<1	1.65	<10	<10	273	252
		Count Detect	4	1	1	4	2	4	0	4	4	3	4	0	0	4	3	0	4	4	4	4	4	0	1	4	4	0	0	4	0	0	4	4
		Min.	50	<10	<1	1	<1	11	<1	1,060	1,190	<0.1	15	<10	<10	114	<1	<1	8,680	7,140	2	4,630	4,110	<0.04	<1	361	312	<0.2	<1	1.13	<10	<10	200	162
		Max.	300	10	4	1	1	18	<1	1,780	1,840	0.2	234	<10	<10	168	6	<1	14,900	10,200	3	6,260	5,990	<0.04	8	692	540	<10	<1	1.65	<10	<10	273	252
		Mean	178	6	1.4	1	0.75	14	0.5	1,555	1,490	0.11	71	5	5	138	2.4	0.5	10,815	8,438	2.8	5,550	5,243	0.02	2.4	491	429	1.3	0.5	1.4	5	5	231	213
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	20/10/2022	1420	960	<1	<1	<1	57	2	270	240	0.1	<1	<10	<10	129	3	1	5610	3140	2	1820	1810	<0.04	<1	146	139	<10	<1	0.595	<10	<10	508	473
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	11/01/2023	910	600	<1	1	<1	37	1	230	190	<0.1	<1	<10	<10	88	4	1	7380	5070	3	1430	1220	<0.04	<1	106	90	0.3	<1	0.384	<10	<10	365	286
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	28/04/2023	1150	870	<1	2	2	27	<1	250	210	<0.1	<1	<10	<10	44	9	7	8140	6580	6	1130	1090	<0.04	<1	76	78	0.3	<1	0.224	<10	<10	86	82
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D2	13/07/2023	880	580	1	1	<1	47	<1	470	390	<0.1	1	<10	<10	70	2	1	10,300	7390	3	2120	2070	<0.04	<1	135	132	0.3	<1	0.355	<10	<10	177	173
		Count Detect	4	4	1	3	1	4	2	4	4	1	1	0	0	4	4	4	4	4	4	4	4	0	0	4	4	3	0	4	0	0	4	4
		Min.	880	580	<1	<1	<1	27	<1	230	190	<0.1	<1	<10	<10	44	2	1	5,610	3,140	2	1,130	1,090	<0.04	<1	76	78	0.3	<1	0.224	<10	<10	86	82
		Max.	1,420	960	1	2	2	57	2	470	390	0.1	1	<10	<10	129	9	7	10,300	7,390	6	2,120	2,070	<0.04	<1	146	139	<10	<1	0.595	<10	<10	508	473
		Mean	1,090	753	0.63	1.1	0.88	42	1	305	258	0.06	0.63	5	5	83	4.5	2.5	7,858	5,545	3.5	1,625	1,548	0.02	0.5	116	110	1.5	0.5	0.39	5	5	284	254
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	13/09/2022	100	<10	<1	1	<1	12	<1	980	990	0.1	16	<10	<10	65	1	<1	5530	4700	3	2590	2510	<0.04	<1	233	221	<10	<1	0.615	<10	<10	189	183
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	23/11/2022	150	20	<1	2	<1	13	<1	680	600	0.1	35	<10	<10	53	2	<1	5360	3520	4	2120	2150	<0.04	2	214	174	<10	<1	0.574	<10	<10	201	180
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	2/03/2023	220	<10	<1	8	2	16	<1	1680	1780	0.1	44	<10	<10	161	<1	<1	17,700	14,800	6	7320	6770	<0.04	2	539	480	0.2	<1	1.5	<10	<10	235	230
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D19	22/06/2023	<10	<10	<1	1	1	11	<1	1510	1440	0.1	<1	<10	<10	150	<1	<1	10,700	12,300	<1	6420	6030	<0.04	<1	525	531	<0.2	<1	1.51	<10	<10	205	221
		Count Detect	3	1	0	3	2	4	0	4	4	4	3	0	0	4	2	0	4	4	3	4	4	0	2	4	4	1	0	4	0	0	4	4
		Min.	<10	<10	<1	<1	<1	11	<1	680	600	0.1	<1	<10	<10	53	<1	<1	5,360	3,520	<1	2,120	2,150	<0.04	<1	214	174	<0.2	<1	0.574	<10	<10	189	180
		Max.	220	20	<1	8	2	16	<1	1,680	1,780	0.1	44	<10	<10	161	2	<1	17,700	14,800	6	7,320	6,770	<0.04	2	539	531	<10	<1	1.51	<10	<10	235	230
		Mean	119	9	0.5	2.9	1	13	0.5	1,213	1,203	0.1	24	5	5	107	1	0.5	9,823	8,830	3.4	4,613	4,365	0.02	1.3	378	352	2.6	0.5	1	5	5	208	204
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	14/09/2022	480	180	<1	<1	<1	29	<1	<50	<50	<0.1	<1	<10	<10	2	3	2	441	106	<1	166	130	<0.04	<1	34	34	<10	<1	0.085	<10	<10	46	39
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	24/11/2022	520	180	<1	<1	<1	35	<1	<50	<50	<0.1	<1	<10	<10	2	5	2	510	150	<1	142	136	<0.04	<1	34	28	<10	<1	0.08	<10	<10	43	29
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	2/03/2023	220	20	<1	8	<1	40	<1	<50	<50	0.2	<1	<10	<10	17	2	2	250	<50	<1	319	254	<0.04	<1	59	53	<0.2	<1	0.094	<10	<10	72	62
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D8	22/06/2023	80	20	<1	<1	<1	36	<1	<50	<50	<0.1	<1	<10	<10	2	2	<1	60	<50	<1	211	202	<0.04	<1	57	49	<0.2	<1	0.096	<10	<10	71	65
		Count Detect	4	4	0	1	0	4	0	0	0	1	0	0	0	4	4	3	4	2	0	4	4	0	0	4	4	0	0	4	0	0	4	4
		Min.	80	20	<1	<1	<1	29	<1	<50	<50	<0.1	<1	<10	<10	2	2	<1	60	<50	<1	142	130	<0.04	<1	34	28	<0.2	<1	0.08	<10	<10	43	29
		Max.	520	180	<1	8	<1	40	<1	<50	<50	0.2	<1	<10	<10	17	5	2	510	150	<1	319	254	<0.04	<1	59	53	<10	<1	0.096	<10	<10	72	65
		Mean	325	100	0.5	2.4	0.5	35	0.5	25	25	0.09	0.5	5	5	5.8	3	1.6	315	77	0.5	210	181	0.02	0.5	46	41	2.6	0.5	0.089	5	5	58	49
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	13/09/2022	680	<10	<1	4	3	38	<1	1750	1730	0.1	2	<10	<10	225	5	<1	59,100	48,300	2	15,100	15,000	0.2	3	1470	1490	<10	<1	3.06	<10	<10	127	74
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	24/11/2022	250	<10	<1	3	<1	35	<1	1440	1630	<0.1	<1	<10	<10	240	1	<1	56,300	22,500	1	15,600	14,800	<0.04	<1	1670	1420	<10	<1	3.47	<10	<10	92	38
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	1/03/2023	430	<10	<1	12	2	36	<1	1730	1840	<0.1	<1	<10	<10	260	63	35	73,400	45,100	<1	18,800	17,800	0.36	2	1700	1610	0.4	<1	3.99	<10	<10	118	78
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D9	21/06/2023	<10	<10	<1	<1	<1	28	<1	1850	1690	<0.1	<1	<10	<10	236	<1	<1	35,800	34,600	<1	15,700	14,600	0.08	<1	1730	1700	0.3	<1	3.56	<10	<10	69	65
		Count Detect	3	0	0	3	2	4	0	4	4	1	1	0	0	4	3	1	4	4	2	4	4	3	2	4	4	2	0	4	0	0	4	4
		Min.	<10	<10	<1	<1	<1	28	<1	1,440	1,630	<0.1	<1	<10	<10	225	<1	<1	35,800	22,500	<1	15,100	14,600	<0.04	<1	1,470	1,420	0.3	<1	3.06	<10	<10	69	38
		Max.	680	<10	<1	12	3	38	<1	1,850	1,840	0.1	2	<10	<10	260	63	35	73,400	48,300	2	18,800	17,800	0.36	3	1,730	1,700	<10	<1	3.99	<10	<10	127	78
		Mean	341	5	0.5	4.9	1.5	34	0.5	1,693	1,723	0.06	0.88	5	5	240	17	9.1	56,150	37,625	1	16,300	15,550	0.17	1.5	1,643	1,555	2.7	0.5	3.5	5	5	102	64
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	13/09/2022	30	<10	<1	9	9	27	<1	3040	3000	<0.1	<1	<10	<10	420	<1	<1	55,400	54,100	<1	23,200	22,600	<0.04	<1	2200	2230	<10	<1	3.35	<10	<10	209	214
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	24/11/2022	320	<10	<1	10	3	33	<1	2960	3010	<0.1	<1	<100	<100	489	2	<1	56,200	38,700	<1	25,000	24,000	<0.04	<1	2620	2220	<10	<1	4.01	<10	<10	242	187
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	1/03/2023	30	<10	1	14	6	23	<1	3140	3660	<0.1	<1	<100	<100	369	24	18	55,100	49,100	<1	22,200	22,000	0.06	1	2010	1960	0.3	<1	3.48	<10	<10	177	178
Cross- and downgradient of LNAR / adjacent Wangcol Creek	D1	21/06/2023	<10	<10	<1	3	2	20	<1	3400	2600	<0.1	<1	<10	<10	326	<1	<1	34,000	35,600	<1	17,500	16,200	<0.04	<1	1750	1670	0.3	<1	2.7	<10	<10	149	148
		Count Detect	3	0	1	4	4	4	0	4	4	0	0	0	0	4	2	1	4	4	0	4	4	1	1	4	4	2	0	4	0	0	4	4
		Min.	<10	<10	<1	3	2	20	<1	2,960	2,600	<0.1	<1	<10	<10	326	<1	<1	34,000	35,600	<1	17,500	16,200	<0.04	<1	1,750	1,670	0.3	<1	2.7	<10	<10	149	148
		Max.	320	<10	1	14	9	33	<1	3,400	3,660	<0.1	<1	<100	<100	489	24	18	56,200	54,100	<1	25,000	24,000	0.06	1	2,620	2,230	<10	<1	4.01	<10	<10	242	214
		Mean	96	5	0.63	9	5	26	0.5	3,135	3,068	0.05	0.5	28	28	401	6.8	4.9	50,175	44,375	0.5	21,975	21,200	0.03	0.63	2,145	2,020	2.7	0.5	3.4	5	5	194	182

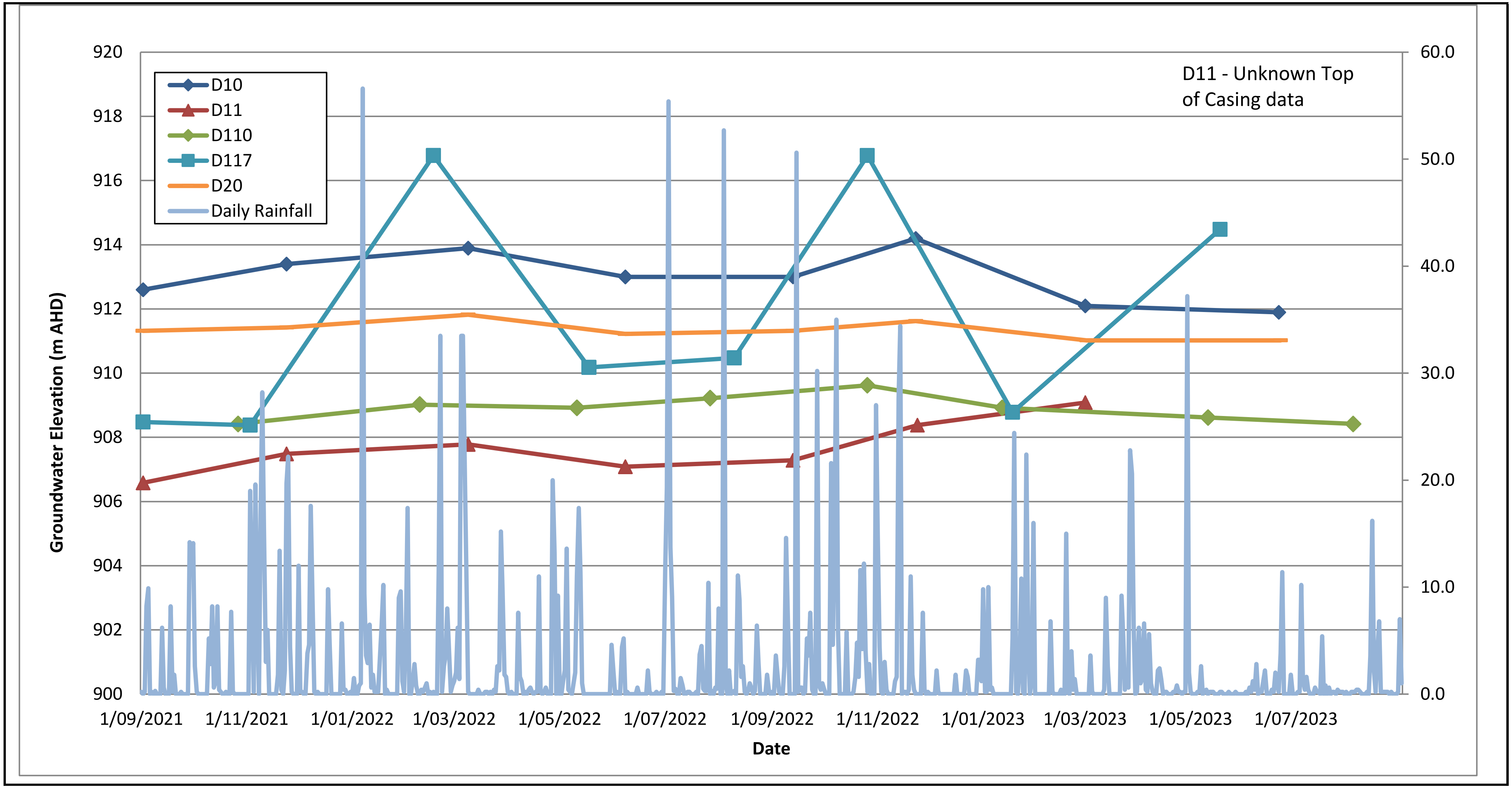
Statistical Summary

	Aluminium	Aluminium (Filtered)	Antimony	Arsenic	Arsenic (Filtered)	Barium	Beryllium	Boron	Boron (Filtered)	Cadmium	Chromium	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Nickel	Nickel (Filtered)	Selenium	Silver	Strontium	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
Number of Results	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Number of Detects	72	39	26	65	52	80	23	71	72	36	39	20	20	80	54	36	80	77	42	80	80	30	37	80	80	37	20	80	20	20	80	80
Minimum Concentration	3	0	0	<1	0	4	0	0	0	0	0	0	0	2	0	0	4	2	0	4	4	0	0	4	4	0	0	0.08	0	0	4	4
Minimum Detect	3	1	0.5	1	0.5	4	0.5	2	3	0.05	0.5	5	5	2	0.5	0.5	4	2	0.5	4	4	0.02	0.5	4	4	0.2	0.5	0.08	5	5	4	4
Maximum Concentration	1420	960	4	32	23	192	2	3400	3660	4	234	<100	<100	489	63	35	73400	54100	6	25000	24000	3	8	2620	2230	<10	<1	4.23	<10	<10	508	473
Maximum Detect	1420	960	4	32	23	192	2	3400	3660	4	234	28	28	489	63	35	73400	54100	6	25000	24000	3	8	2620	2230	3	0.5	4.23	5	5	508	473
Average Concentration	255	83	0.6	4.5	2.3	34	0.51	1008	979	0.19	11	6.4	6.4	139	4.4	2.4	20453	15321	1.4	7879	7401	0.12	1.1	684	631	2	0.44	1.8	4.4	4.4	140	120
Median Concentration	114.5	5	0.5	2.2	1	23	0.5	890	805	0.05	0.5	5	5	143	2	0.5	11092.5	8945	0.5	6200	5750	0.02	0.5	524	453	1	0.5	1.13	5	5	99	76
Standard Deviation	339	219	0.6	5.8	3.8	41	0.35	947	939	0.57	38	9.2	9.2	116	10	6.1	20639	16518	1.5	7153	6817	0.38	1.3	737	684	2.1	0.17	1.5	1.7	1.7	112	106
Number of Guideline Exceedances	0	0	0	2	0	0	0	51	51	2	14	70	70	0	15	7	63	63	4	41	40	14	0	34	27	24	70	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	2	0	0	0	51	51	2	14	10	10	0	15	7	63	63	4	41	40	14	0	34	27	0	10	0	0	0	0	0

APPENDIX D HYDROGRAPHS


Groundwater Elevation (m AHD)
920
918
916
914
912
910
908
906
904
902
900
60.0
50.0
40.0
30.0
20.0
10.0
0.0
D5
D4
Daily Rainfall
1/09/2021
1/11/2021
1/01/2022
1/03/2022
1/05/2022
1/07/2022
1/09/2022
1/11/2022
1/01/2023
1/03/2023
1/05/2023
1/07/2023
Date


D106
D107
D119
D3
Daily Rainfall
Groundwater Elevation (m AHD)
920
918
916
914
912
910
908
906
904
902
900
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1/09/2021
1/11/2021
1/01/2022
1/03/2022
1/05/2022
1/07/2022
1/09/2022
1/11/2022
1/01/2023
1/03/2023
1/05/2023
1/07/2023
Date


D10
D11
D110
D117
D20
Daily Rainfall
D11 - Unknown Top of Casing data
Groundwater Elevation (m AHD)
920
918
916
914
912
910
908
906
904
902
900
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1/09/2021
1/11/2021
1/01/2022
1/03/2022
1/05/2022
1/07/2022
1/09/2022
1/11/2022
1/01/2023
1/03/2023
1/05/2023
1/07/2023
Date

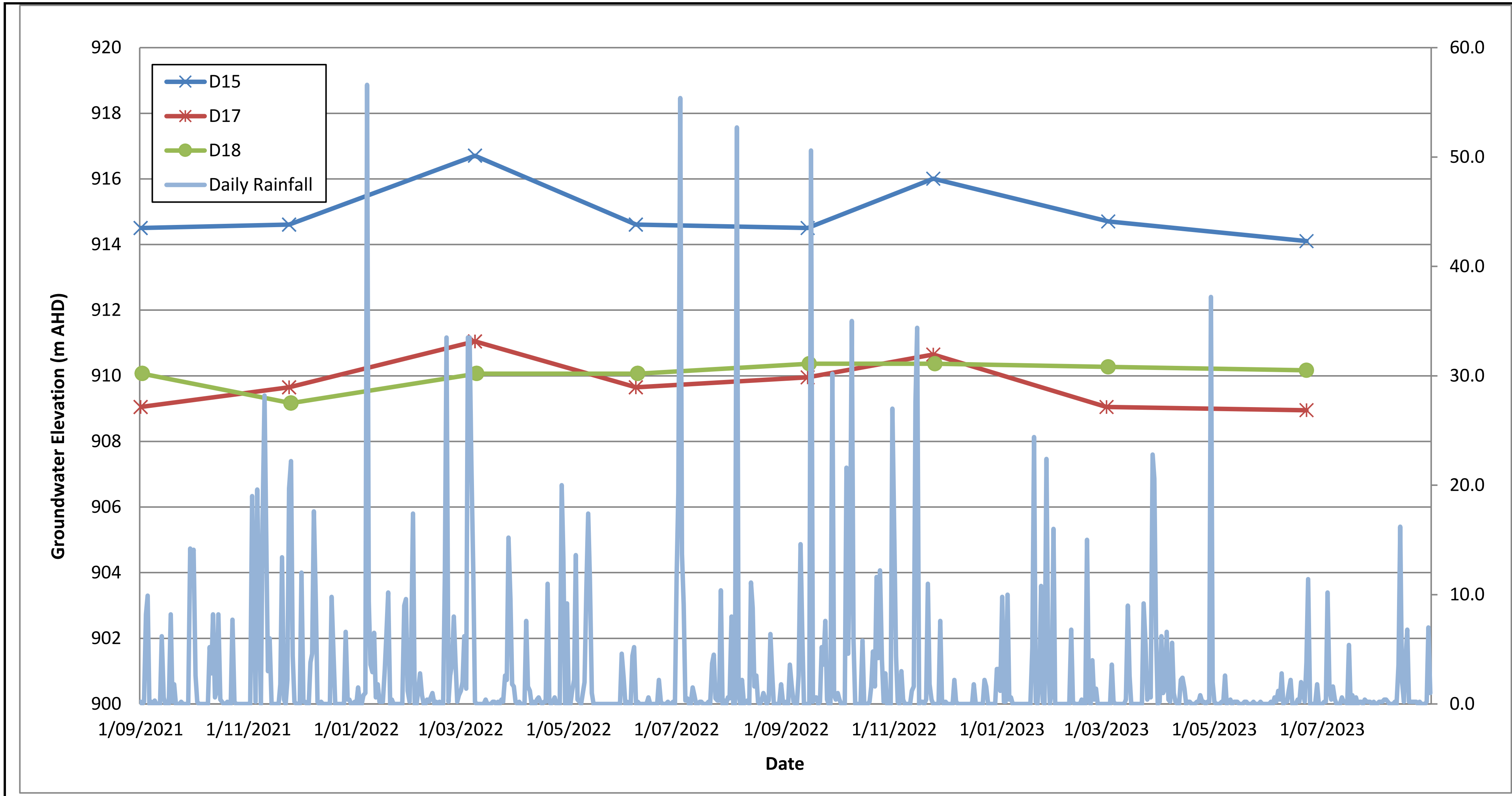
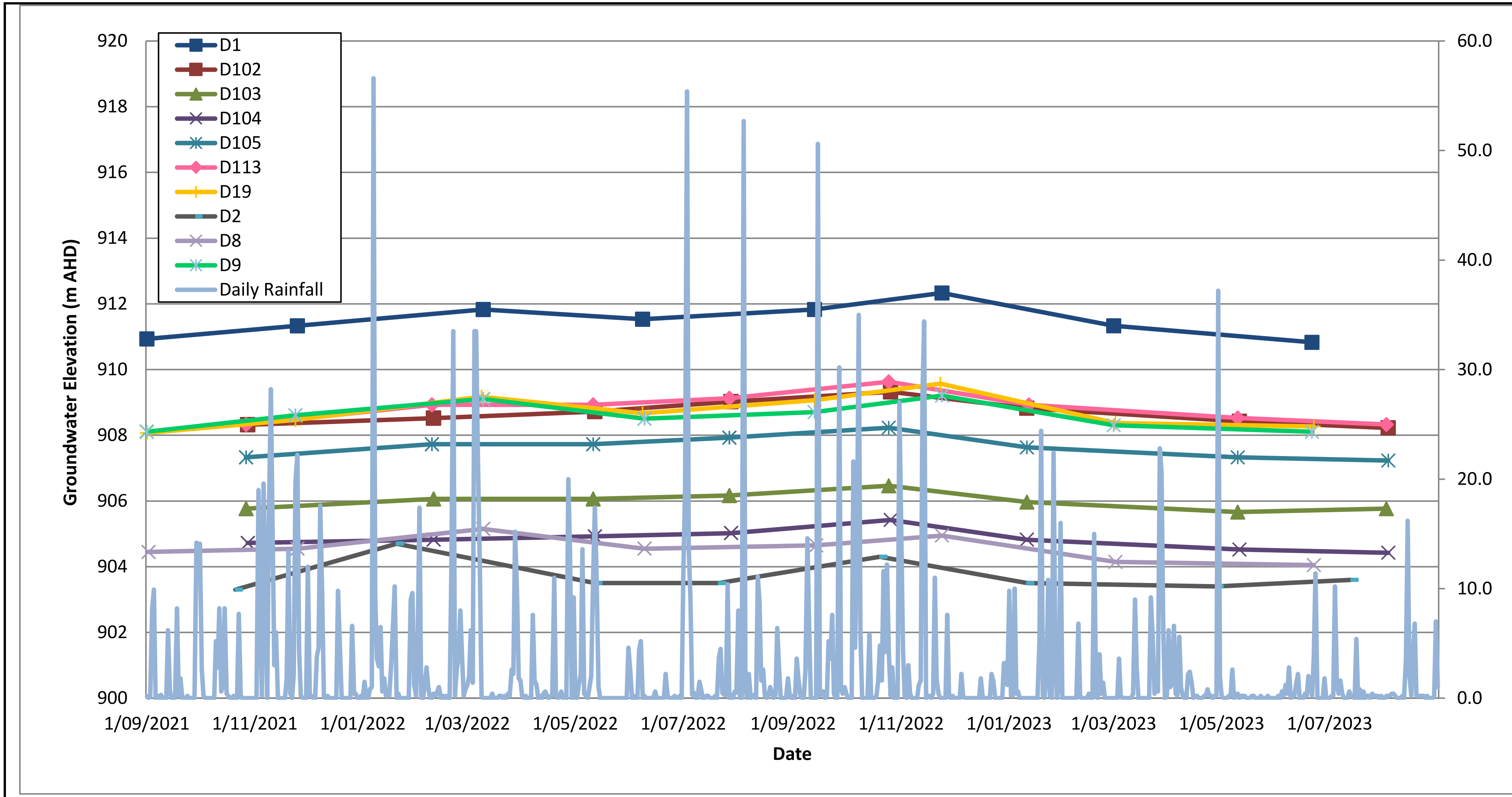
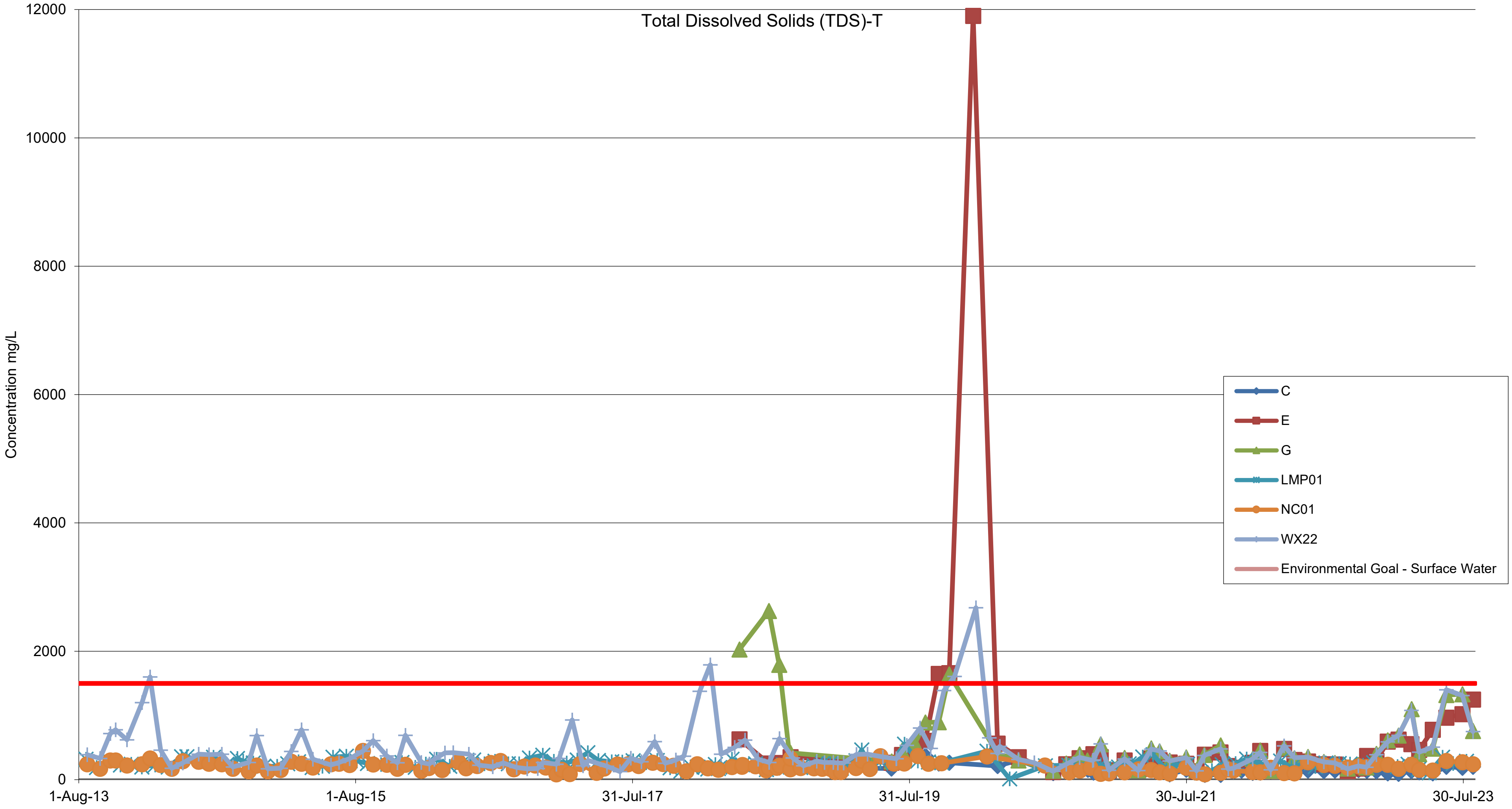
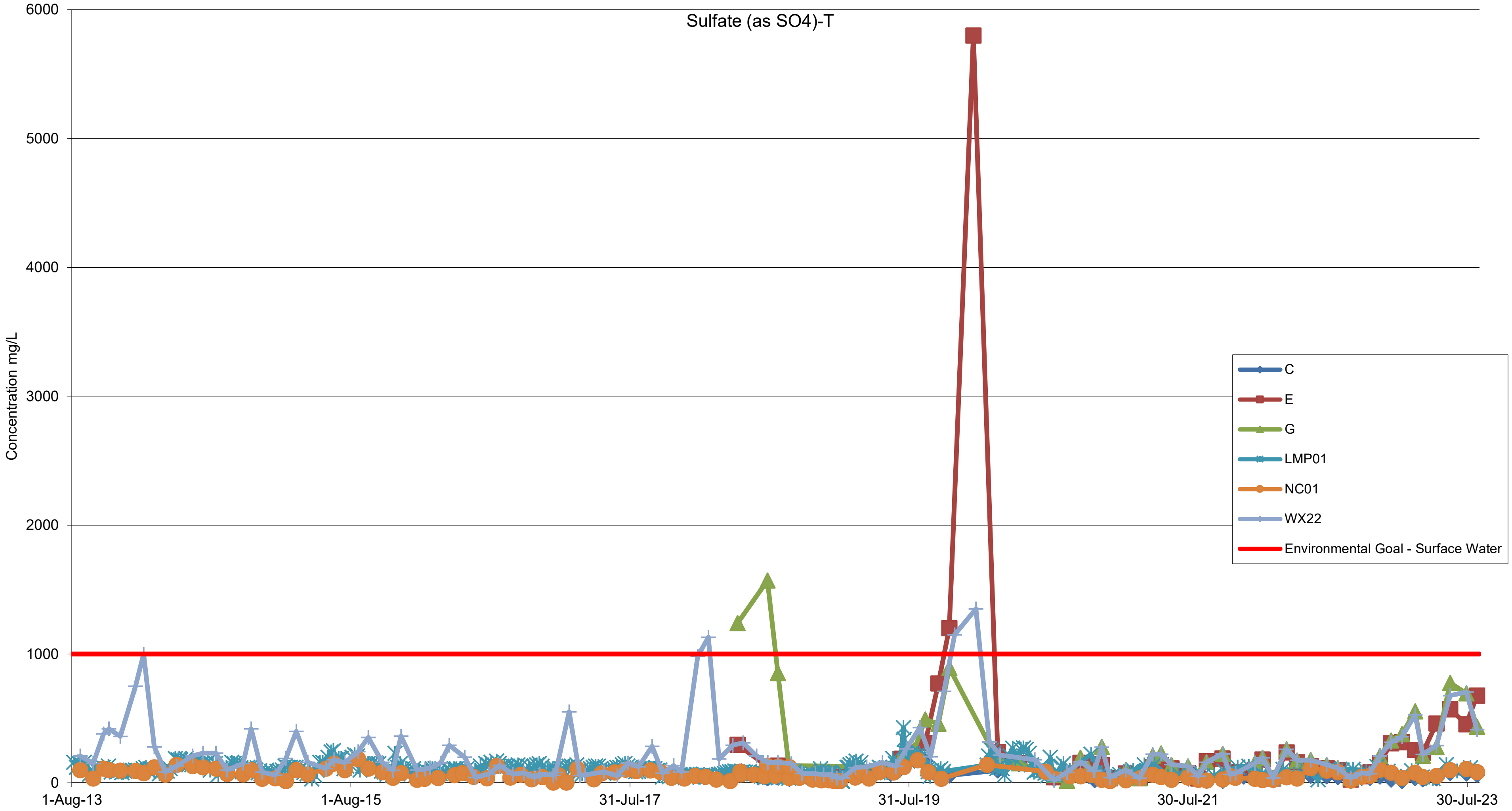

920
918
916
914
912
910
908
906
904
902
900
60.0
50.0
40.0
30.0
20.0
10.0
0.0
D15
D17
D18
Daily Rainfall
Groundwater Elevation (m AHD)
1/09/2021
1/11/2021
1/01/2022
1/03/2022
1/05/2022
1/07/2022
1/09/2022
1/11/2022
1/01/2023
1/03/2023
1/05/2023
1/07/2023
Date

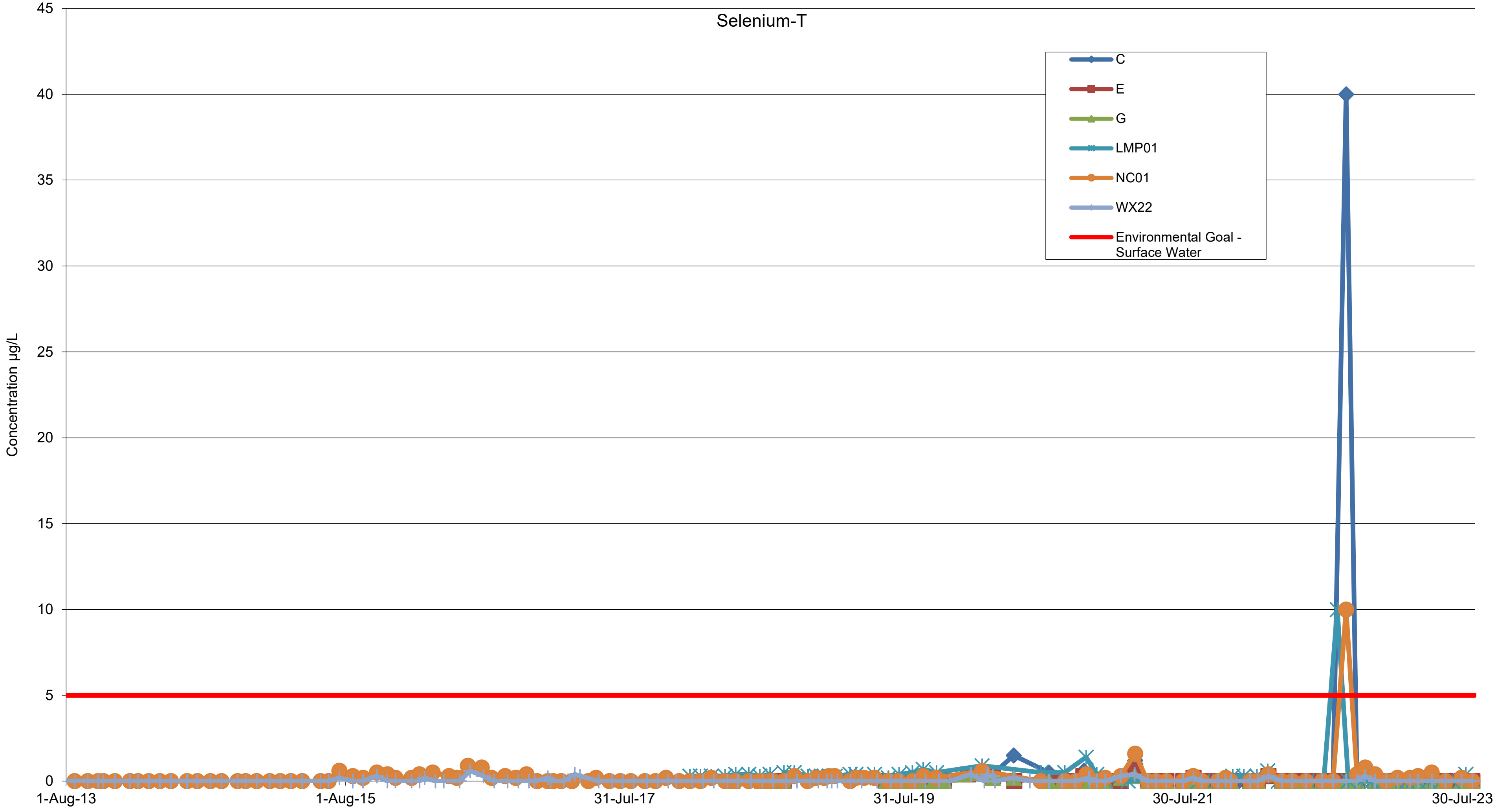
Figure D-5. Water Levels Over Time - Cross- and downgradient of LNAR / Adjacent Wangcol Creek
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/23
0553983

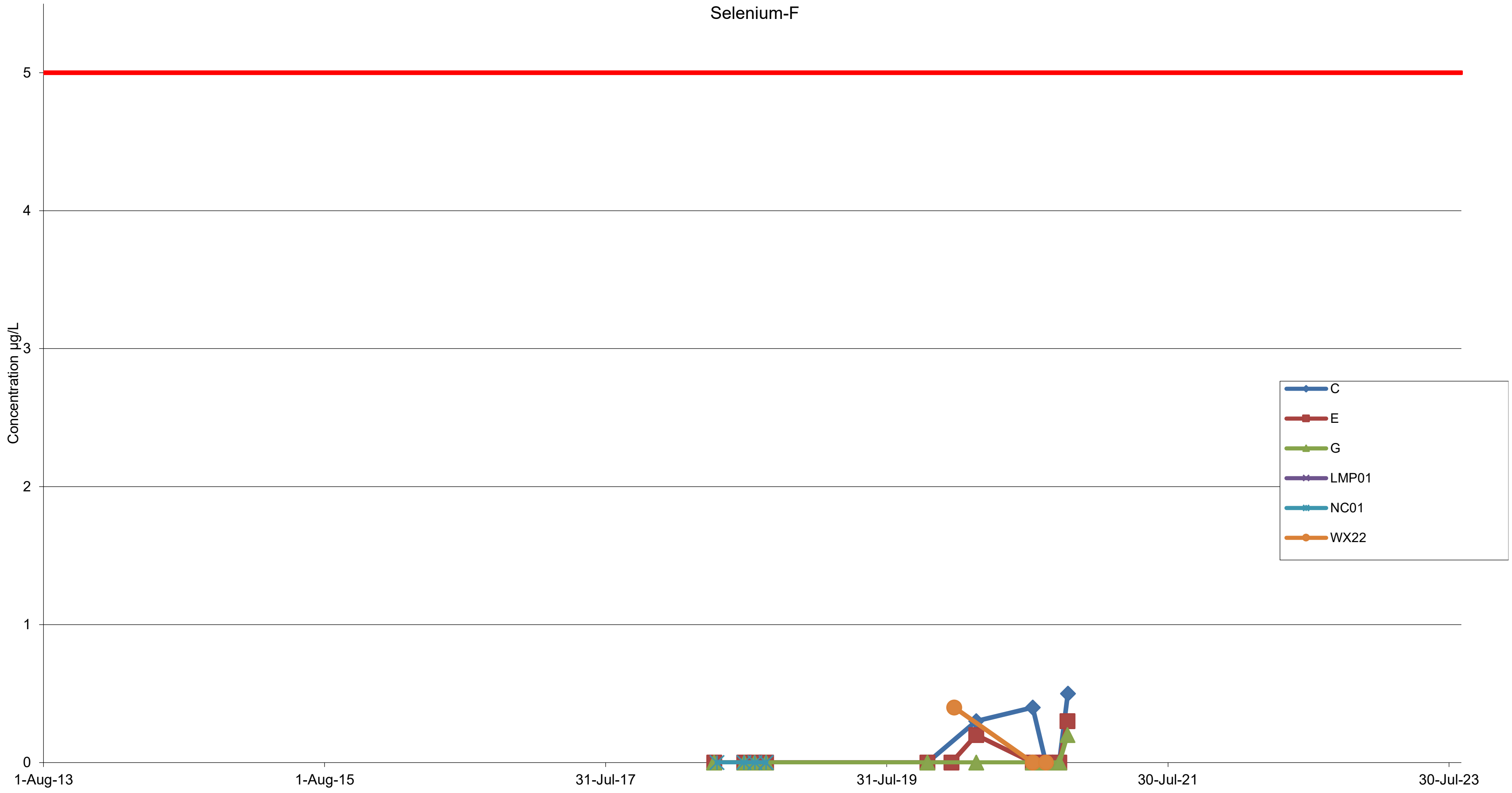


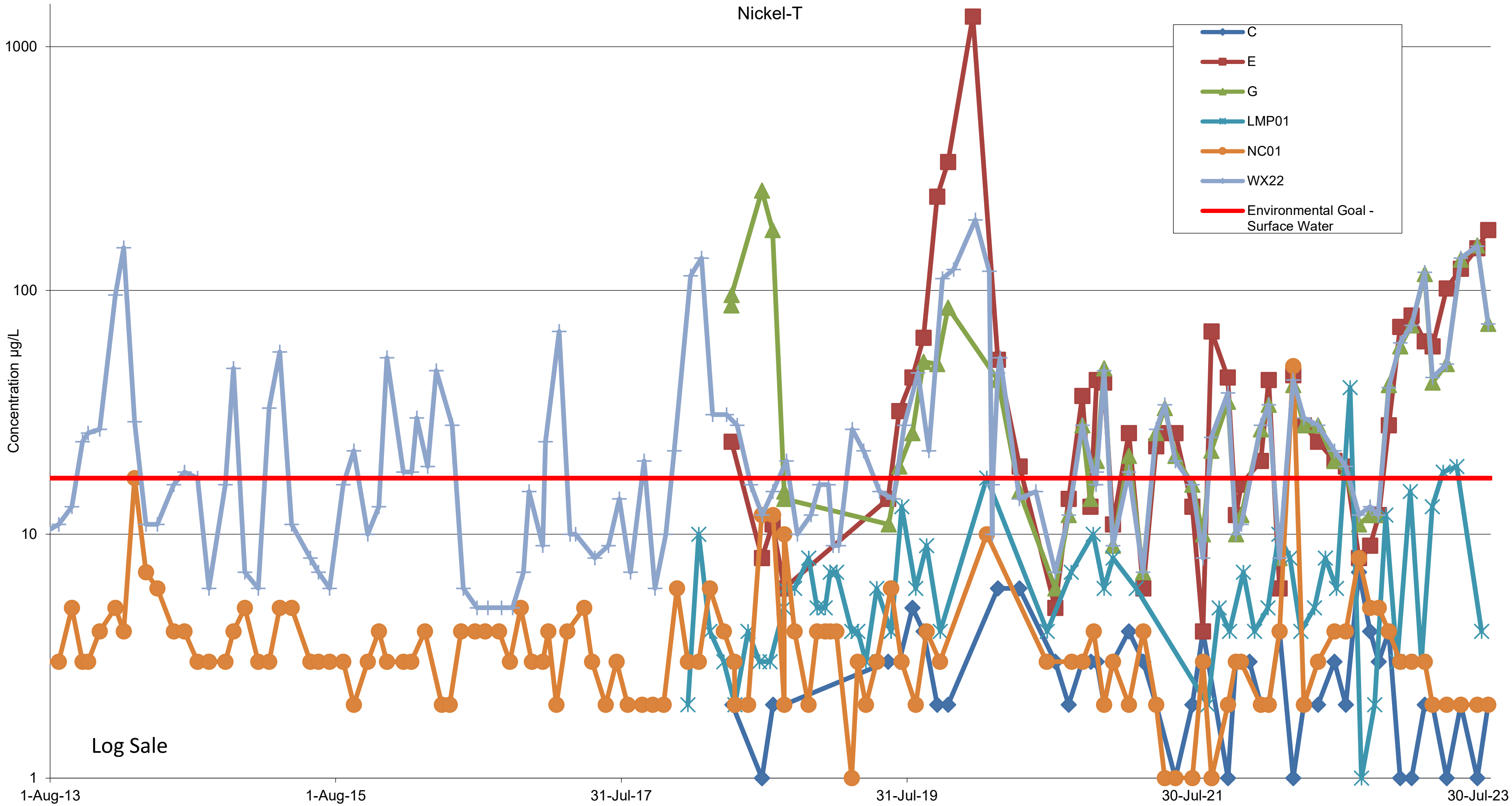
APPENDIX E TREND GRAPHS – SURFACE WATER

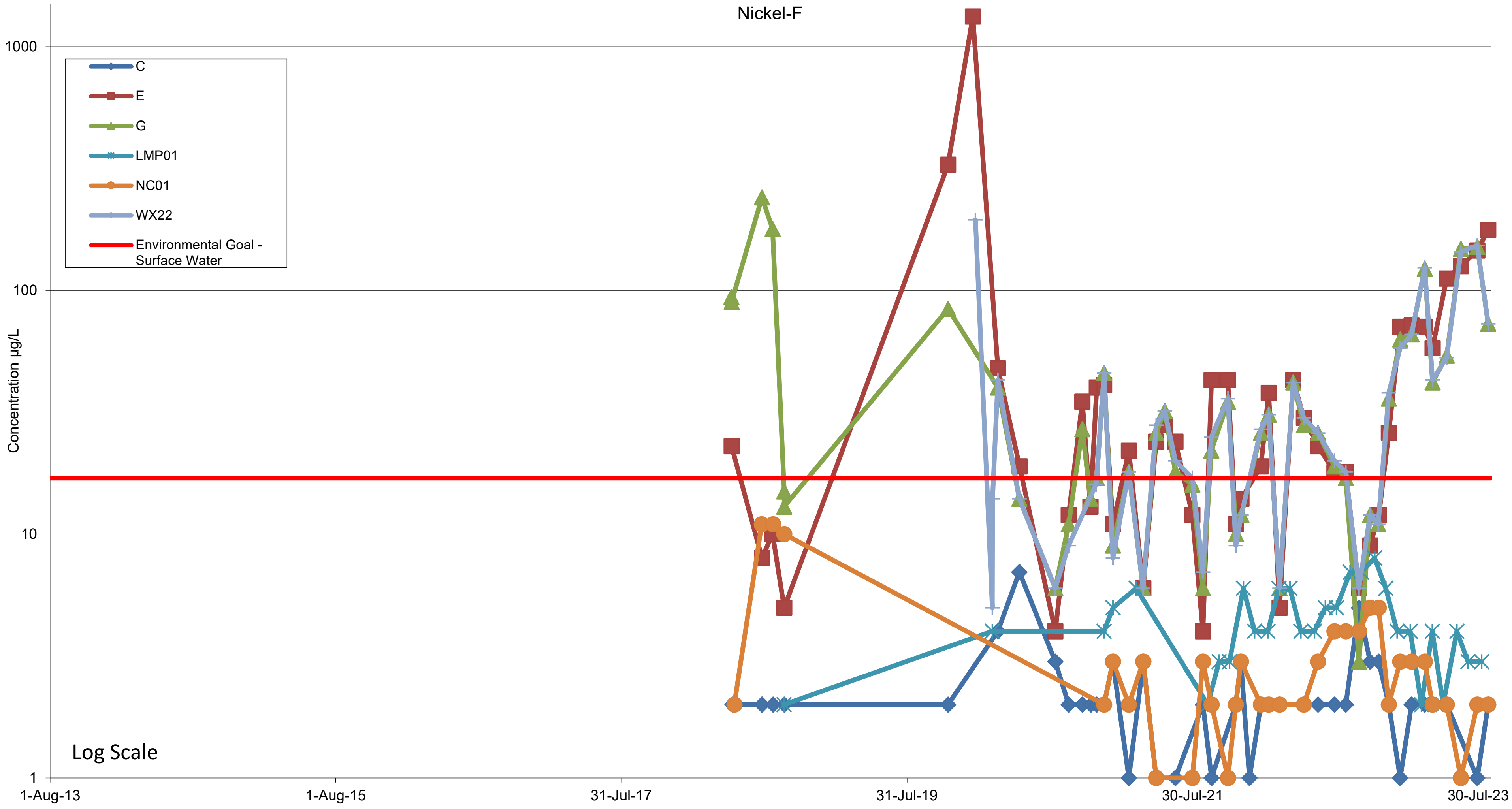

Total Dissolved Solids (TDS)-T
Concentration mg/L
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water

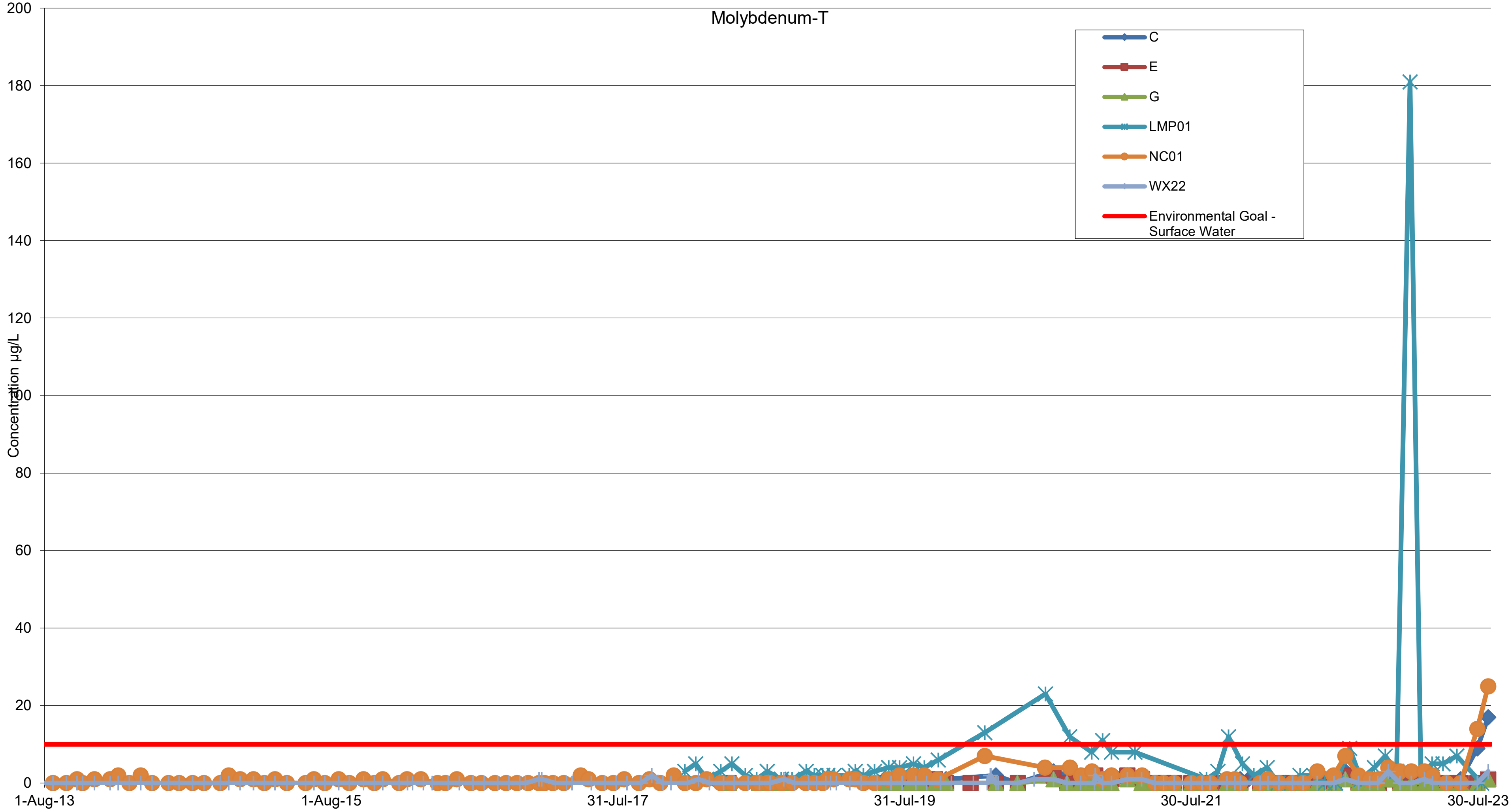

Sulfate (as SO4)-T
Concentration mg/L
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water

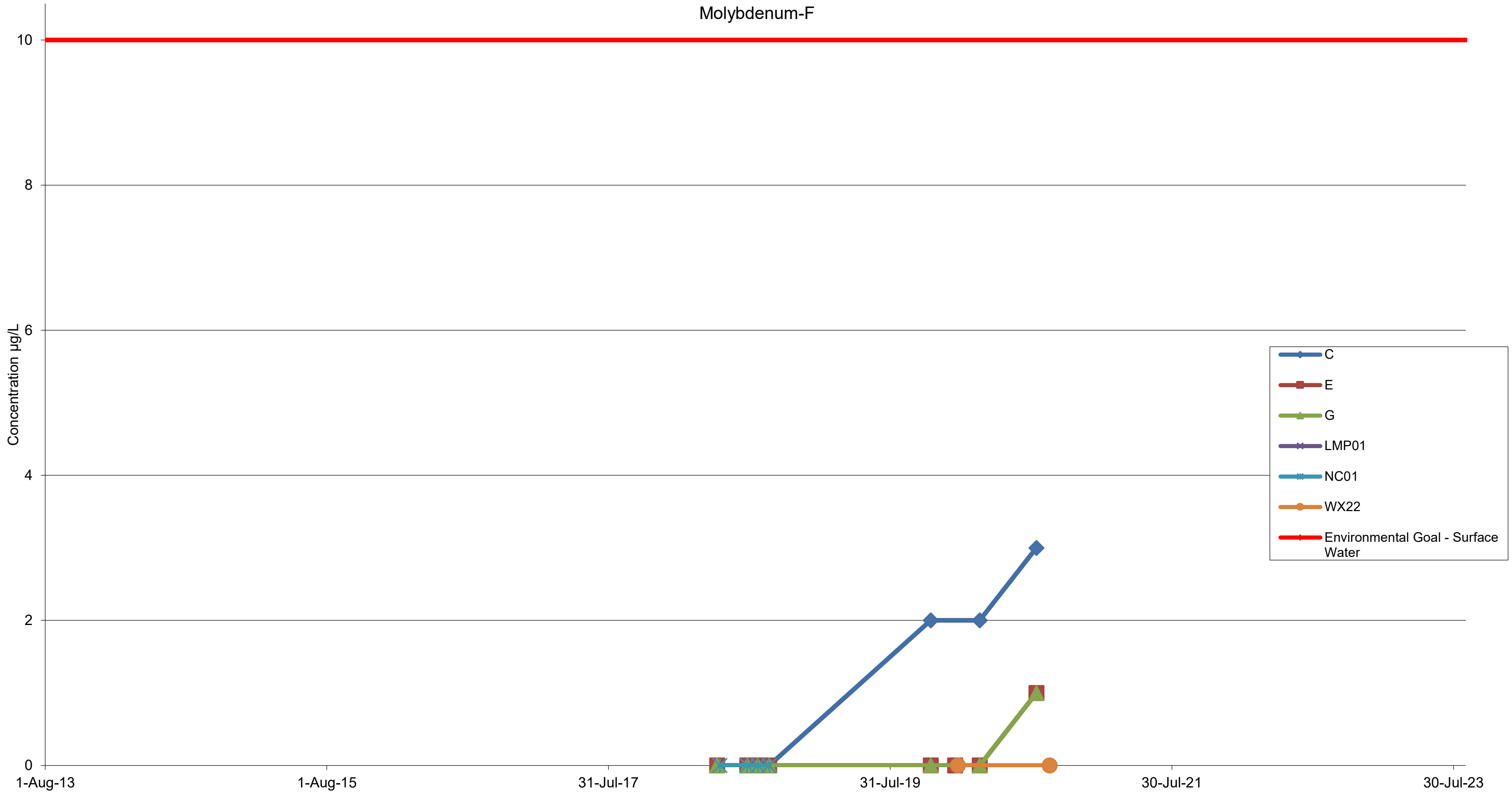

Selenium-T
Concentration µg/L
45
40
35
30
25
20
15
10
5
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water

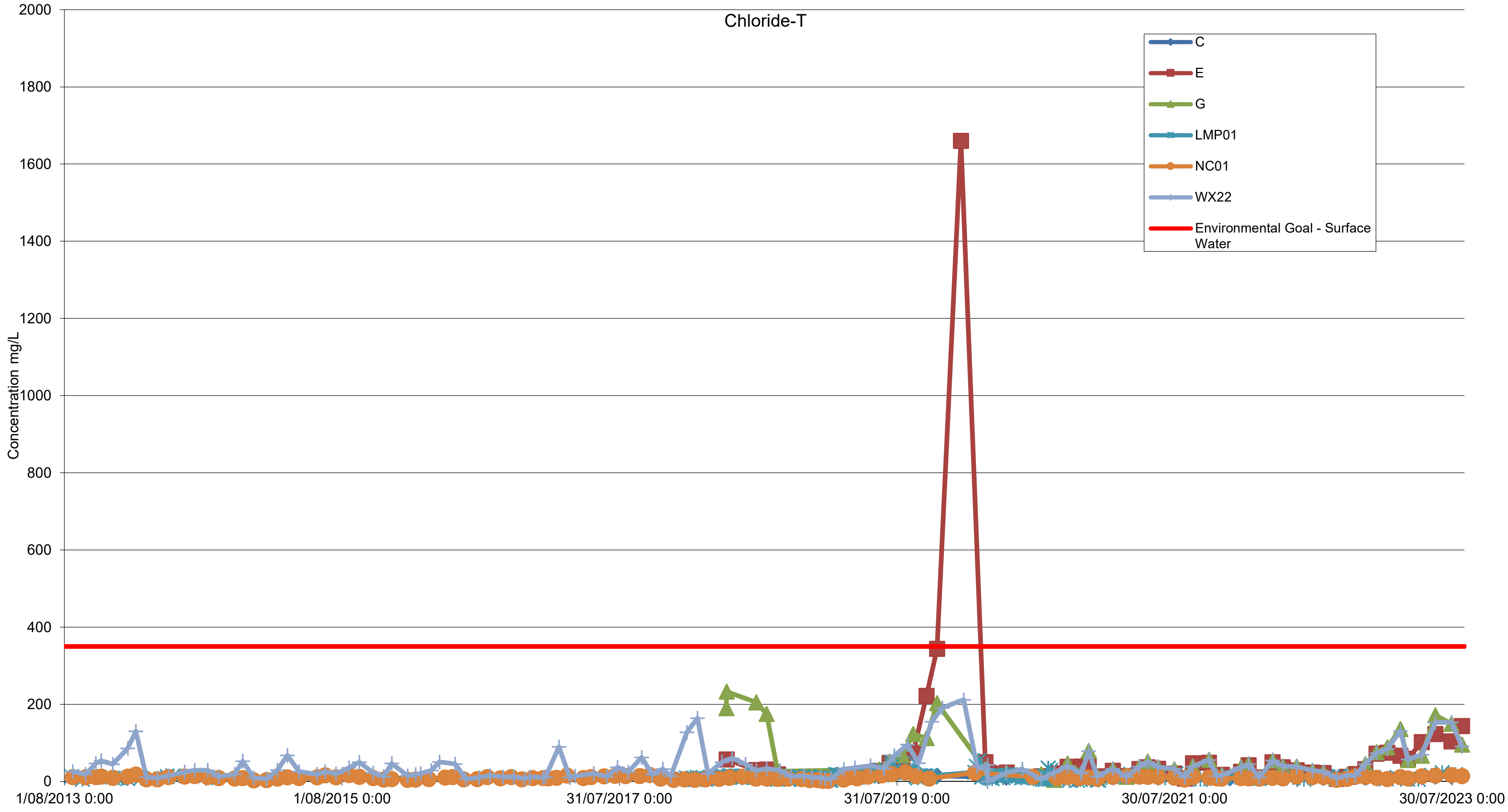

Selenium-F
Concentration µg/L
5
4
3
2
1
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22


Nickel-T
Concentration µg/L
1000
100
10
1
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water
Log Sale

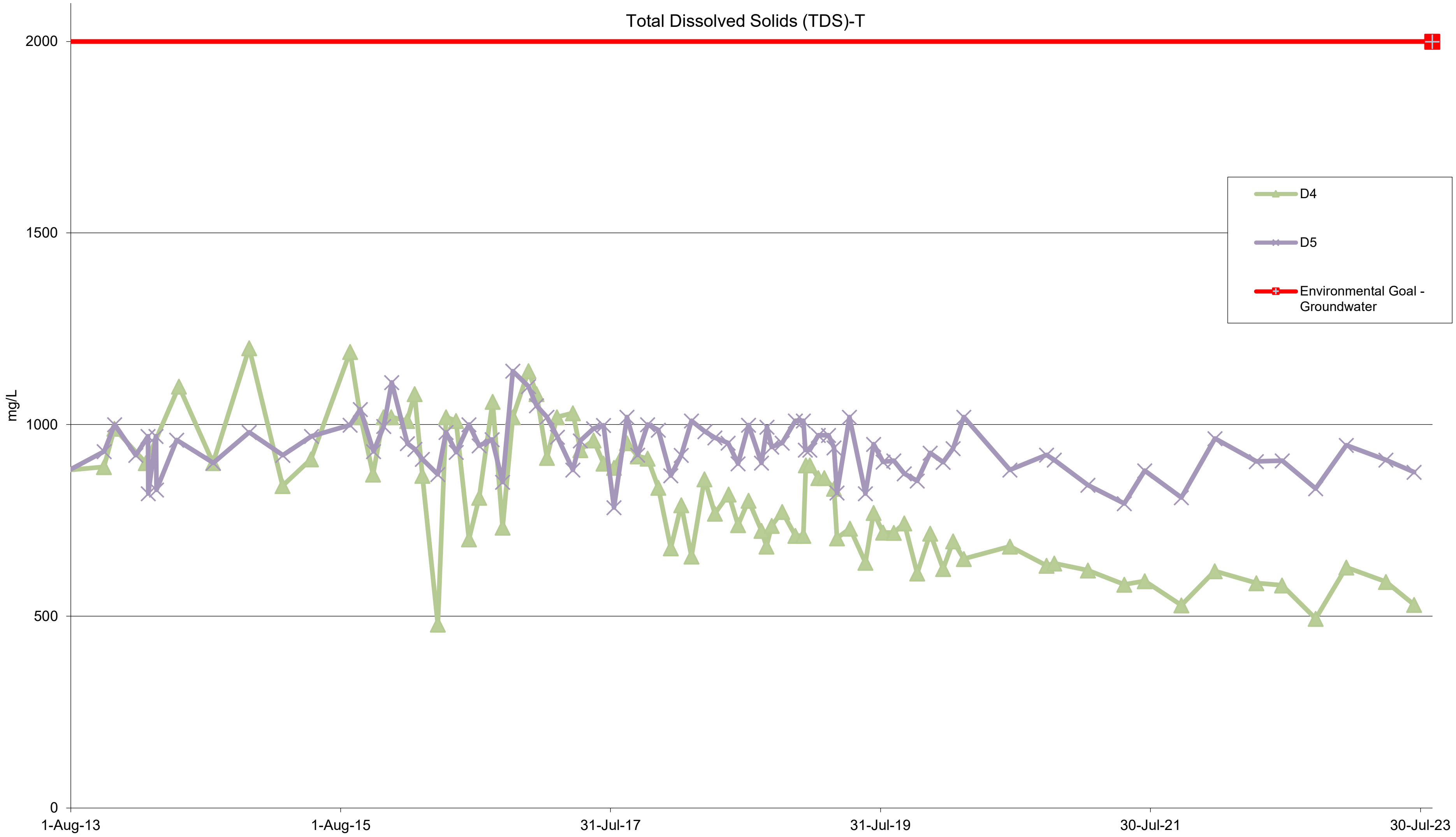

Nickel-F
Concentration µg/L
1000
100
10
1
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water
Log Scale

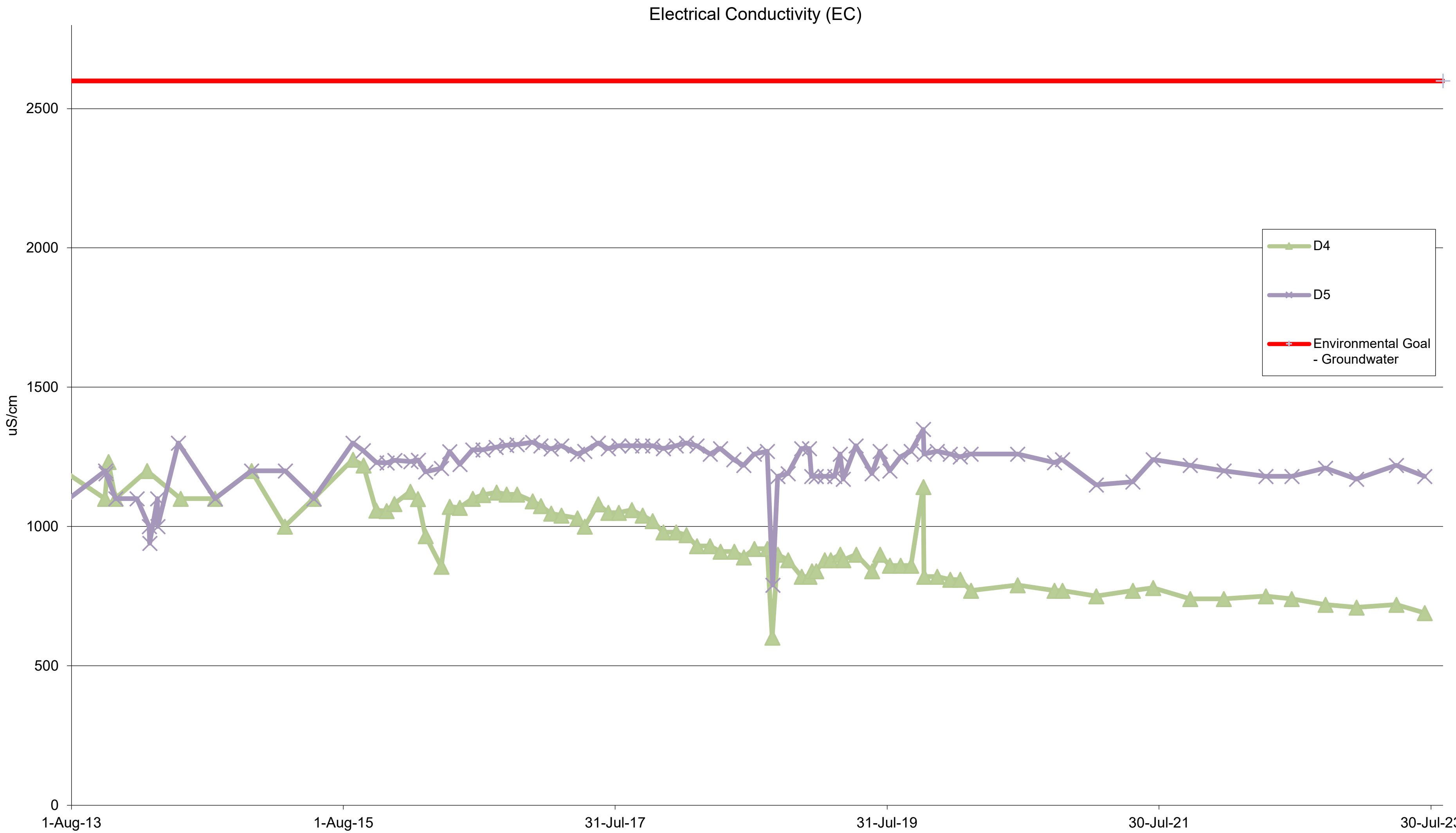

Molybdenum-T
Concentration µg/L
200
180
160
140
120
100
80
60
40
20
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water


Molybdenum-F
Concentration µg/L
10
8
6
4
2
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water

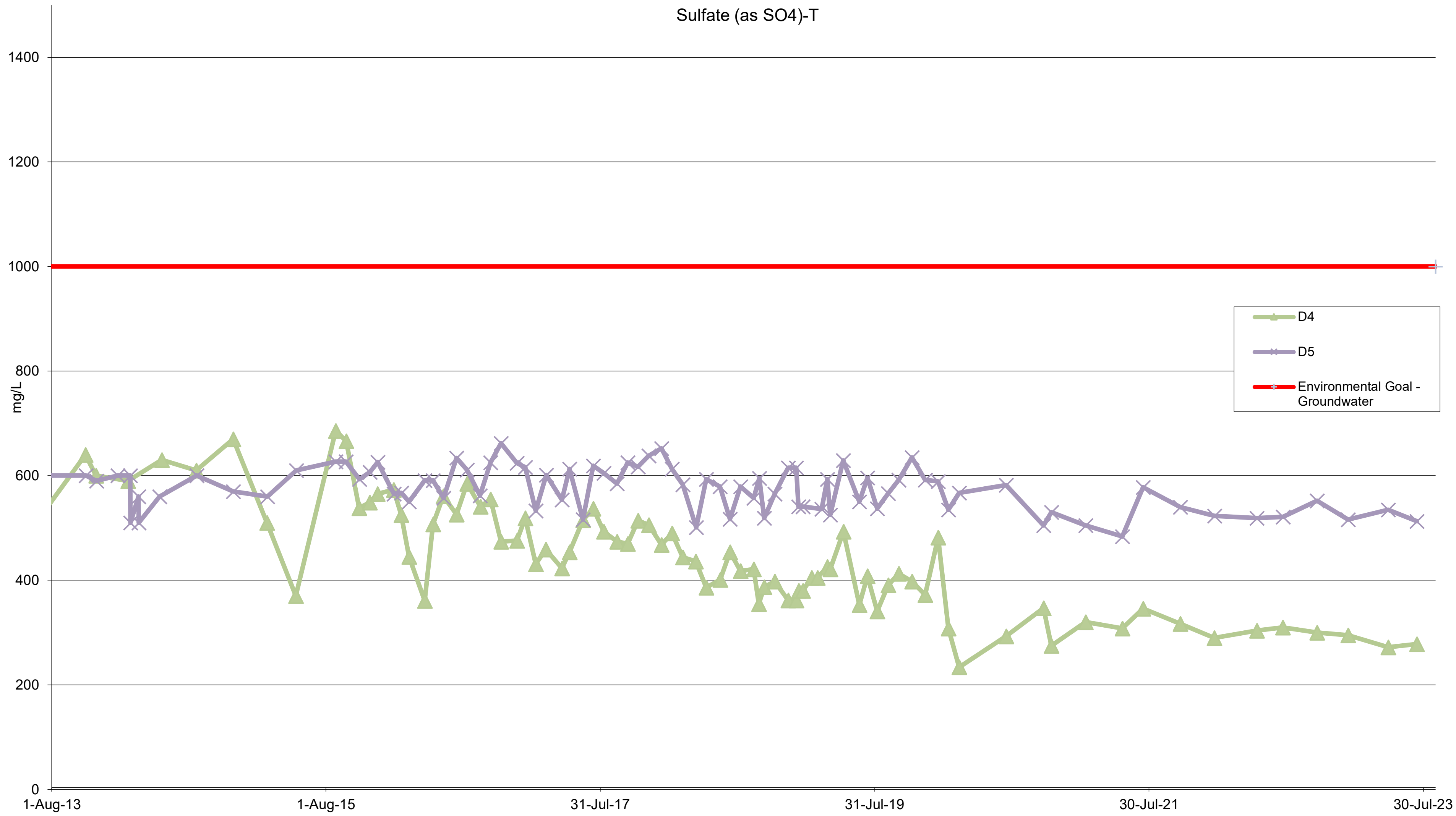

Chloride-T
Concentration mg/L
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1/08/2013 0:00
1/08/2015 0:00
31/07/2017 0:00
31/07/2019 0:00
30/07/2021 0:00
30/07/2023 0:00
C
E
G
LMP01
NC01
WX22
Environmental Goal - Surface Water

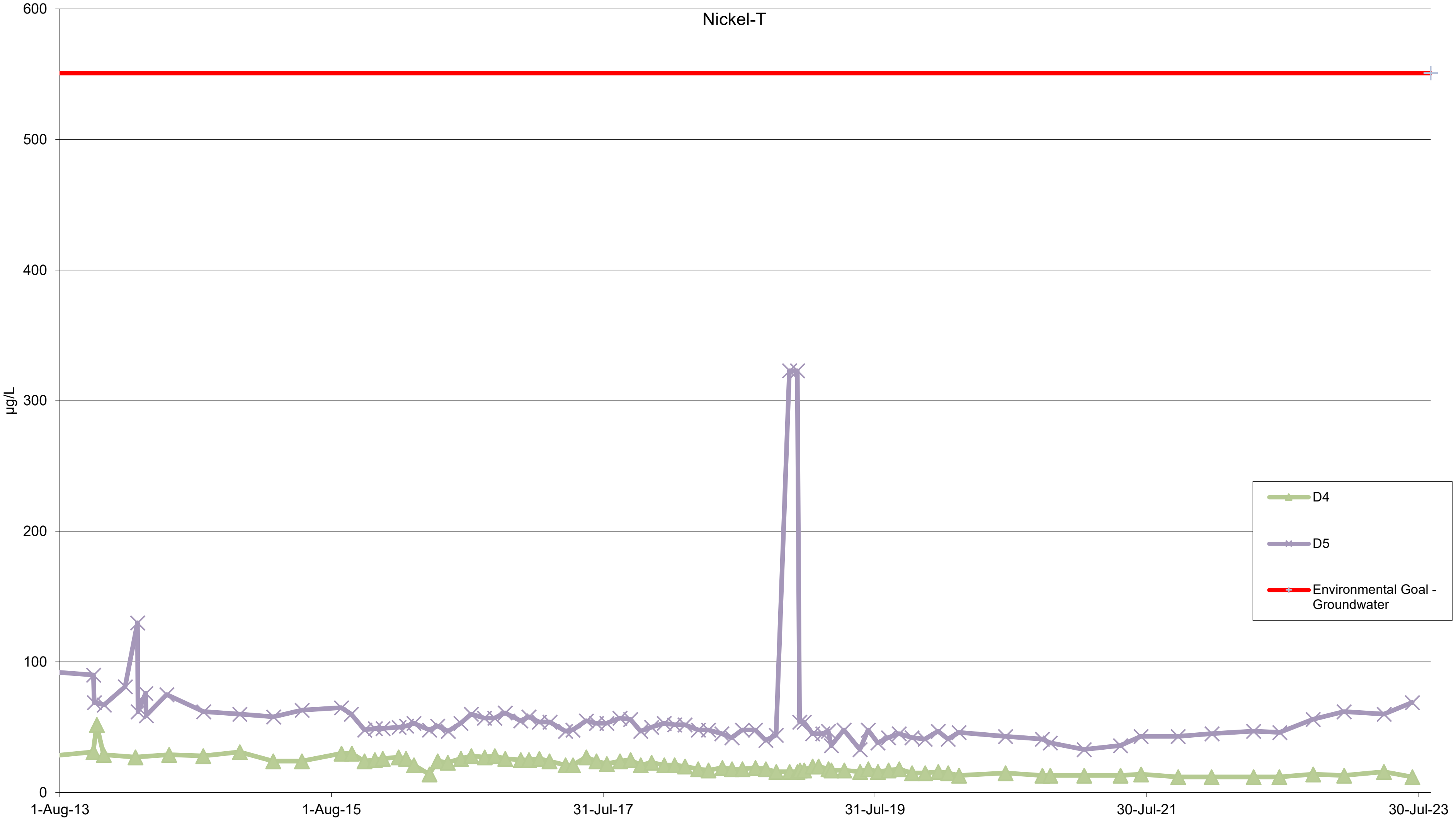
APPENDIX F TREND GRAPHS – GROUNDWATER

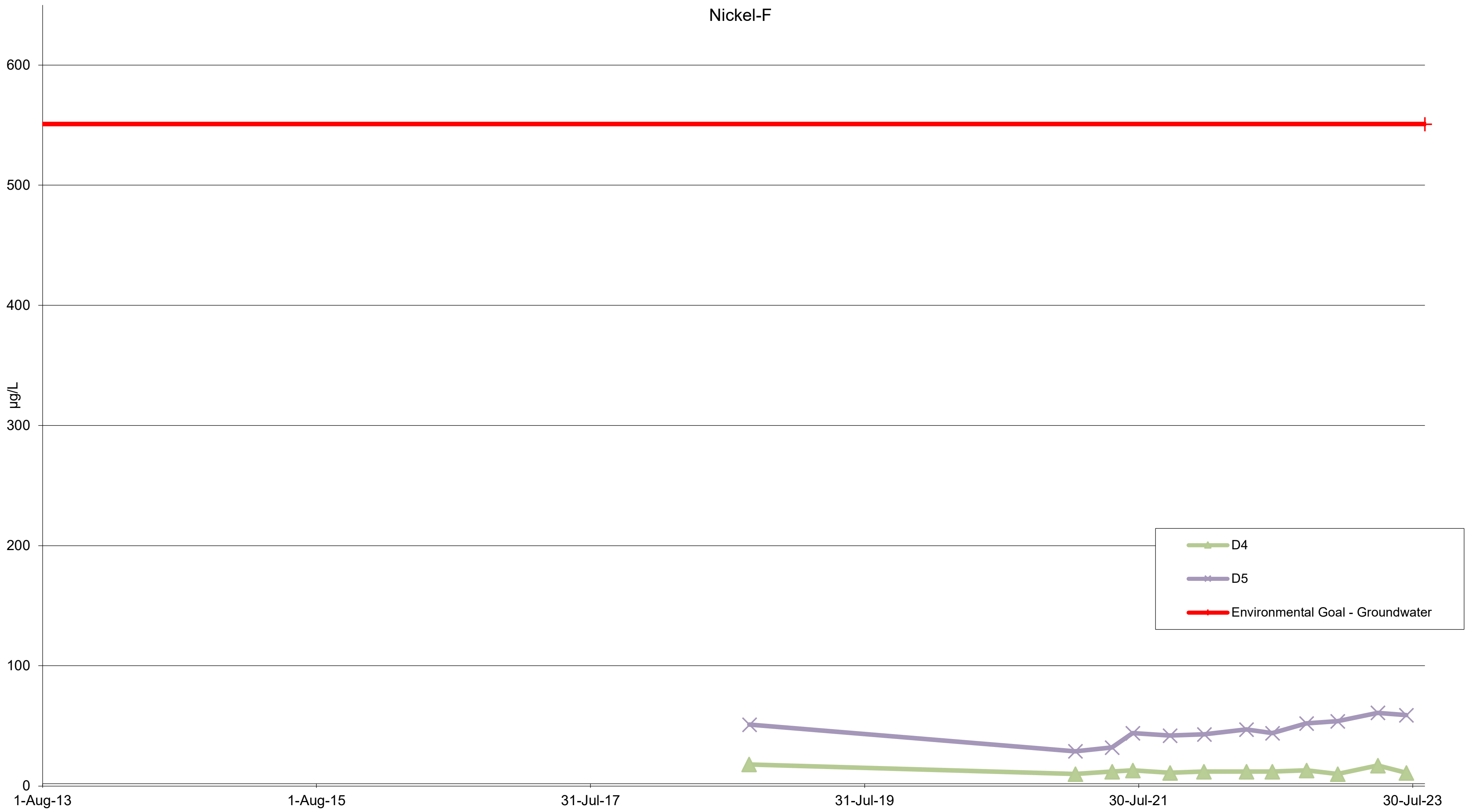

Total Dissolved Solids (TDS)-T
mg/L
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

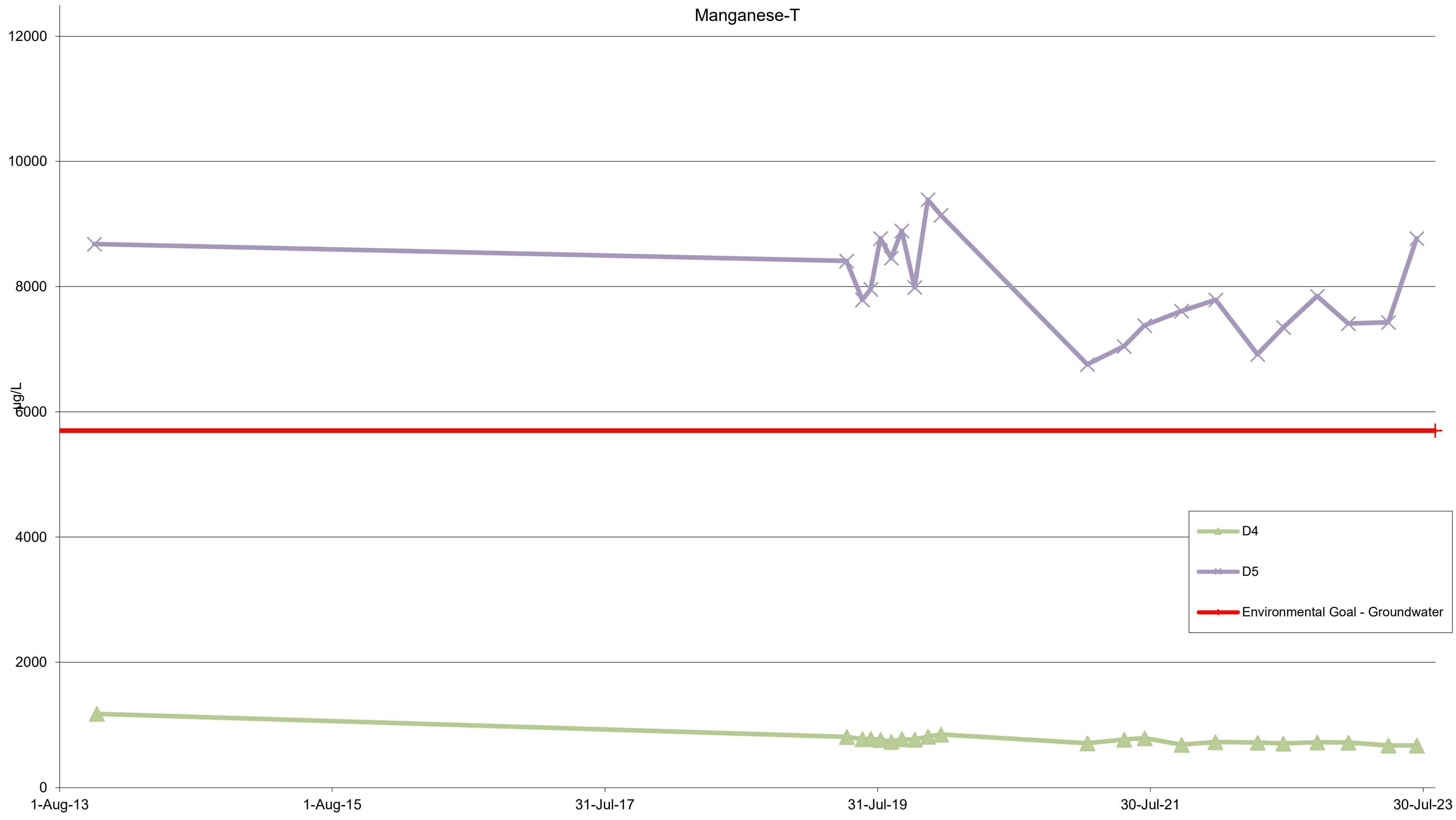

Electrical Conductivity (EC)
uS/cm
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

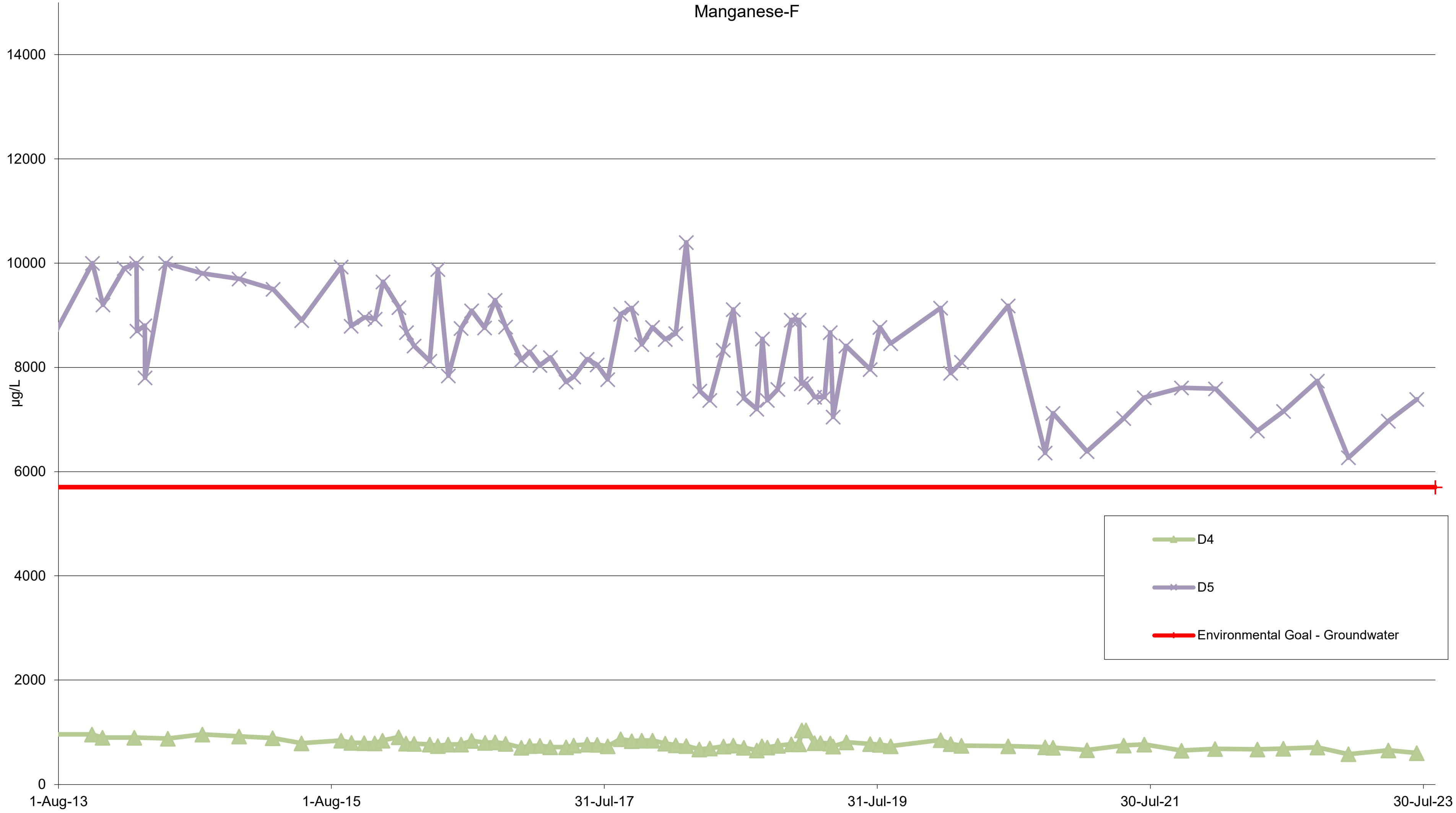
Appendix F. Upgradient / Background Wells - Sulfate (as SO4) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983



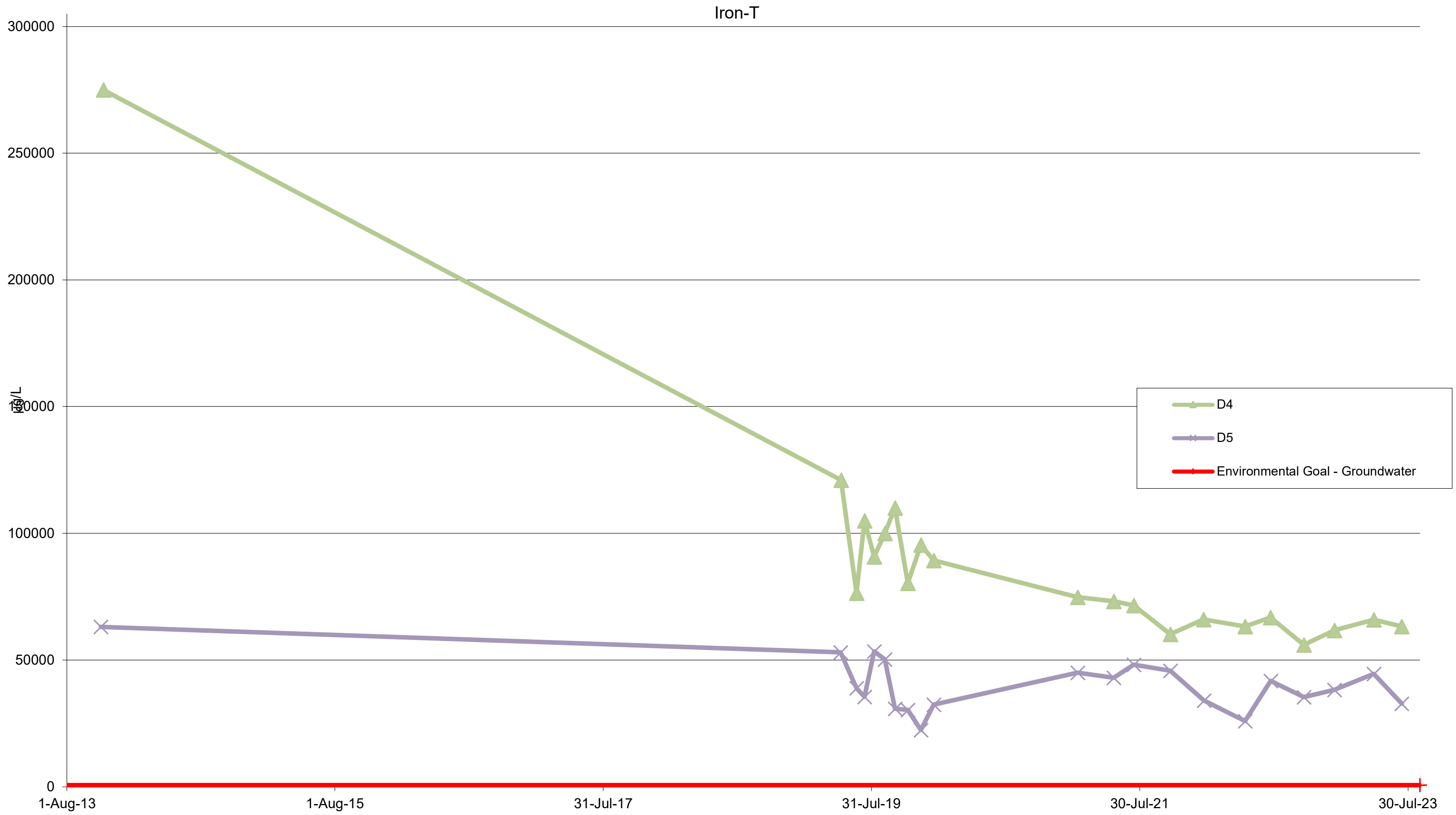

Nickel-T
µg/L
600
500
400
300
200
100
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater


Nickel-F
µg/L
600
500
400
300
200
100
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

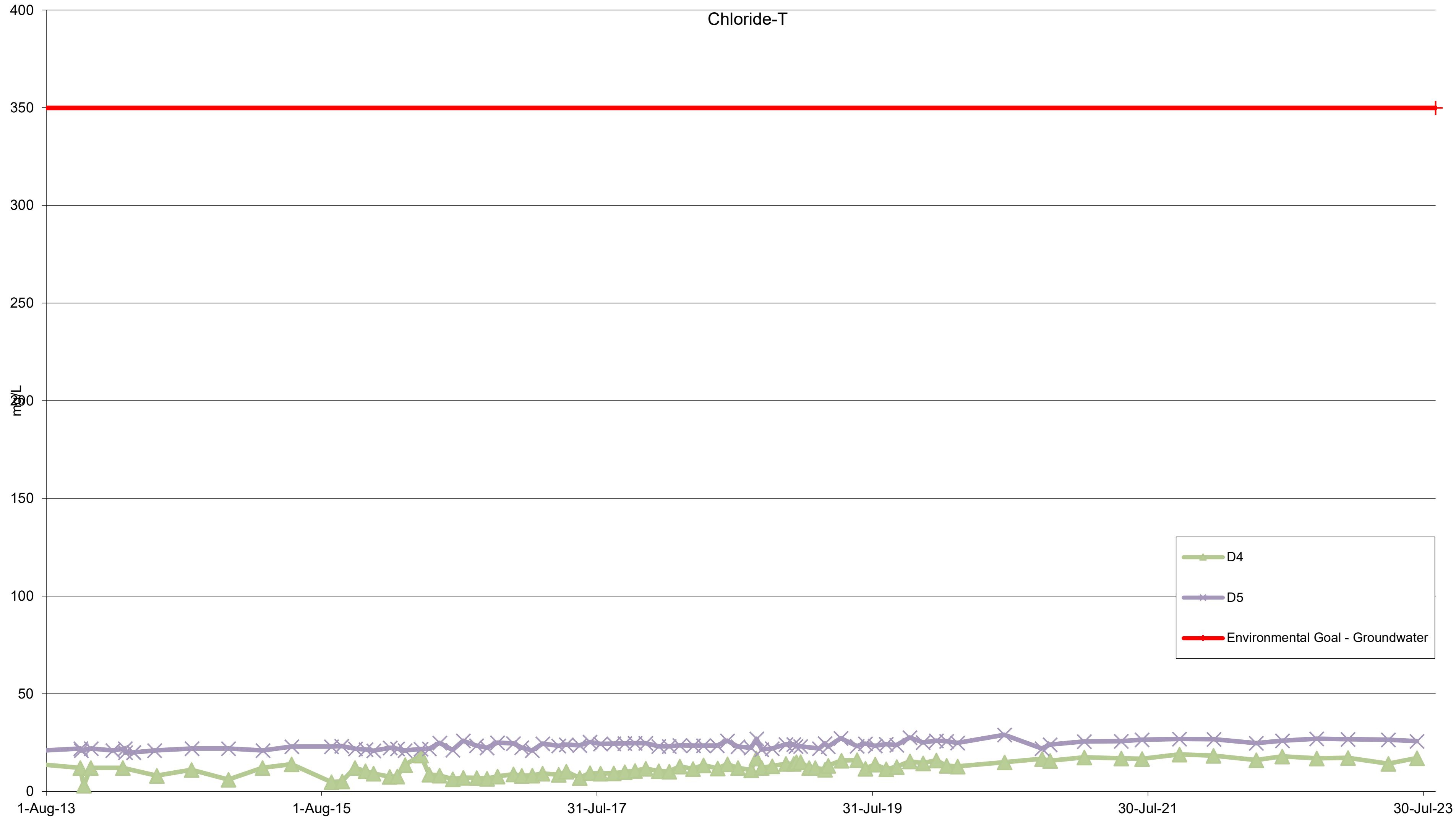

Manganese-T
µg/L
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

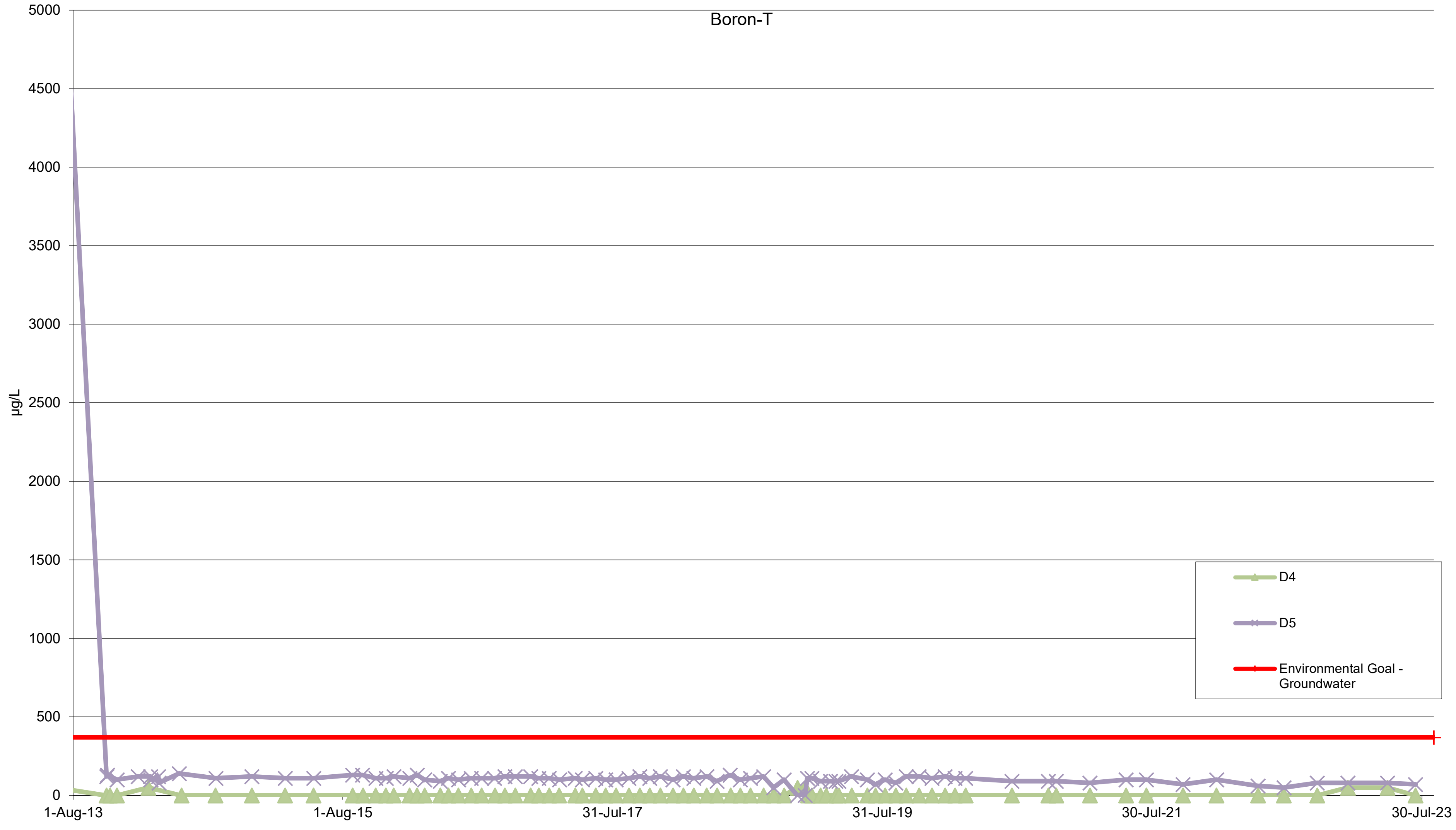

Manganese-F
µg/L
14000
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

Appendix F. Upgradient / Background Wells - Iron (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

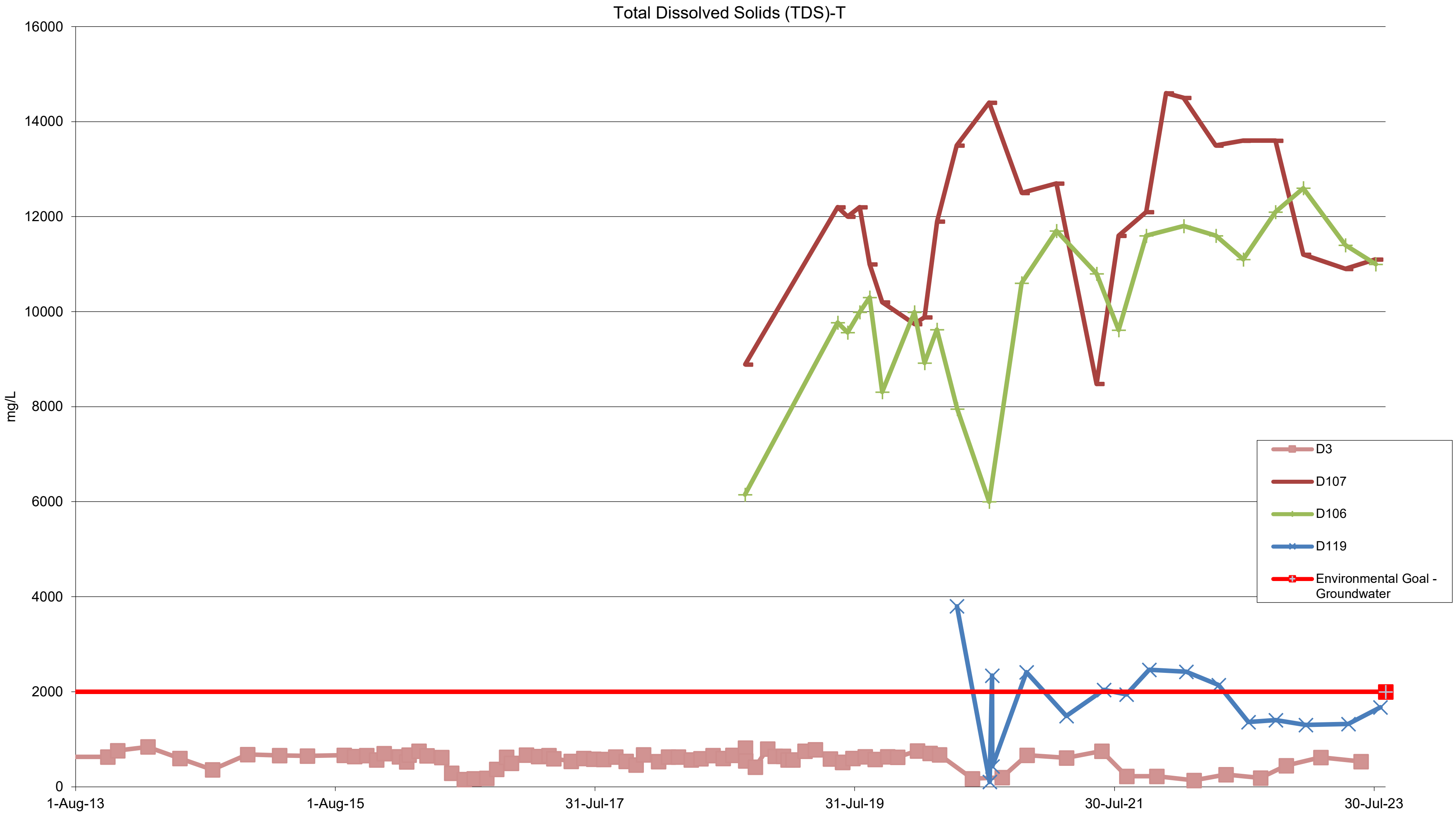


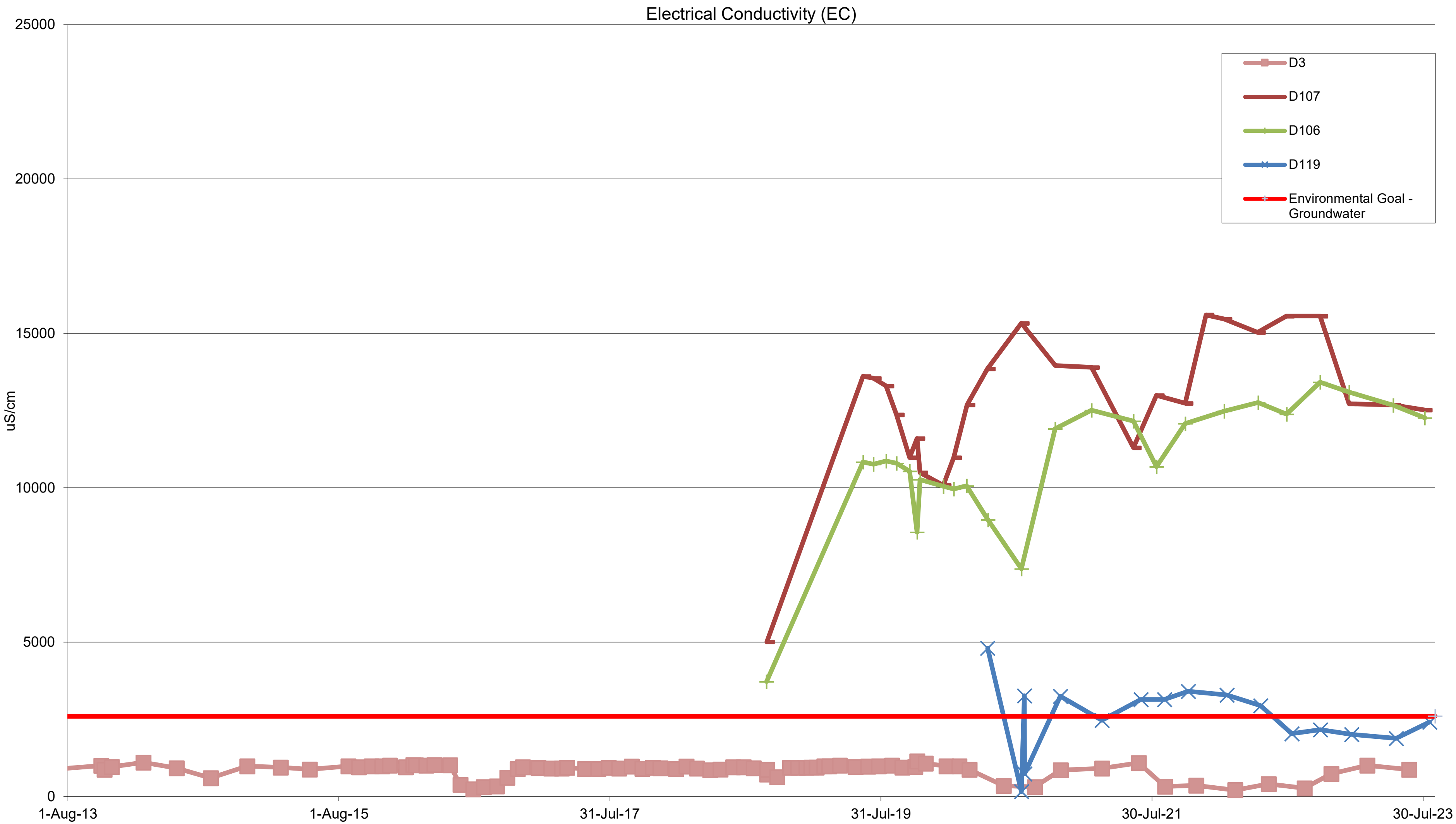

Iron-F
3000
2500
2000
1500
1000
500
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

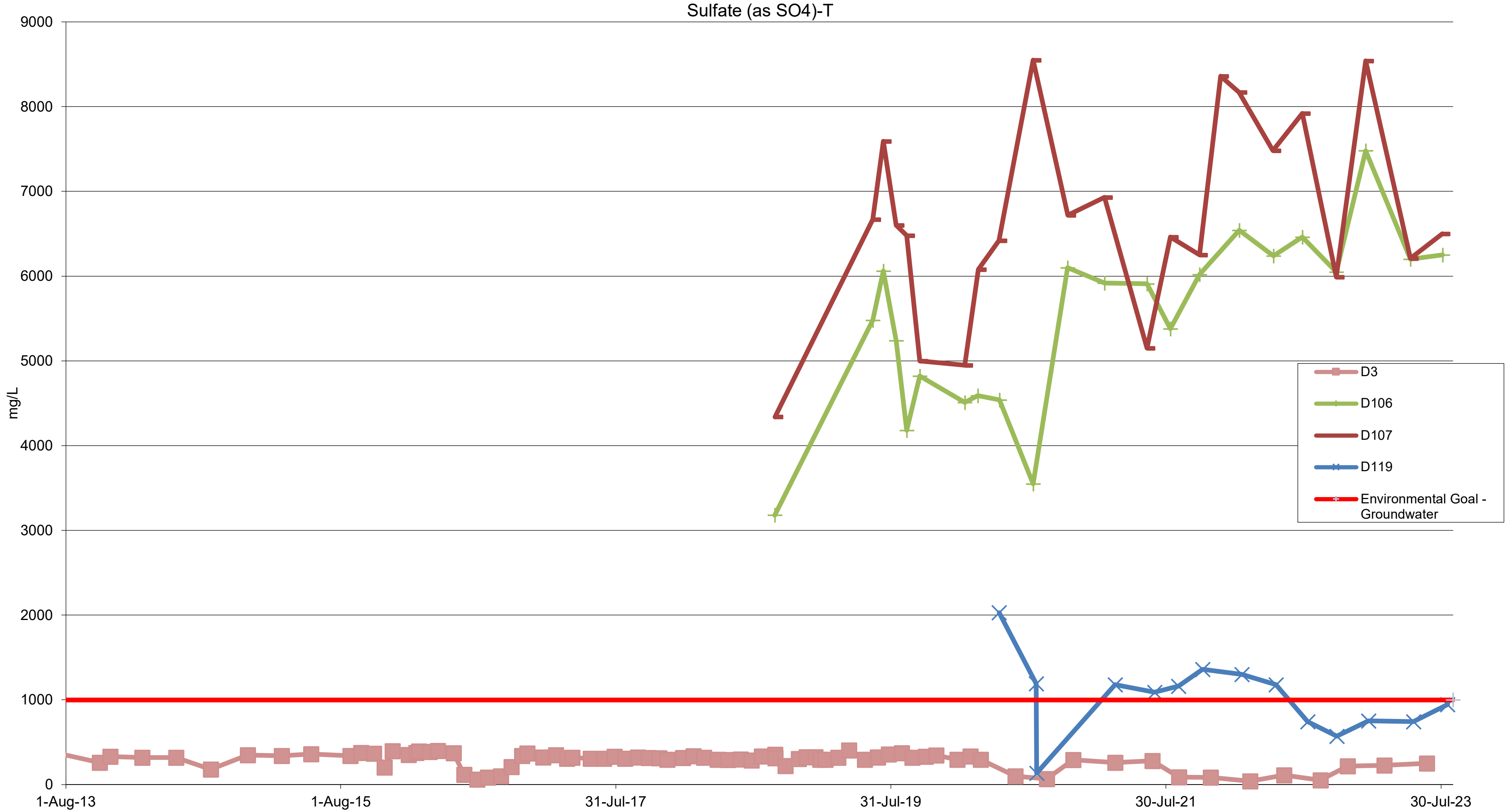

Chloride-T
mg/L
400
350
300
250
200
150
100
50
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

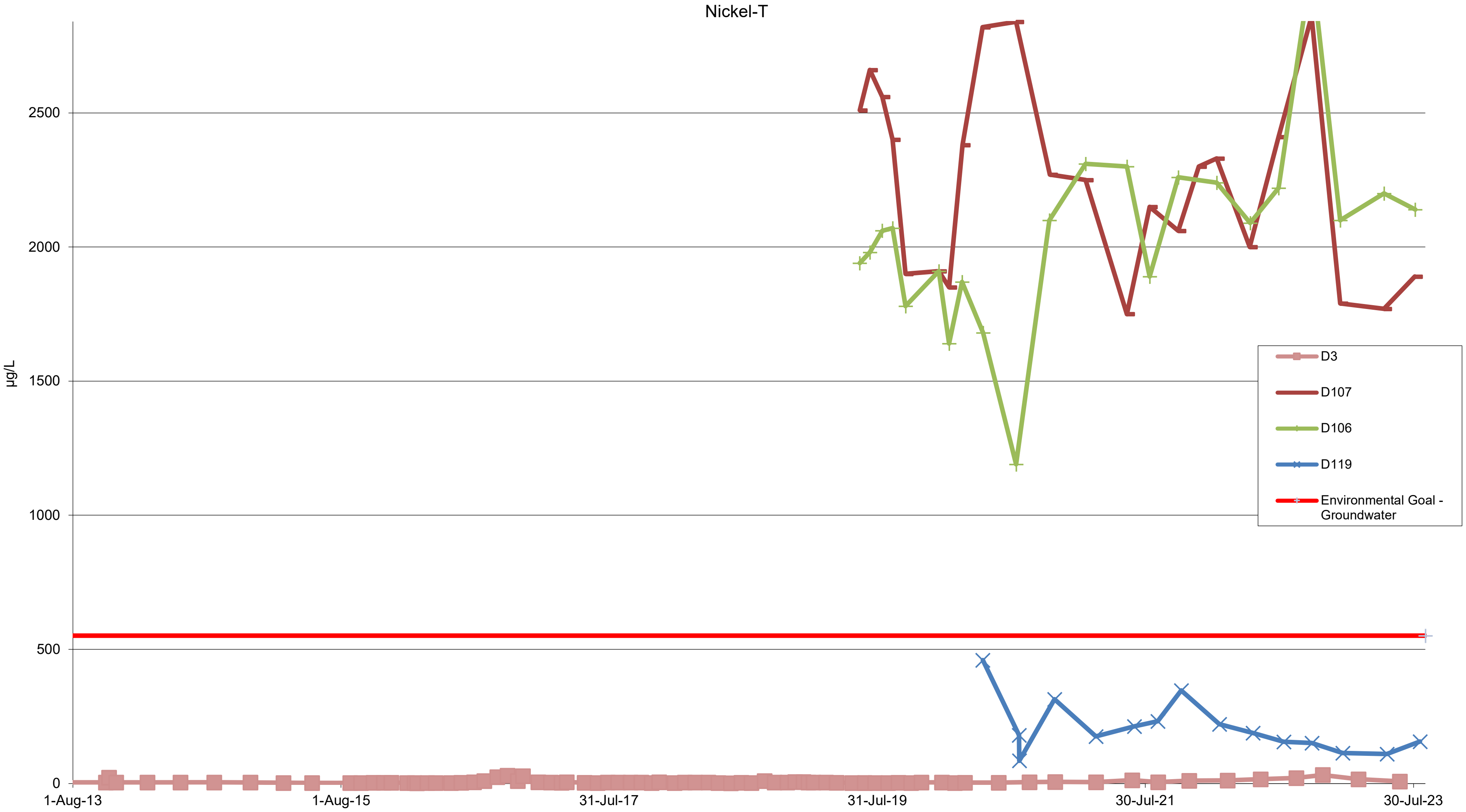

Boron-T
µg/L
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater

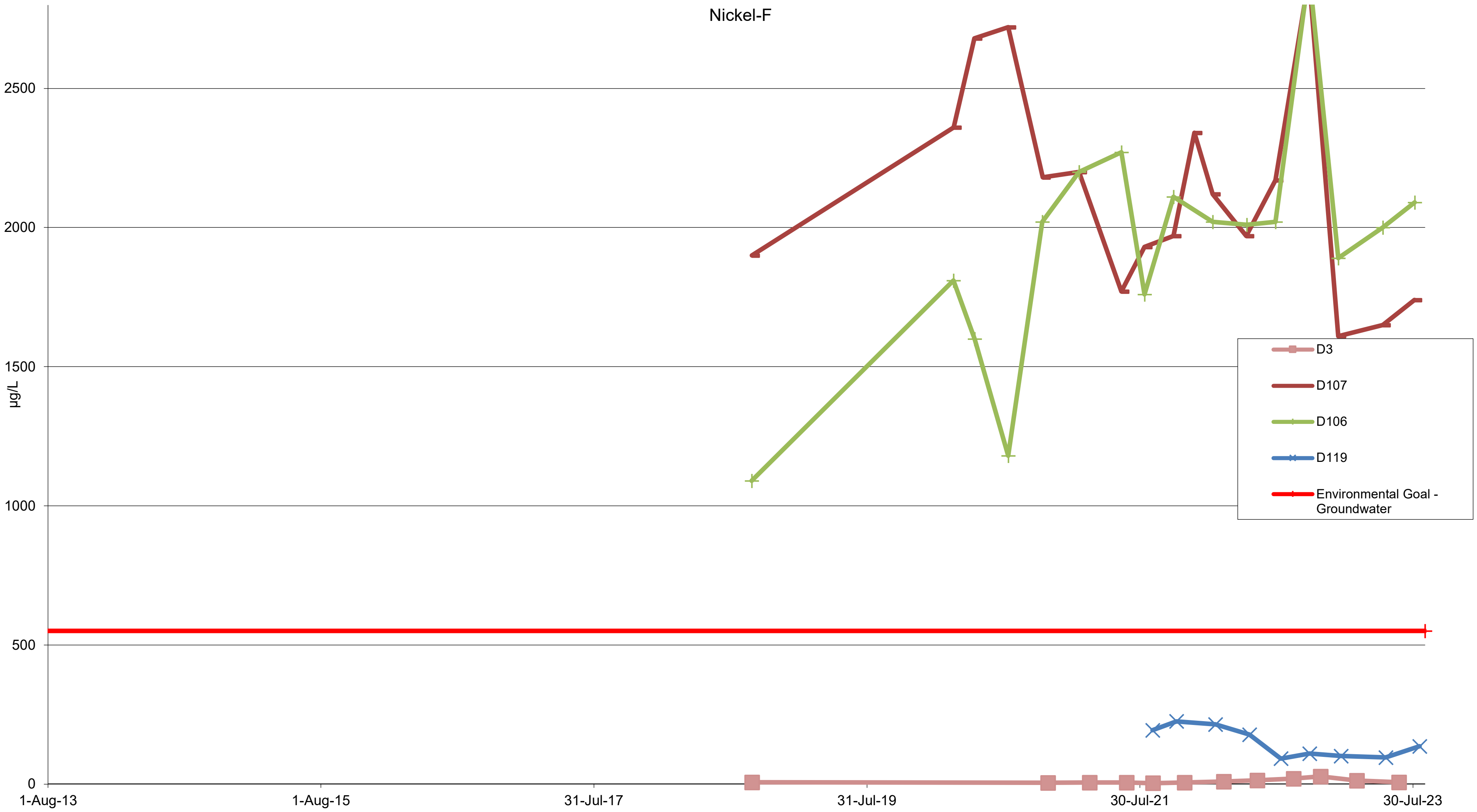

Boron-F
450
400
350
300
250
200
150
100
50
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D4
D5
Environmental Goal - Groundwater


Total Dissolved Solids (TDS)-T
mg/L
16000
14000
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater

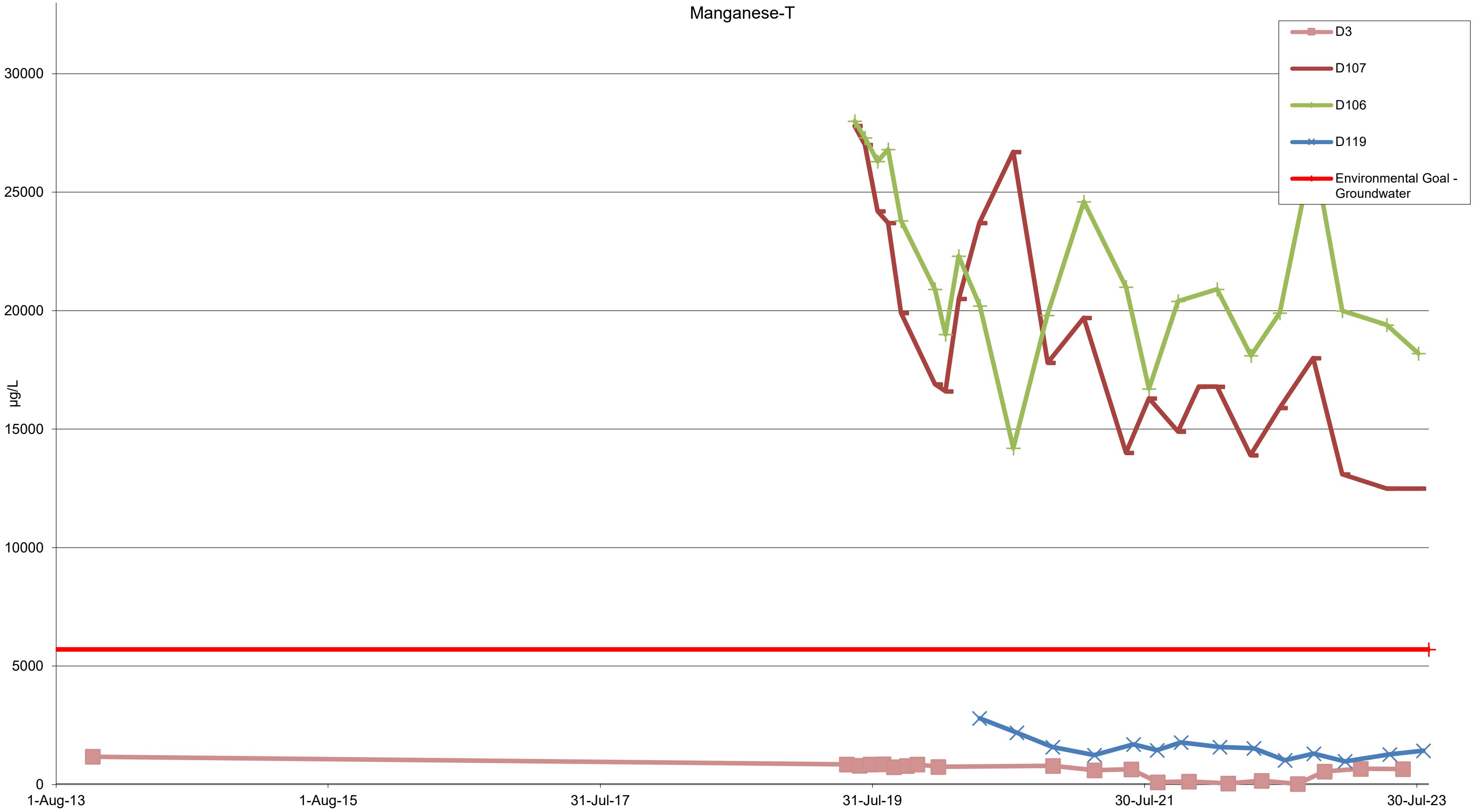

Electrical Conductivity (EC)
25000
20000
15000
10000
5000
0
uS/cm
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater

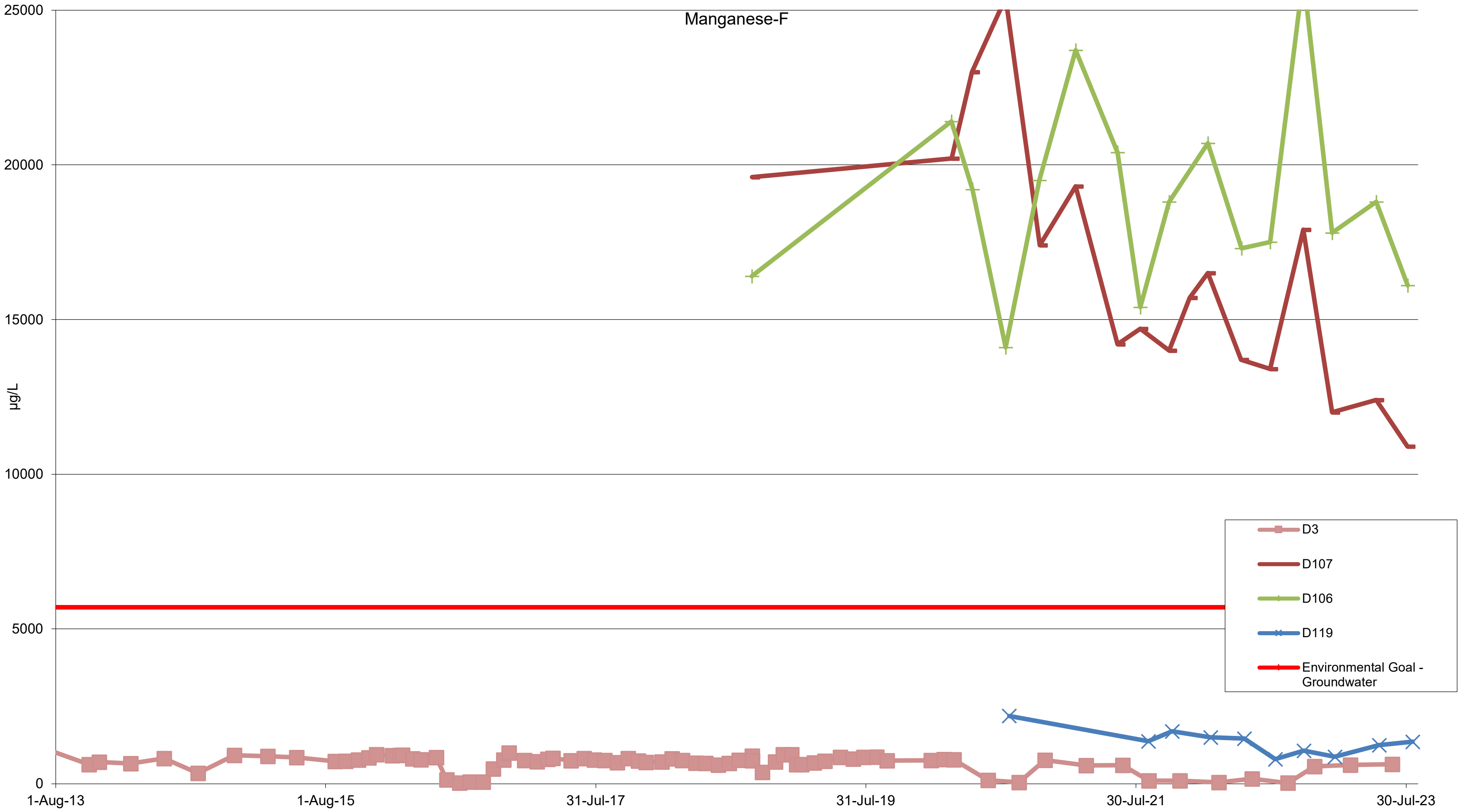

Sulfate (as SO4)-T
mg/L
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D106
D107
D119
Environmental Goal - Groundwater

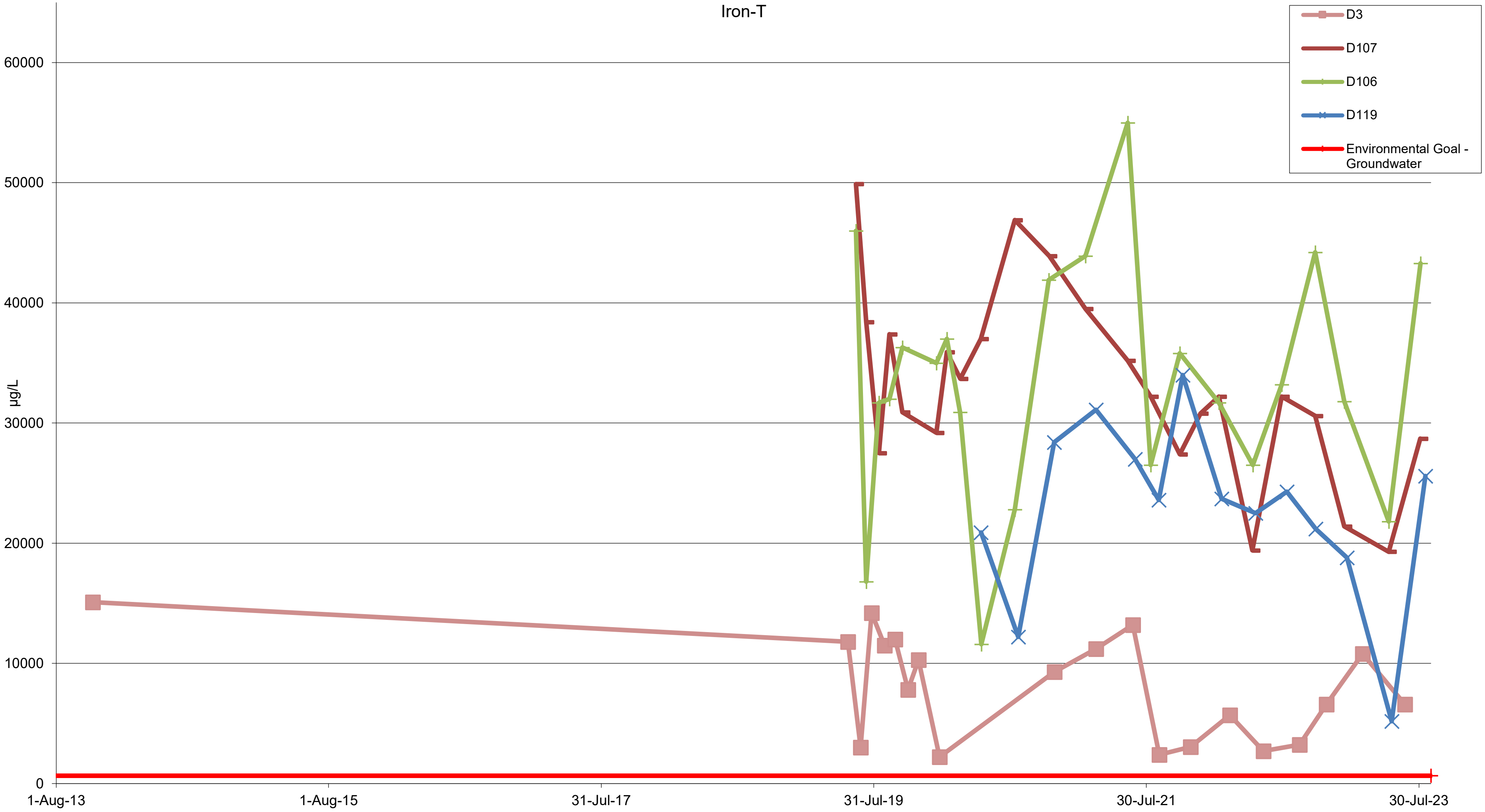

Nickel-T
µg/L
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater


Nickel-F
µg/L
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater

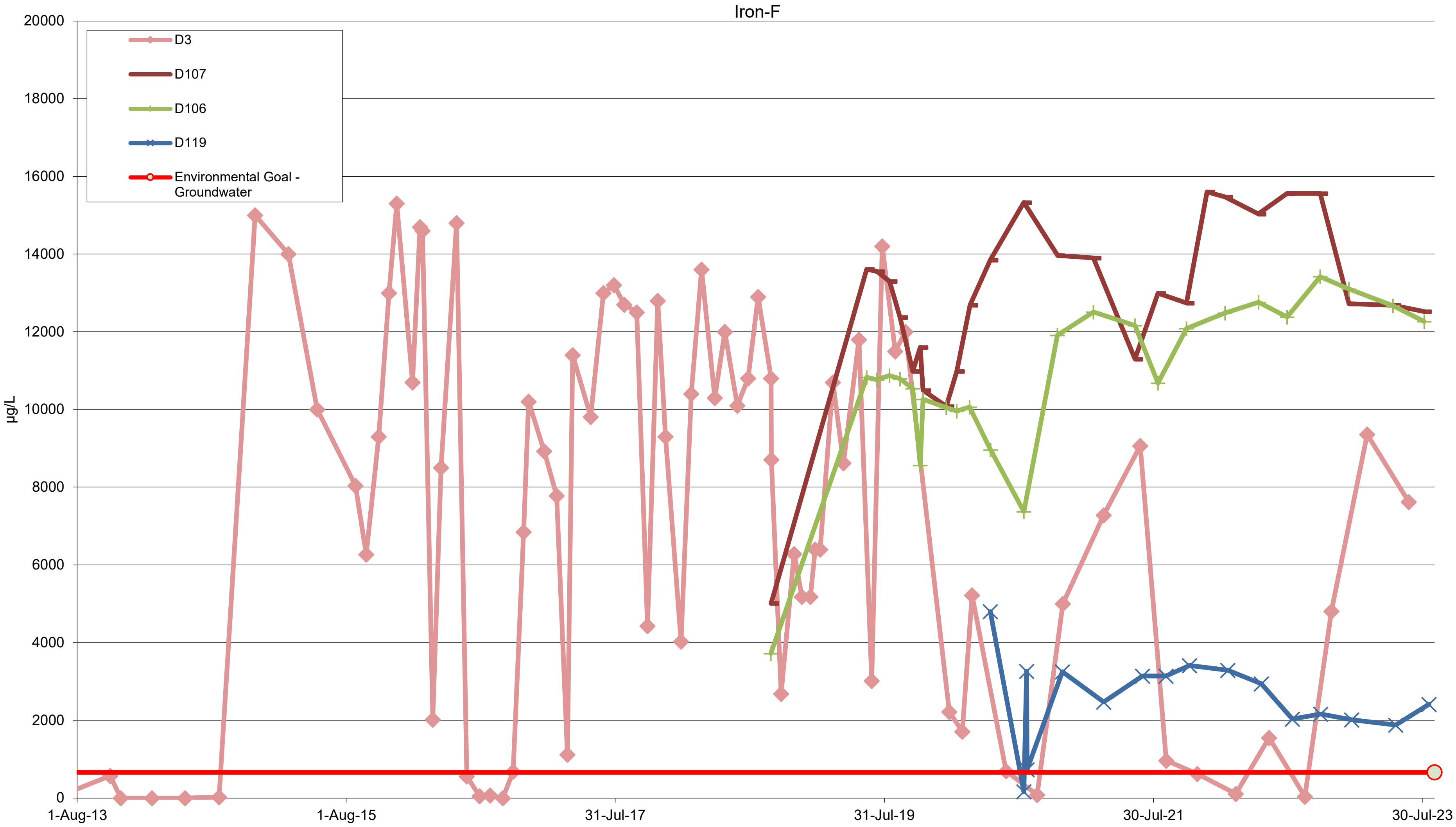
Appendix F. Upgradient / Adjacent the MPAR - Manganese (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

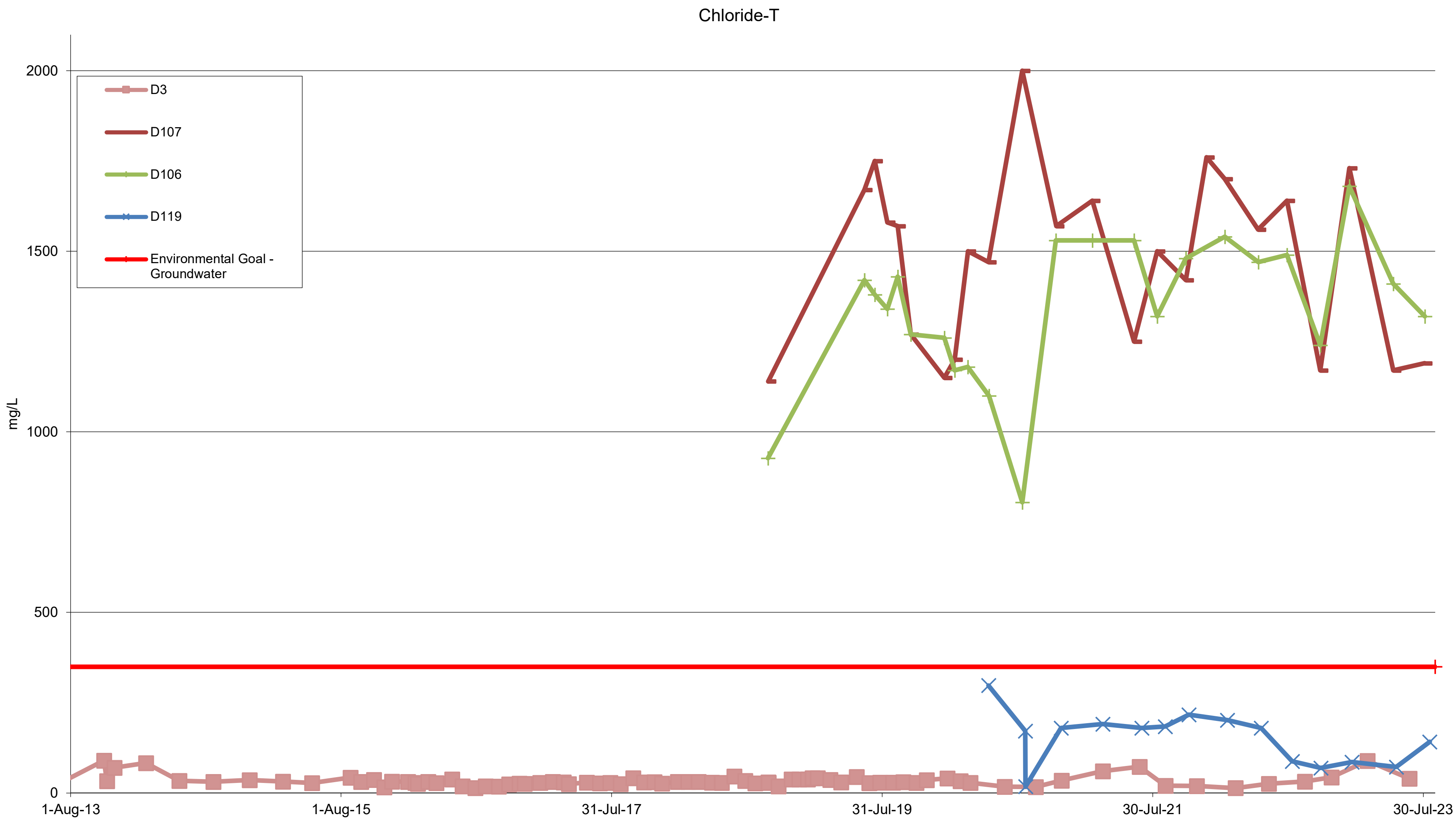


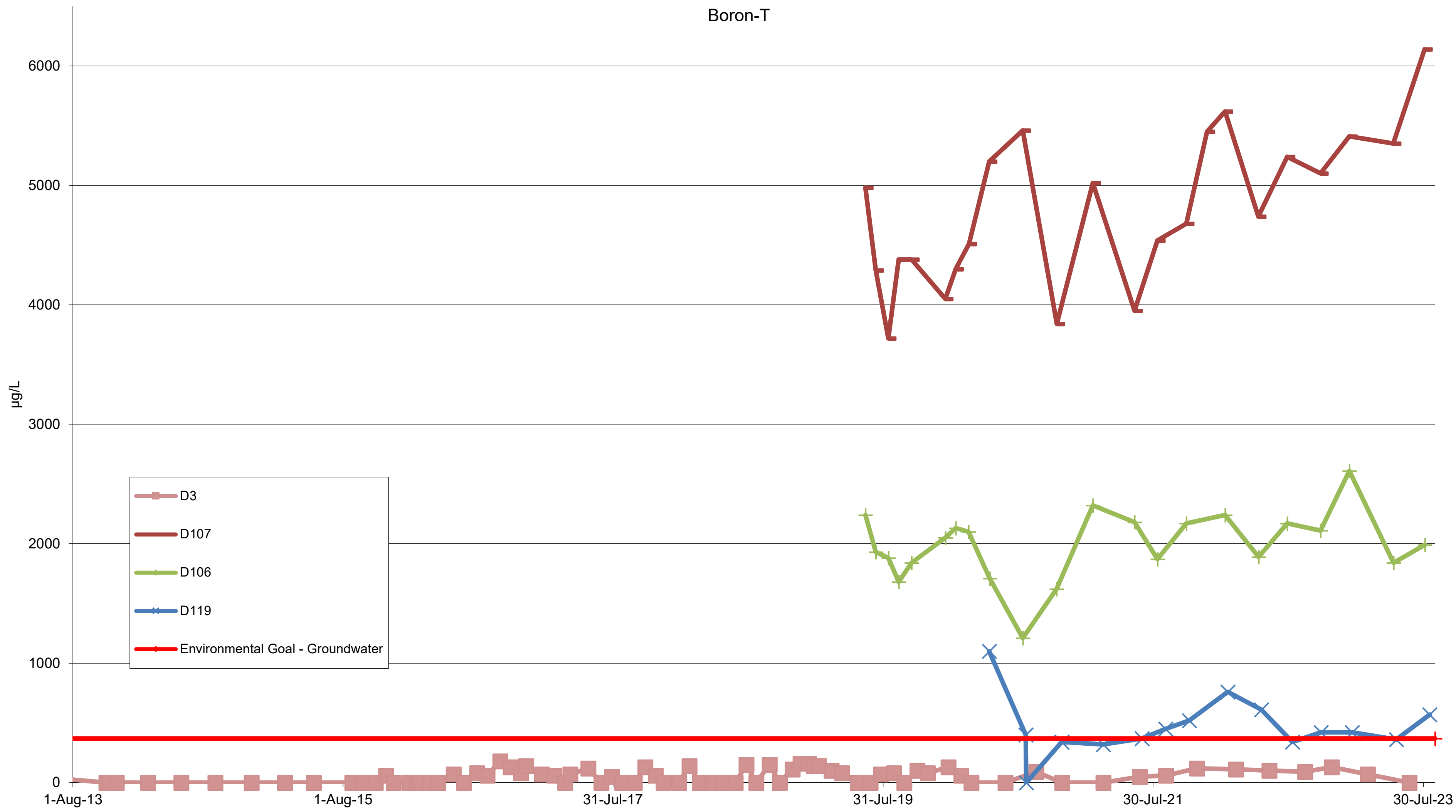

Manganese-F
µg/L
25000
20000
15000
10000
5000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater

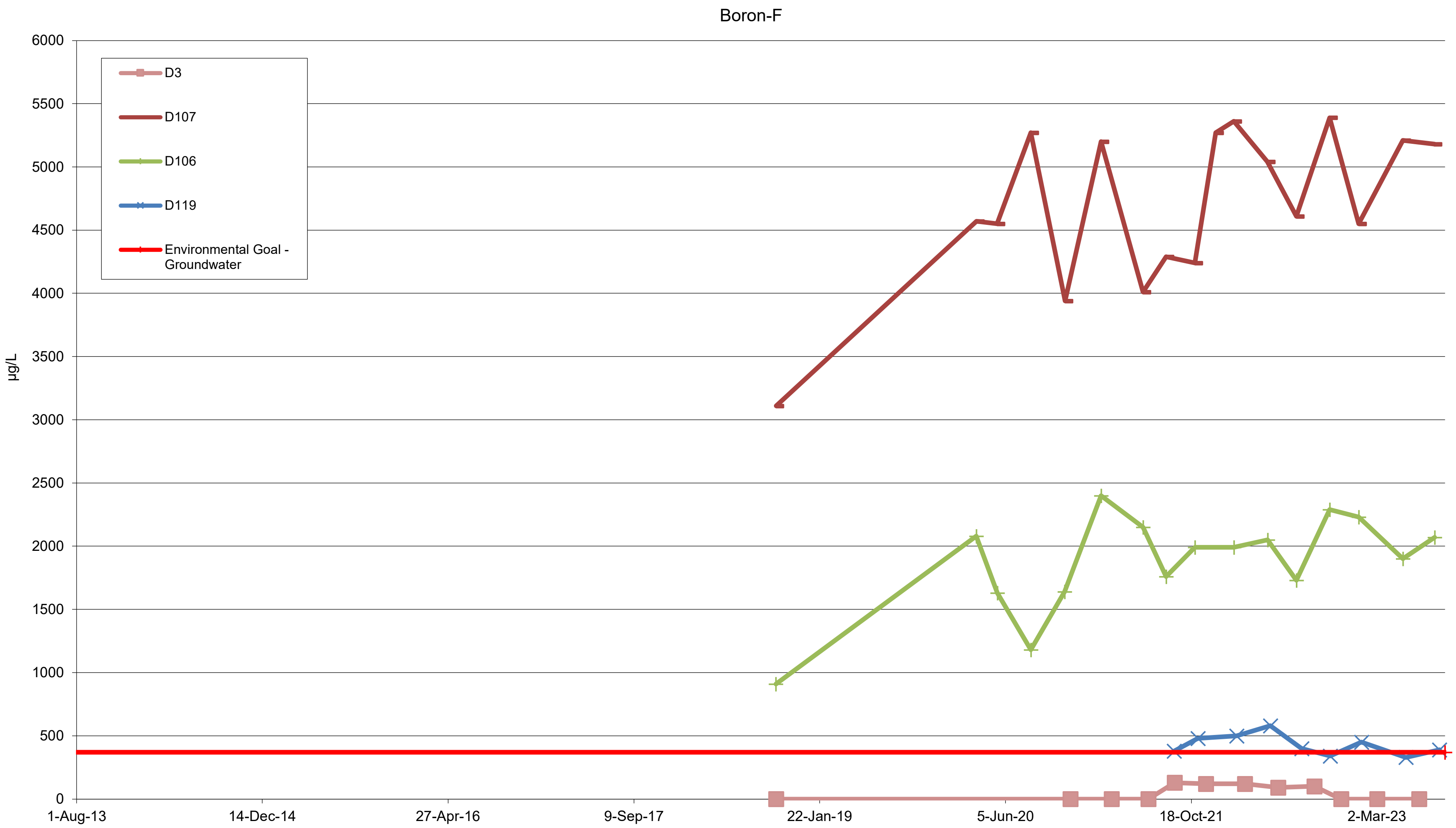

Iron-T
µg/L
60000
50000
40000
30000
20000
10000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater

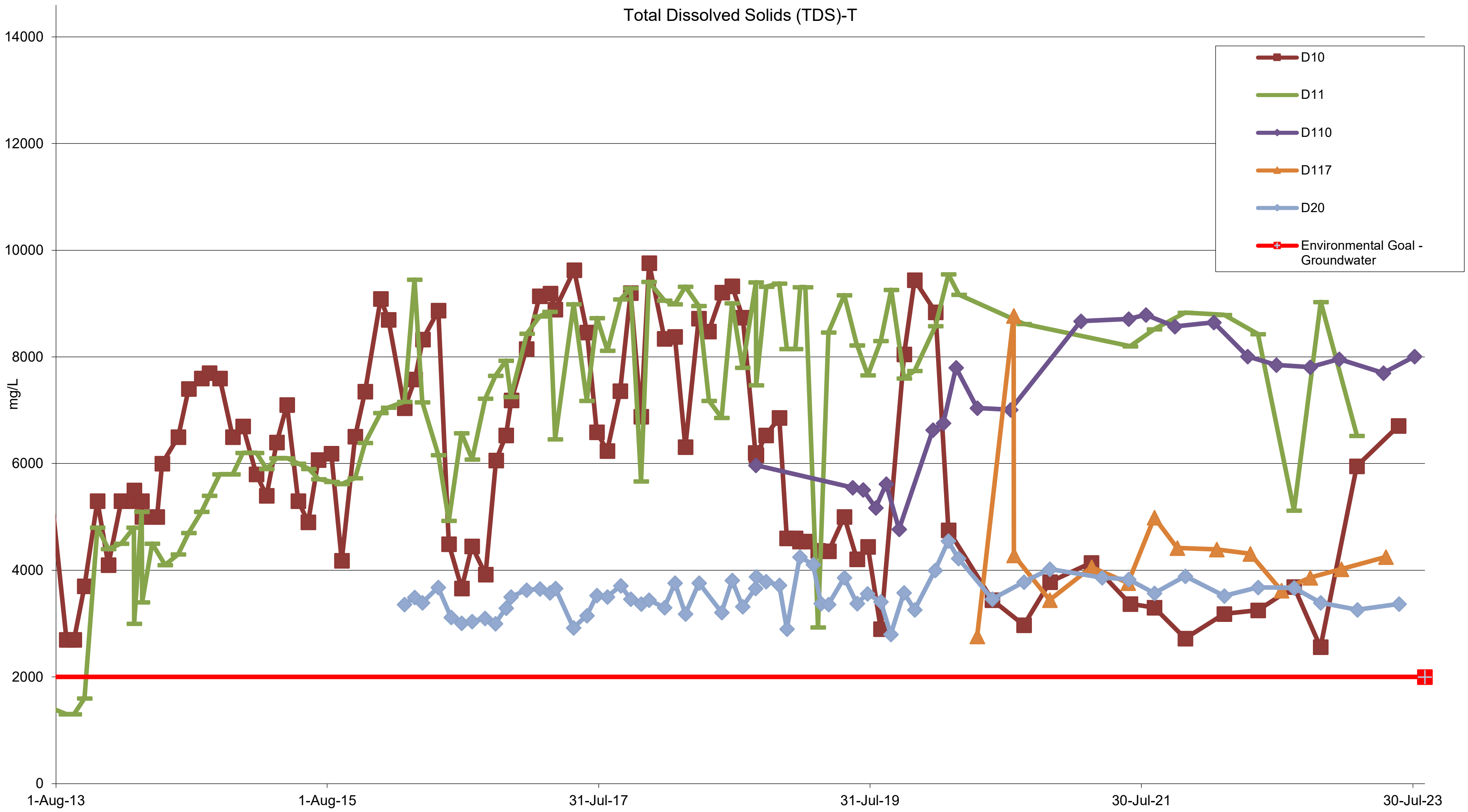
Appendix F. Upgradient / Adjacent the MPAR - Iron (Filtered) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

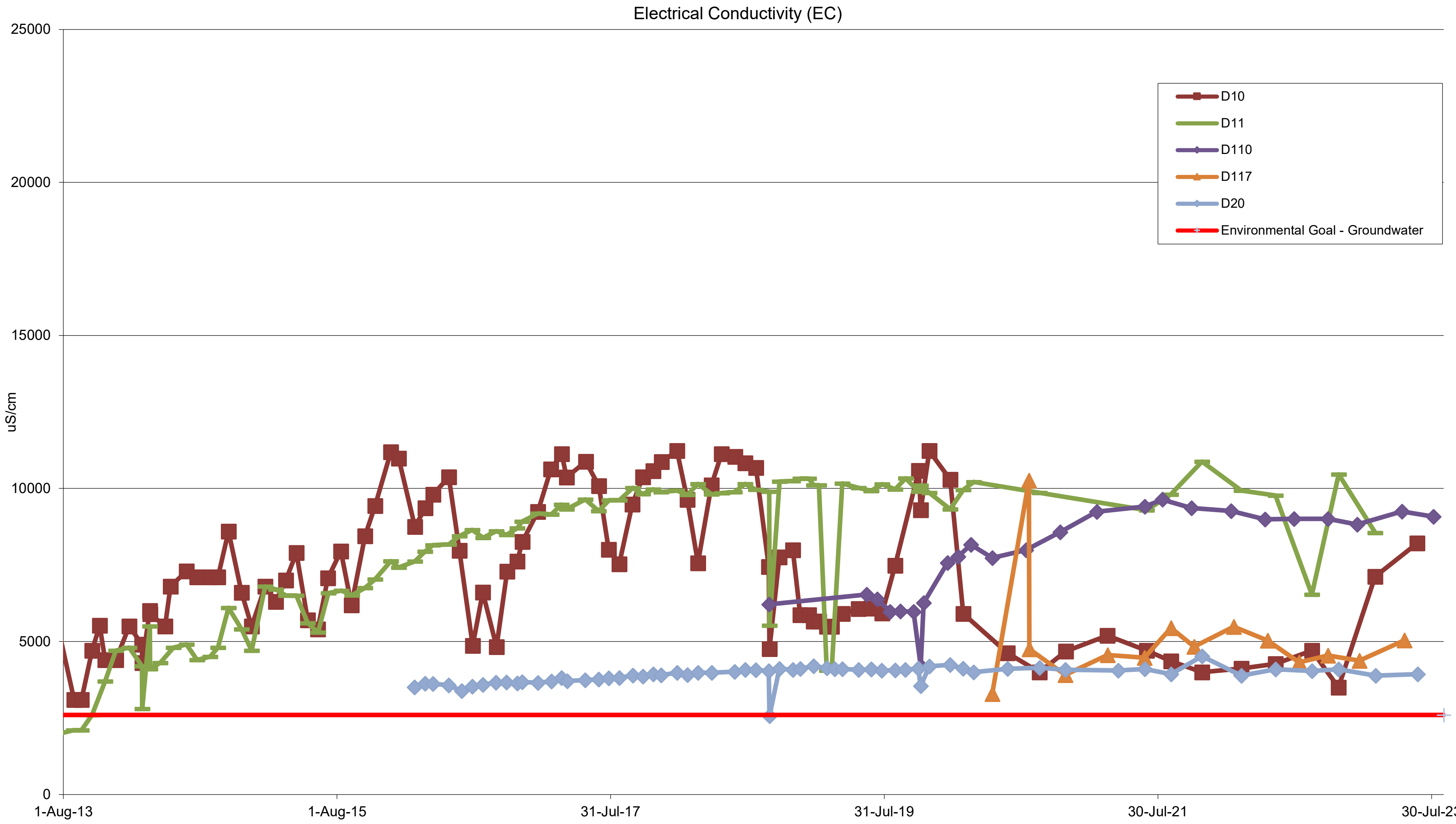



Chloride-T
mg/L
2000
1500
1000
500
0
D3
D107
D106
D119
Environmental Goal - Groundwater
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23

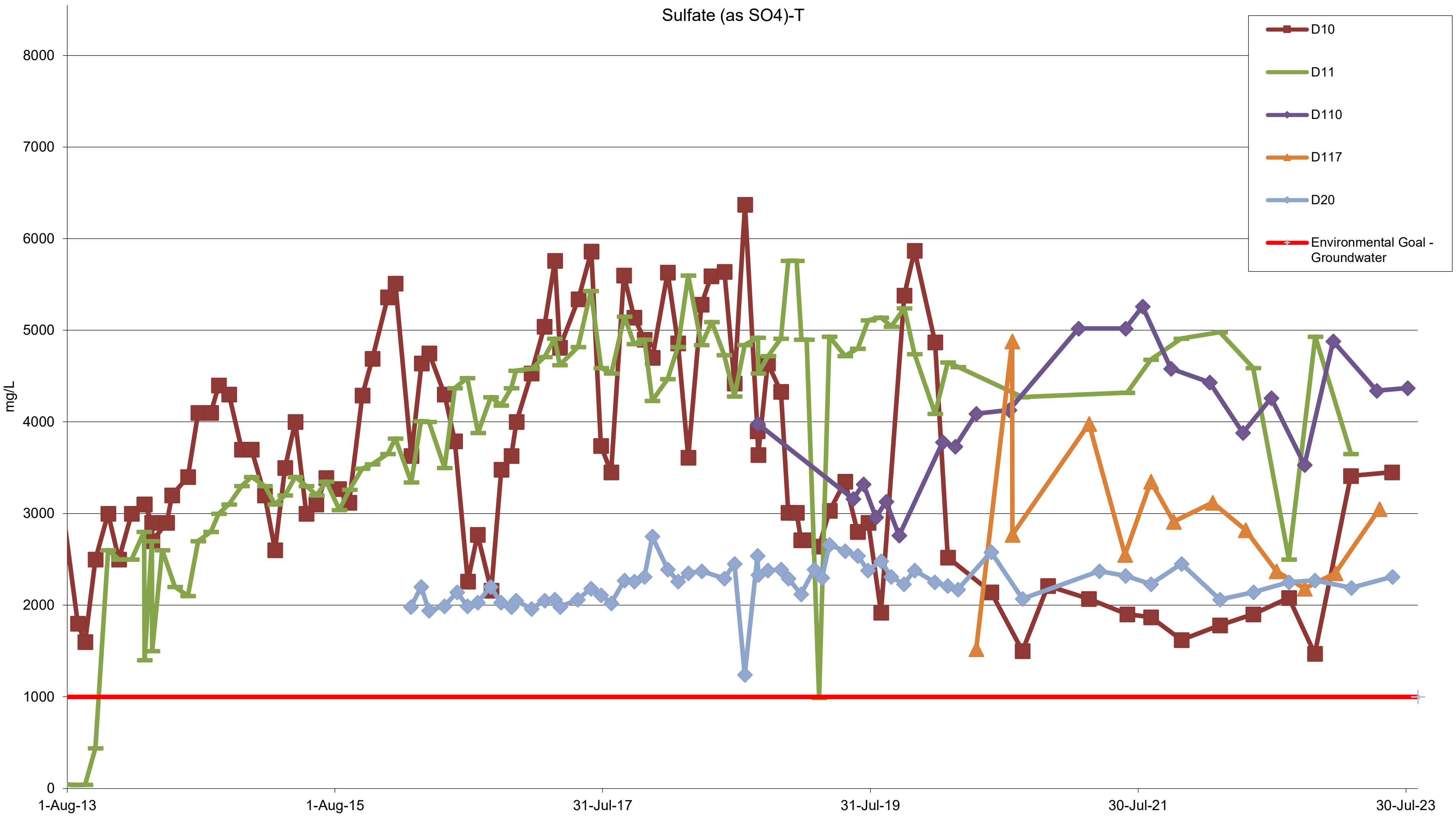

Boron-T
µg/L
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D3
D107
D106
D119
Environmental Goal - Groundwater


Boron-F
µg/L
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1-Aug-13
14-Dec-14
27-Apr-16
9-Sep-17
22-Jan-19
5-Jun-20
18-Oct-21
2-Mar-23
D3
D107
D106
D119
Environmental Goal - Groundwater

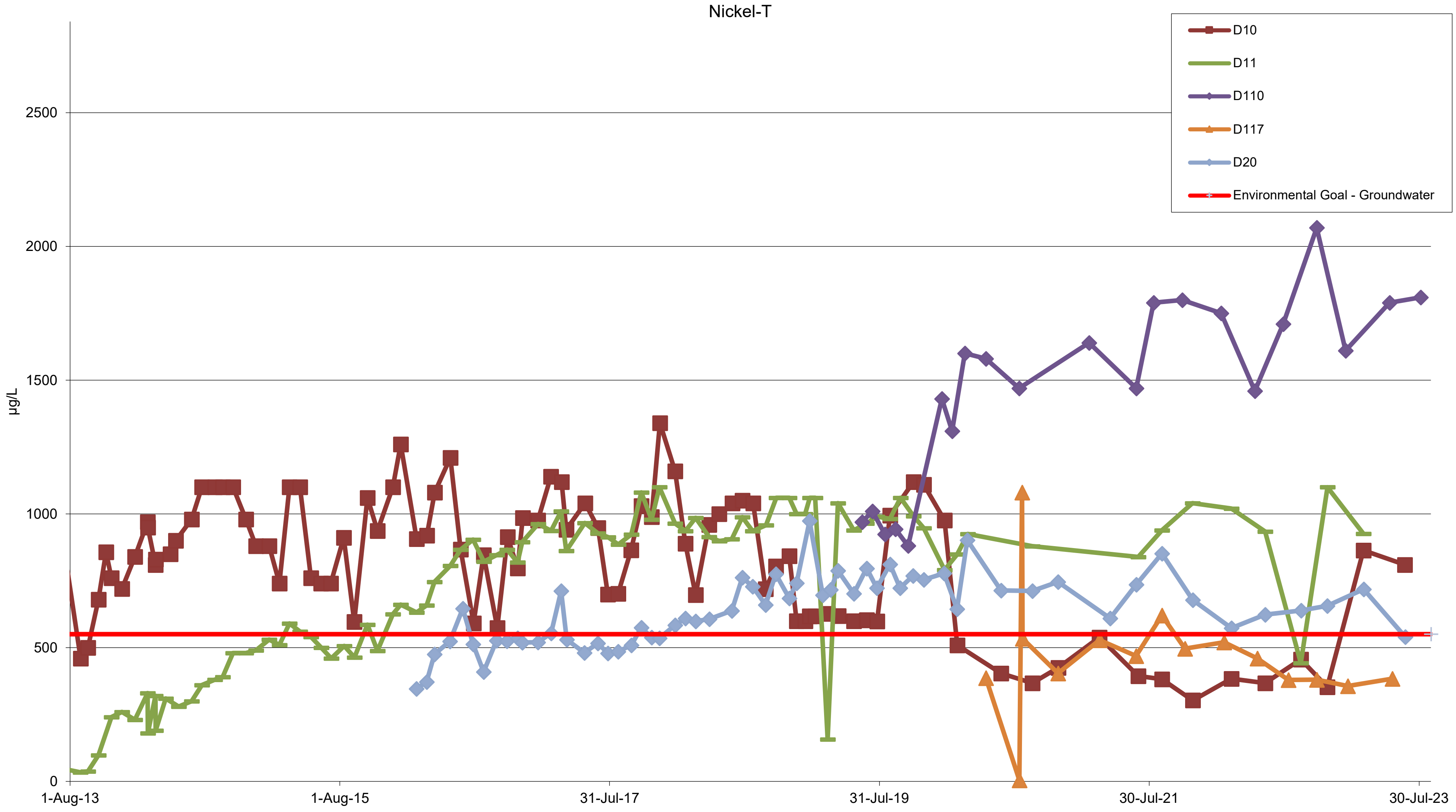

Total Dissolved Solids (TDS)-T
mg/L
14000
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

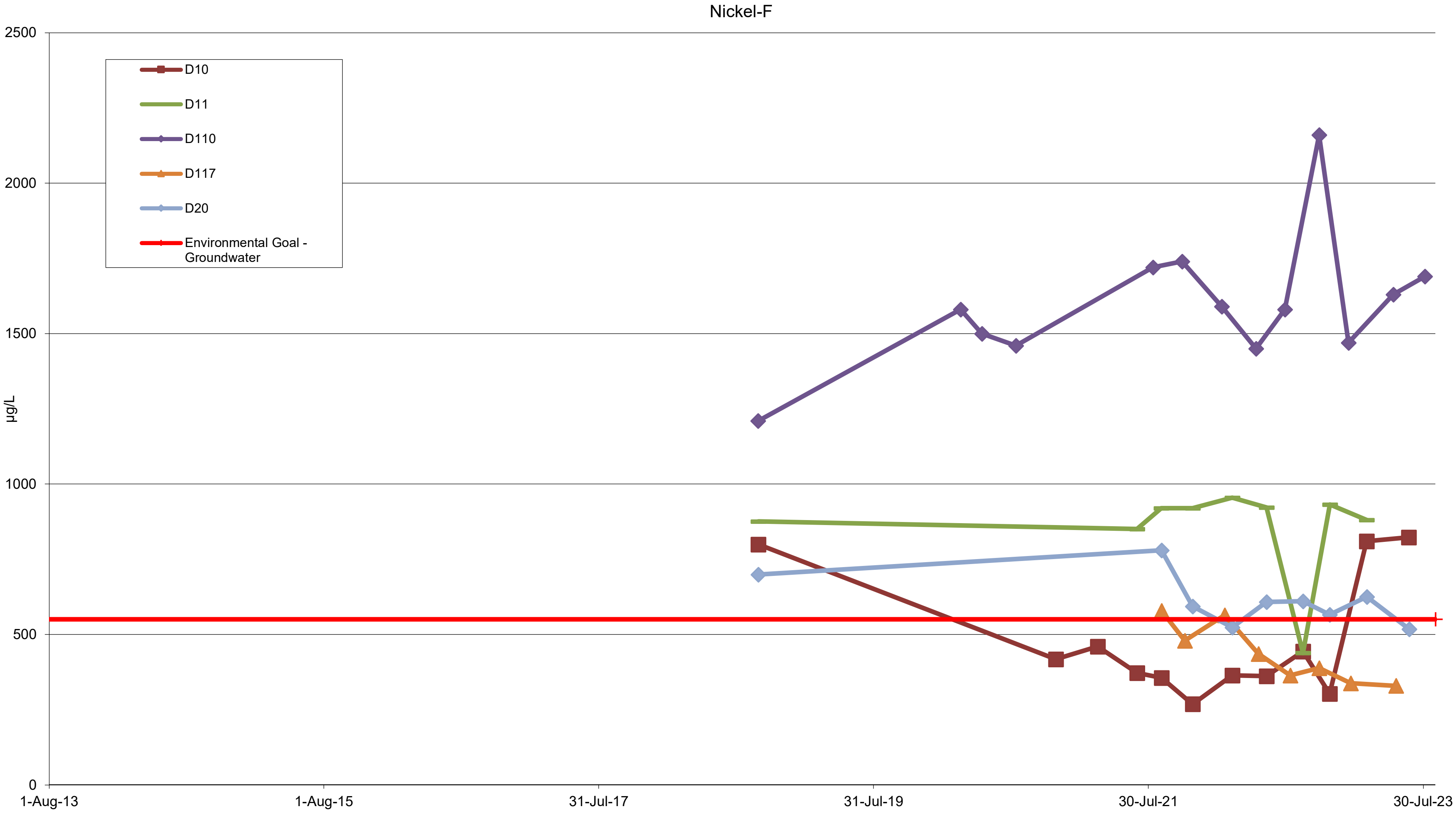

Electrical Conductivity (EC)
25000
20000
15000
10000
5000
0
uS/cm
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

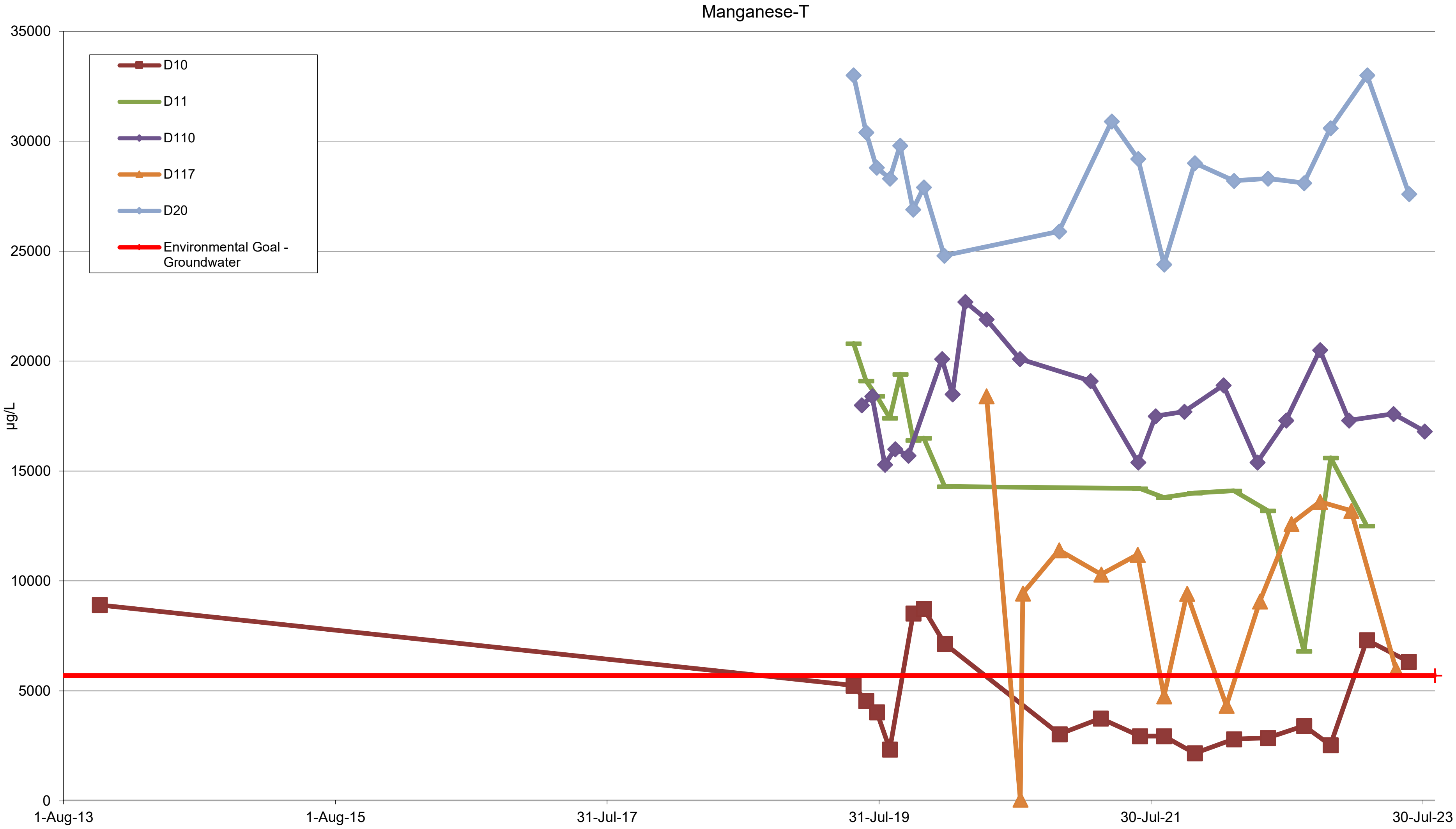
Appendix F. Within / Immediately Adjacent LNAR North - Sulfate (as SO4) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

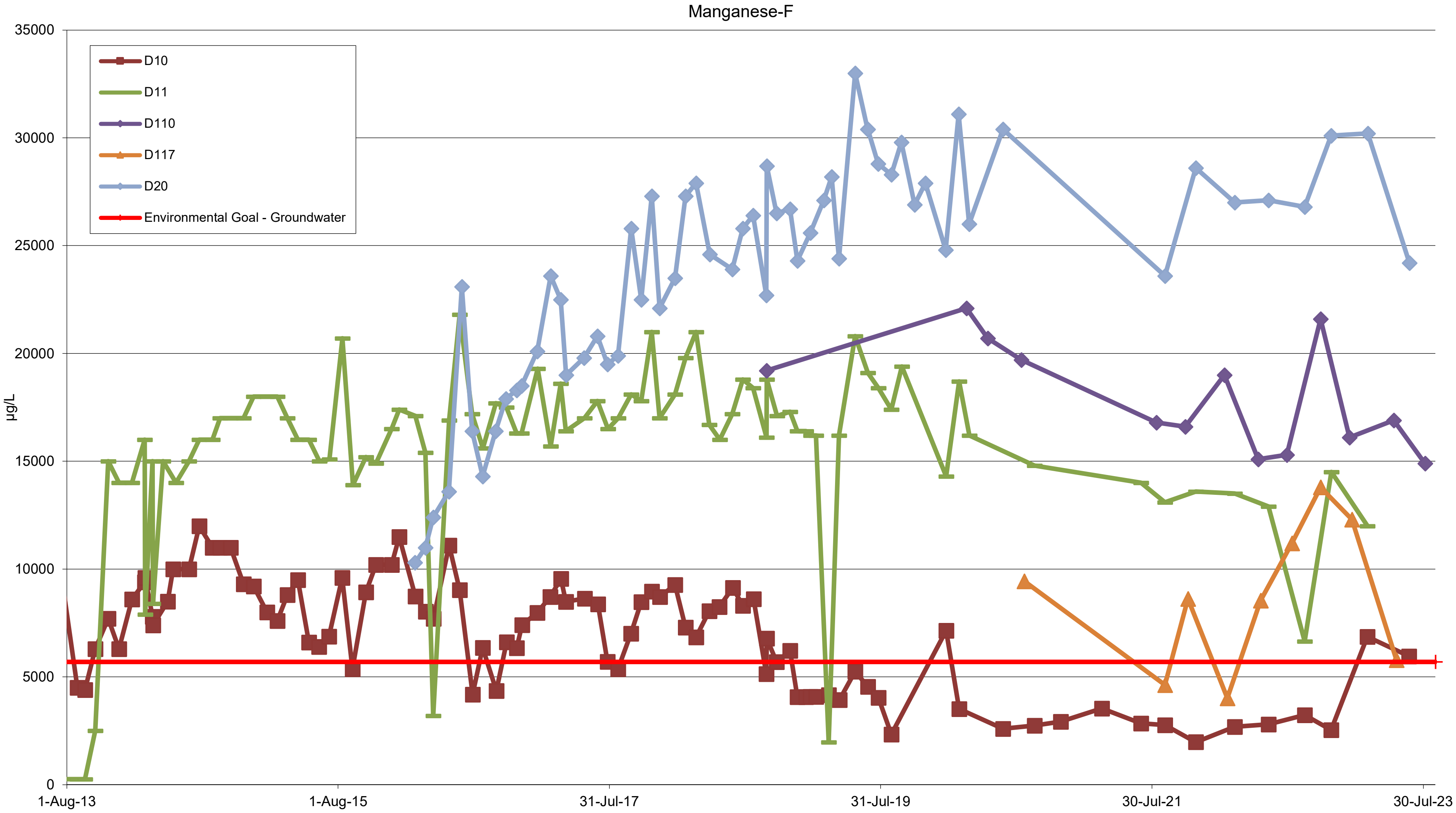


Appendix F. Within / Immediately Adjacent LNAR North - Nickel (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

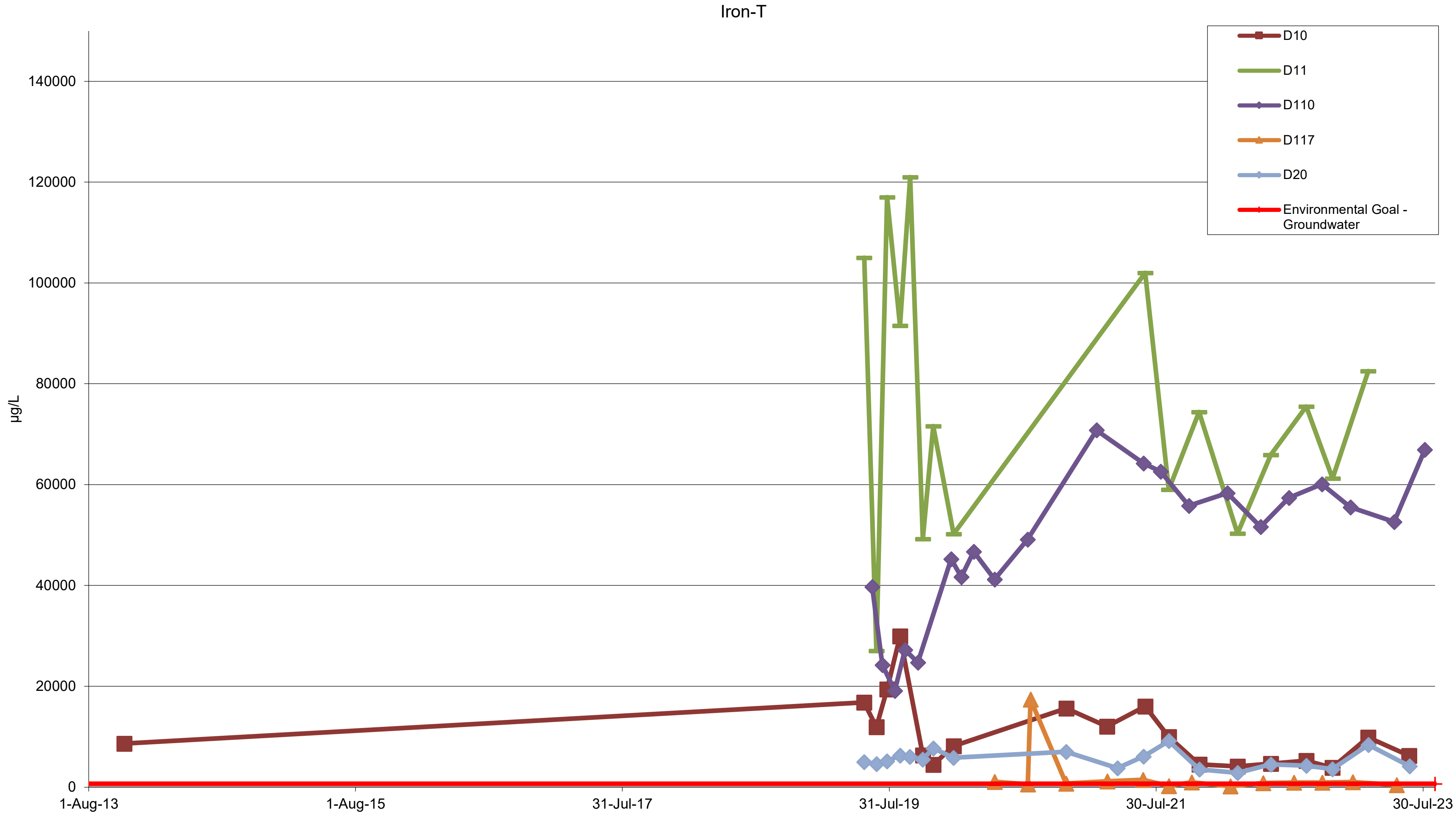


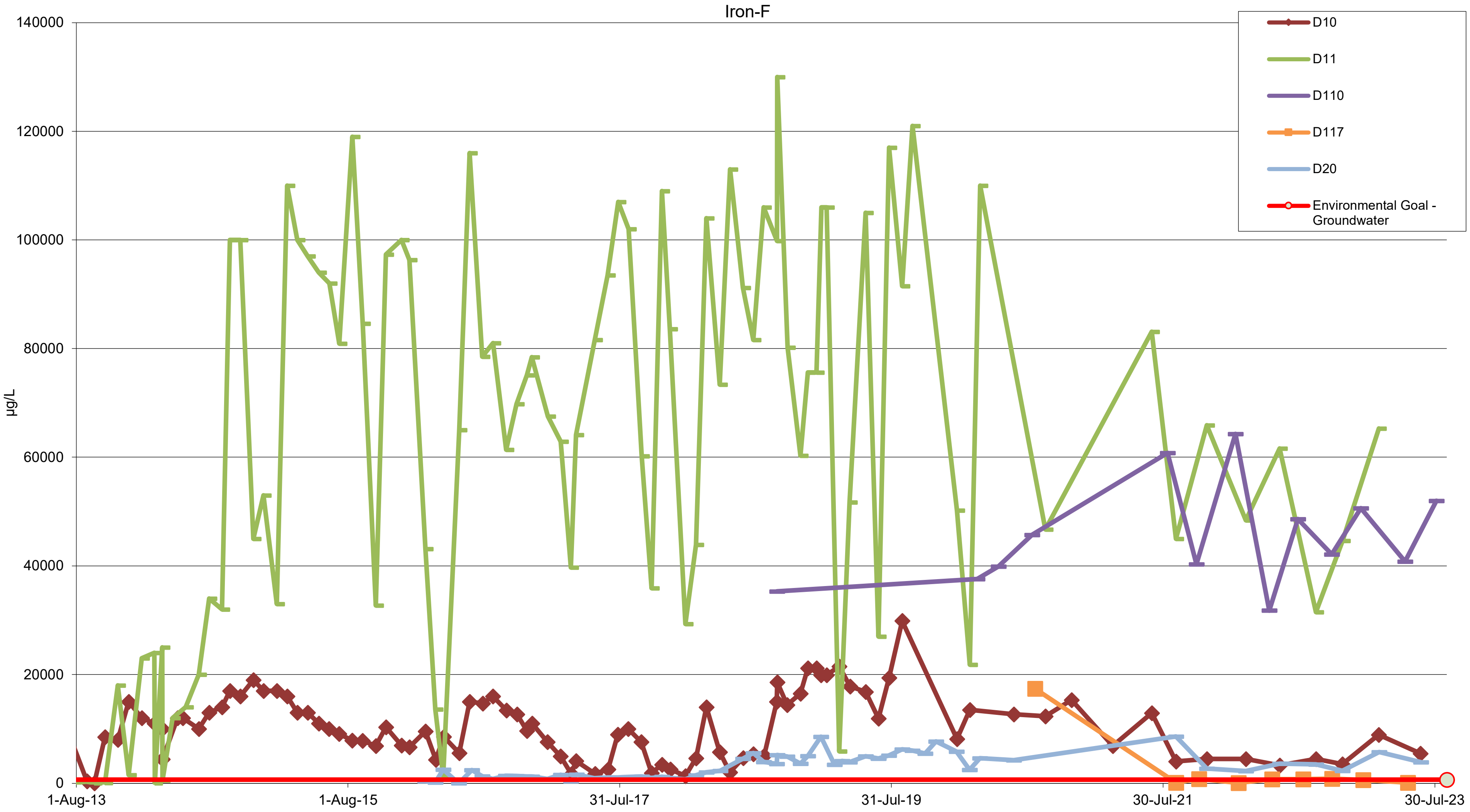

Nickel-F
2500
2000
1500
1000
500
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

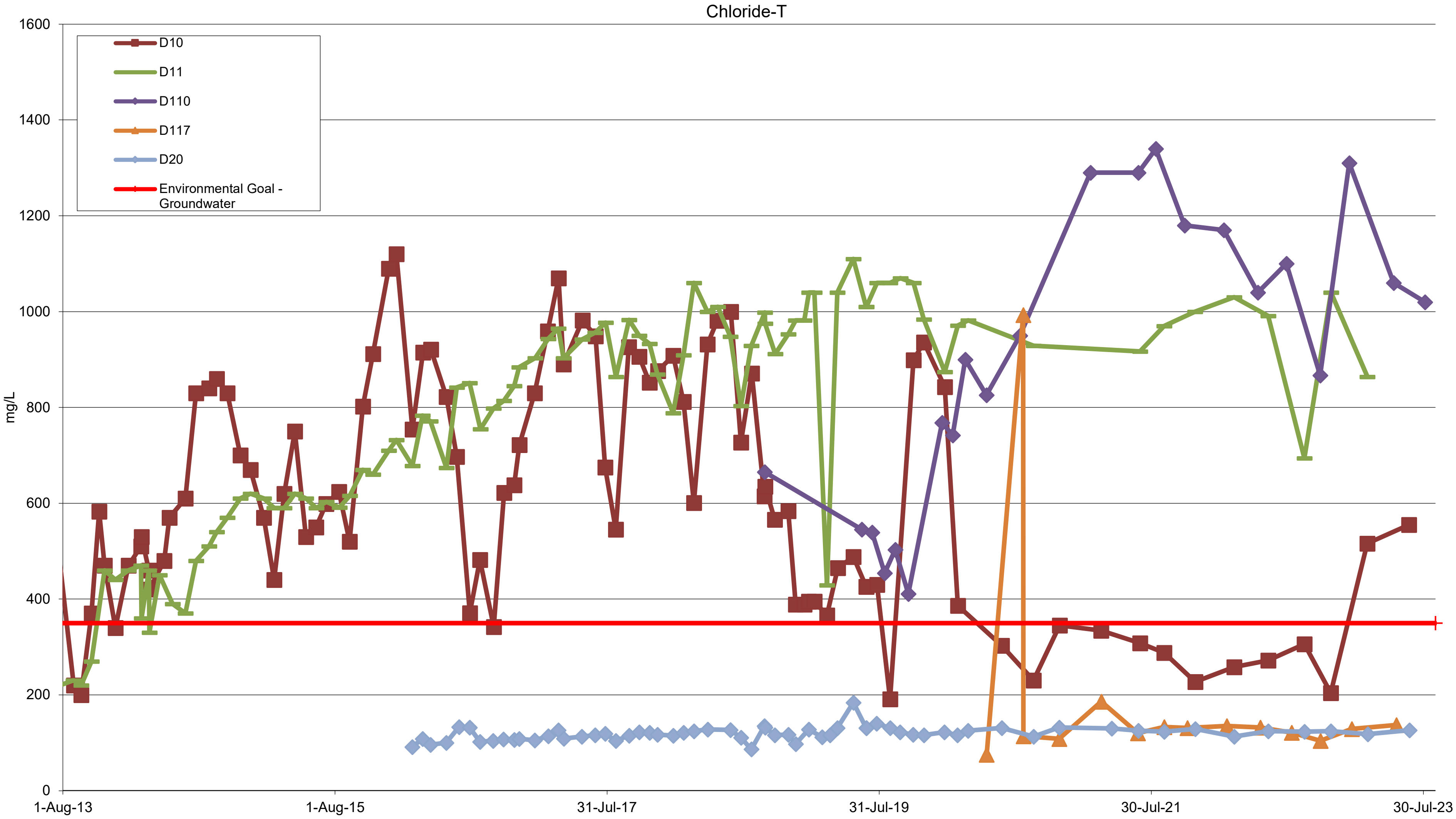

Manganese-T
µg/L
35000
30000
25000
20000
15000
10000
5000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

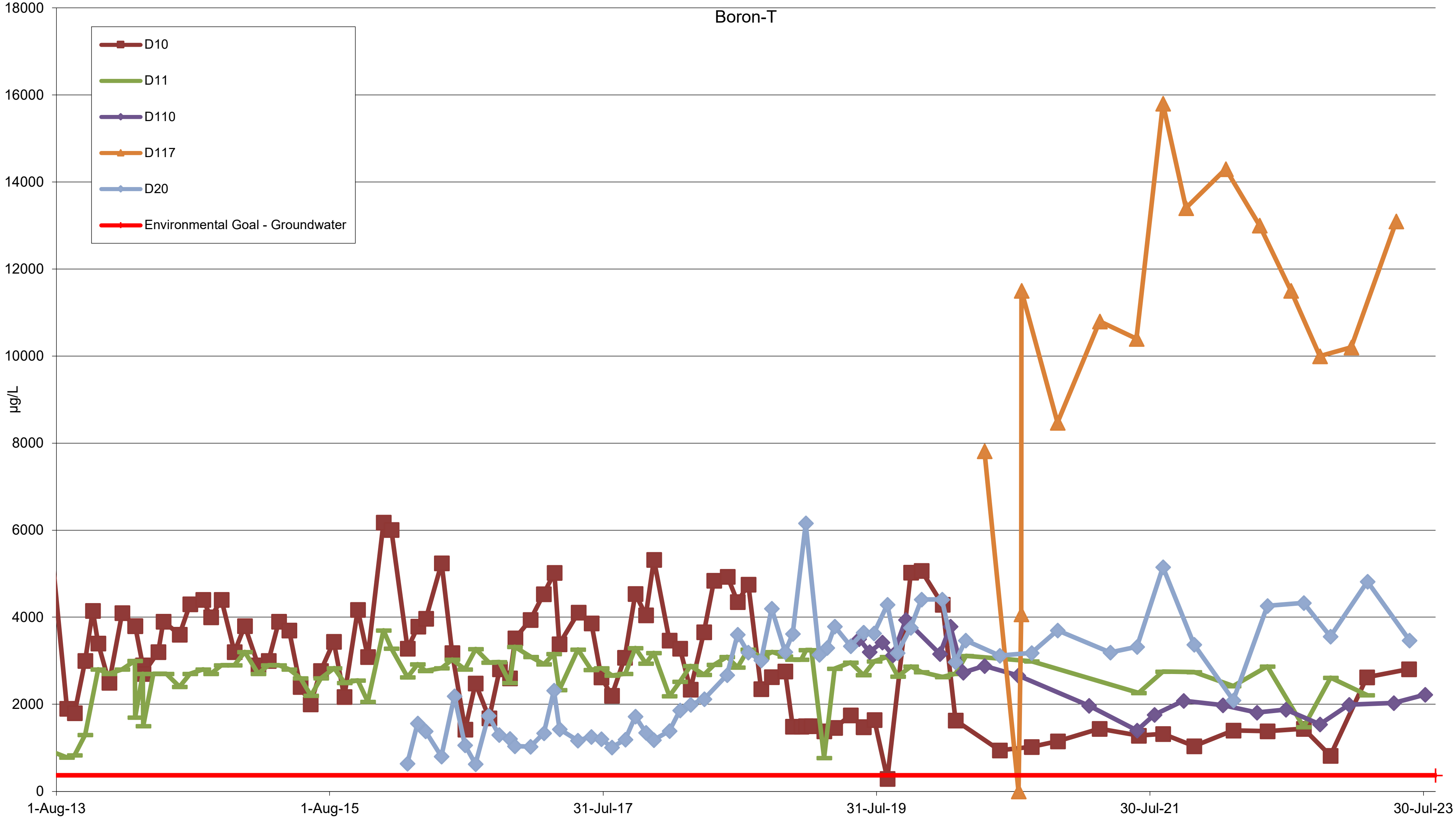

Manganese-F
35000
30000
25000
20000
15000
10000
5000
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

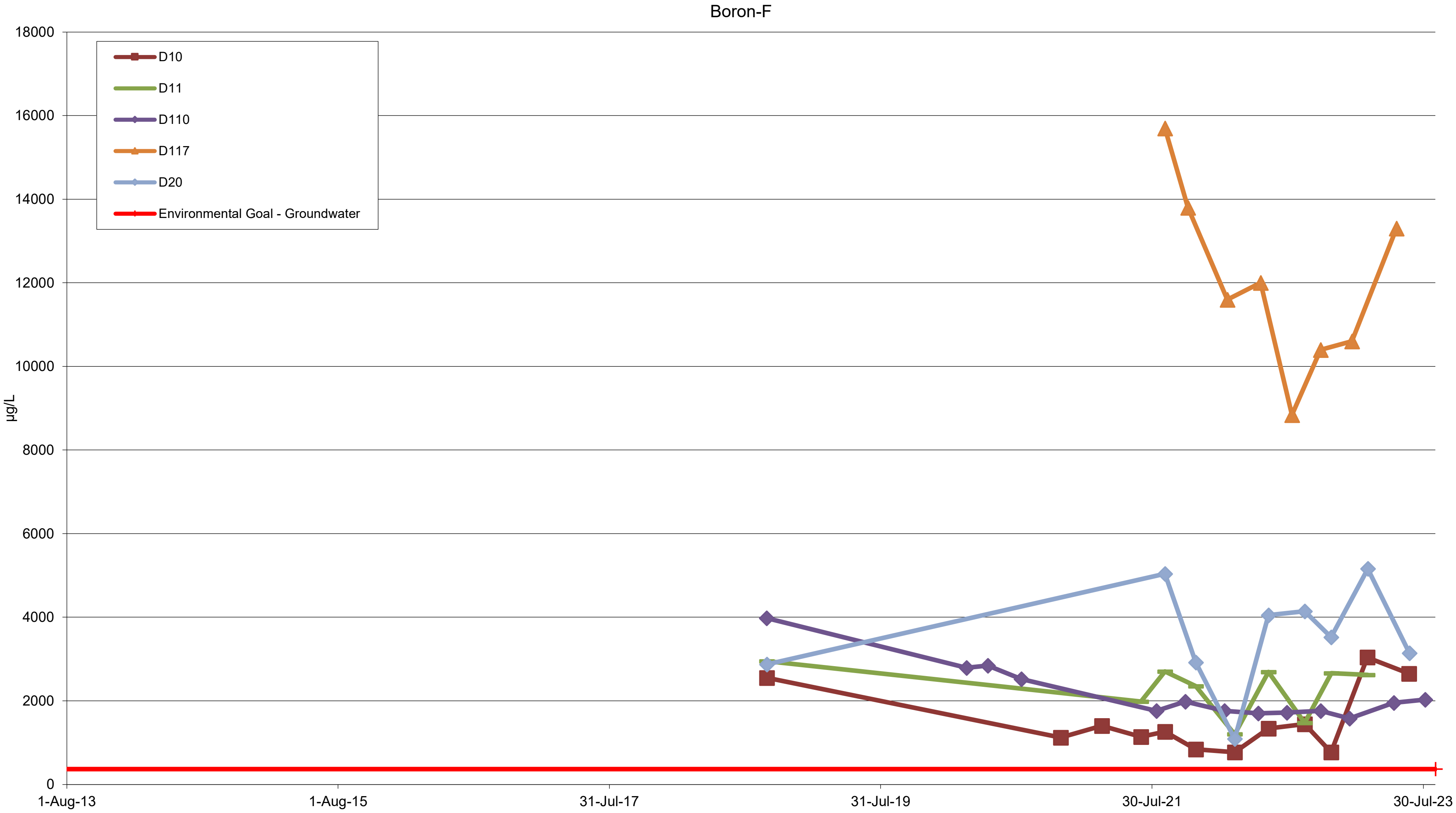
Appendix F. Within / Immediately Adjacent LNAR North - Iron (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983



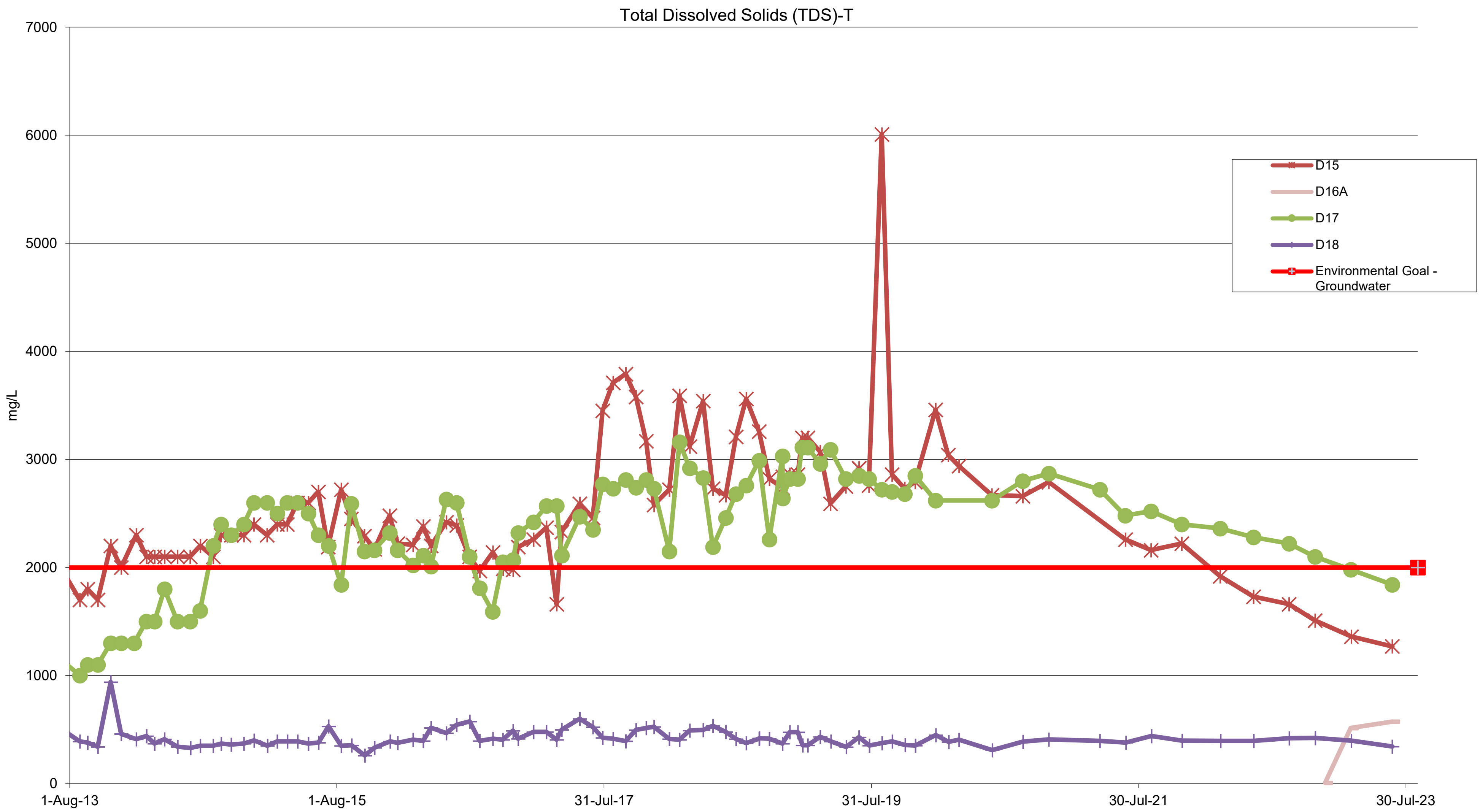

Iron-F
140000
120000
100000
80000
60000
40000
20000
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

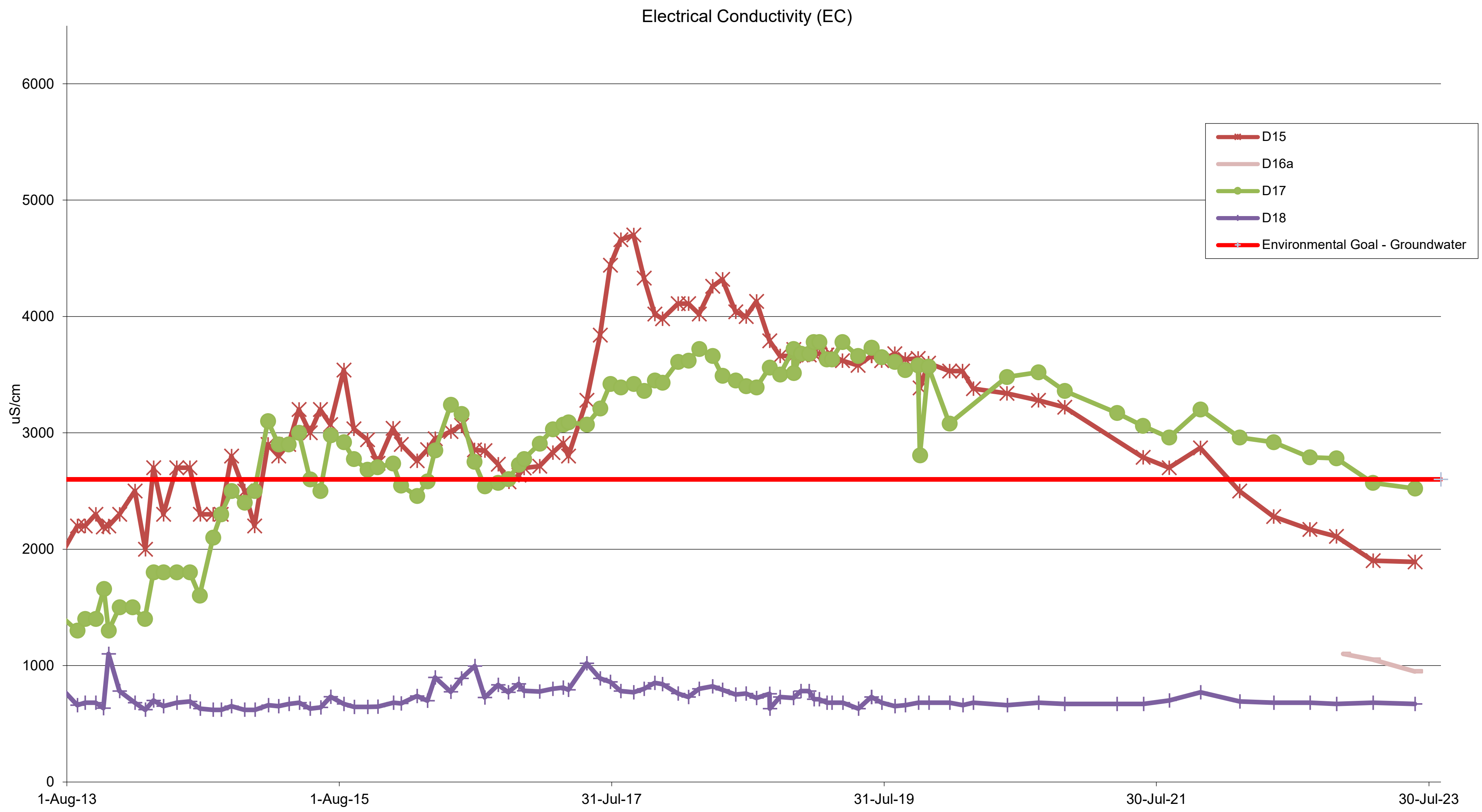

Chloride-T
mg/L
1600
1400
1200
1000
800
600
400
200
0
D10
D11
D110
D117
D20
Environmental Goal - Groundwater
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23

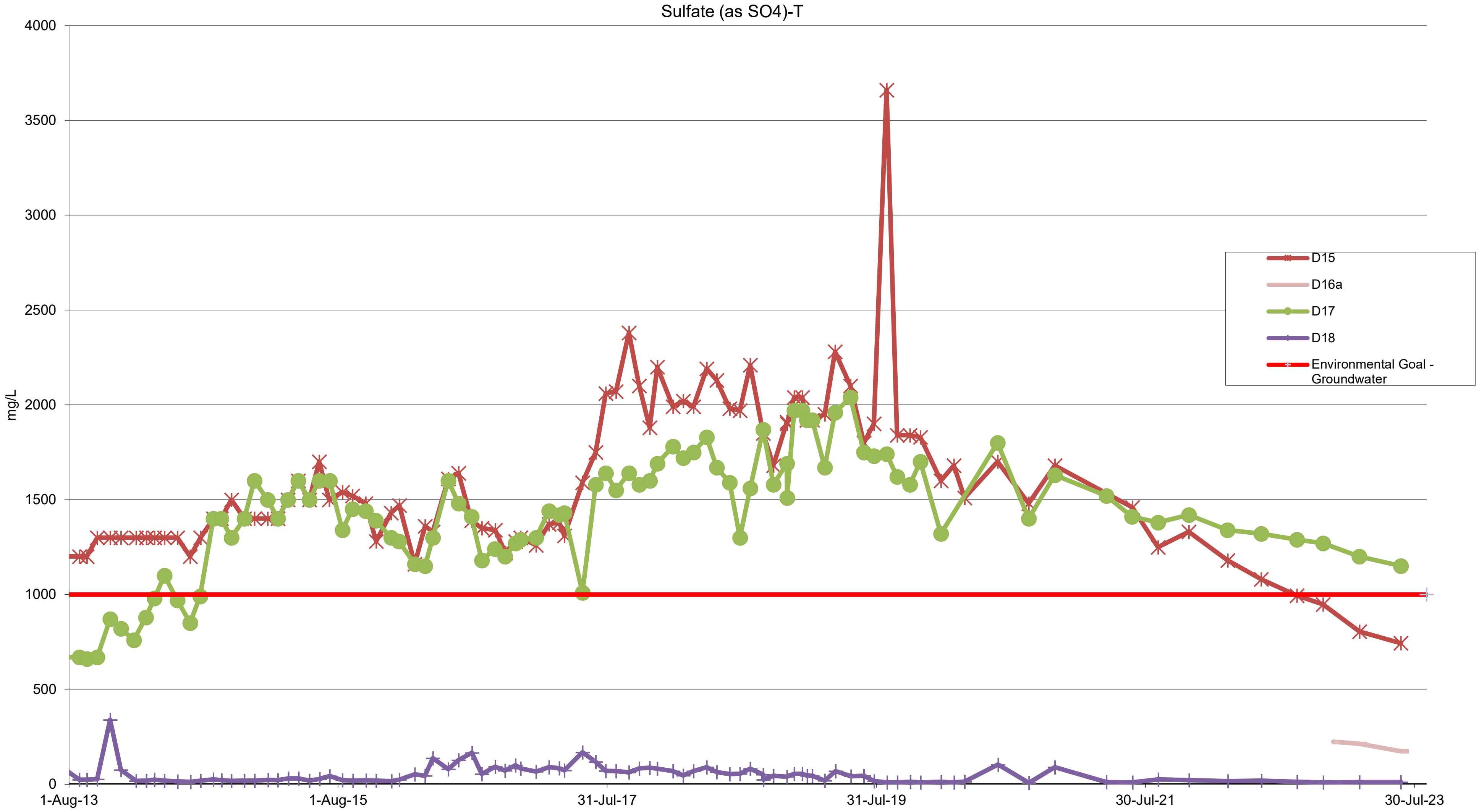

Boron-T
D10
D11
D110
D117
D20
Environmental Goal - Groundwater
µg/L
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23

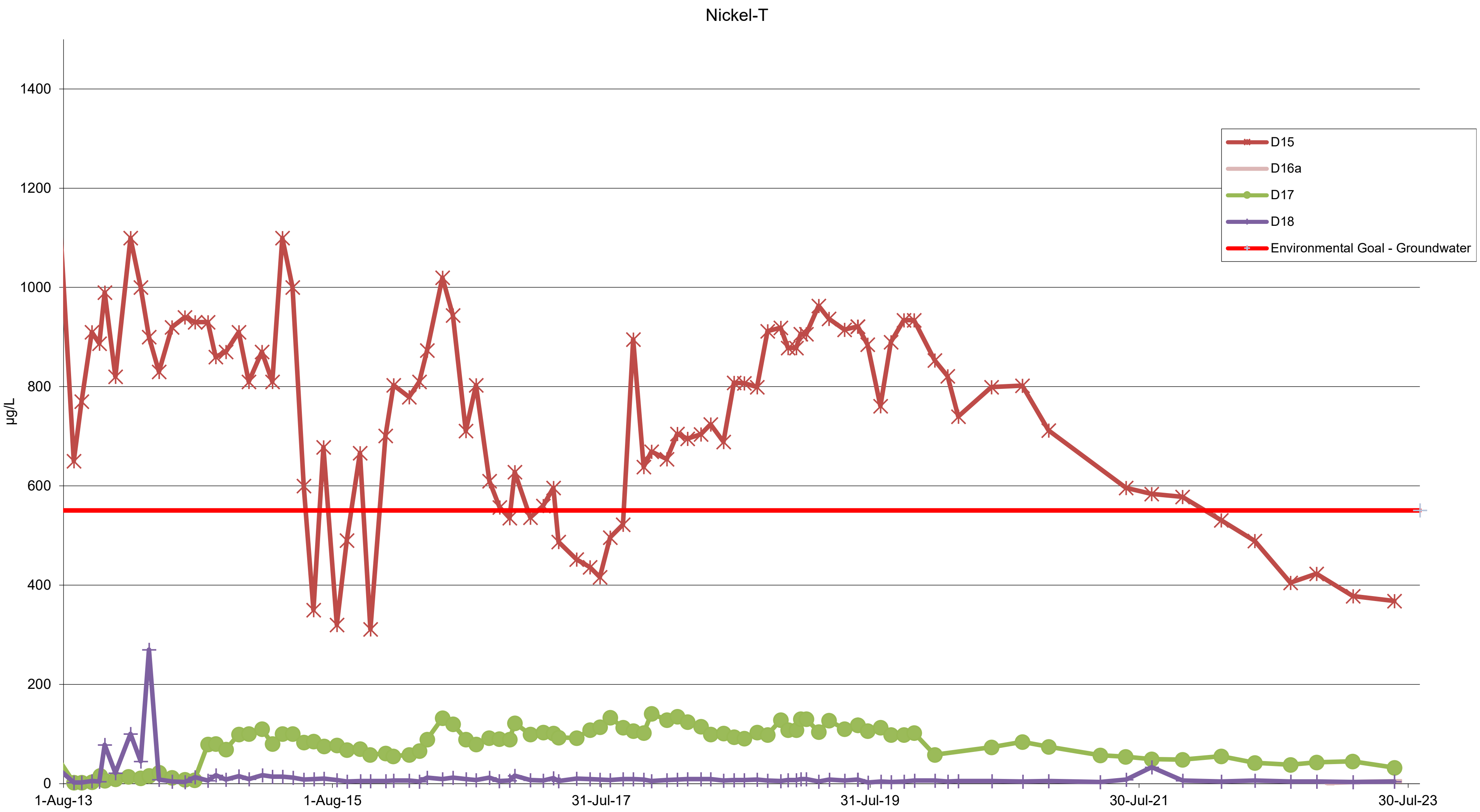

Boron-F
µg/L
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D10
D11
D110
D117
D20
Environmental Goal - Groundwater

Appendix F. Within / Immediately Adjacent LNAR South - TDS Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

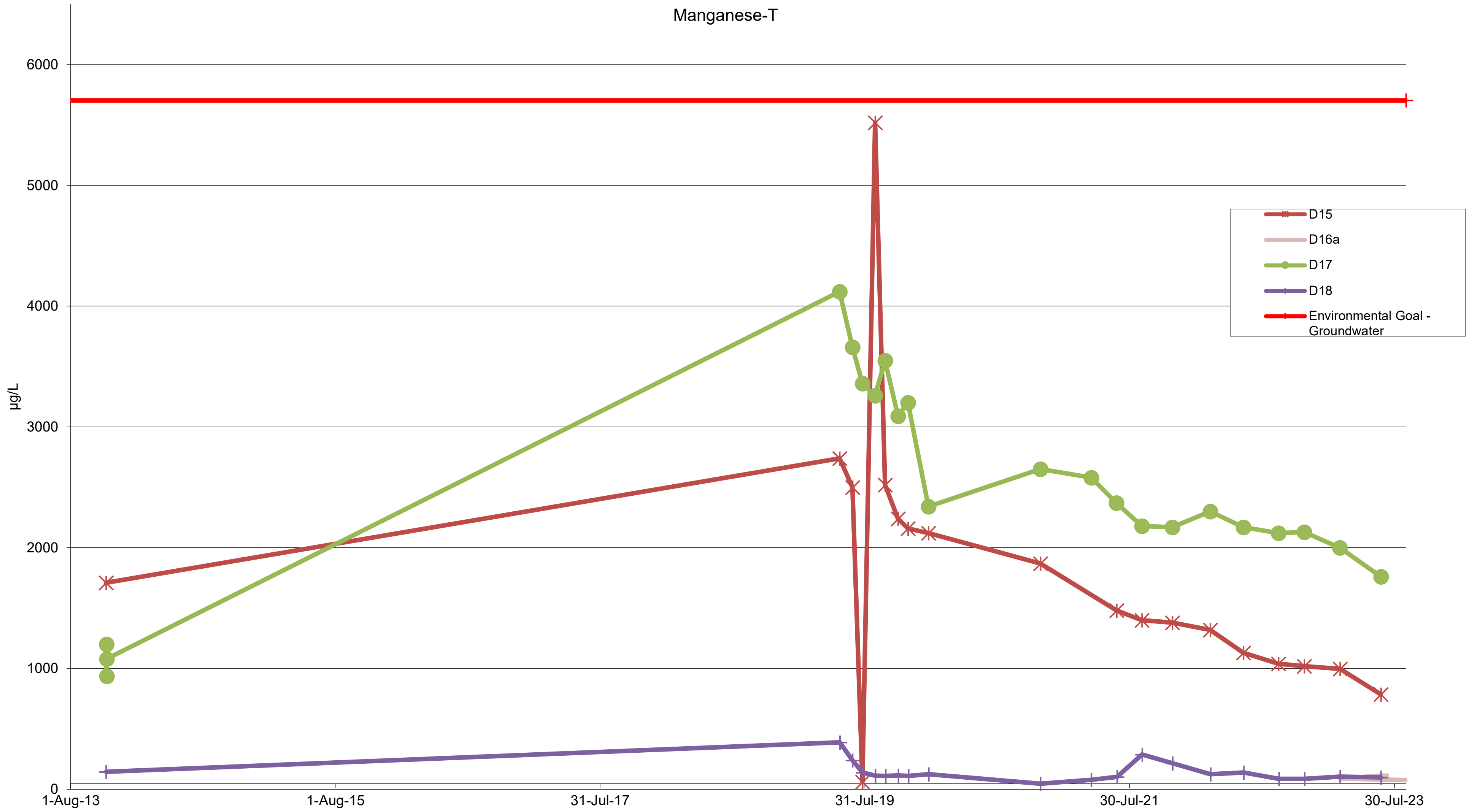


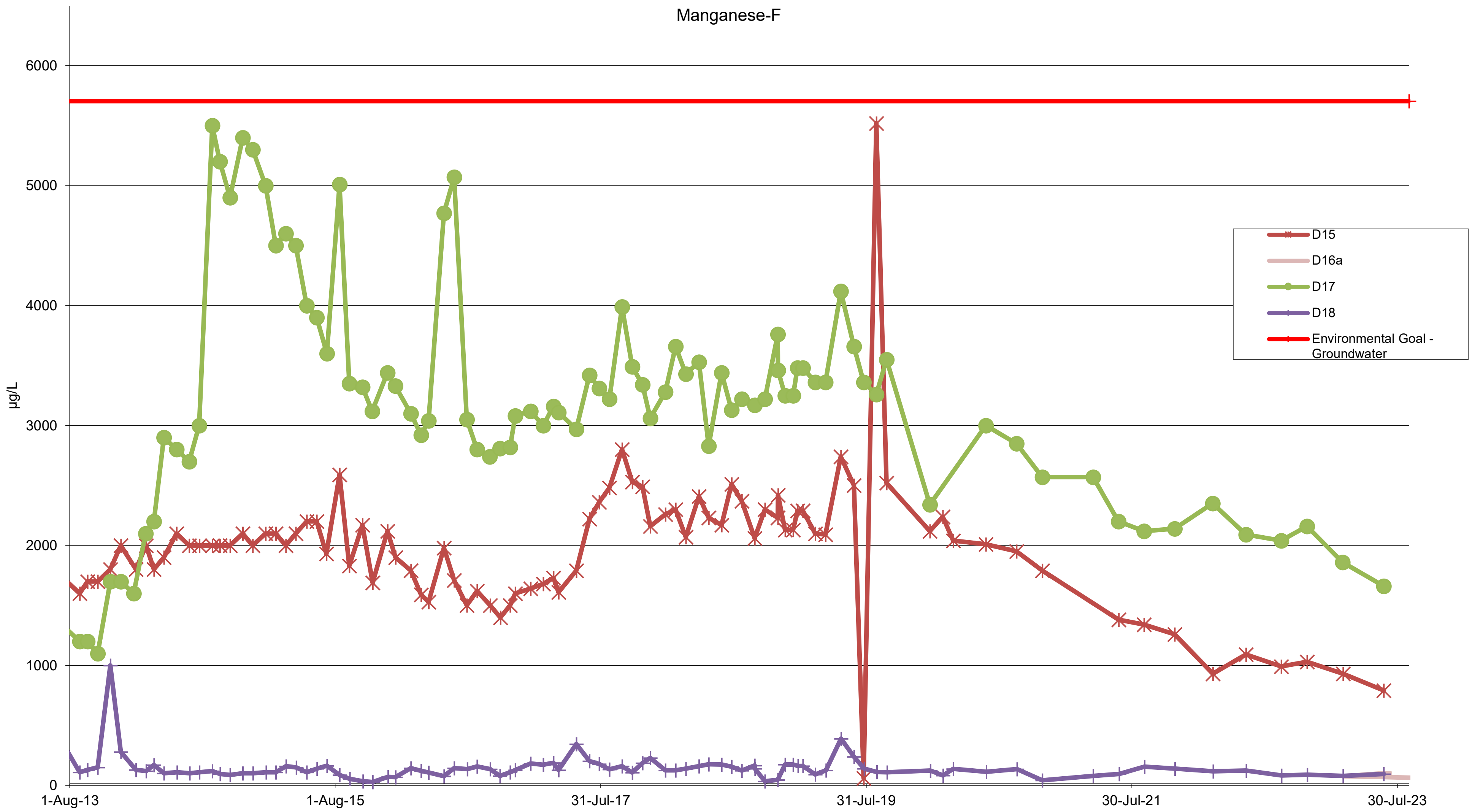

Electrical Conductivity (EC)
uS/cm
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

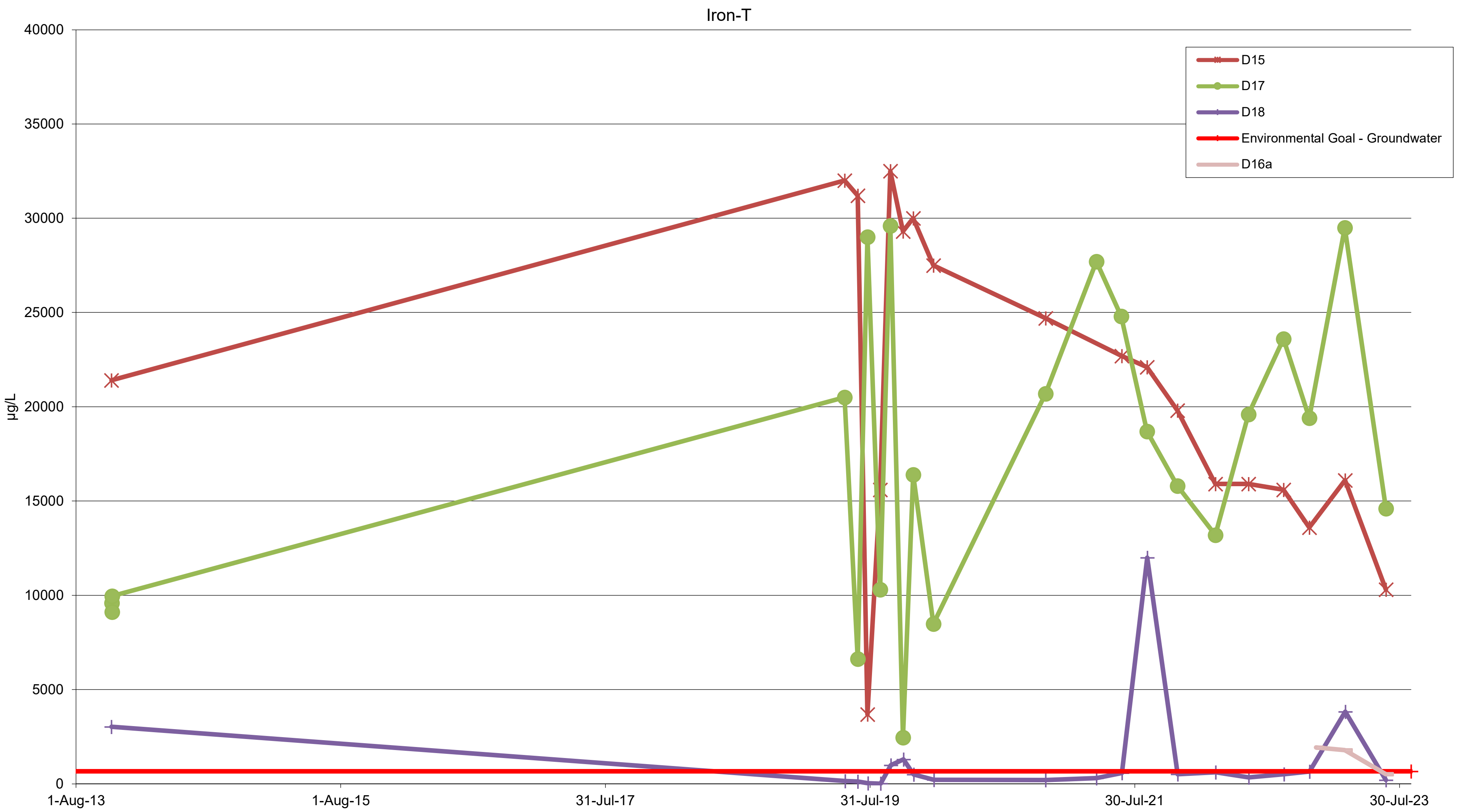

Sulfate (as SO4)-T
mg/L
4000
3500
3000
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

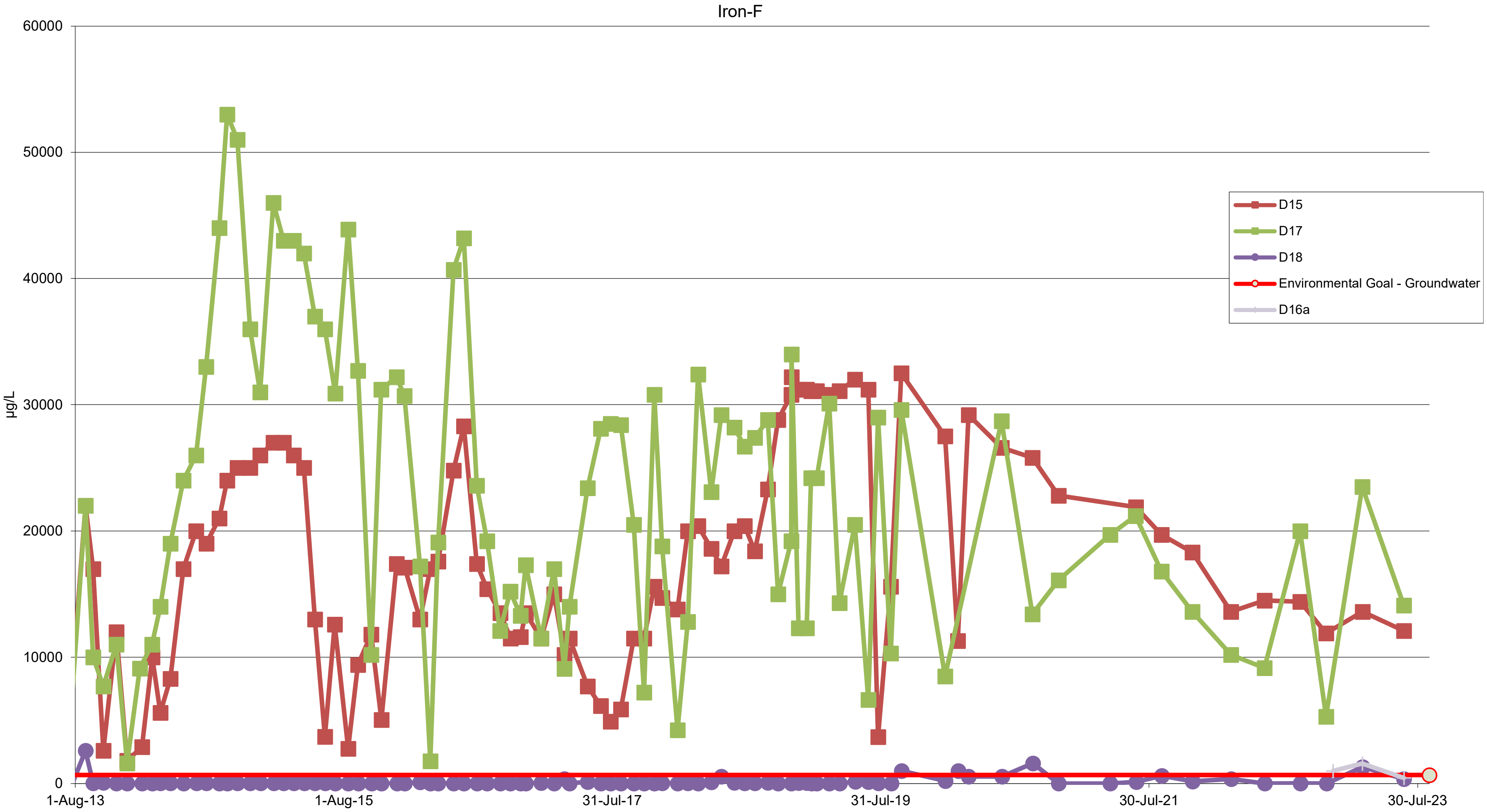

Nickel-T
µg/L
1400
1200
1000
800
600
400
200
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

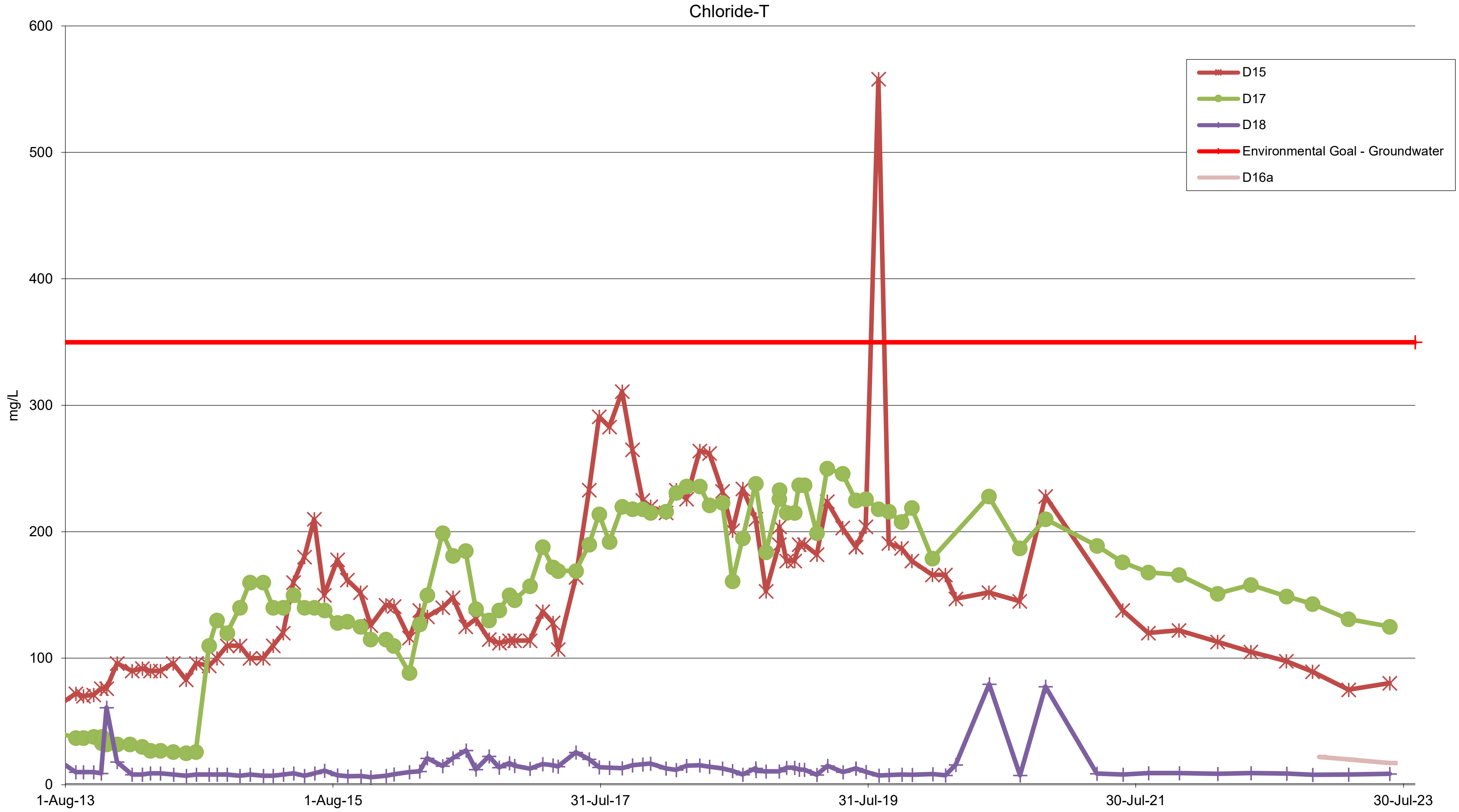

Nickel-F
µg/L
1000
900
800
700
600
500
400
300
200
100
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

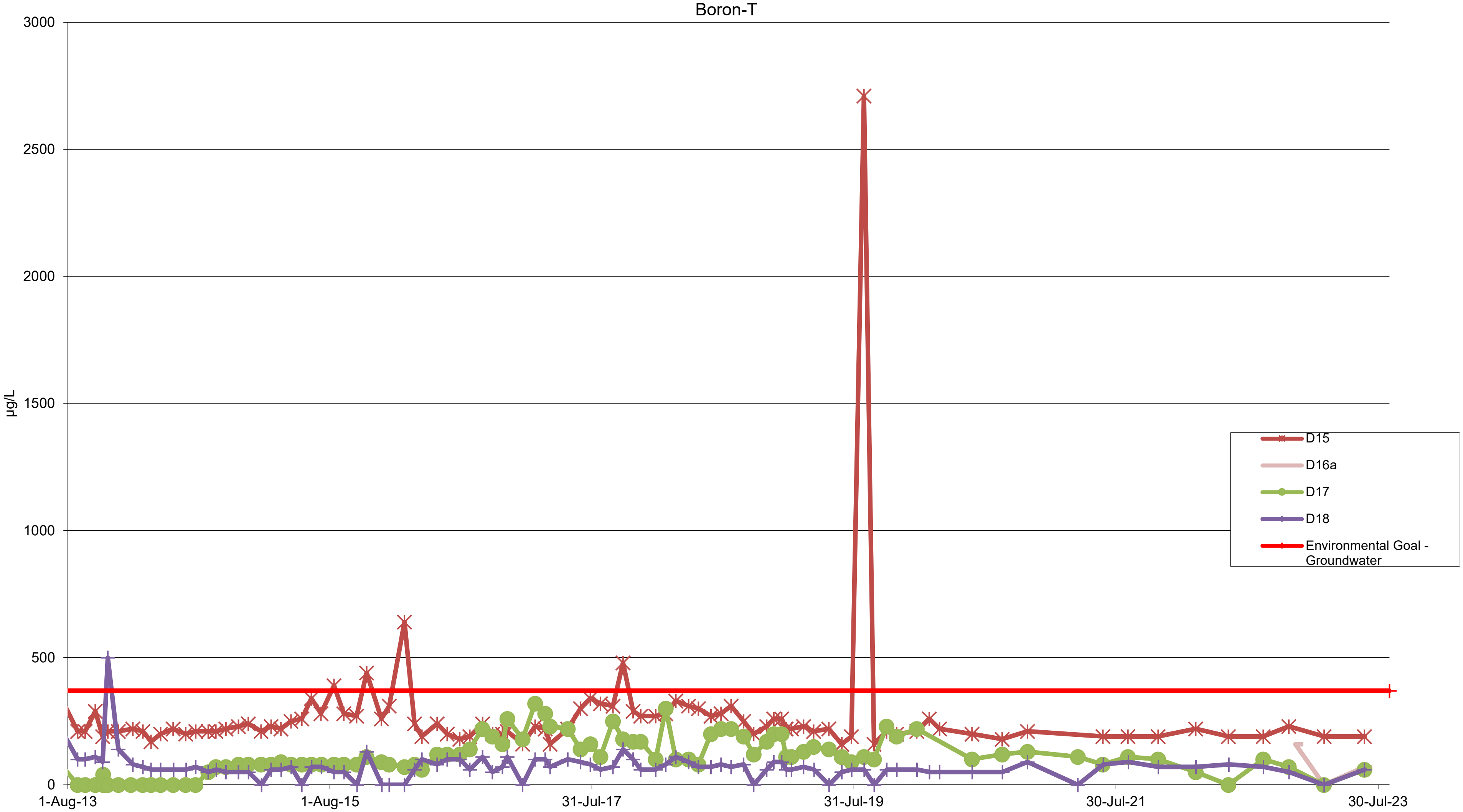

Manganese-T
µg/L
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

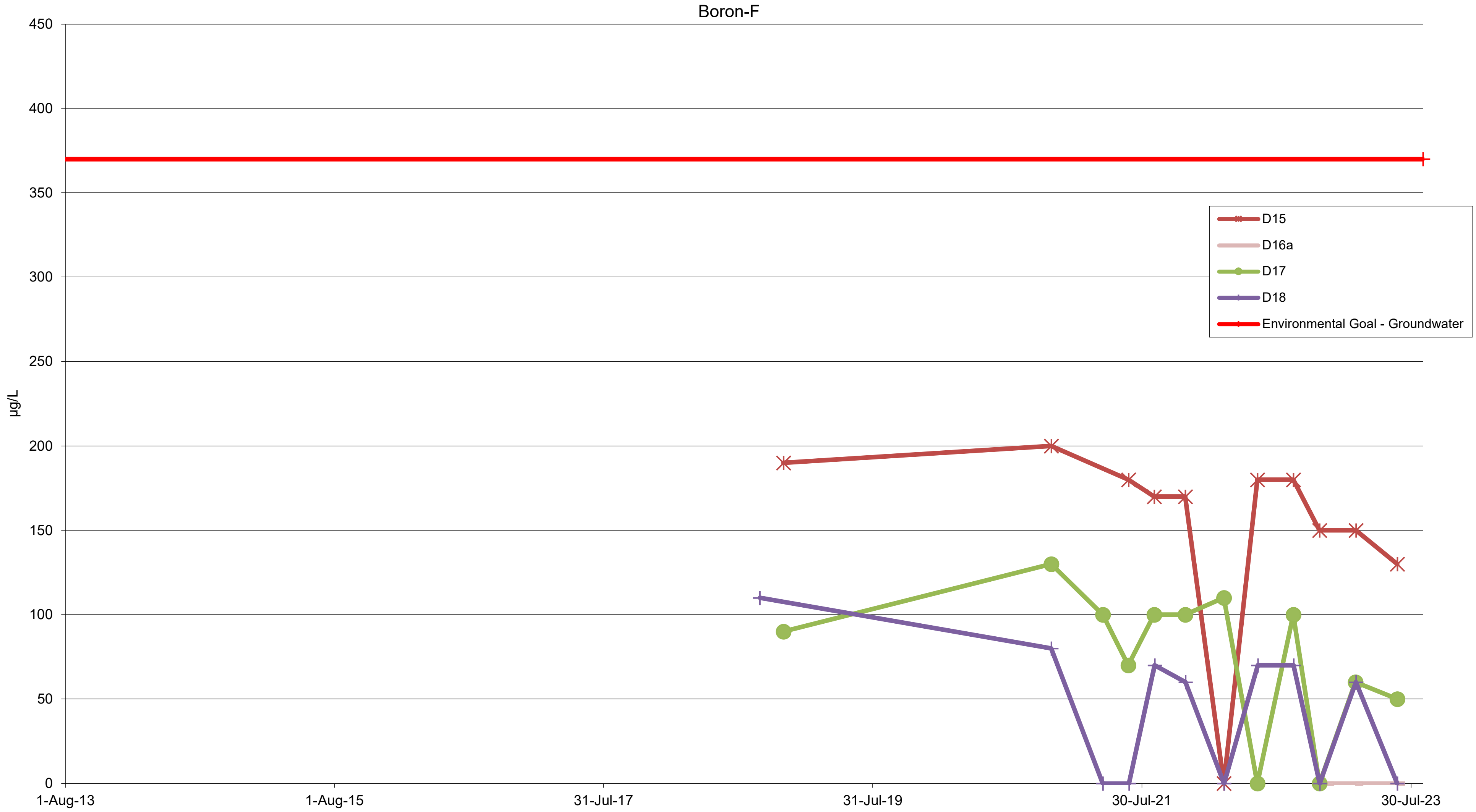

Manganese-F
µg/L
6000
5000
4000
3000
2000
1000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater


Iron-T
µg/L
40000
35000
30000
25000
20000
15000
10000
5000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D17
D18
Environmental Goal - Groundwater
D16a

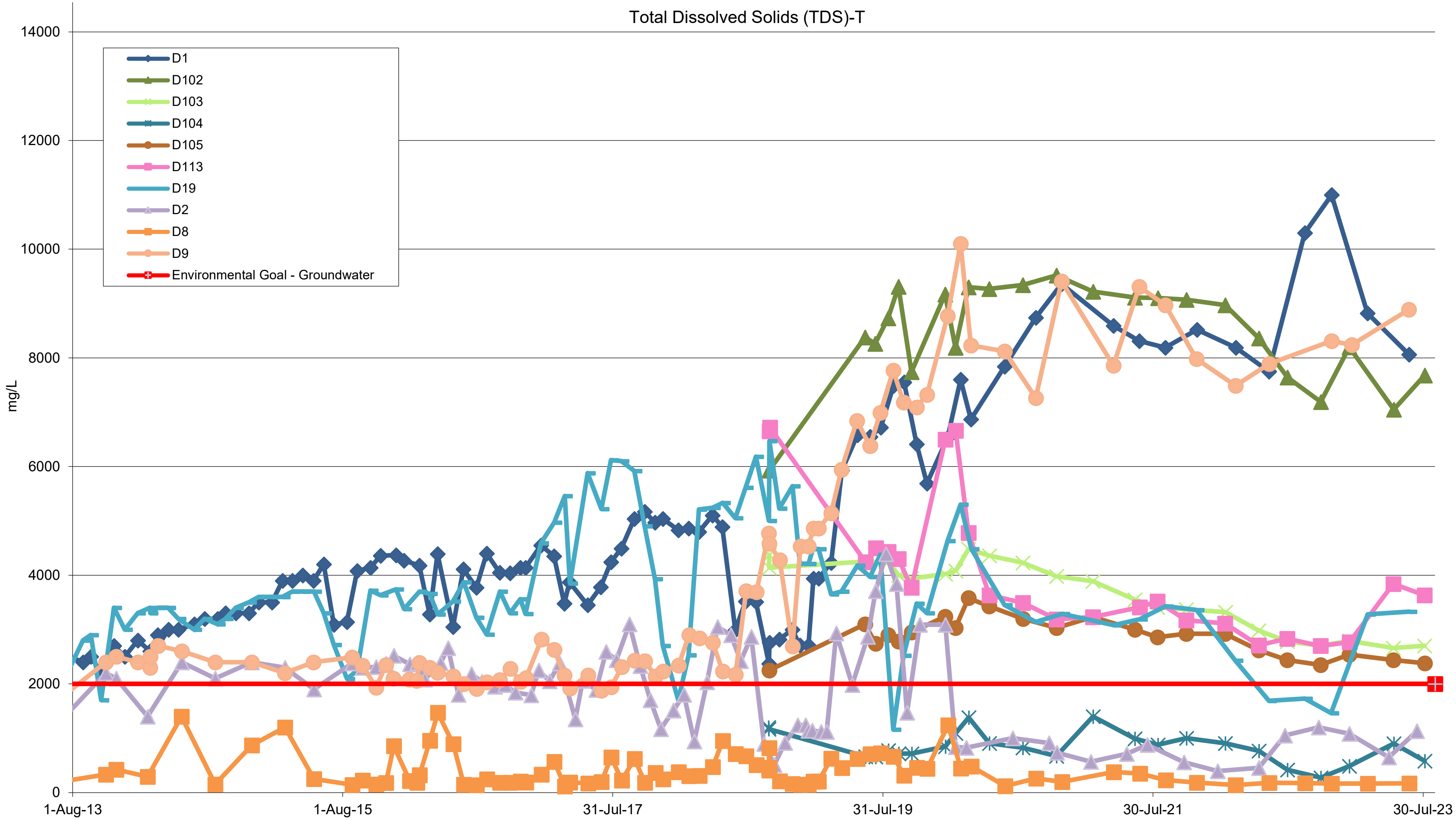

Iron-F
µg/L
60000
50000
40000
30000
20000
10000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D17
D18
Environmental Goal - Groundwater
D16a

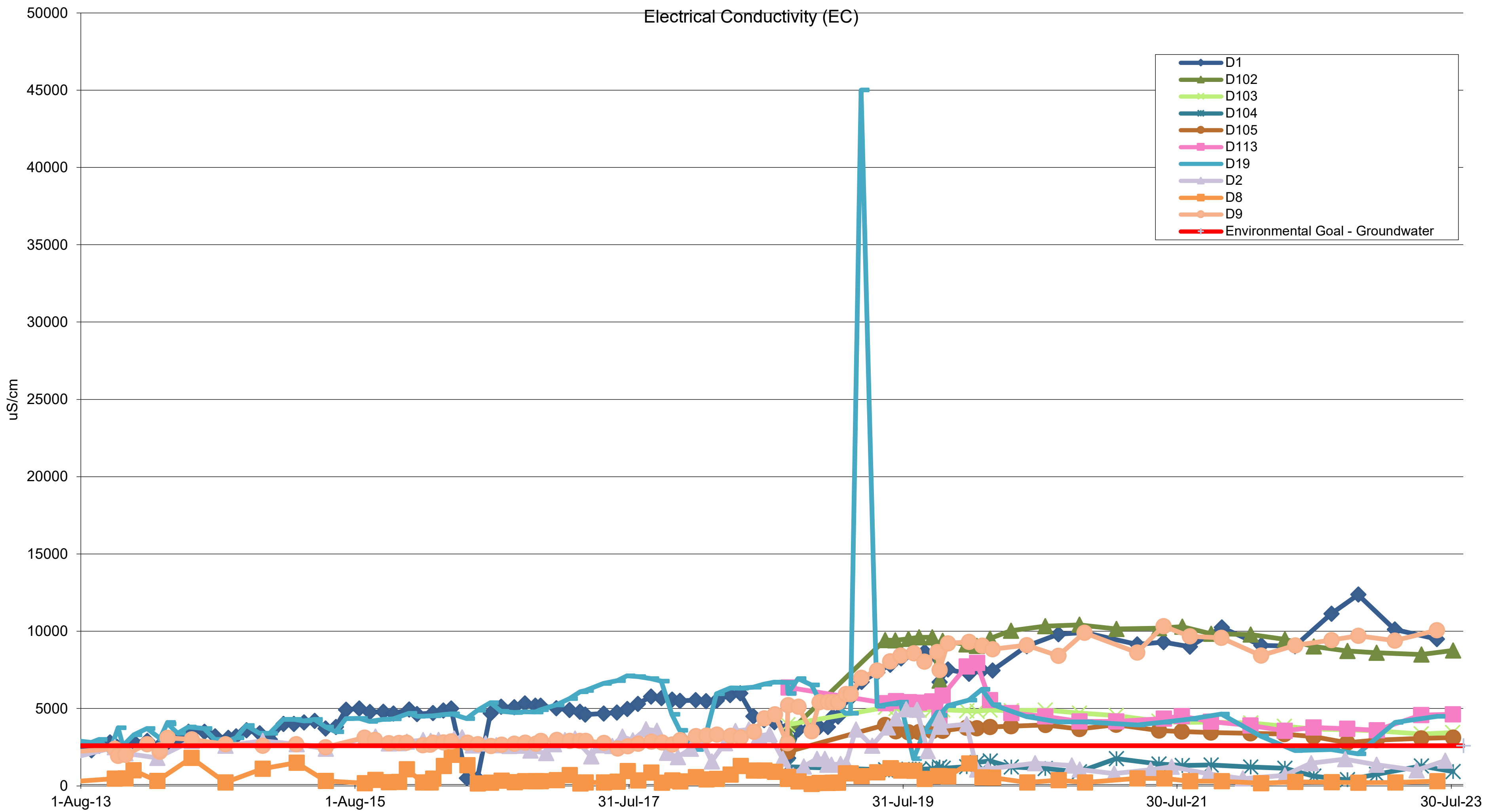

Chloride-T
mg/L
600
500
400
300
200
100
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D17
D18
Environmental Goal - Groundwater
D16a


Boron-T
3000
2500
2000
1500
1000
500
0
µg/L
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

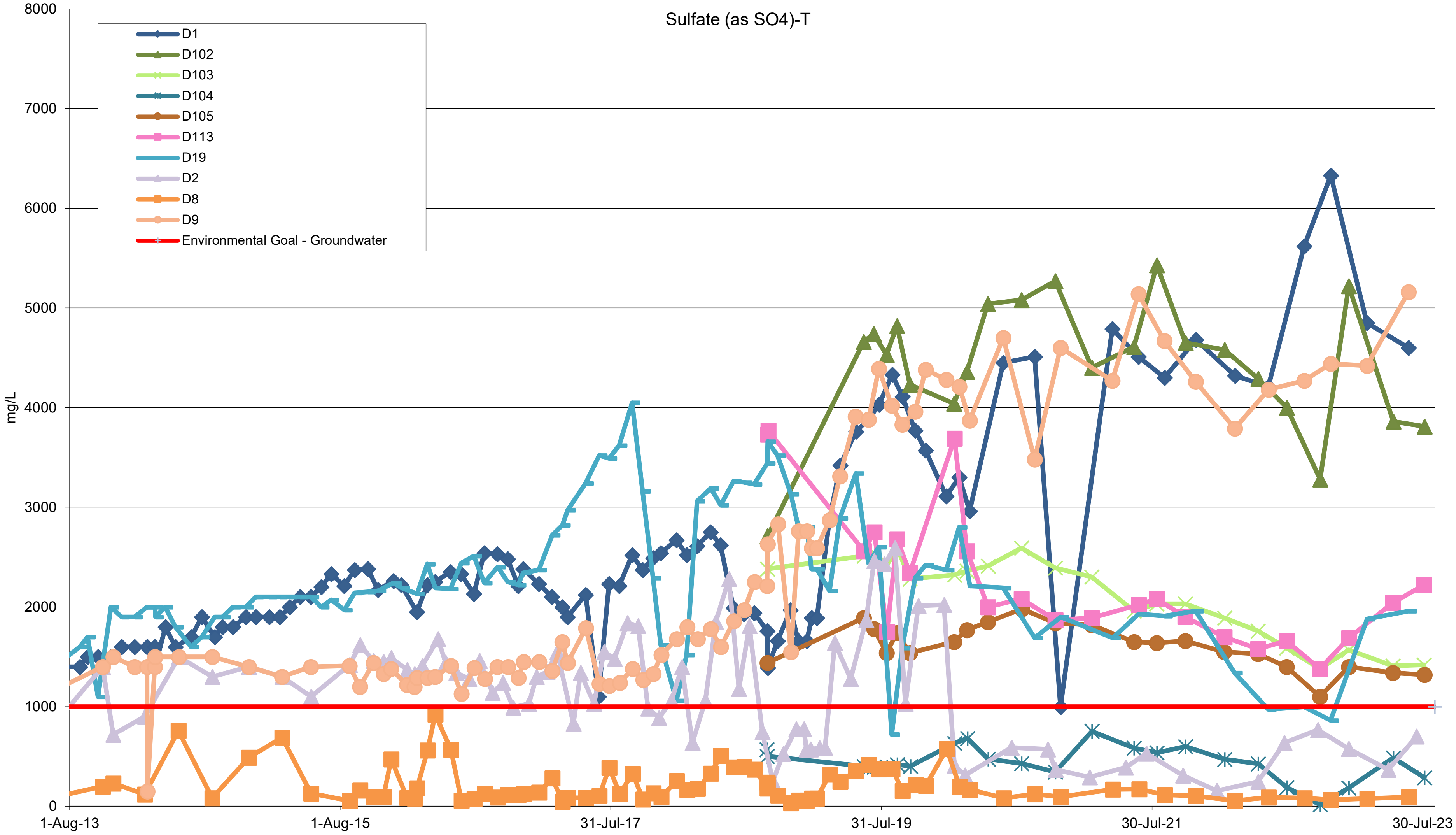

Boron-F
µg/L
450
400
350
300
250
200
150
100
50
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D15
D16a
D17
D18
Environmental Goal - Groundwater

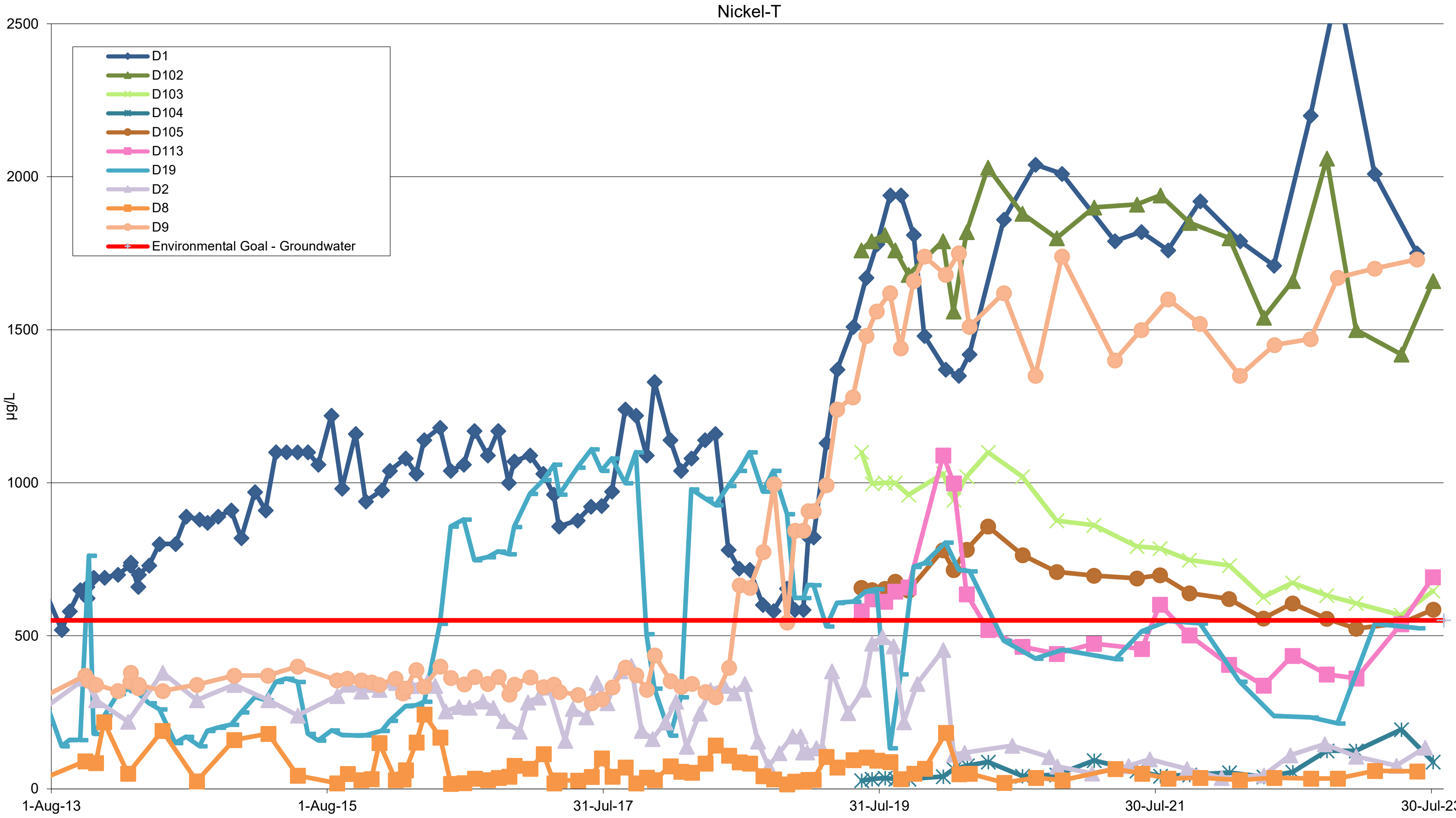
Appendix F. Cross- and downgradient of LNAR / Adjacent Wangcol Creek - TDS Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983



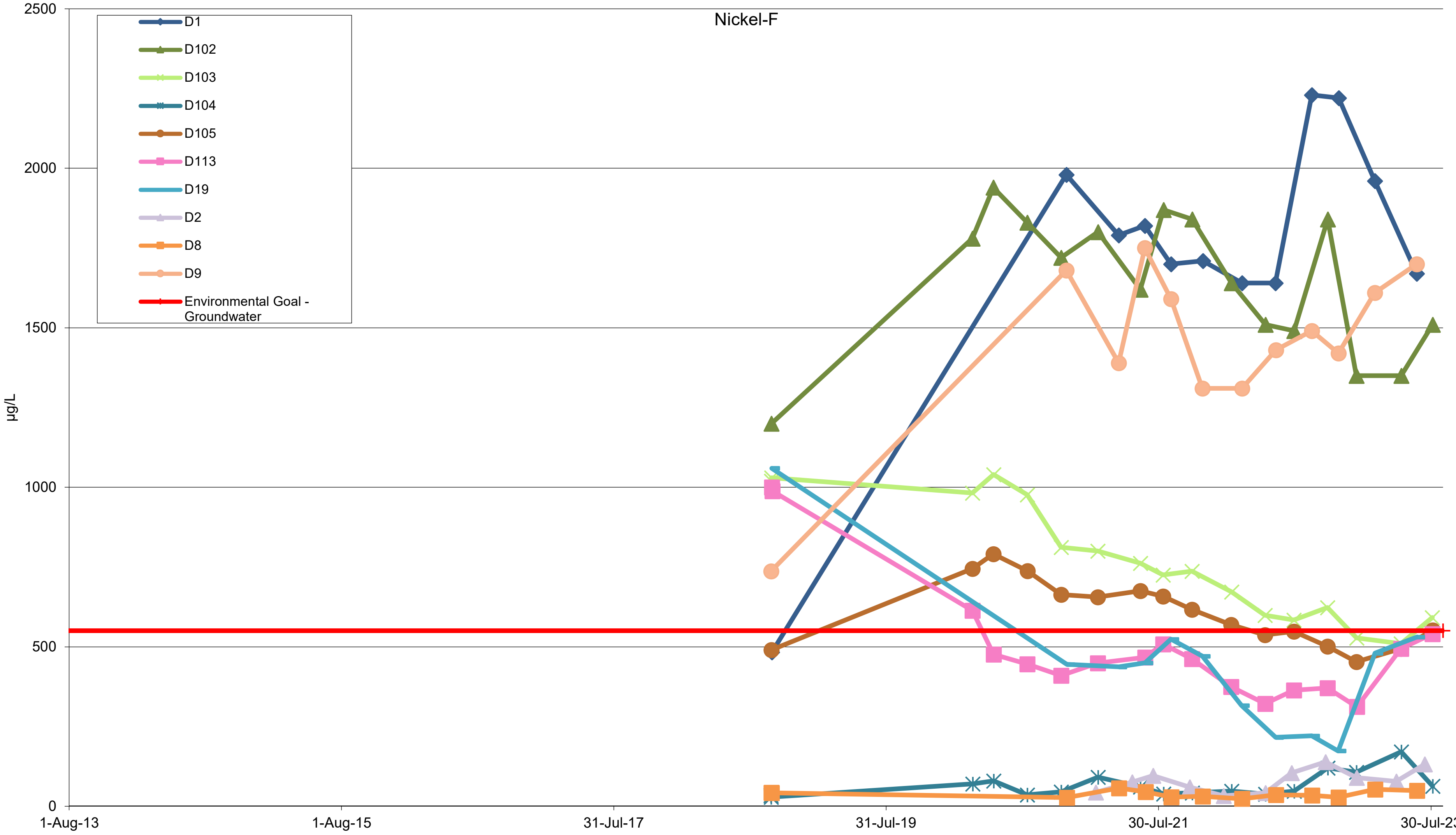

Electrical Conductivity (EC)
uS/cm
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D1
D102
D103
D104
D105
D113
D19
D2
D8
D9
Environmental Goal - Groundwater

Appendix F. Cross- and downgradient of LNAR / Adjacent Wangcol Creek - Sulfate (as SO4) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

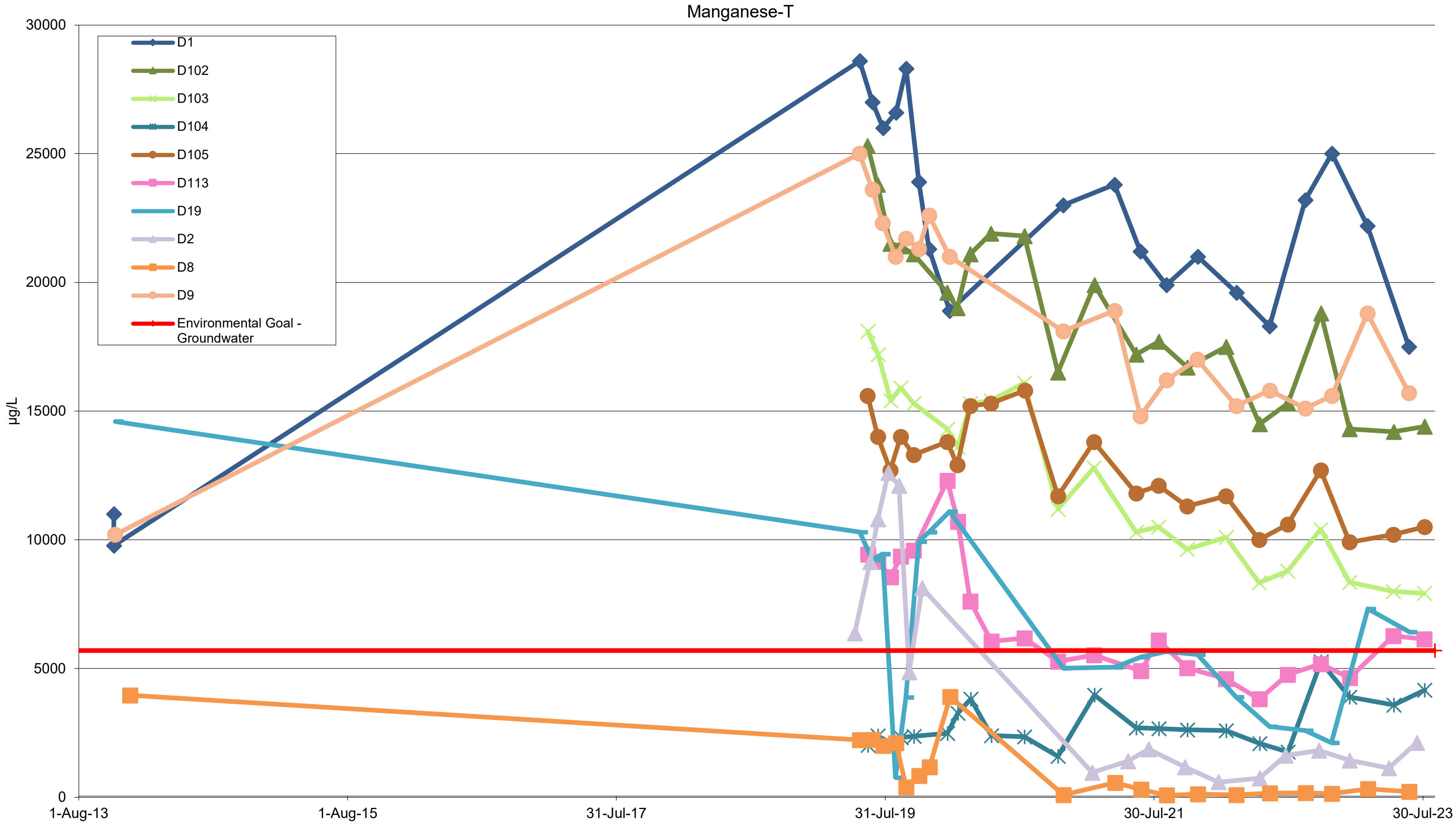


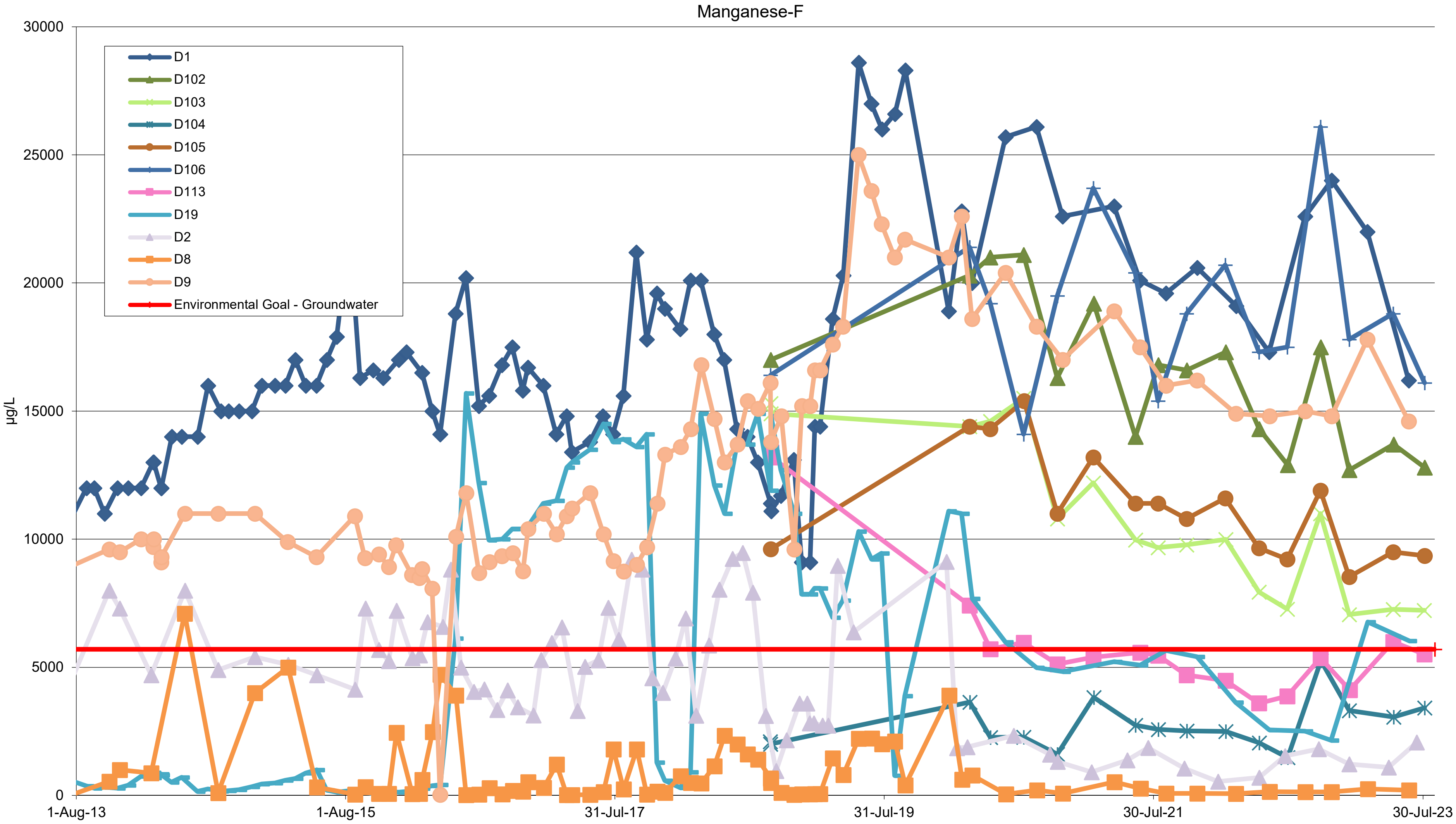

Nickel-T
µg/L
2500
2000
1500
1000
500
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D1
D102
D103
D104
D105
D113
D19
D2
D8
D9
Environmental Goal - Groundwater

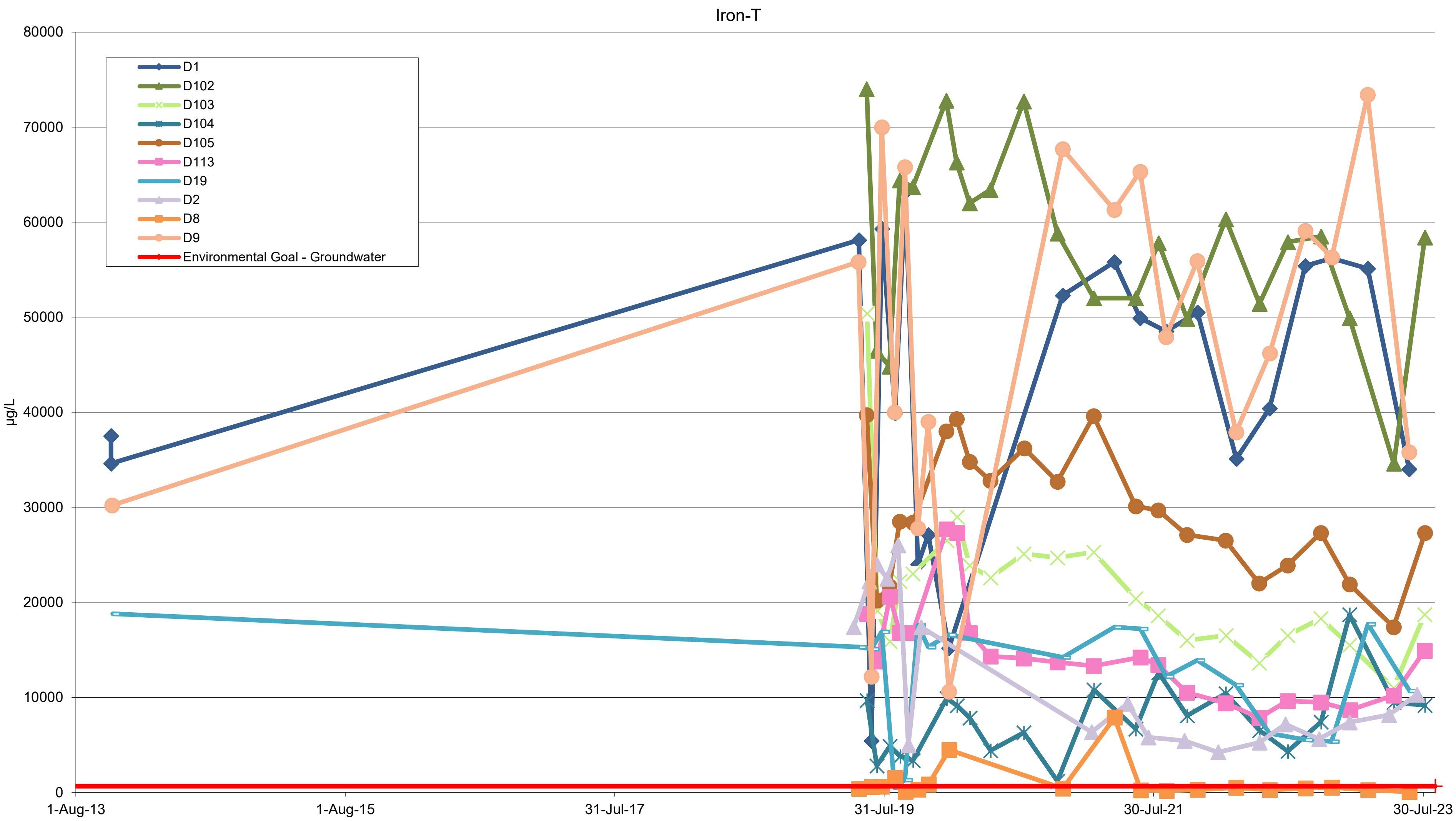
Appendix F. Cross- and downgradient of LNAR / Adjacent Wangcol Creek - Nickel (Filtered) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983

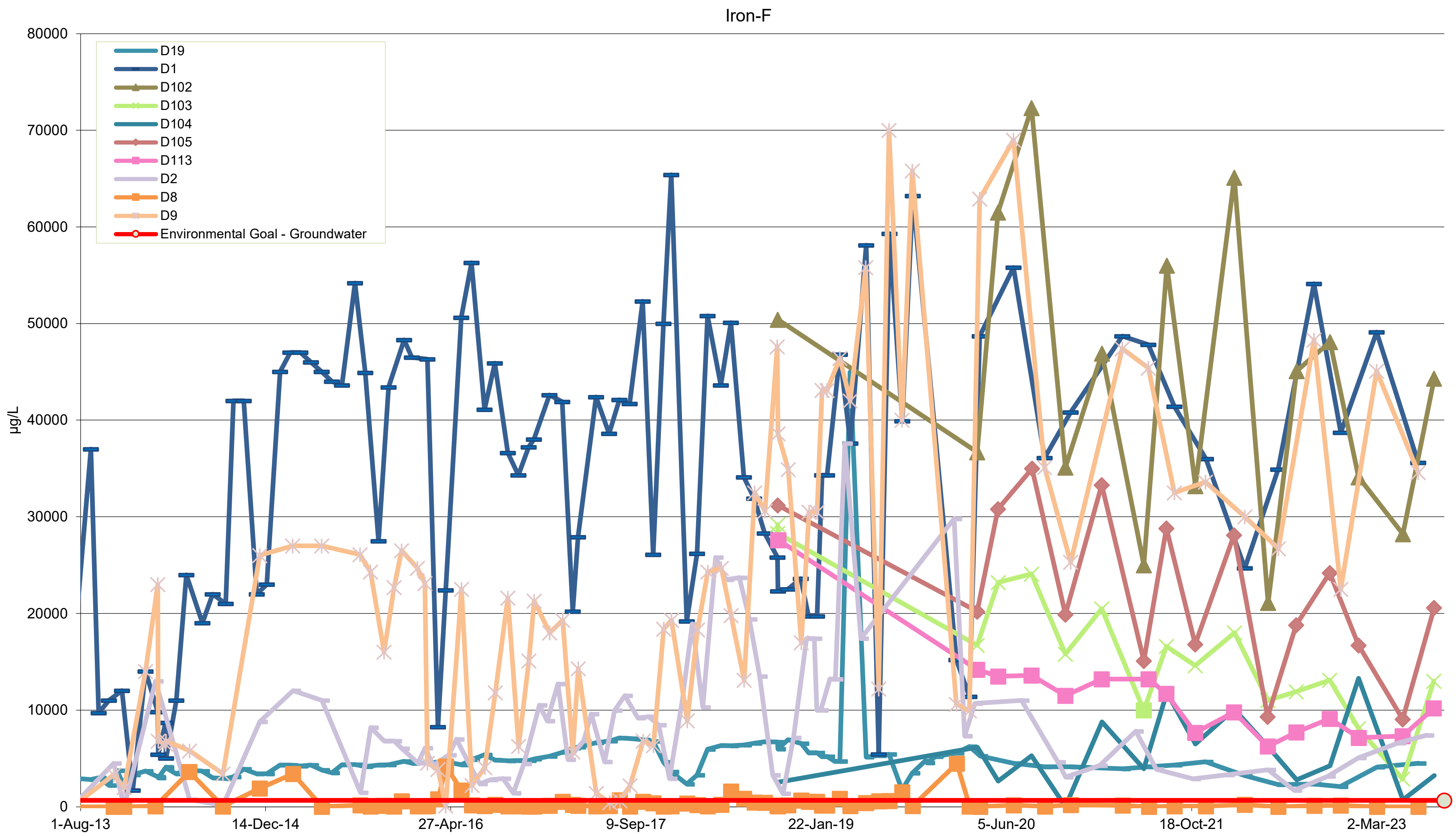


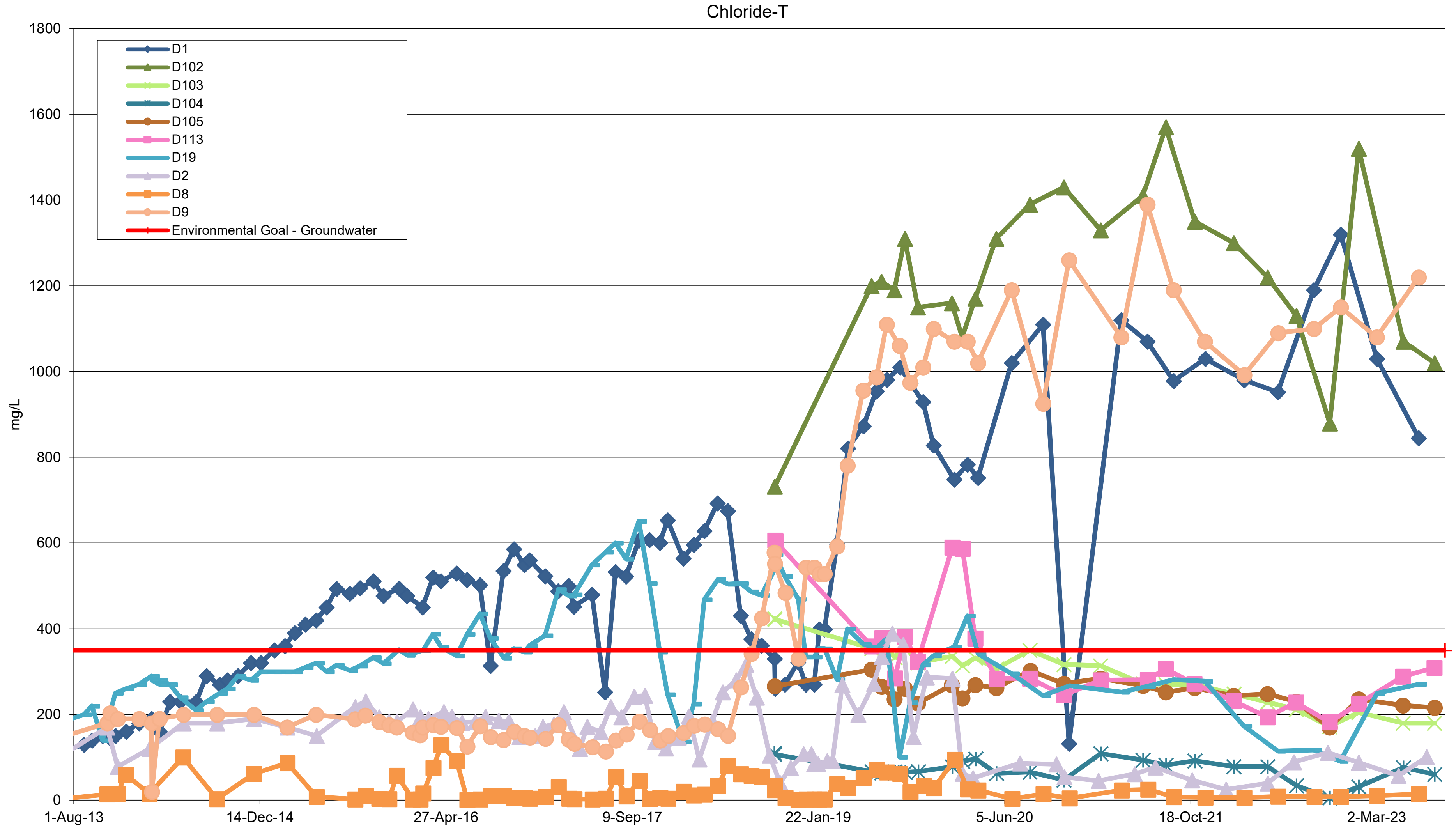
Appendix F. Cross- and downgradient of LNAR / Adjacent Wangcol Creek - Manganese (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983



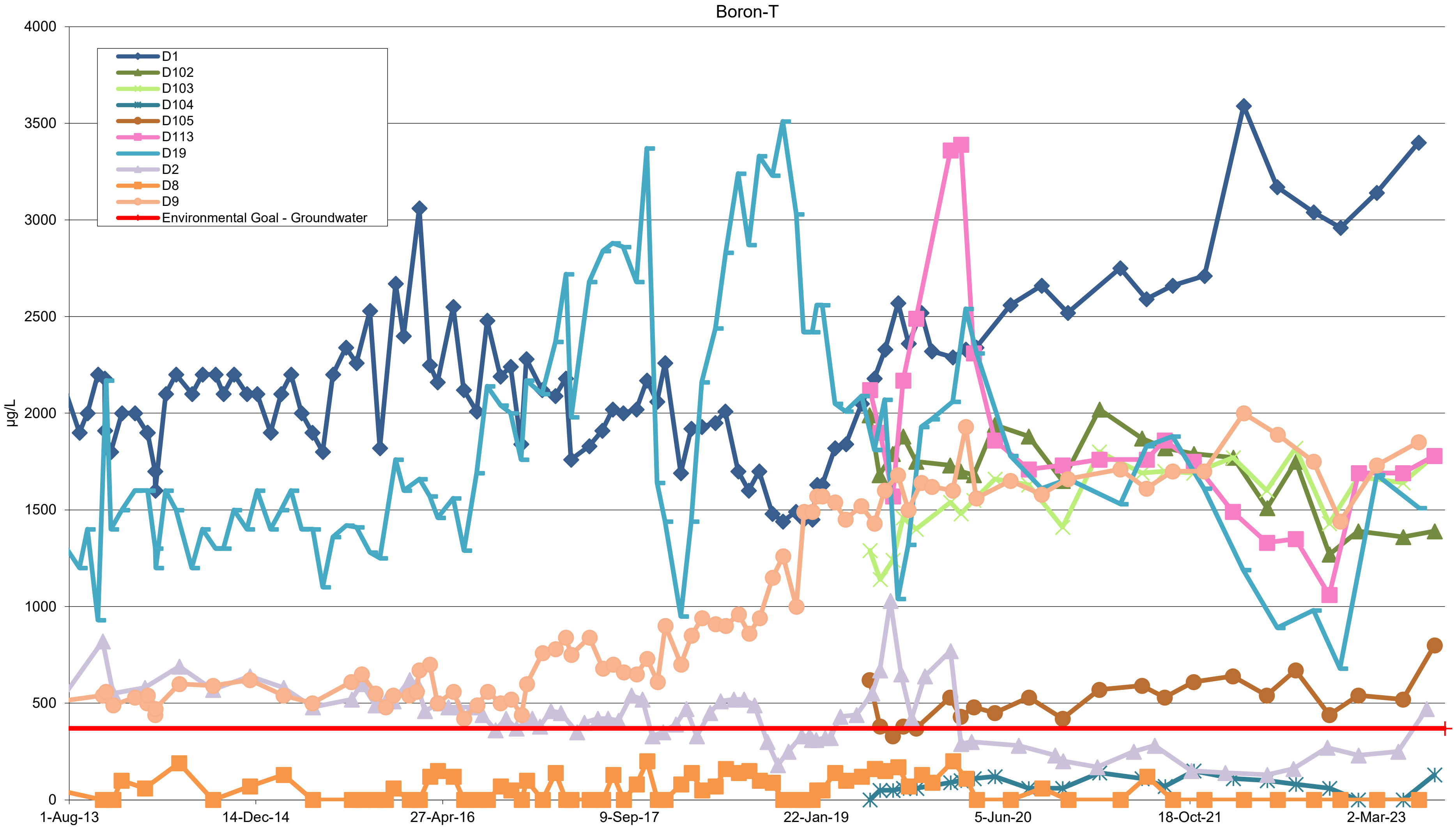

Manganese-F
µg/L
30000
25000
20000
15000
10000
5000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D1
D102
D103
D104
D105
D106
D113
D19
D2
D8
D9
Environmental Goal - Groundwater

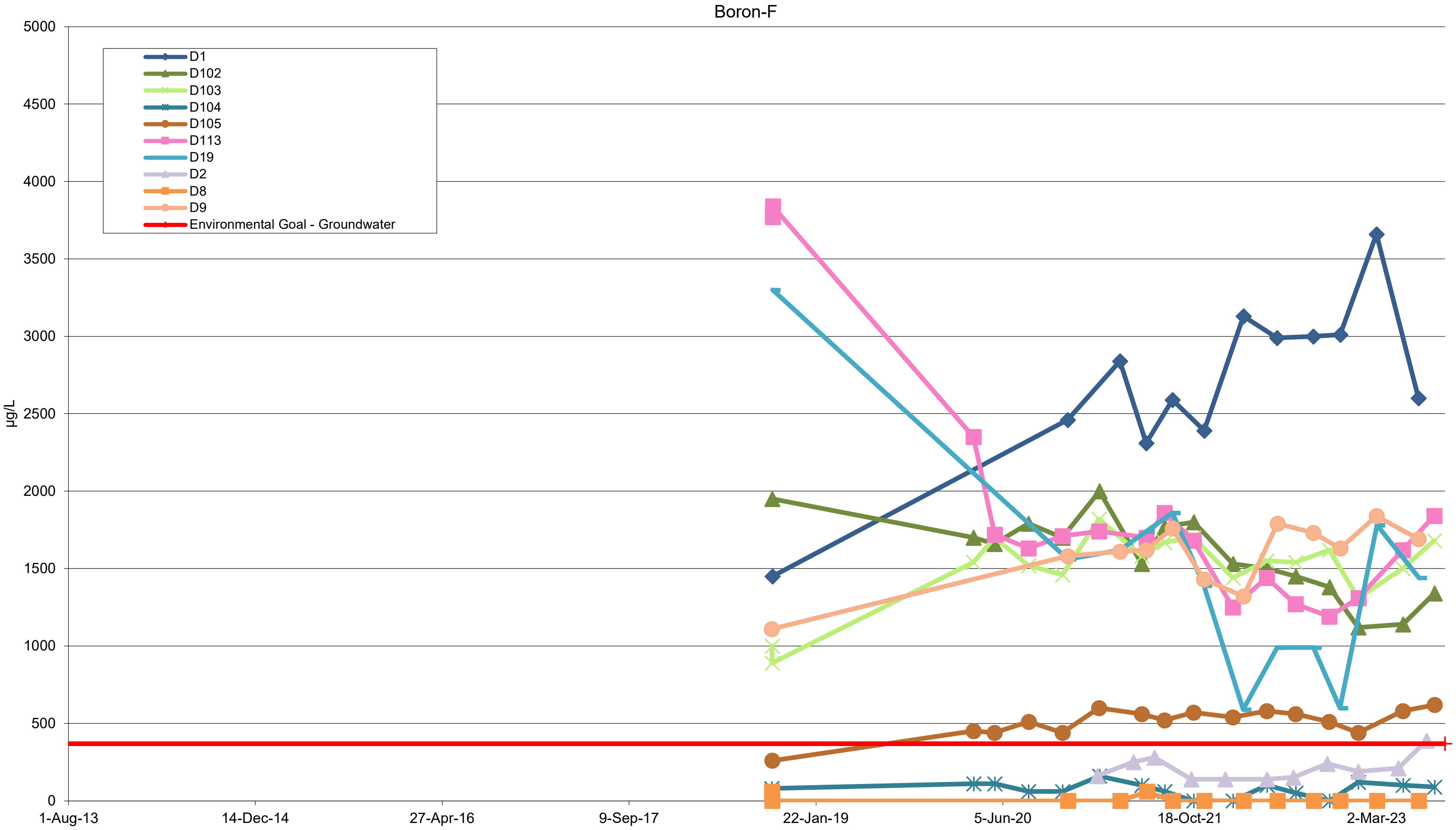

Iron-T
µg/L
80000
70000
60000
50000
40000
30000
20000
10000
0
1-Aug-13
1-Aug-15
31-Jul-17
31-Jul-19
30-Jul-21
30-Jul-23
D1
D102
D103
D104
D105
D113
D19
D2
D8
D9
Environmental Goal - Groundwater


Iron-F
80000
70000
60000
50000
40000
30000
20000
10000
0
µg/L
1-Aug-13
14-Dec-14
27-Apr-16
9-Sep-17
22-Jan-19
5-Jun-20
18-Oct-21
2-Mar-23
D19
D1
D102
D103
D104
D105
D113
D2
D8
D9
Environmental Goal - Groundwater


Chloride-T
mg/L
1800
1600
1400
1200
1000
800
600
400
200
0
1-Aug-13
14-Dec-14
27-Apr-16
9-Sep-17
22-Jan-19
5-Jun-20
18-Oct-21
2-Mar-23
D1
D102
D103
D104
D105
D113
D19
D2
D8
D9
Environmental Goal - Groundwater

Appendix F. Cross- and downgradient of LNAR / Adjacent Wangcol Creek - Boron (Total) Concentrations Over Time
Lamberts North Ash Placement Water Quality Monitoring
Annual Water Quality Monitoring Report 2022/2023
0553983




Boron-F
µg/L
D1
D102
D103
D104
D105
D113
D19
D2
D8
D9
Environmental Goal - Groundwater
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1-Aug-13
14-Dec-14
27-Apr-16
9-Sep-17
22-Jan-19
5-Jun-20
18-Oct-21
2-Mar-23

ERM

APPENDIX G CLIMATE DATA

Weather Observations from Mt Piper Weather Station

Month	Sep-22			Oct-22			Nov-22			Dec-22		
Measurement	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall
Date	°C	°C	mm	°C	°C	mm	°C	°C	mm	°C	°C	mm
1	3.8	15.0	0.2	5.2	11.0	0.4	3.3	16.1	15.0	10.1	16.0	0.0
2	3.0	12.0	0.0	2.5	14.8	0.0	1.4	7.7	4.4	9.4	15.9	0.0
3	3.3	7.0	3.6	-0.1	15.2	0.0	4.1	12.5	0.2	5.3	22.3	0.0
4	4.4	9.1	1.8	1.3	17.8	0.0	5.4	14.3	0.0	8.2	24.2	0.0
5	-0.8	12.5	0.2	8.0	10.3	21.6	6.8	17.7	3.0	7.5	25.5	2.2
6	3.3	11.2	0.0	8.9	12.4	4.6	5.7	18.4	0.4	7.1	22.6	0.2
7	4.8	12.7	0.0	9.8	14.4	14.4	8.7	19.1	0.0	-	-	-
8	6.9	14.1	2.6	8.7	16.0	35.0	8.4	18.9	0.0	-	-	-
9	7.3	13.0	14.6	3.4	13.6	5.8	4.6	19.4	0.0	-	-	-
10	7.1	11.4	6.6	2.1	13.3	0.0	7.2	20.9	0.0	-	-	-
11	3.1	12.1	0.0	7.7	14.7	0.0	6.3	17.5	1.2	-	-	-
12	1.9	11.5	0.0	5.1	15.2	0.0	6.7	23.5	1.6	-	-	-
13	4.4	12.7	0.0	9.2	16.6	0.0	12.3	19.5	27.6	3.5	18.4	0.0
14	3.4	12.2	0.0	7.1	13.5	5.8	11.9	17.1	34.4	3.4	14.2	0.0
15	6.4	9.2	50.6	4.9	17.9	0.0	5.2	15.5	0.0	3.1	17.9	0.0
16	7.1	14.7	0.2	3.2	16.7	0.0	2.8	9.7	0.2	6.3	17.3	1.8
17	4.5	12.3	0.6	9.1	14.3	0.0	1.0	15.5	0.2	4.1	18.2	0.0
18	4.1	13.2	0.6	9.1	16.3	0.2	3.1	17.7	0.0	8.1	17.2	0.0
19	0.5	12.9	0.0	11.5	18.7	1.6	6.2	21.5	0.4	7.5	17.3	0.0
20	-2.0	16.1	0.2	12.8	16.0	4.8	9.6	16.3	11.0	5.0	19.2	0.0
21	4.7	13.7	5.2	14.1	18.9	1.6	4.5	12.5	1.8	4.6	21.9	0.0
22	10.1	12.3	3.6	12.9	19.1	11.6	3.4	11.9	0.4	6.9	18.0	2.2
23	9.5	15.0	7.6	12.5	18.9	4.2	6.8	17.1	0.0	12.0	25.9	1.6
24	5.4	15.0	0.4	11.6	17.0	12.2	5.8	21.0	0.0	12.7	27.7	0.0
25	1.3	16.3	0.0	10.1	19.1	4.0	5.0	20.9	0.0	11.4	28.7	0.0
26	0.6	15.1	0.0	12.4	18.6	0.2	5.8	22.7	0.0	10.4	29.0	0.0
27	7.4	16.6	30.2	10.7	16.9	2.8	12.1	25.3	7.6	8.1	27.9	0.0
28	4.5	13.5	0.8	8.7	14.6	0.0	8.4	19.5	0.4	8.0	29.4	0.0
29	4.1	14.8	0.4	8.0	15.8	0.0	6.2	21.3	0.0	11.0	24.6	3.2
30	7.2	12.2	1.0	3.6	18.4	0.0	8.5	19.0	0.2	14.3	21.4	3.2
31				8.4	19.1	27.0				12.0	23.7	1.2
Min	-2.0	7.0	0.0	-0.1	10.3	0.0	1.0	7.7	0.0	3.1	14.2	0.0
Max	10.1	16.6	50.6	14.1	19.1	35.0	12.3	25.3	34.4	14.3	29.4	3.2
Average	4.4	13.0		7.8	16.0		6.2	17.7		8.0	21.8	
Total			131.0			157.8			110.0			15.6

Note:
- signifies data not provided

Weather Observations

Month	Jan-23			Feb-23			Mar-23			Apr-23			May-23			Jun-23		
Measurement	AT 2M 1Hr Min	AT 2M 1Hr Max	Rain	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall	AT 2M 1Hr Min	AT 2M 1Hr Max	Rainfall
Date	°C	°C	mm	°C	°C	mm	°C	°C	mm	°C	°C	mm	°C	°C	mm	°C	°C	mm
1	15.3	24.2	9.8	14.5	27.4	0.0	9.4	25.2	0.0	3.6	17.1	6.2	0.8	9.9	0.2	3.2	15.7	0.0
2	14.3	26.9	0.2	14.0	26.3	0.0	15.0	24.6	0.0	9.2	13.9	1.0	7.6	13.4	0.0	1.3	16.5	0.2
3	14.1	30.0	0.2	8.8	19.4	0.0	10.4	23.6	0.0	11.1	17.7	1.4	6.8	14.0	0.0	3.1	16.6	0.0
4	13.5	25.1	10.0	7.3	18.6	0.0	14.8	21.4	3.6	8.6	17.7	6.6	2.5	14.6	0.0	7.9	10.9	0.6
5	10.4	14.7	0.4	9.6	27.5	0.0	10.8	27.8	0.2	8.4	19.9	0.4	-1.3	15.2	0.2	7.0	10.5	0.2
6	9.1	14.5	0.6	12.5	28.8	0.0	14.1	31.0	0.0	7.1	18.0	0.2	-1.4	13.8	0.2	6.1	14.1	1.2
7	10.6	18.6	0.0	15.6	26.3	0.0	11.3	27.0	0.0	8.1	18.6	5.6	-0.7	7.3	2.6	5.9	15.8	0.4
8	10.1	25.5	0.0	14.6	22.8	0.0	8.4	23.5	0.0	10.0	13.3	1.0	-0.3	7.4	0.0	5.5	9.9	2.8
9	7.0	29.4	0.0	13.8	20.9	6.8	7.2	21.3	0.0	7.0	10.6	0.2	0.0	11.5	0.2	2.3	9.8	0.0
10	8.0	27.9	0.0	9.2	26.4	0.2	5.2	25.5	0.0	3.4	10.3	0.0	-2.1	15.2	0.4	-2.2	10.3	0.2
11	13.7	27.3	0.0	11.5	30.0	0.0	9.4	26.8	0.0	4.8	16.0	0.0	0.3	15.3	0.0	-4.7	12.6	0.2
12	14.5	28.9	0.0	16.3	28.0	0.0	13.5	25.2	0.4	3.3	15.1	2.2	0.1	15.7	0.2	-2.5	11.7	1.2
13	15.3	24.9	0.0	14.0	20.5	0.0	13.9	16.4	9.0	8.0	16.5	2.4	0.3	15.0	0.2	3.8	12.4	2.2
14	14.8	25.6	0.0	14.0	18.5	0.0	12.8	19.4	2.6	7.6	16.6	1.4	3.7	14.8	0.2	4.2	8.4	0.0
15	11.1	30.6	0.0	13.2	23.7	0.4	11.6	25.0	0.0	4.7	19.0	0.0	-	-	-	3.2	8.1	0.0
16	15.6	23.9	0.0	9.1	29.0	0.0	9.3	28.8	0.0	7.8	17.1	0.2	-	-	-	-2.0	11.2	0.0
17	14.1	26.2	0.0	10.2	30.7	0.0	8.5	28.5	0.0	2.4	17.8	0.2	-	-	-	-4.4	12.0	0.4
18	9.9	29.3	5.2	12.8	32.7	15.0	13.1	31.0	0.0	6.3	17.3	0.0	-0.1	10.7	0.2	-3.1	9.6	0.2
19	11.3	16.7	24.4	11.9	25.9	0.2	9.0	34.3	0.0	6.5	17.9	0.0	-4.0	11.4	0.2	0.5	7.4	2.0
20	11.5	16.1	0.2	15.5	28.5	0.0	11.6	22.2	0.0	10.4	14.0	0.0	3.4	8.2	0.0	-5.0	7.3	1.0
21	9.4	20.1	0.0	13.6	28.4	4.0	12.6	16.0	0.0	3.9	15.6	0.2	5.4	8.7	0.0	-7.5	10.8	0.2
22	12.0	15.5	2.4	12.0	15.0	0.4	12.4	17.8	9.2	2.8	16.0	0.2	-2.8	14.8	0.0	-0.9	9.8	3.8
23	11.8	21.9	10.8	11.2	17.7	1.4	13.0	21.9	5.4	6.1	16.5	0.8	-2.5	17.9	0.2	4.5	8.6	11.4
24	13.1	25.3	0.2	11.3	20.1	0.0	9.5	20.9	0.4	6.9	16.4	0.2	-4.9	16.9	0.0	4.2	11.1	0.0
25	9.9	28.0	0.0	7.4	24.1	0.0	13.4	17.2	2.2	8.3	18.6	0.2	-2.3	14.7	0.0	-1.4	10.4	0.0
26	12.3	31.2	22.4	8.3	27.0	0.0	13.5	18.5	0.6	5.6	17.1	0.0	-0.1	11.3	0.0	4.0	9.0	0.0
27	14.2	26.8	4.6	13.4	28.4	0.0	14.1	21.0	22.8	6.0	18.3	0.2	-4.6	8.8	0.2	4.6	8.4	0.0
28	16.2	30.2	0.0	14.9	25.6	0.0	11.9	19.2	20.6	3.5	18.9	0.2	3.0	7.8	0.0	3.3	5.8	1.8
29	16.0	29.3	1.2				11.7	18.6	6.4	9.0	12.4	37.2	6.3	10.7	0.0	1.9	6.3	0.0
30	16.1	19.2	16.0				7.4	15.1	0.0	4.8	11.6	2.0	1.7	11.9	0.0	1.7	6.6	0.0
31	14.6	24.3	0.0				3.7	16.8	0.2				7.8	13.5	0.0			
Min	7.0	14.5	0.0	7.3	15.0	0.0	3.7	15.1	0.0	2.4	10.3	0.0	-4.9	7.3	0.0	-7.5	5.8	0.0
Max	16.2	31.2	24.4	16.3	32.7	15.0	15.0	34.3	22.8	11.1	19.9	37.2	7.8	17.9	2.6	7.9	16.6	11.4
Average	12.6	24.5		12.2	24.9		11.0	23.0		6.5	16.2		0.8	12.5		1.5	10.6	
Total			108.6			28.4			83.6			70.2			5.2			30.0

Note:
- signifies data not prov

APPENDIX H CEH REPOSITORY DATA

NOTES:
1) COPYRIGHT OF THIS PLAN & ASSOCIATED ELECTRONIC FILES VESTS WITH CEH SURVEY.
2) THE PLAN & ASSOCIATED ELECTRONIC FILES SHALL ONLY BE USED BY THE ADDRESSED CLIENT FOR THE PURPOSE OF THE SURVEY.
3) THIS SURVEY AND PLAN IS FOR CONTOUR & DETAIL / PLANNING PURPOSES ONLY.
4) THE BOUNDARIES, AREAS & DIMENSIONS OF THE LAND, AS SHOWN, ARE BASED ON ORIGINAL DATA AND HAVE NOT BEEN RE-SURVEYED, OR ARE SUBJECT TO FINAL SURVEY.
5) CONTOURS SHOW THE GENERAL SURFACE TOPOGRAPHY AS SURVEYED AT 1.0m INTERVAL, AS DERIVED FROM DRONE SURVEY DATED 25/08/2023.
6) NO SERVICES HAVE BEEN LOCATED OR SHOWN. SURFACE AND/OR UNDERGROUND SERVICES MAY EXIST. CEH SURVEY ACCEPTS NO RESPONSIBILITY FOR SERVICES NOT SHOWN.
7) BACKGROUND IMAGERY FROM DRONE FLIGHTS UNDERTAKEN BY CEH SURVEY DATED 25/08/2023.
8) CALCULATION BOUNDARIES AS SHOWN ARE BASED ON LIMITS OF ASH PLACEMENT AND WORKING AREAS AS AT THE DATE OF SURVEY INTERPRETED FROM THE AERIAL IMAGERY.
9) VOLUMES AS SHOWN FOR ZONES 1, 2 & 3 ARE VOLUMES IN EXCESS/REMAINING CALCULATED BETWEEN THE SURVEYED SURFACE AND FINAL DESIGN ASH SURFACES HELD ON FILE AT CEH SURVEY, ALLOWANCES FOR A CAPPING LAYER 1 METRE THICK ACROSS THE FINAL DESIGN SURFACE AREA, HAVE BEEN APPLIED IN CALCULATING VOLUMES.
10) VOLUMES FOR STAGE 2B "H" & "Q" AREAS ARE VOLUMES AS PLACED SINCE HANDOVER OF THE SITE FROM CENTENNIAL COAL AS AT A SURVEY DATED 14/07/2022.

SERVICESTREAM
MOUNT PIPER - ASH PLACEMENT
SURVEY : 25th AUGUST 2023

SCALE - 1:5000 (A3 SHEET) DATUM: MGA (ZONE56)

GRID NORTH

CEH SURVEY
CONSULTING LAND, ENGINEERING AND MINING SURVEYORS
"Astrolabe" 1 Rutherford Lane, LITHGOW 2790
ABN: 68 056 544 551 Office: (02) 6351 2281
Email: survey@ceh.com.au Website: www.ceh.com.au

DATE	25-08-2023
AMENDED	06-09-2023
SURVEYOR	TH/BN
DRAWN	TH/GM
CHECKED	

DRAWING No:
MPA0823 (contour)

CCAD6 JOB & DWG:
MPA0823_gm - MPA0823 contour

ERM

APPENDIX I PROJECT APPROVAL REQUIREMENTS

Appendix I Project Approval Requirement

The relevant consent requirements required under the project approval and the corresponding actions and compliance status are summarised in Table I-1.

TABLE I-1 PROJECT APPROVAL REQUIREMENTS

Project Approval Document	Condition Number and Phase	Consent requirements	How addressed by this report	Compliance status
Project Approval 09_0186	E15 (During Operations).	The Proponent shall prepare and implement a Groundwater Monitoring Program to monitor the impacts of ash placement activities on local groundwater quality and hydrology. The Program shall be developed in consultation with WaterNSW, and shall describe the location, frequency, rationale and procedures and protocols for collecting groundwater samples as well as the parameters analysed and methods of analysis. The monitoring program shall be ongoing for the operation of the project and for a minimum of 5 years following project completion and include, but not be limited to:	Refer to Section 5.5 of OEMP	Compliant
		a) monitoring at established bore sites (or replacement bore sites in the event that existing sites are damaged or lost) as described in the Groundwater Management Plan as per condition D3(b); and	Refer to Section 6 of this report	Compliant
		b) a schedule for periodic monitoring of groundwater quality, depth and flow at all monitoring sites, at an initial frequency of no less than once every month for the first 12 months of operation. The monitoring program shall form part of the Groundwater Management Plan referred to in condition D3(b) of this approval.	Refer to Section 6 of this report	Compliant

Project Approval Document	Condition Number and Phase	Consent requirements	How addressed by this report	Compliance status
	E16 (During Operations).	The Proponent shall prepare and implement a surface water quality monitoring program to monitor the impacts of the ash placement activities on Wangcol Creek Lamberts Gully. The Program shall be developed in consultation with the WaterNSW, and shall describe the location, frequency, rationale and the procedures and protocols for collecting water samples as well as the parameters analysed and methods of analysis. The program shall include, but not necessarily be limited to:	Refer to Section 5.6 of OEMP	Compliant Minor non-conforming laboratory LORs were reported for speciated chromium, silver and selenium as described in Section 5 of this report. These non-conforming laboratory LORs do not impact upon the conclusions of this report, as these are not considered to represent primary constituents of concern for surface water monitoring in accordance with the OEMP.
		a) monitoring at the existing water quality monitoring sites as described in the document referred to under condition A1c);	Refer to Section 5 of this report	Compliant
		b) monitoring at surface water discharge points from Lamberts Gully Creek;	Refer to Section 5 of this report	Compliant
		c) monitoring at surface water discharge points into Wangcol Creek;	Refer to Section 5 of this report	Compliant
		d) wet weather monitoring with a minimum of two events recorded within the first 12 months operation of the project; and	Refer to Section 3.1 of this report	Compliant

Project Approval Document	Condition Number and Phase	Consent requirements	How addressed by this report	Compliance status
		e) a schedule for periodic monitoring of surface quality at all sites throughout the life of the project, at an initial frequency of no less than once every month for the first 12 months and must include, but not be limited to, monitoring of dissolved oxygen, turbidity, sulfate, salinity, boron, manganese, iron chloride, total phosphorus and total nitrogen.	Refer to Section 5 of this report	Compliant
Operational Environmental Management Plan	Not applicable	Section 5.5.3 Groundwater Monitoring Program - Guidelines	Refer to Section 6 of this report	Compliant
	Not applicable	Section 5.5.3.1 Groundwater Monitoring Program – Water Quality Criteria	Refer to Appendix C and Section 6 of this report	Compliant
	Not applicable	Section 5.5.4 Monitoring (Table 5-12 – Groundwater Monitoring Schedule)	Refer to Section 6.3 of this report	Compliant
	Not applicable	Section 5.5.4 Monitoring (Table 5-13 – Procedures and Protocols for Monitoring)	Refer to Appendix C and Sections 6.4 and 6.5 of this report	Compliant. Minor non-conforming laboratory LORs were reported for silver, selenium and fluoride as described in Section 6 of this report. These non-conforming laboratory LORs do not impact upon the conclusions of this report, as these are not considered to represent primary constituents of concern for

Project Approval Document	Condition Number and Phase	Consent requirements	How addressed by this report	Compliance status
				groundwater monitoring in accordance with the OEMP.
	Not applicable	Section 5.5.4 Monitoring (Table 5-14 – Groundwater contamination contingency plan for Lamberts North)	Refer to Sections 6.7 and 6.7.5 of this report	Compliant
	Not applicable	Section 5.5.4 Monitoring (Table 5-15 – Investigation protocol)	Refer to Sections 6.7, 6.7.5 and 9 of this report	Compliant
	Not applicable	Section 5.5.4 Monitoring (Table 5-16 Reporting Requirements, Item 2)	This report	Compliant
	Not applicable	Section 5.6.5 (Table 5-20 Soil and Surface Water Monitoring Measures – Items 3 to 5)	Refer to Appendix B and Section 5 of this report	Compliant
	Not applicable	Section 5.6.5 (Table 5-21 Reporting, Item 5)	This report	Compliant

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APPENDIX J NALCO QAQC PROGRAM

Unit 12, 2 Eden Park Drive
Macquarie Park 2113
Phone: +61 (0) 2 8870 8434

ABN: 41 000 424 788

Ecolab | Nalco Water - Global Analytical & Microbiology

Quality assurance/quality control program (2023)

The laboratory's Quality assurance/quality control program ensures that sampling activities and analytical data is accurate, reliable and acceptable.

The Quality assurance/quality control program consists of both internal and external measures.

Internal

- Laboratory instrumentation and field equipment are calibrated at the correct intervals, as prescribed in the relevant NATA 'General equipment table'.
- Regular preventative maintenance is carried out on all key laboratory instrumentation and field equipment.
- Trip blanks (where appropriate) are supplied to monitor contamination.
- Certified reference materials are analysed routinely.
- Duplicate analysis is conducted to check precision.
- Laboratory blanks are analysed to monitor contamination.
- Quality control checks on media are performed.
- All records and subsequent reports are systematically checked.
- Quality control charts are used to statistically monitor trends in data.
- The laboratory is regularly internally audited.

External

- Ecolab Global Analytical & Microbiology laboratory participates in regular chemical and microbiological external proficiency testing programs as well as NATA audits as per their surveillance program.

Sampling and Data Collection

- All sampling is performed by trained personnel in accordance with procedure A-2.18 and relevant parts of Australian Standard 5667, for which NATA accreditation is held.
- Site measurements (Dissolved Oxygen, pH, Turbidity, Temperature and Conductivity) and sampling observations (water depth) are recorded and reported in accordance with procedure CA12125.

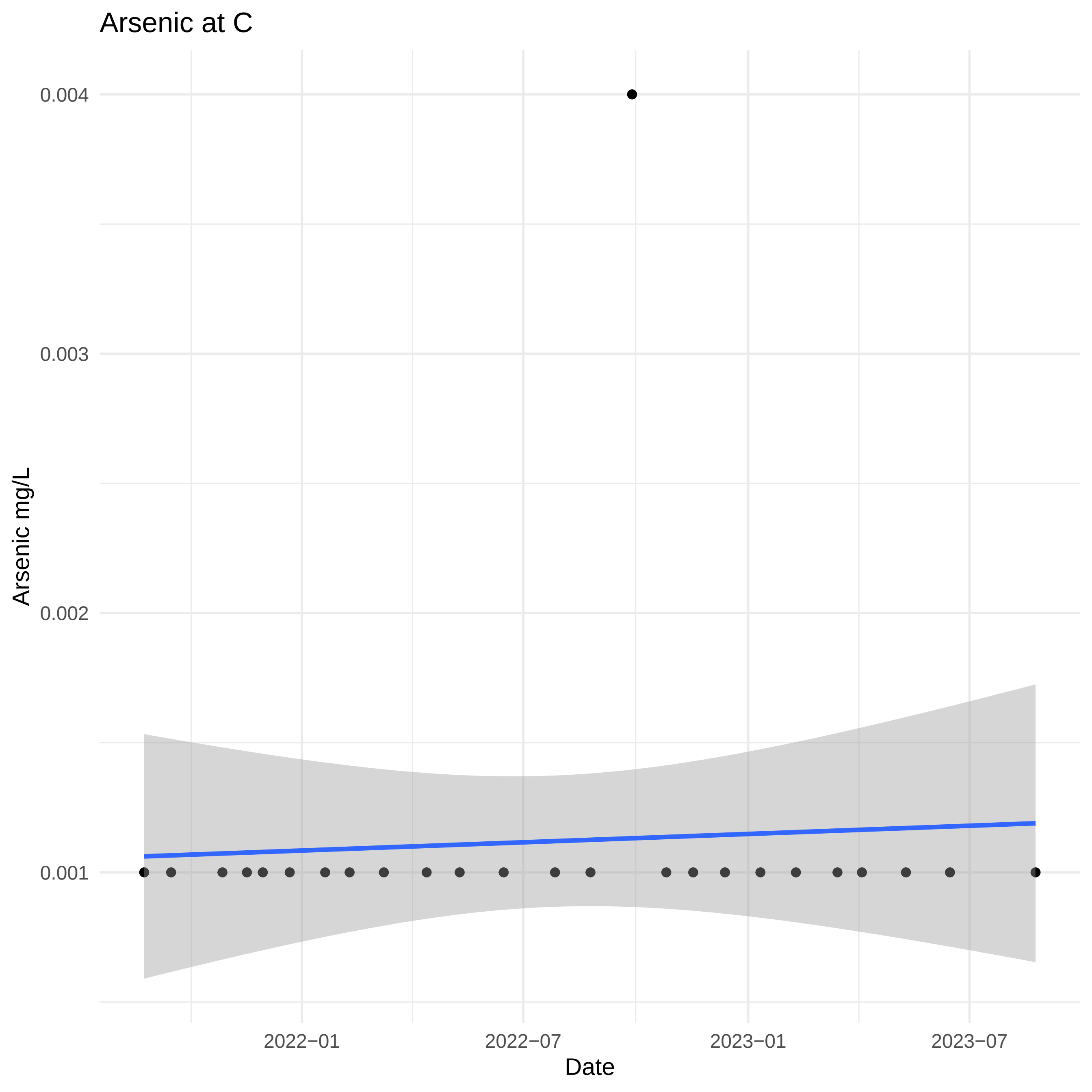
Sample Bottles

- Pre-labeled sample containers are used for routine sampling and testing.
- The sample bottles are prepared so that samples are preserved in accordance with Australian Standard 5667.1:1998 and Standard Methods for the Examination of Water and Wastewater, 22^{nd} Edition (APHA).

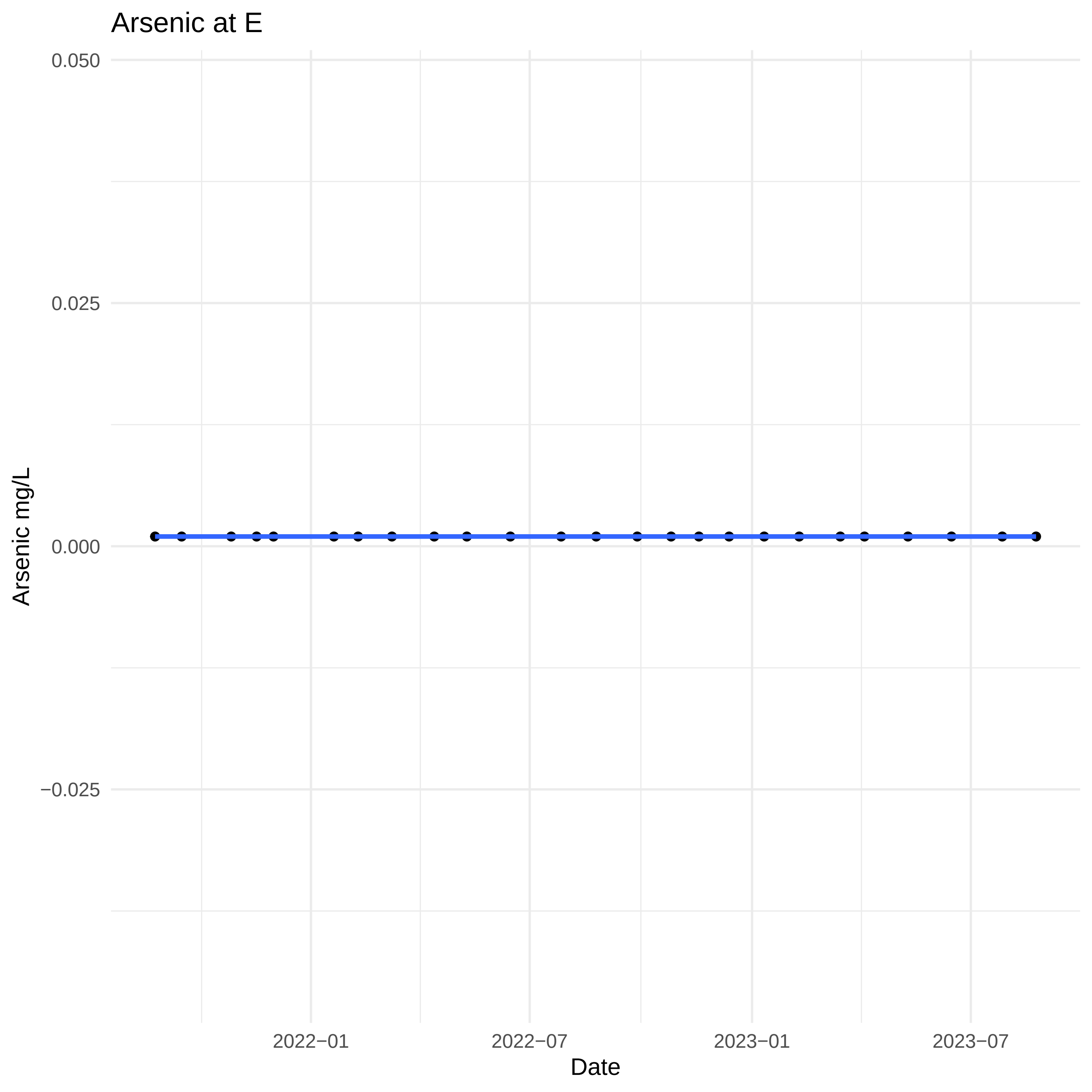
Delivery of Samples

- Eskies and freezer packs are used to maintain the integrity of the samples during transport from the sampling sites to our Global Analytical & Microbiology laboratory (Sydney).

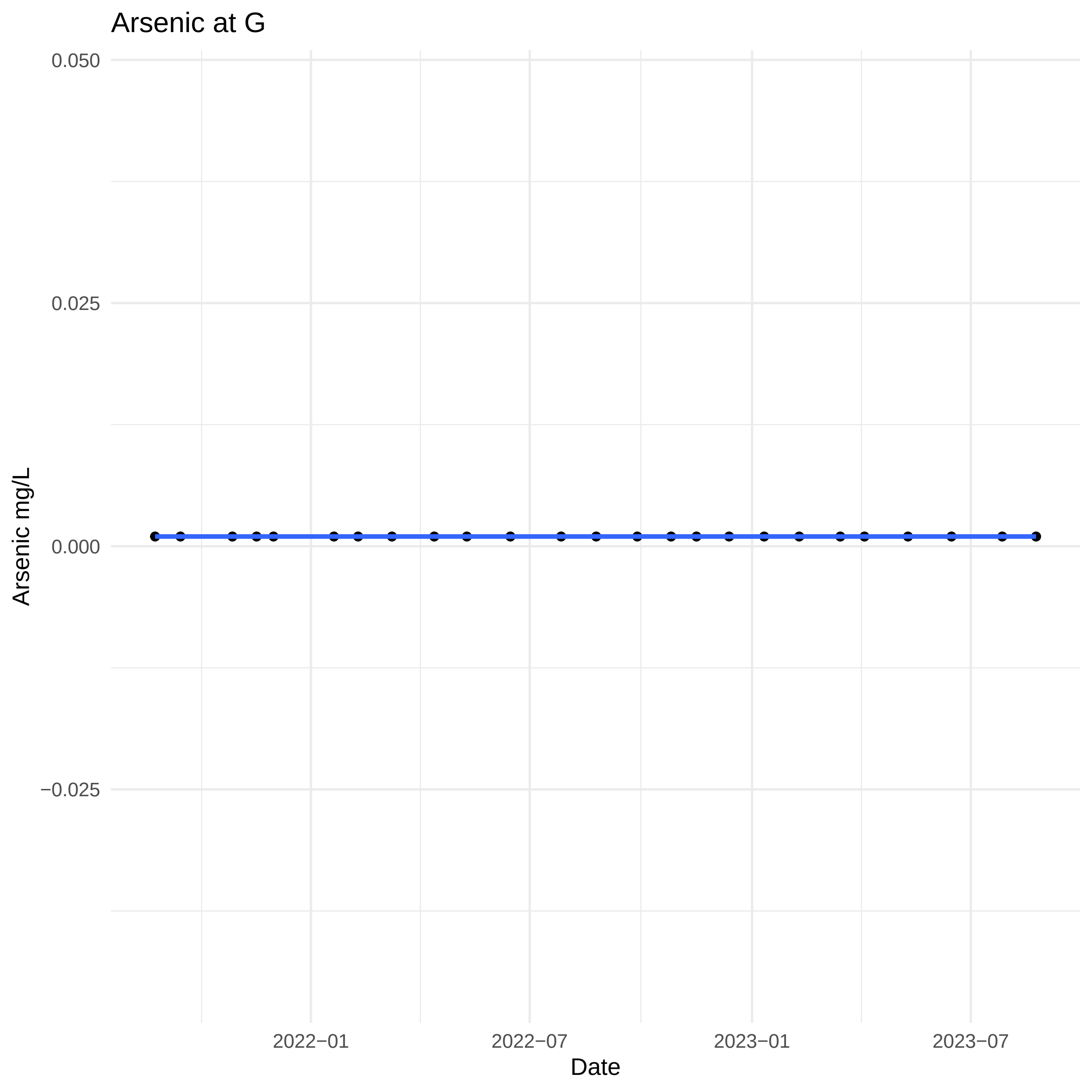
APPENDIX K SURFACE WATER LINEAR TREND GRAPHS



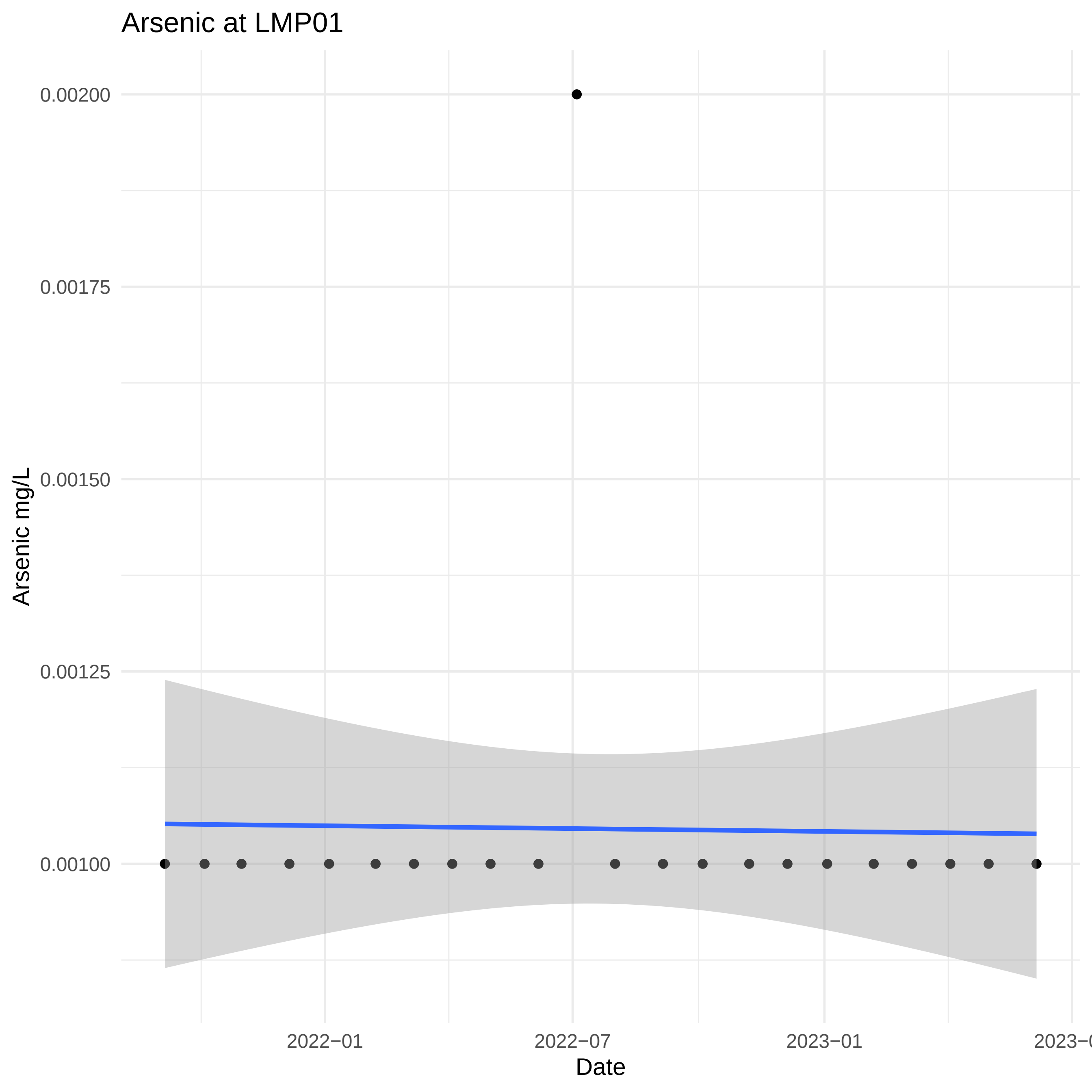
Arsenic at C
0.004
0.003
0.002
0.001
Arsenic mg/L
2022−01
2022−07
2023−01
2023−07
Date



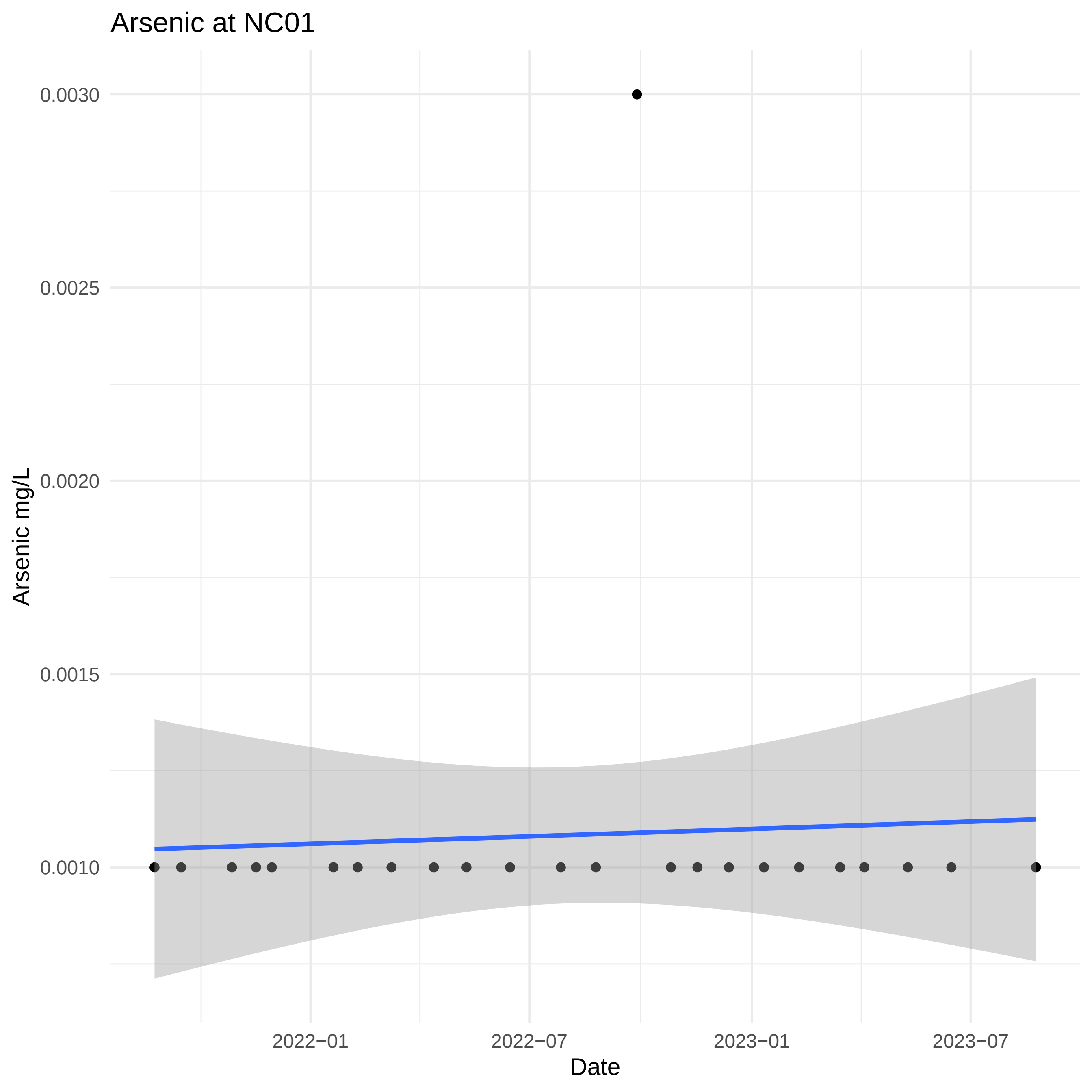
Arsenic at E
0.050
0.025
0.000
−0.025
Arsenic mg/L
2022−01
2022−07
2023−01
2023−07
Date



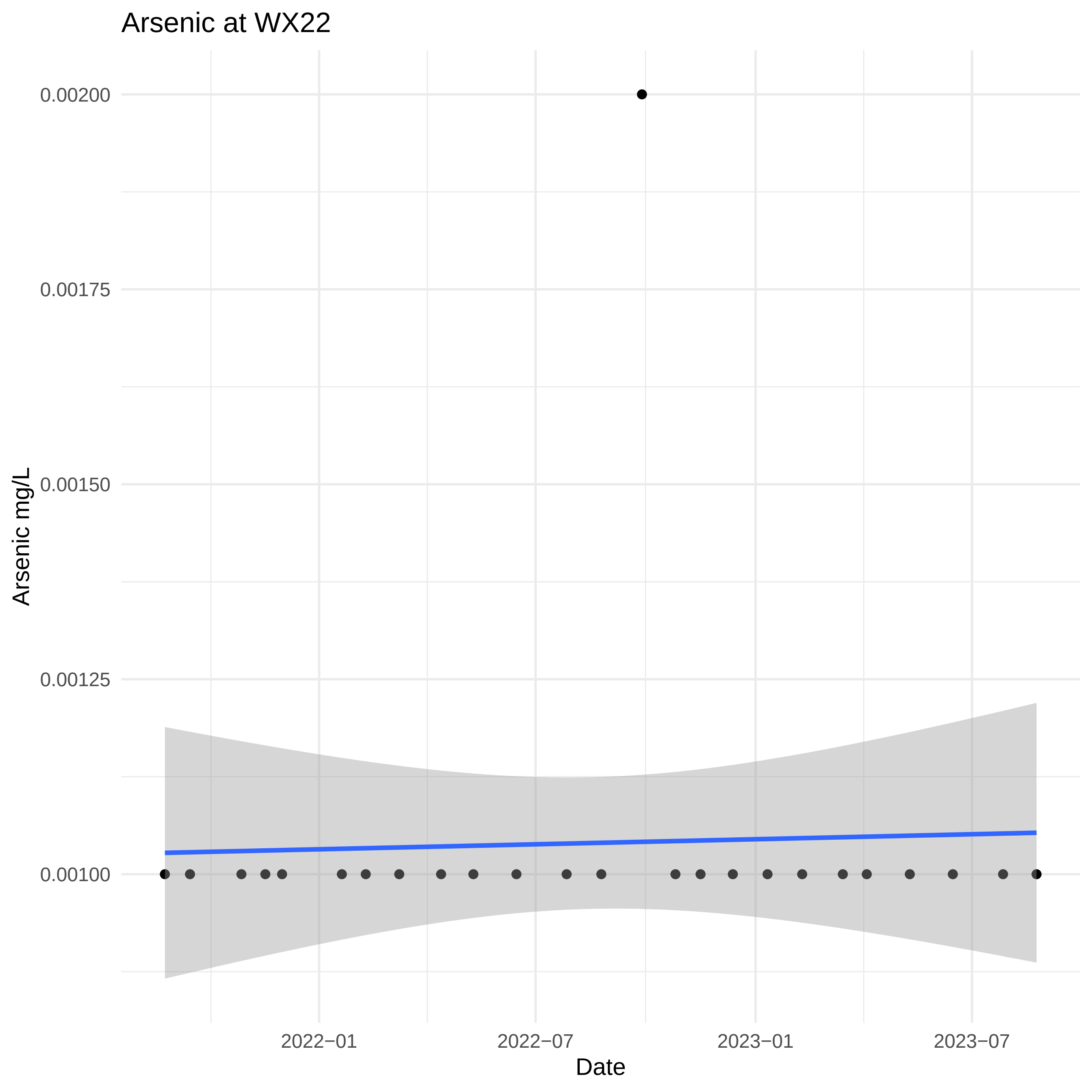
Arsenic at G
0.050
0.025
0.000
−0.025
Arsenic mg/L
2022−01
2022−07
2023−01
2023−07
Date

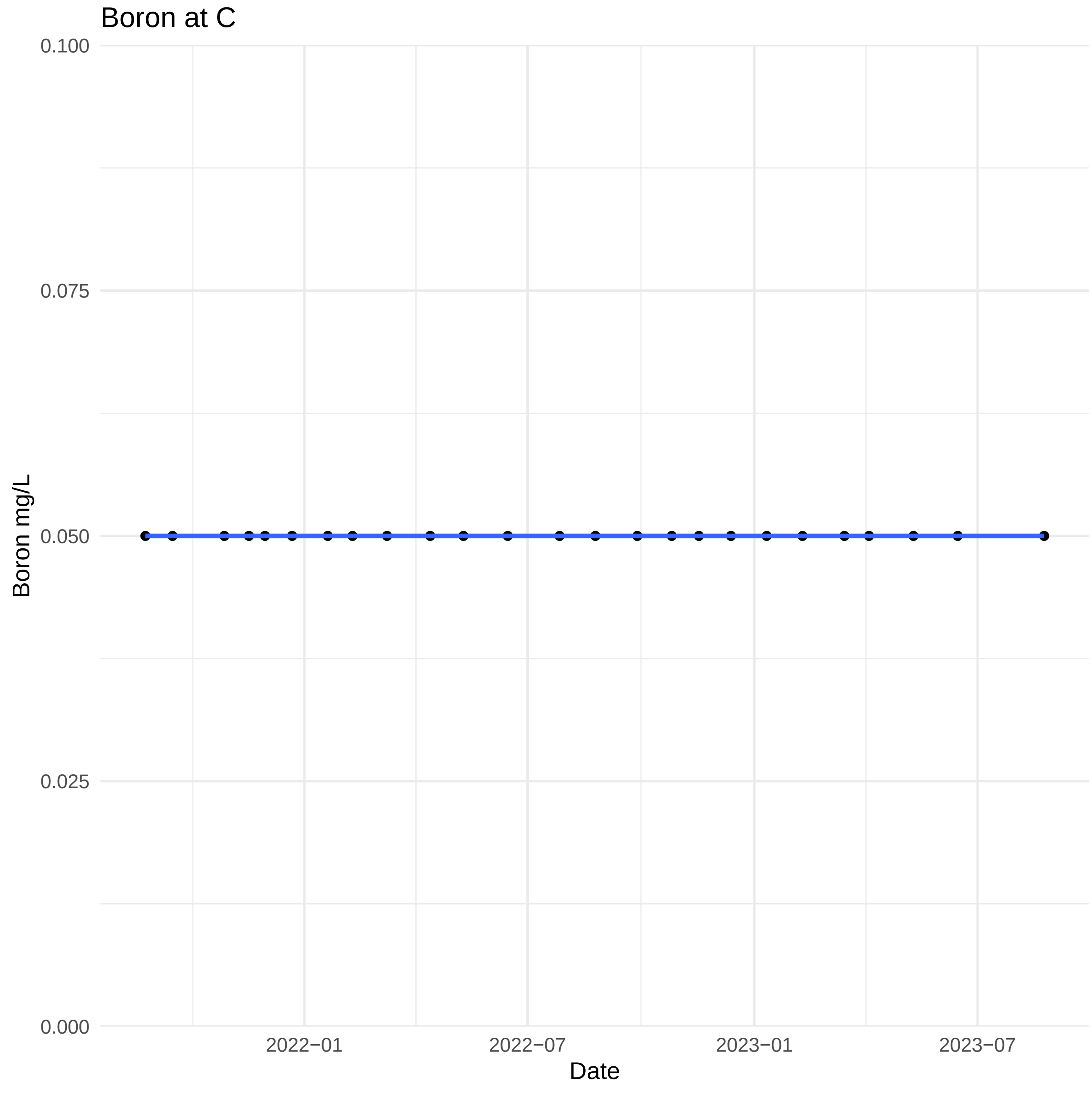


Arsenic at LMP01
0.00200
0.00175
0.00150
0.00125
0.00100
Arsenic mg/L
2022−01
2022−07
2023−01
Date

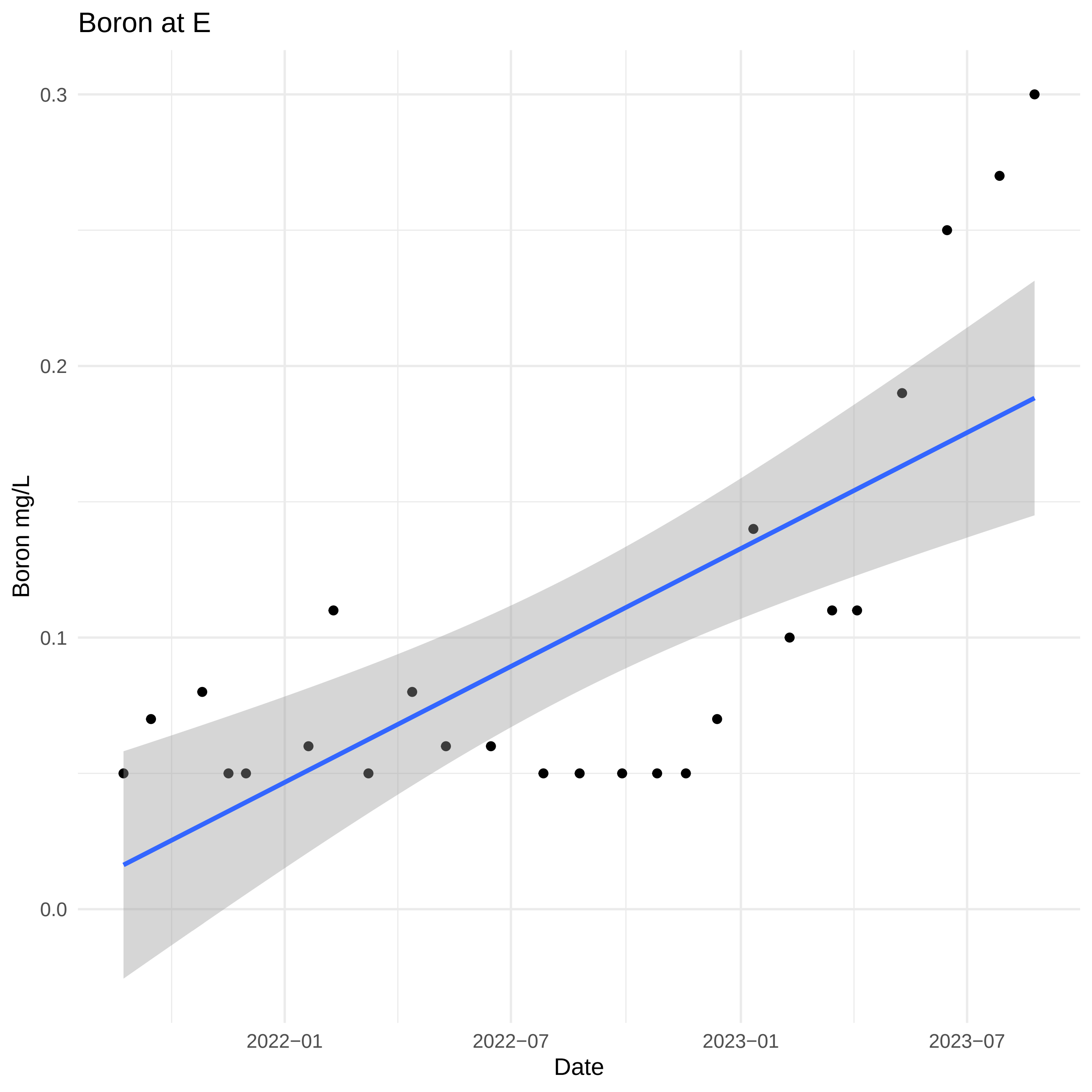


Arsenic at NC01
0.0030
0.0025
0.0020
0.0015
0.0010
Arsenic mg/L
2022−01
2022−07
2023−01
2023−07
Date

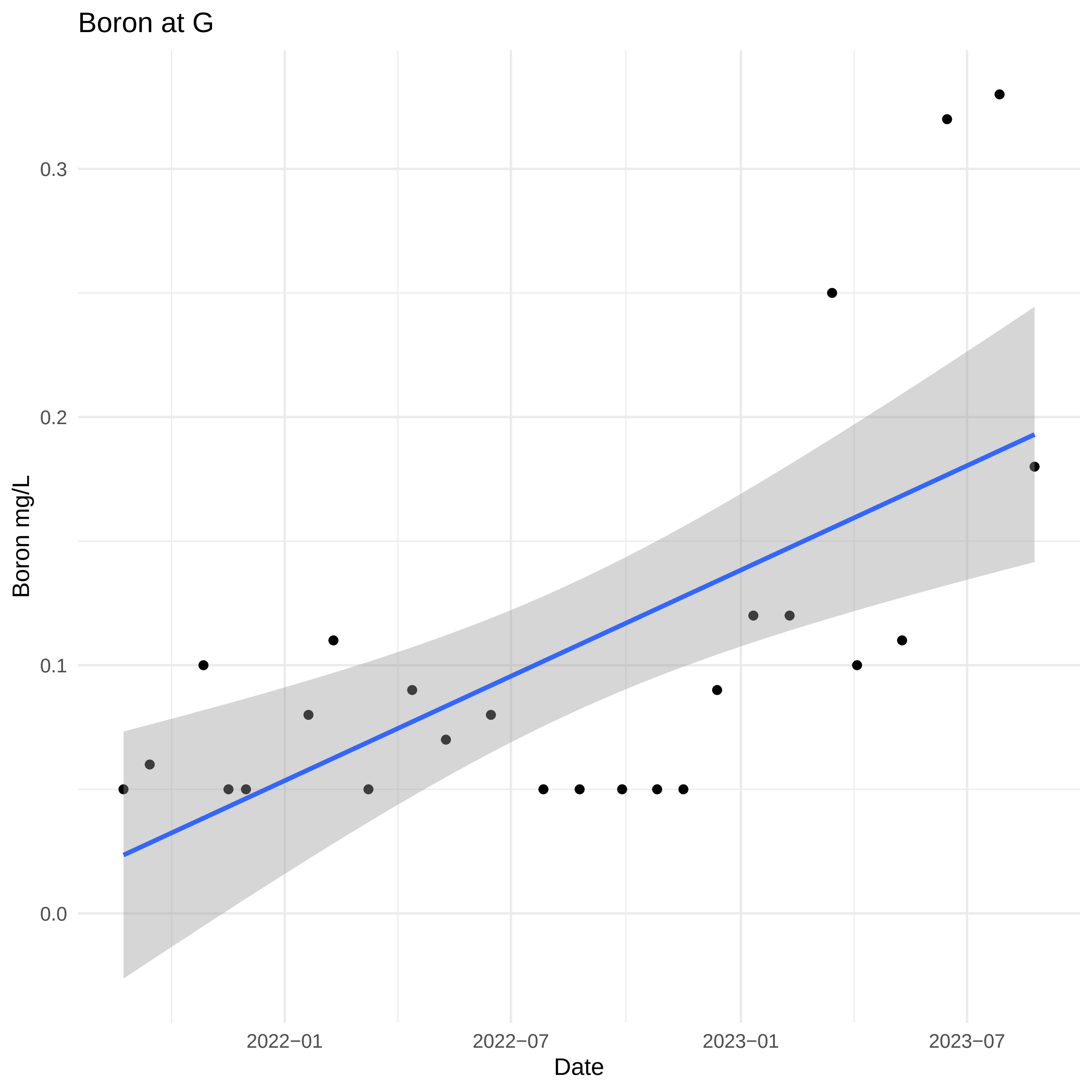

Arsenic at WX22
0.00200
0.00175
0.00150
0.00125
0.00100
Arsenic mg/L
2022−01
2022−07
2023−01
2023−07
Date



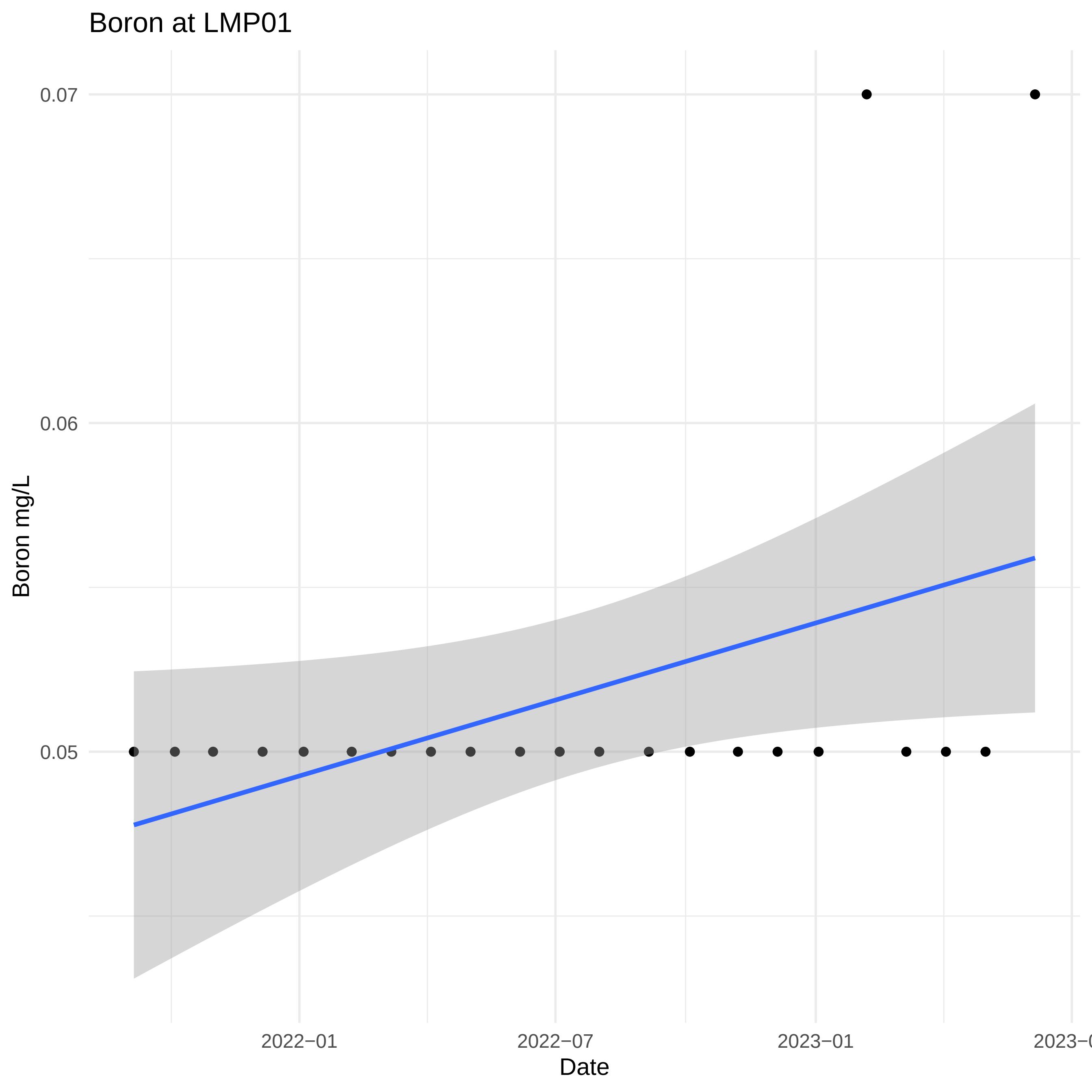
Boron at C
0.100
0.075
0.050
0.025
0.000
Boron mg/L
2022−01
2022−07
2023−01
2023−07
Date



Boron at E
Boron mg/L
0.3
0.2
0.1
0.0
2022−01
2022−07
2023−01
2023−07
Date

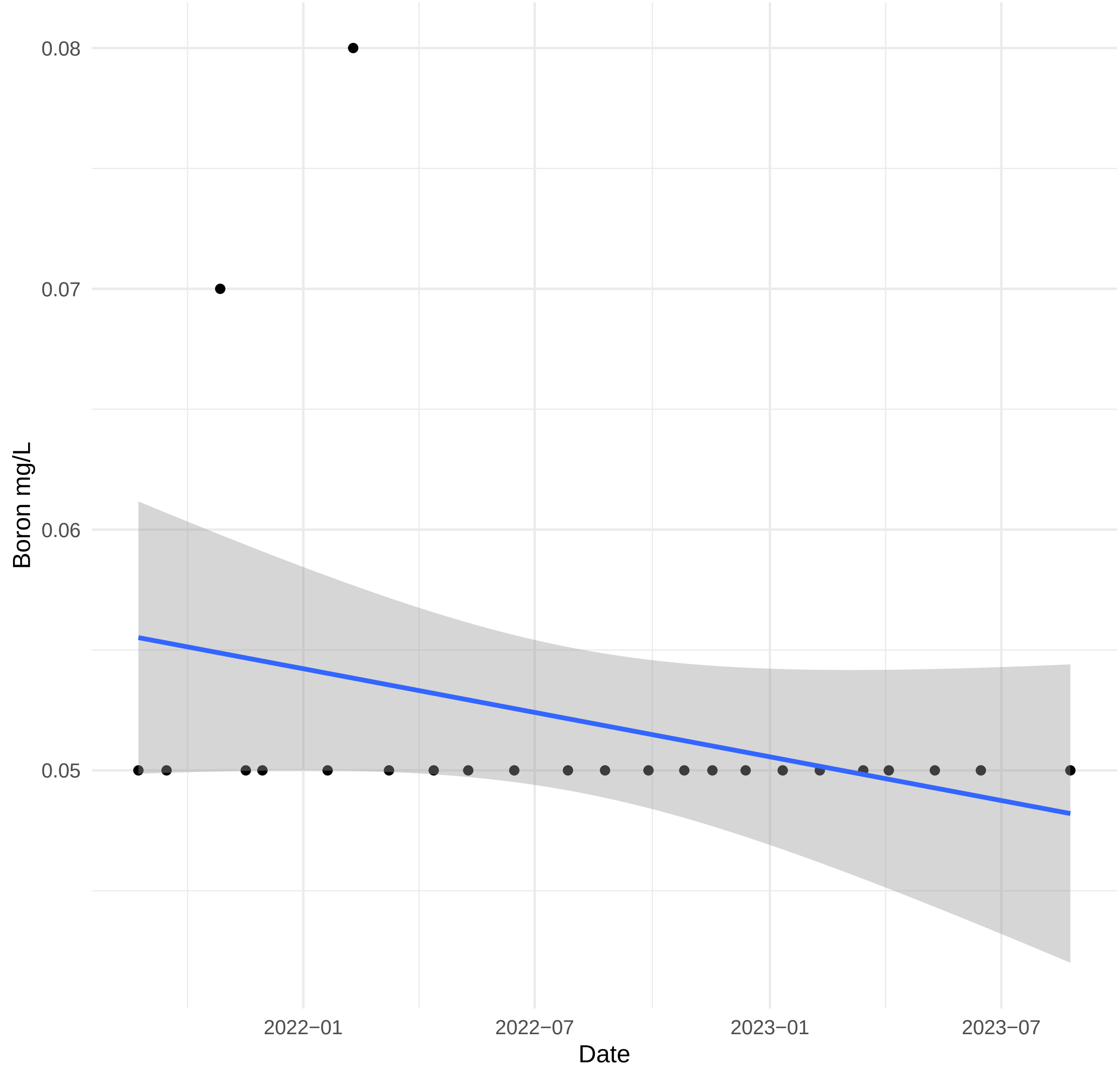


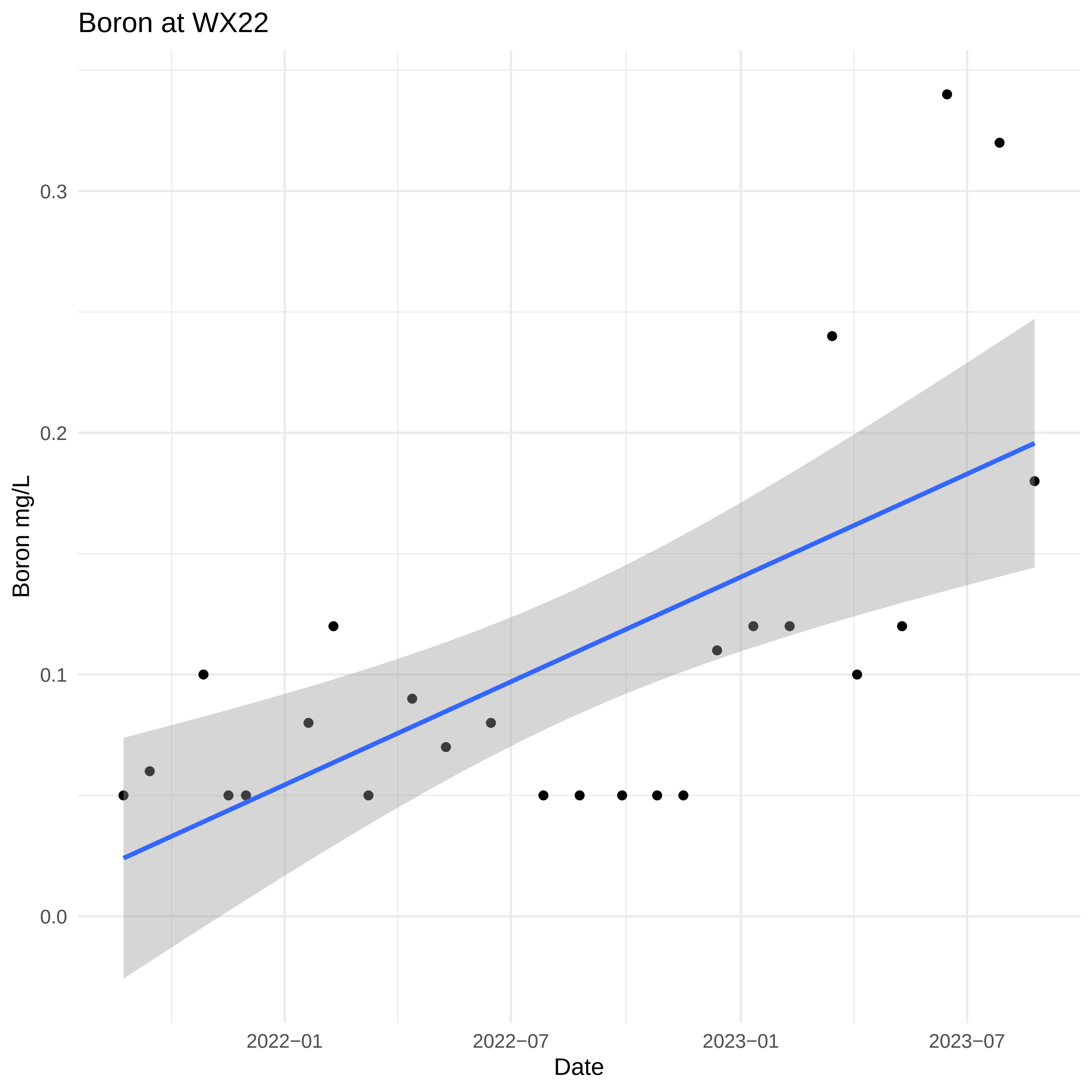
Boron at G
Boron mg/L
0.0
0.1
0.2
0.3
2022−01
2022−07
2023−01
2023−07
Date

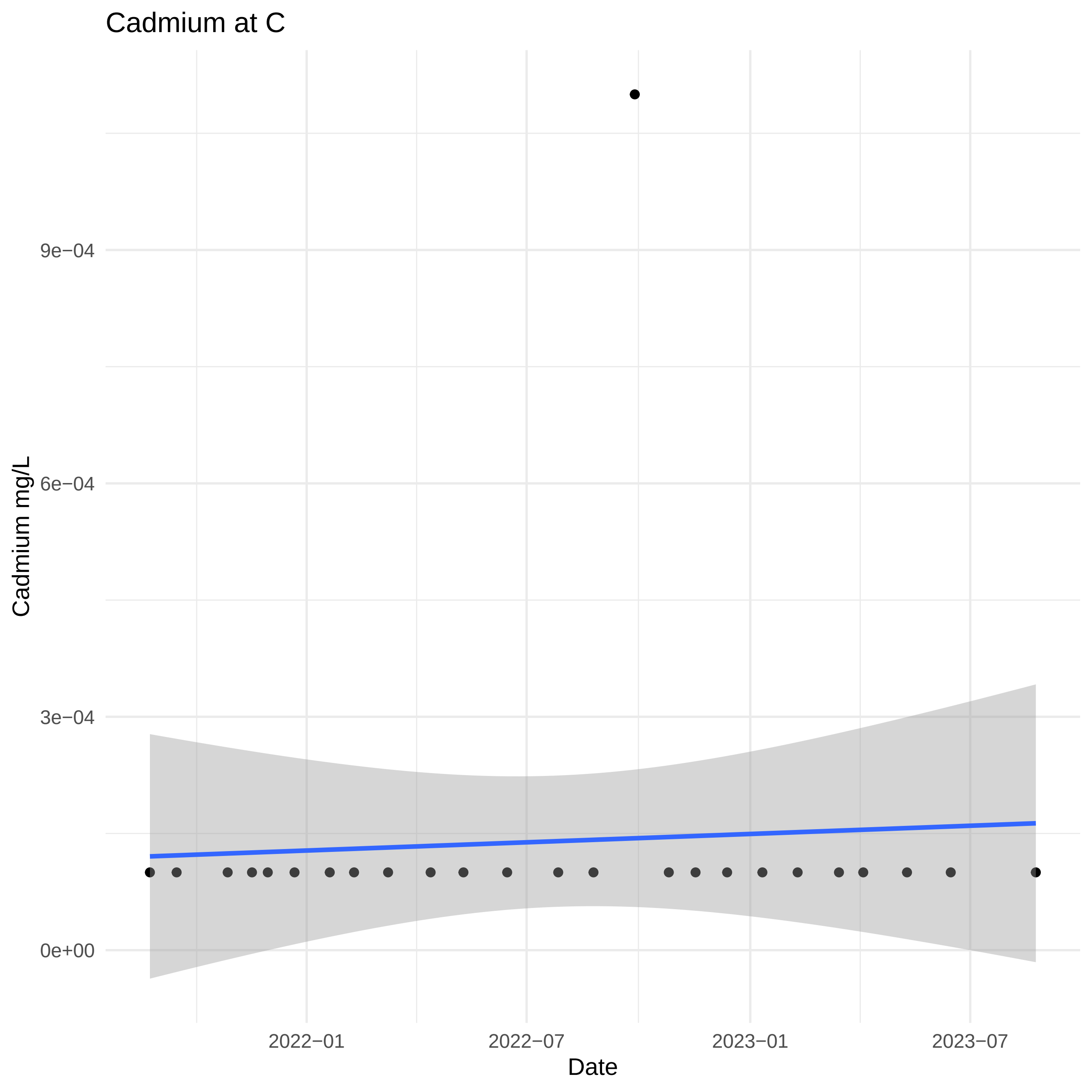


Boron at LMP01
0.07
0.06
0.05
Boron mg/L
2022−01
2022−07
2023−01
Date

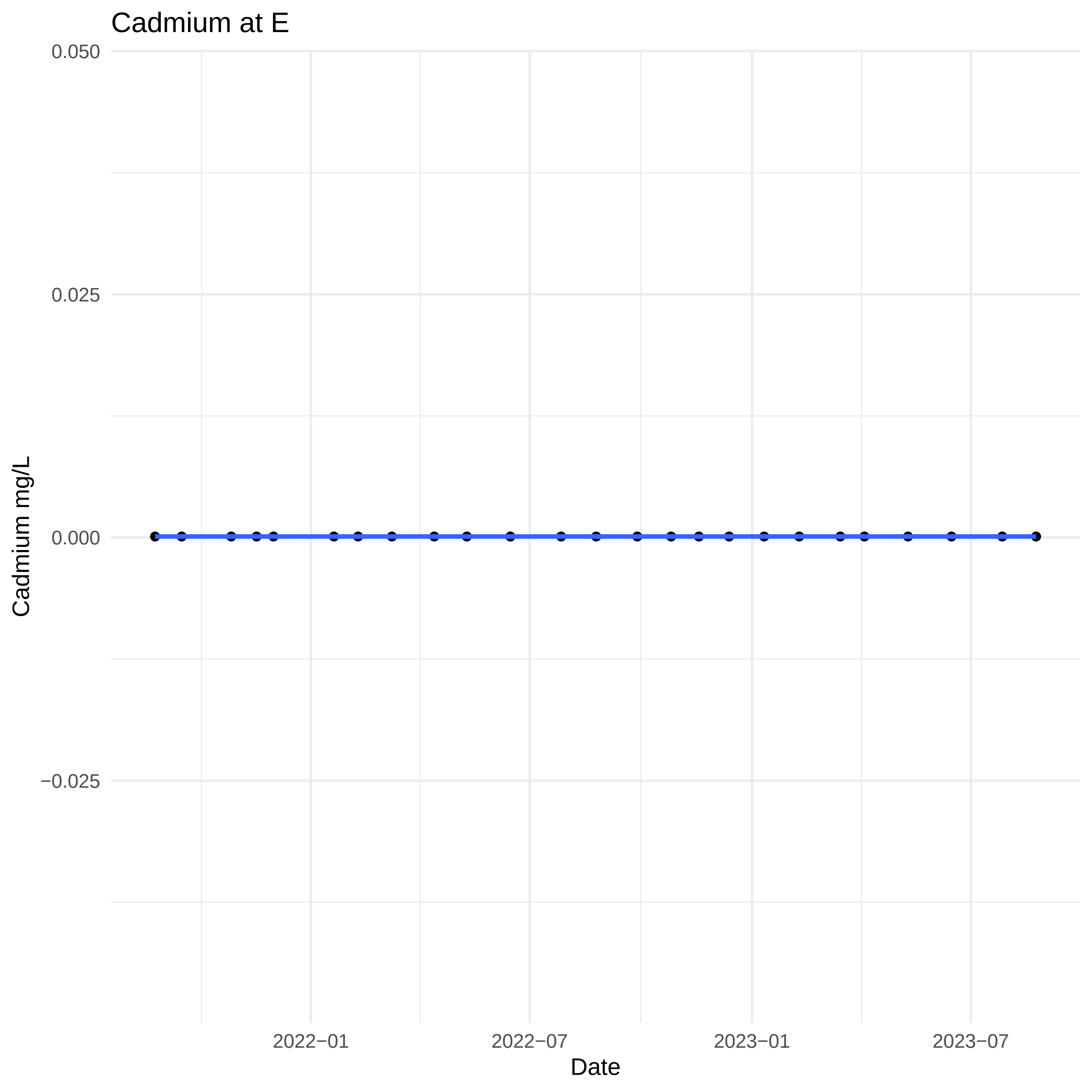
Boron at NC01



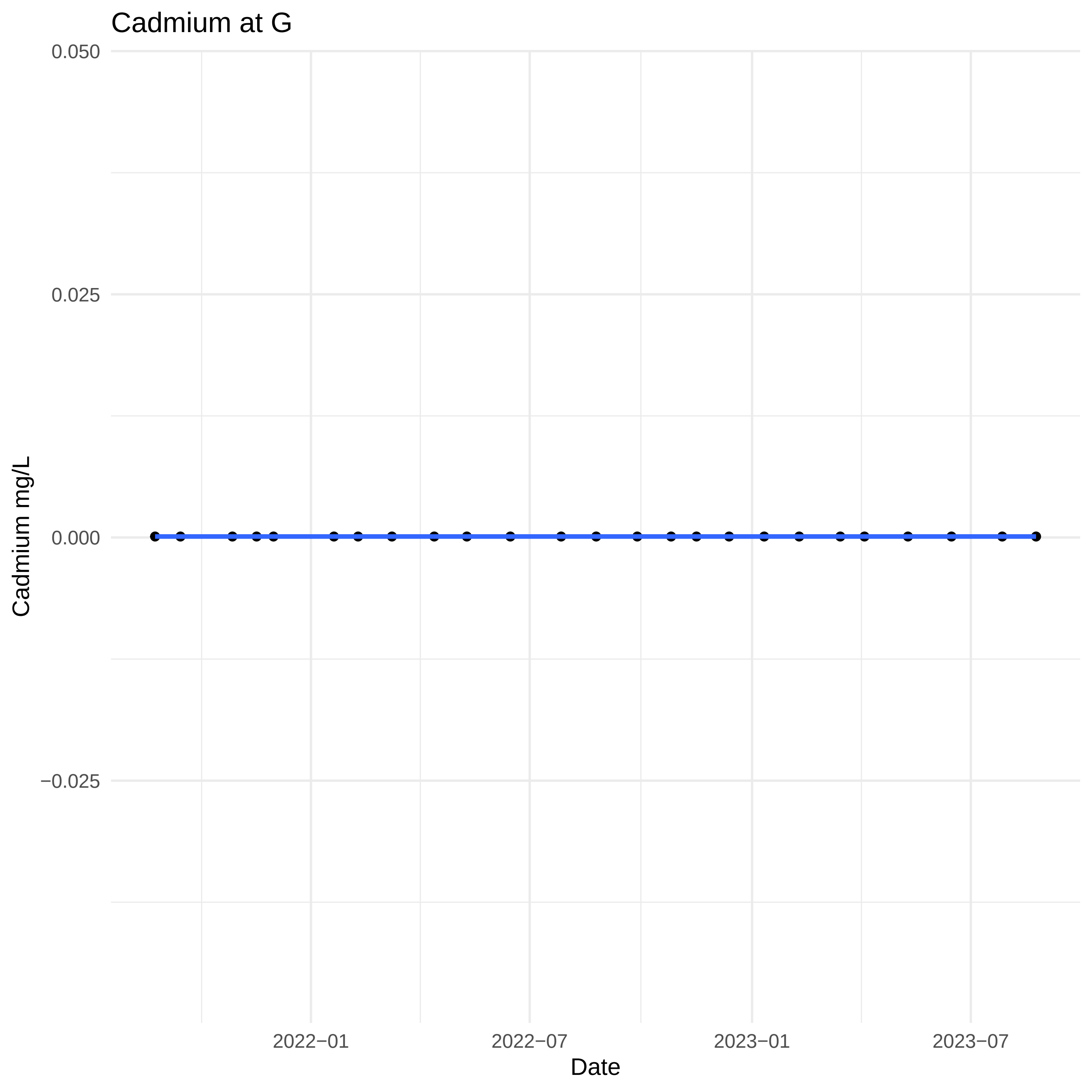

Boron at WX22
Boron mg/L
0.3
0.2
0.1
0.0
2022−01
2022−07
2023−01
2023−07
Date

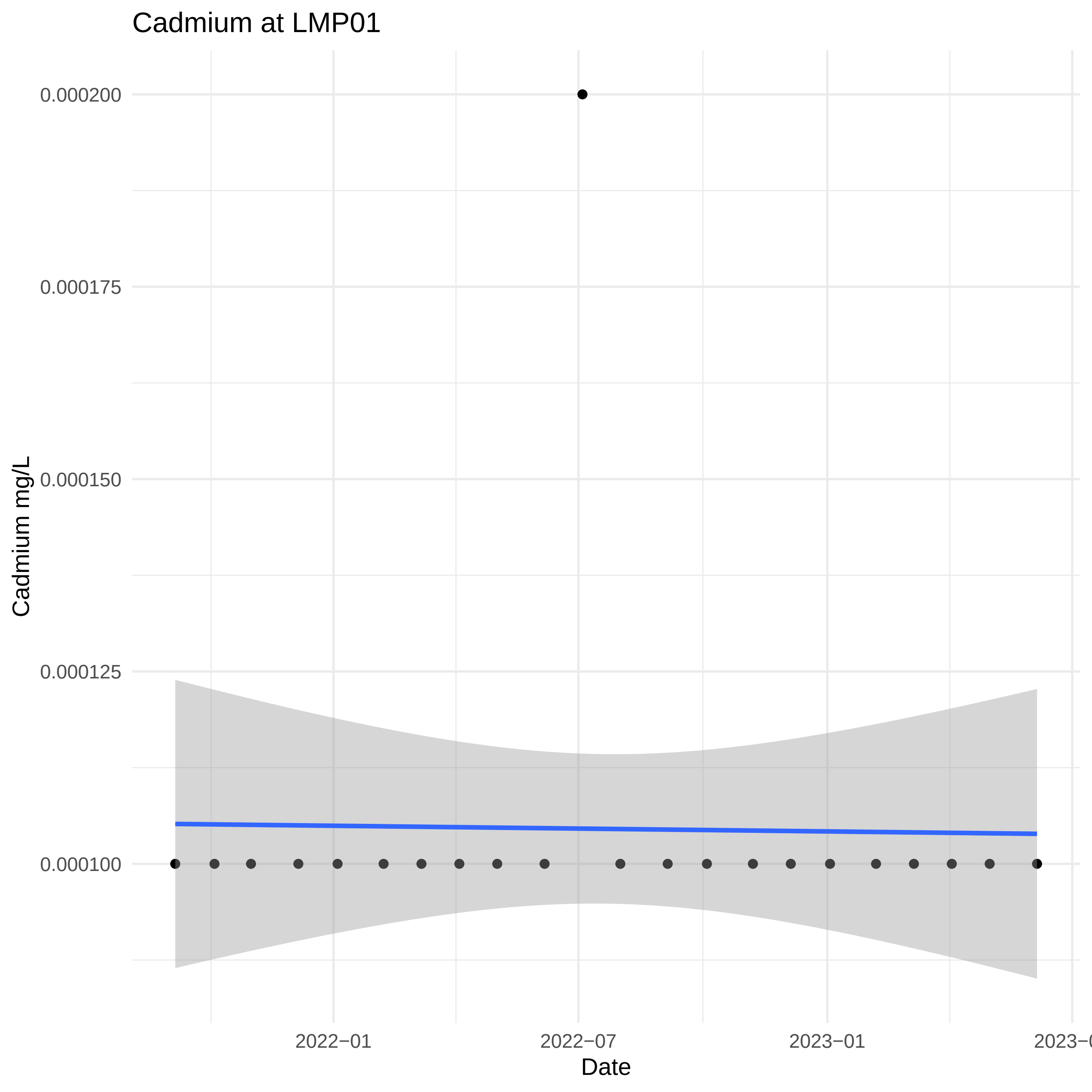


Cadmium at C
9e−04
6e−04
3e−04
0e+00
Cadmium mg/L
2022−01
2022−07
2023−01
2023−07
Date

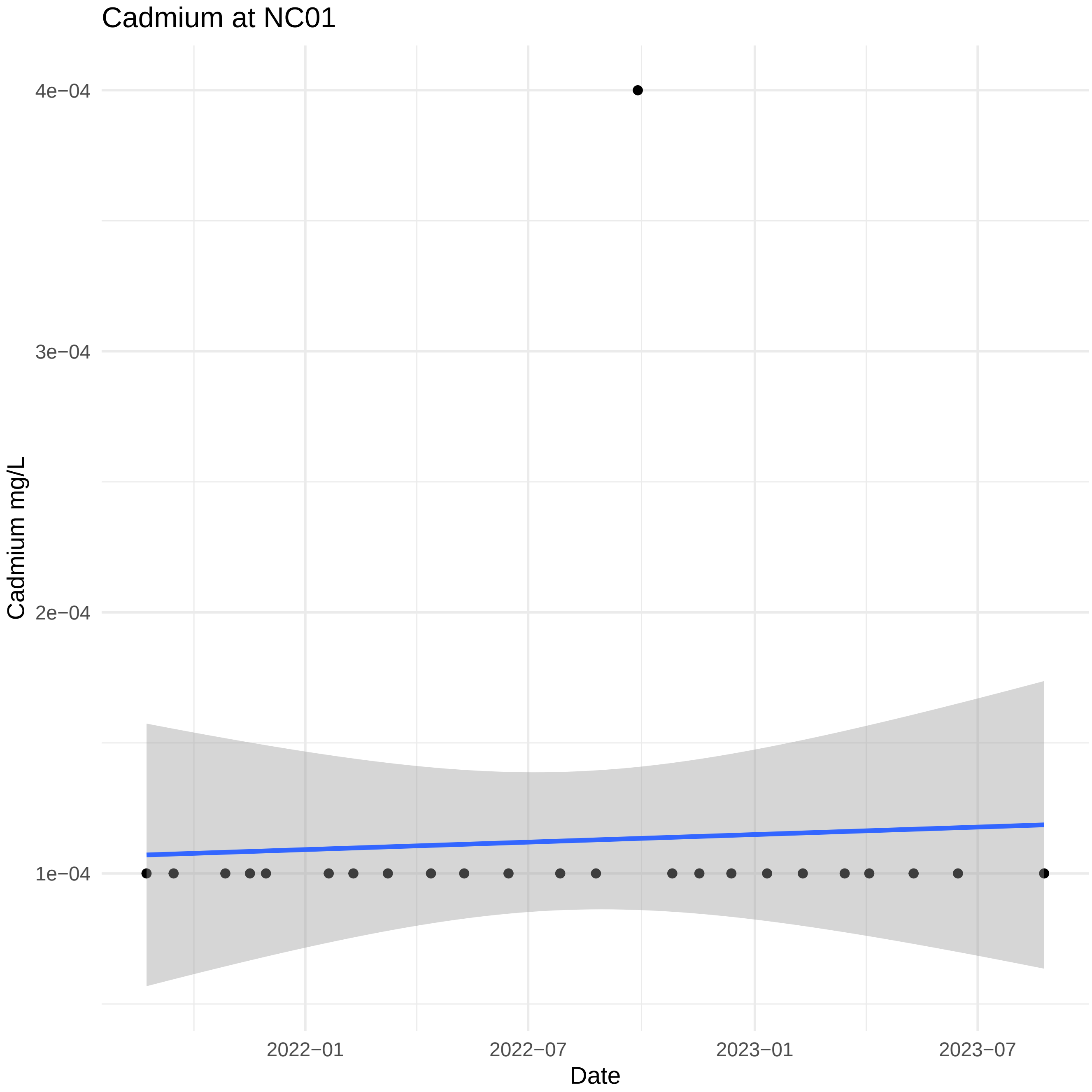


Cadmium at E
0.050
0.025
0.000
−0.025
Cadmium mg/L
2022−01
2022−07
2023−01
2023−07
Date

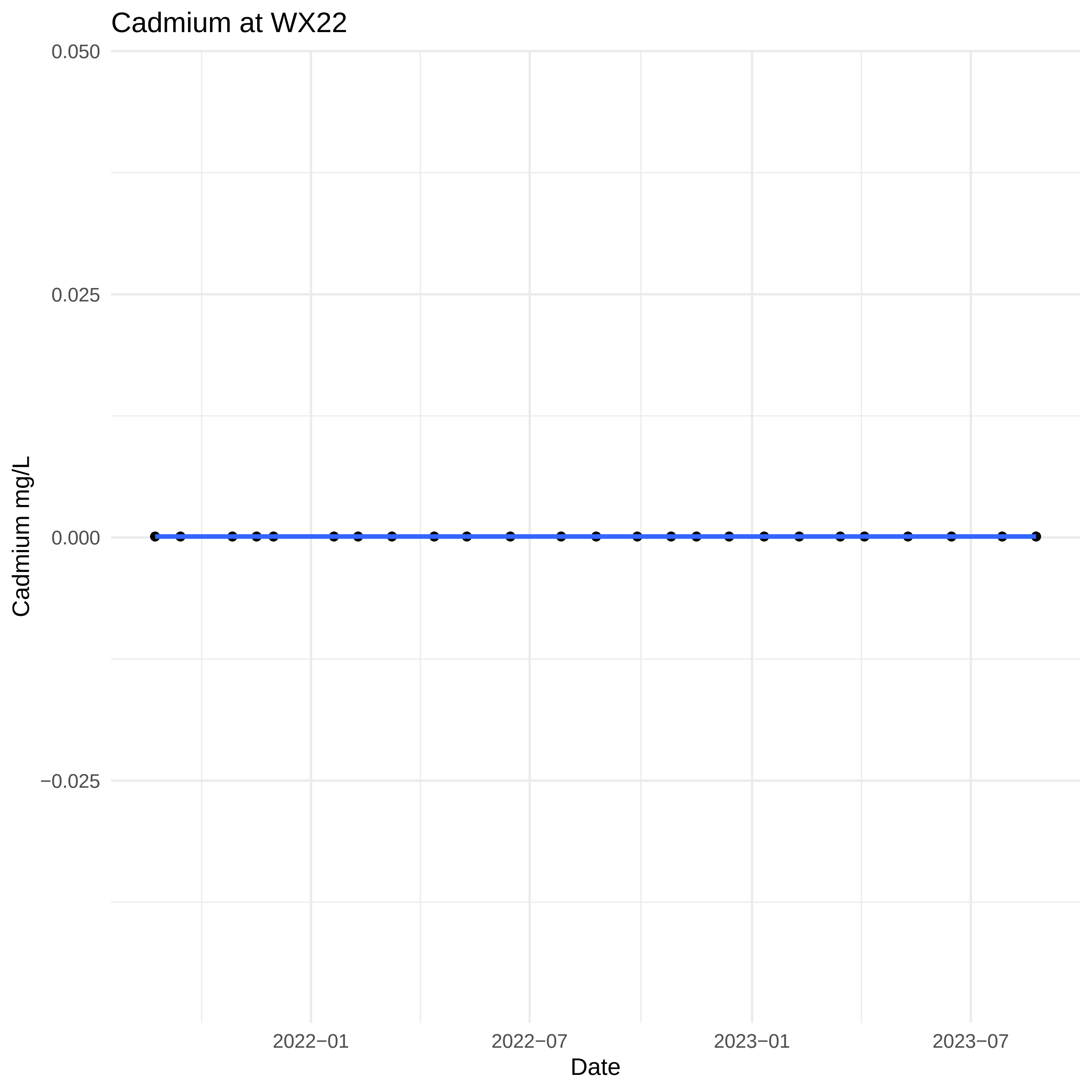

Cadmium at G
0.050
0.025
0.000
−0.025
Cadmium mg/L
2022−01
2022−07
2023−01
2023−07
Date



Cadmium at LMP01
Cadmium mg/L
0.000200
0.000175
0.000150
0.000125
0.000100
2022−01
2022−07
2023−01
2023−0
Date

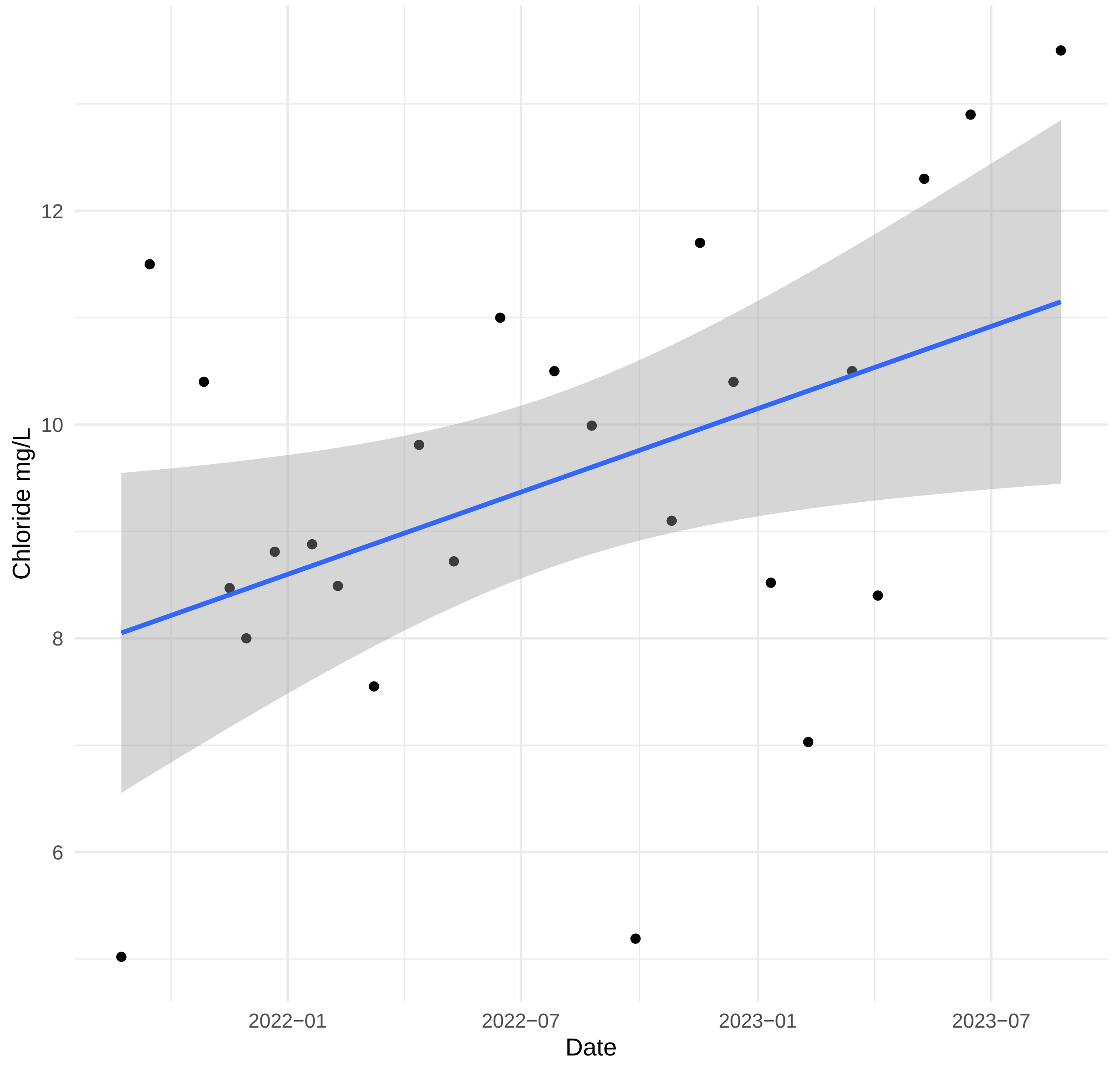


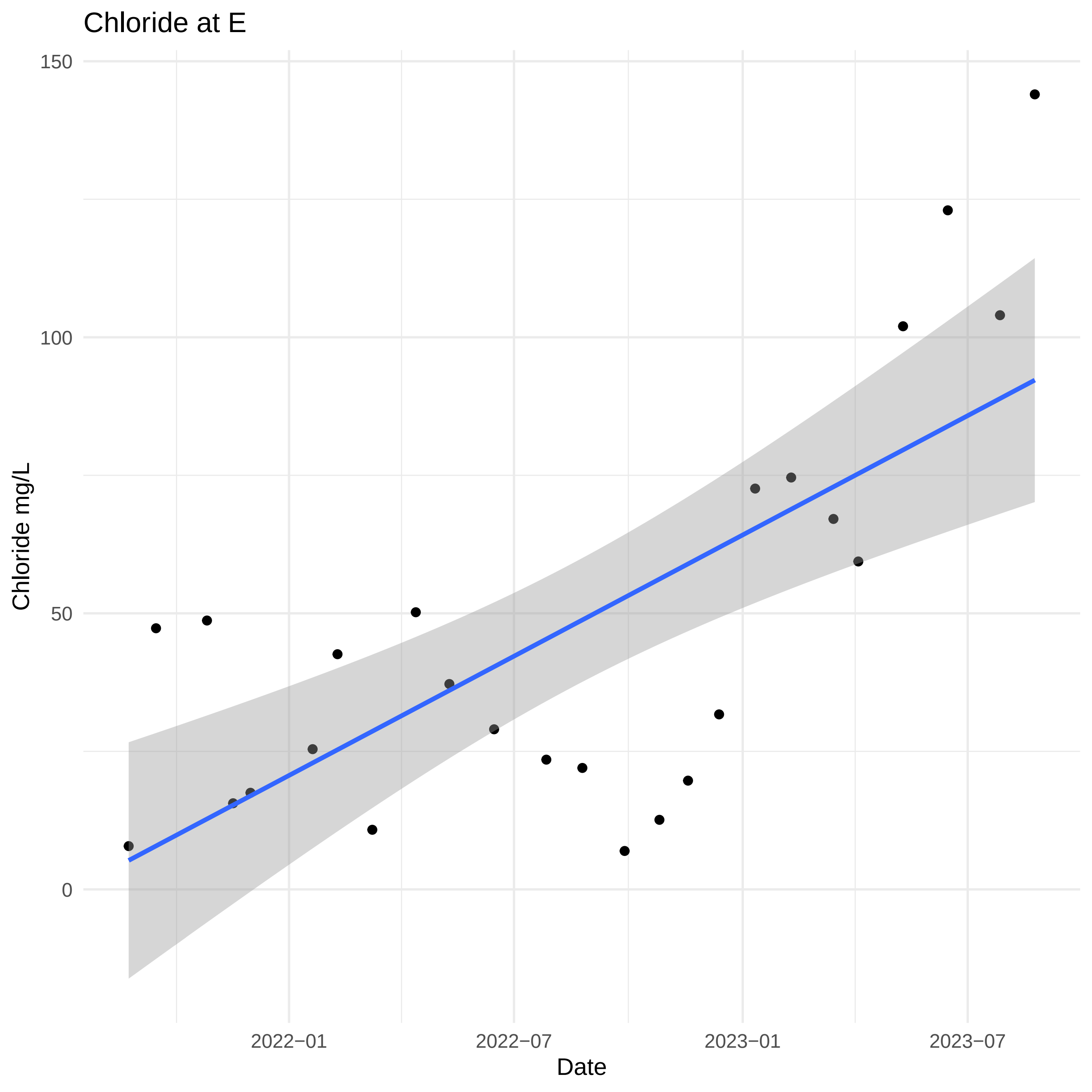
Cadmium at NC01
4e−04
3e−04
2e−04
1e−04
Cadmium mg/L
2022−01
2022−07
2023−01
2023−07
Date

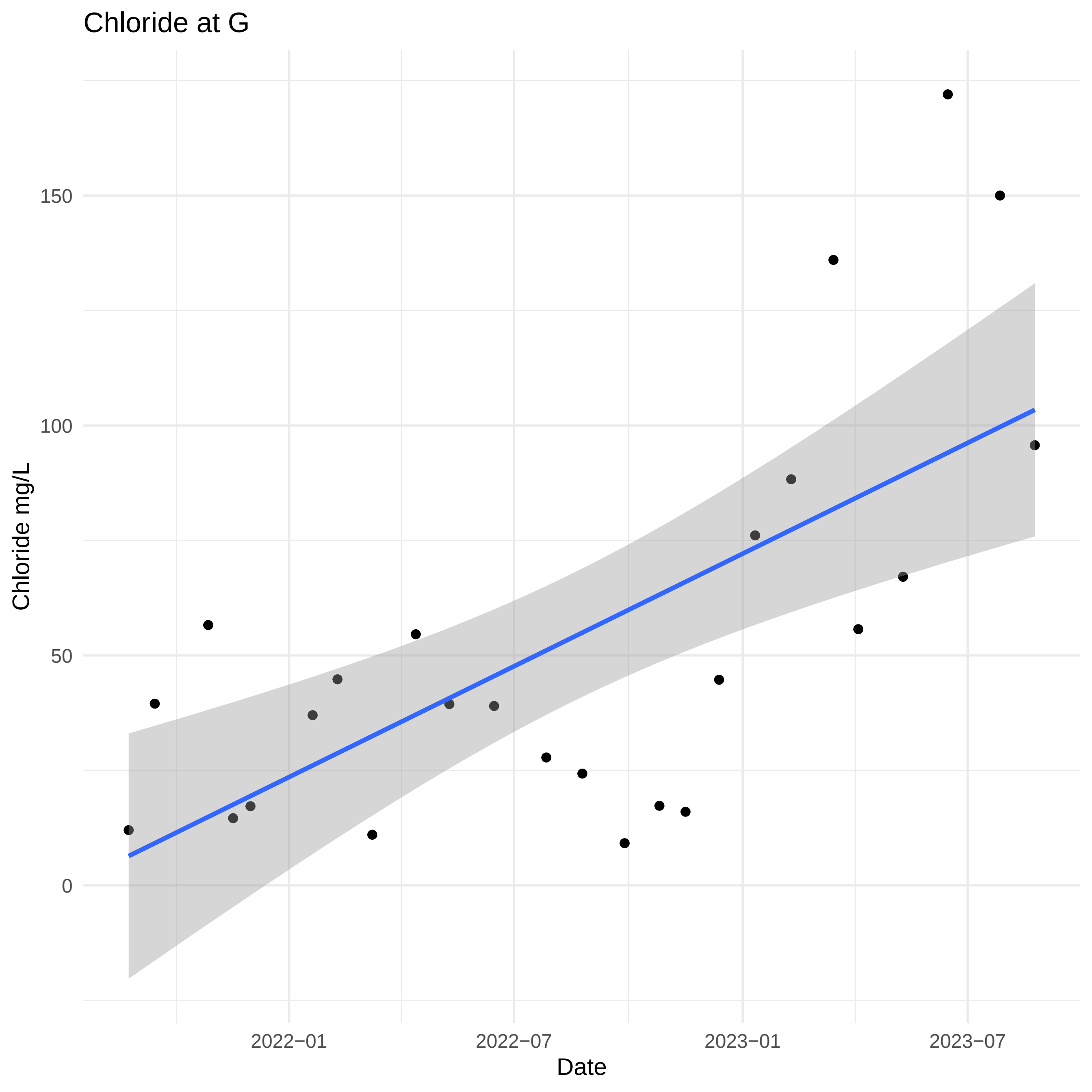


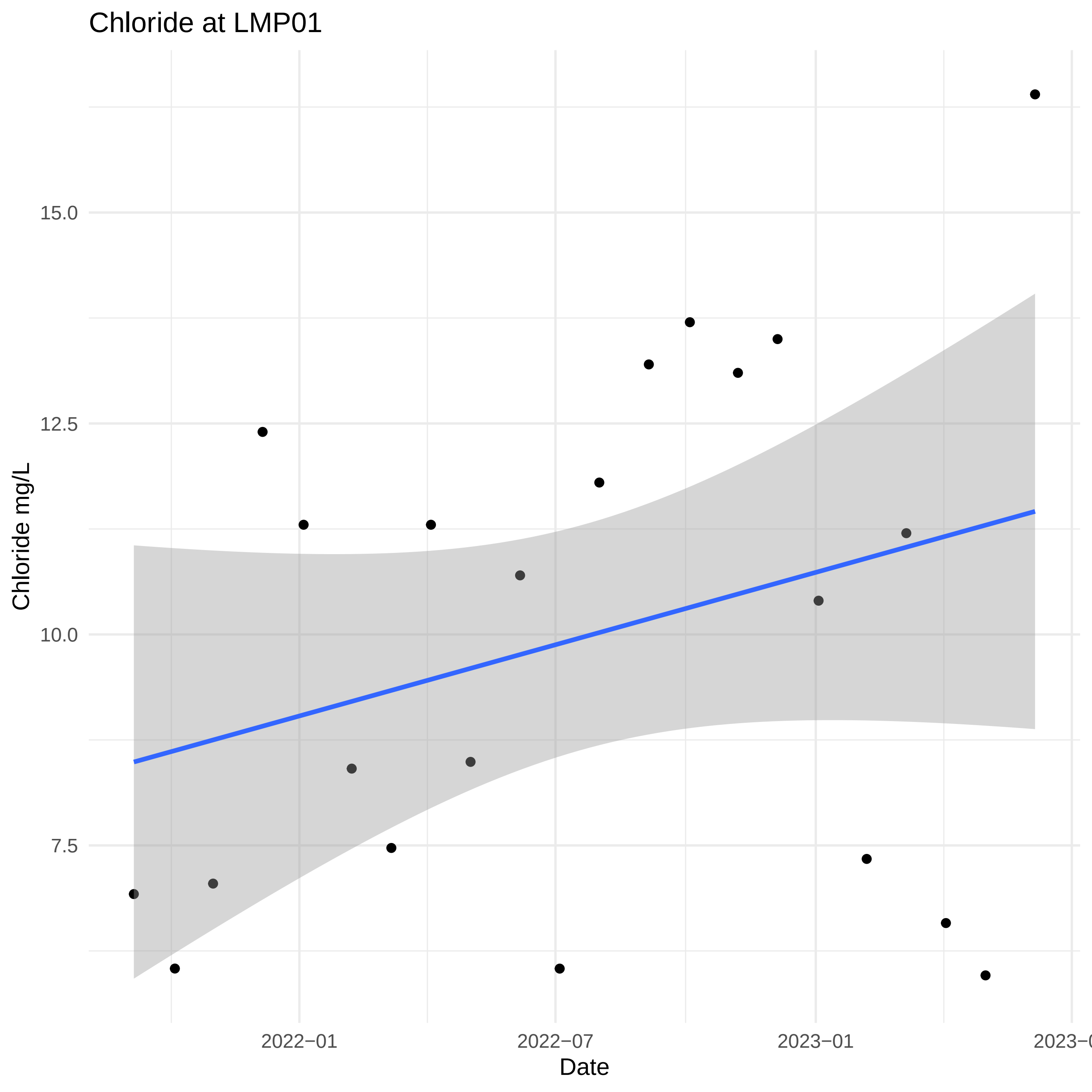
Cadmium at WX22
0.050
0.025
0.000
−0.025
Cadmium mg/L
2022−01
2022−07
2023−01
2023−07
Date

Chloride at C

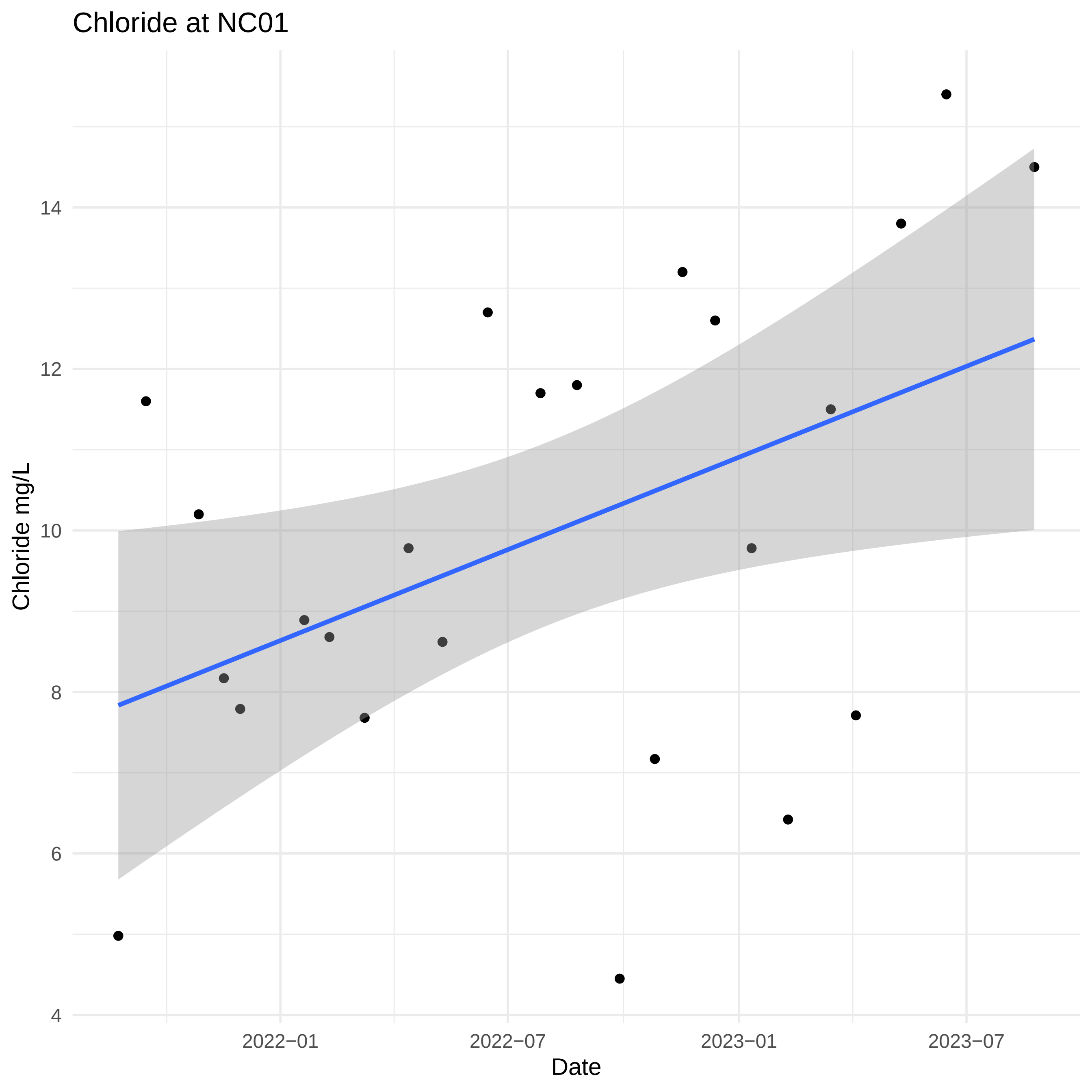



Chloride at E
150
100
50
0
Chloride mg/L
2022−01
2022−07
2023−01
2023−07
Date

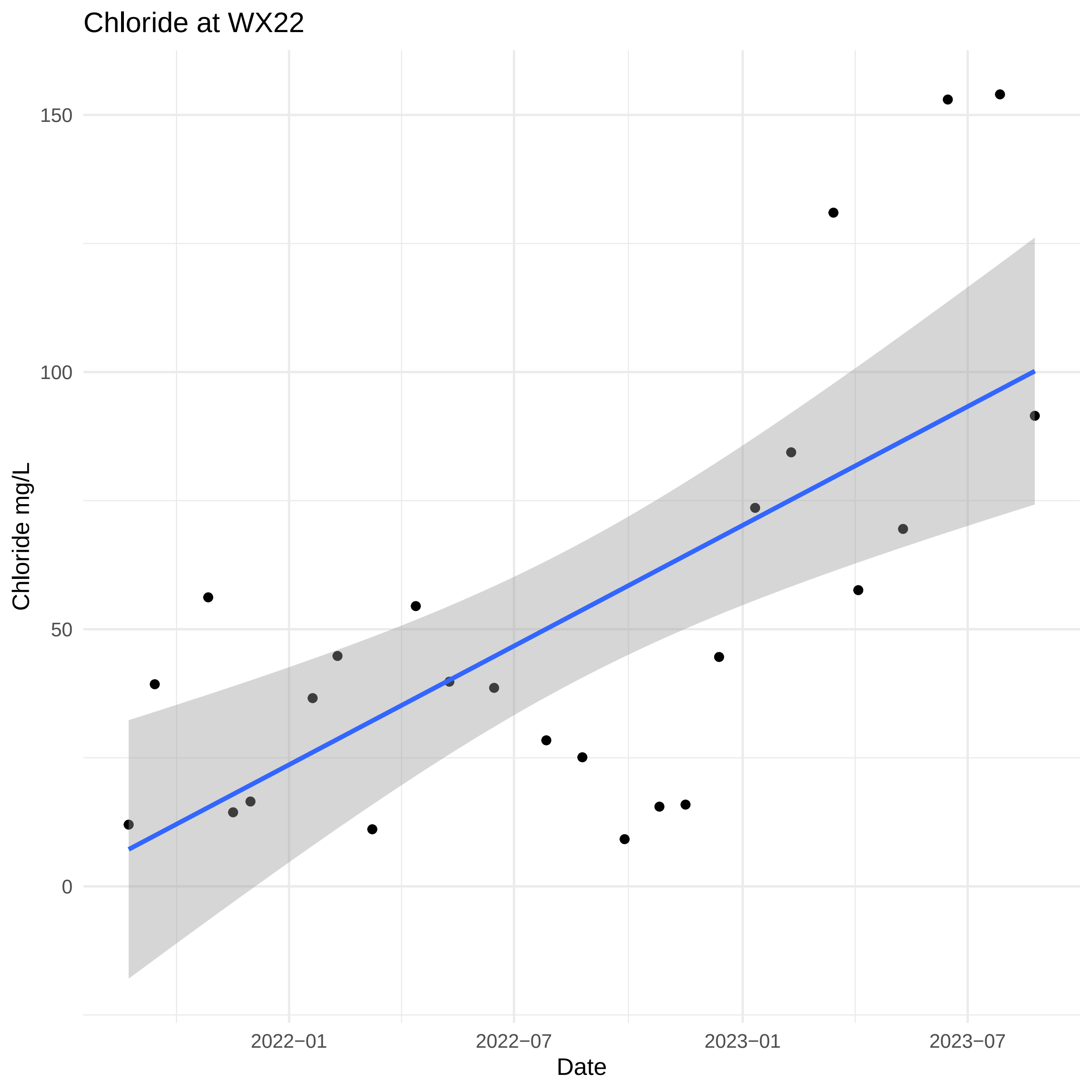

Chloride at G
150
100
50
0
Chloride mg/L
2022−01
2022−07
2023−01
2023−07
Date



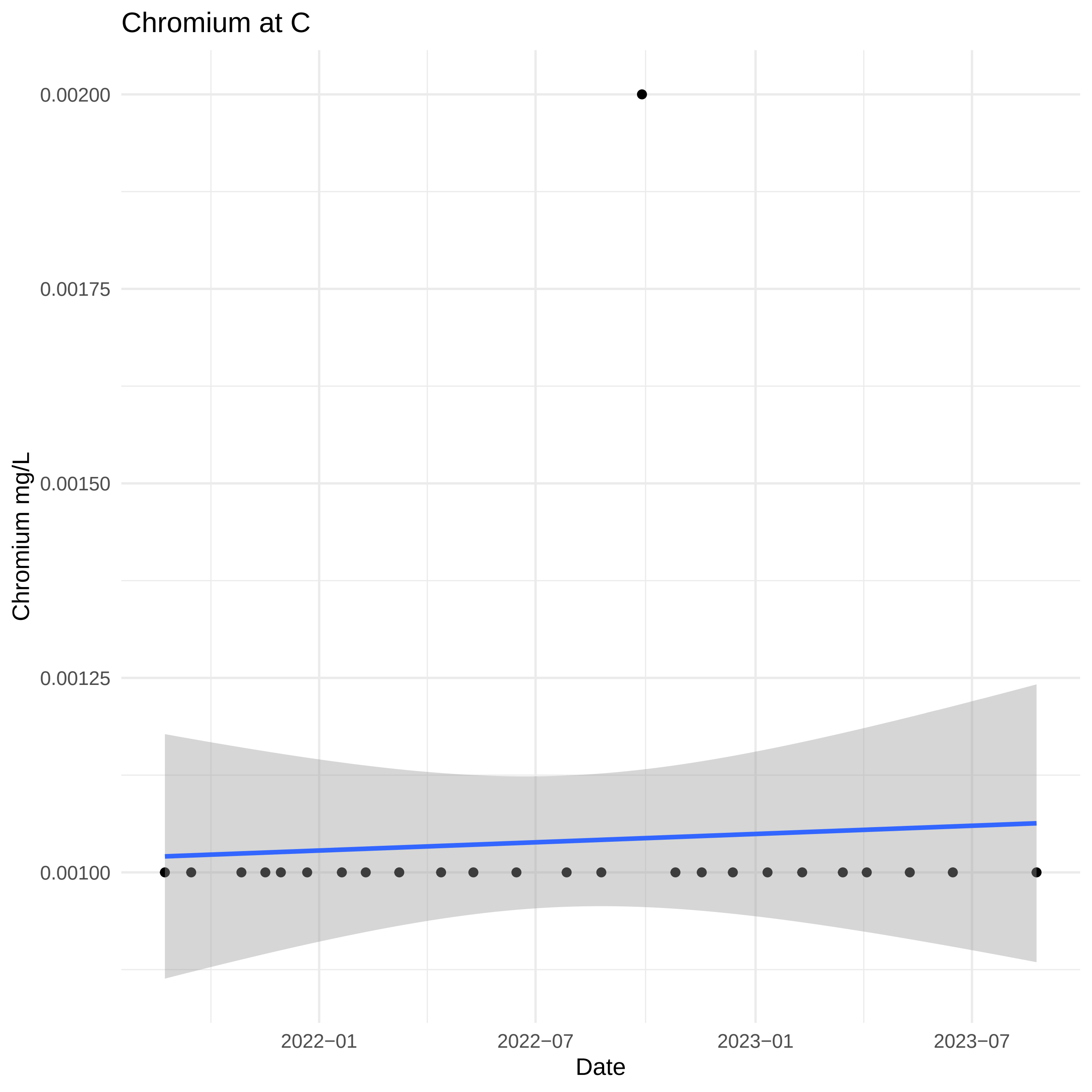
Chloride at LMP01
Chloride mg/L
15.0
12.5
10.0
7.5
2022−01
2022−07
2023−01
Date



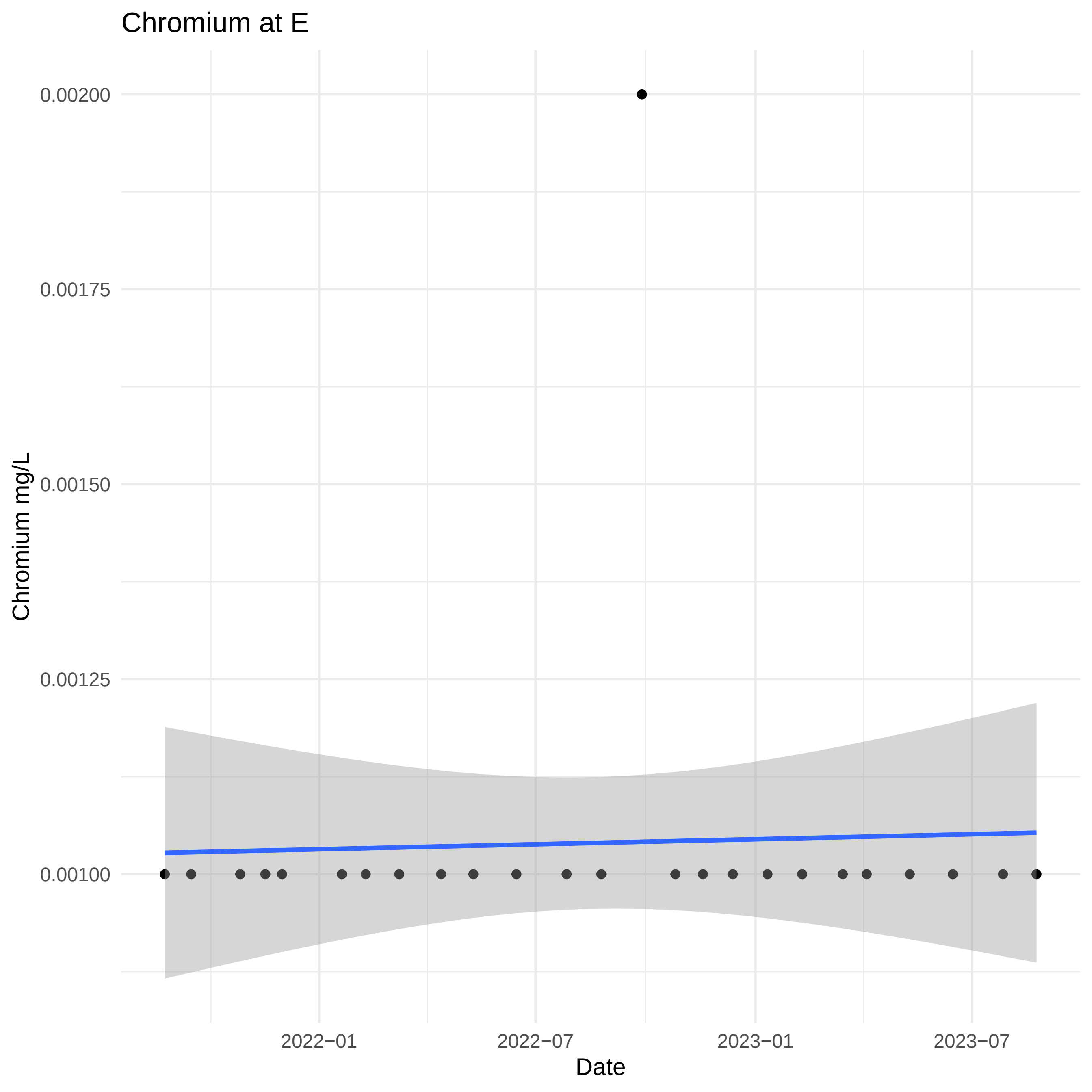
Chloride at NC01
Chloride mg/L
Date
4
6
8
10
12
14
2022−01
2022−07
2023−01
2023−07

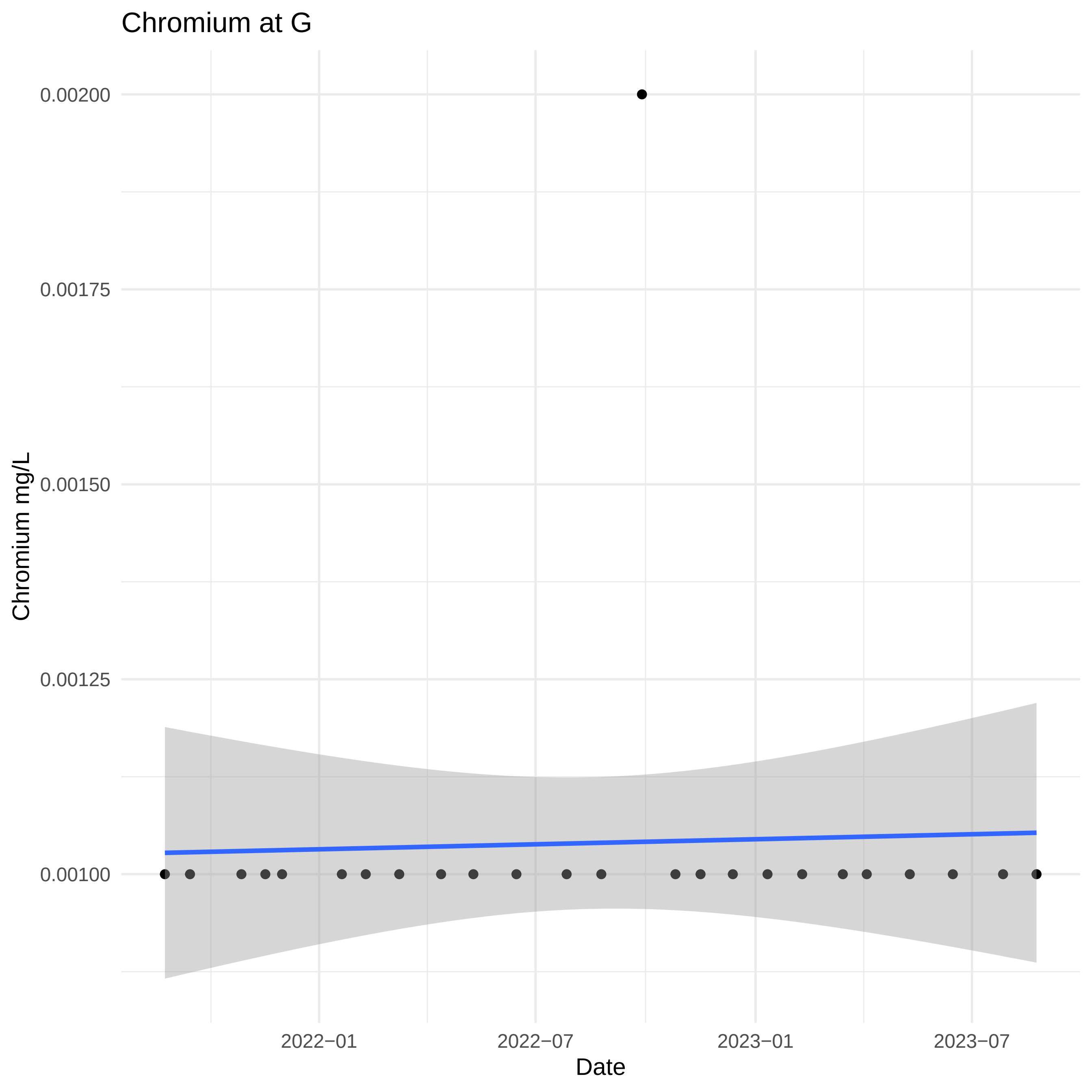


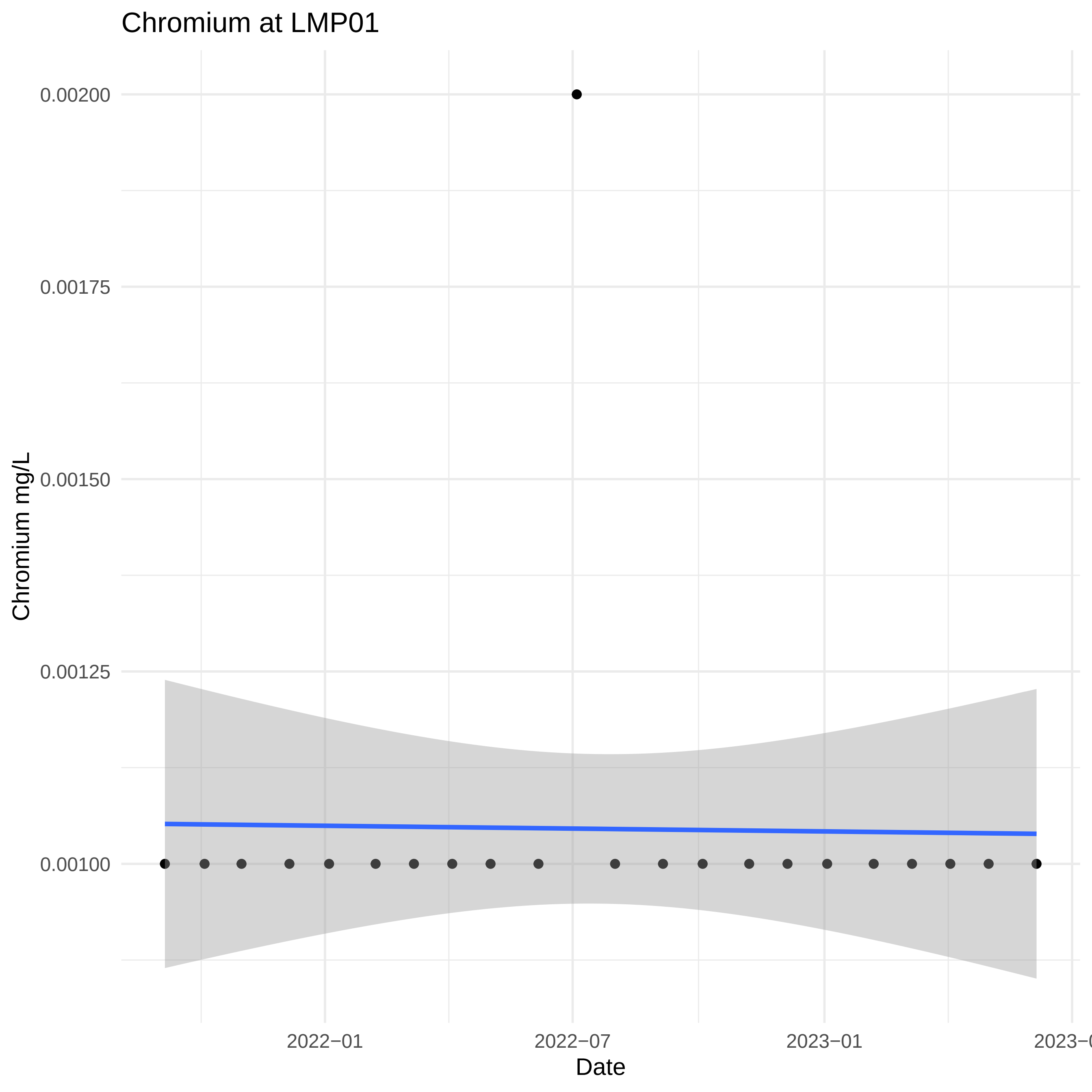
Chloride at WX22
150
100
50
0
Chloride mg/L
2022−01
2022−07
2023−01
2023−07
Date



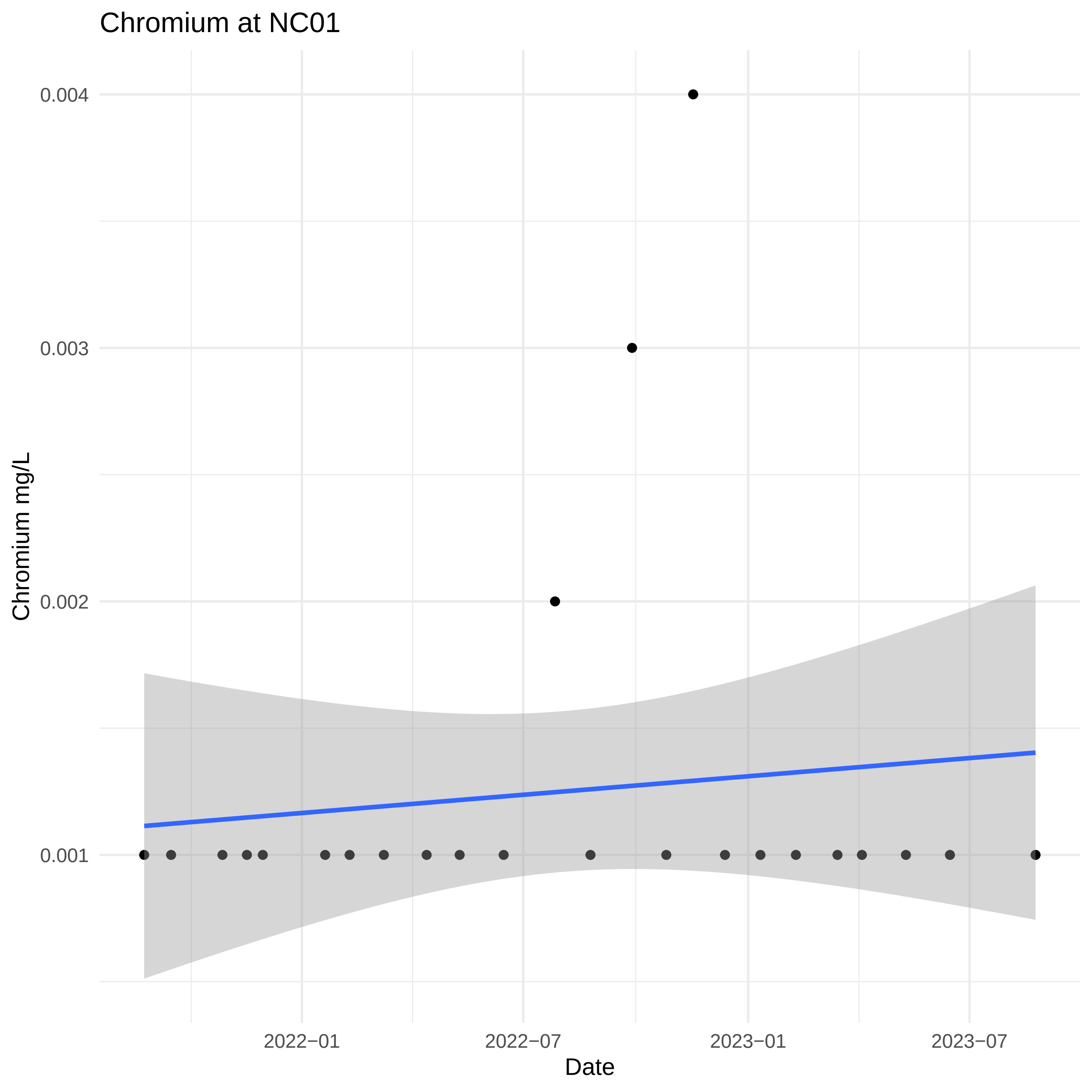
Chromium at C
0.00200
0.00175
0.00150
0.00125
0.00100
Chromium mg/L
2022−01
2022−07
2023−01
2023−07
Date


Chromium at E
Chromium mg/L
0.00200
0.00175
0.00150
0.00125
0.00100
2022−01
2022−07
2023−01
2023−07
Date

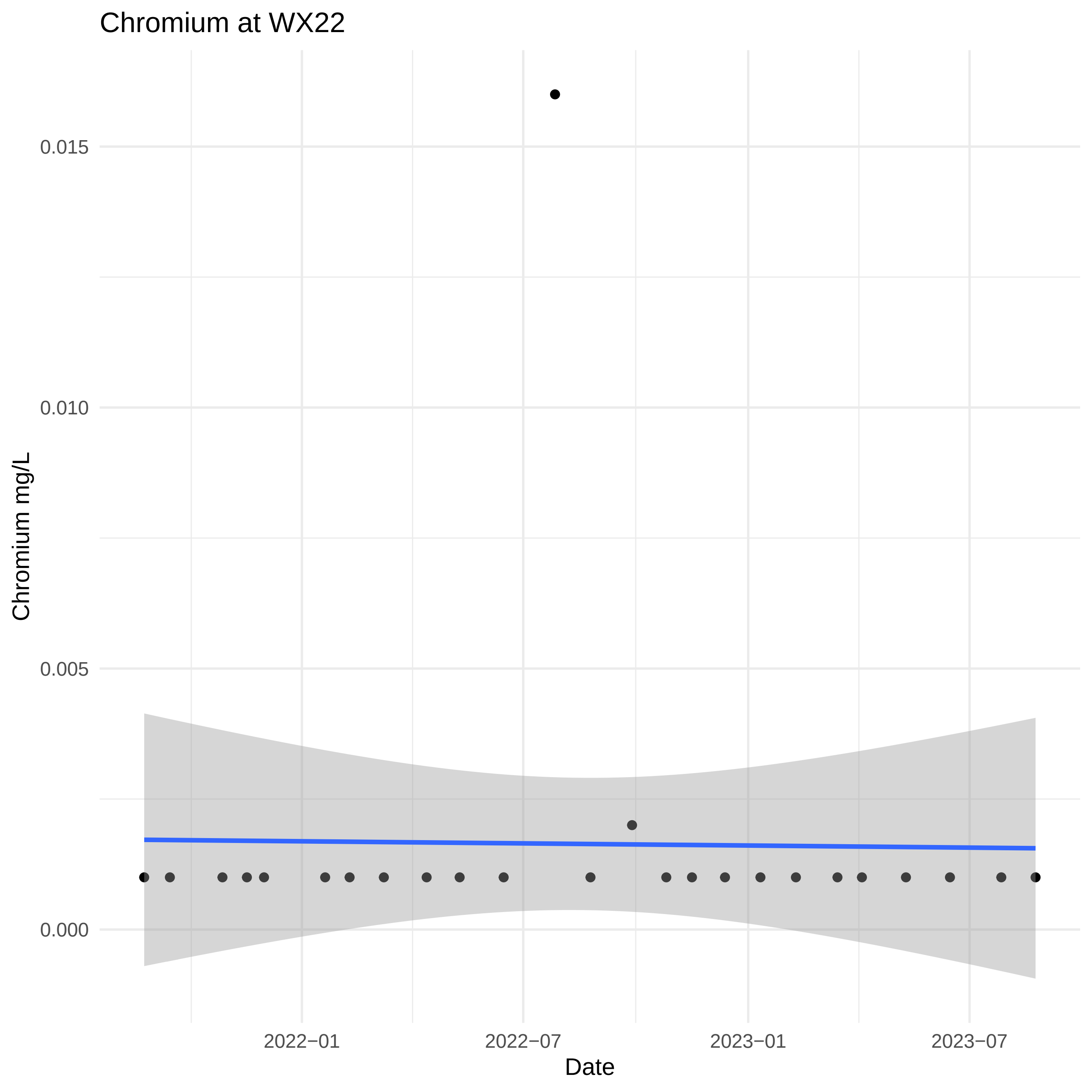

Chromium at G
0.00200
0.00175
0.00150
0.00125
0.00100
Chromium mg/L
2022−01
2022−07
2023−01
2023−07
Date

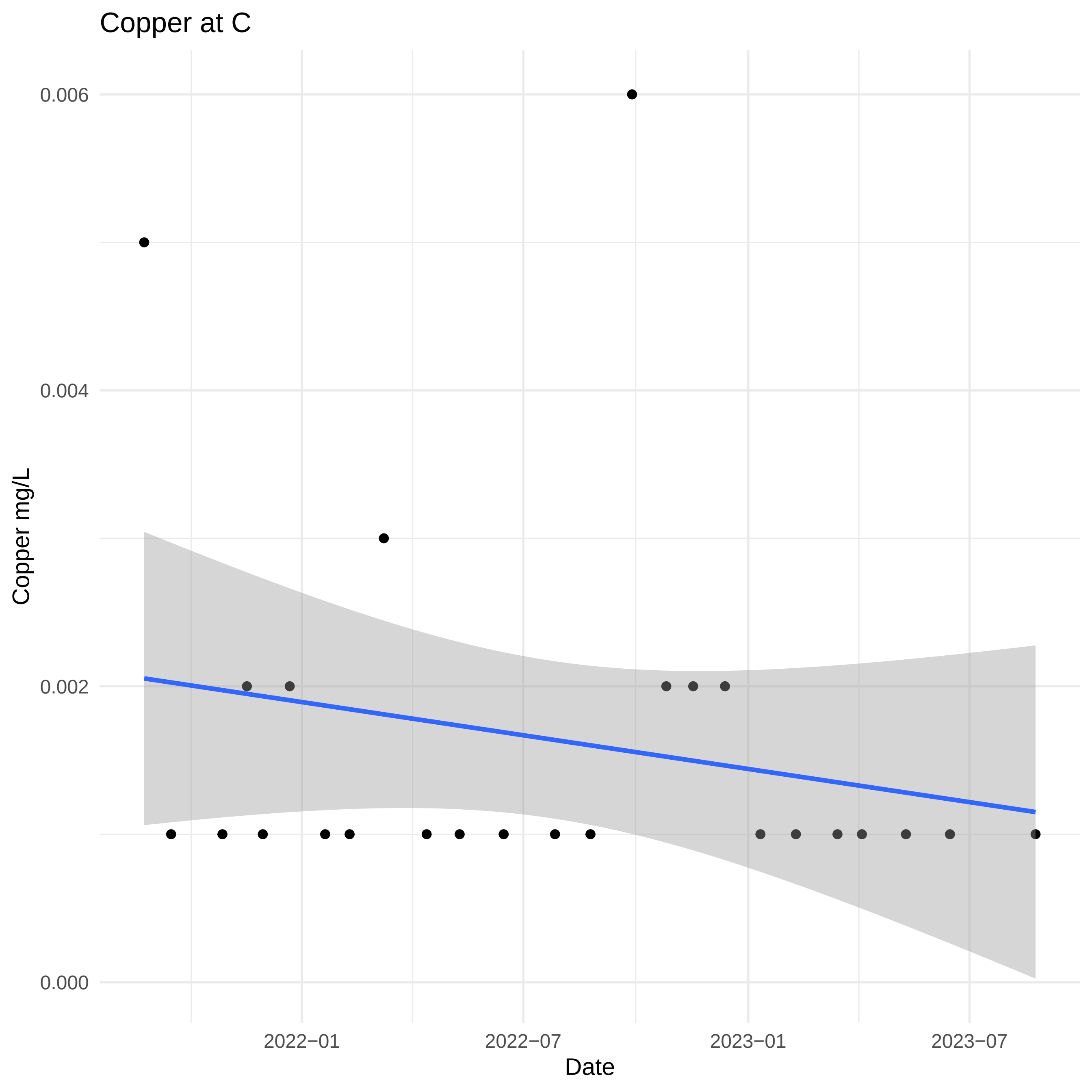


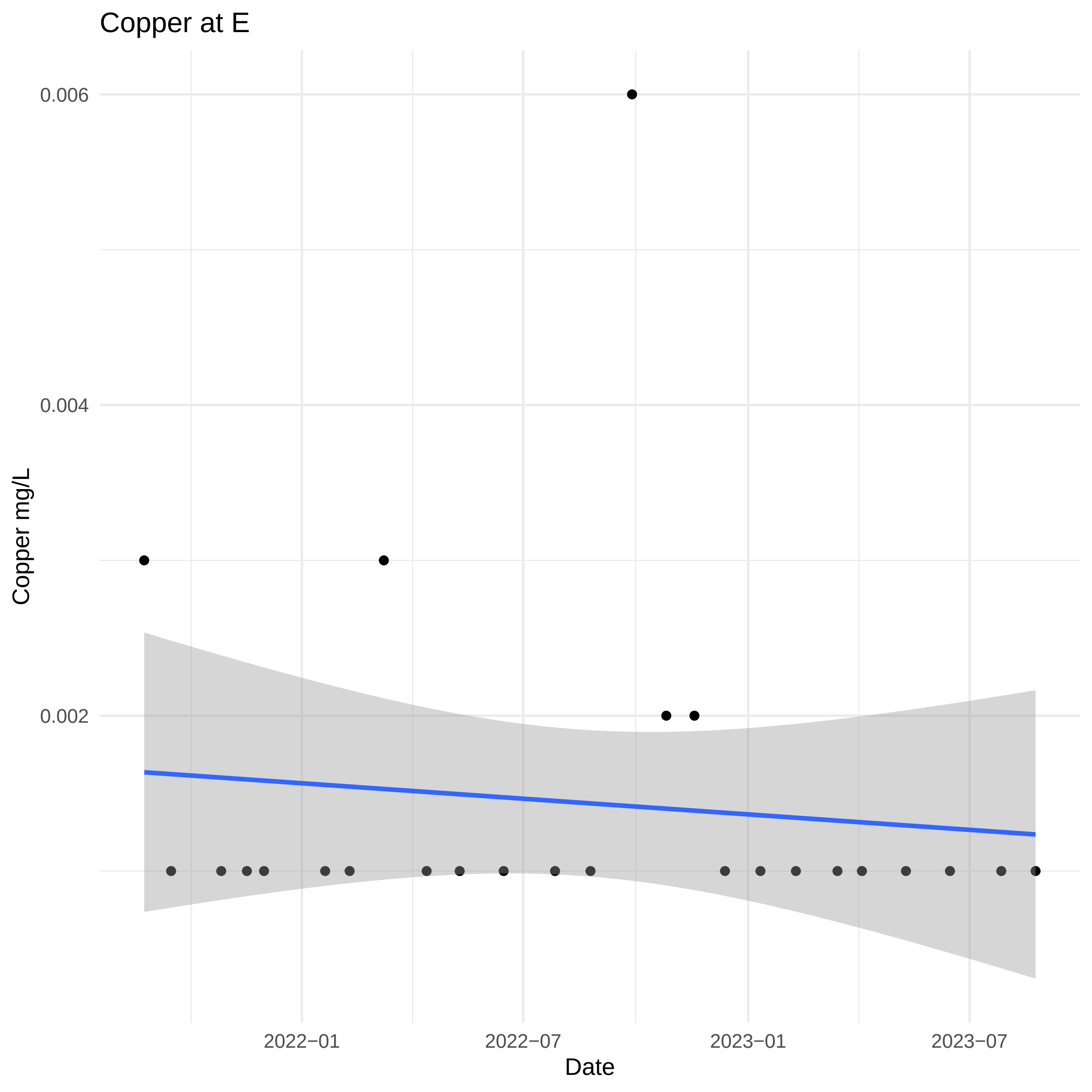
Chromium at LMP01
0.00200
0.00175
0.00150
0.00125
0.00100
Chromium mg/L
2022−01
2022−07
2023−01
2023−0
Date

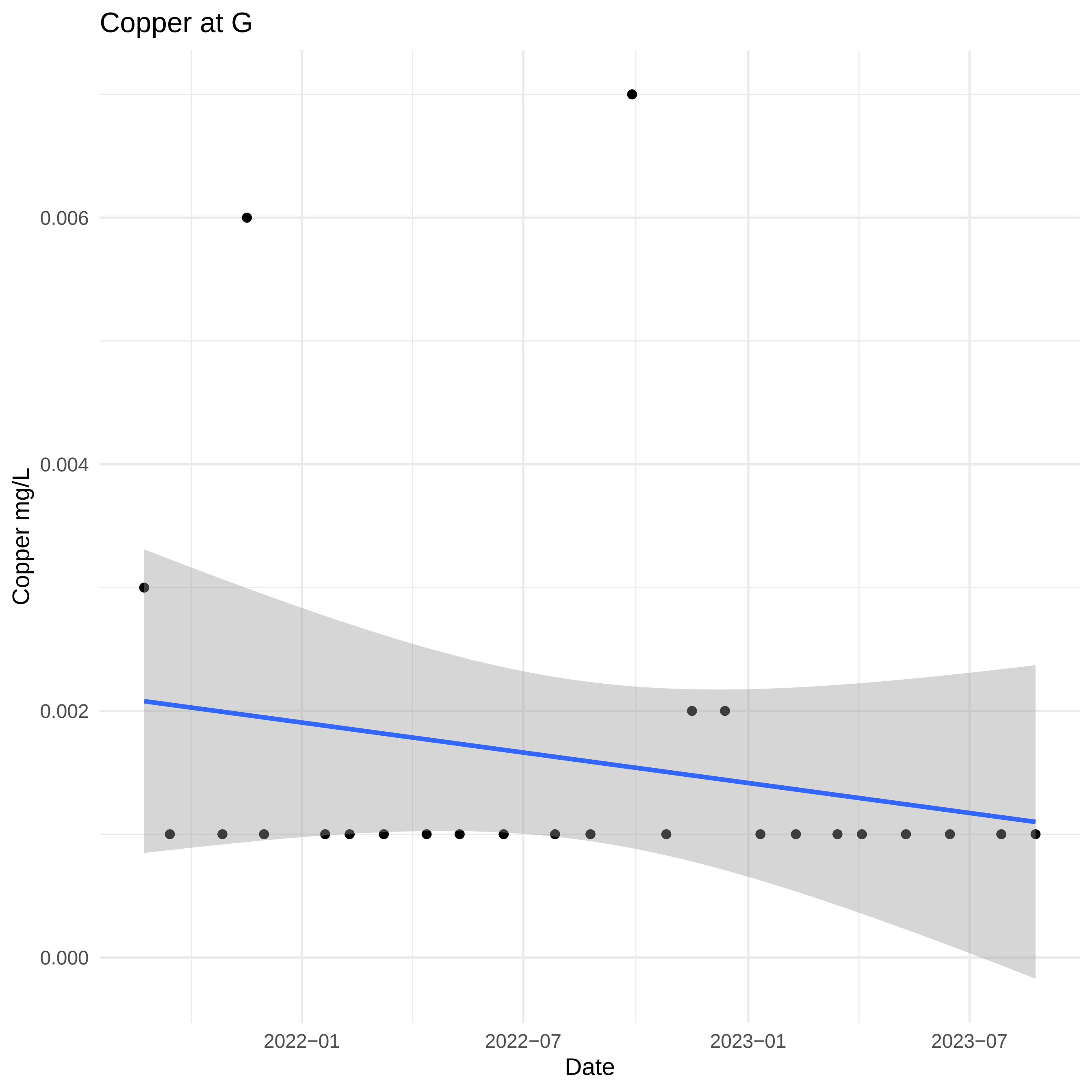


Chromium at NC01
Chromium mg/L
0.004
0.003
0.002
0.001
2022−01
2022−07
2023−01
2023−07
Date

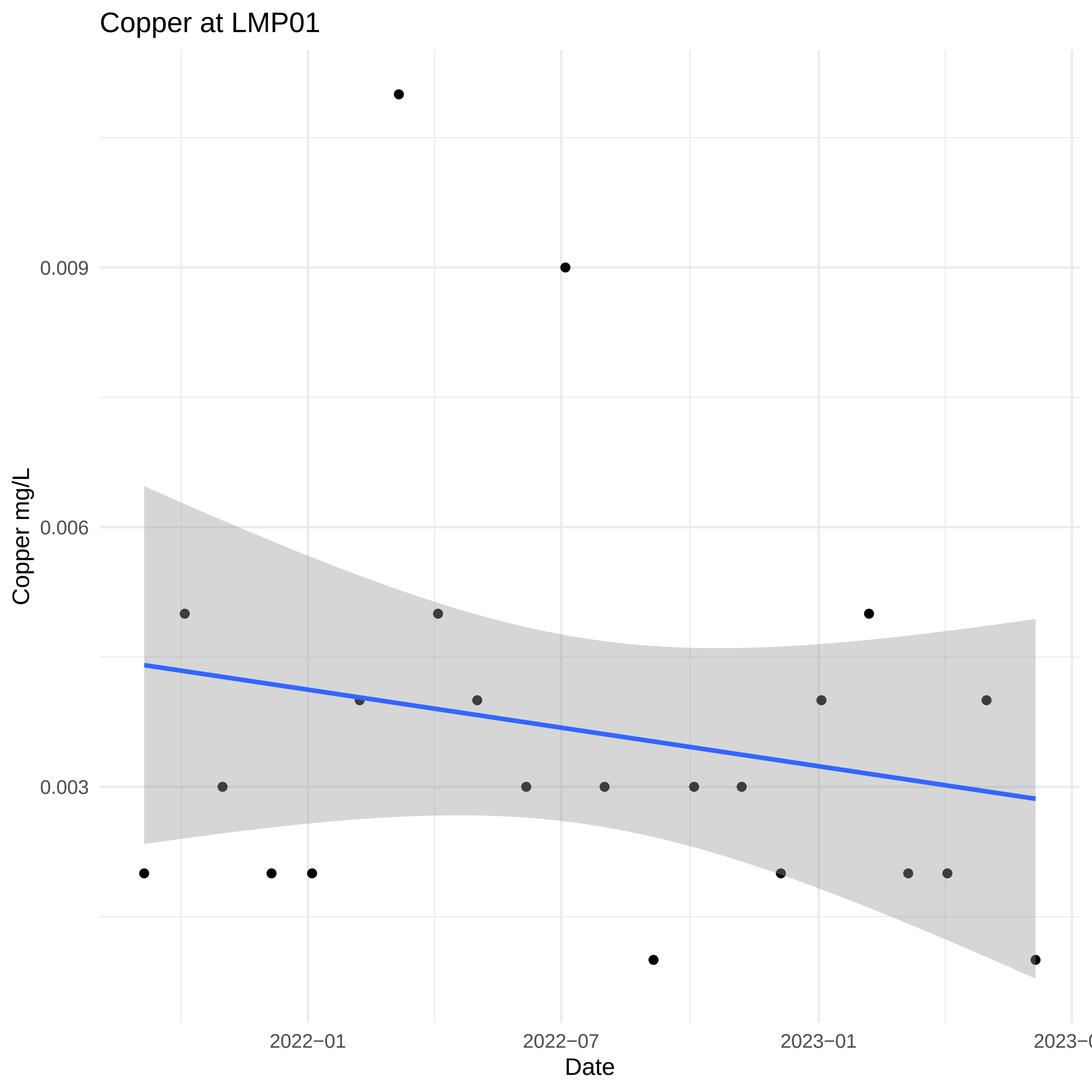

Chromium at WX22
0.015
0.010
0.005
0.000
Chromium mg/L
2022−01
2022−07
2023−01
2023−07
Date


Copper at C
Copper mg/L
0.006
0.004
0.002
0.000
2022−01
2022−07
2023−01
2023−07
Date

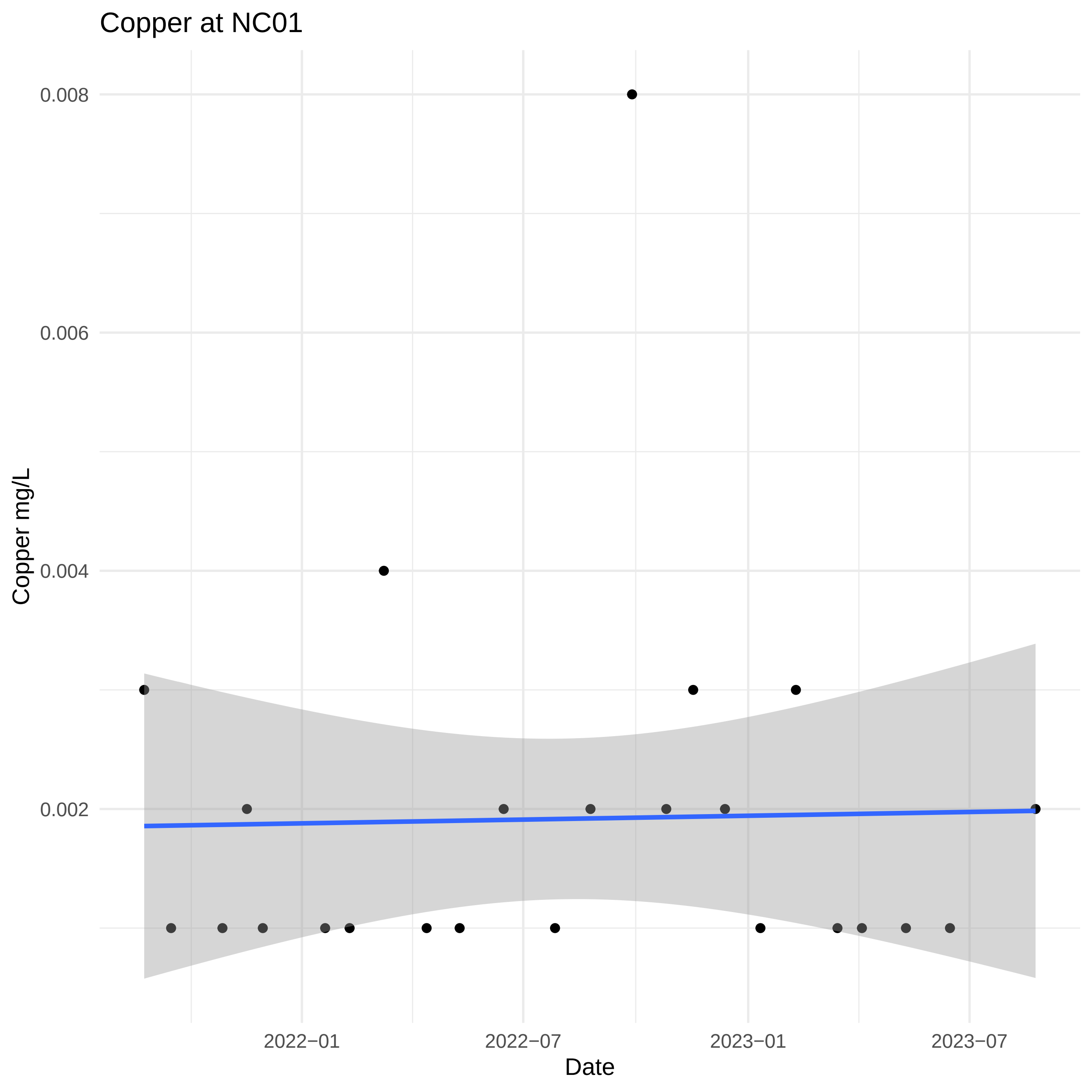

Copper at E
0.006
0.004
0.002
Copper mg/L
2022−01
2022−07
2023−01
2023−07
Date



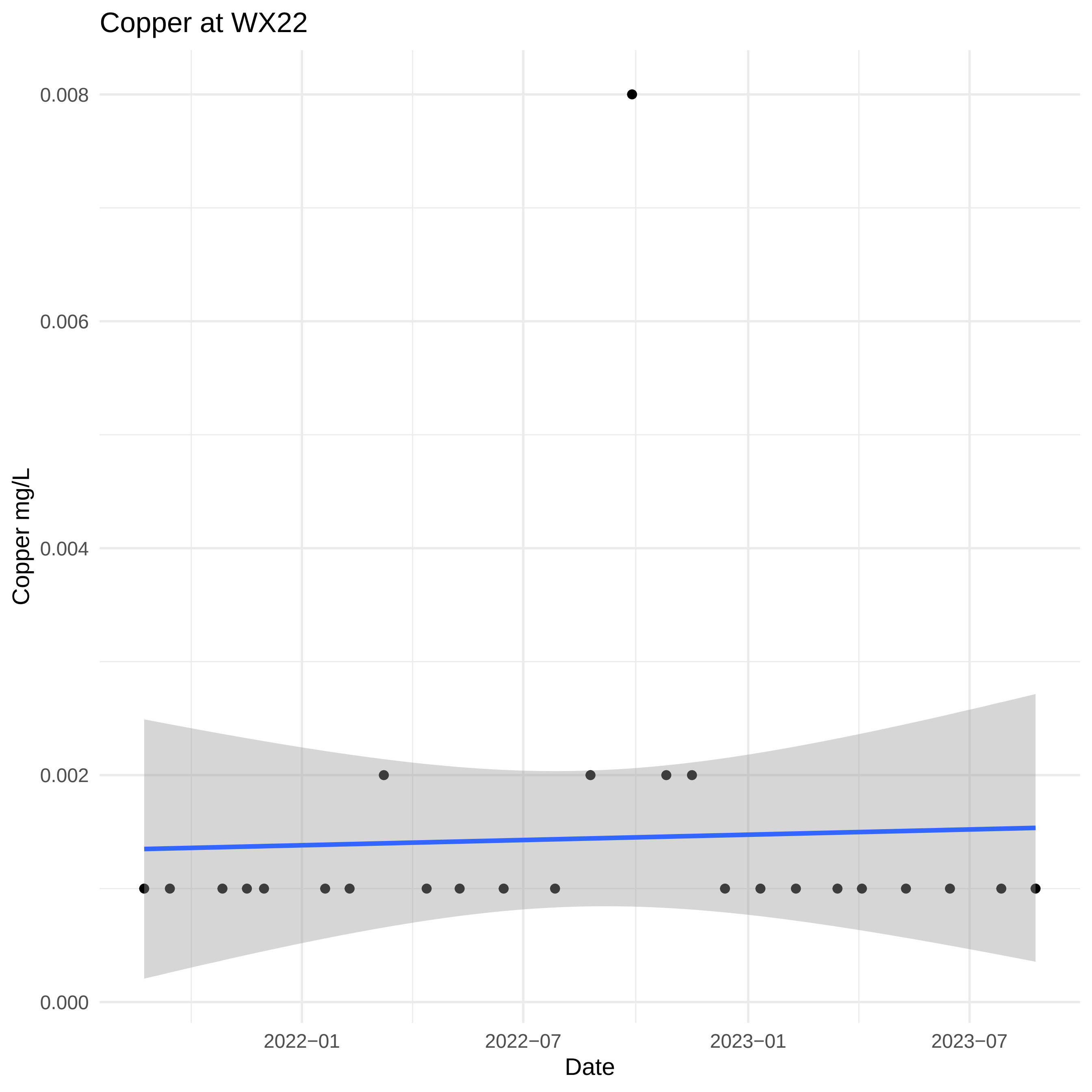
Copper at G
Copper mg/L
0.006
0.004
0.002
0.000
2022−01
2022−07
2023−01
2023−07
Date



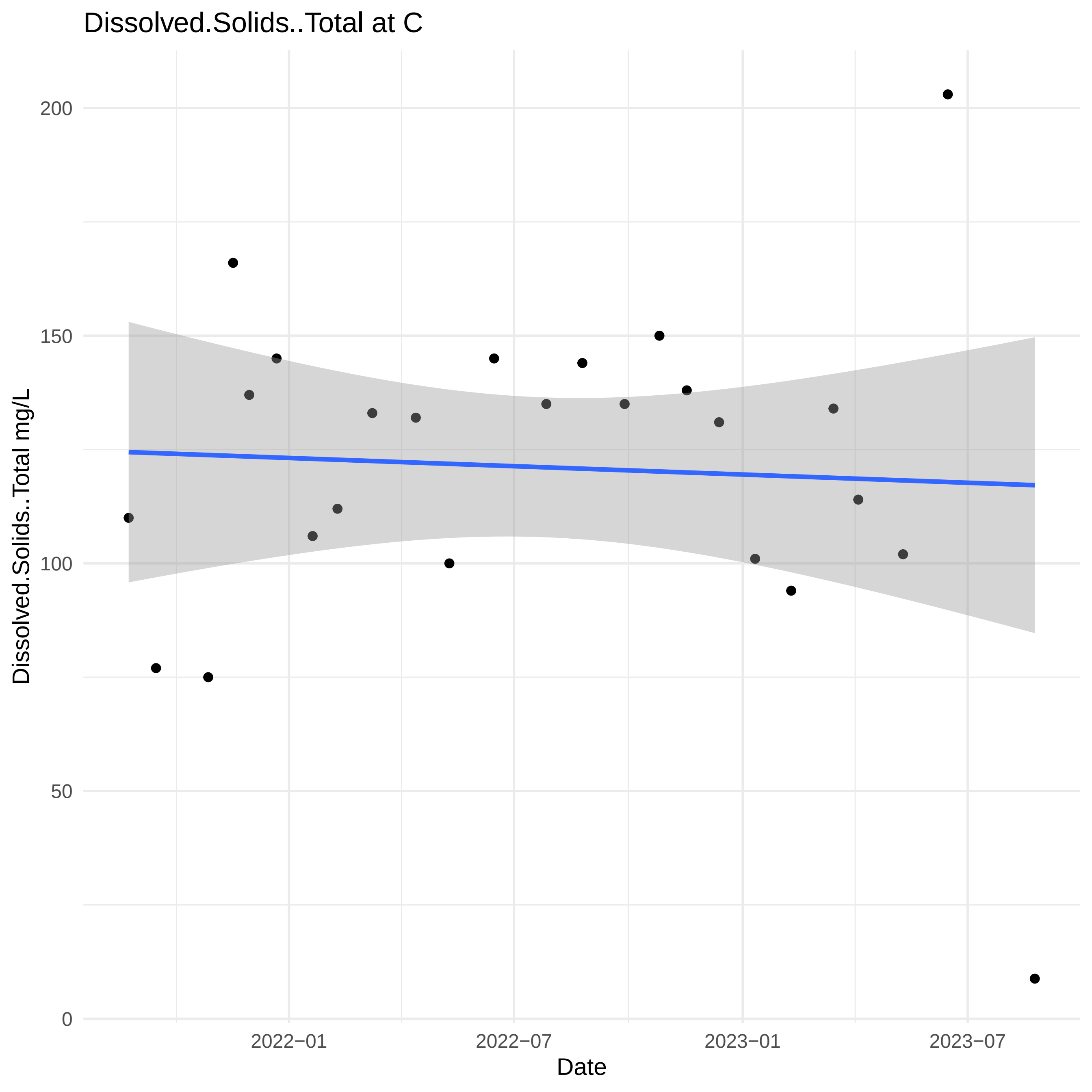
Copper at LMP01
0.009
0.006
0.003
Copper mg/L
2022−01
2022−07
2023−01
2023−0
Date



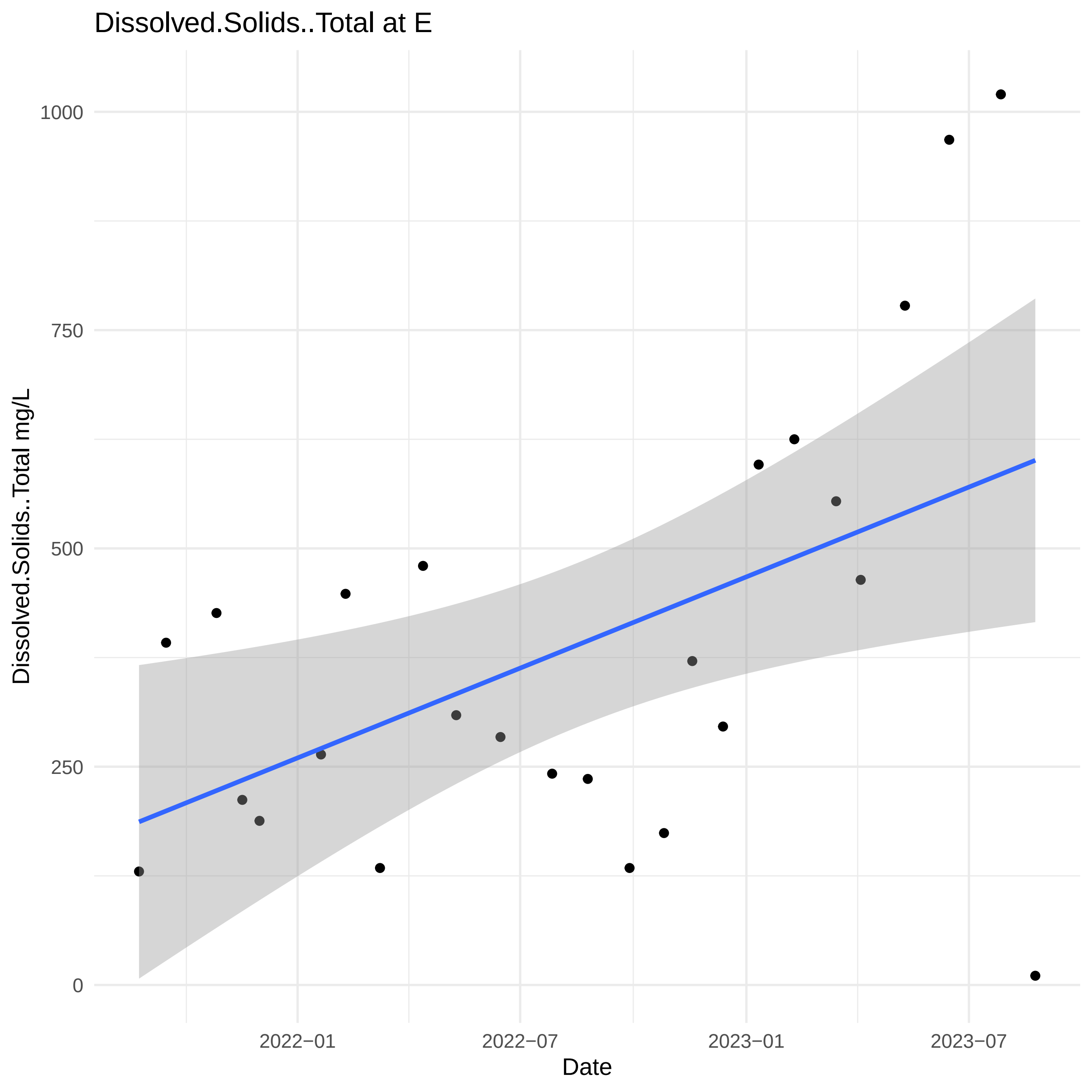
Copper at NC01
0.008
0.006
0.004
0.002
Copper mg/L
2022−01
2022−07
2023−01
2023−07
Date



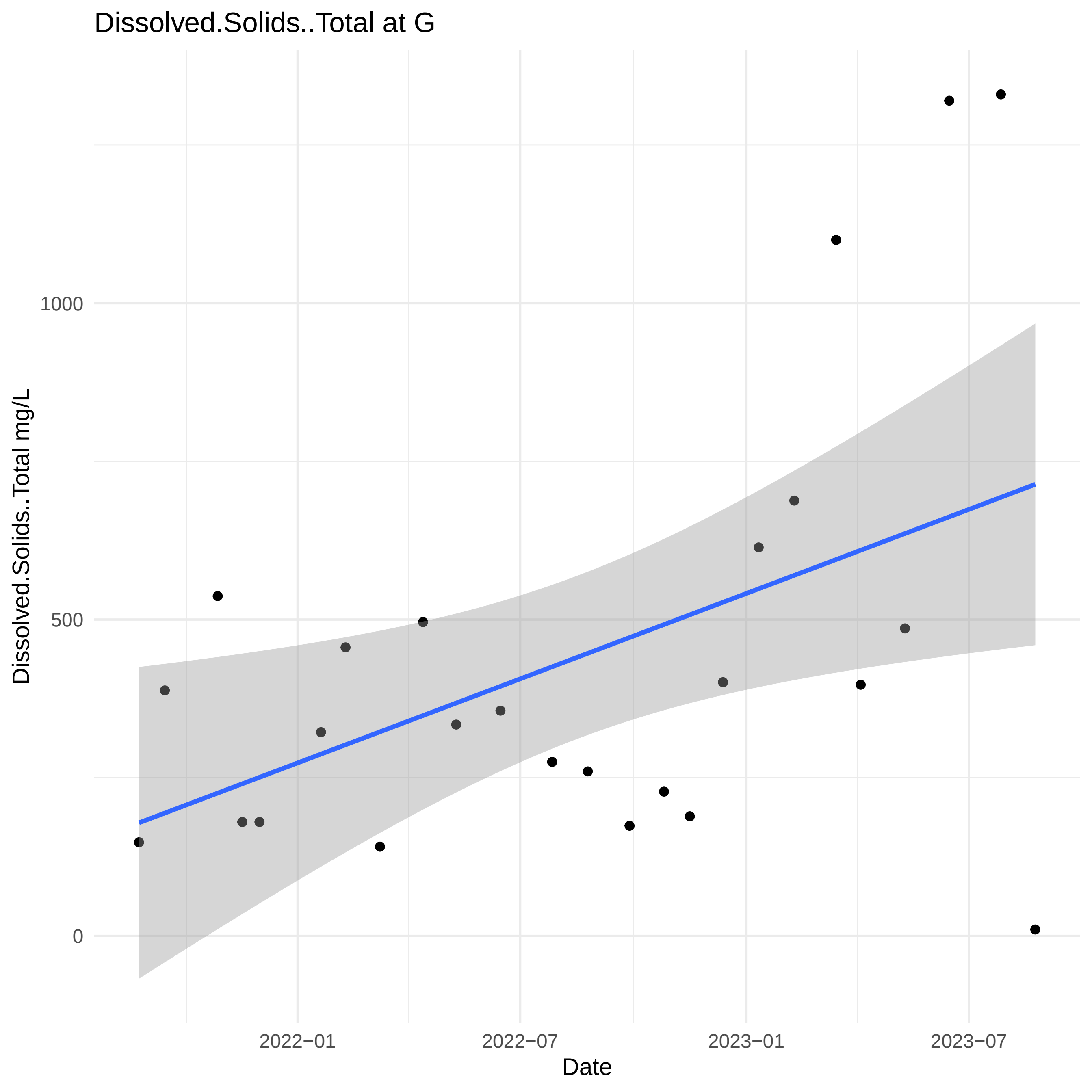
Copper at WX22
0.008
0.006
0.004
0.002
0.000
Copper mg/L
2022−01
2022−07
2023−01
2023−07
Date

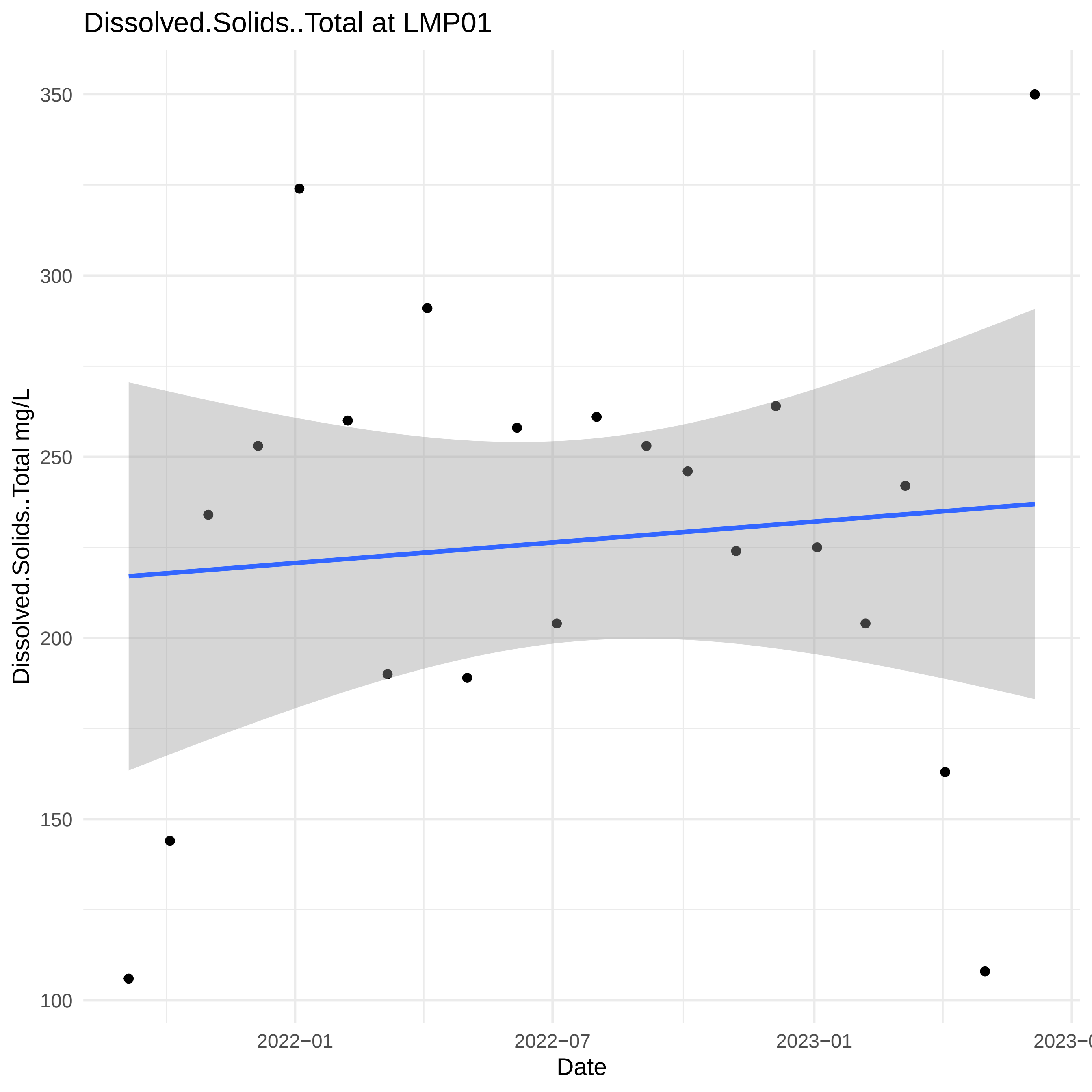


Dissolved.Solids..Total at C
200
150
100
50
0
Dissolved.Solids..Total mg/L
2022−01
2022−07
2023−01
2023−07
Date

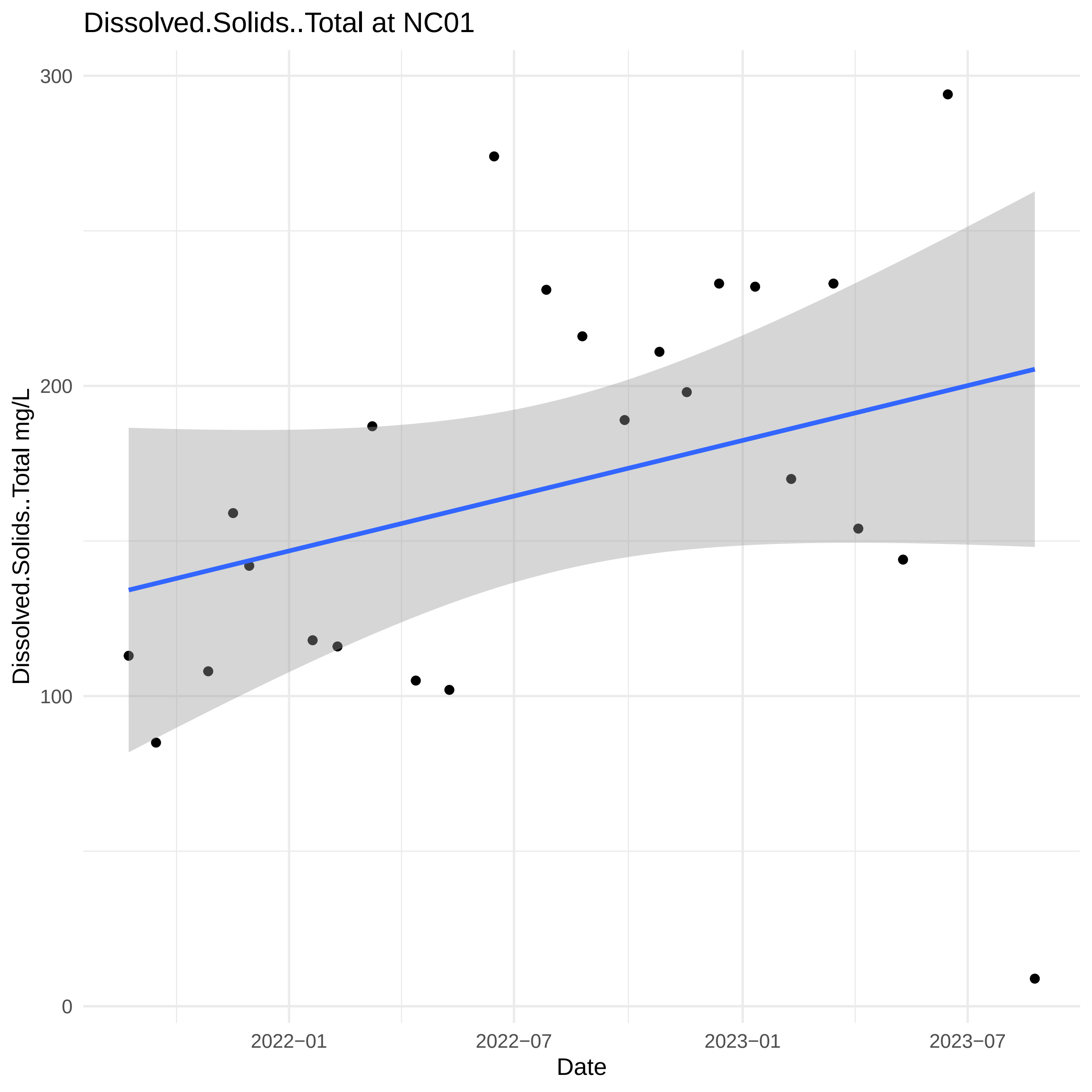


Dissolved.Solids..Total at E
Dissolved.Solids..Total mg/L
1000
750
500
250
0
2022−01
2022−07
2023−01
2023−07
Date

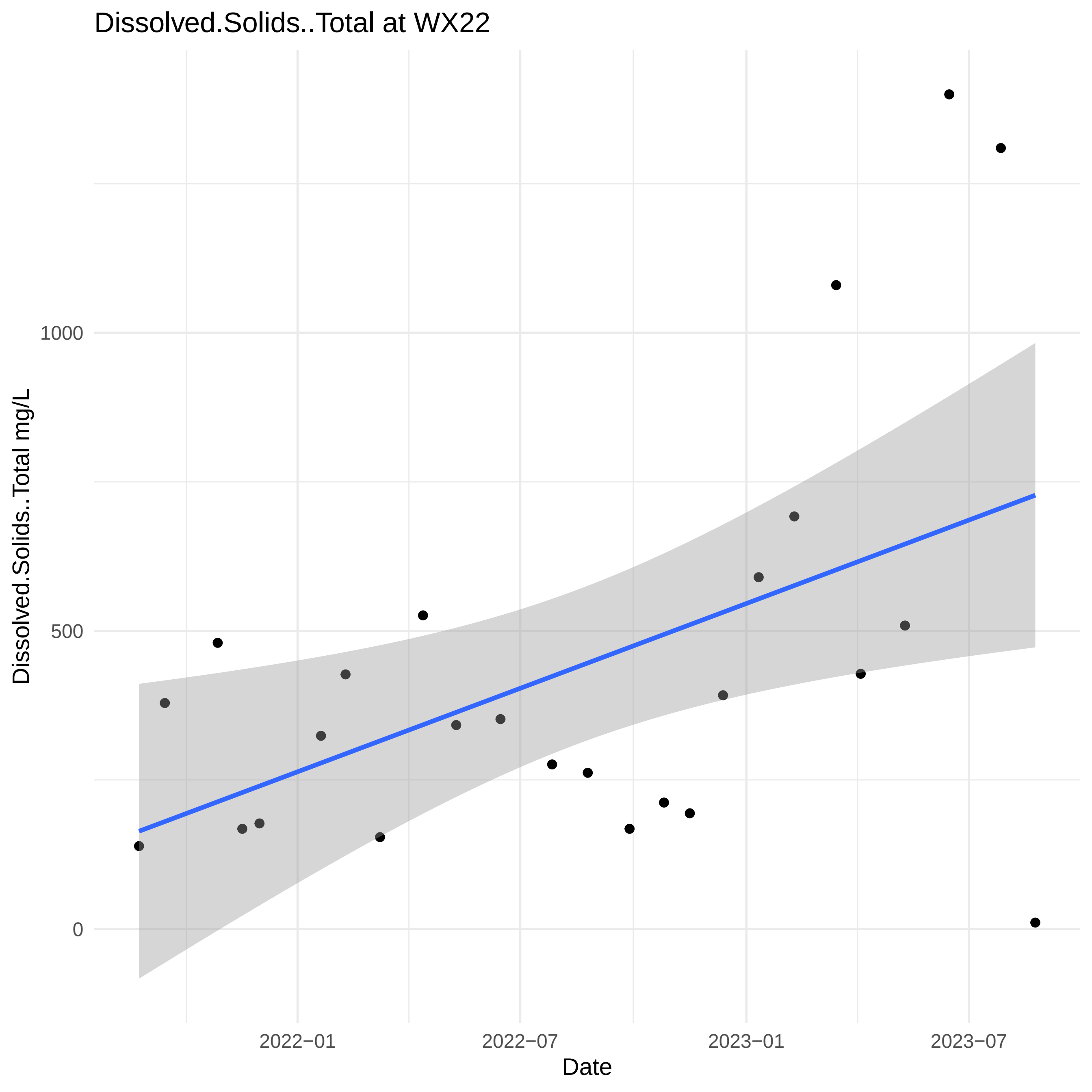

Dissolved.Solids..Total at G
Dissolved.Solids..Total mg/L
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date



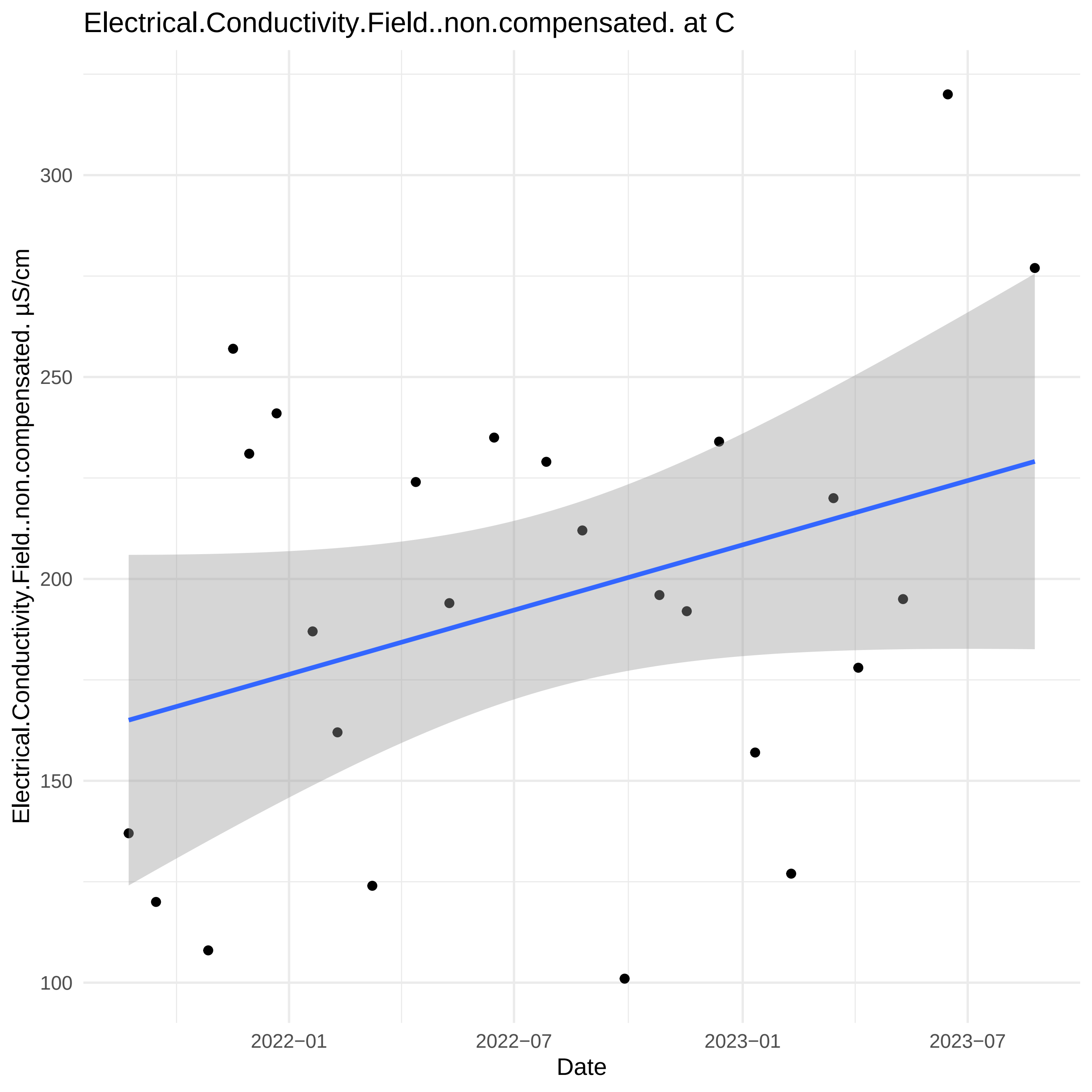
Dissolved.Solids..Total at LMP01
Dissolved.Solids..Total mg/L
350
300
250
200
150
100
2022−01
2022−07
2023−01
2023−0
Date



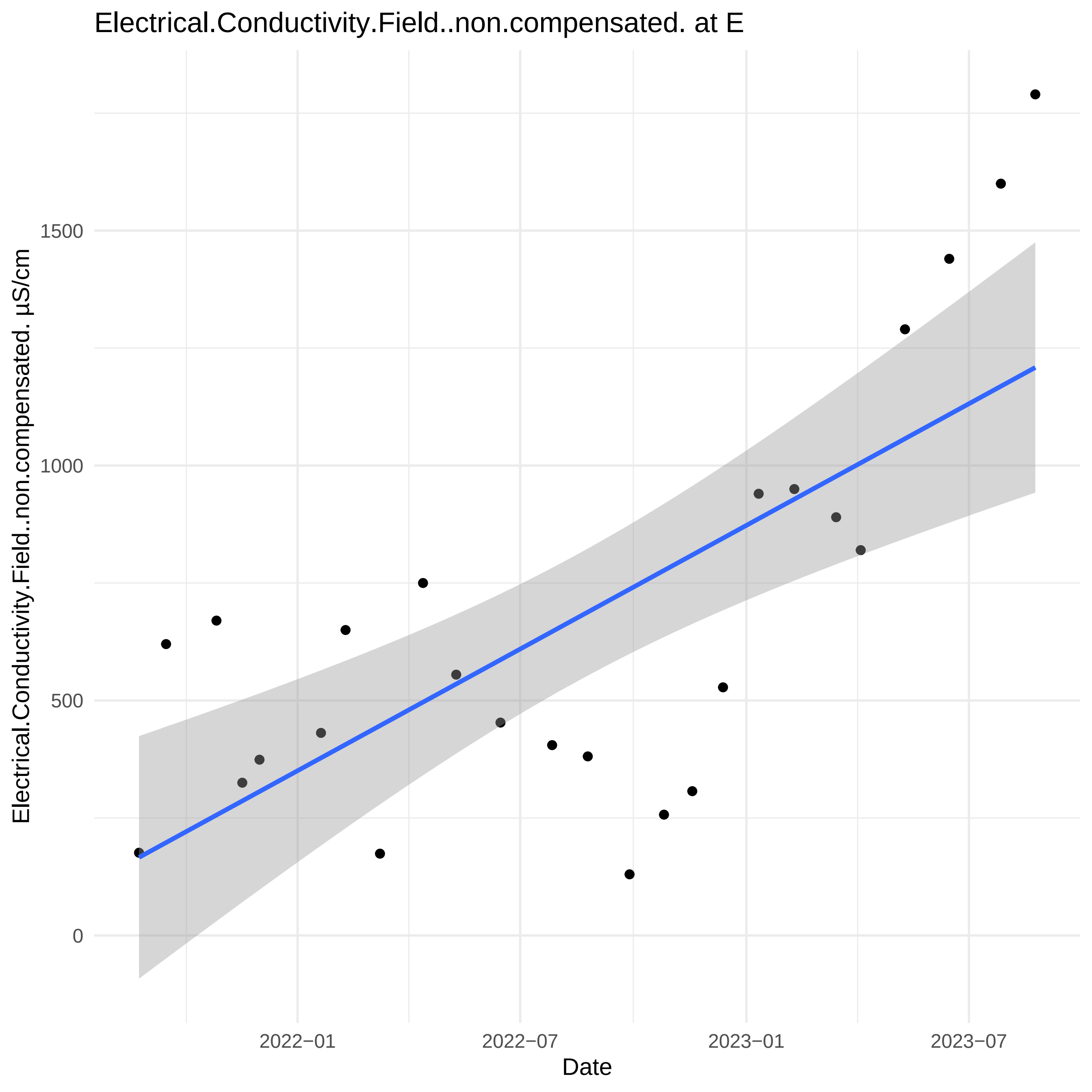
Dissolved.Solids..Total at NC01
300
200
100
0
Dissolved.Solids..Total mg/L
2022−01
2022−07
2023−01
2023−07
Date



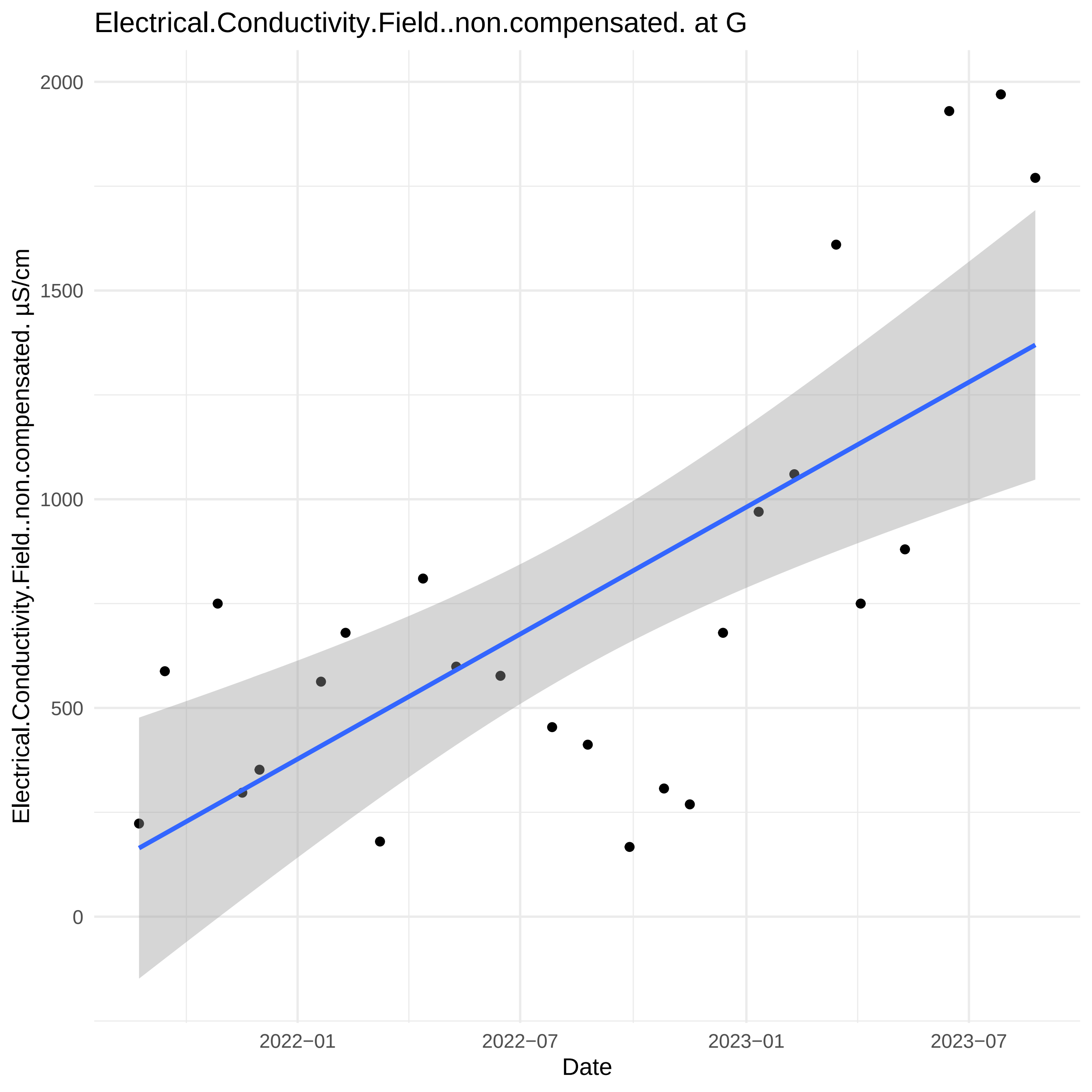
Dissolved.Solids..Total at WX22
Dissolved.Solids..Total mg/L
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date



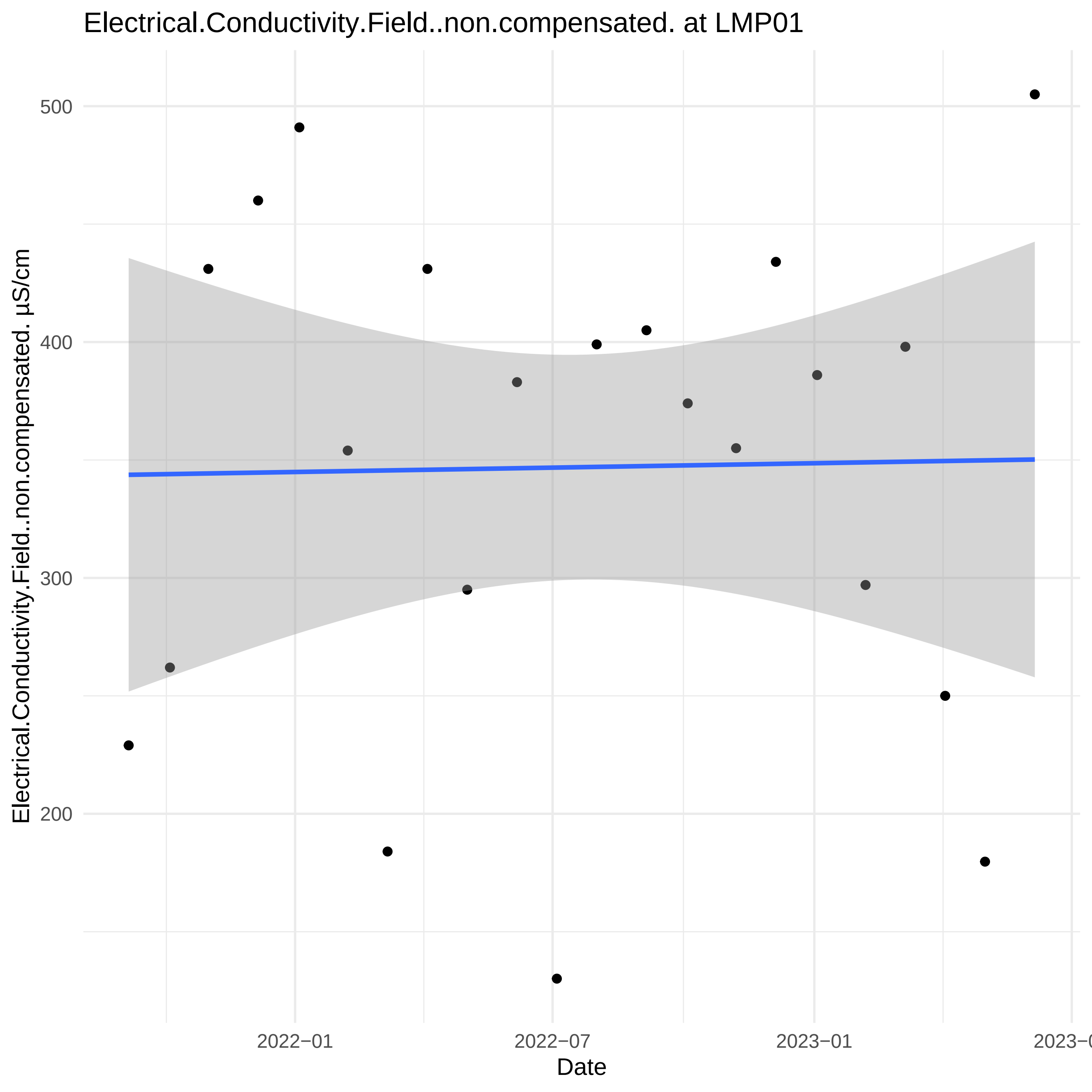
Electrical.Conductivity.Field..non.compensated. at C
Electrical.Conductivity.Field..non.compensated. µS/cm
300
250
200
150
100
2022−01
2022−07
2023−01
2023−07
Date



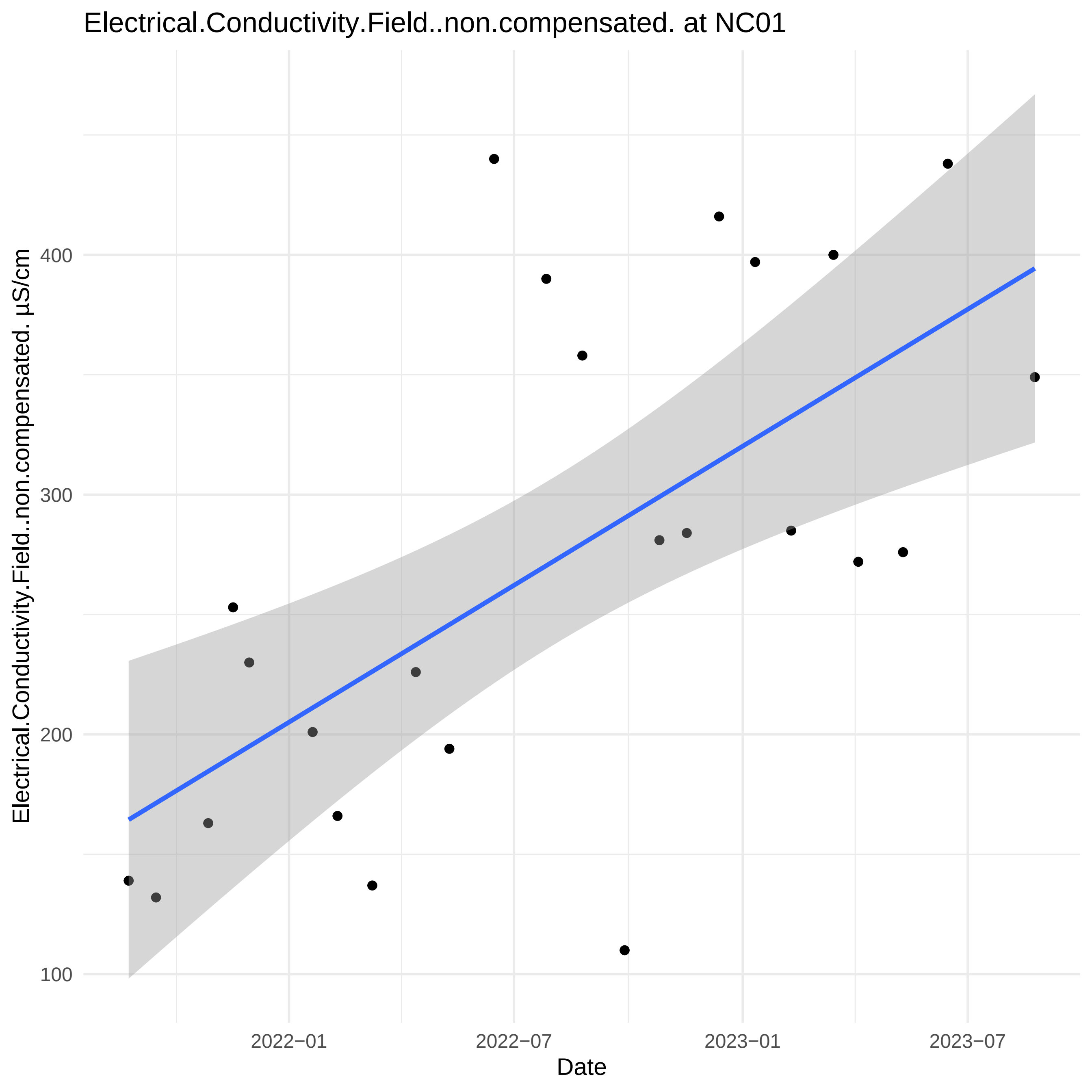
Electrical.Conductivity.Field..non.compensated. at E
Electrical.Conductivity.Field..non.compensated. µS/cm
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date



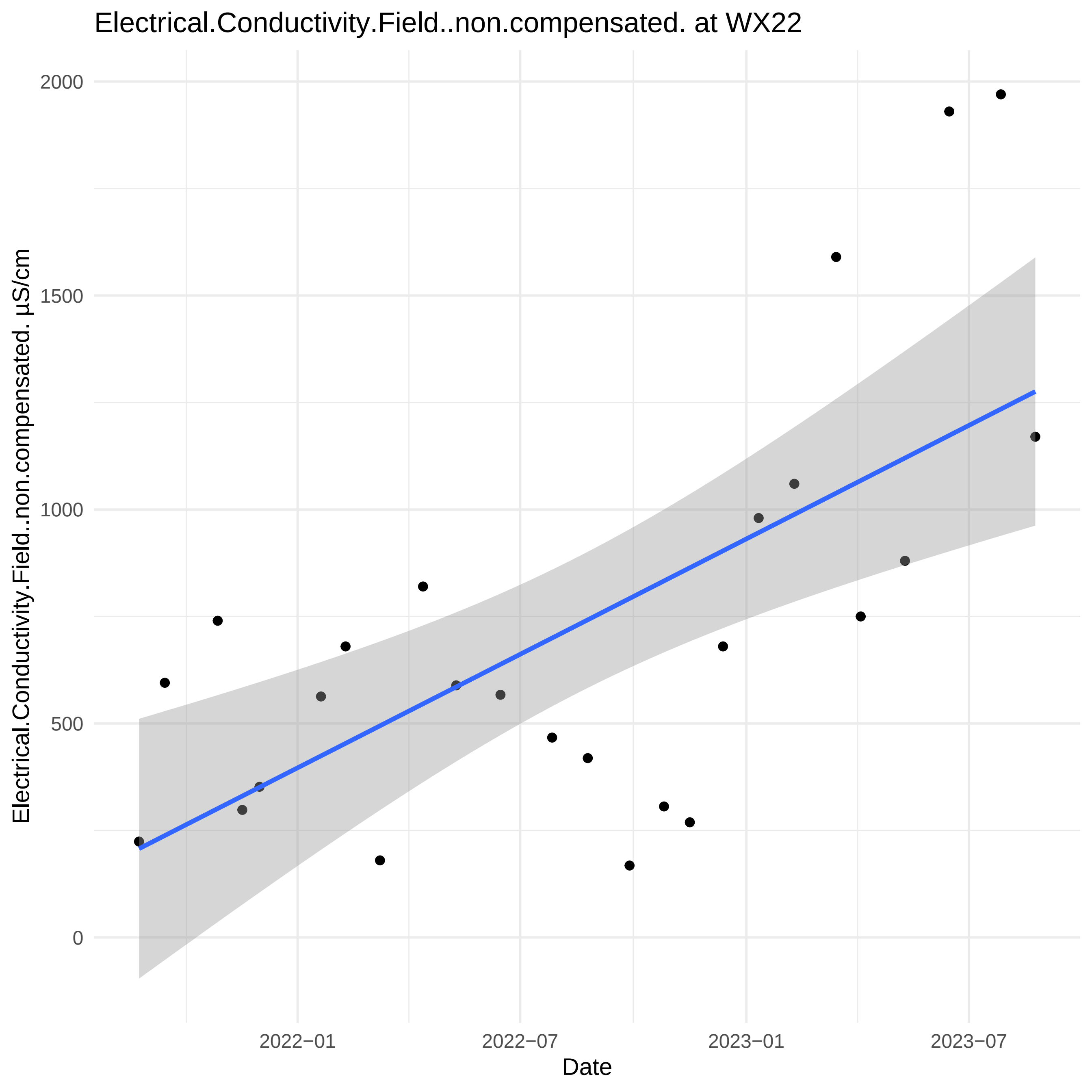
Electrical.Conductivity.Field..non.compensated. at G
2000
1500
1000
500
0
Electrical.Conductivity.Field..non.compensated. µS/cm
2022−01
2022−07
2023−01
2023−07
Date



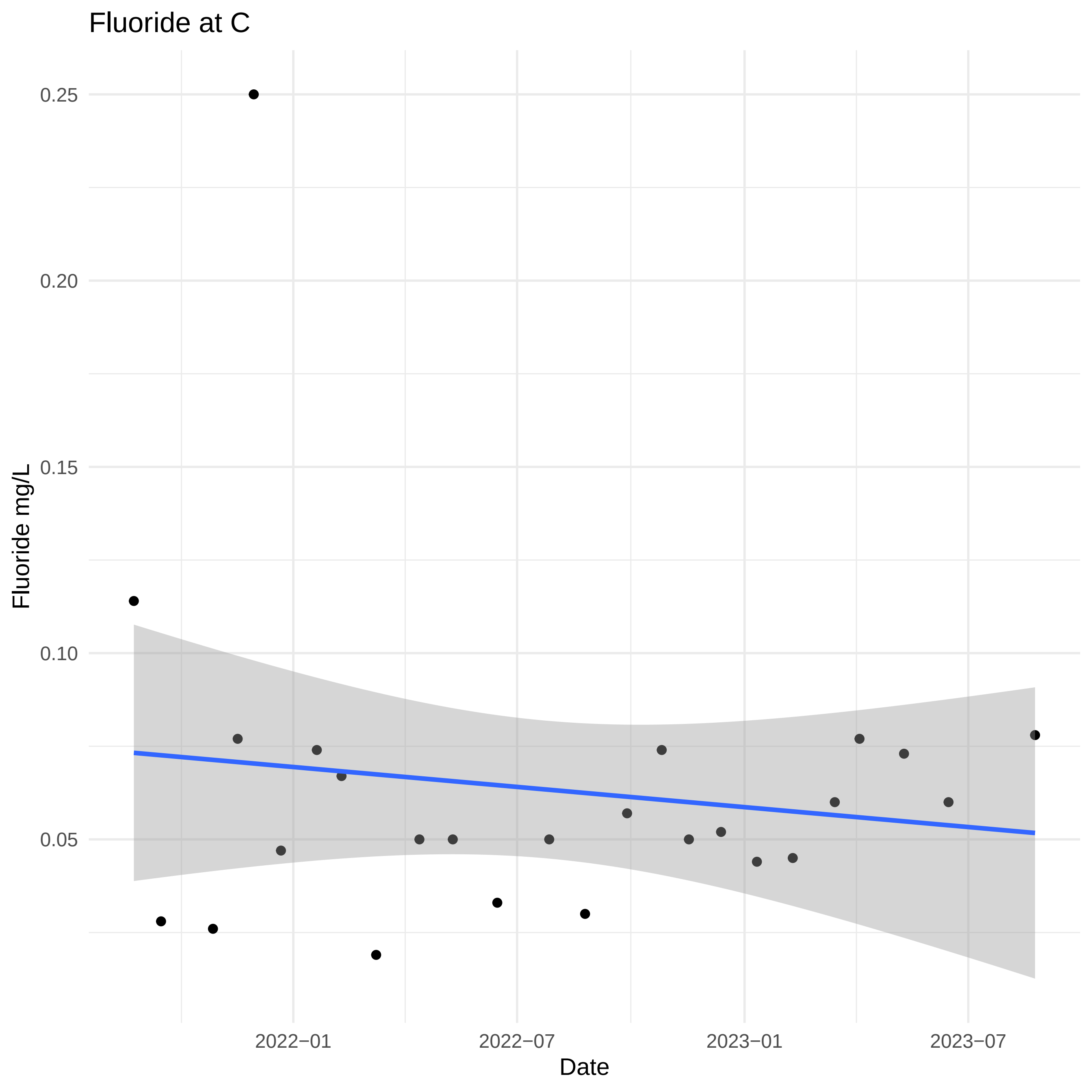
Electrical.Conductivity.Field..non.compensated. at LMP01
500
400
300
200
Electrical.Conductivity.Field..non.compensated. µS/cm
2022−01
2022−07
2023−01
2023−0
Date

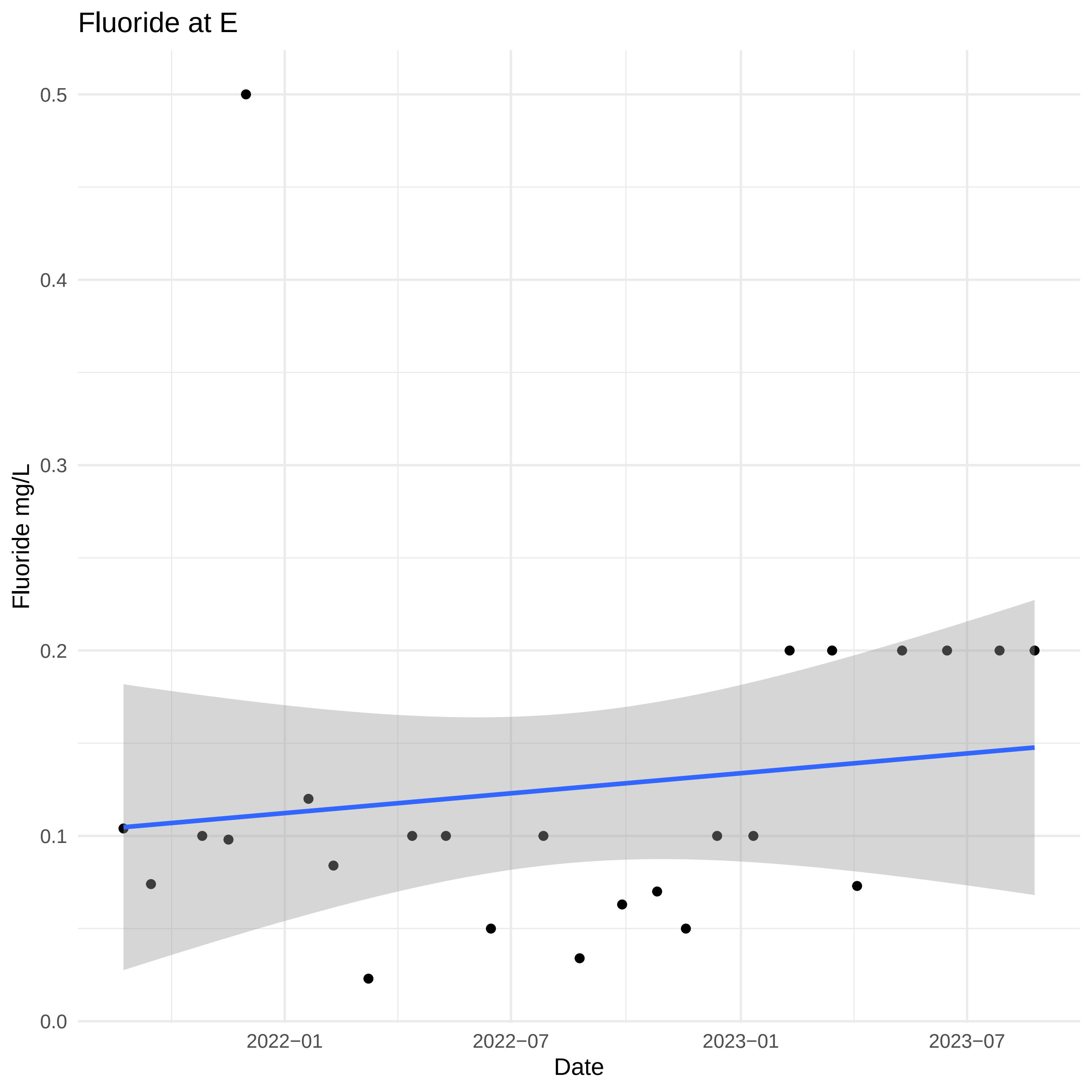


Electrical.Conductivity.Field..non.compensated. at NC01
Electrical.Conductivity.Field..non.compensated. µS/cm
400
300
200
100
2022−01
2022−07
2023−01
2023−07
Date

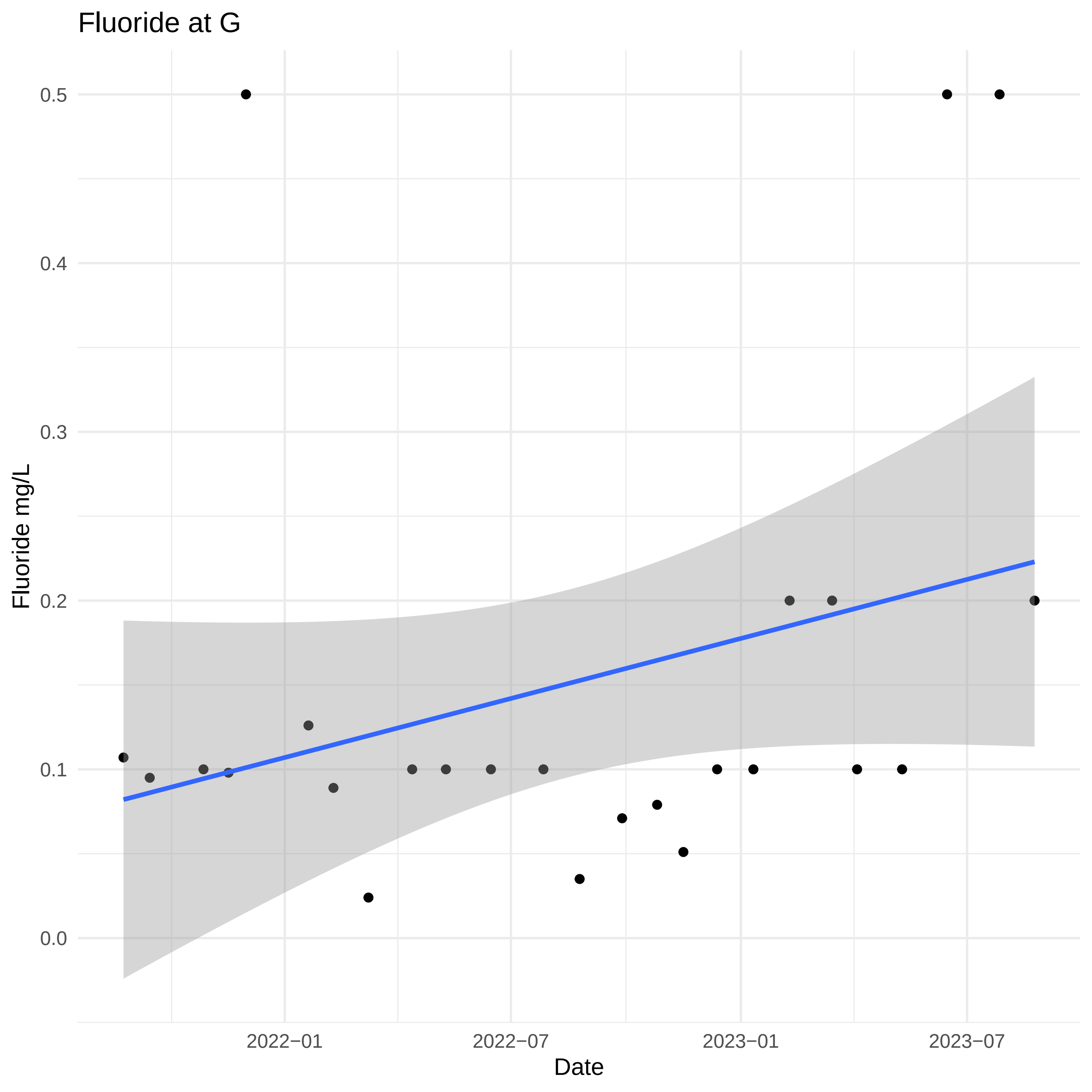


Electrical.Conductivity.Field..non.compensated. at WX22
Electrical.Conductivity.Field..non.compensated. µS/cm
2000
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date

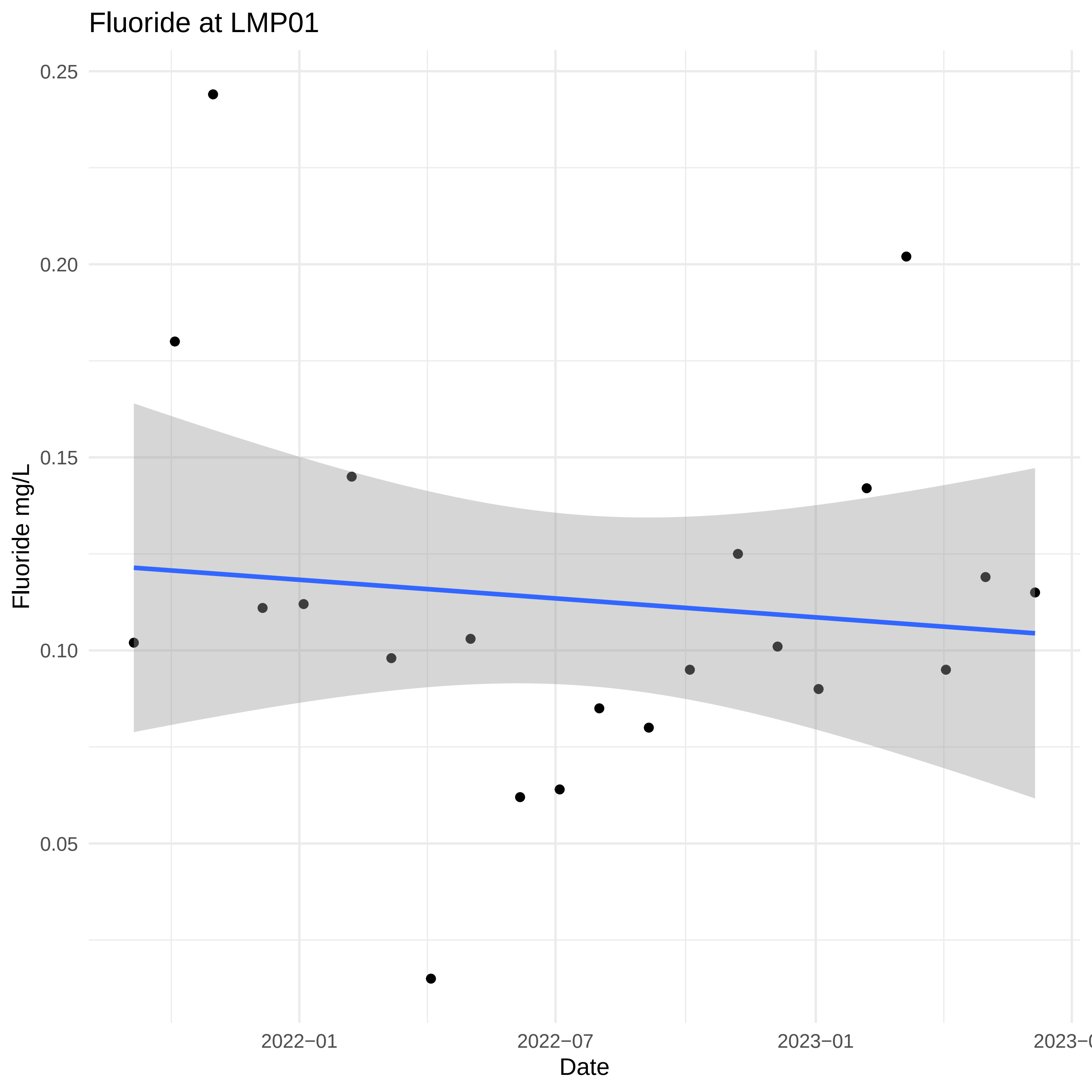

Fluoride at C
Fluoride mg/L
0.25
0.20
0.15
0.10
0.05
2022−01
2022−07
2023−01
2023−07
Date

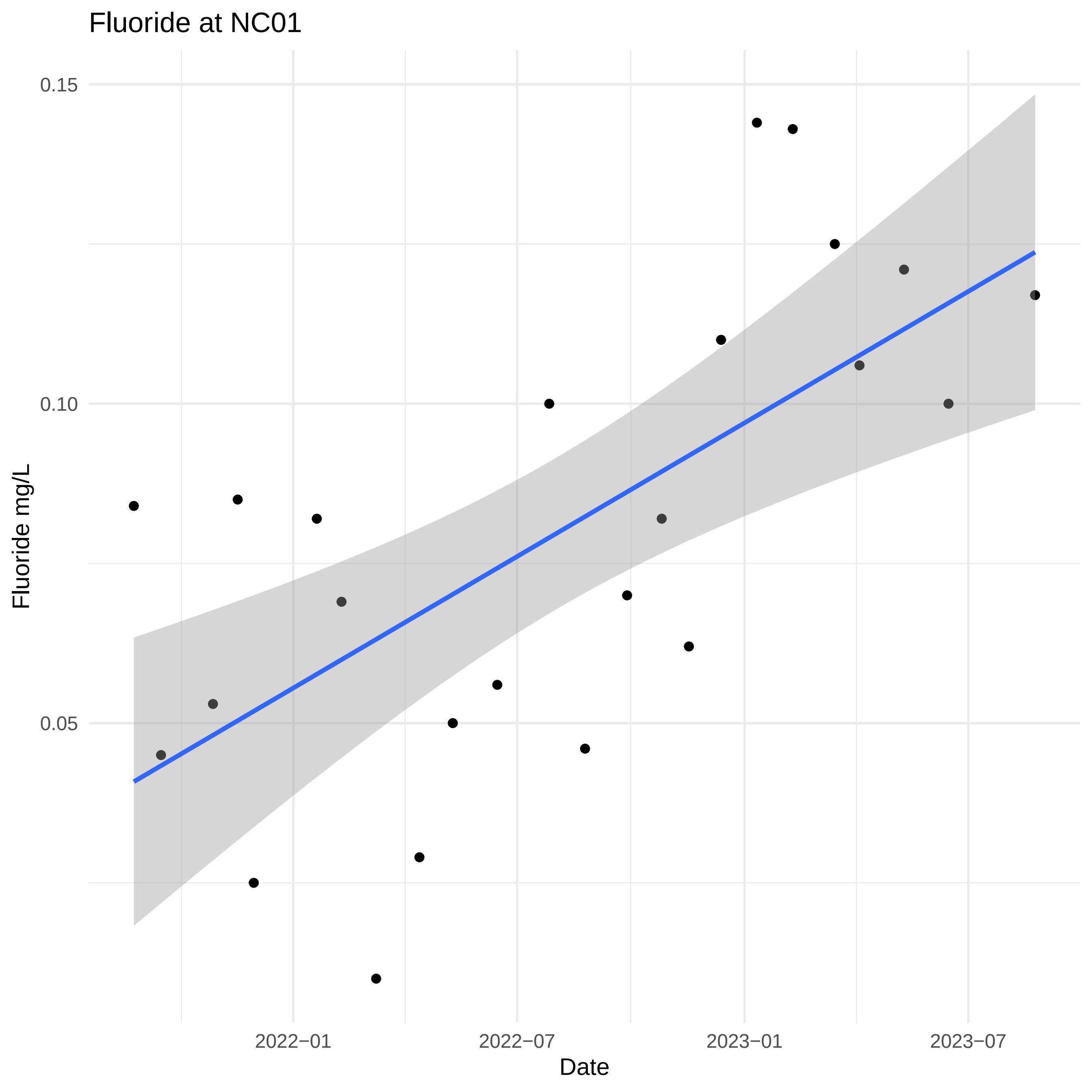


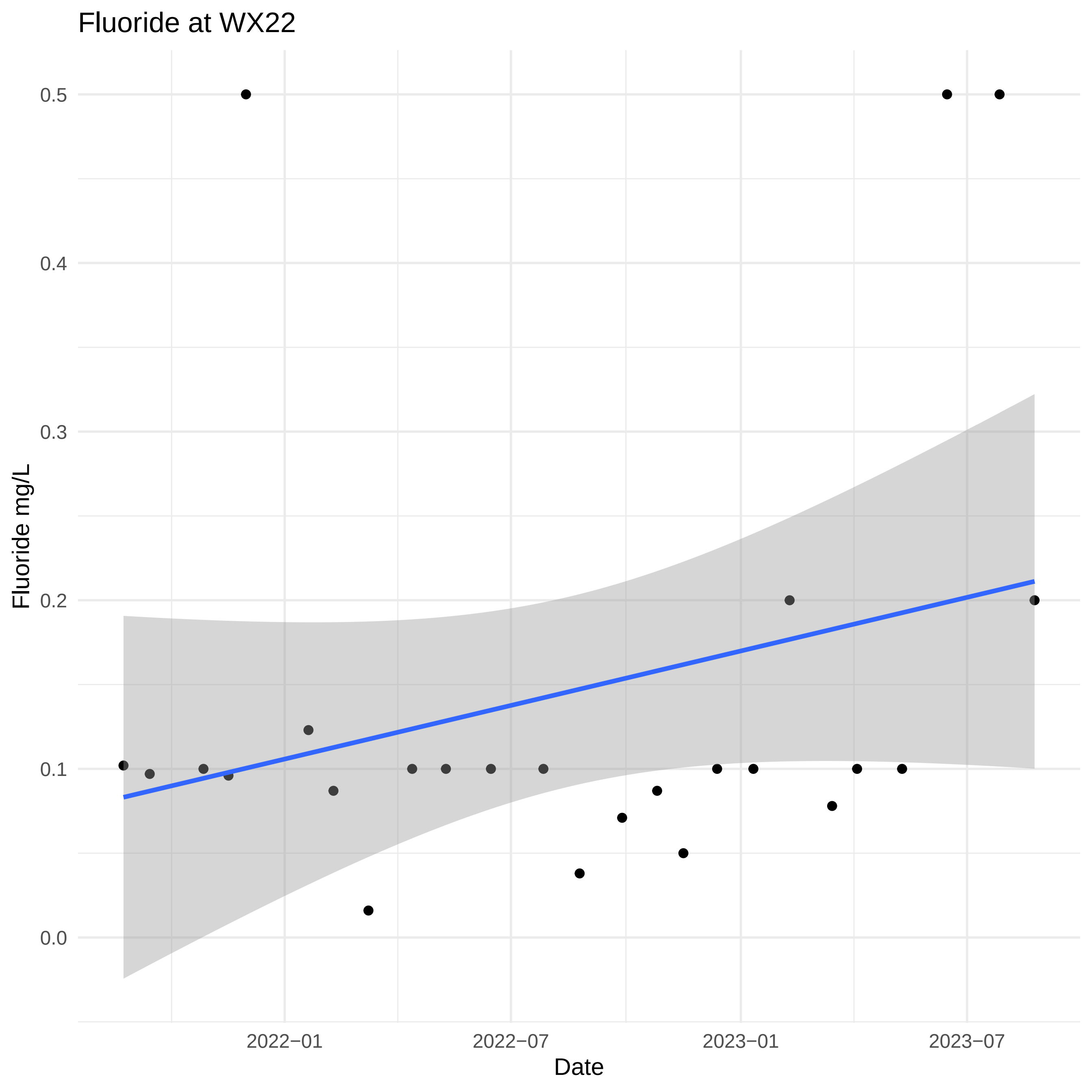
Fluoride at E
Fluoride mg/L
0.5
0.4
0.3
0.2
0.1
0.0
2022−01
2022−07
2023−01
2023−07
Date



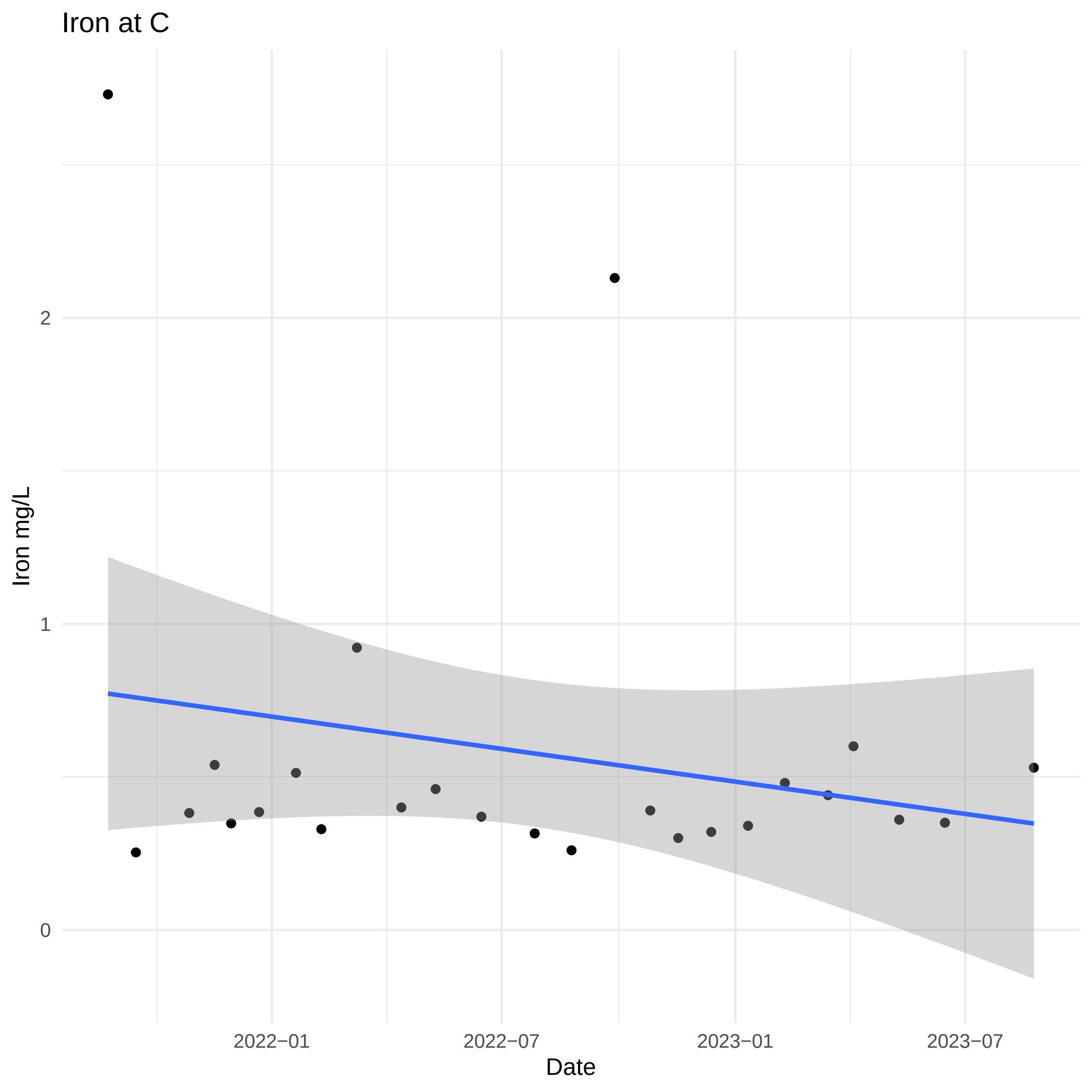
Fluoride at G
0.5
0.4
0.3
0.2
0.1
0.0
Fluoride mg/L
2022−01
2022−07
2023−01
2023−07
Date

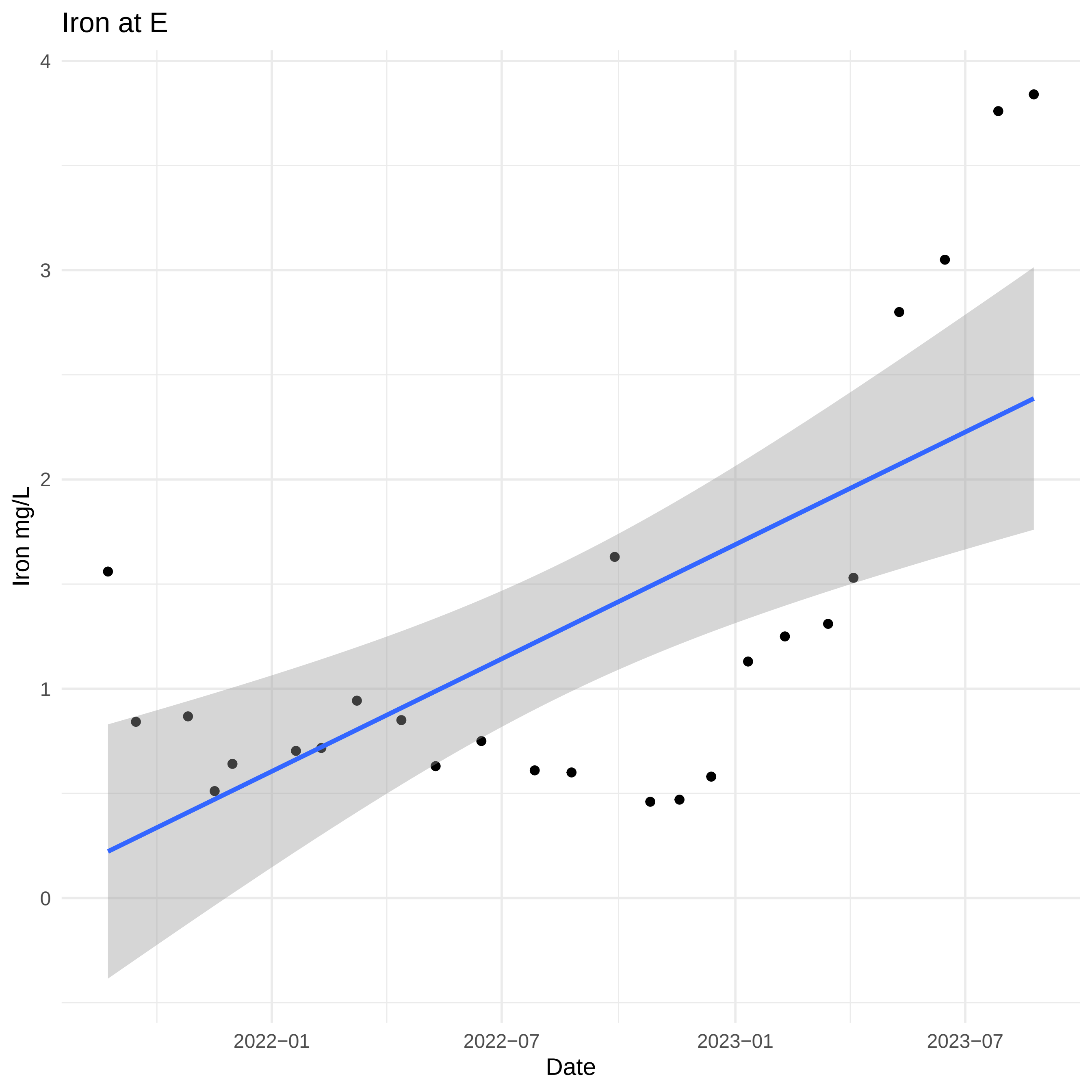

Fluoride at LMP01
0.25
0.20
0.15
0.10
0.05
Fluoride mg/L
2022−01
2022−07
2023−01
Date


Fluoride at NC01
0.15
0.10
0.05
Fluoride mg/L
2022−01
2022−07
2023−01
2023−07
Date

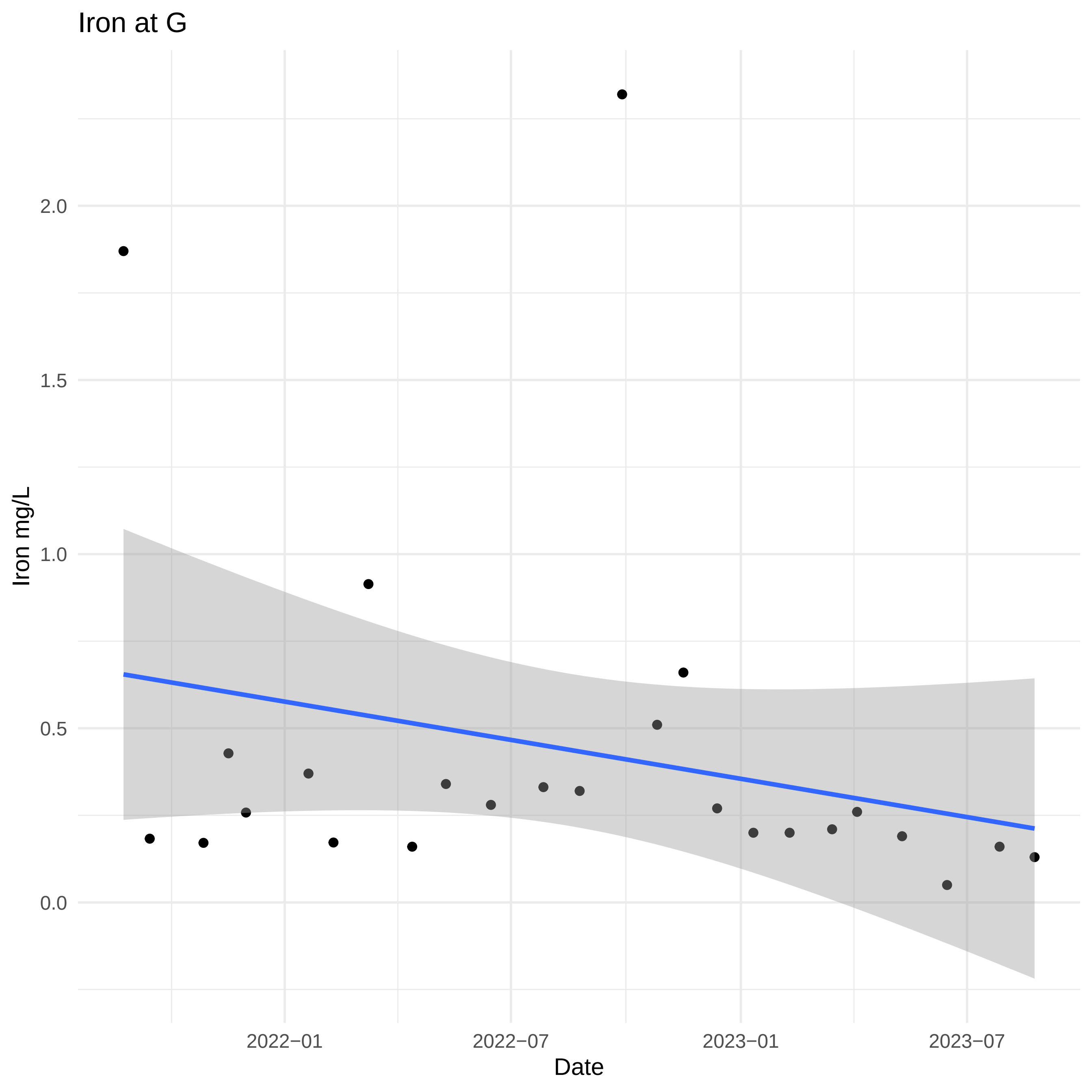


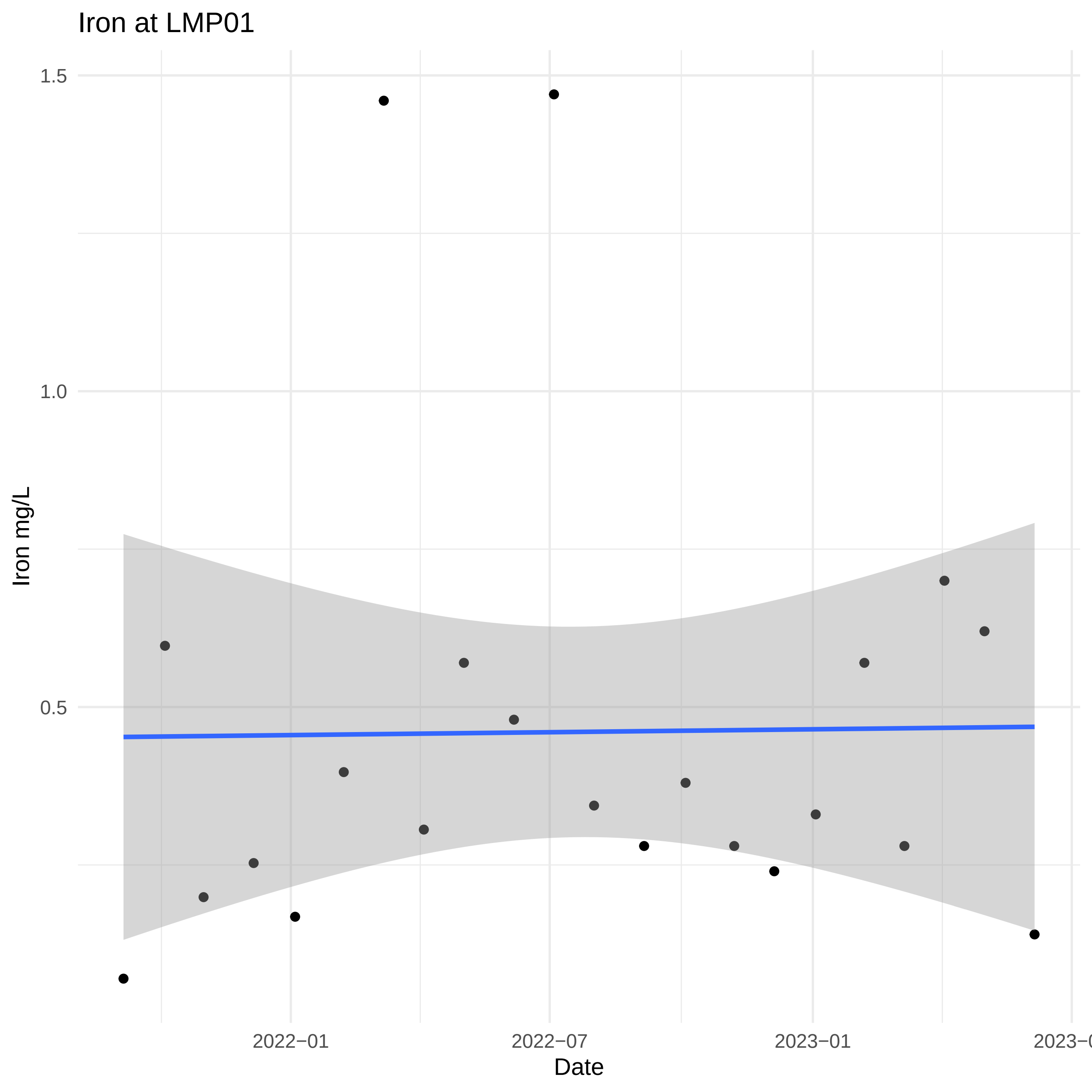
Fluoride at WX22
Fluoride mg/L
0.0
0.1
0.2
0.3
0.4
0.5
2022−01
2022−07
2023−01
2023−07
Date


Iron at C
Iron mg/L
0
1
2
2022−01
2022−07
2023−01
2023−07
Date

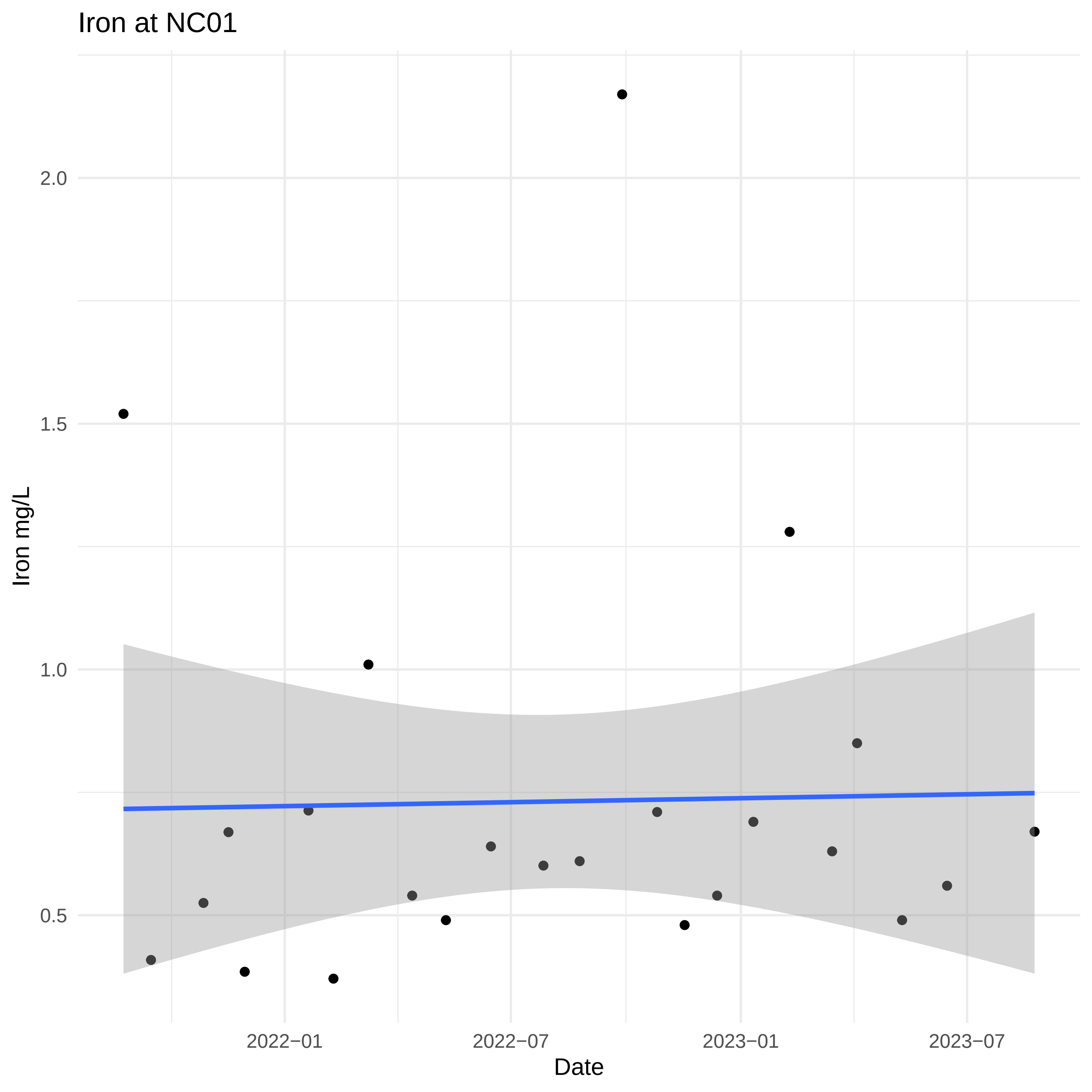


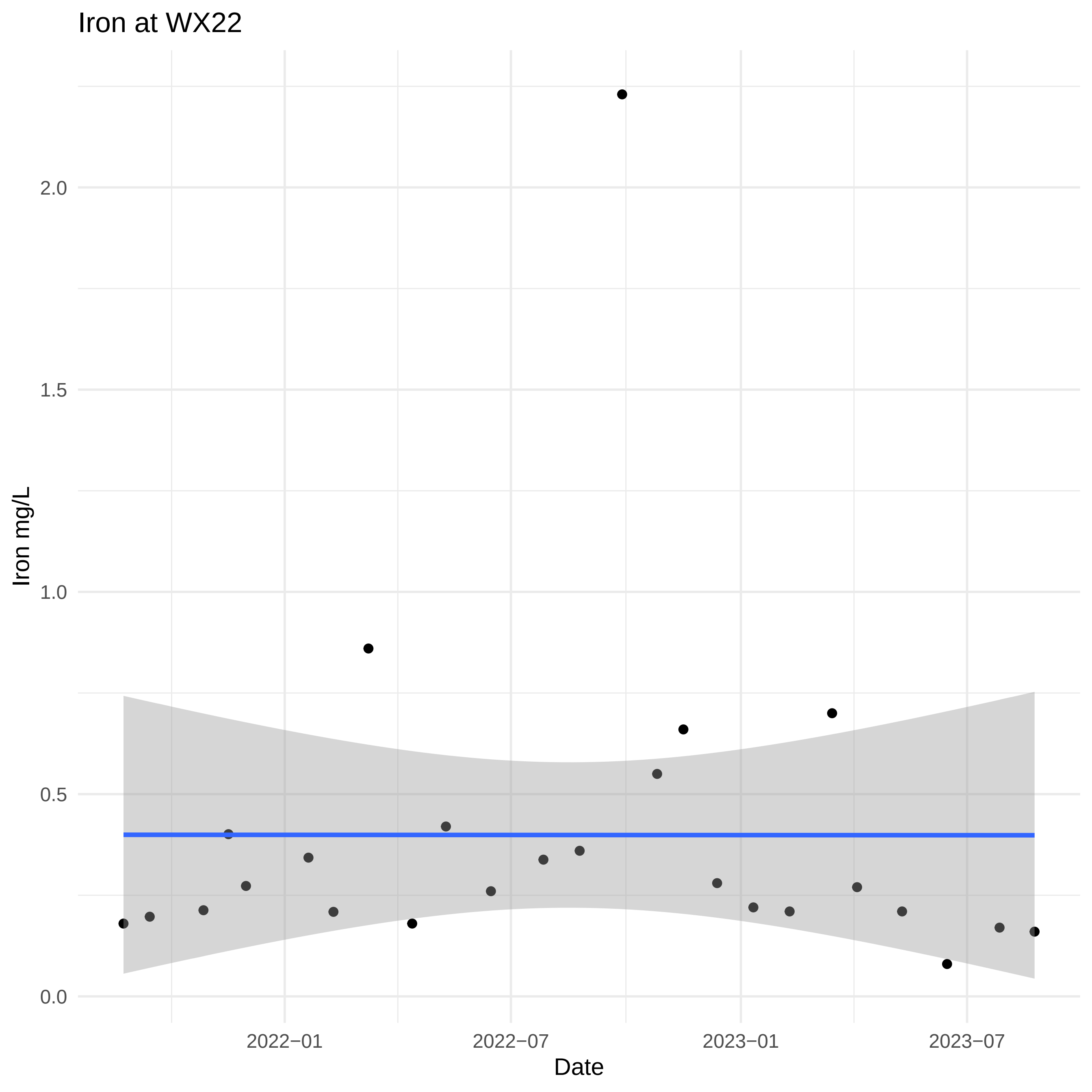
Iron at E
Iron mg/L
Date
0
1
2
3
4
2022−01
2022−07
2023−01
2023−07


Iron at G
Iron mg/L
2.0
1.5
1.0
0.5
0.0
2022−01
2022−07
2023−01
2023−07
Date

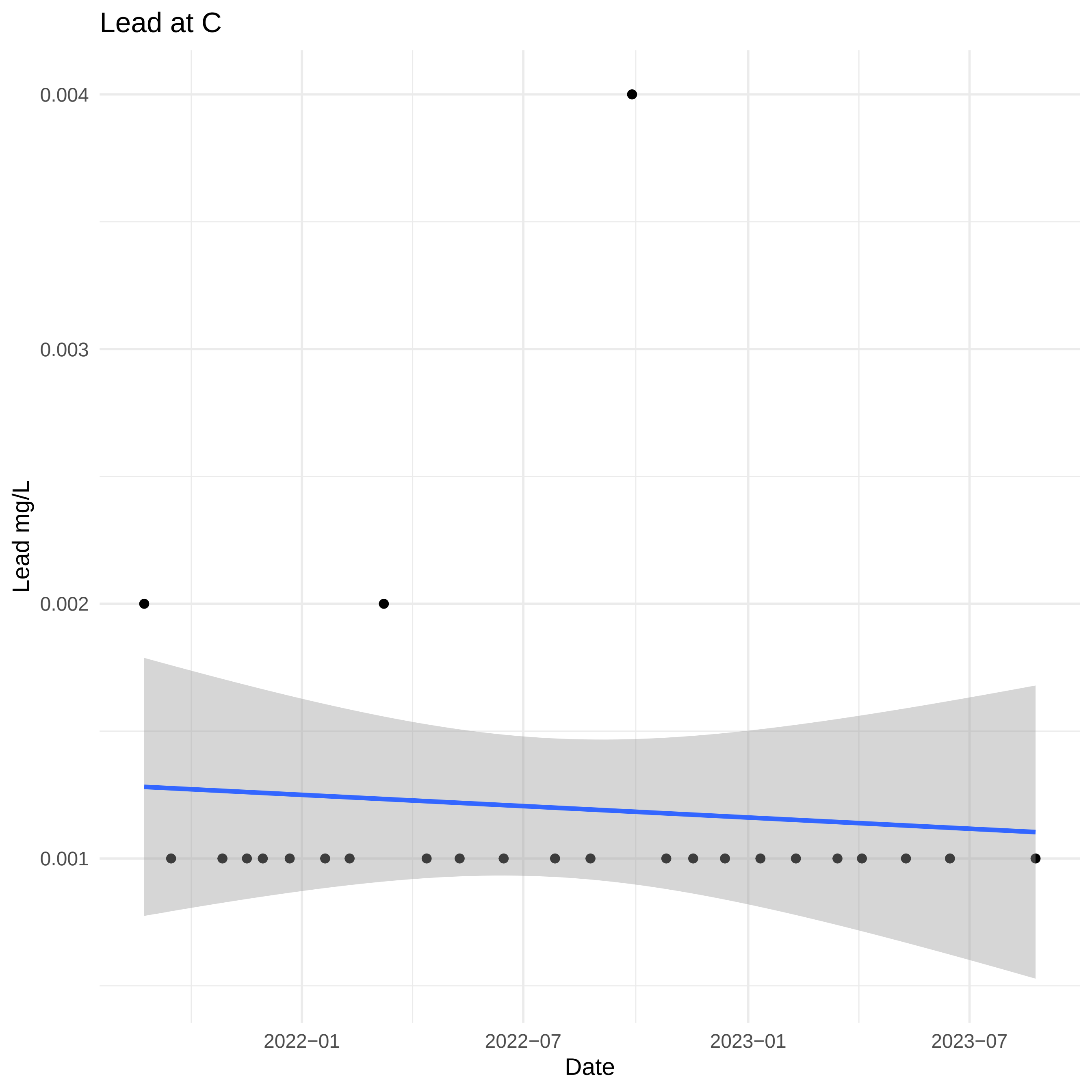


Iron at LMP01
Iron mg/L
1.5
1.0
0.5
2022−01
2022−07
2023−01
2023−0
Date

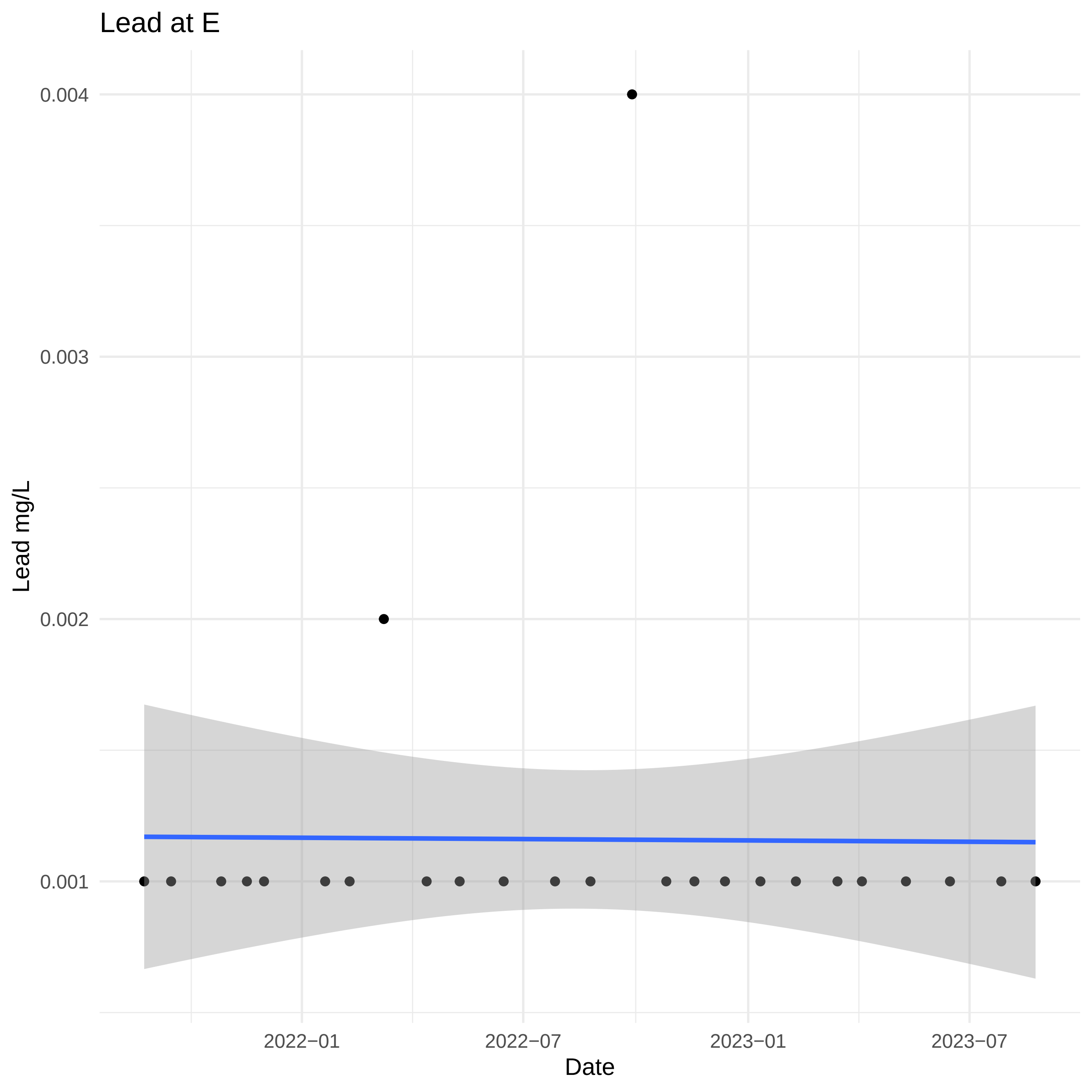

Iron at NC01
2.0
1.5
1.0
0.5
Iron mg/L
2022−01
2022−07
2023−01
2023−07
Date



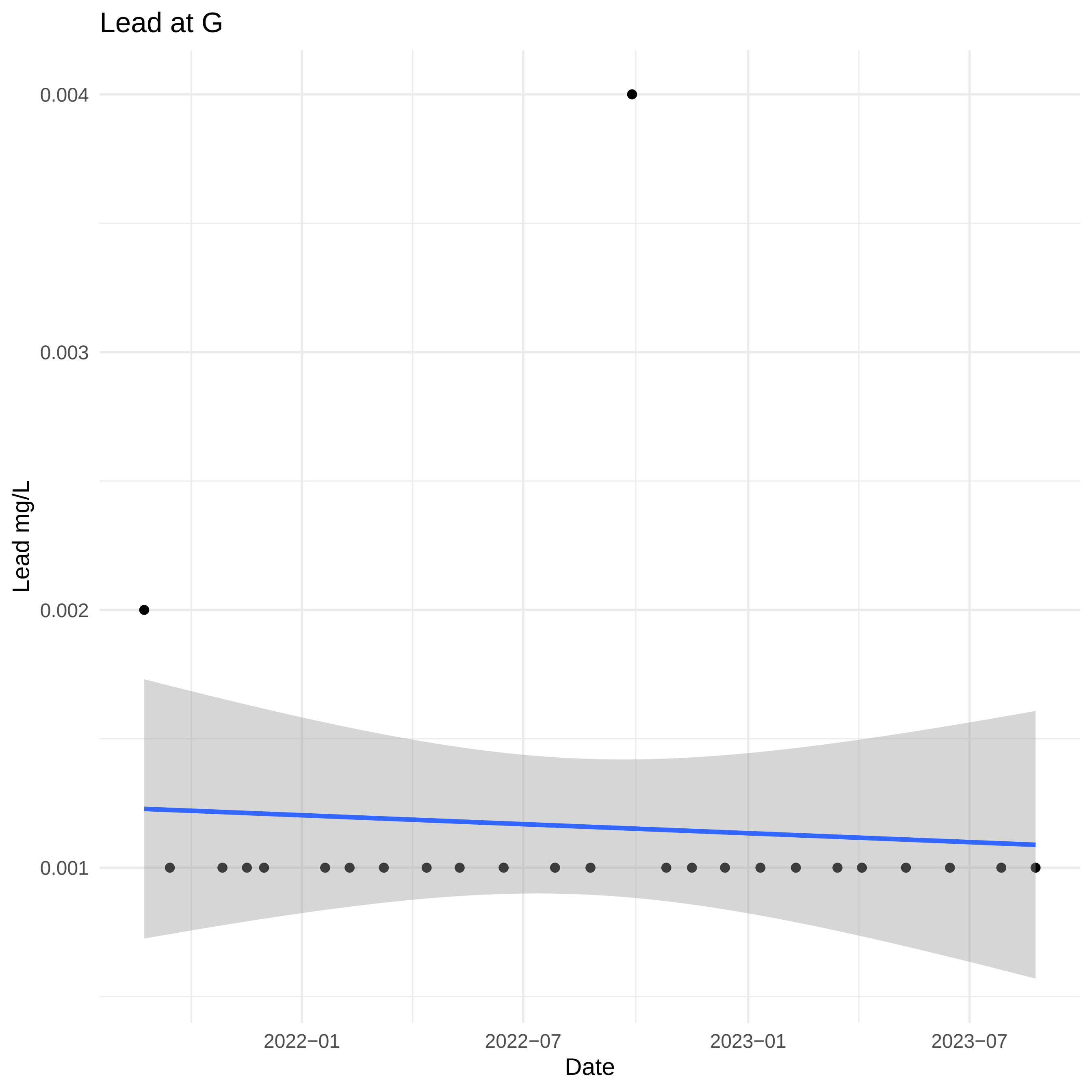
Iron at WX22
Iron mg/L
2.0
1.5
1.0
0.5
0.0
2022−01
2022−07
2023−01
2023−07
Date



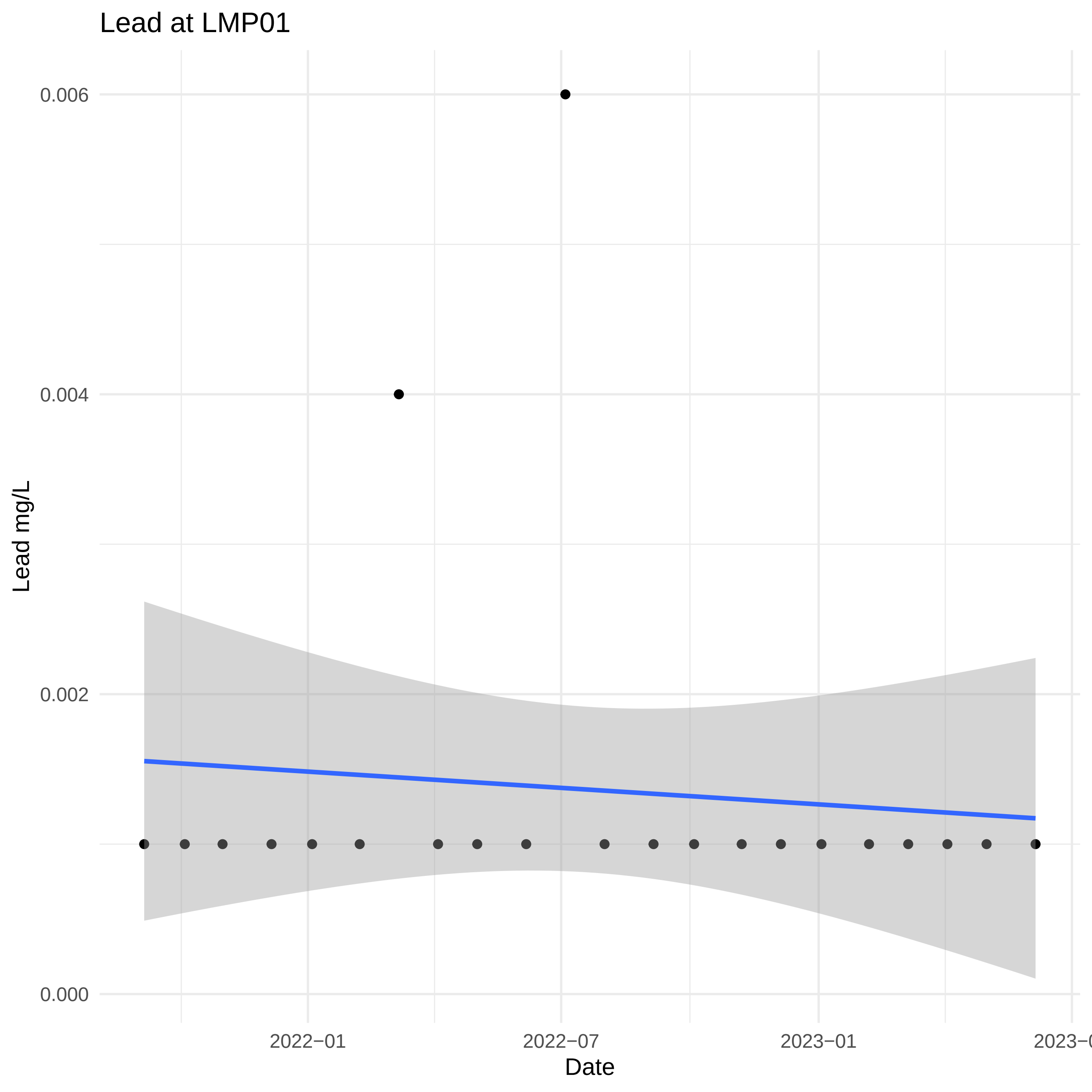
Lead at C
0.004
0.003
0.002
0.001
Lead mg/L
2022−01
2022−07
2023−01
2023−07
Date



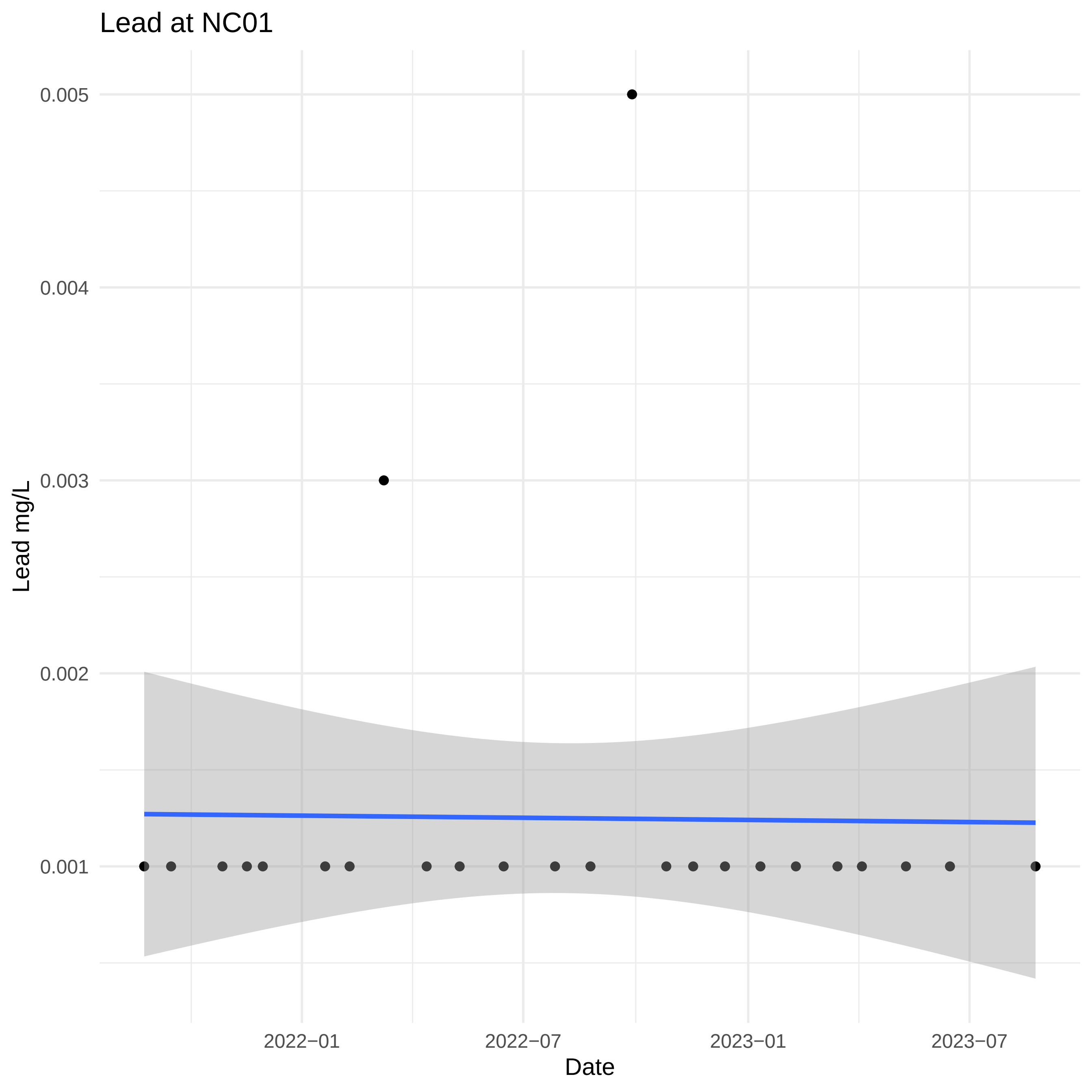
Lead at E
0.004
0.003
0.002
0.001
Lead mg/L
2022−01
2022−07
2023−01
2023−07
Date



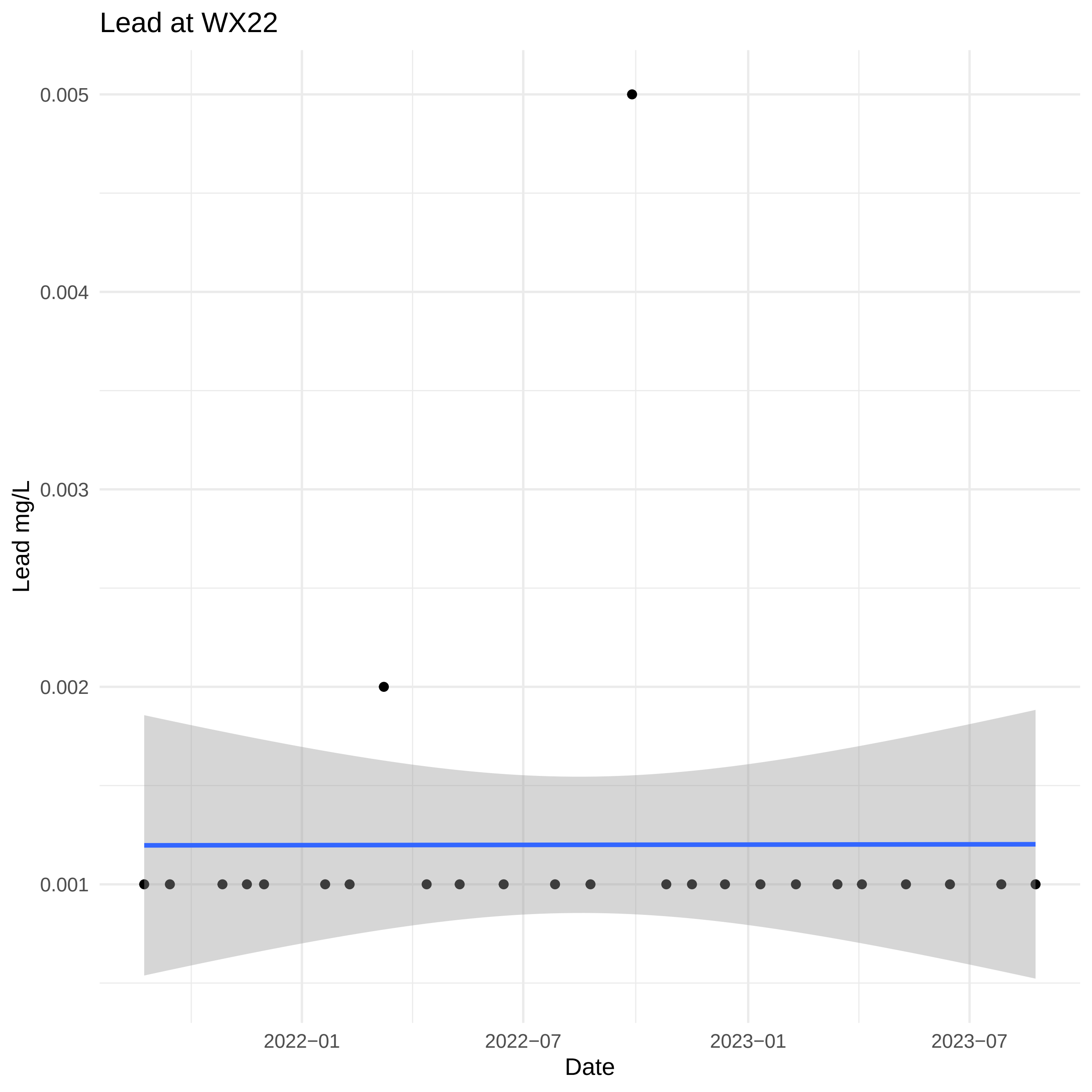
Lead at G
0.004
0.003
0.002
0.001
Lead mg/L
2022−01
2022−07
2023−01
2023−07
Date



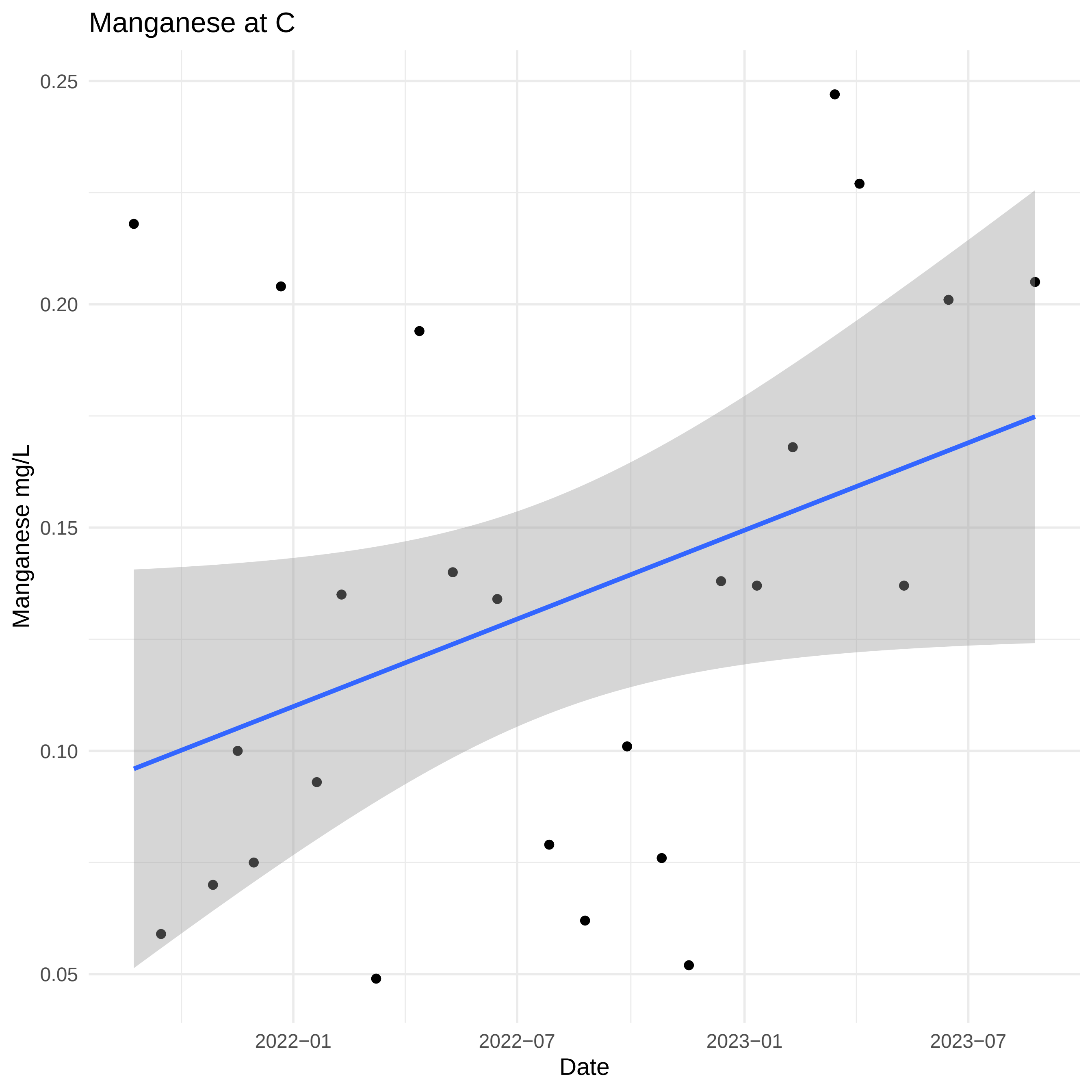
Lead at LMP01
0.006
0.004
0.002
0.000
Lead mg/L
2022−01
2022−07
2023−01
Date



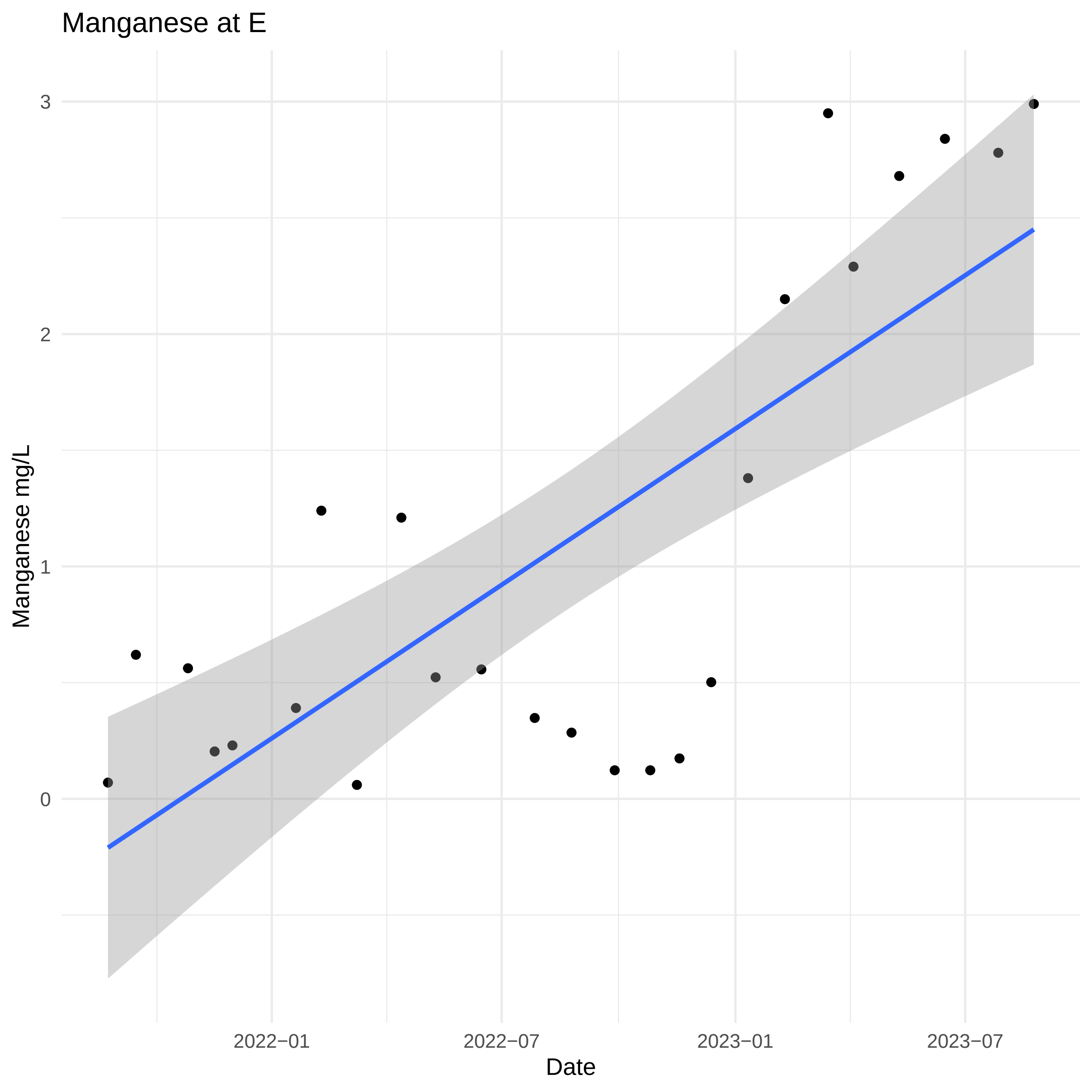
Lead at NC01
0.005
0.004
0.003
0.002
0.001
Lead mg/L
2022−01
2022−07
2023−01
2023−07
Date

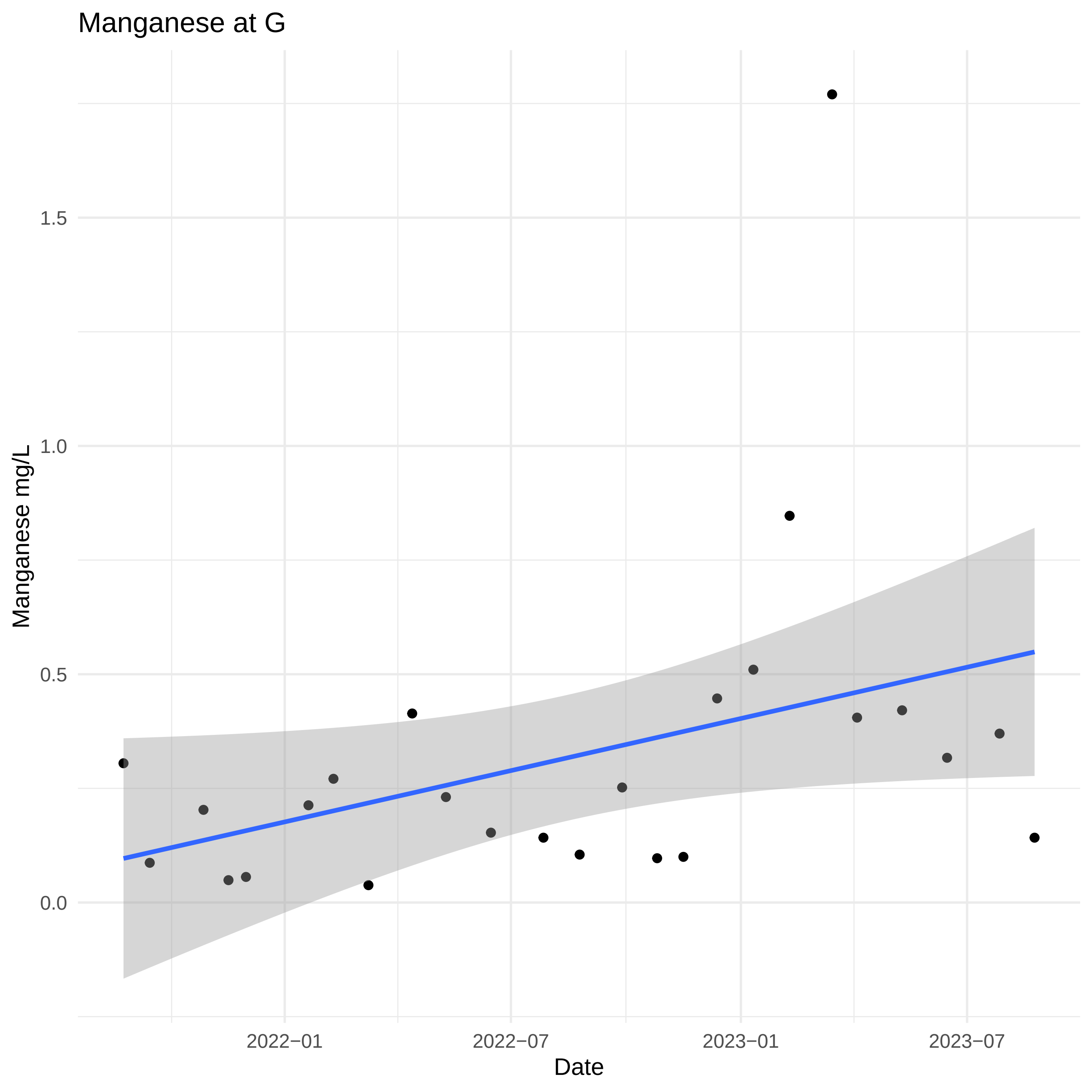


Lead at WX22
0.005
0.004
0.003
0.002
0.001
Lead mg/L
2022−01
2022−07
2023−01
2023−07
Date

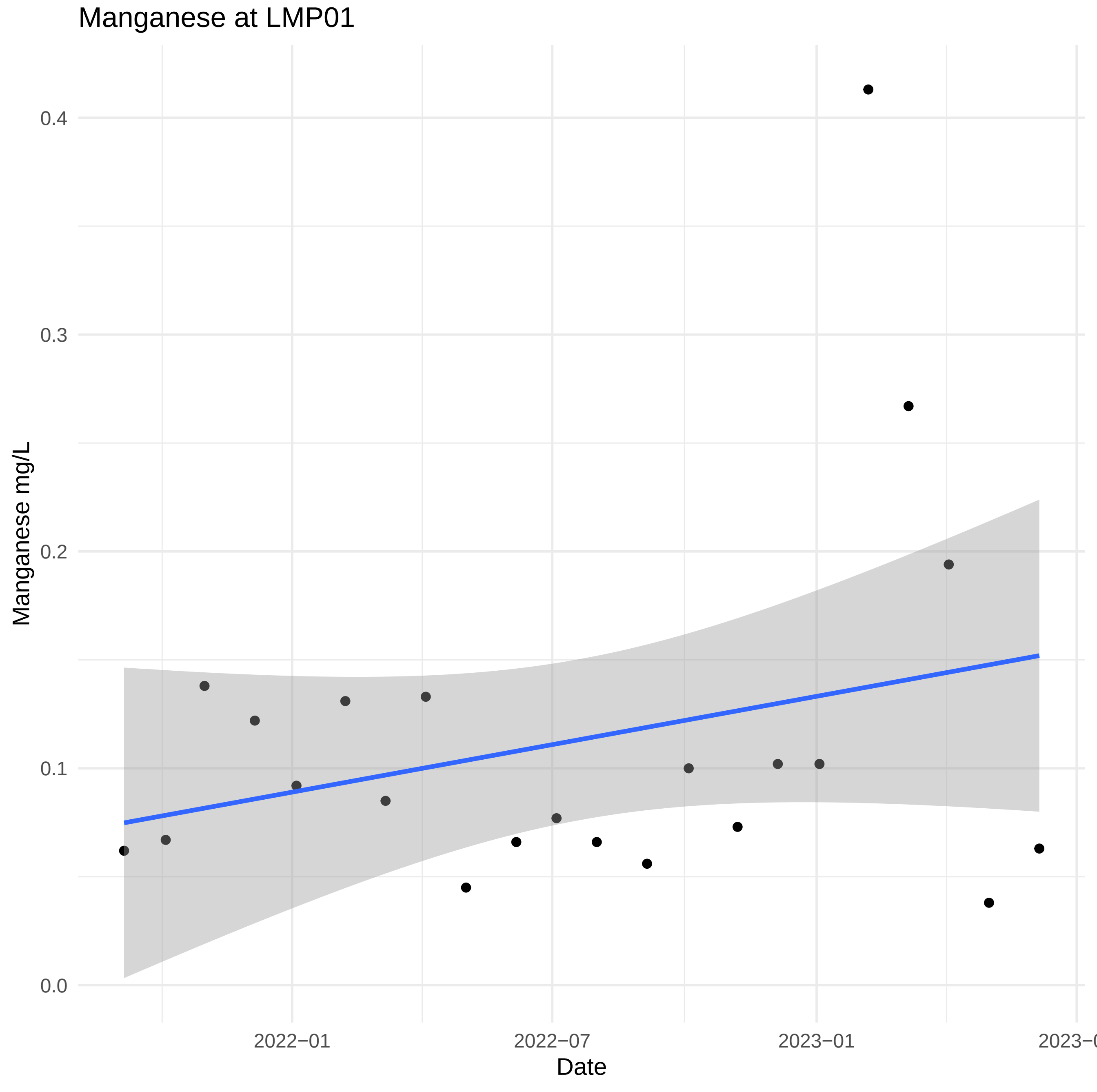


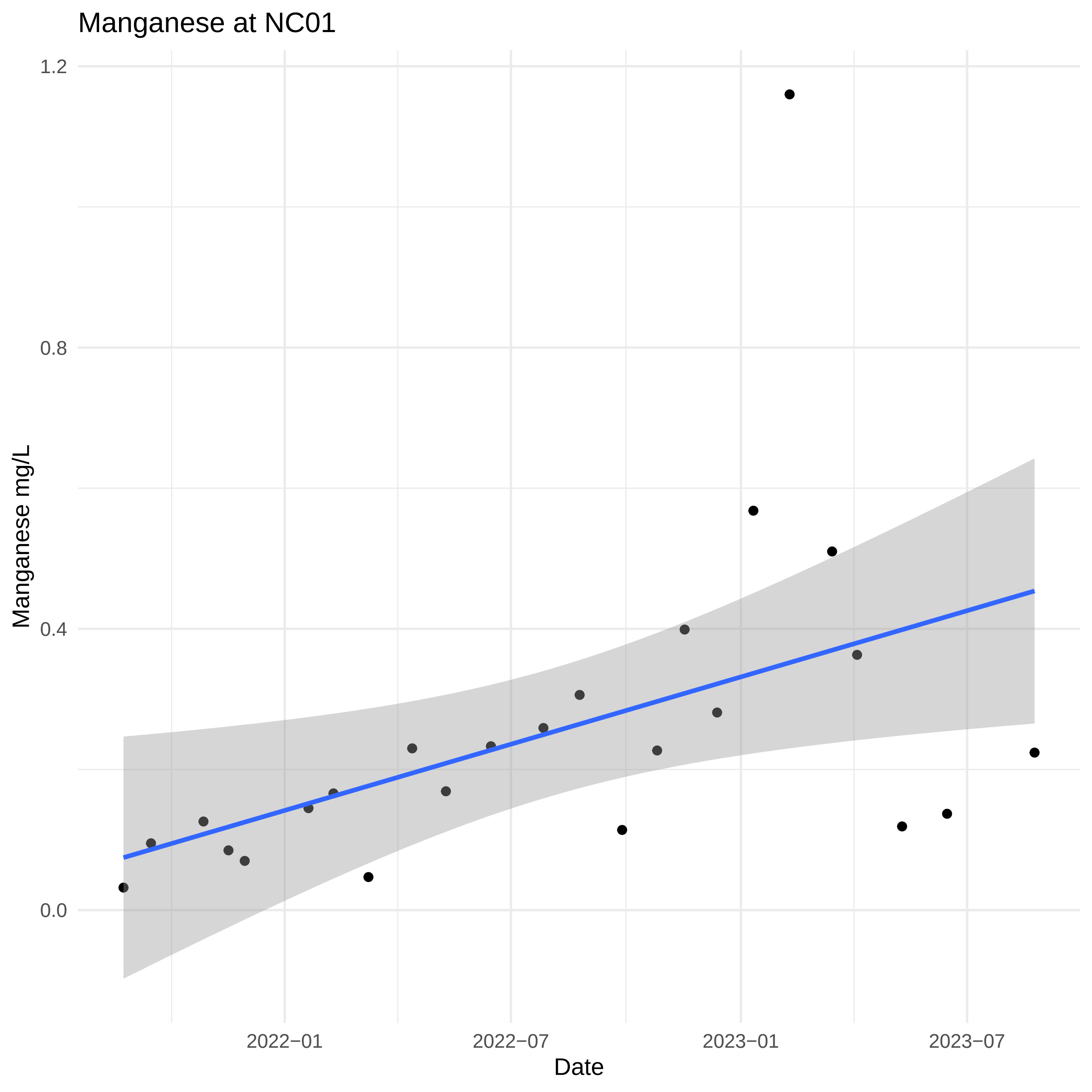
Manganese at C
0.25
0.20
0.15
0.10
0.05
Manganese mg/L
2022−01
2022−07
2023−01
2023−07
Date


Manganese at E
3
2
1
0
Manganese mg/L
2022−01
2022−07
2023−01
2023−07
Date

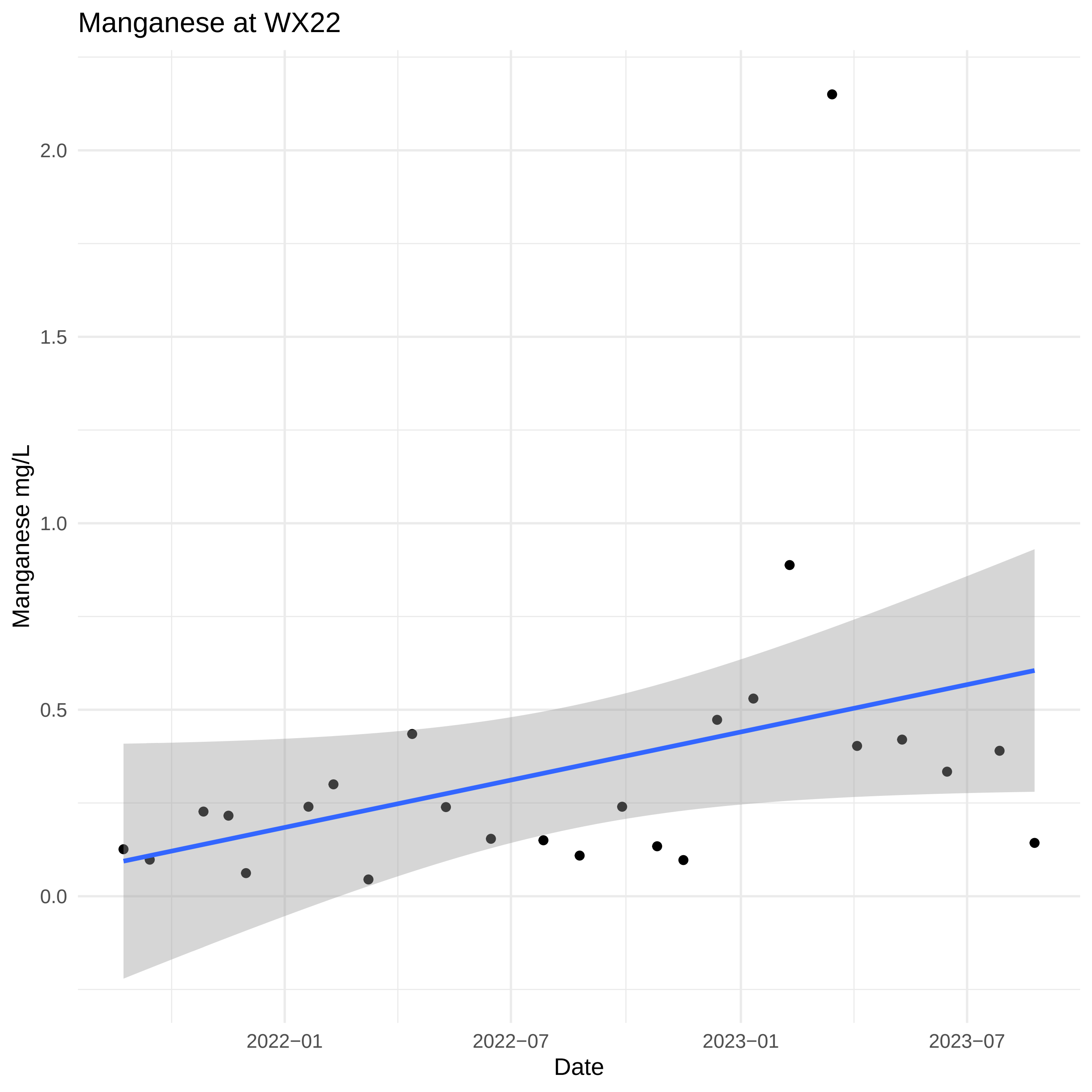


Manganese at G
Manganese mg/L
1.5
1.0
0.5
0.0
2022−01
2022−07
2023−01
2023−07
Date

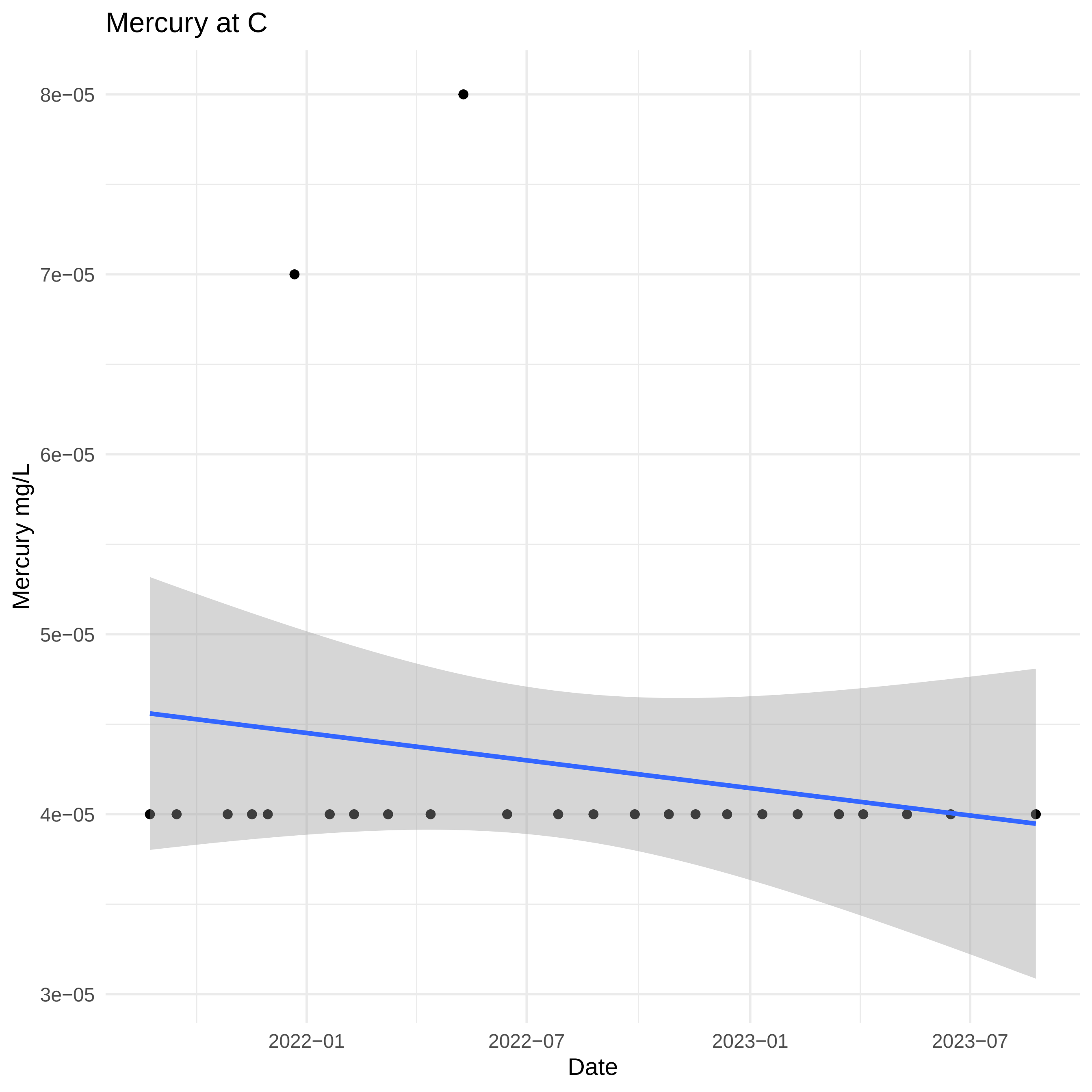

Manganese at LMP01
Manganese mg/L
0.4
0.3
0.2
0.1
0.0
2022−01
2022−07
2023−01
2023−0
Date



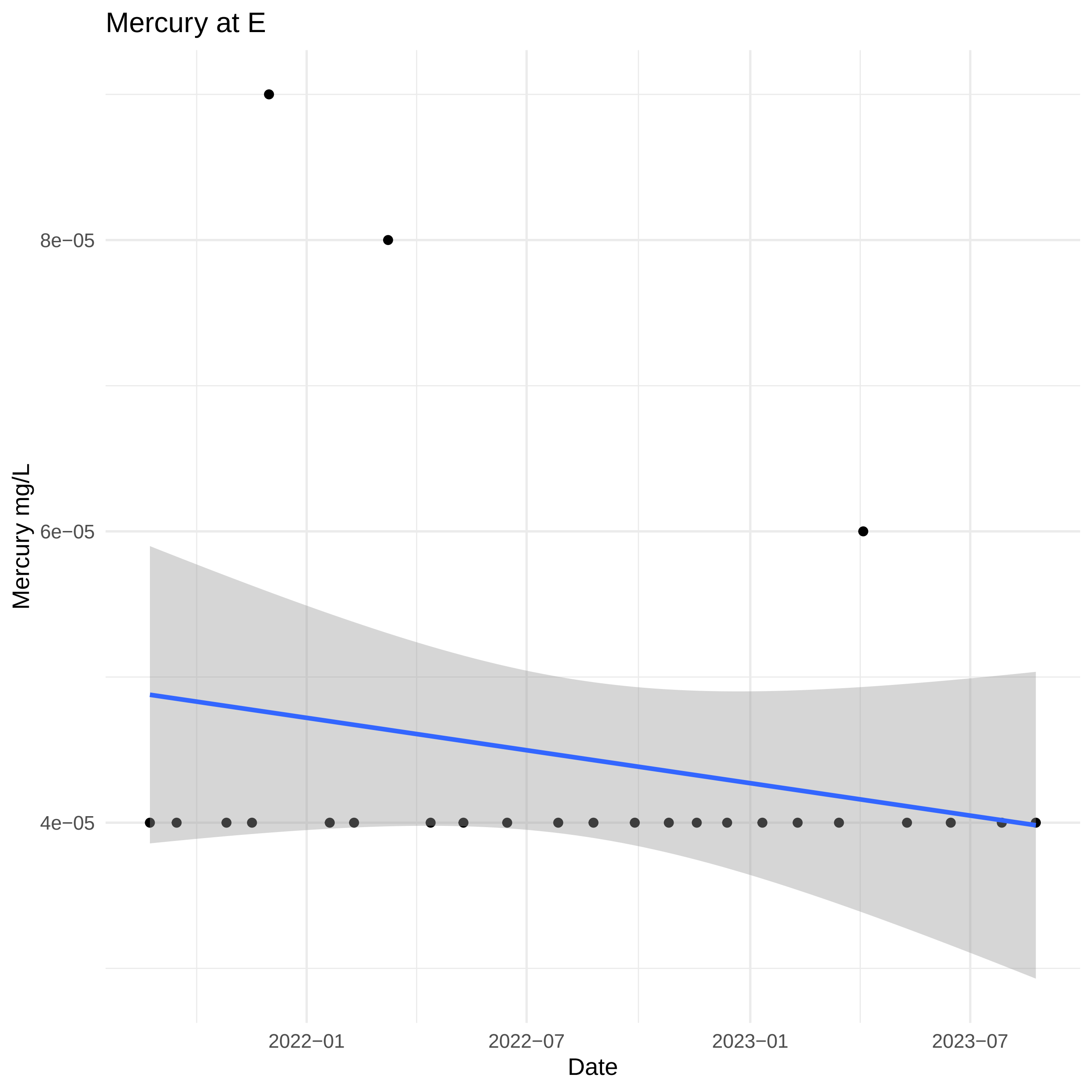
Manganese at NC01
Manganese mg/L
1.2
0.8
0.4
0.0
2022−01
2022−07
2023−01
2023−07
Date



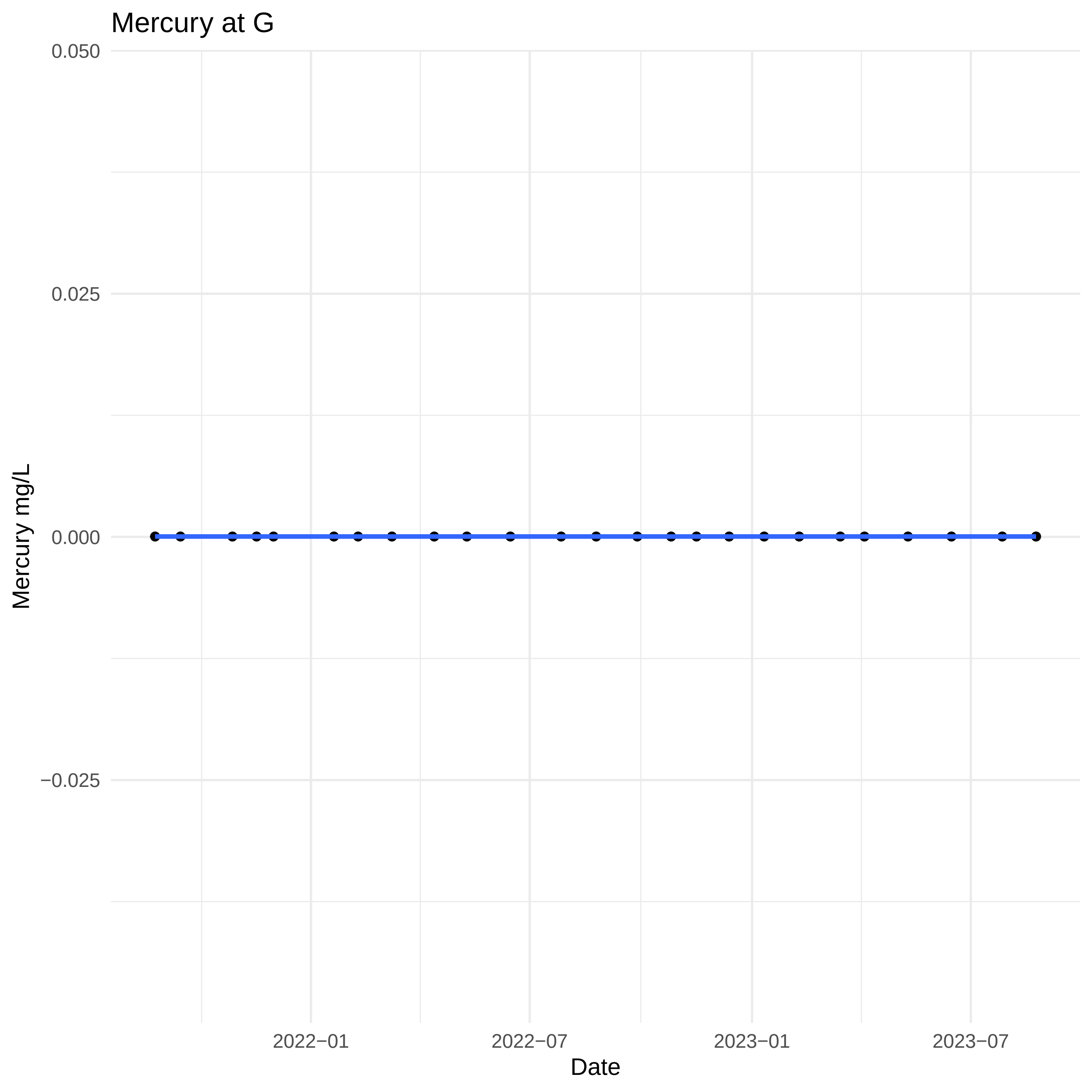
Manganese at WX22
2.0
1.5
1.0
0.5
0.0
Manganese mg/L
2022−01
2022−07
2023−01
2023−07
Date



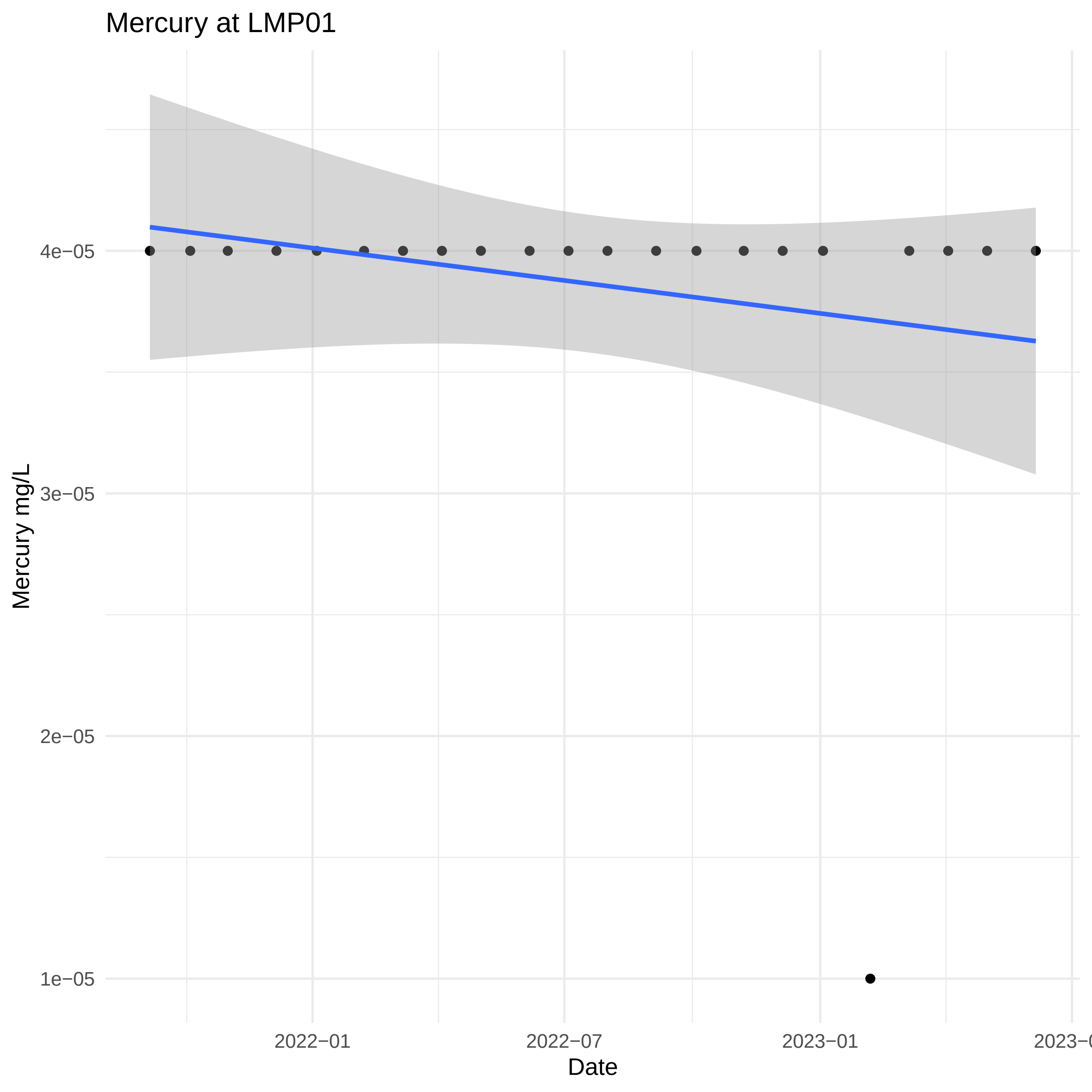
Mercury at C
8e−05
7e−05
6e−05
5e−05
4e−05
3e−05
Mercury mg/L
2022−01
2022−07
2023−01
2023−07
Date

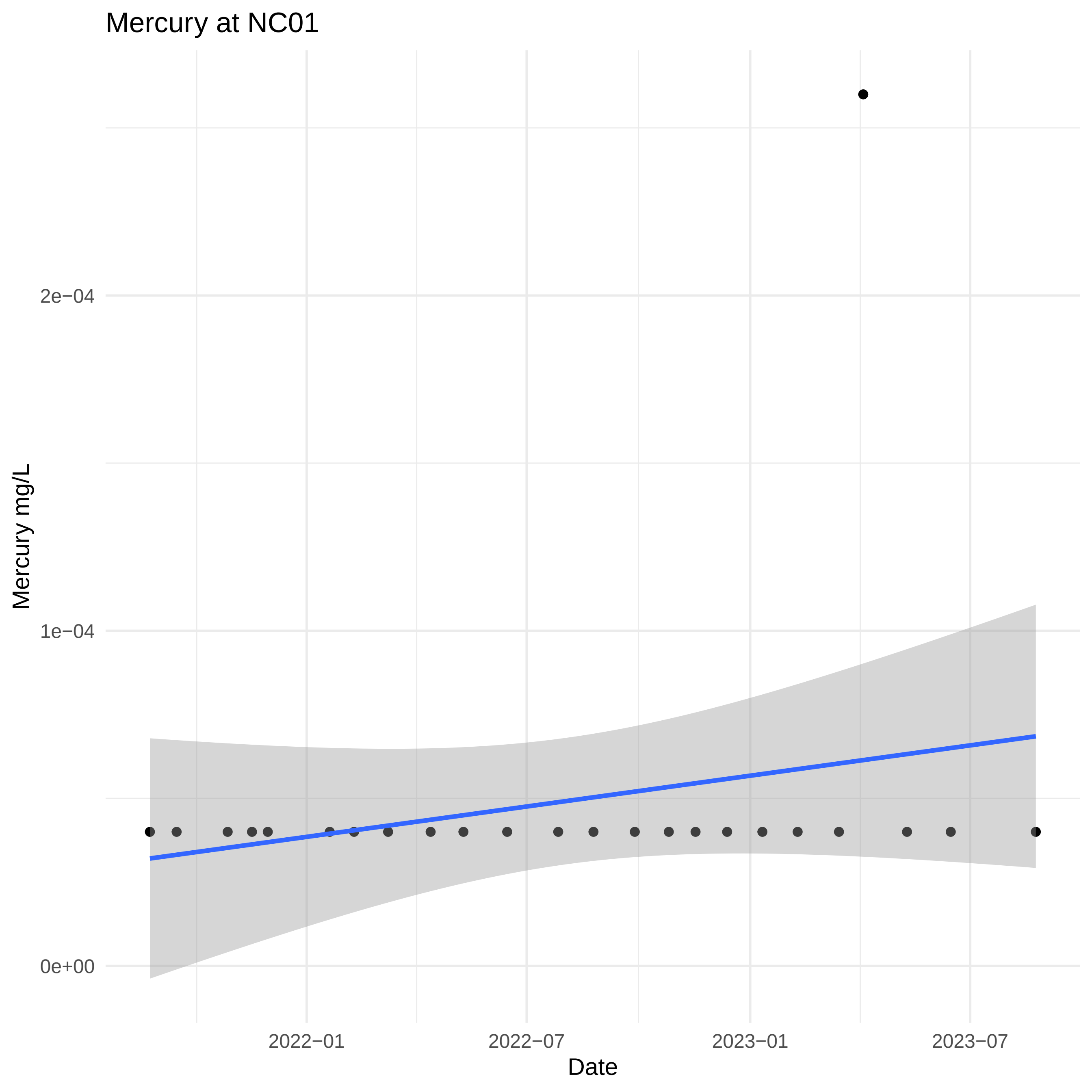


Mercury at E
Mercury mg/L
8e−05
6e−05
4e−05
2022−01
2022−07
2023−01
2023−07
Date

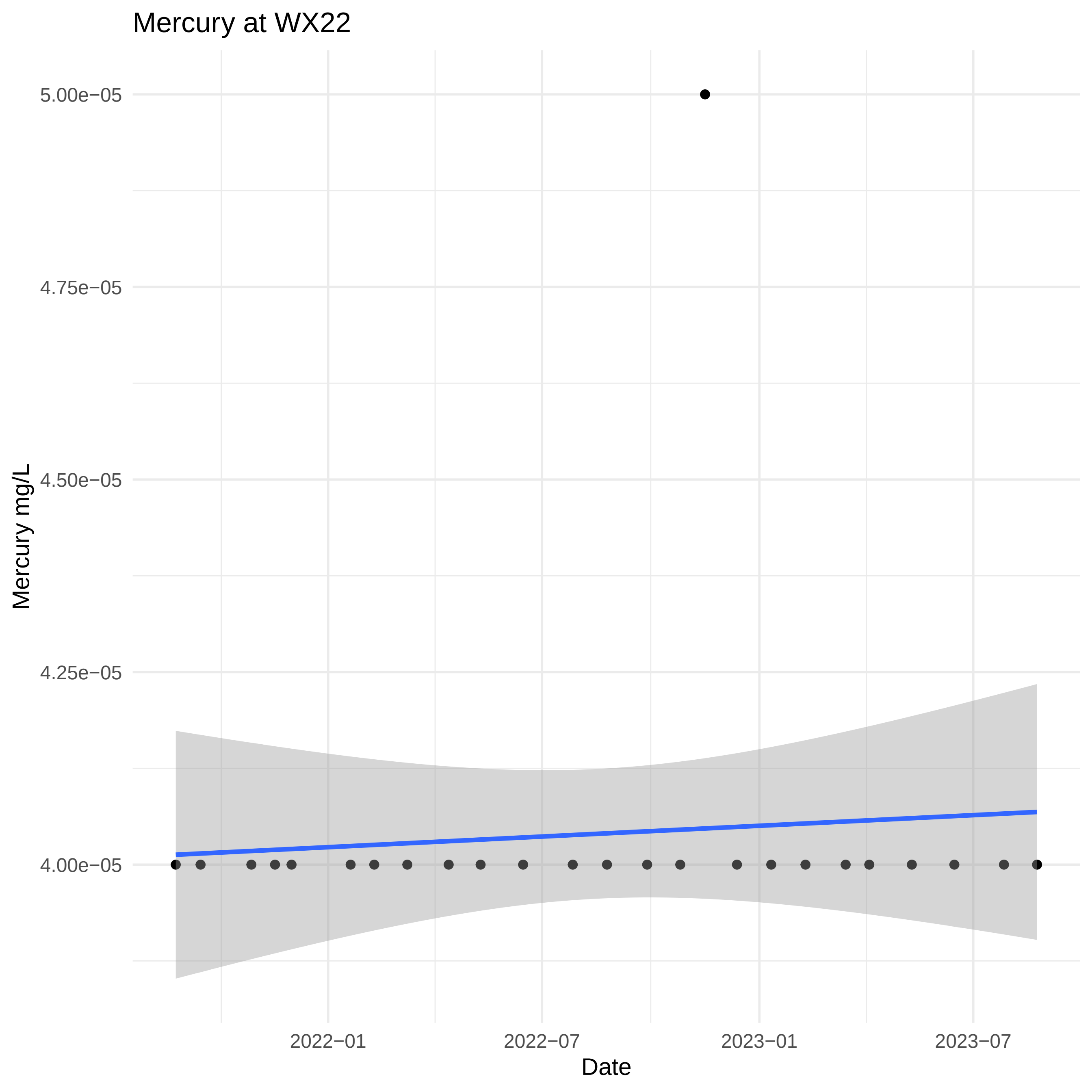


Mercury at G
0.050
0.025
0.000
−0.025
Mercury mg/L
2022−01
2022−07
2023−01
2023−07
Date

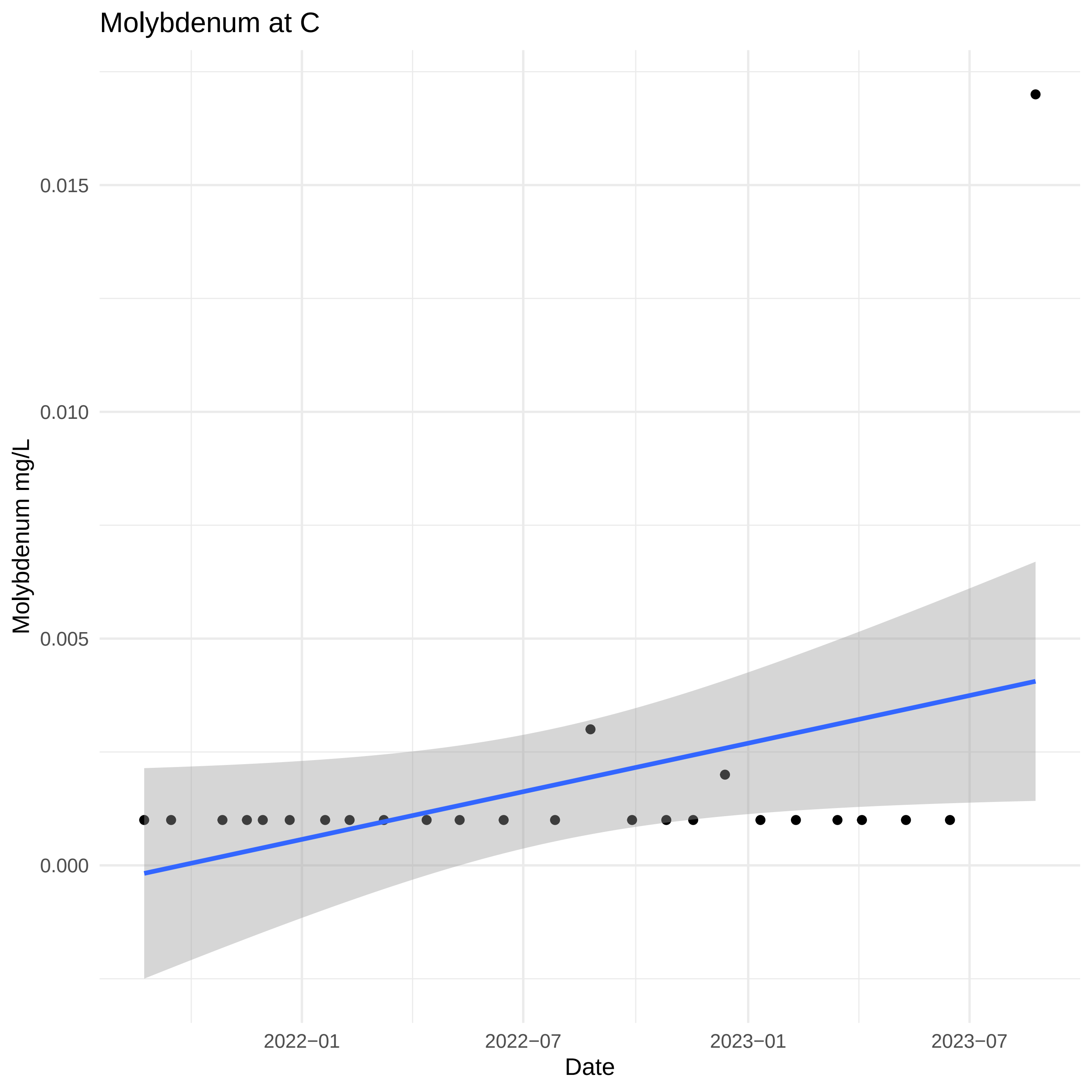

Mercury at LMP01
Mercury mg/L
4e−05
3e−05
2e−05
1e−05
2022−01
2022−07
2023−01
2023−0
Date



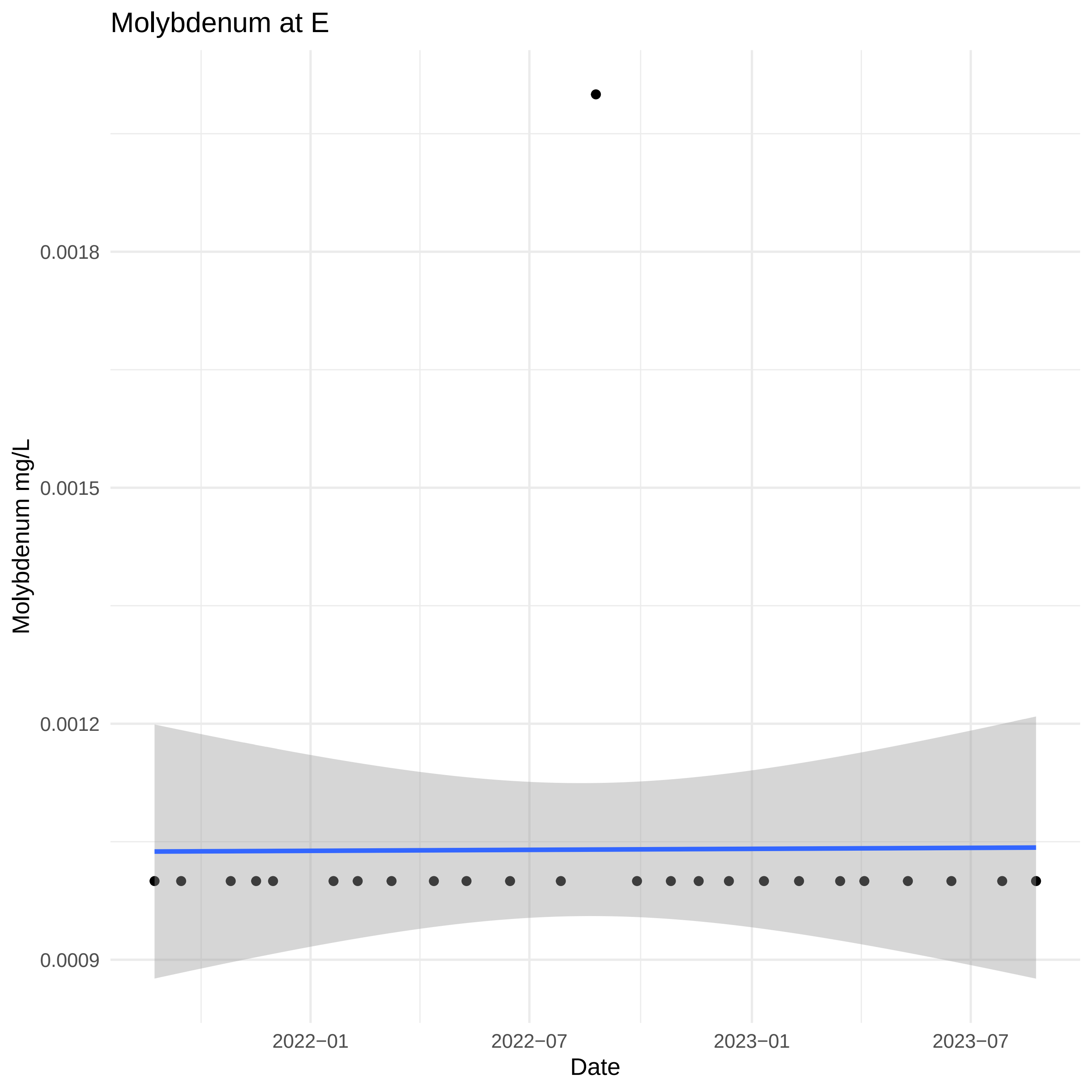
Mercury at NC01
Mercury mg/L
2e−04
1e−04
0e+00
2022−01
2022−07
2023−01
2023−07
Date



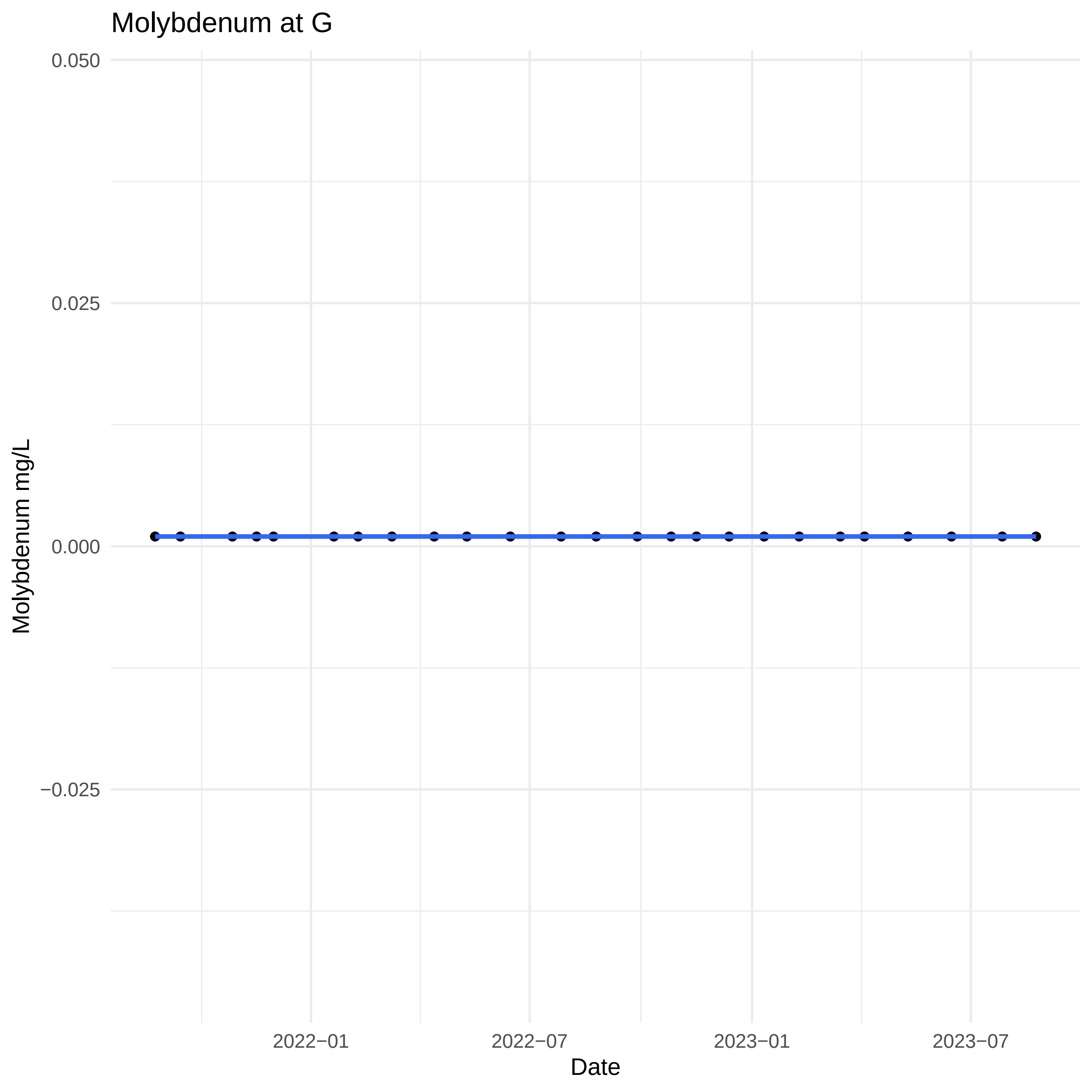
Mercury at WX22
5.00e−05
4.75e−05
4.50e−05
4.25e−05
4.00e−05
Mercury mg/L
2022−01
2022−07
2023−01
2023−07
Date

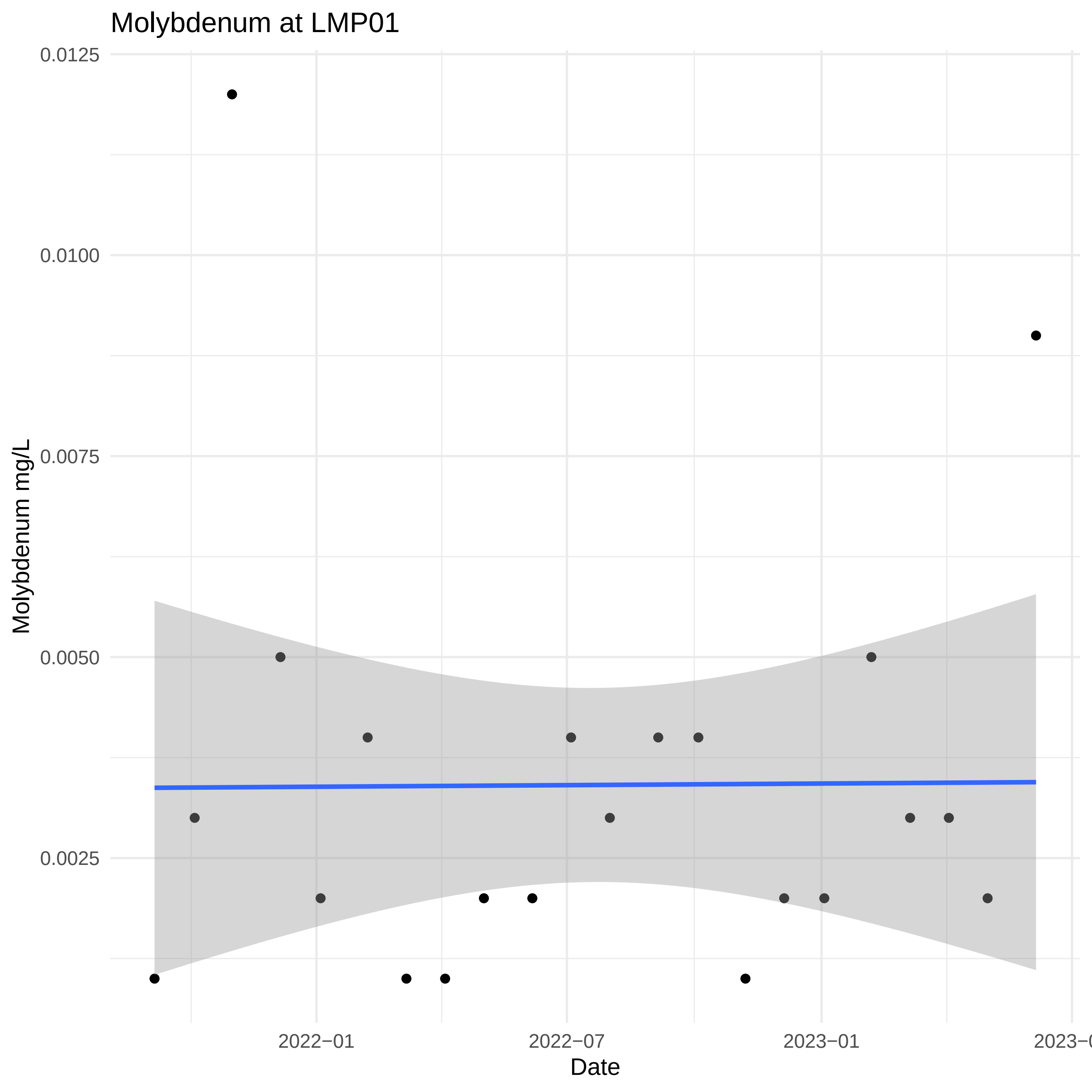


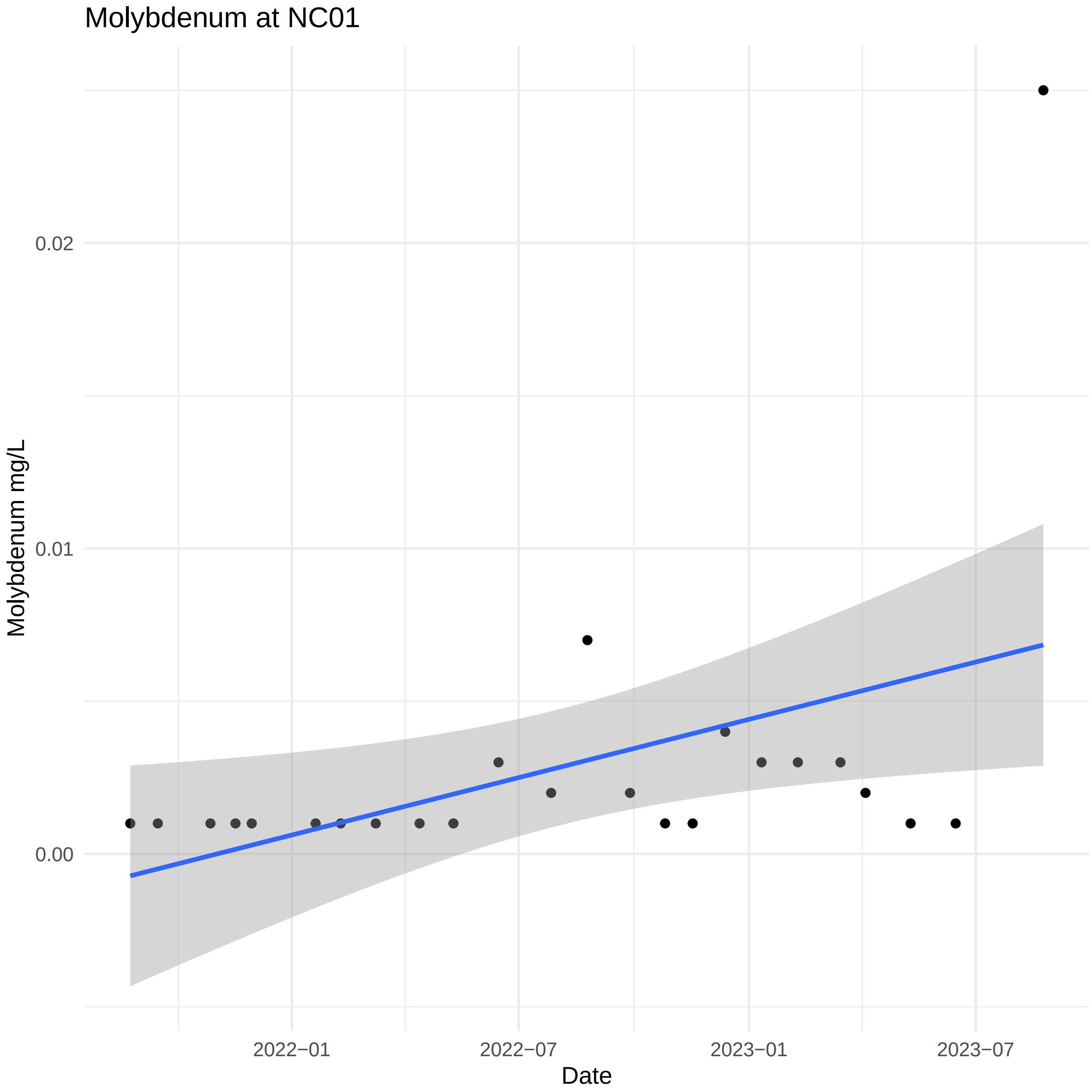
Molybdenum at C
Molybdenum mg/L
0.015
0.010
0.005
0.000
2022−01
2022−07
2023−01
2023−07
Date

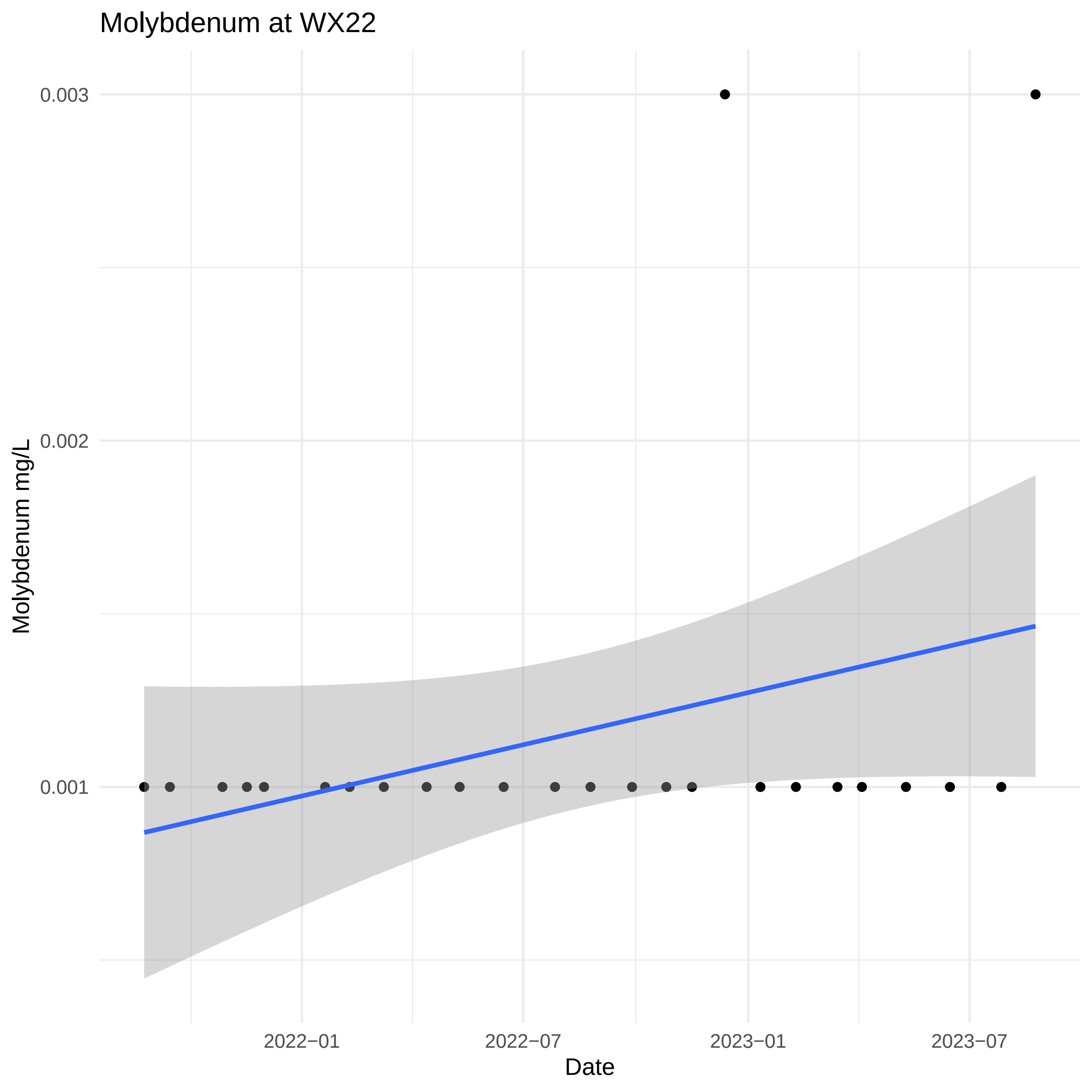


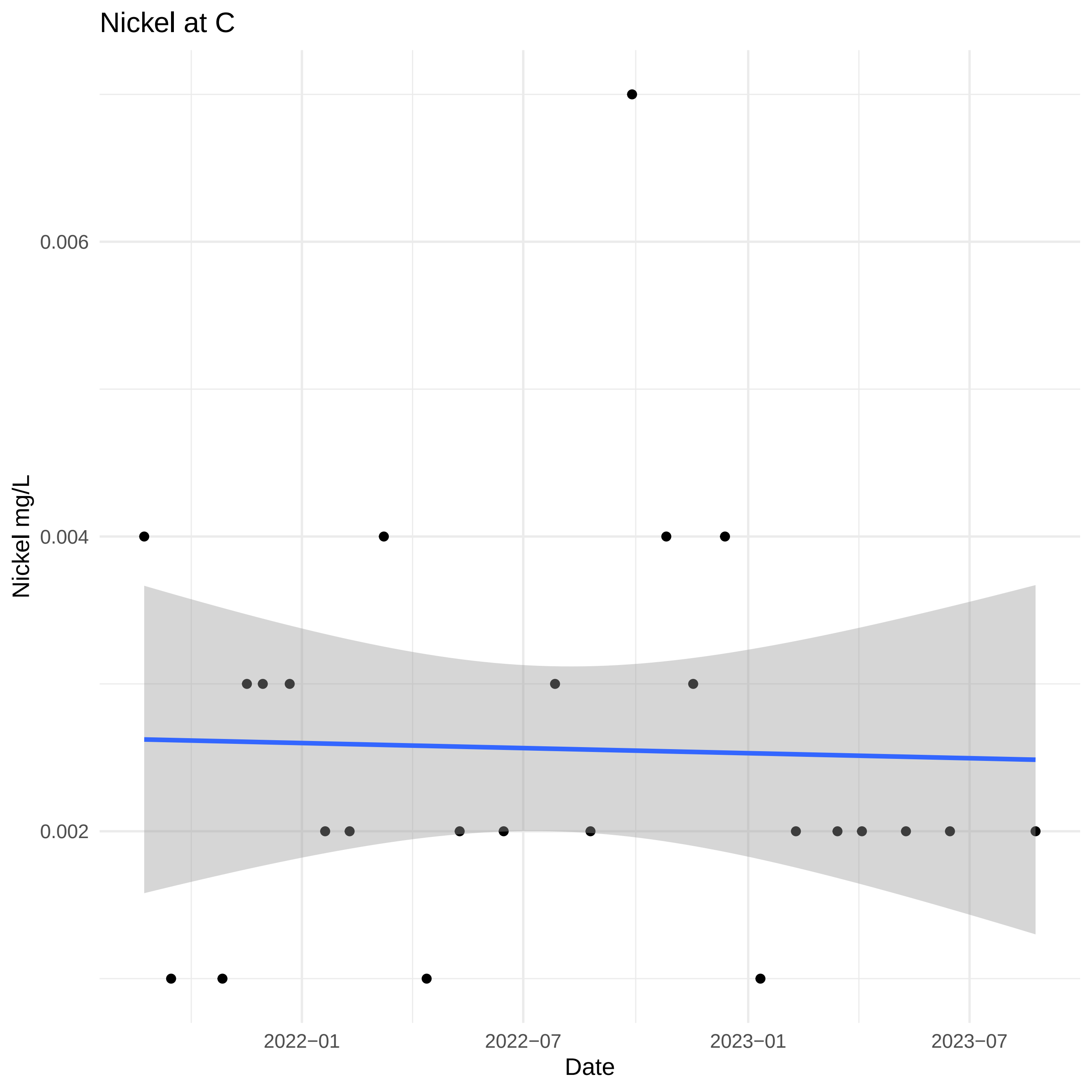
Molybdenum at E
0.0018
0.0015
0.0012
0.0009
Molybdenum mg/L
2022−01
2022−07
2023−01
2023−07
Date


Molybdenum at G
0.050
0.025
0.000
−0.025
Molybdenum mg/L
2022−01
2022−07
2023−01
2023−07
Date

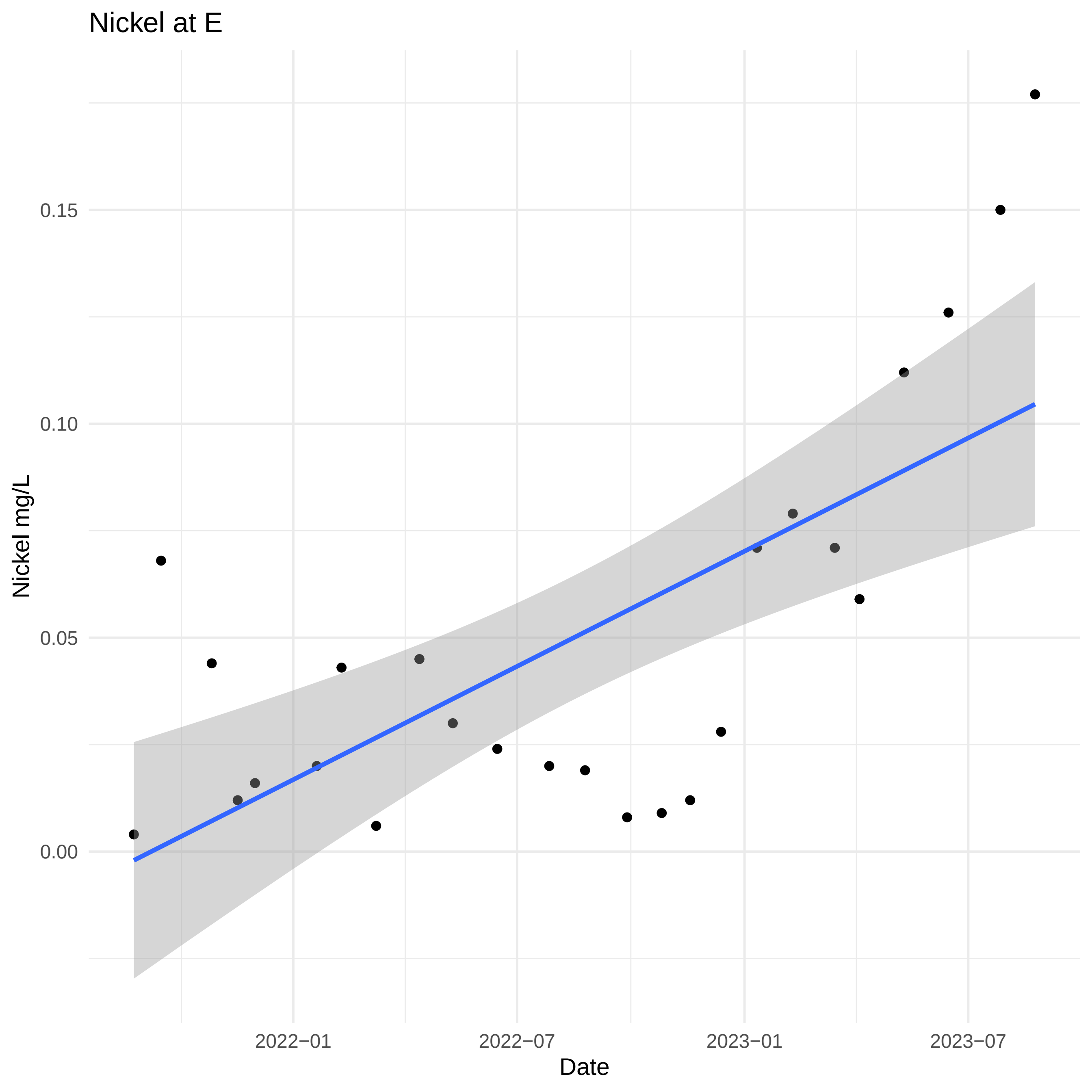

Molybdenum at LMP01
0.0125
0.0100
0.0075
0.0050
0.0025
Molybdenum mg/L
2022−01
2022−07
2023−01
2023−0
Date


Molybdenum at NC01
Molybdenum mg/L
0.02
0.01
0.00
2022−01
2022−07
2023−01
2023−07
Date

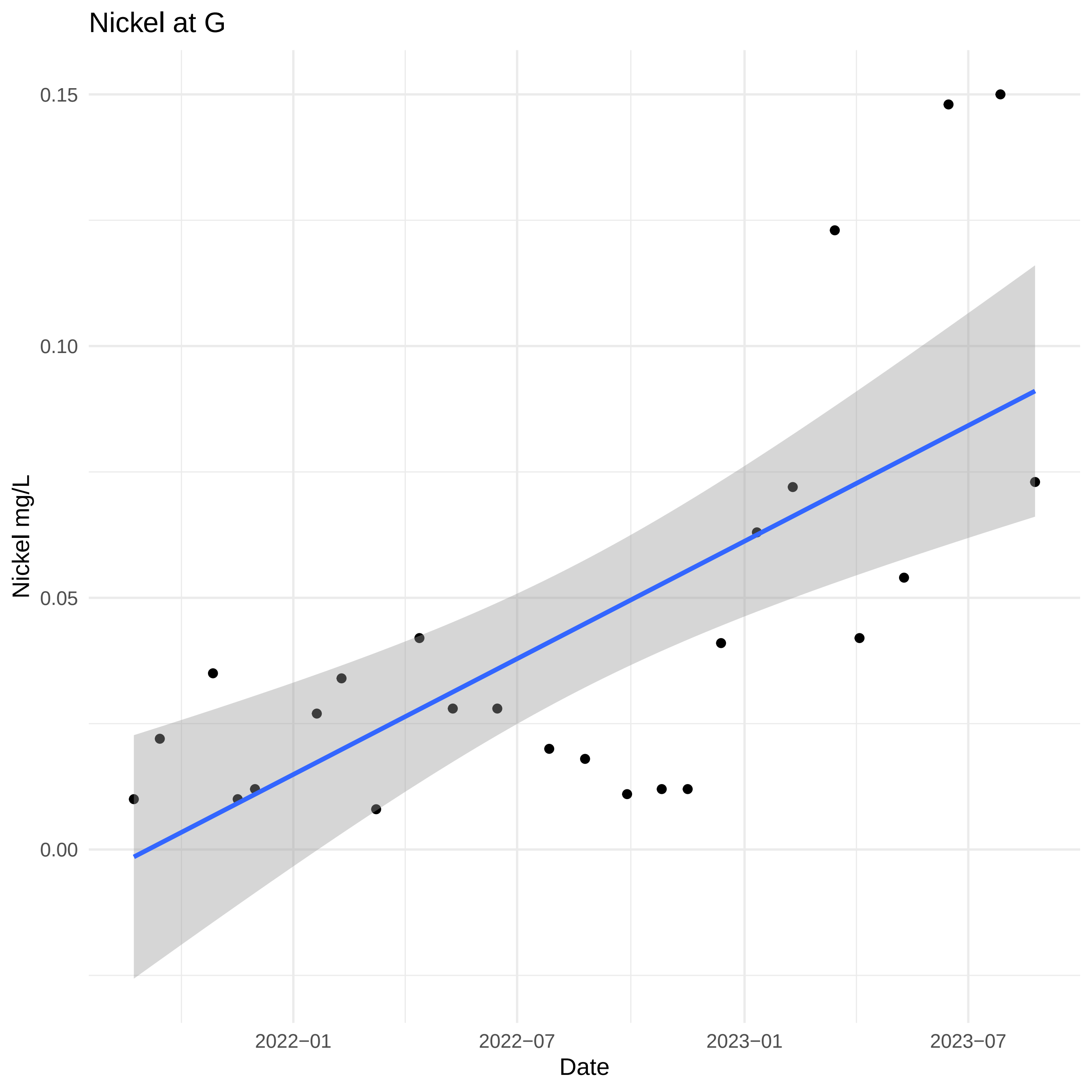

Molybdenum at WX22
0.003
0.002
0.001
Molybdenum mg/L
2022−01
2022−07
2023−01
2023−07
Date



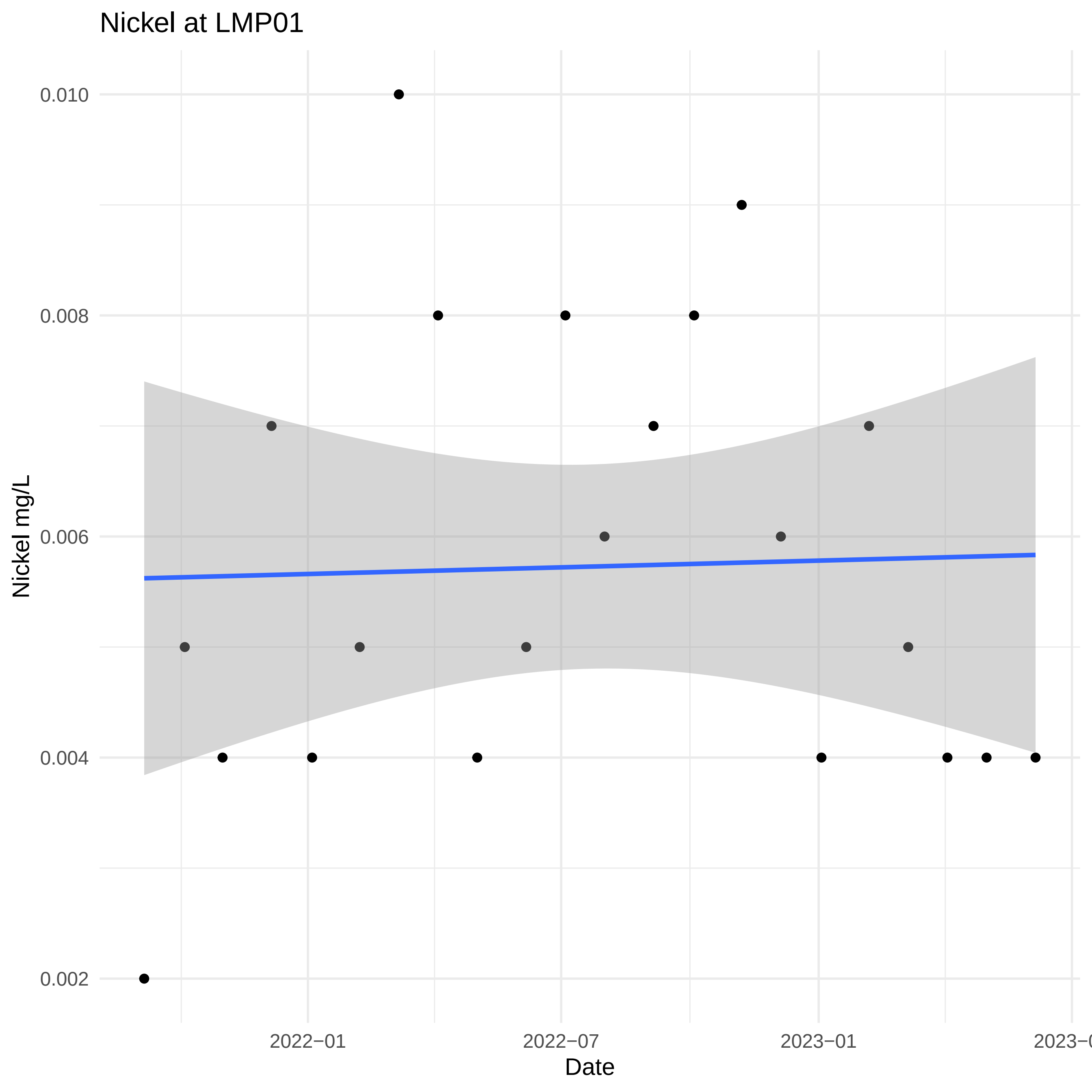
Nickel at C
Nickel mg/L
0.006
0.004
0.002
2022−01
2022−07
2023−01
2023−07
Date



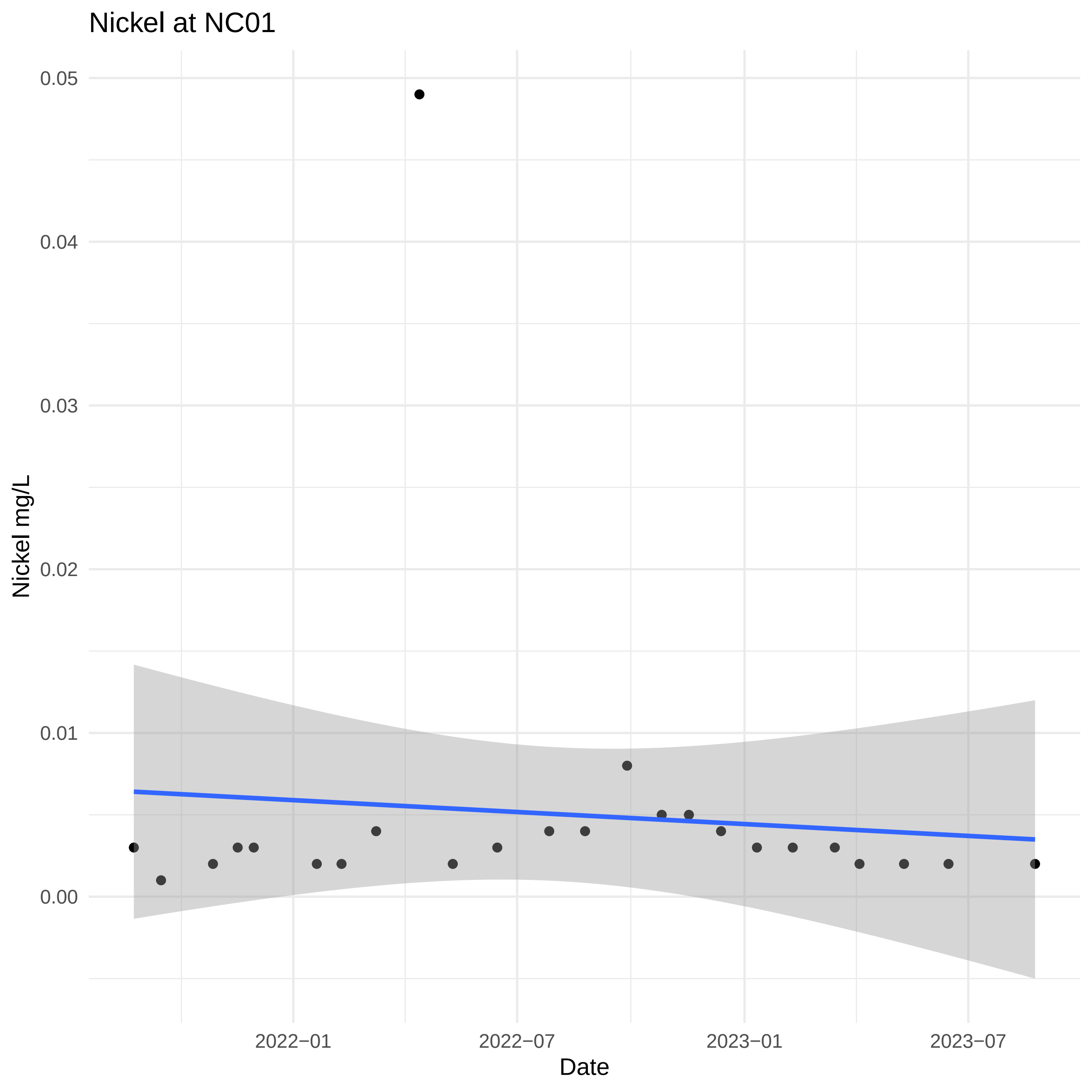
Nickel at E
0.15
0.10
0.05
0.00
Nickel mg/L
2022−01
2022−07
2023−01
2023−07
Date



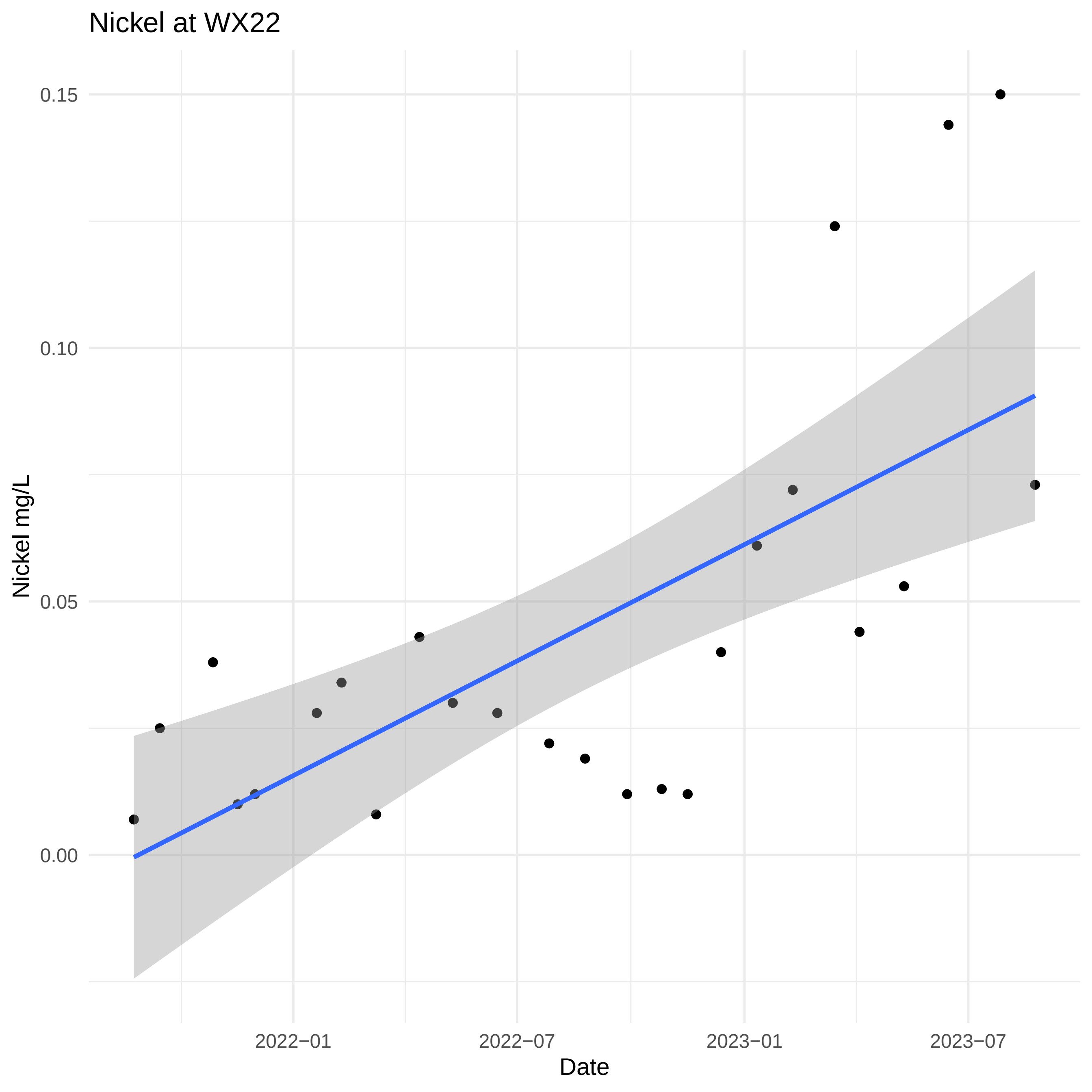
Nickel at G
0.15
0.10
0.05
0.00
Nickel mg/L
2022−01
2022−07
2023−01
2023−07
Date



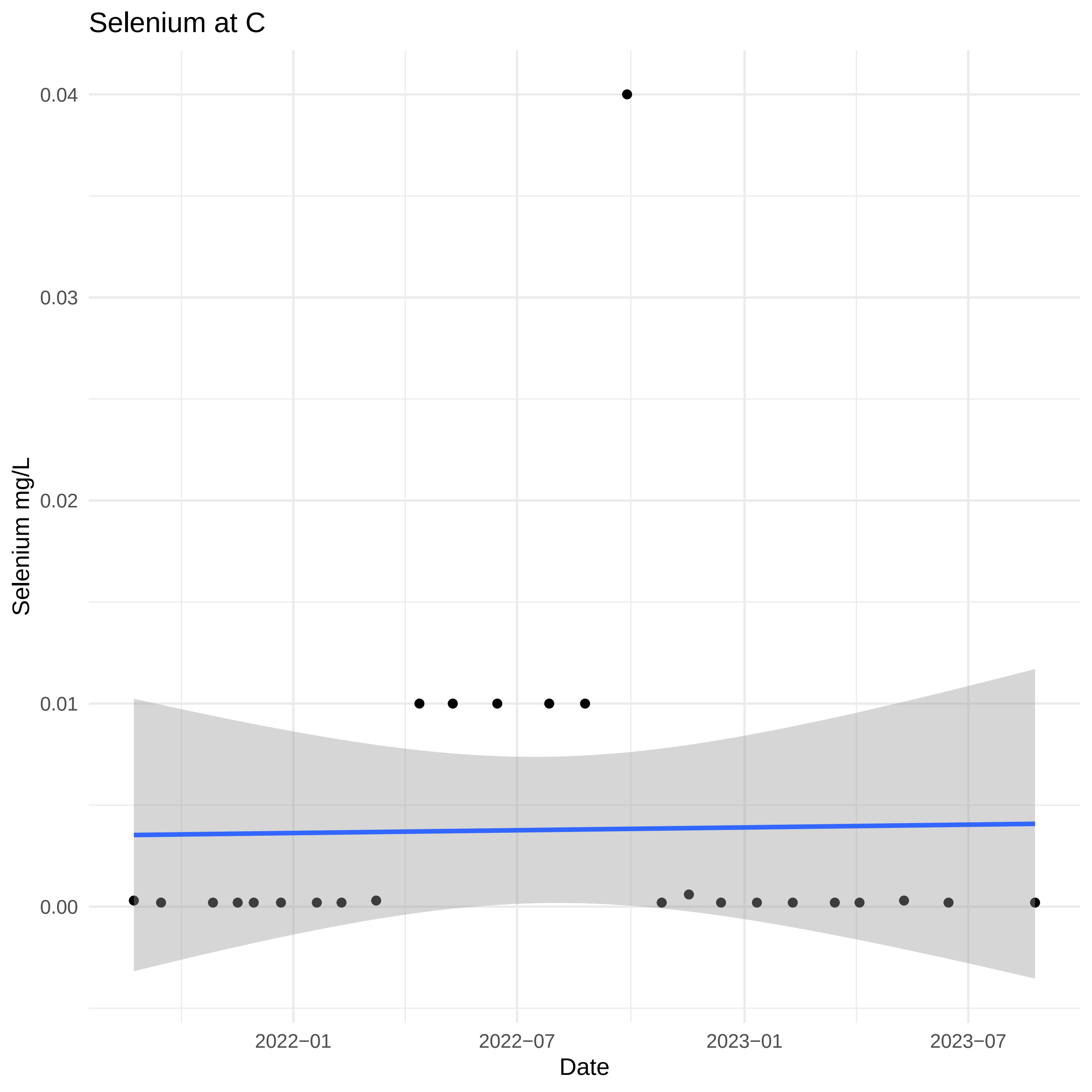
Nickel at LMP01
Nickel mg/L
0.010
0.008
0.006
0.004
0.002
2022−01
2022−07
2023−01
Date



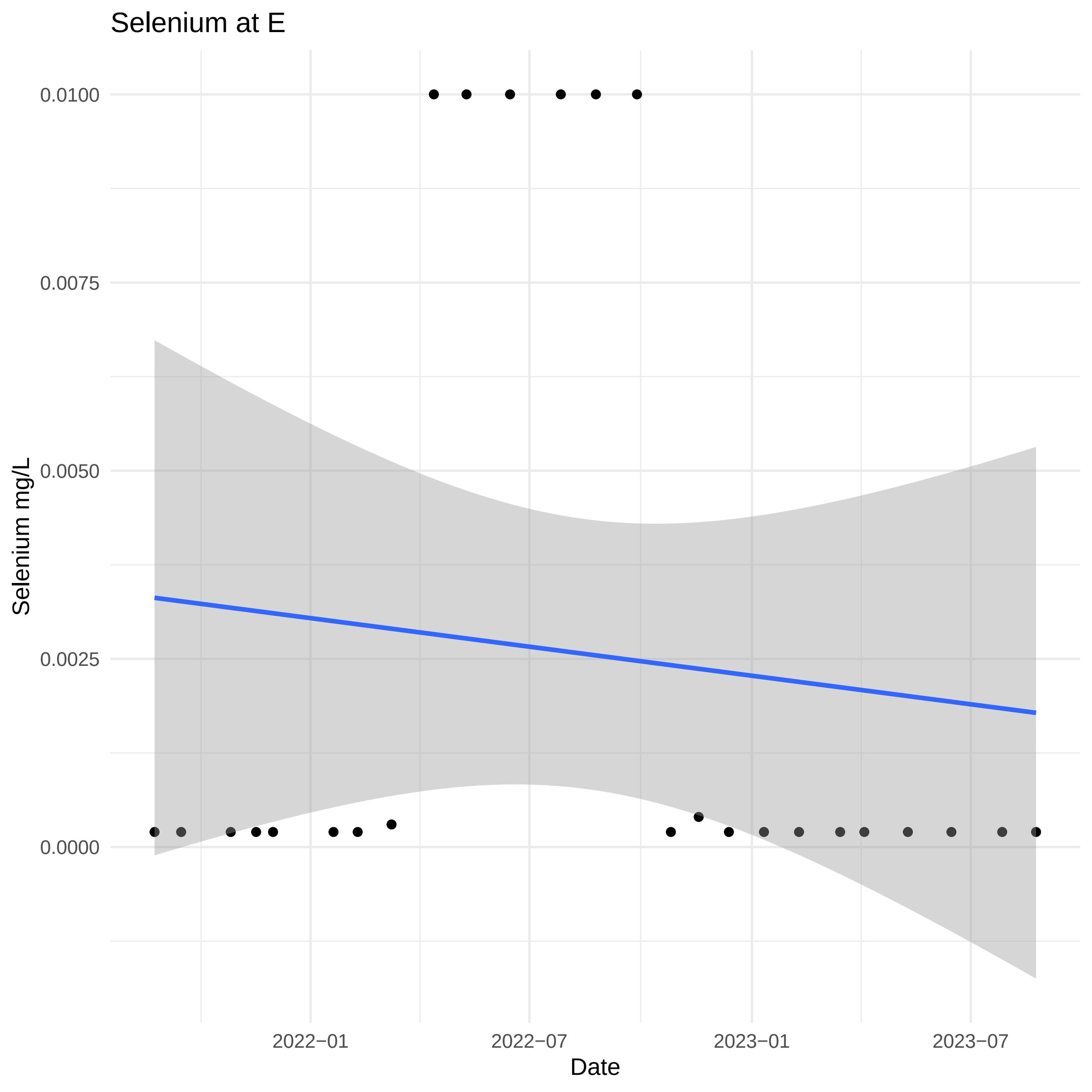
Nickel at NC01
Nickel mg/L
0.05
0.04
0.03
0.02
0.01
0.00
2022−01
2022−07
2023−01
2023−07
Date



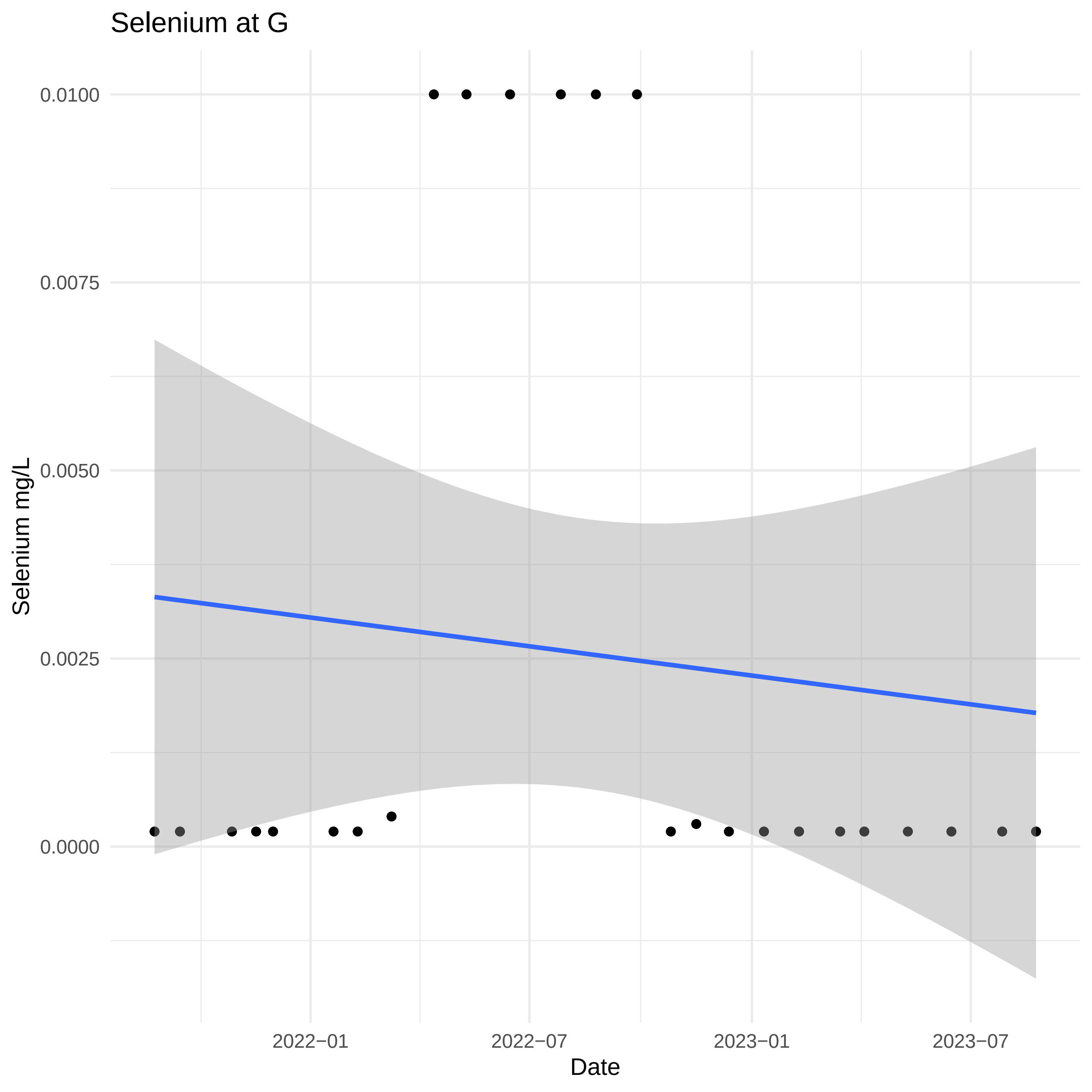
Nickel at WX22
0.15
0.10
0.05
0.00
Nickel mg/L
2022−01
2022−07
2023−01
2023−07
Date

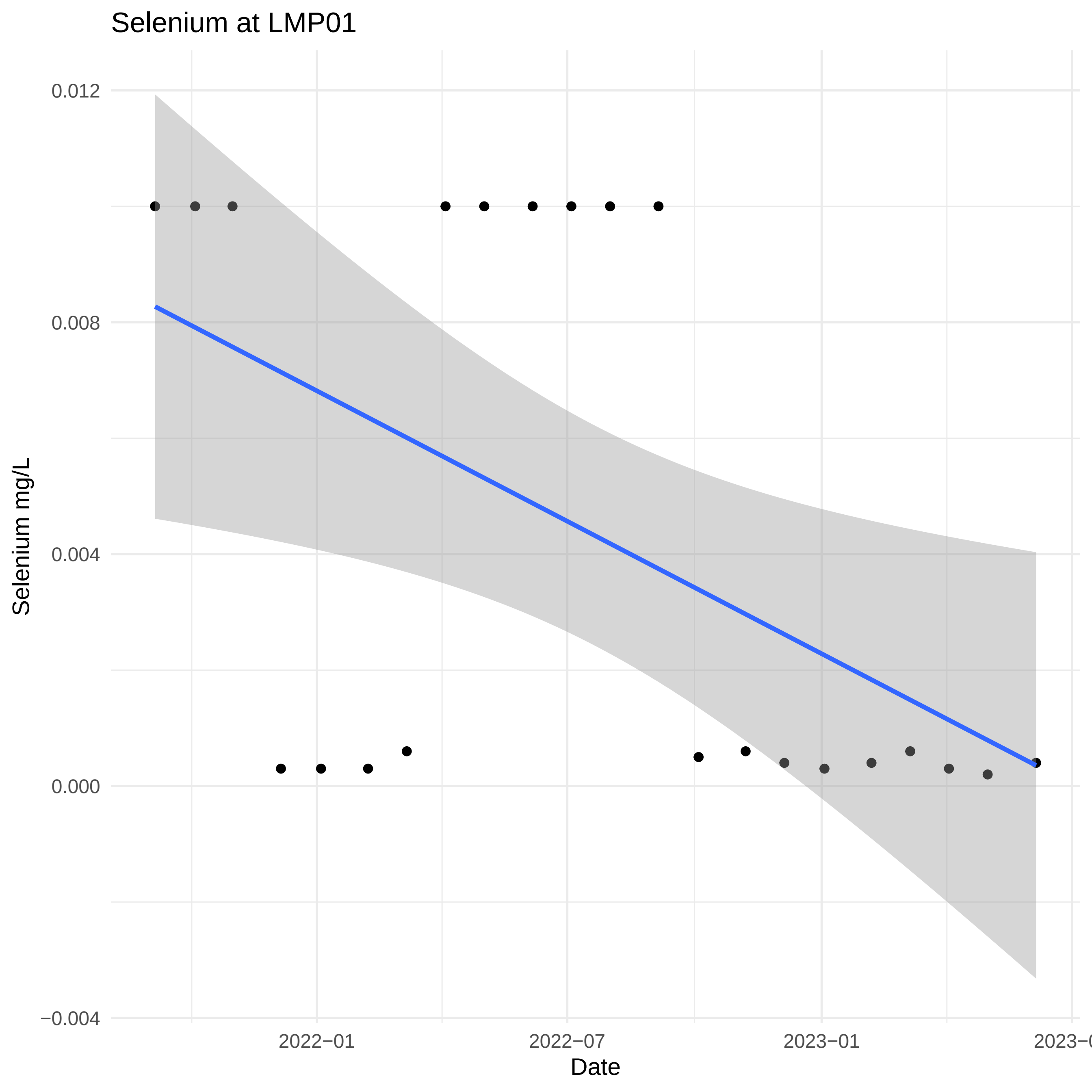


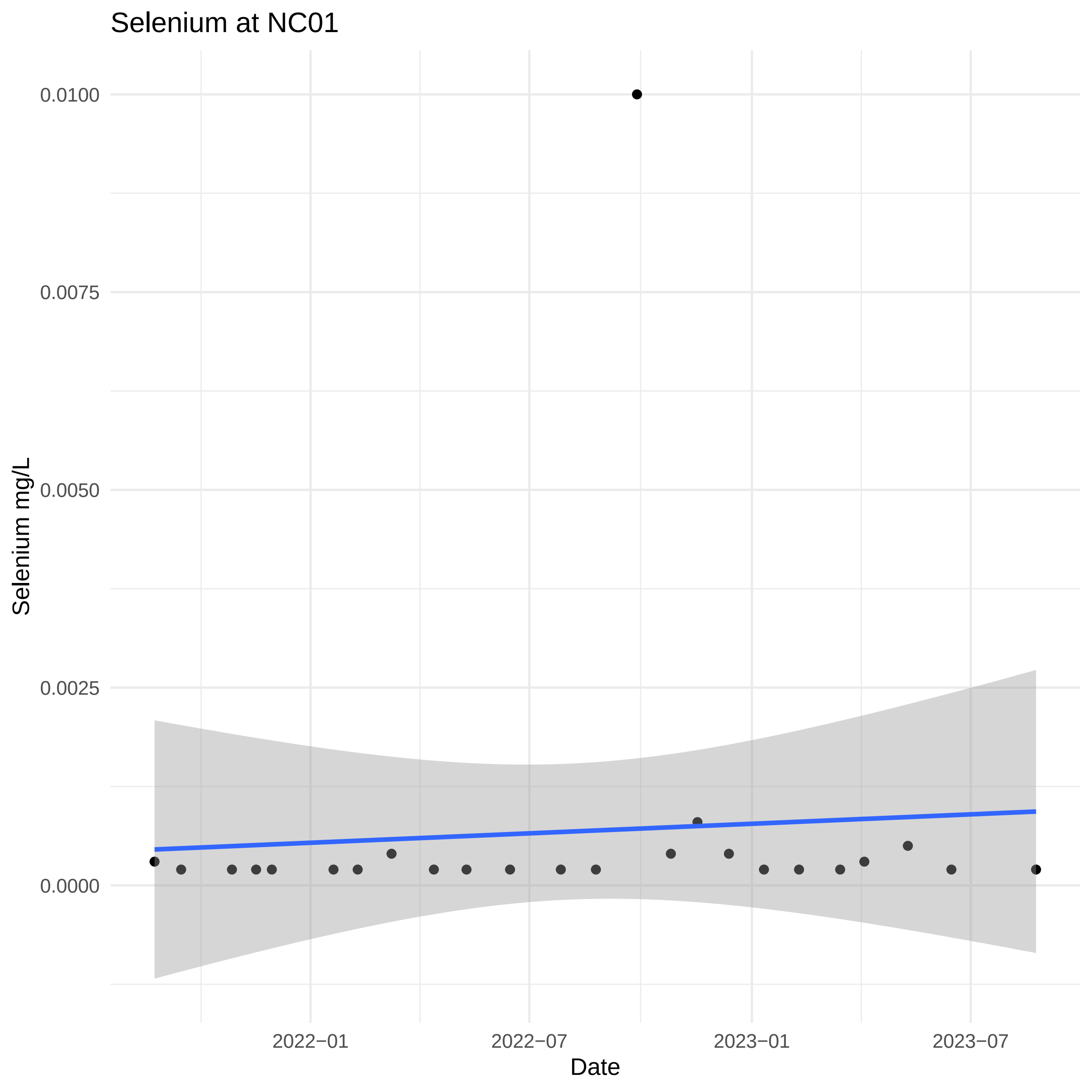
Selenium at C
Selenium mg/L
0.04
0.03
0.02
0.01
0.00
2022−01
2022−07
2023−01
2023−07
Date



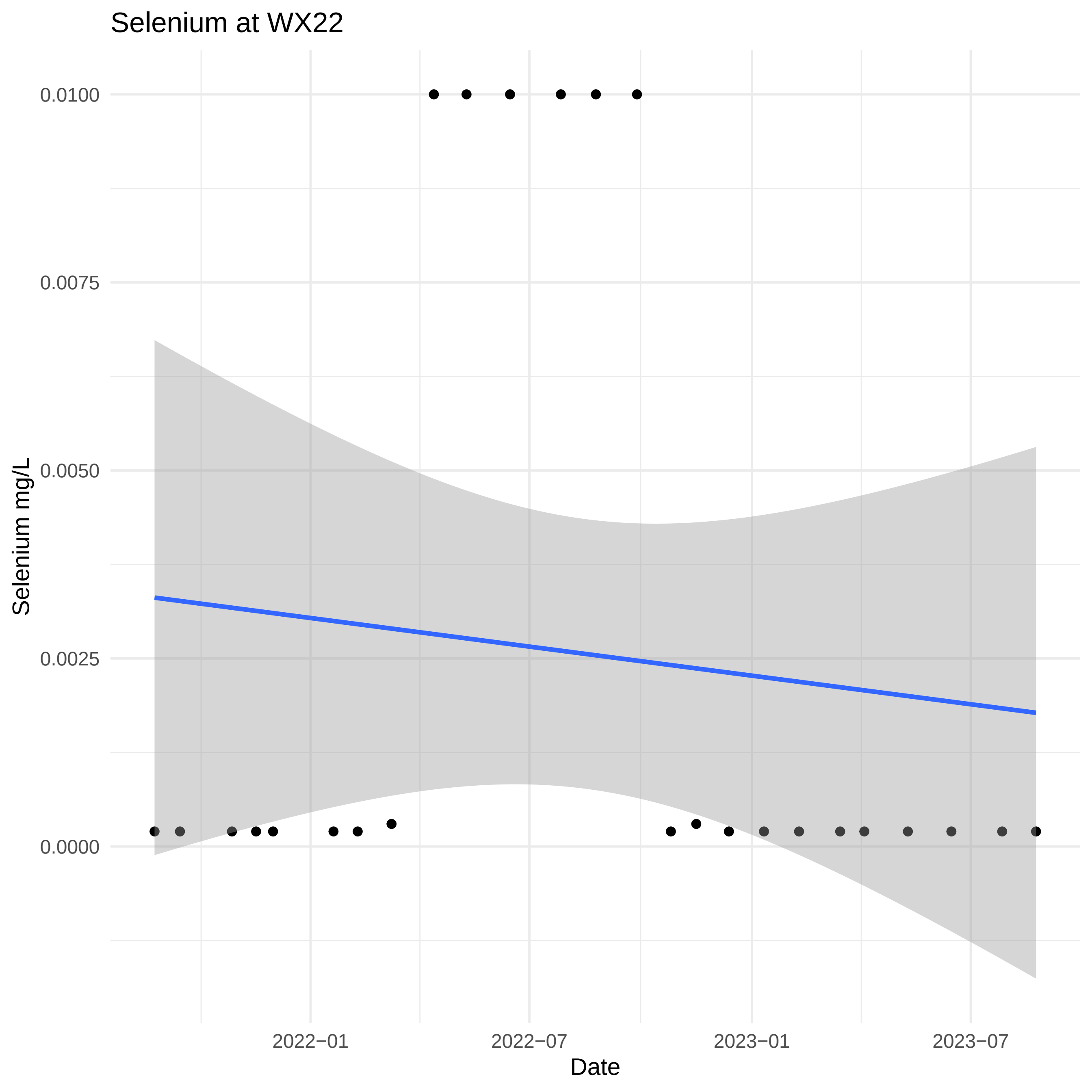
Selenium at E
Selenium mg/L
0.0100
0.0075
0.0050
0.0025
0.0000
2022−01
2022−07
2023−01
2023−07
Date


Selenium at G
0.0100
0.0075
0.0050
0.0025
0.0000
Selenium mg/L
2022−01
2022−07
2023−01
2023−07
Date

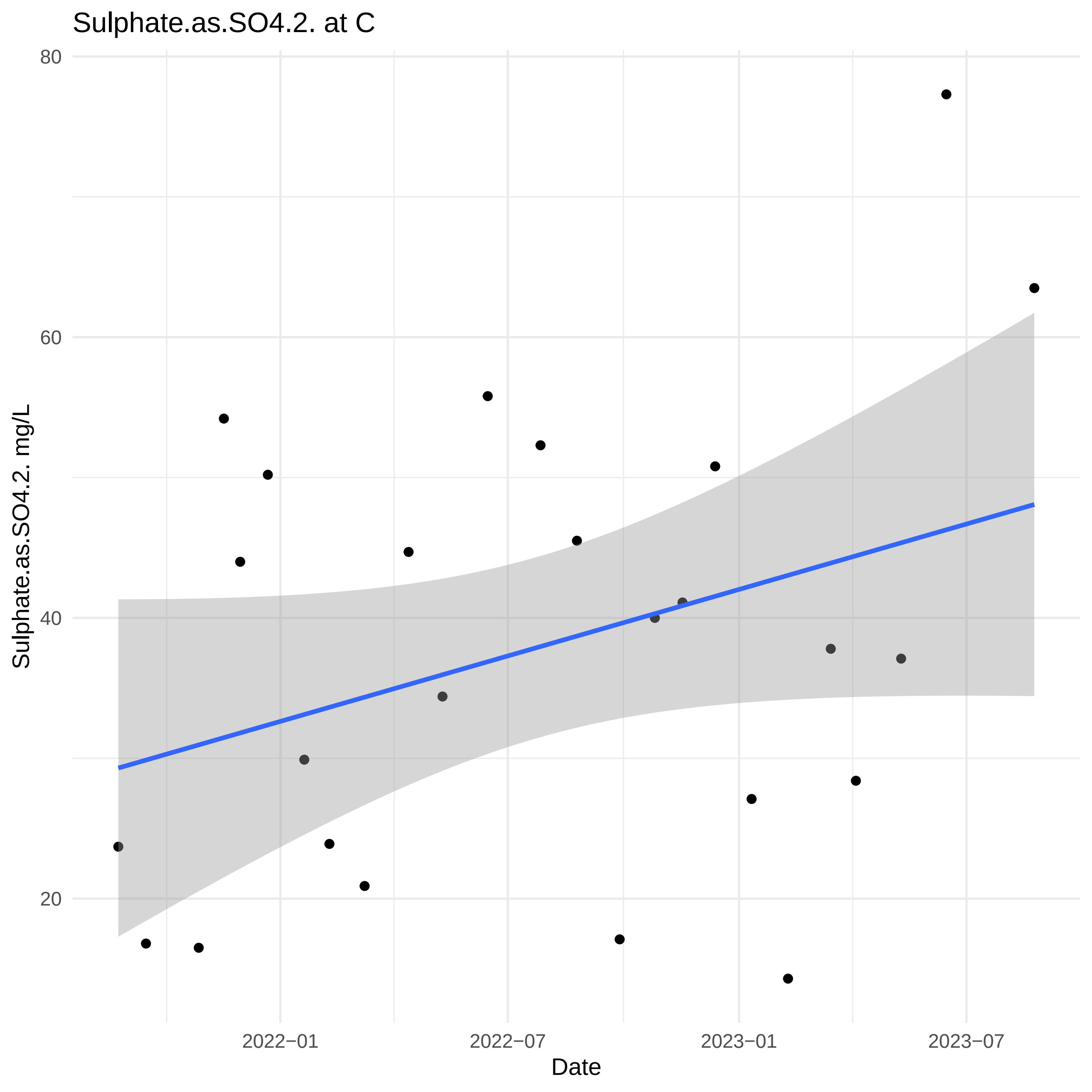

Selenium at LMP01
0.012
0.008
0.004
0.000
−0.004
Selenium mg/L
2022−01
2022−07
2023−01
2023−0
Date



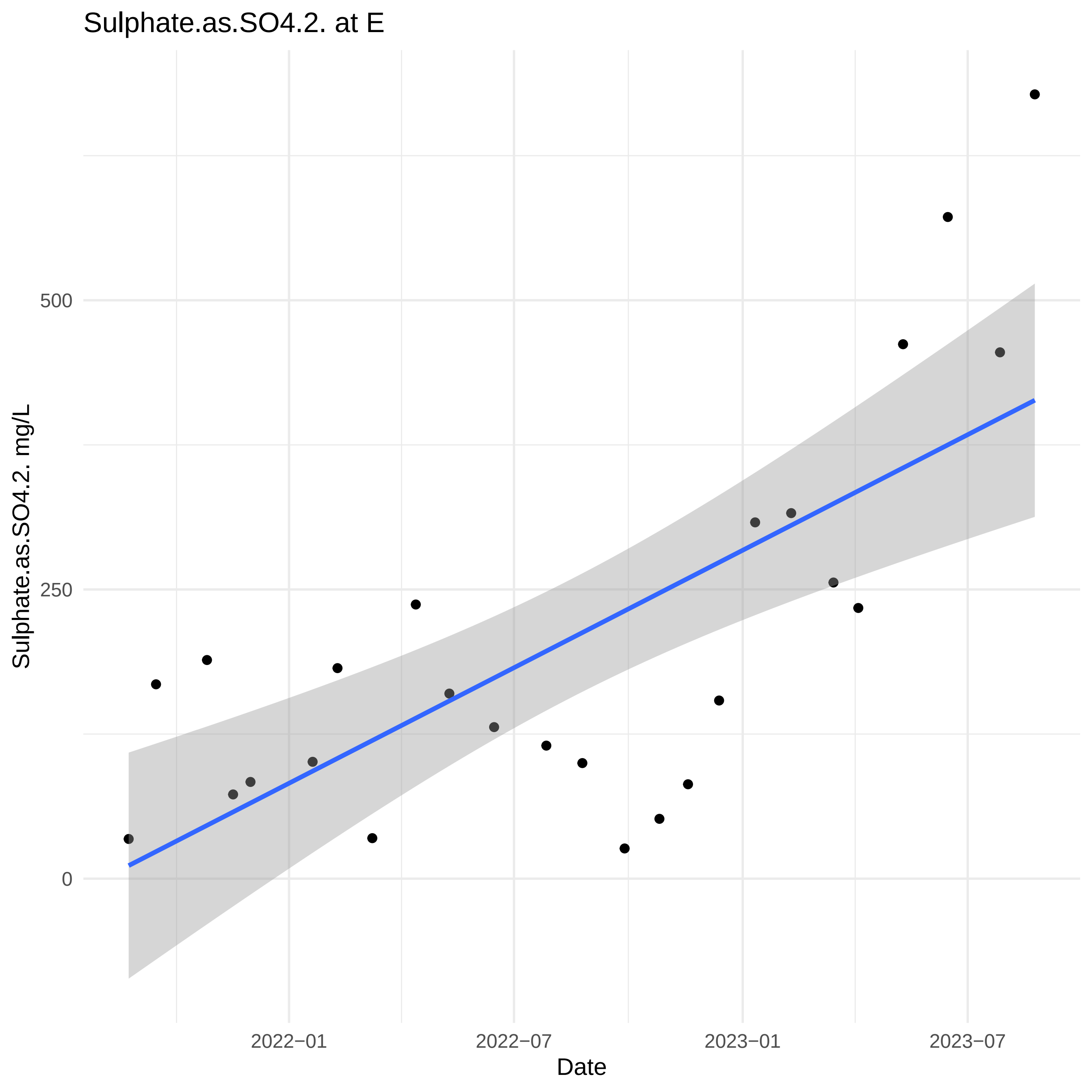
Selenium at NC01
0.0100
0.0075
0.0050
0.0025
0.0000
Selenium mg/L
2022−01
2022−07
2023−01
2023−07
Date



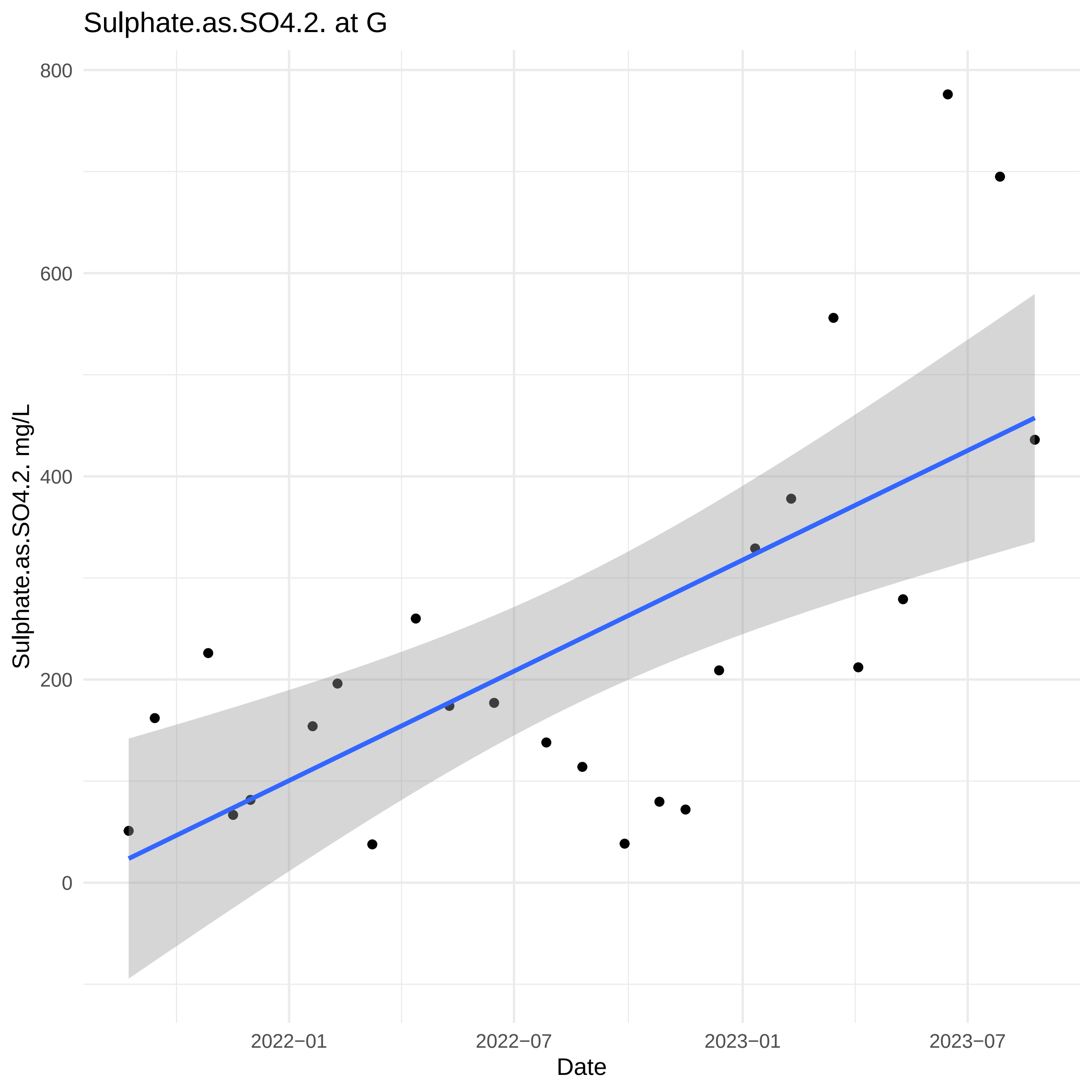
Selenium at WX22
0.0100
0.0075
0.0050
0.0025
0.0000
Selenium mg/L
2022−01
2022−07
2023−01
2023−07
Date



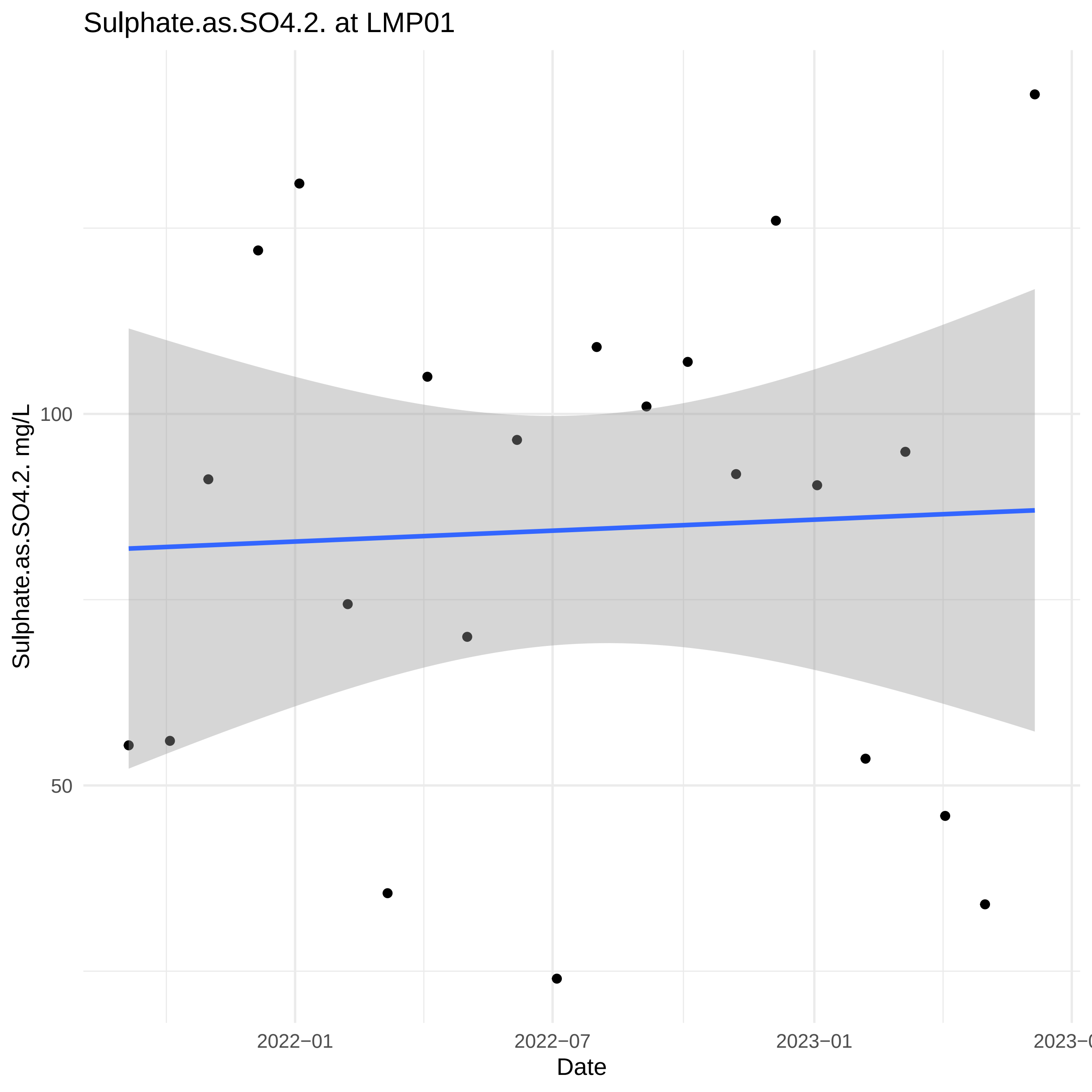
Sulphate.as.SO4.2. at C
80
60
40
20
Sulphate.as.SO4.2. mg/L
2022−01
2022−07
2023−01
2023−07
Date



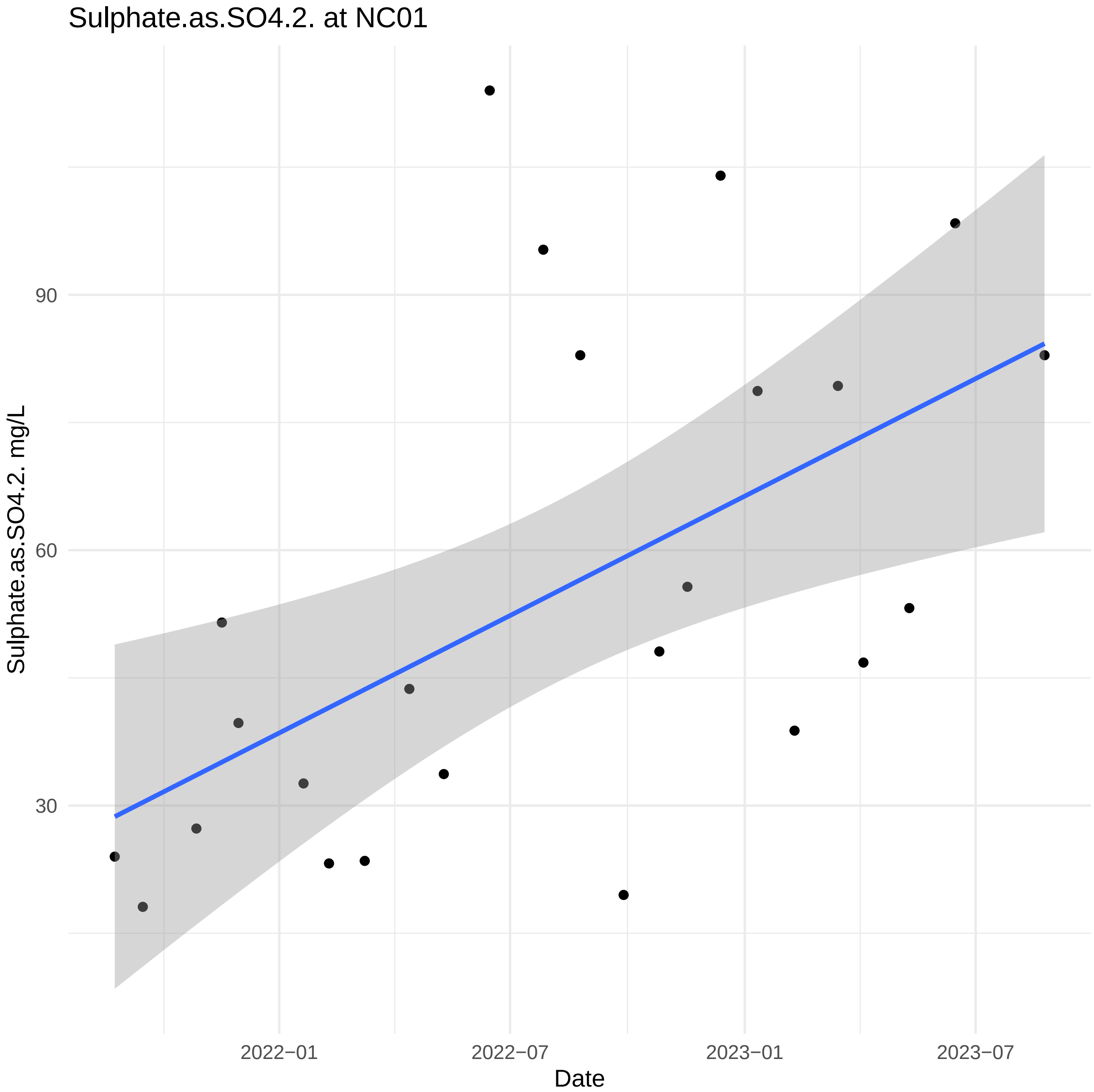
Sulphate.as.SO4.2. at E
Sulphate.as.SO4.2. mg/L
500
250
0
2022−01
2022−07
2023−01
2023−07
Date



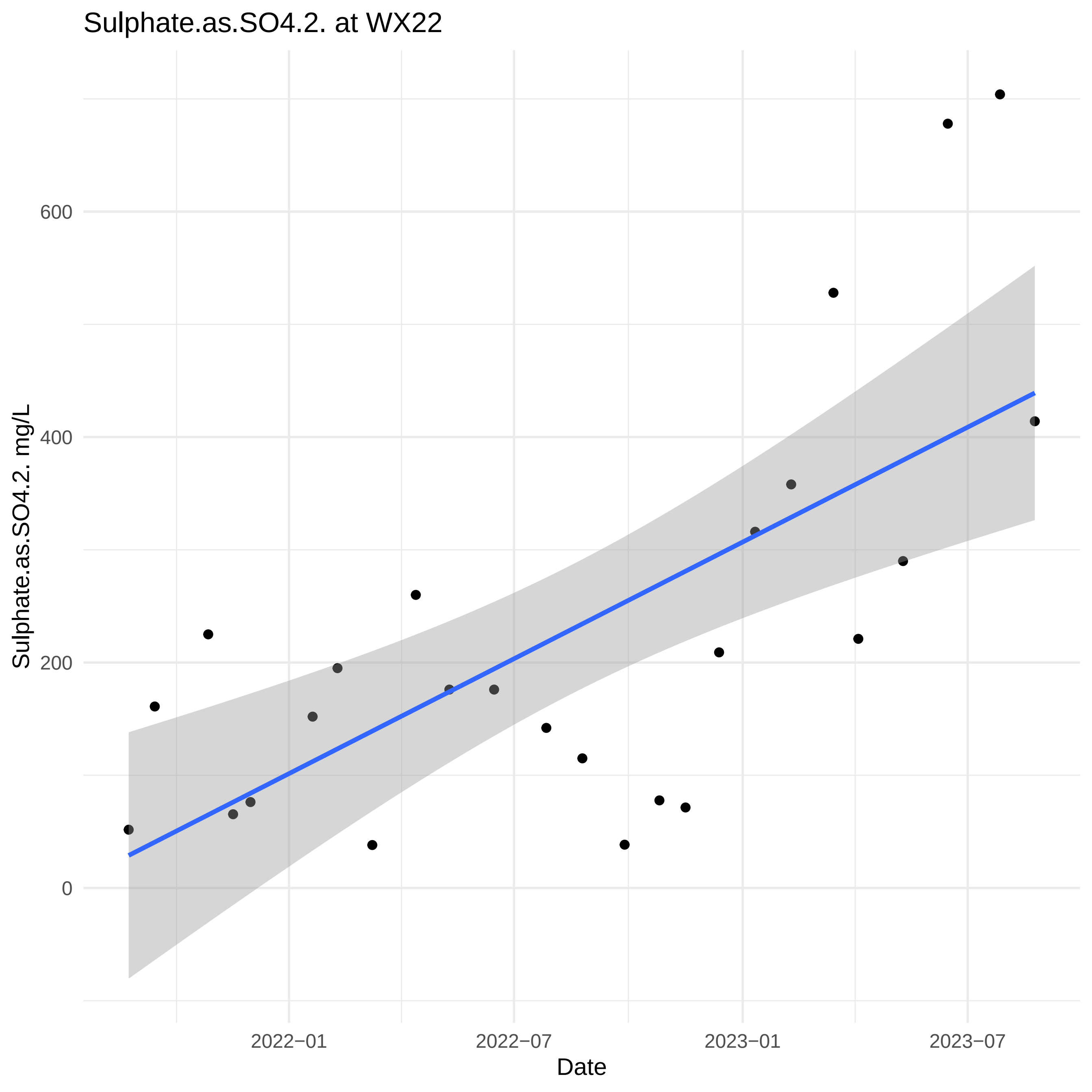
Sulphate.as.SO4.2. at G
800
600
400
200
0
Sulphate.as.SO4.2. mg/L
2022−01
2022−07
2023−01
2023−07
Date

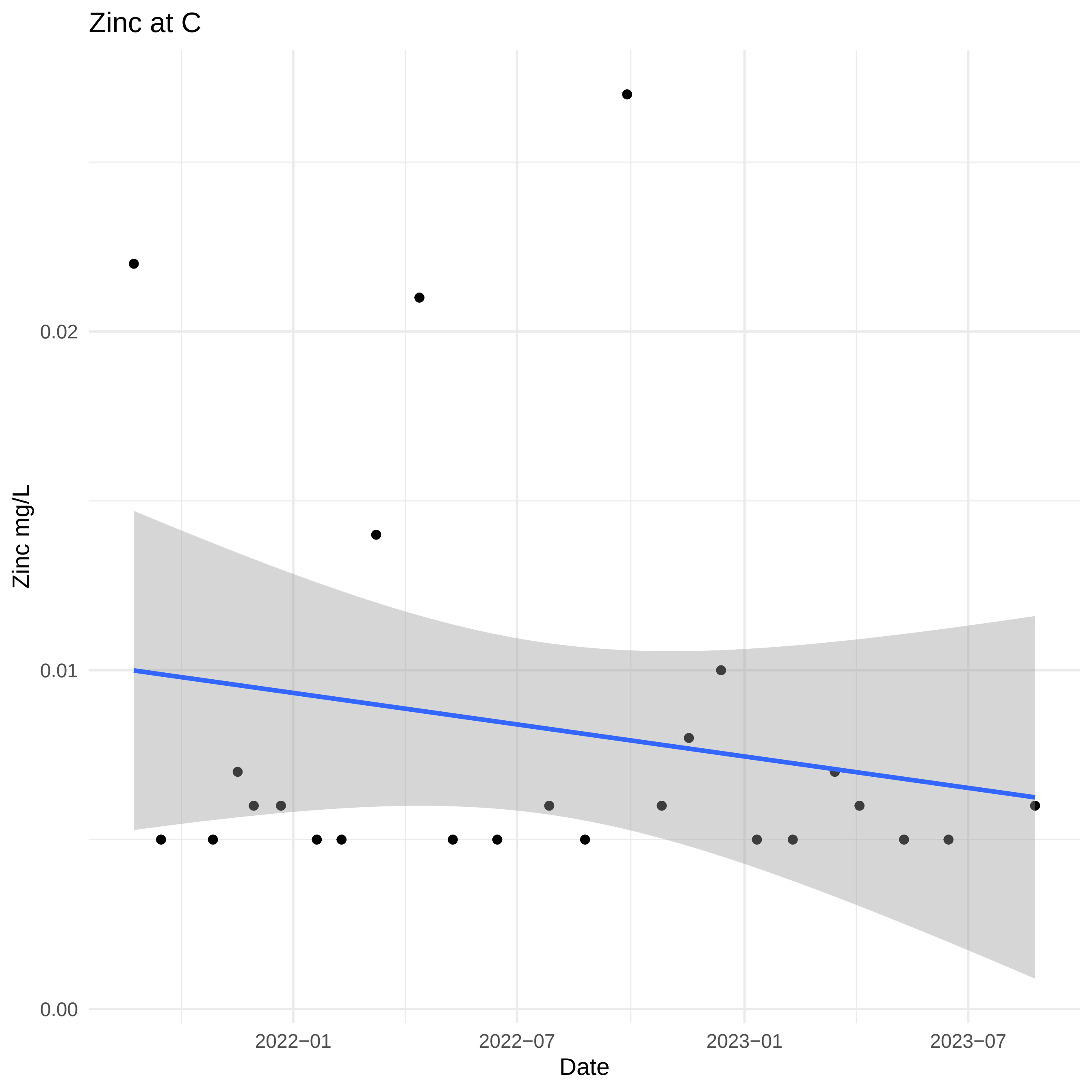


Sulphate.as.SO4.2. at LMP01
Sulphate.as.SO4.2. mg/L
100
50
2022−01
2022−07
2023−01
2023−0
Date

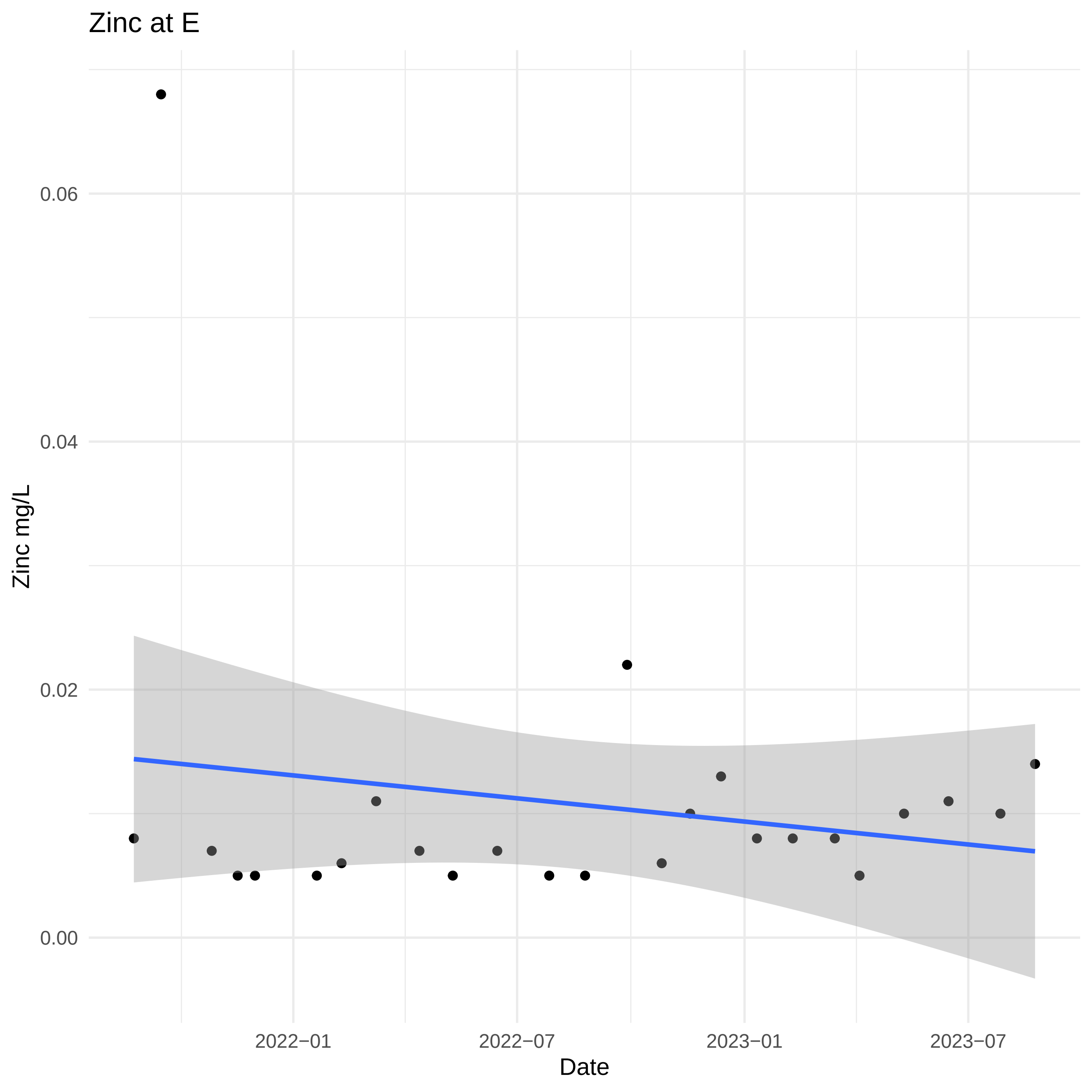


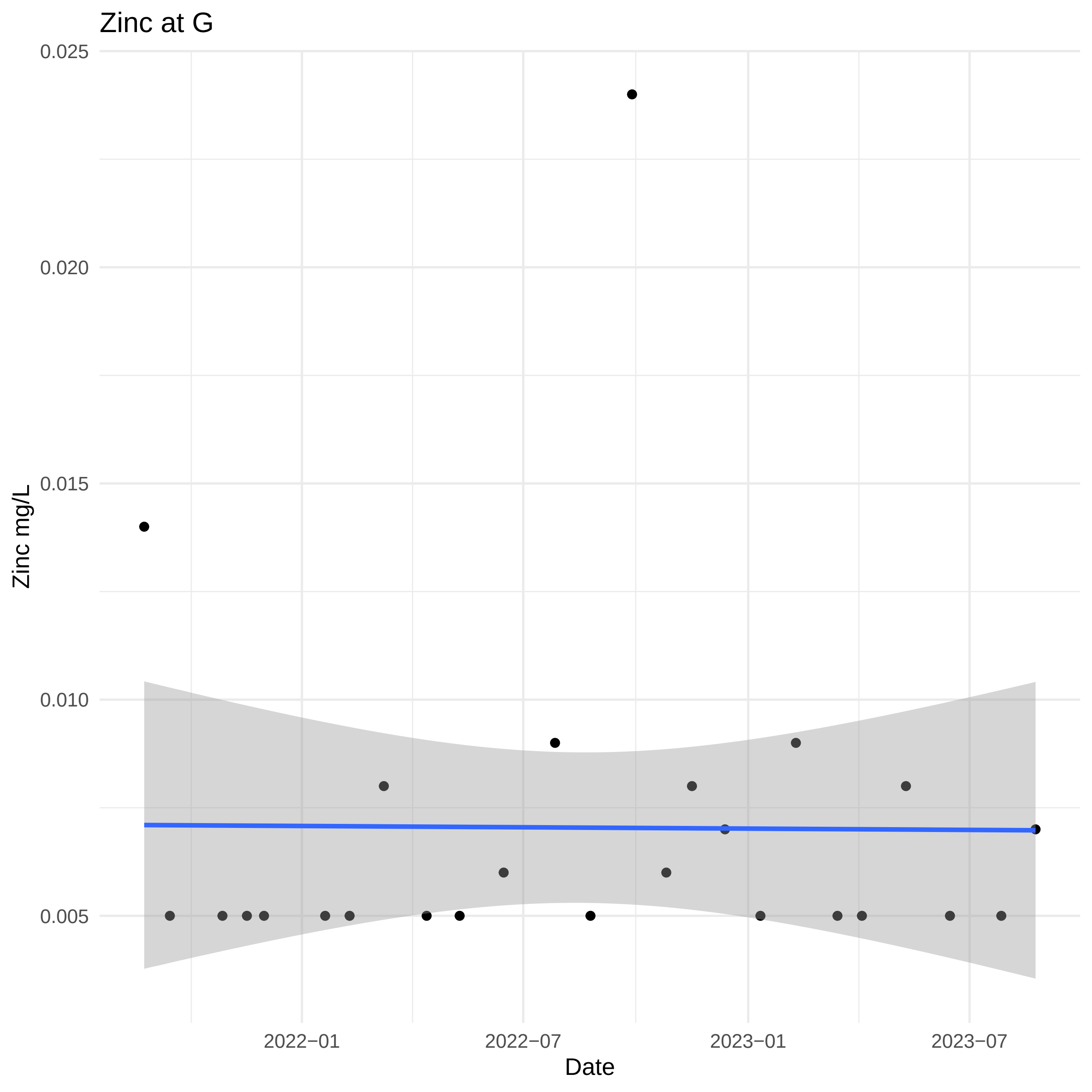
Sulphate.as.SO4.2. at NC01
Sulphate.as.SO4.2. mg/L
90
60
30
2022−01
2022−07
2023−01
2023−07
Date


Sulphate.as.SO4.2. at WX22
Sulphate.as.SO4.2. mg/L
600
400
200
0
2022−01
2022−07
2023−01
2023−07
Date

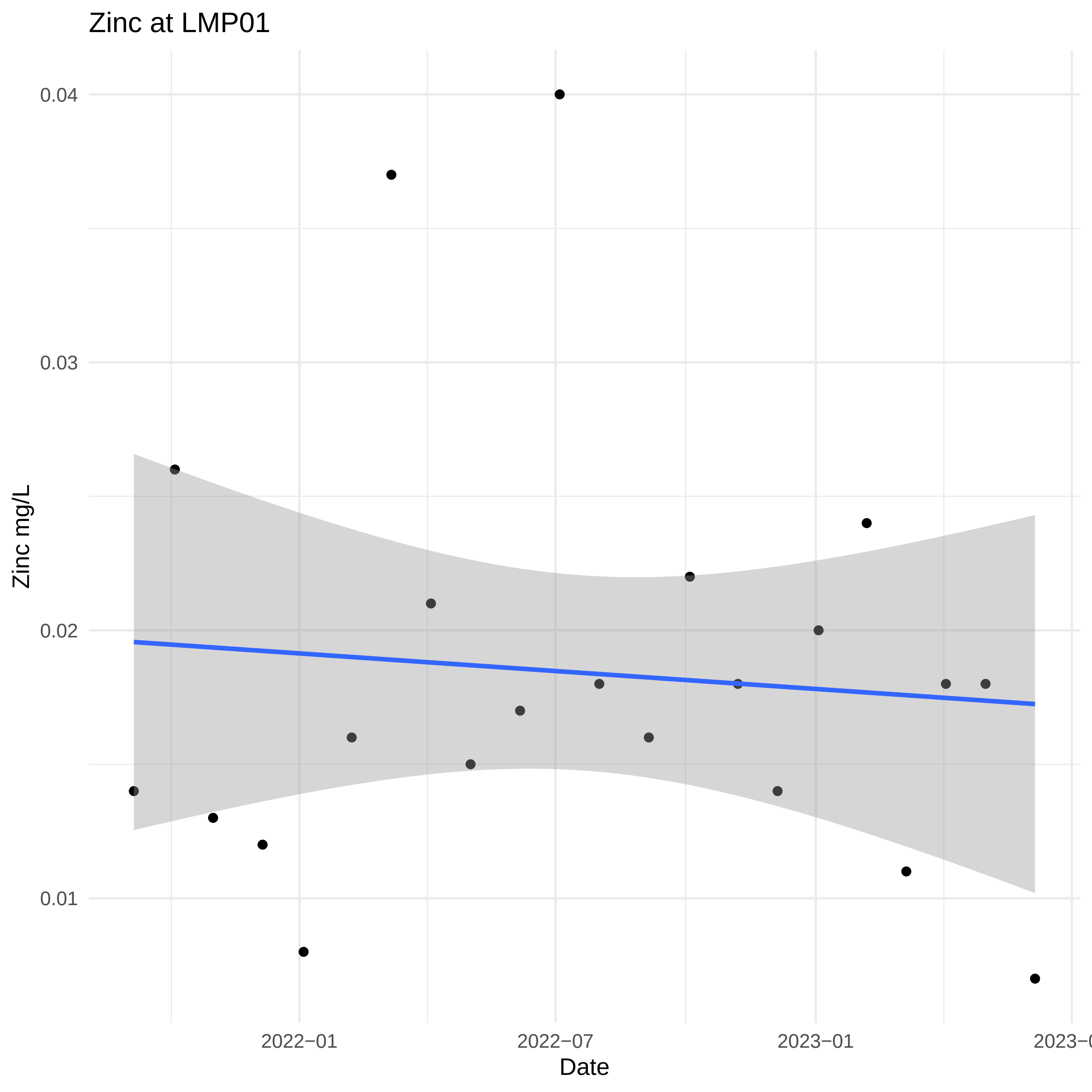


Zinc at C
Zinc mg/L
0.02
0.01
0.00
2022−01
2022−07
2023−01
2023−07
Date

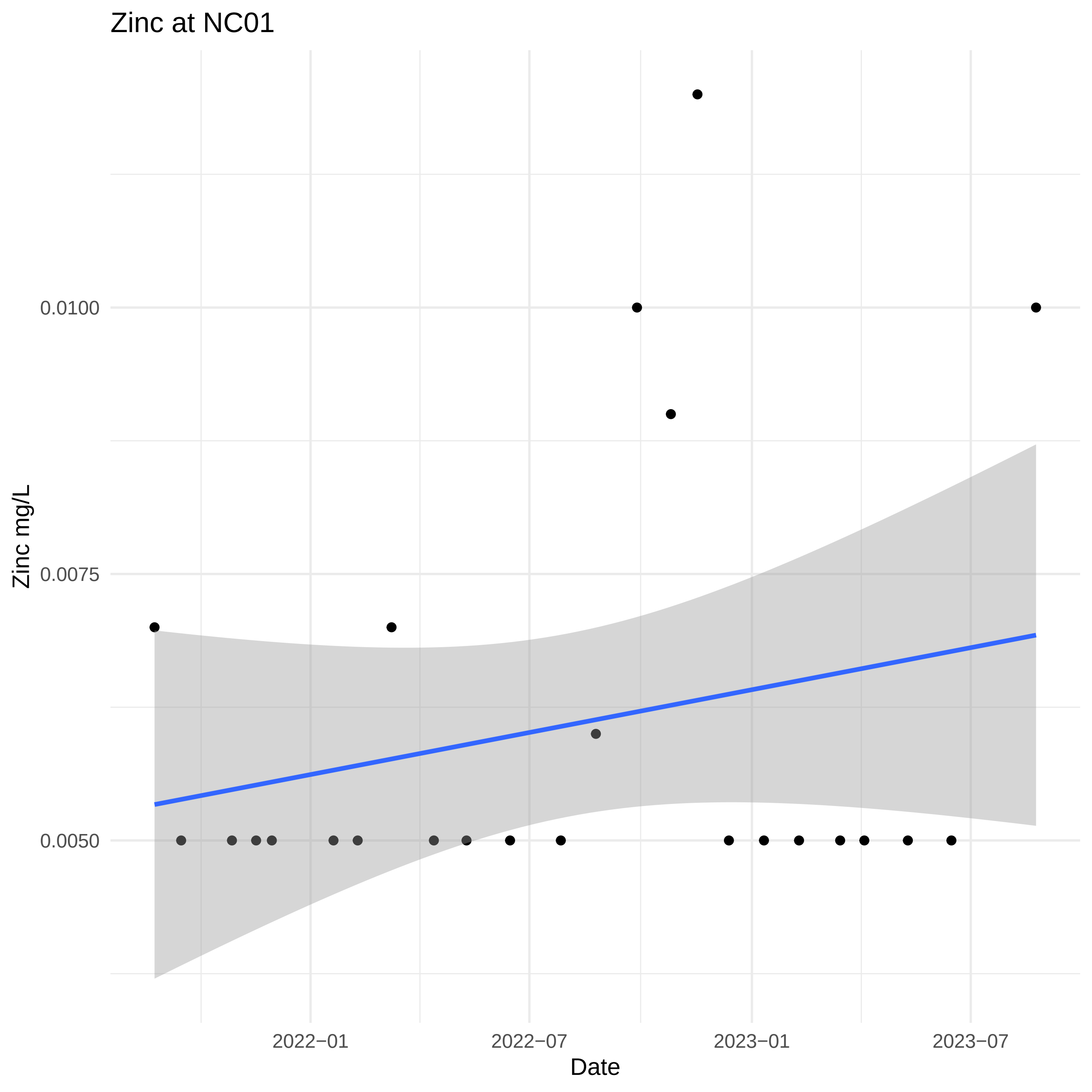

Zinc at E
0.06
0.04
0.02
0.00
Zinc mg/L
2022−01
2022−07
2023−01
2023−07
Date



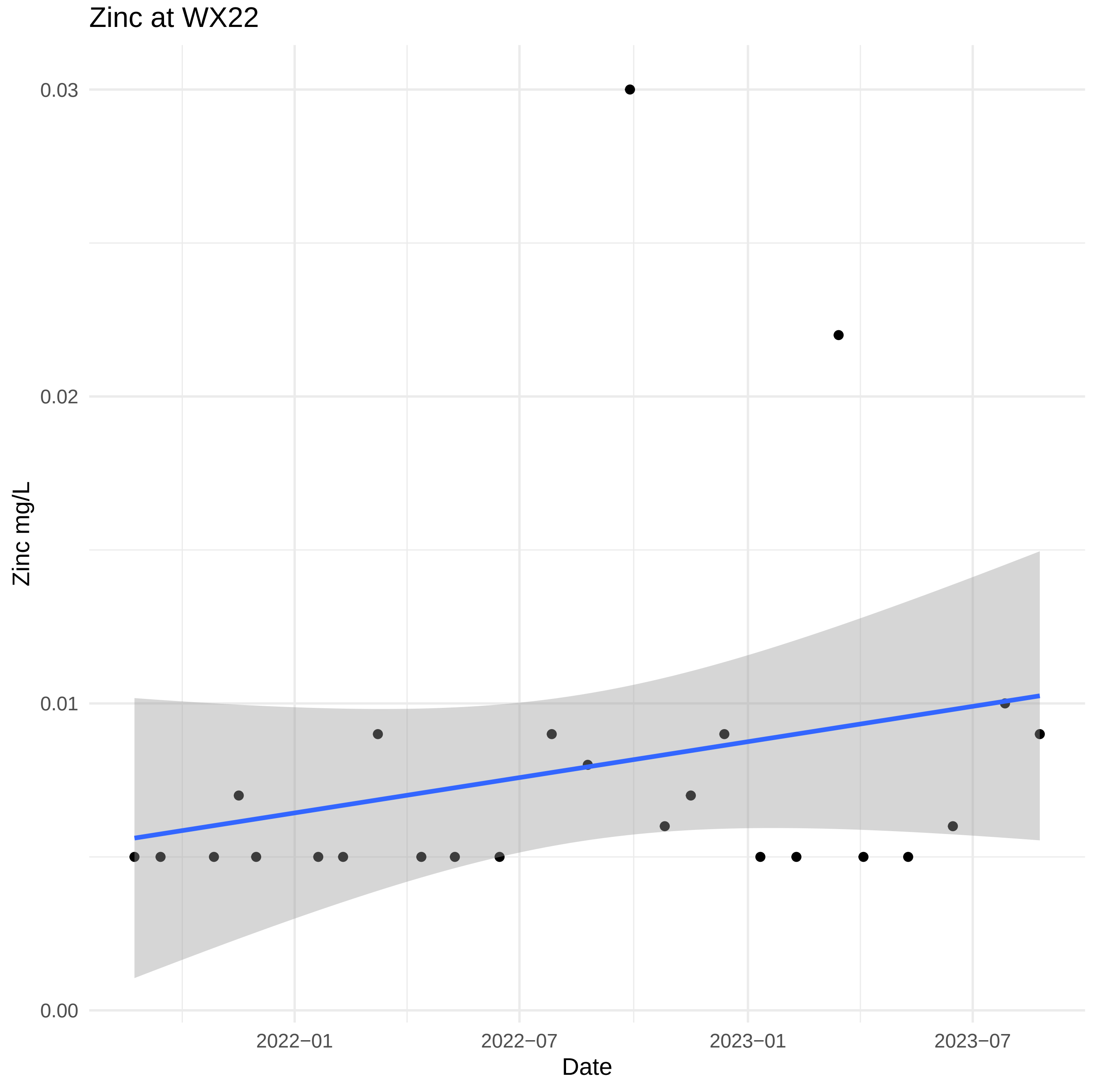
Zinc at G
0.025
0.020
0.015
0.010
0.005
Zinc mg/L
2022−01
2022−07
2023−01
2023−07
Date



Zinc at LMP01
0.04
0.03
0.02
0.01
Zinc mg/L
2022−01
2022−07
2023−01
Date



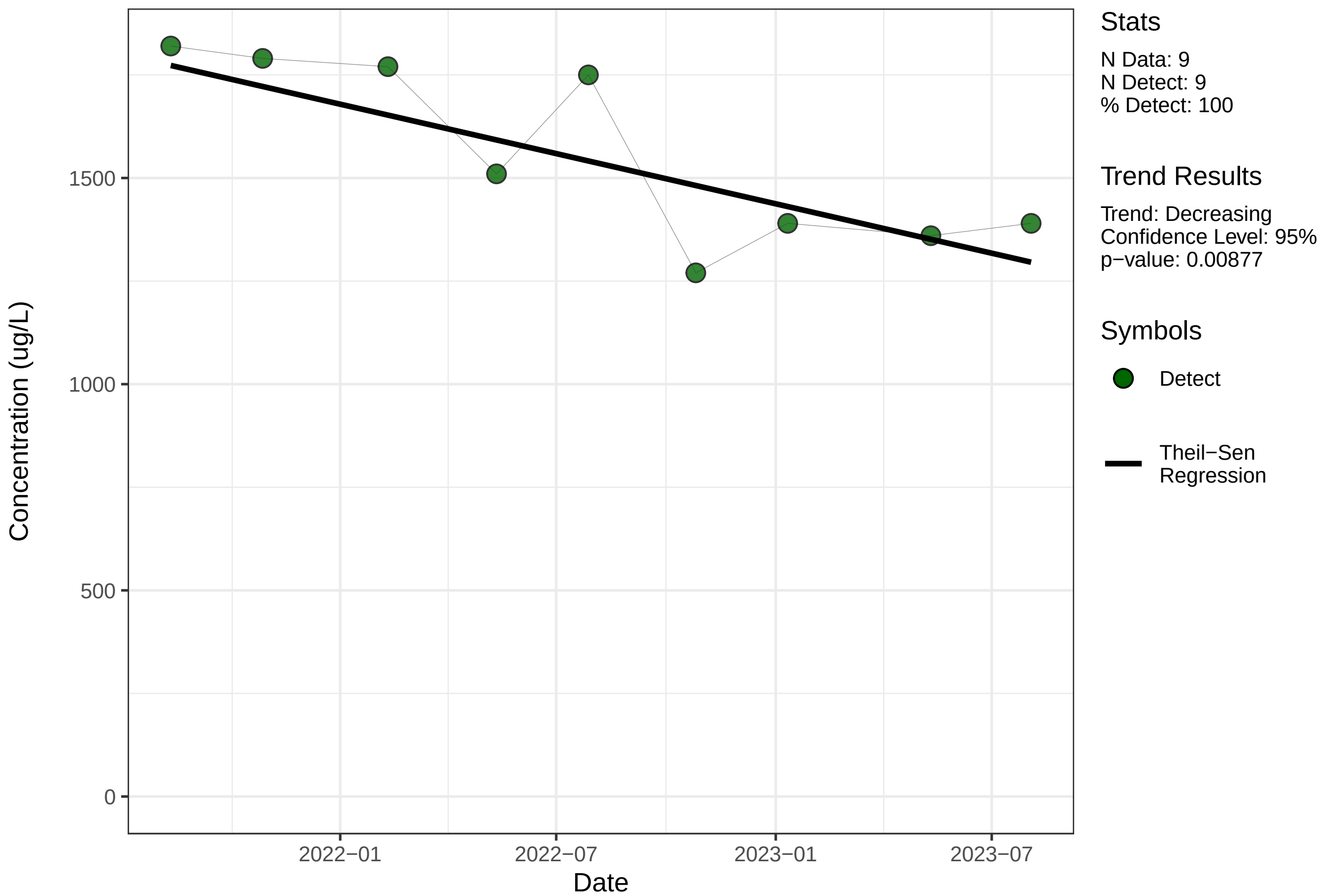
Zinc at NC01
0.0100
0.0075
0.0050
Zinc mg/L
2022−01
2022−07
2023−01
2023−07
Date


Zinc at WX22
0.03
0.02
0.01
0.00
Zinc mg/L
2022−01
2022−07
2023−01
2023−07
Date

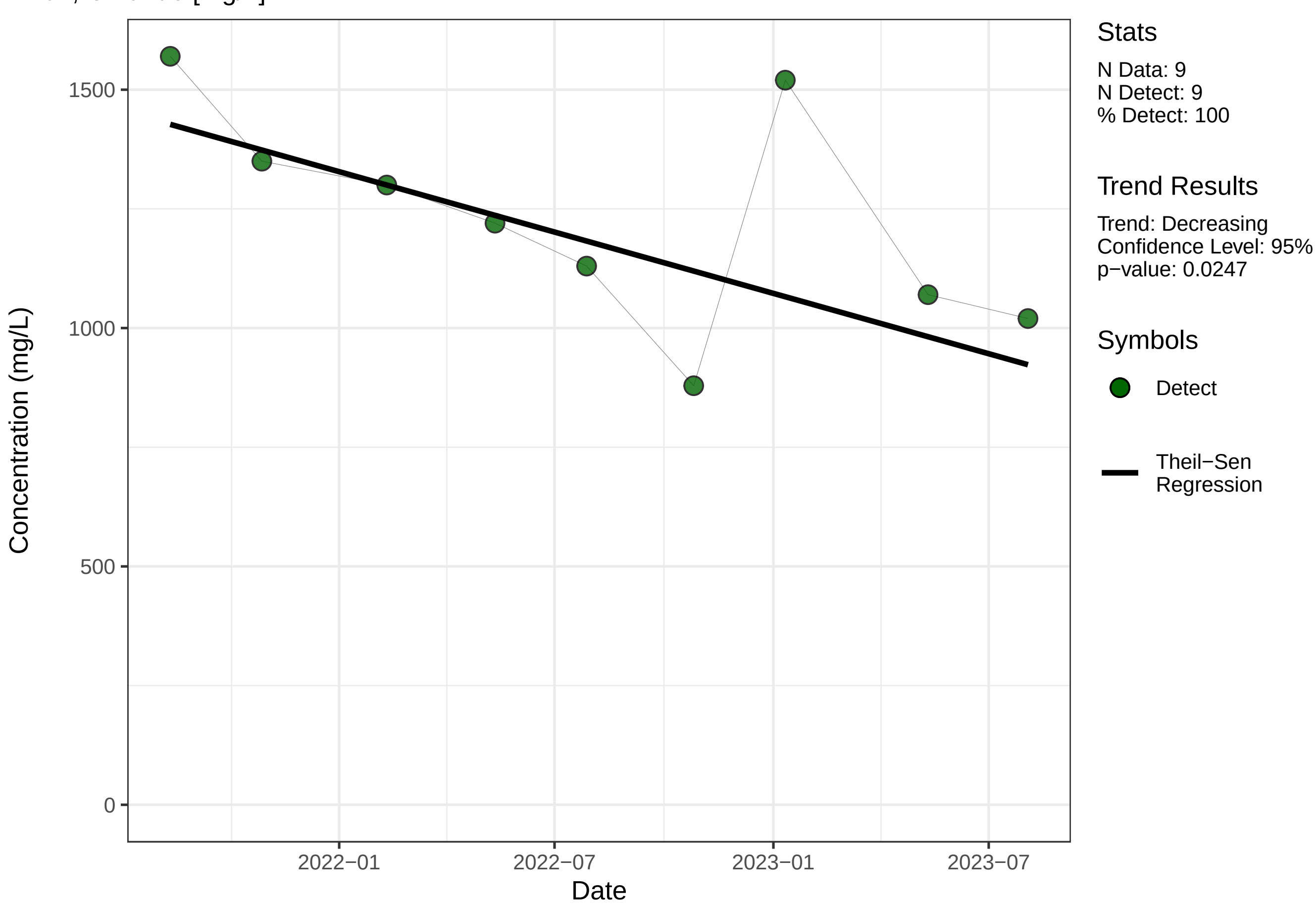
APPENDIX L GROUNDWATER MANN-KENDALL OUTPUTS

Time Series Figures

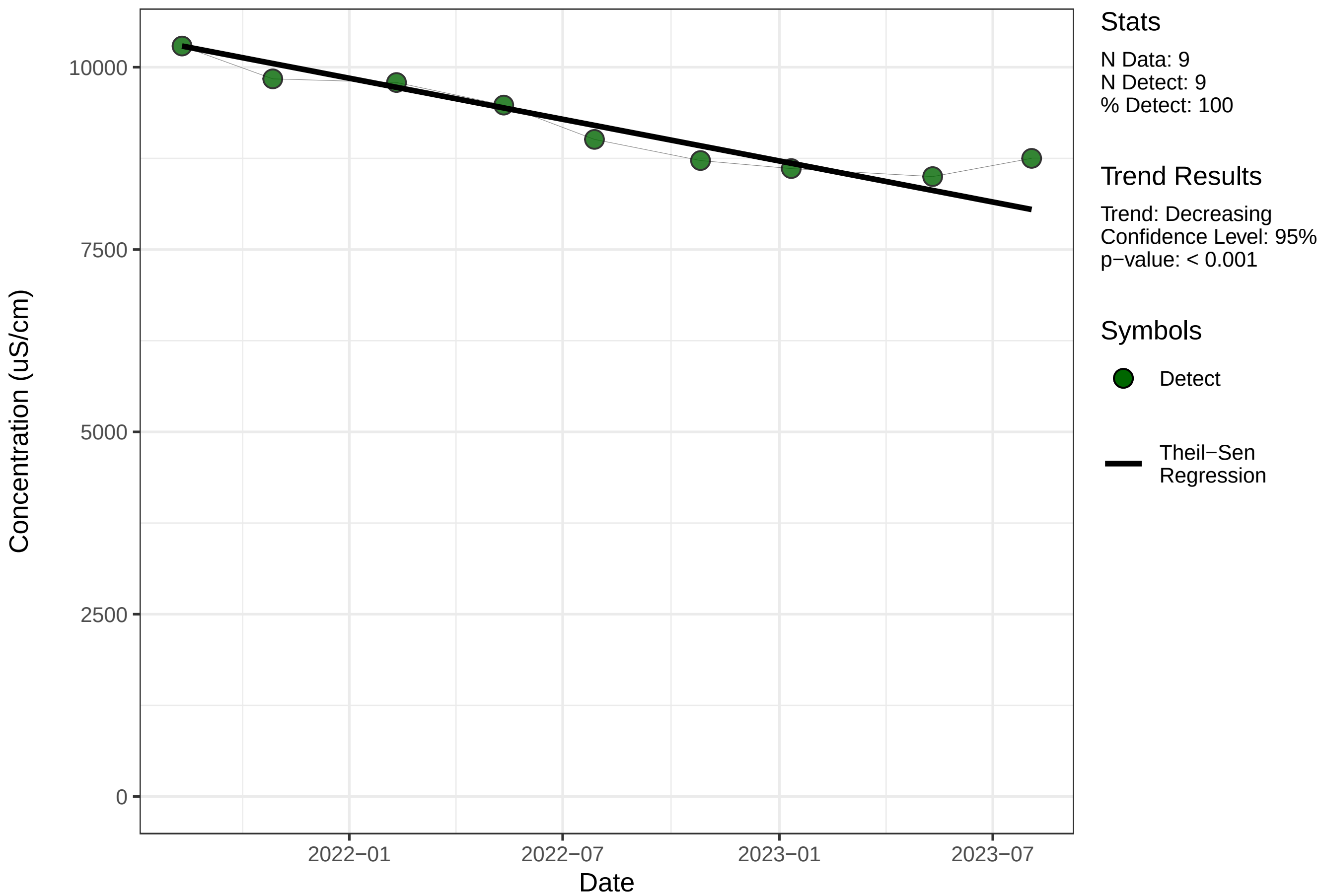
D102, Boron [ug/L]



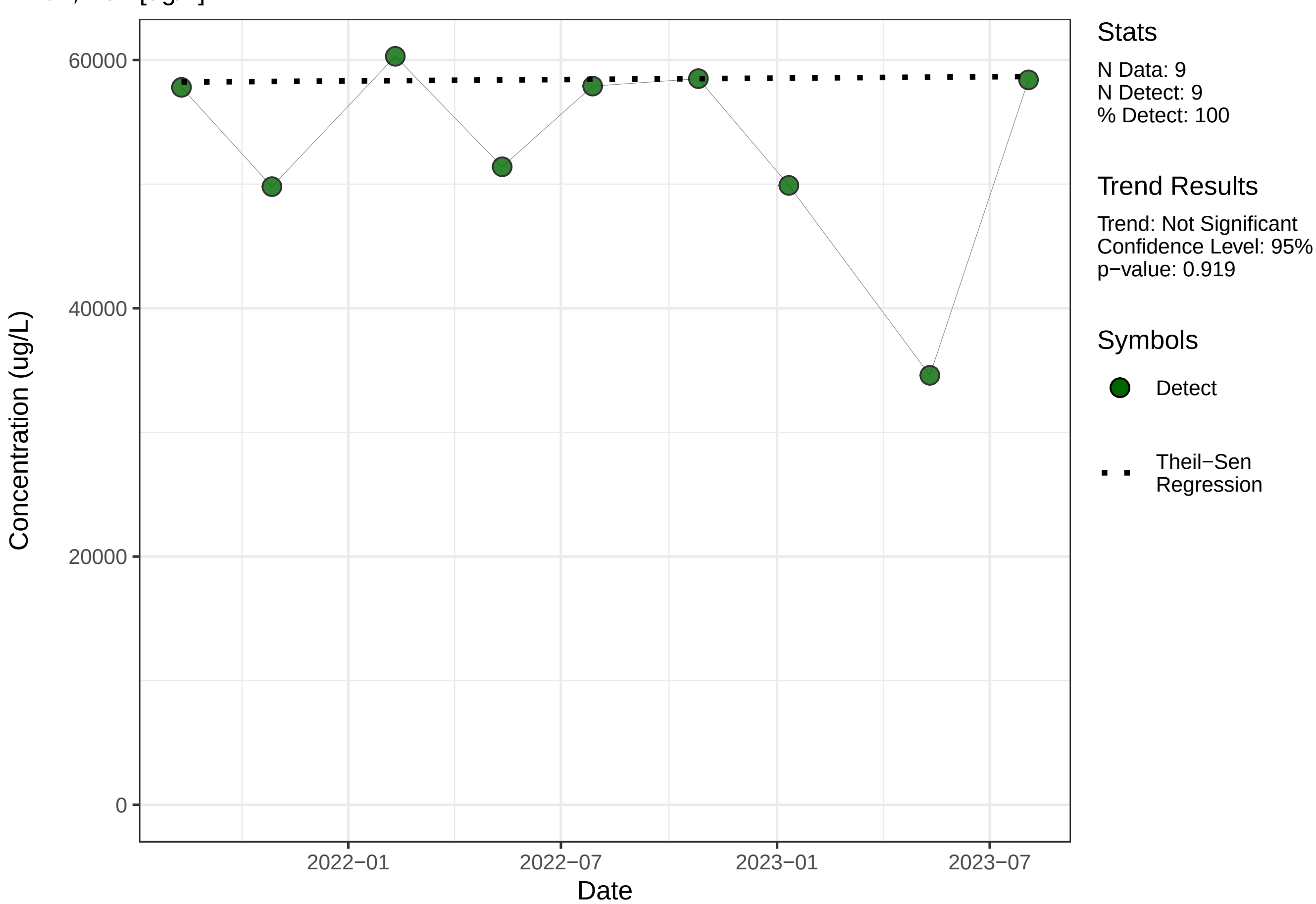
D102, Chloride [mg/L]

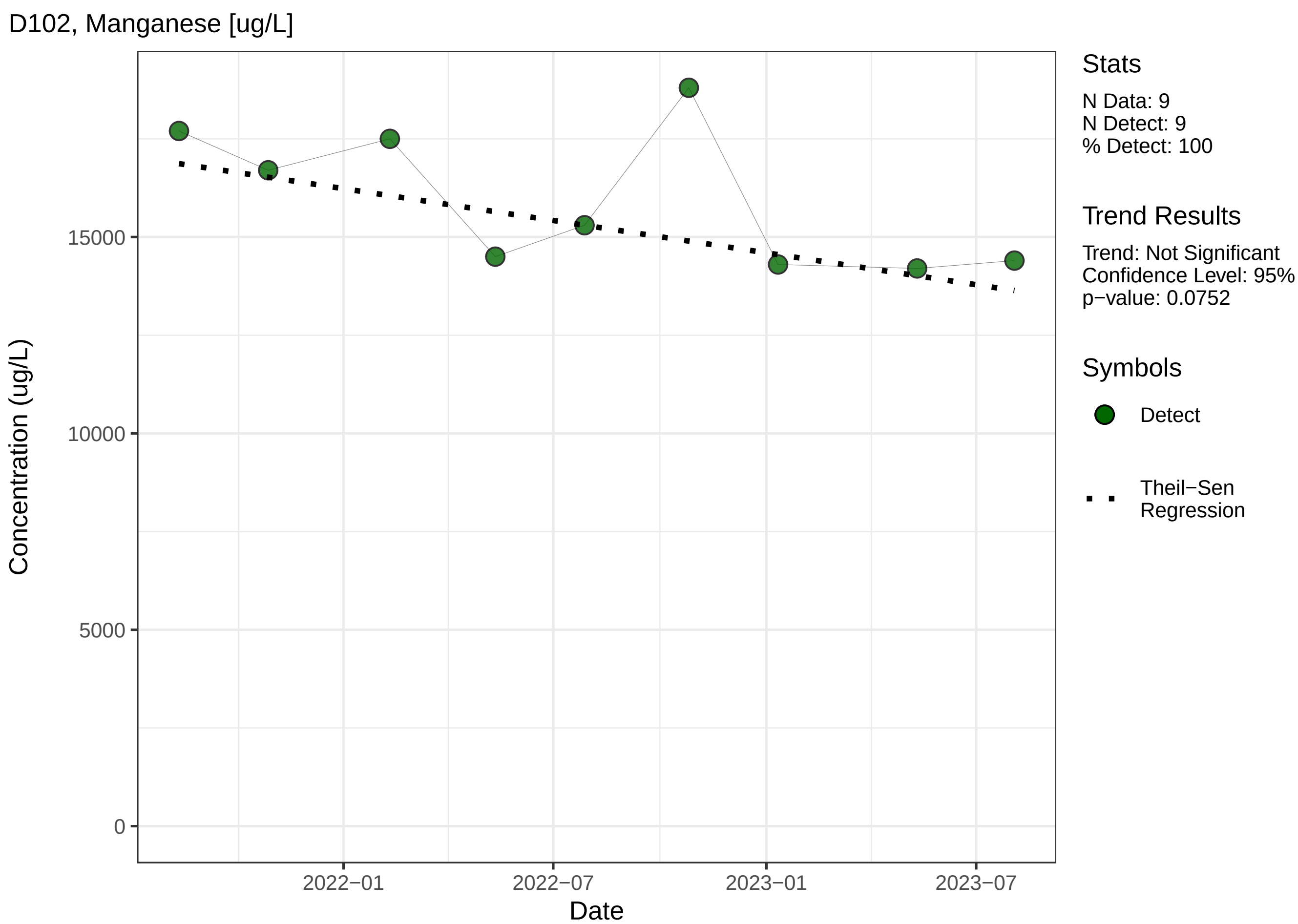


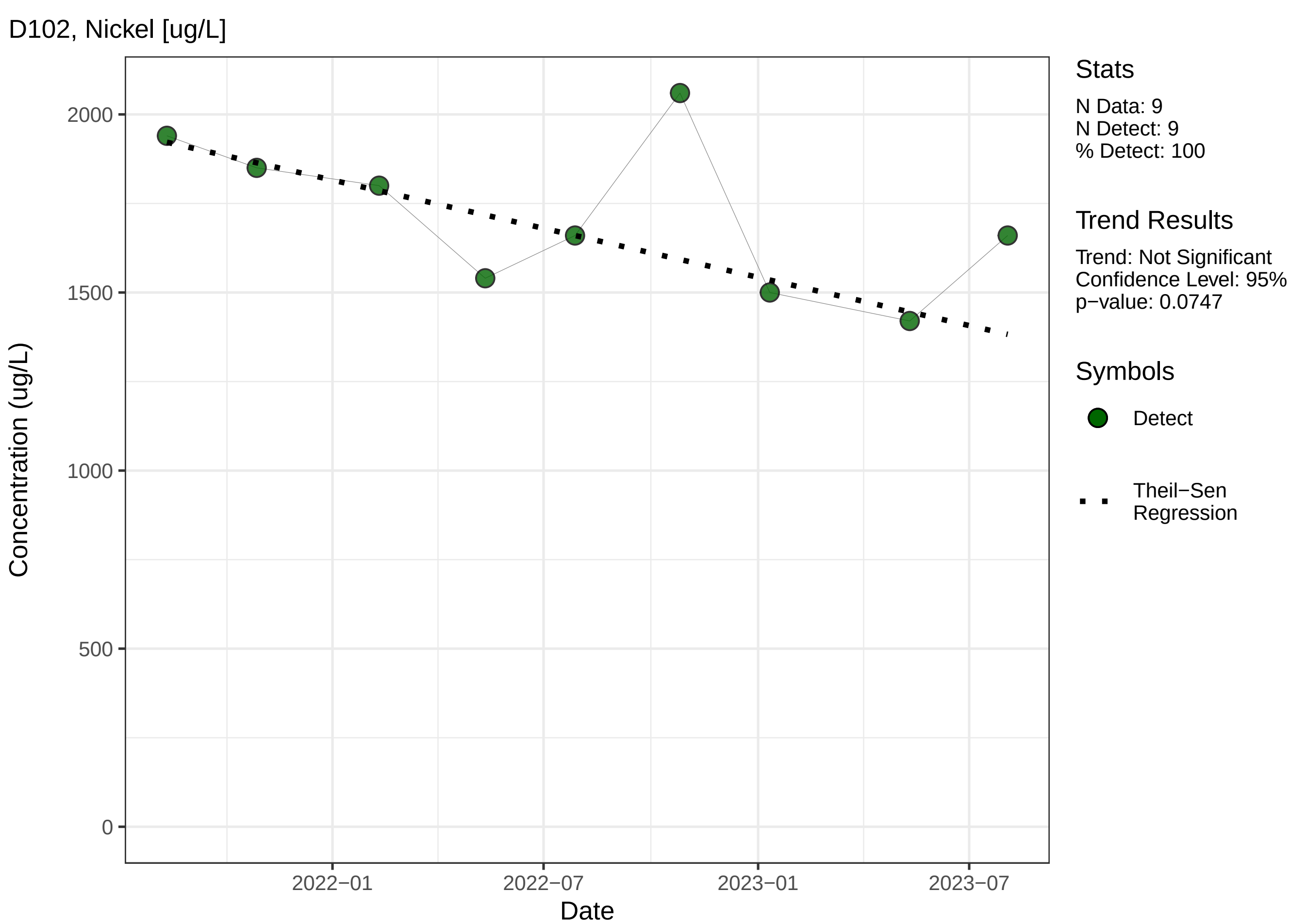
D102, Electrical Conductivity (Field) [uS/cm]



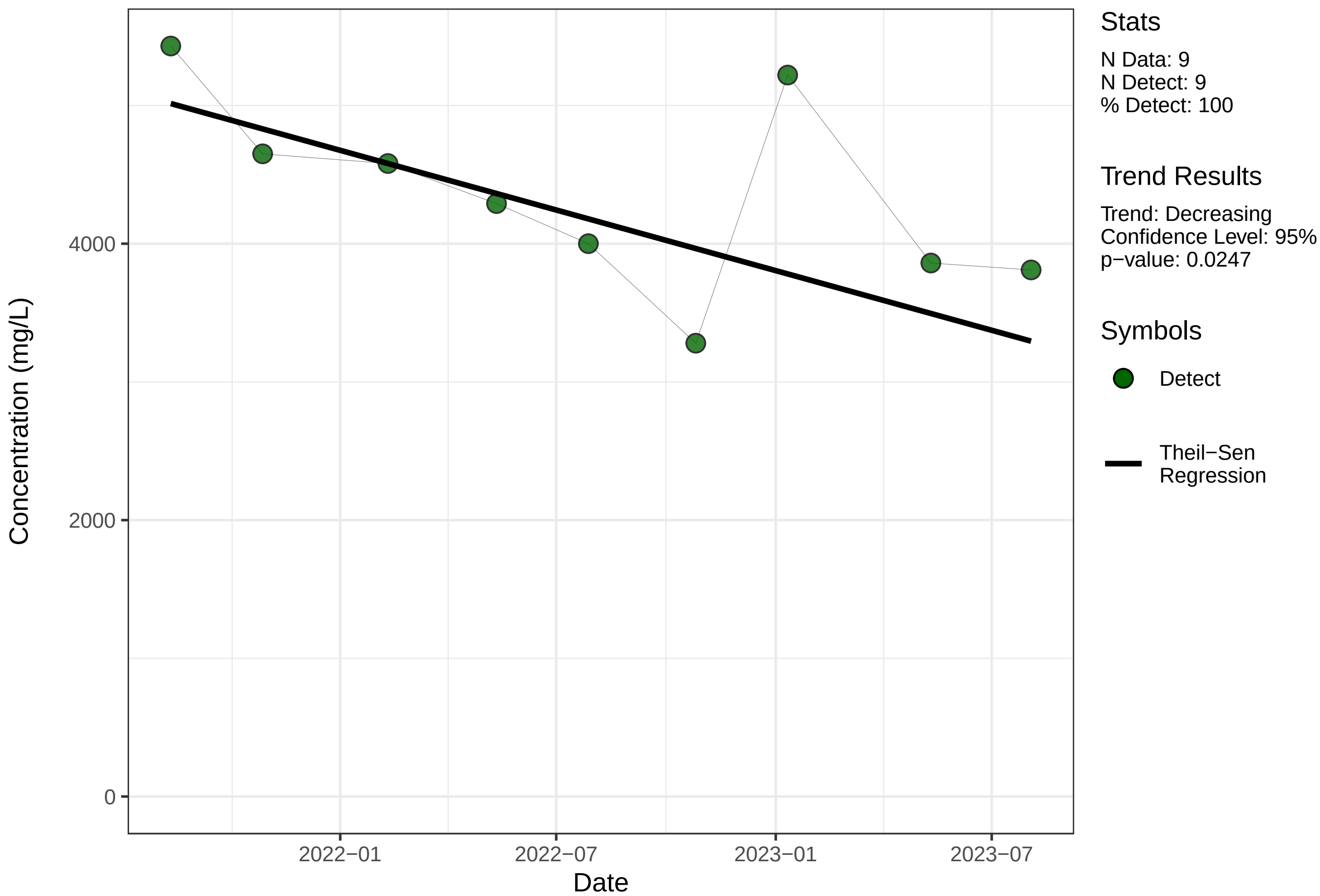
D102, Iron [ug/L]



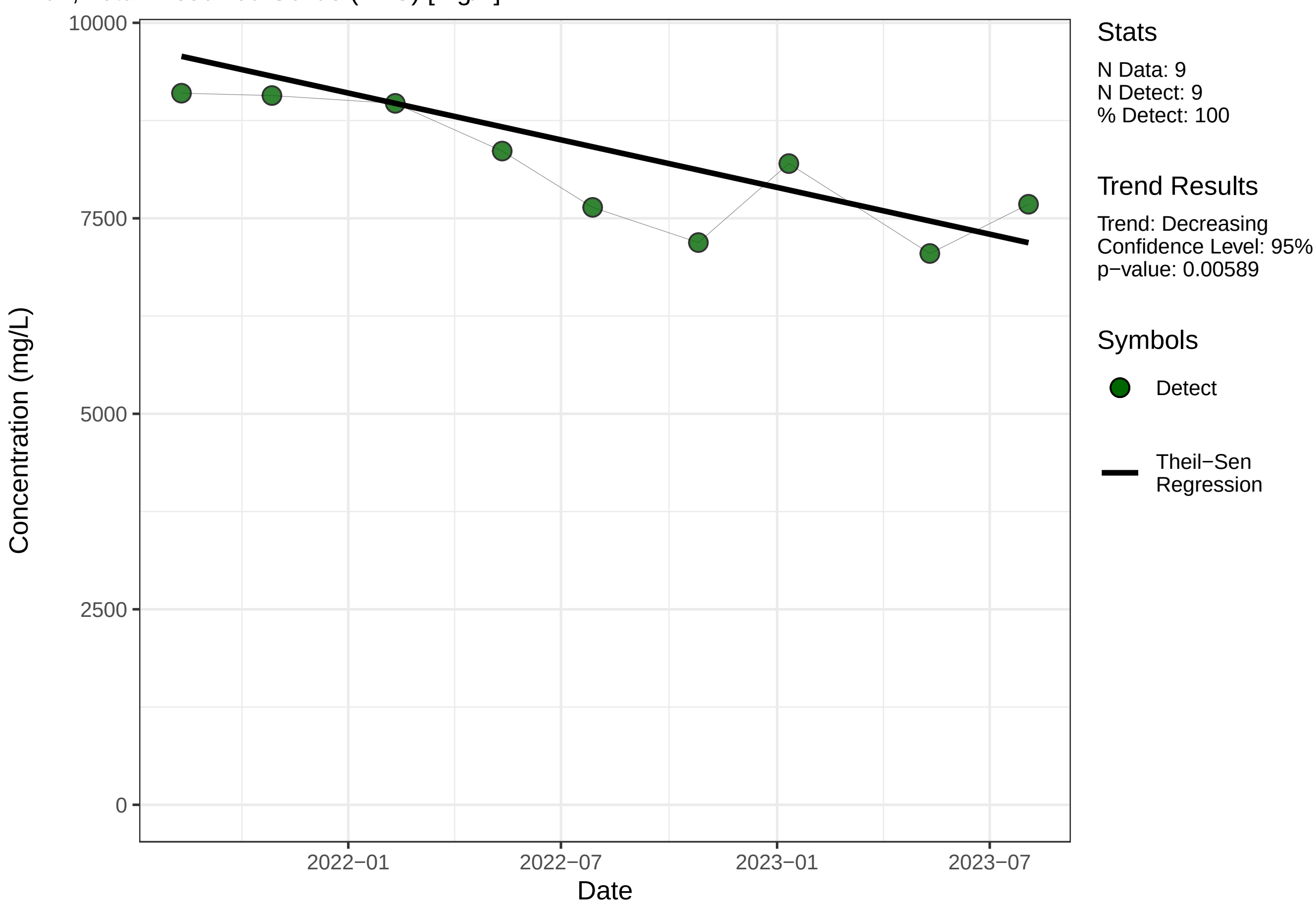

D102, Manganese [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.0752
Symbols
Detect
Theil−Sen Regression

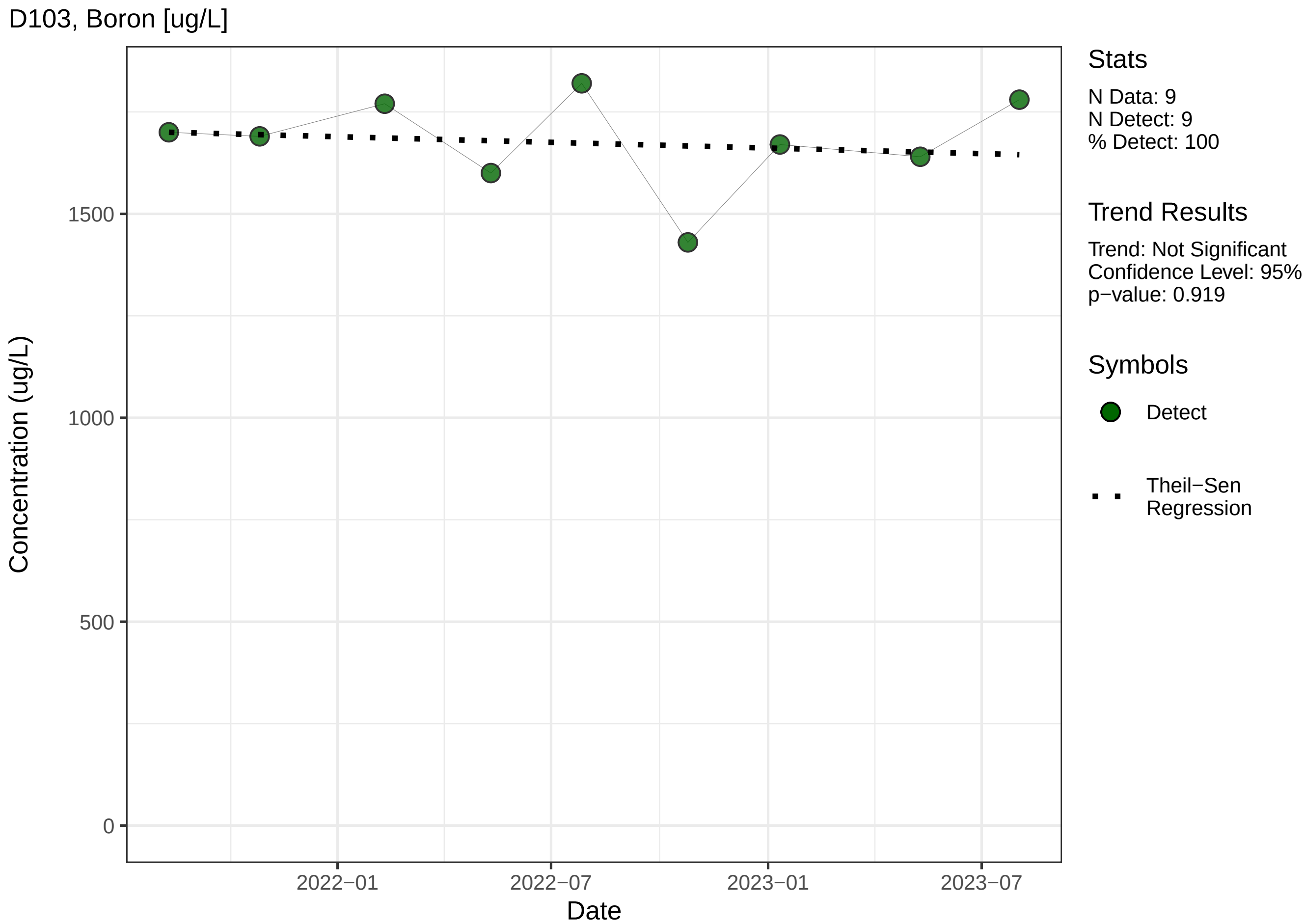

D102, Nickel [ug/L]
Concentration (ug/L)
2000
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.0747
Symbols
Detect
Theil−Sen Regression

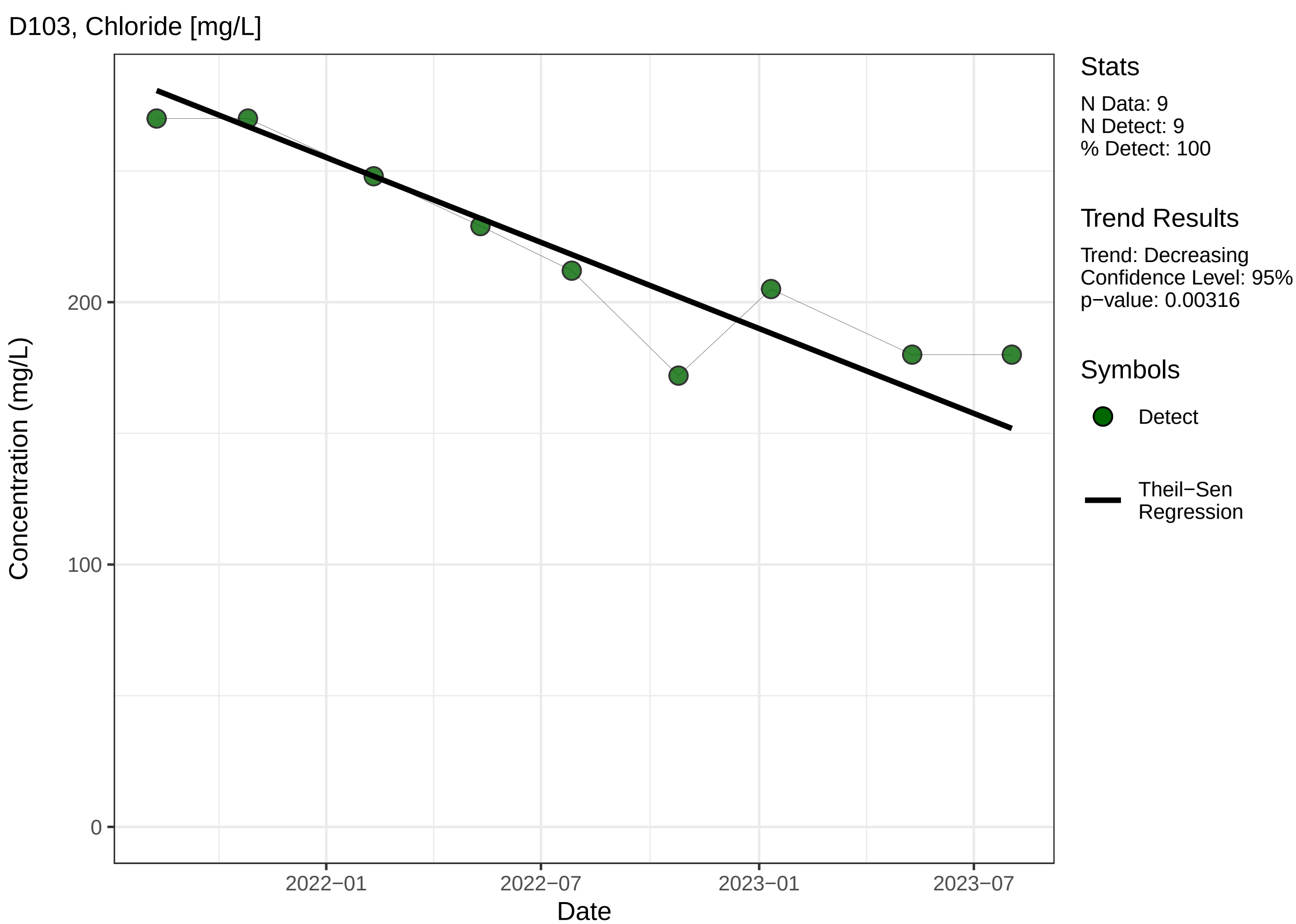
D102, Sulfate (as SO4) [mg/L]

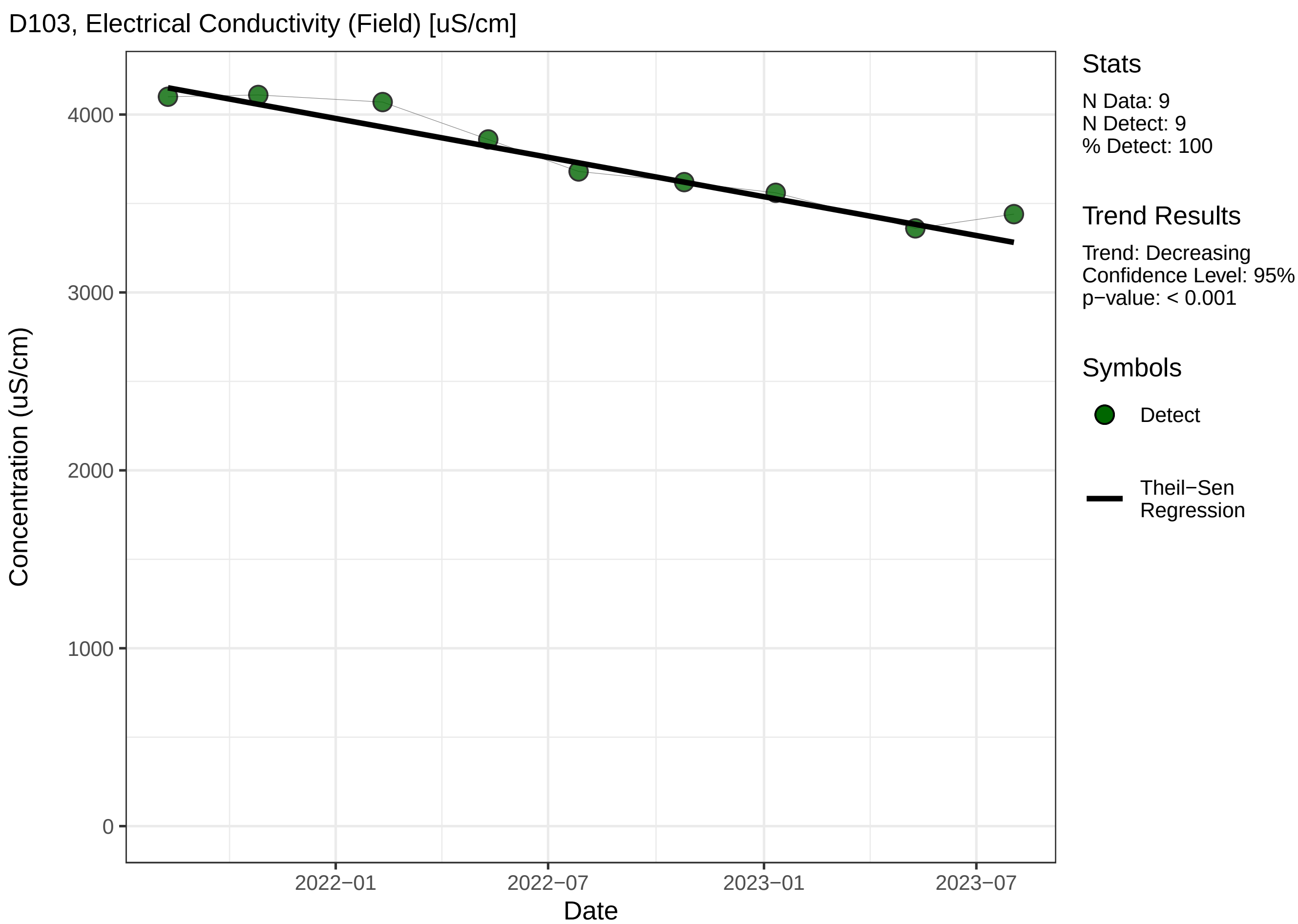


D102, Total Dissolved Solids (TDS) [mg/L]

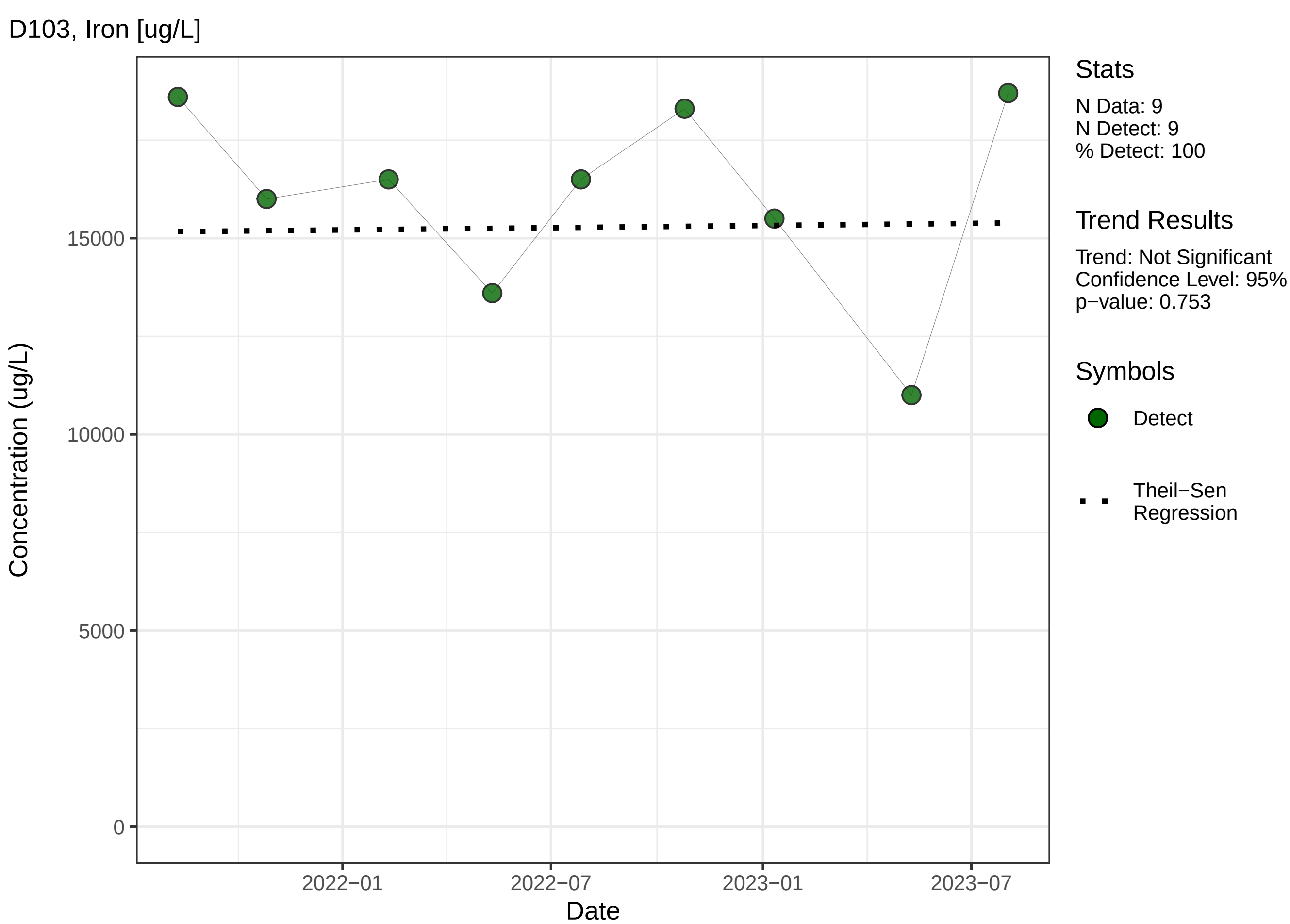



D103, Boron [ug/L]
Concentration (ug/L)
0
500
1000
1500
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.919
Symbols
Detect
Theil−Sen Regression

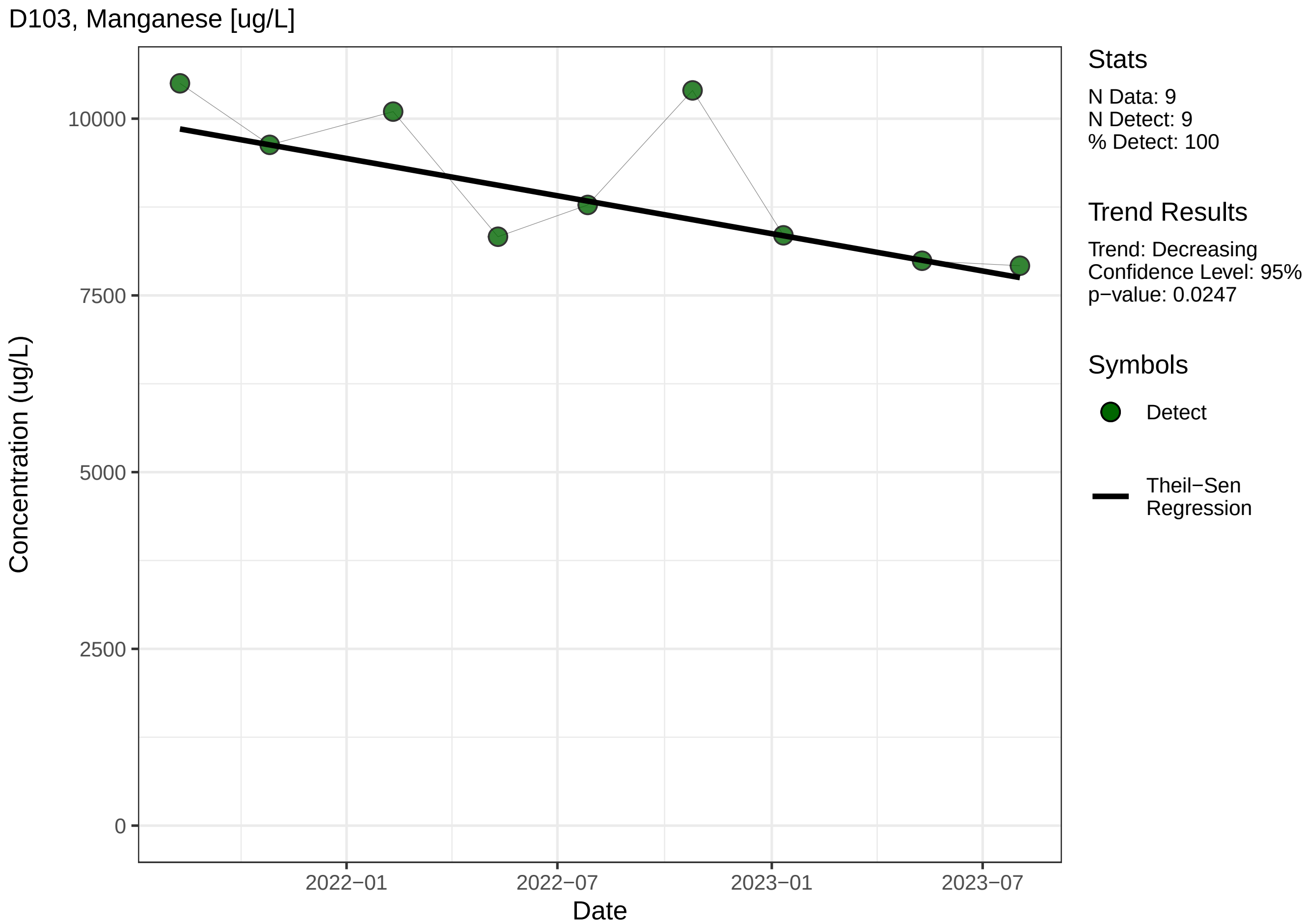

D103, Chloride [mg/L]
Concentration (mg/L)
0
100
200
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.00316
Symbols
Detect
Theil−Sen Regression

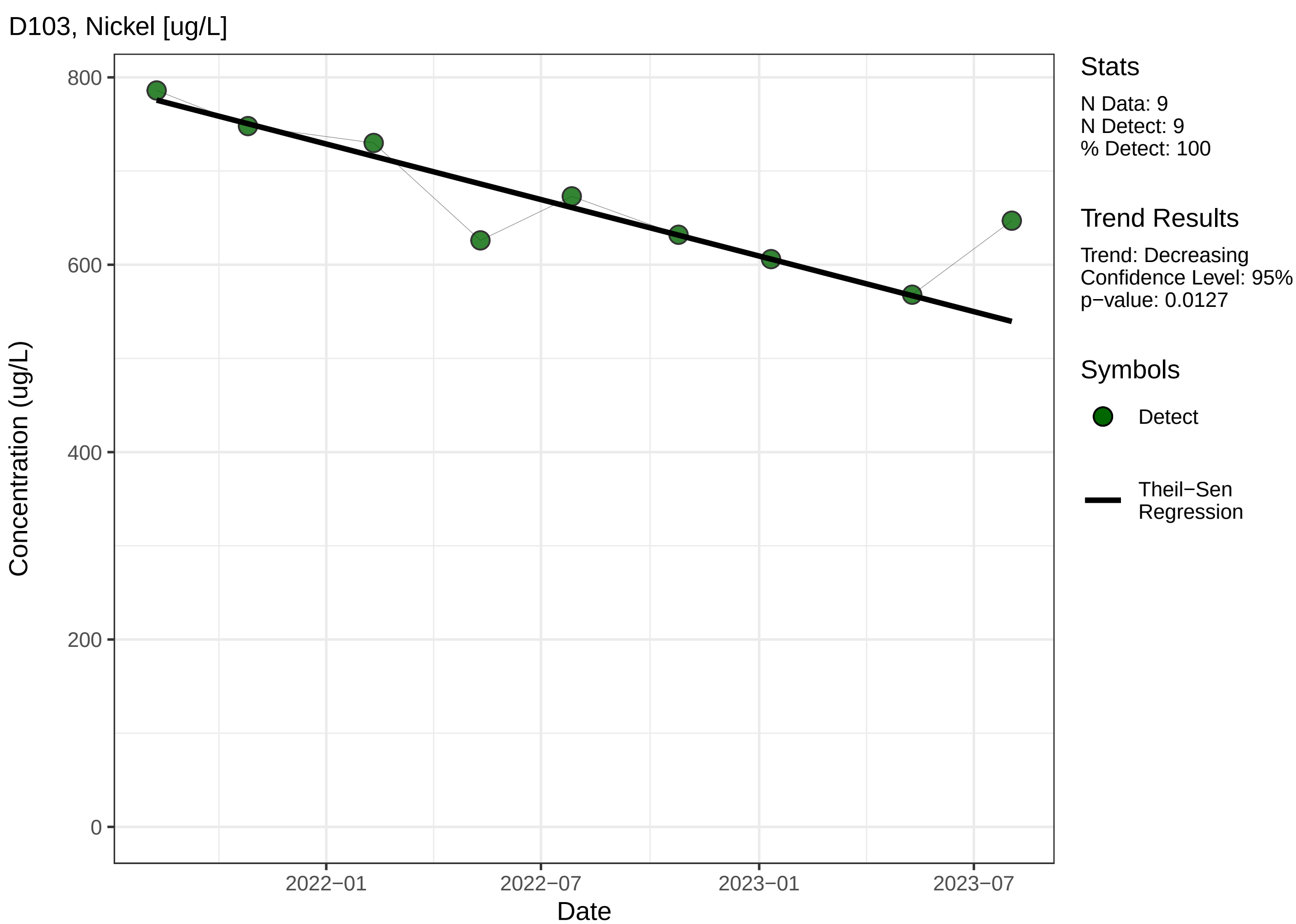


D103, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
4000
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: < 0.001
Symbols
Detect
Theil−Sen Regression

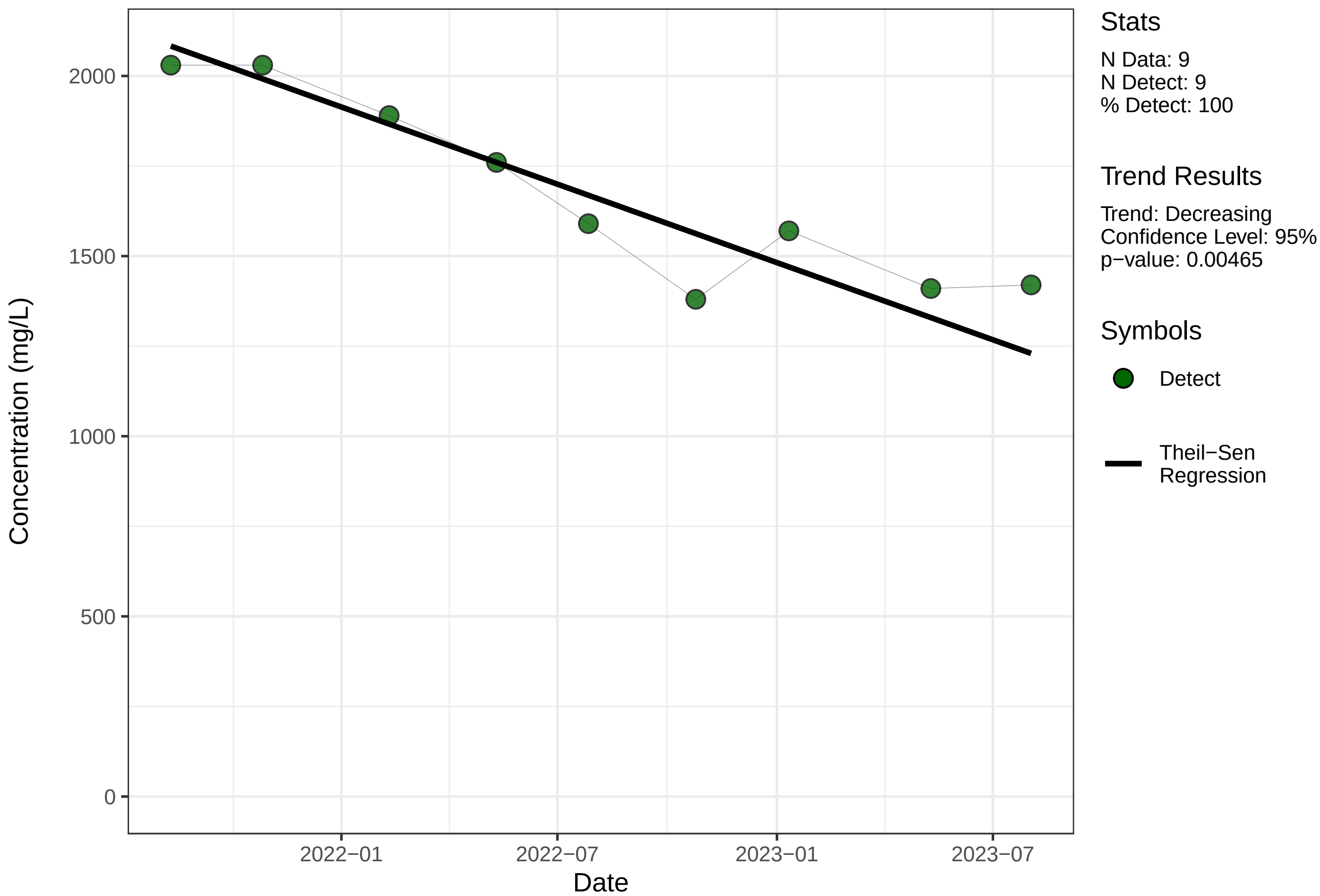


D103, Iron [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.753
Symbols
Detect
Theil−Sen Regression

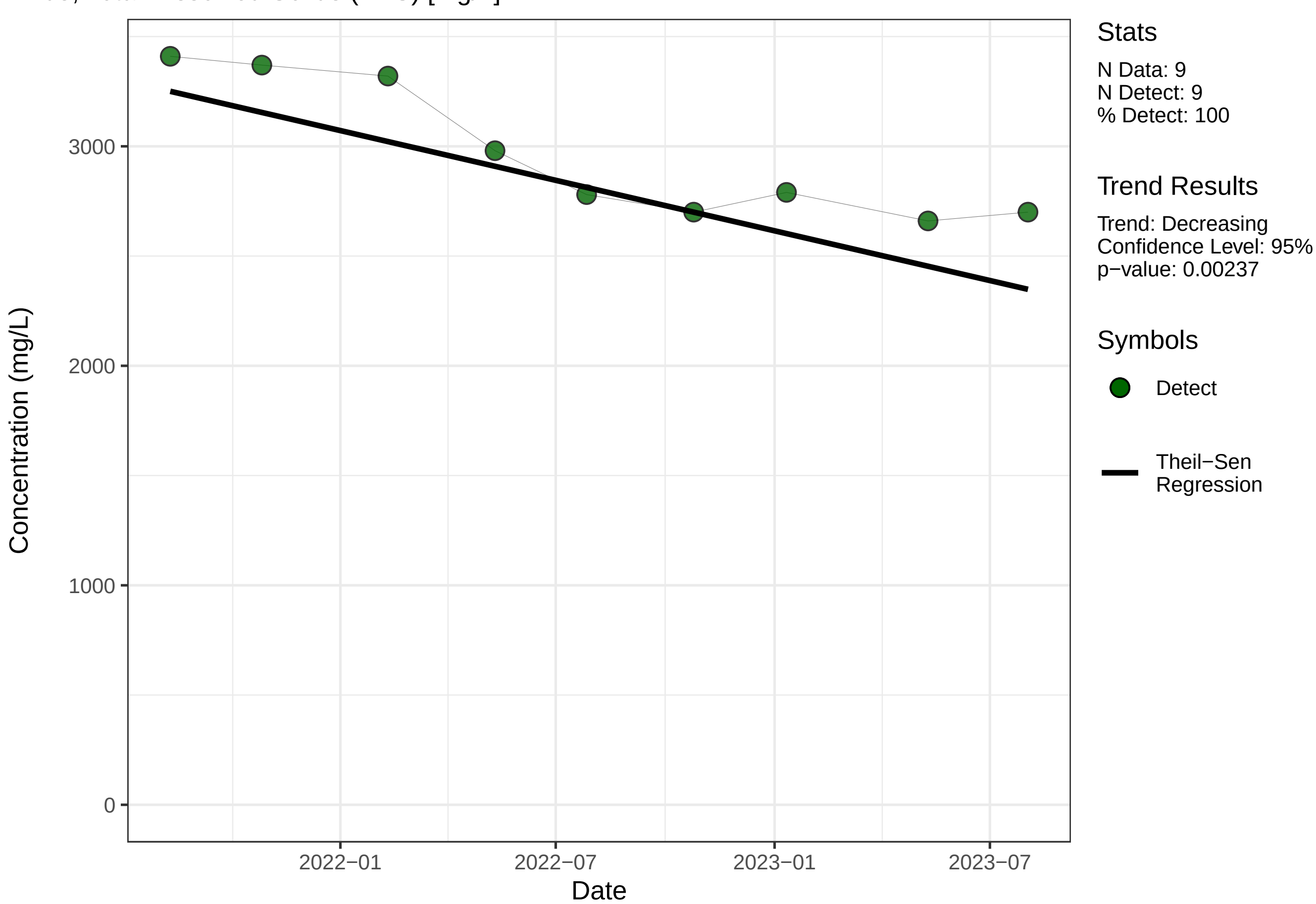

D103, Manganese [ug/L]
Concentration (ug/L)
10000
7500
5000
2500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0247
Symbols
Detect
Theil−Sen Regression

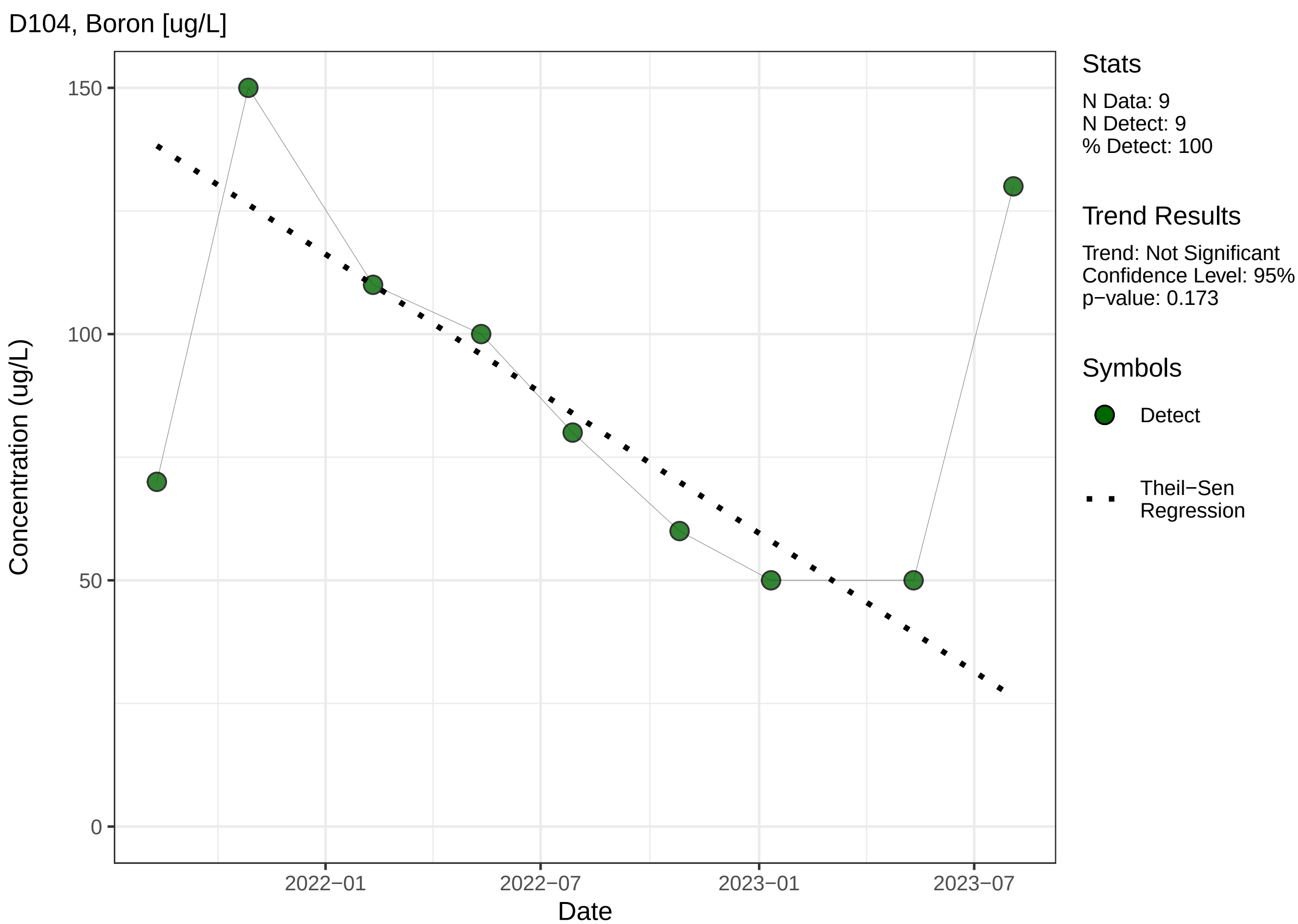

D103, Nickel [ug/L]
Concentration (ug/L)
800
600
400
200
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0127
Symbols
Detect
Theil−Sen Regression

D103, Sulfate (as SO4) [mg/L]

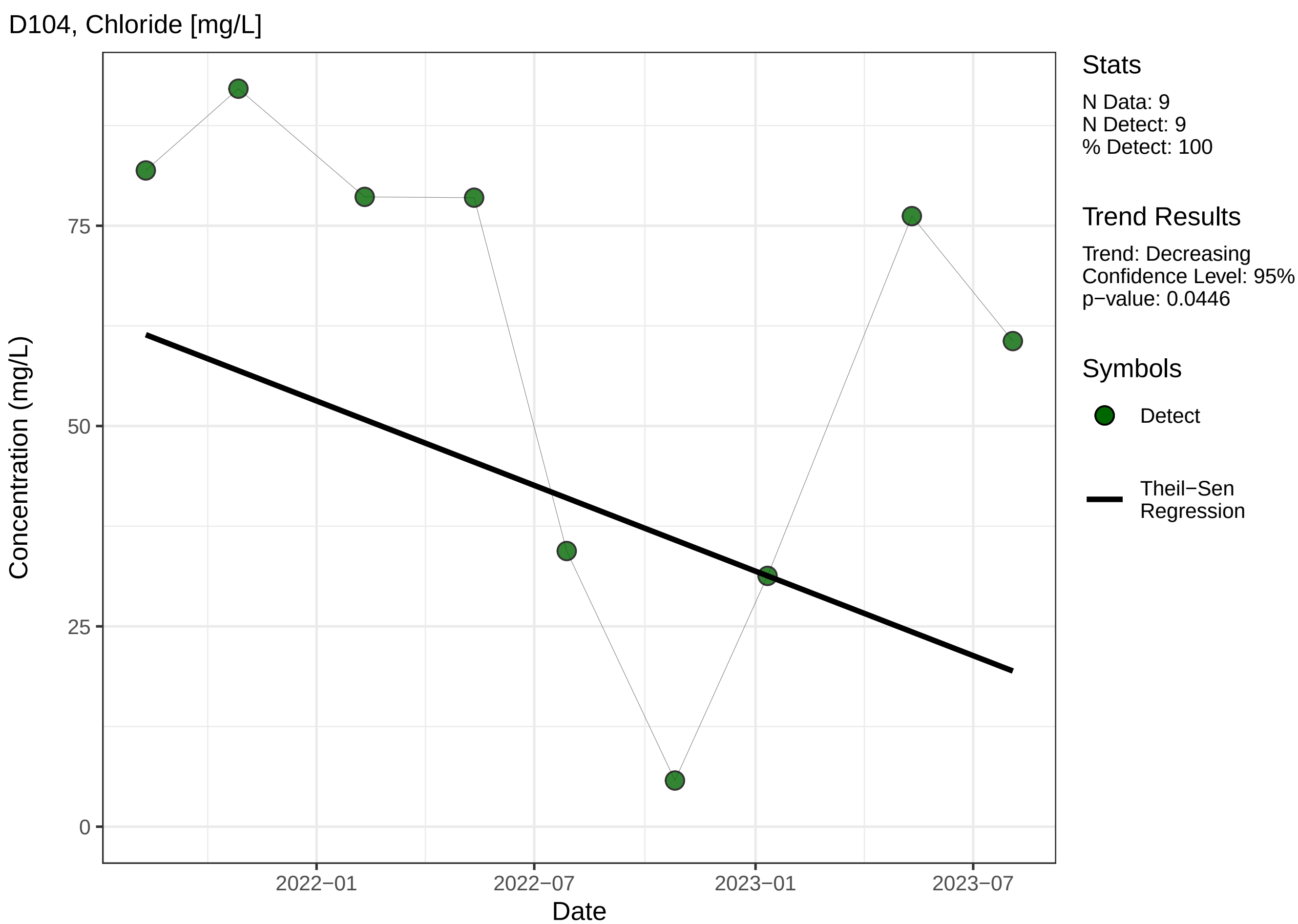


D103, Total Dissolved Solids (TDS) [mg/L]



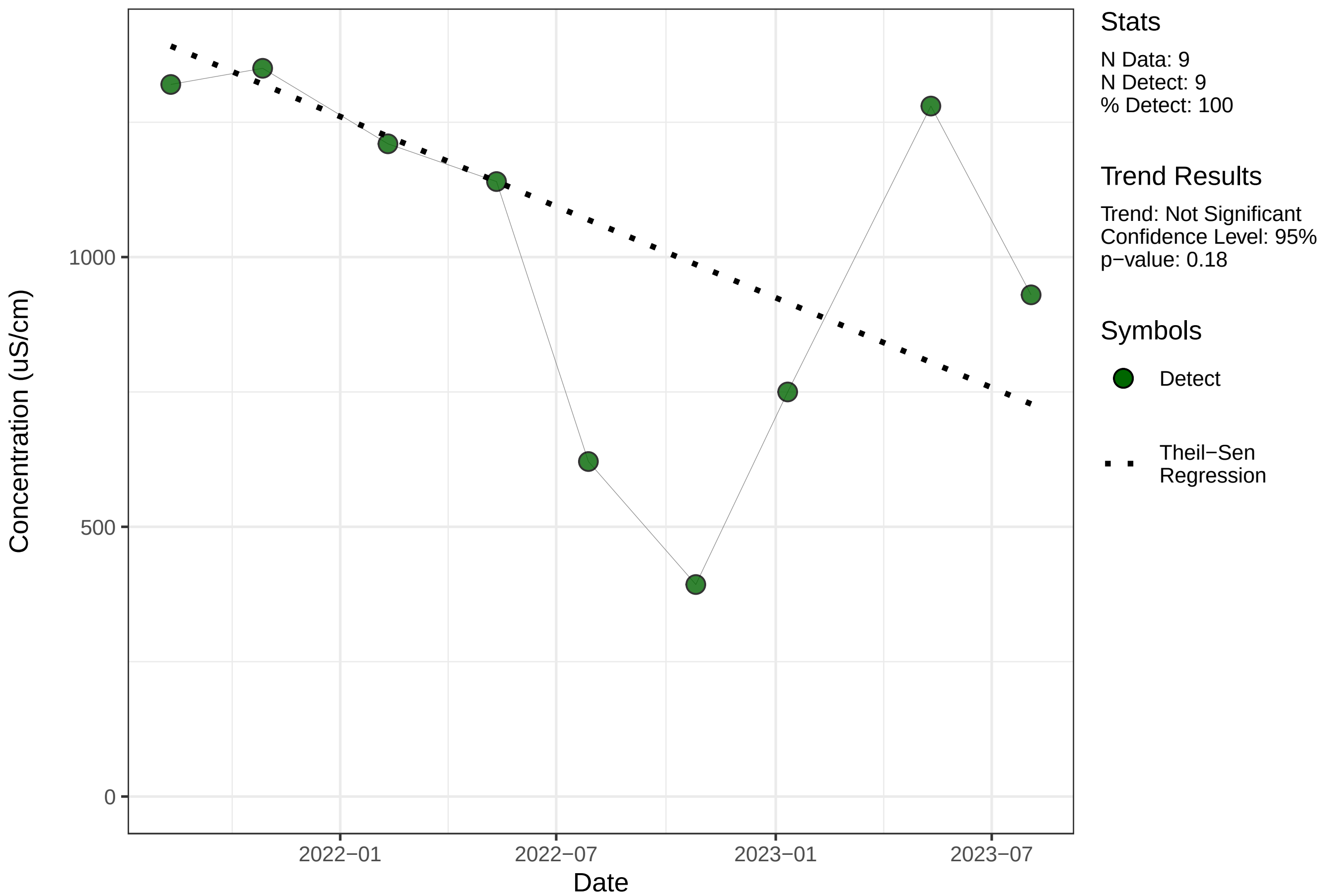


D104, Boron [ug/L]
Concentration (ug/L)
150
100
50
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.173
Symbols
Detect
Theil−Sen Regression

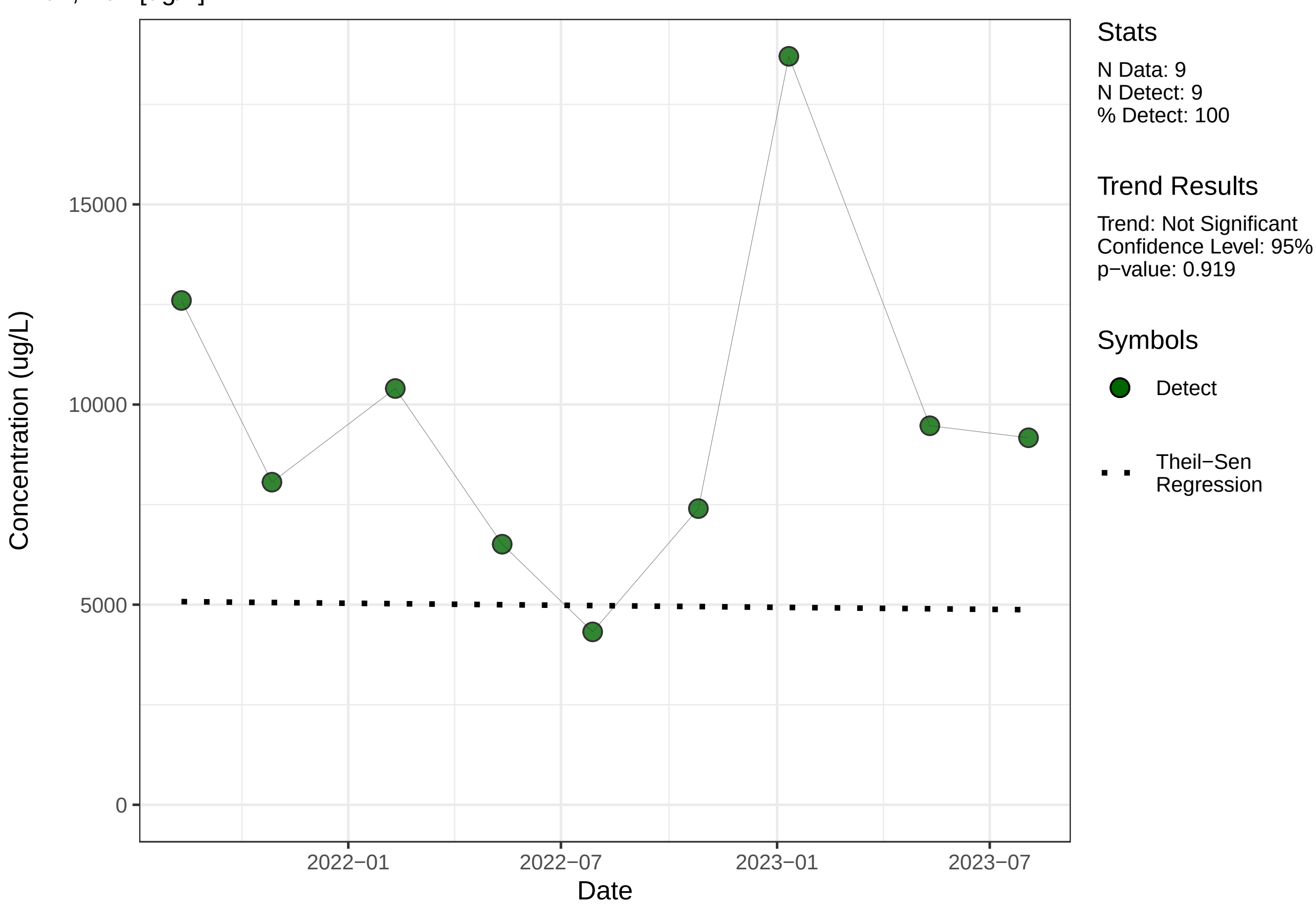


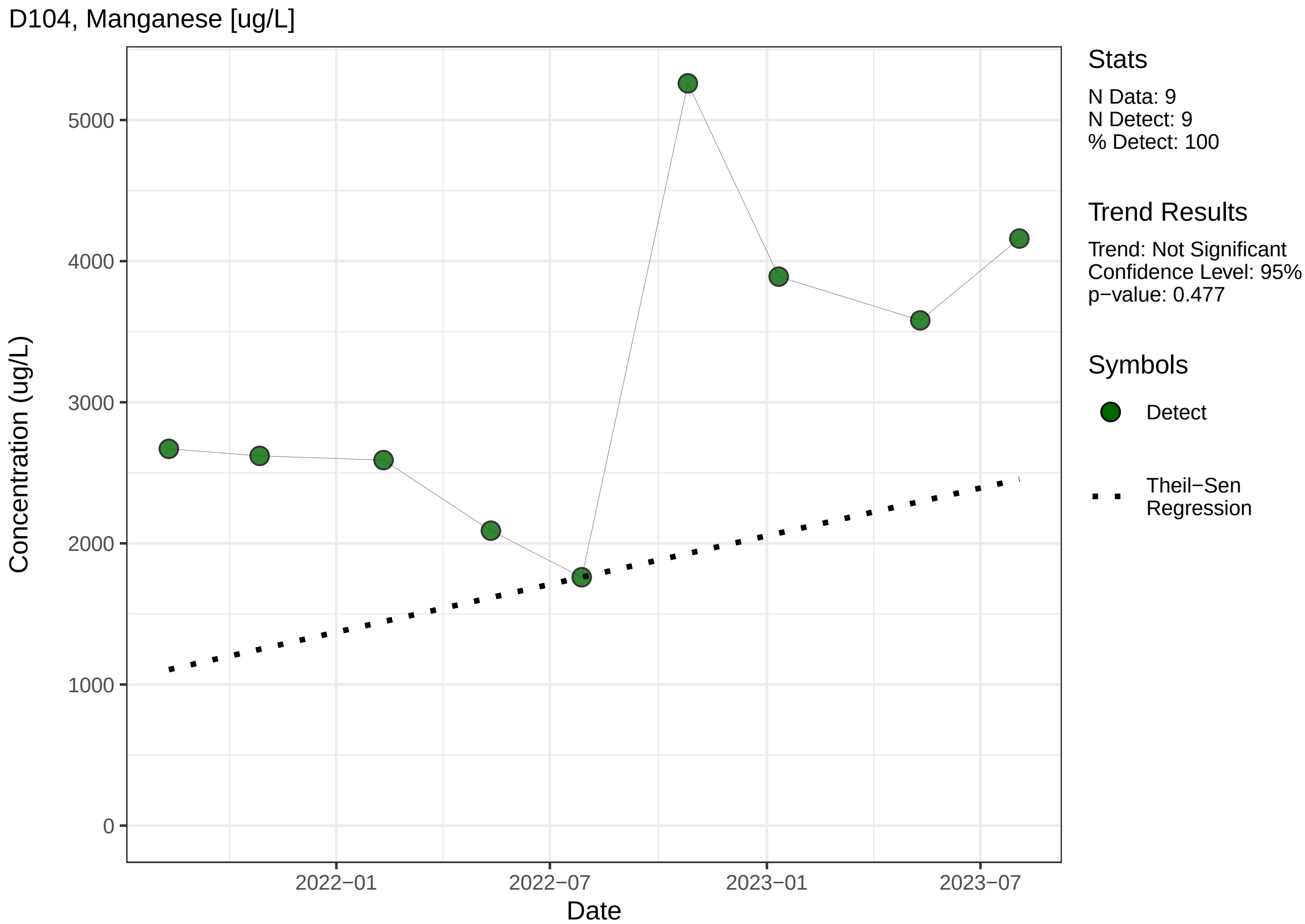
D104, Chloride [mg/L]
Concentration (mg/L)
75
50
25
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0446
Symbols
Detect
Theil−Sen Regression

D104, Electrical Conductivity (Field) [uS/cm]

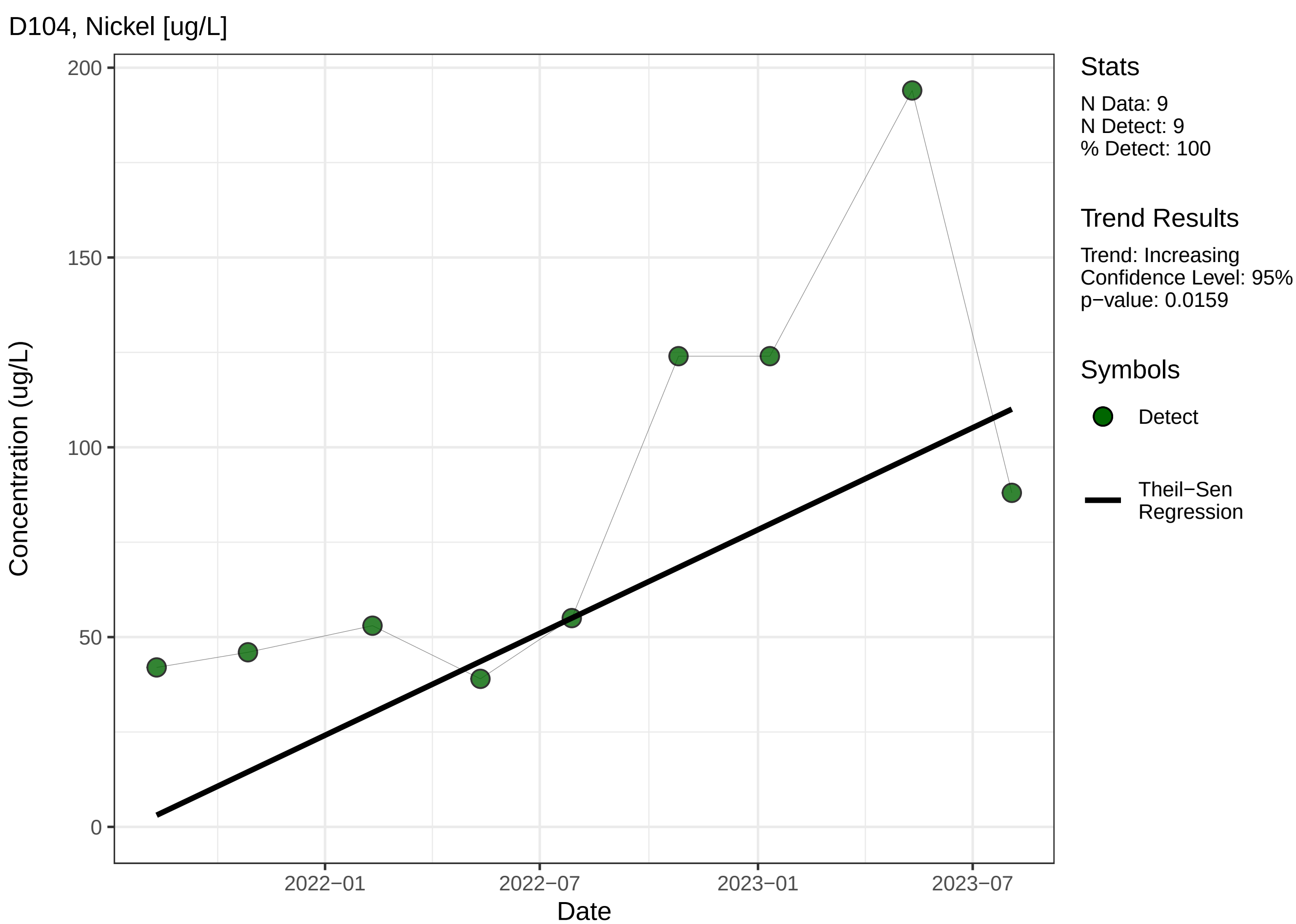


D104, Iron [ug/L]



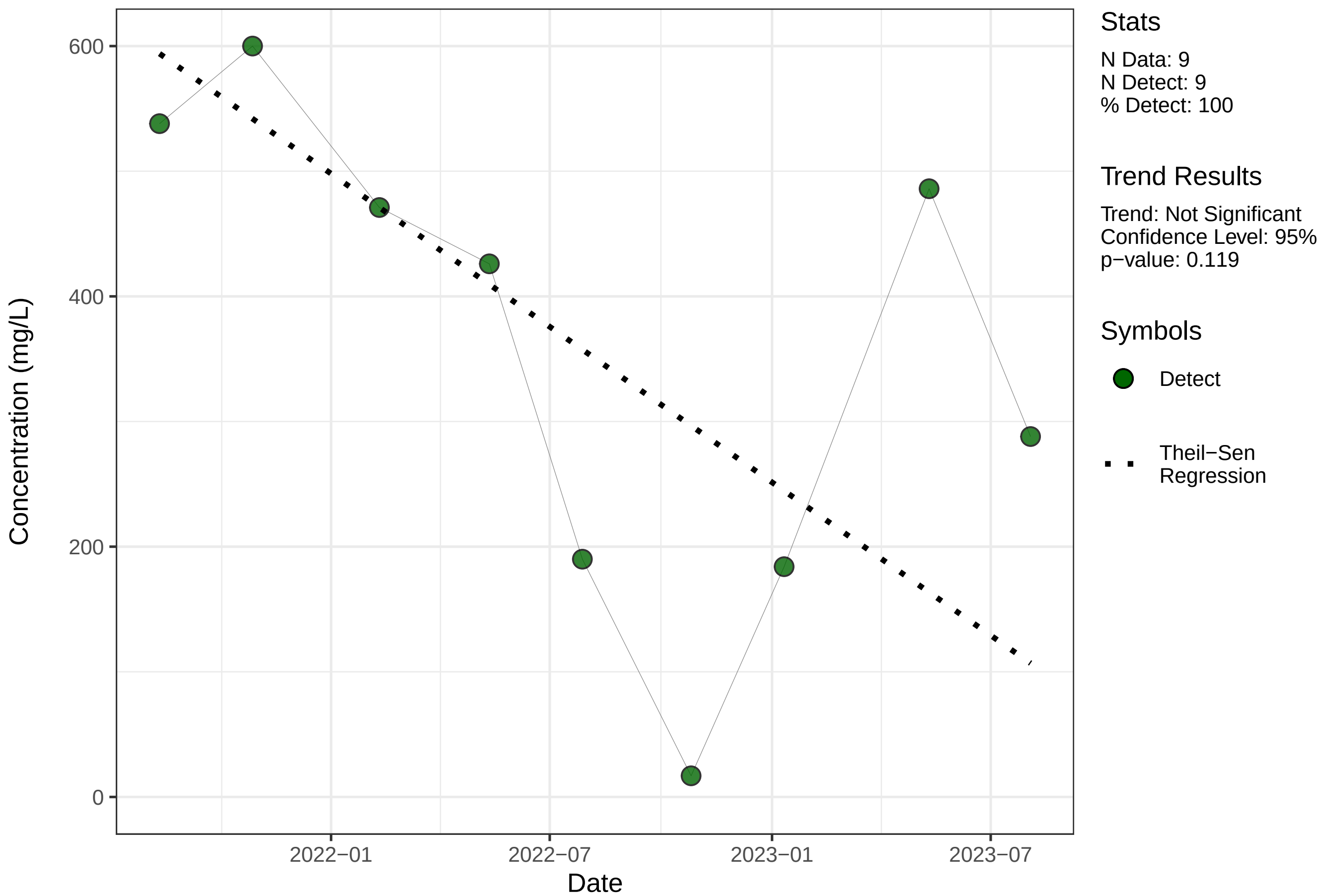


D104, Manganese [ug/L]
Concentration (ug/L)
5000
4000
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.477
Symbols
Detect
Theil−Sen Regression

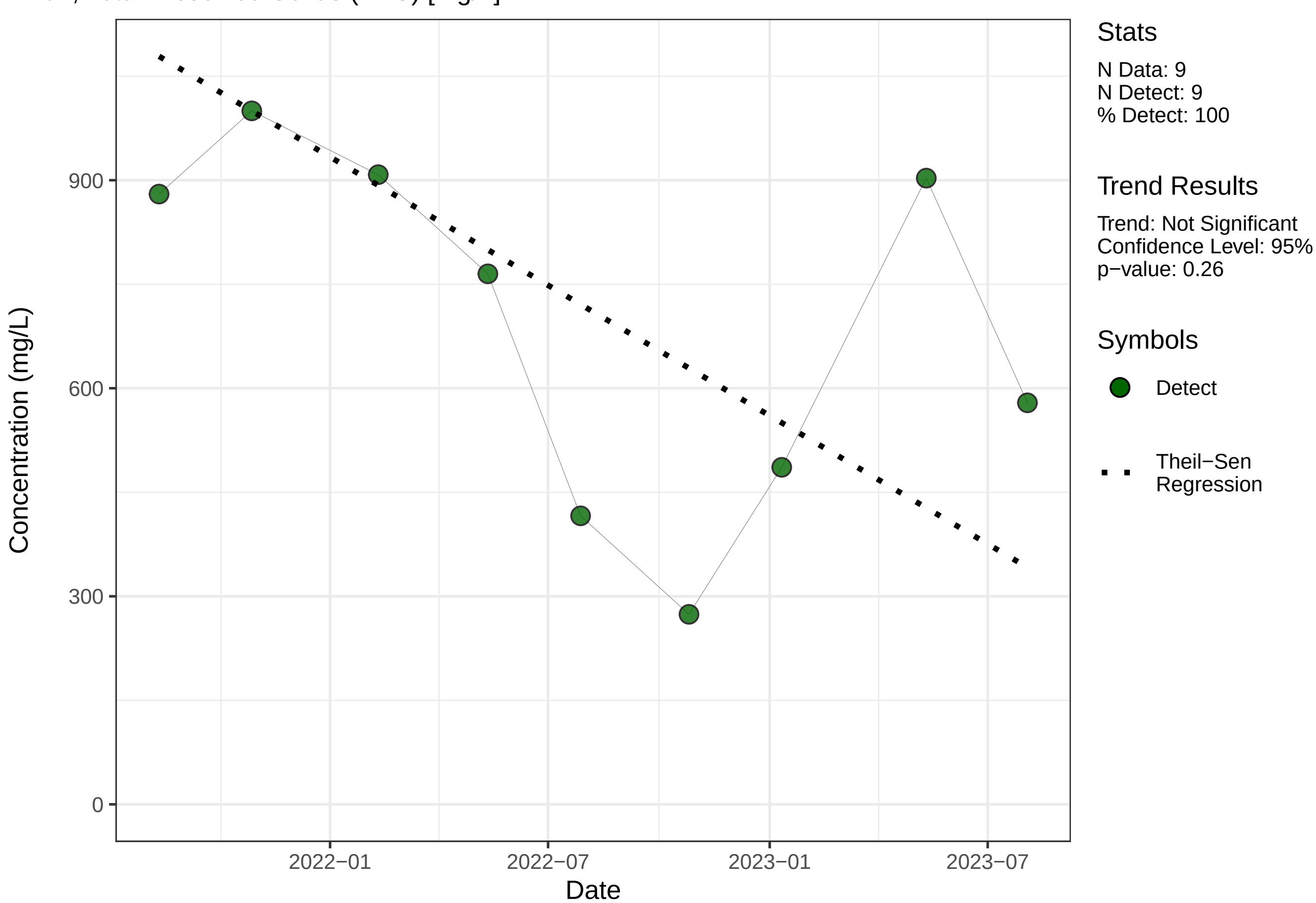


D104, Nickel [ug/L]
Concentration (ug/L)
200
150
100
50
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Increasing
Confidence Level: 95%
p−value: 0.0159
Symbols
Detect
Theil−Sen Regression

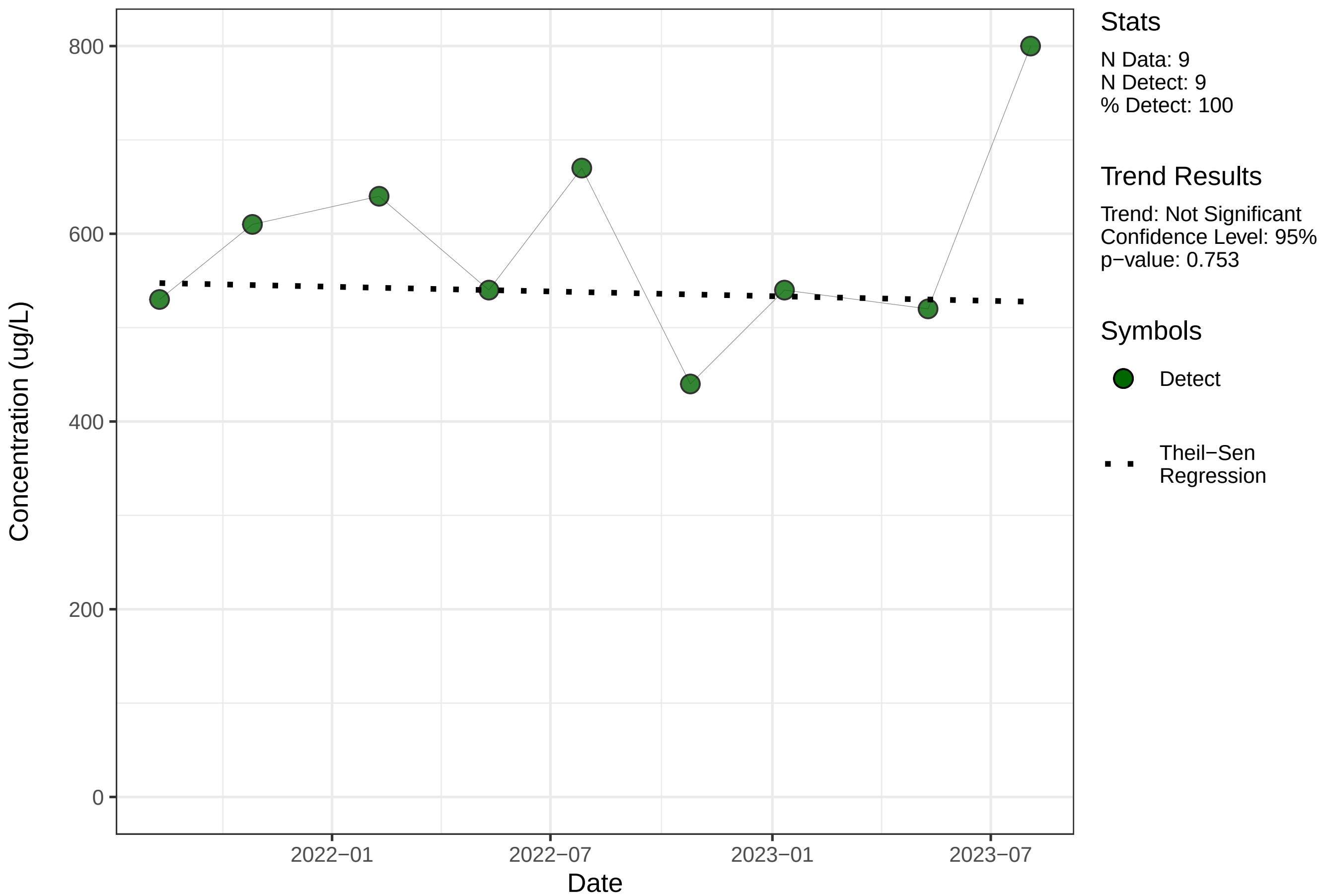
D104, Sulfate (as SO4) [mg/L]



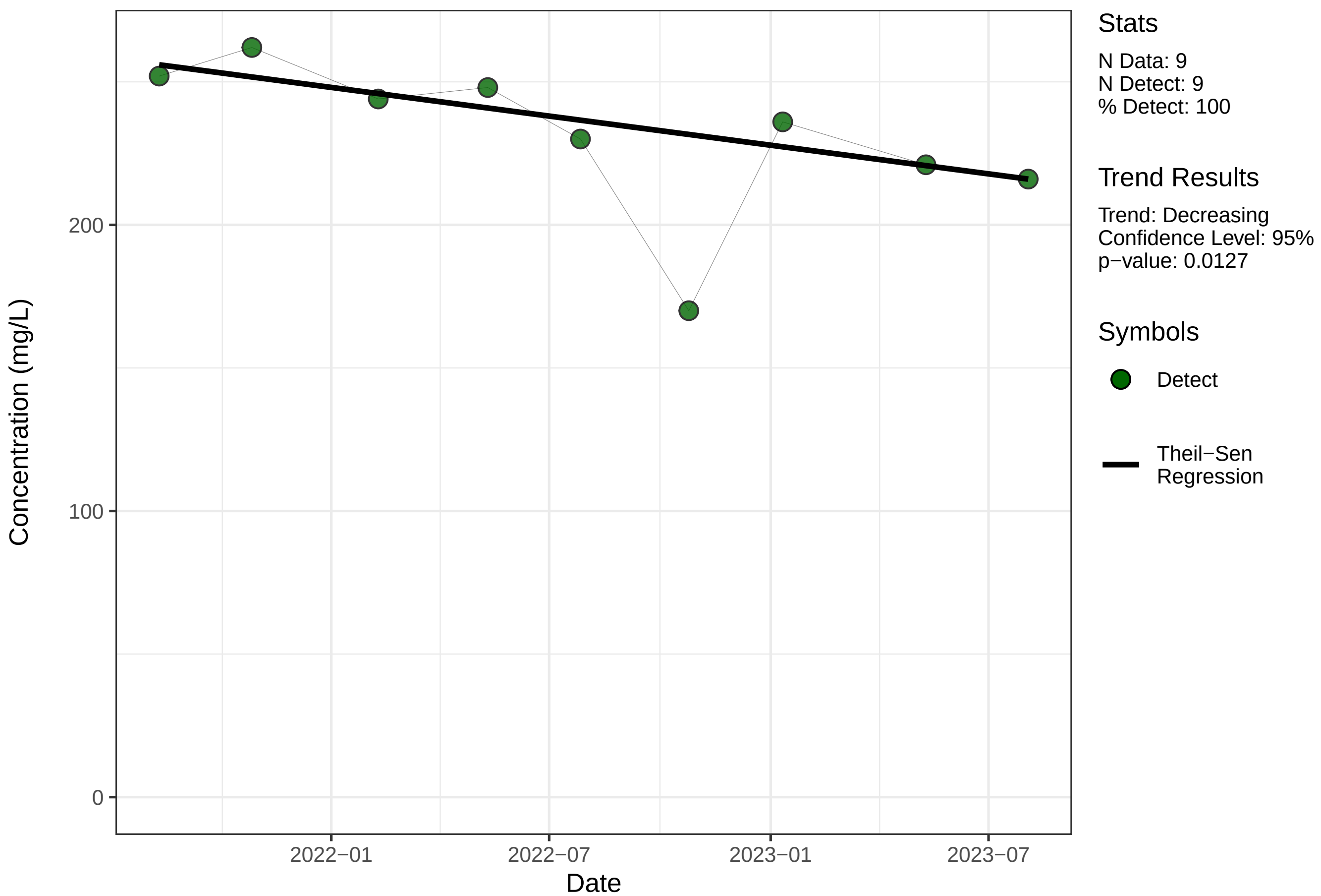
D104, Total Dissolved Solids (TDS) [mg/L]



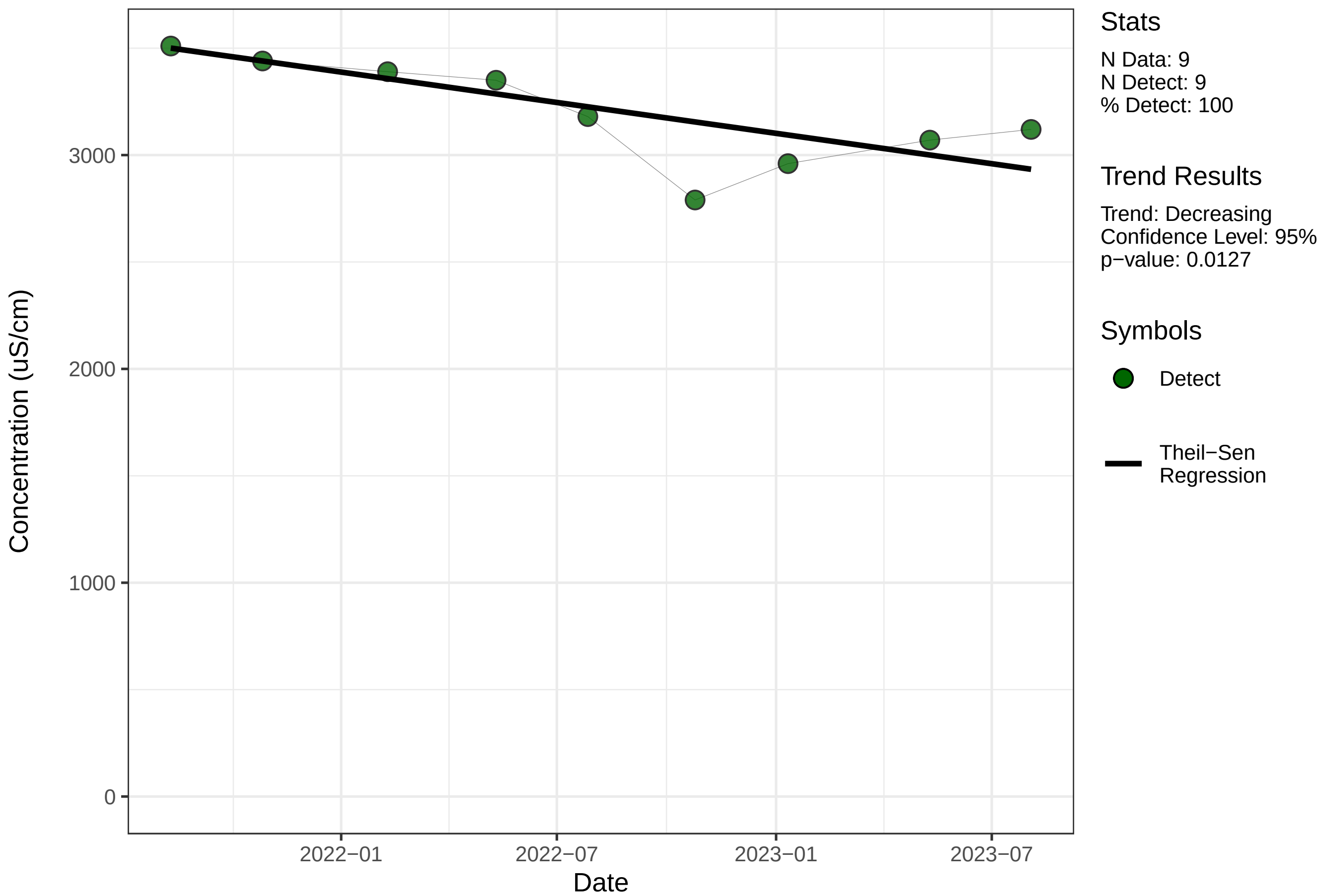
D105, Boron [ug/L]



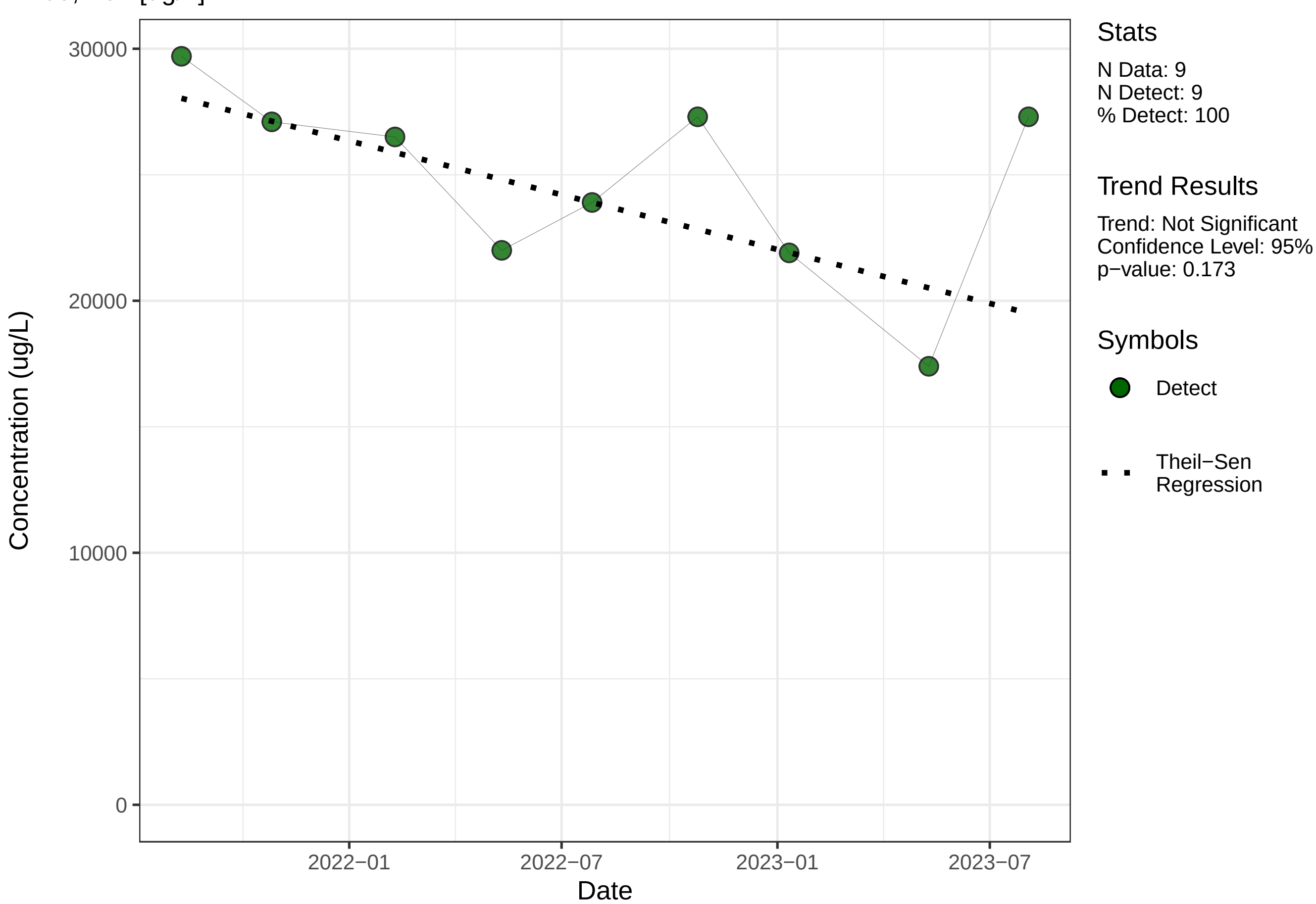
D105, Chloride [mg/L]

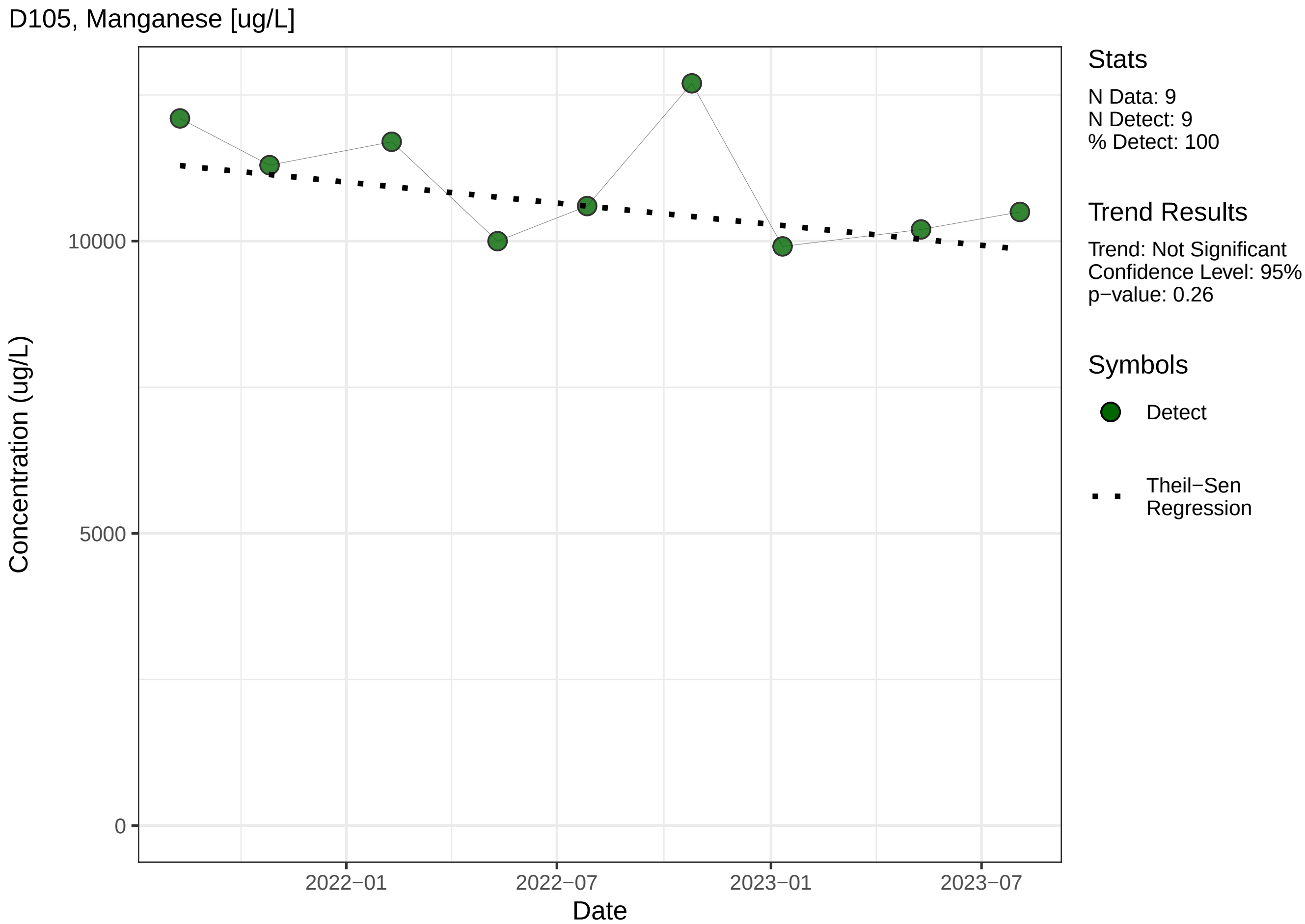


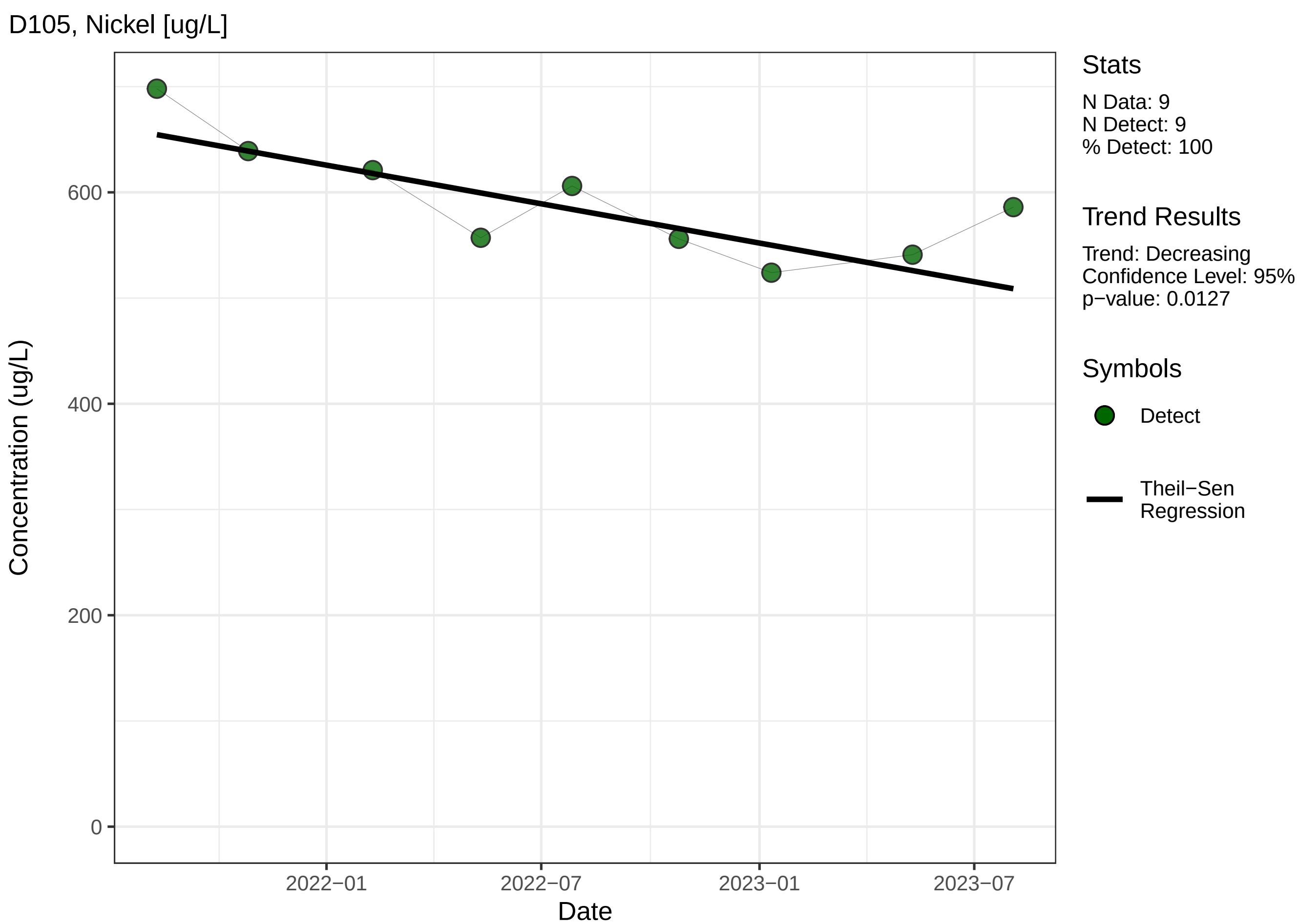
D105, Electrical Conductivity (Field) [uS/cm]



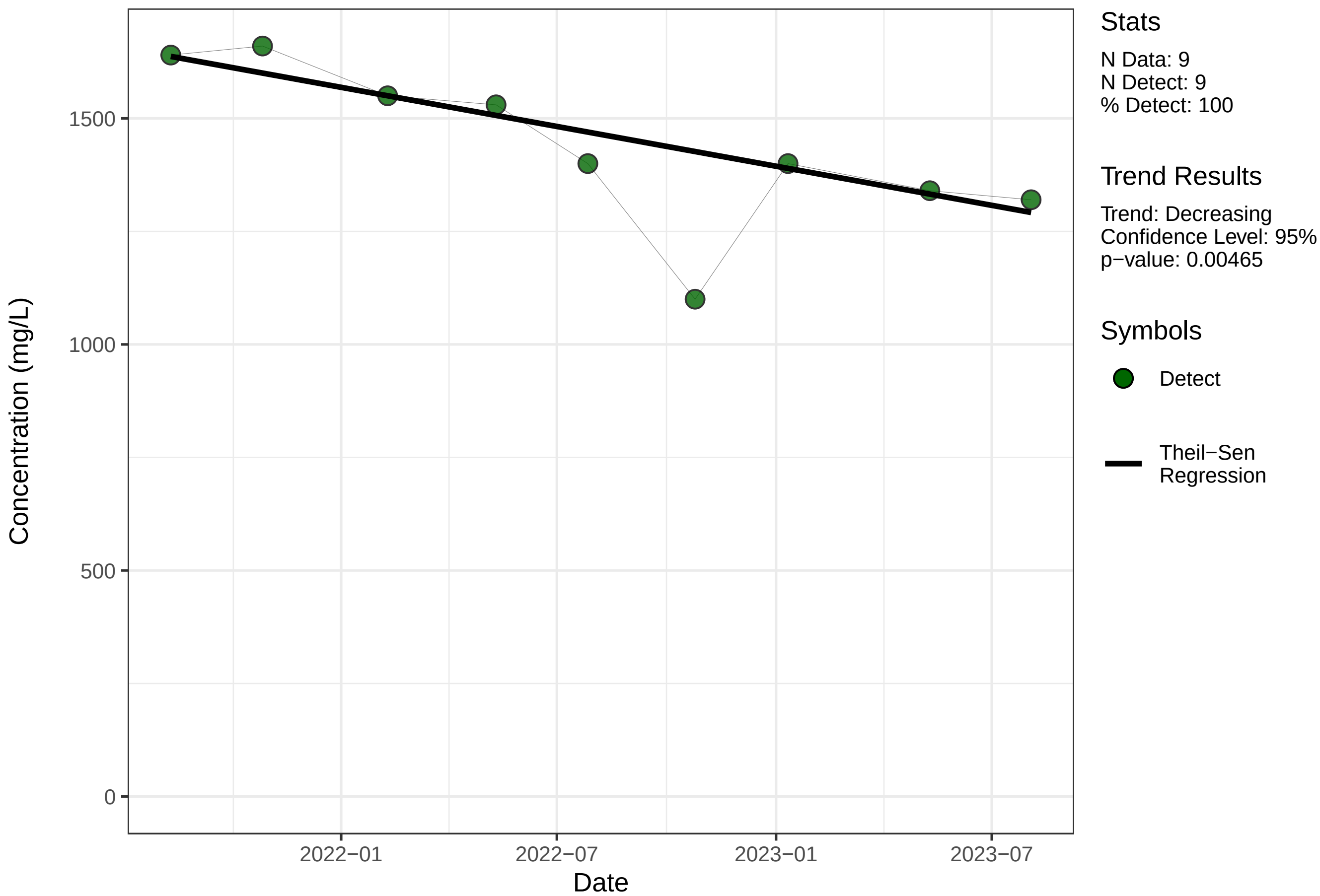
D105, Iron [ug/L]



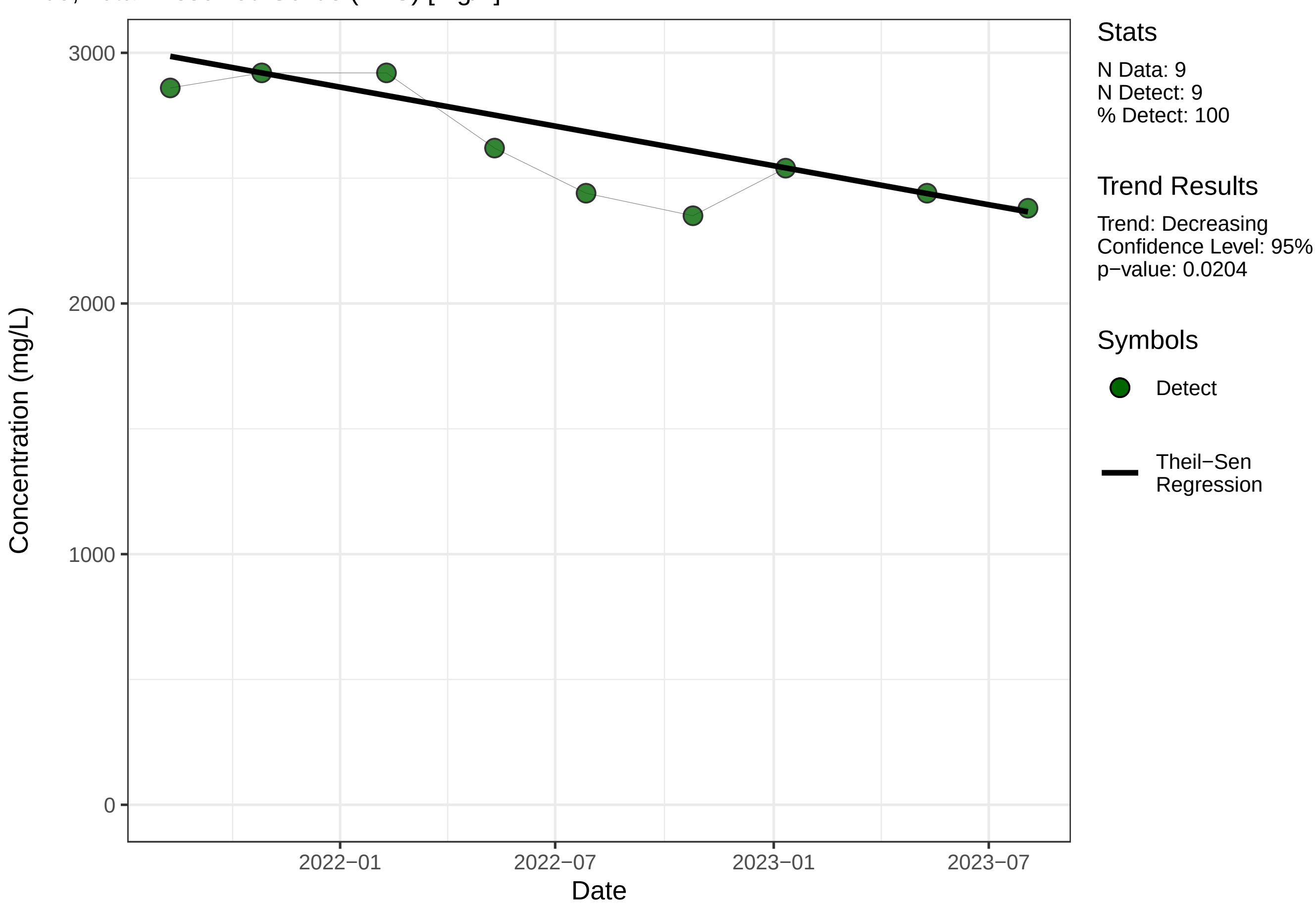

D105, Manganese [ug/L]
Concentration (ug/L)
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.26
Symbols
Detect
Theil−Sen Regression


D105, Nickel [ug/L]
Concentration (ug/L)
600
400
200
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0127
Symbols
Detect
Theil−Sen Regression

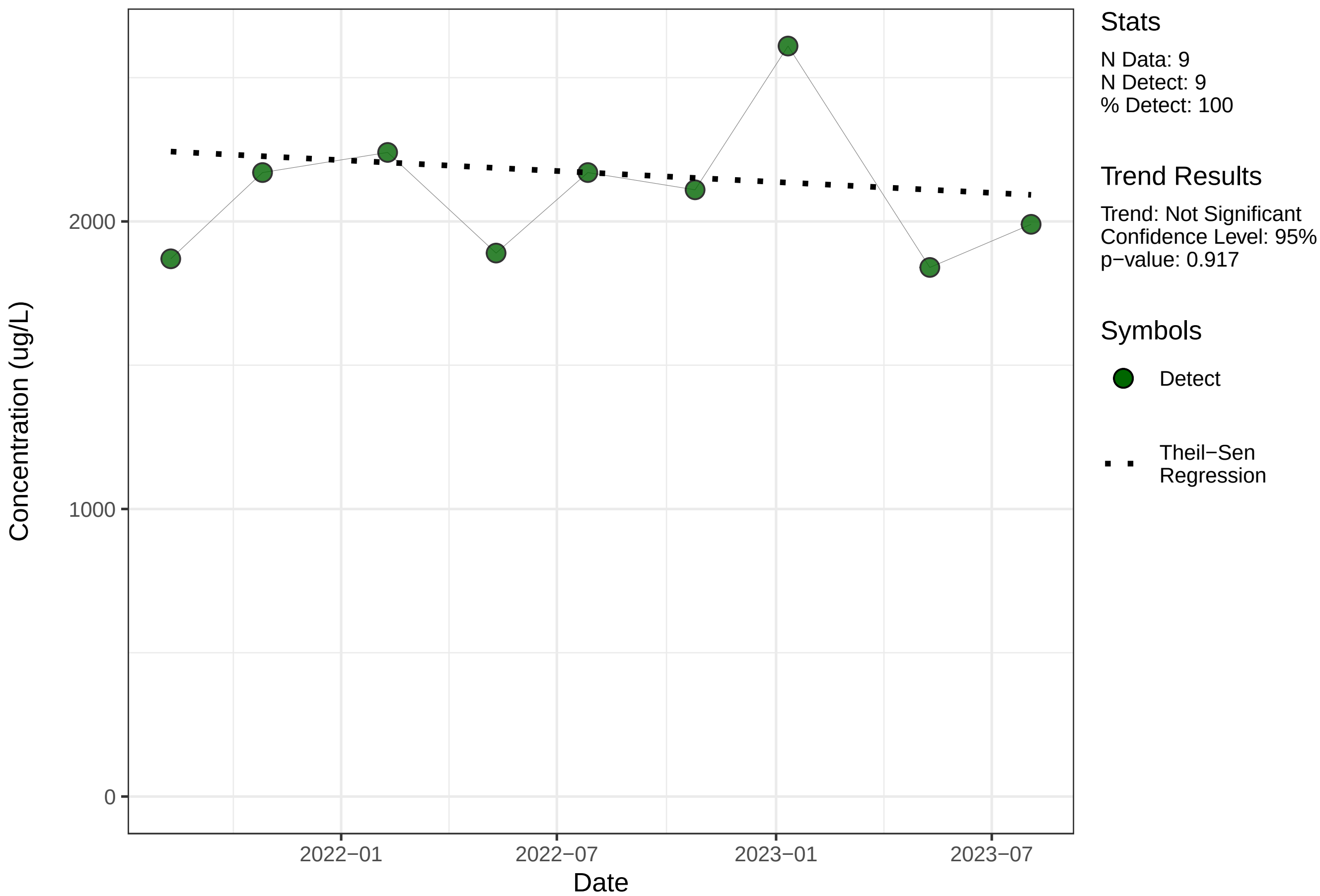
D105, Sulfate (as SO4) [mg/L]



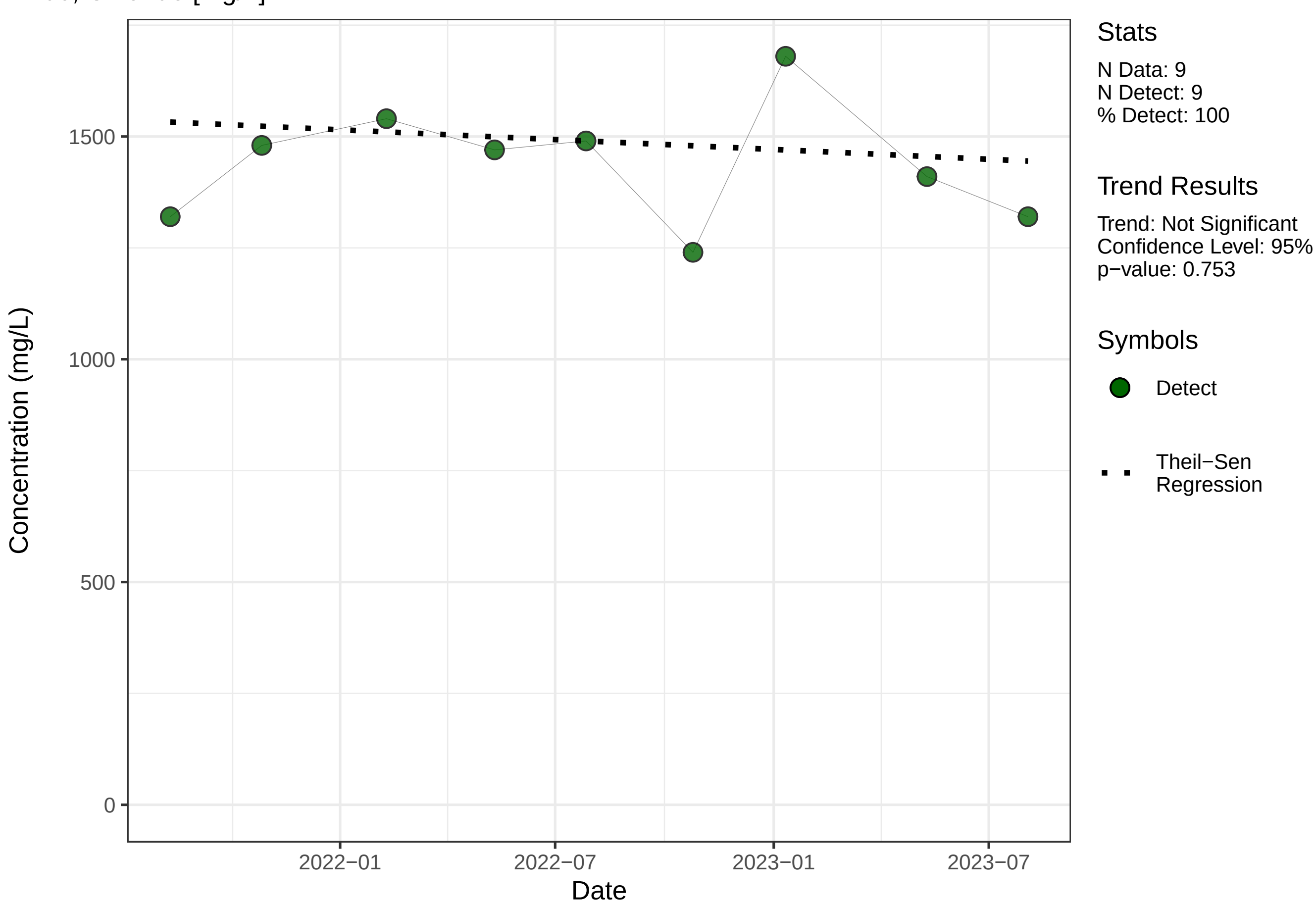
D105, Total Dissolved Solids (TDS) [mg/L]

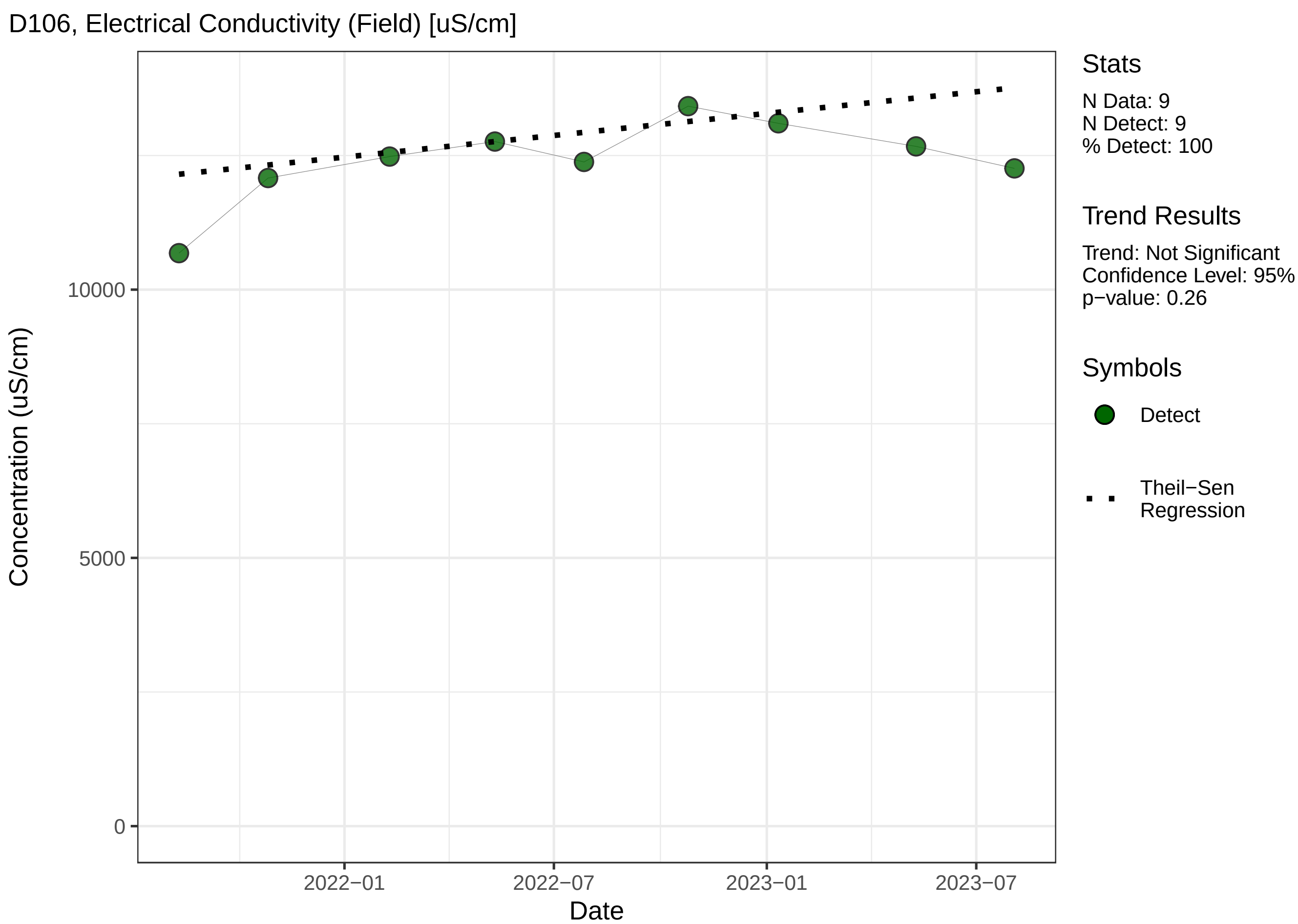


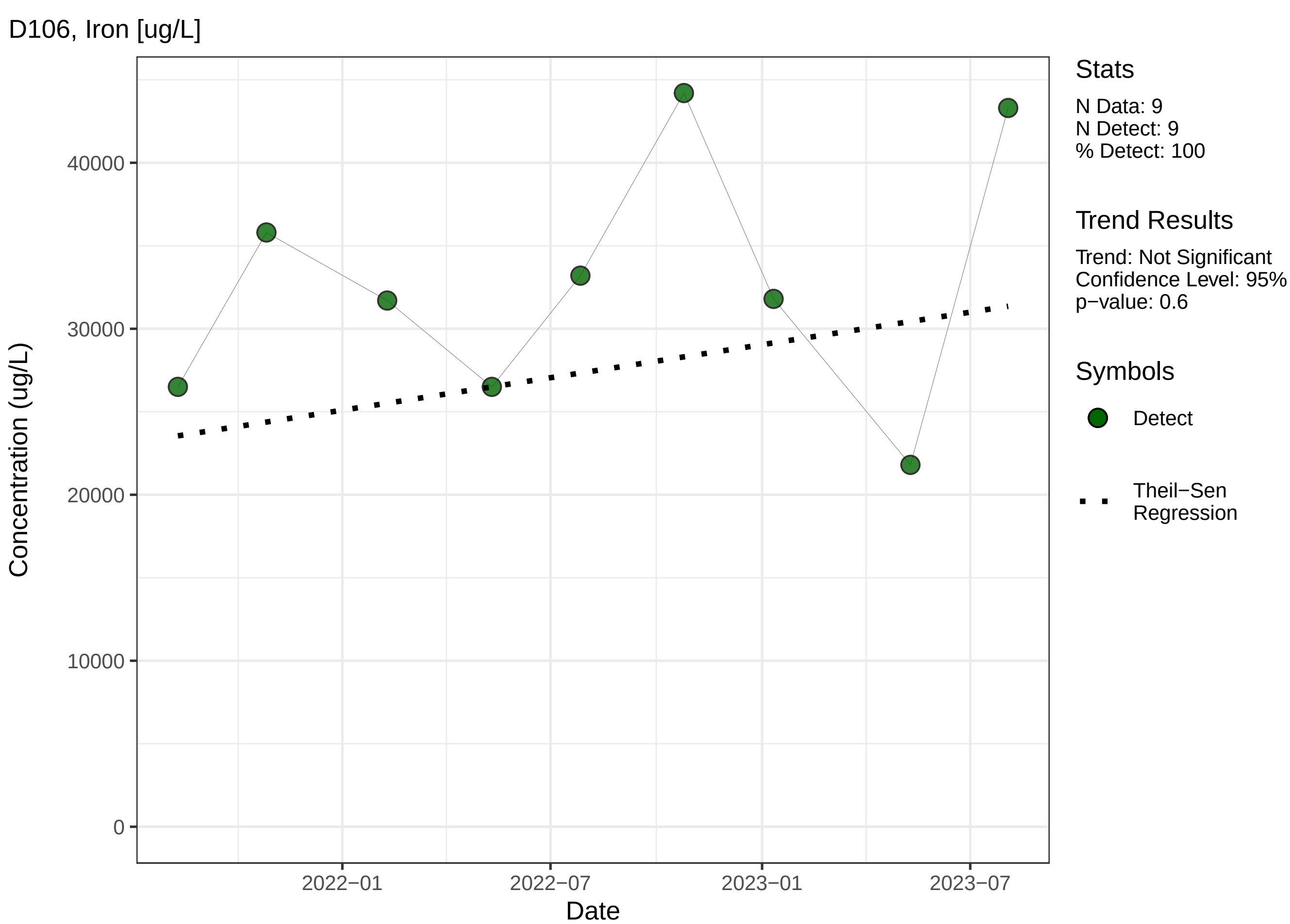
D106, Boron [ug/L]



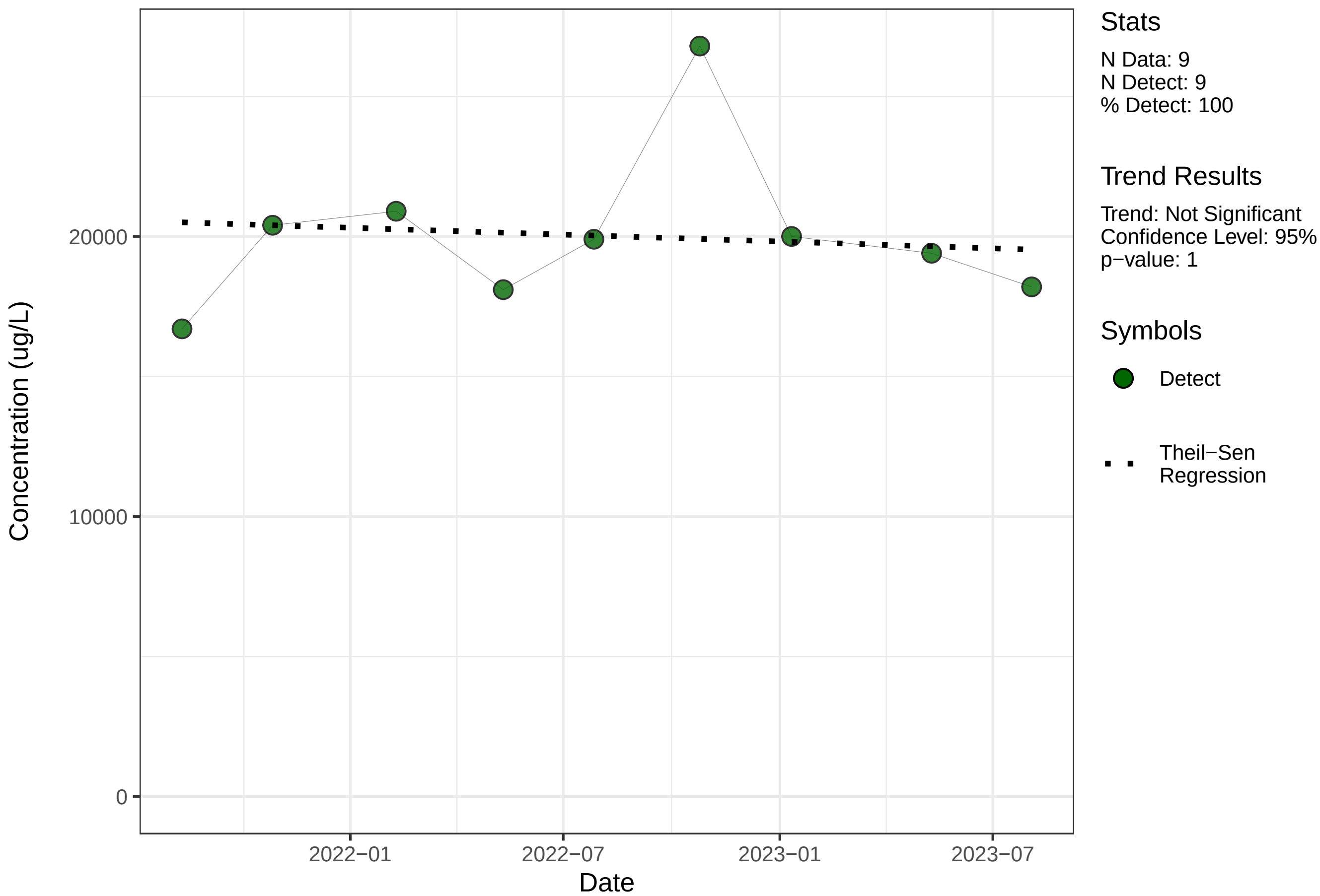
D106, Chloride [mg/L]



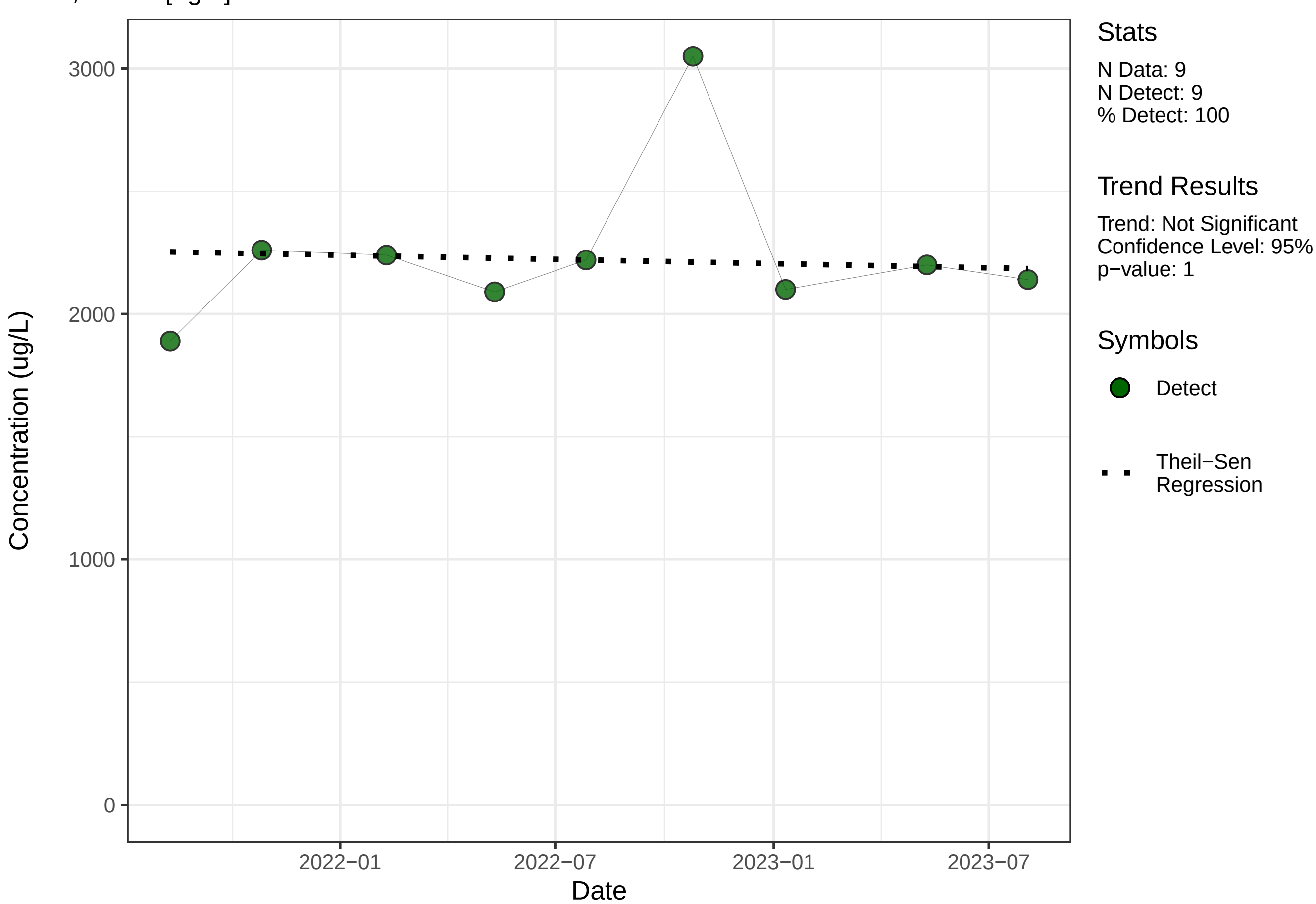

D106, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.26
Symbols
Detect
Theil−Sen Regression


D106, Iron [ug/L]
Concentration (ug/L)
40000
30000
20000
10000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.6
Symbols
Detect
Theil−Sen Regression

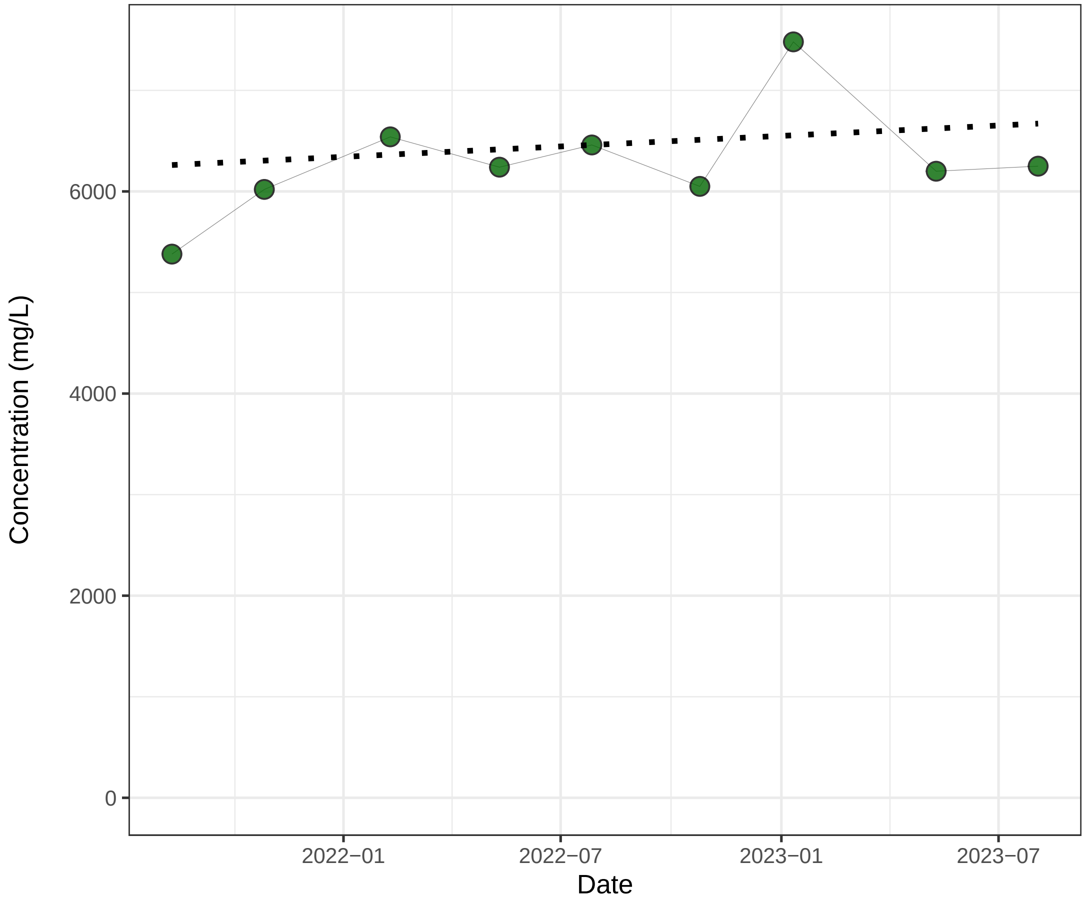
D106, Manganese [ug/L]



D106, Nickel [ug/L]



D106, Sulfate (as SO4) [mg/L]



Stats

N Data: 9
N Detect: 9
% Detect: 100

Trend Results

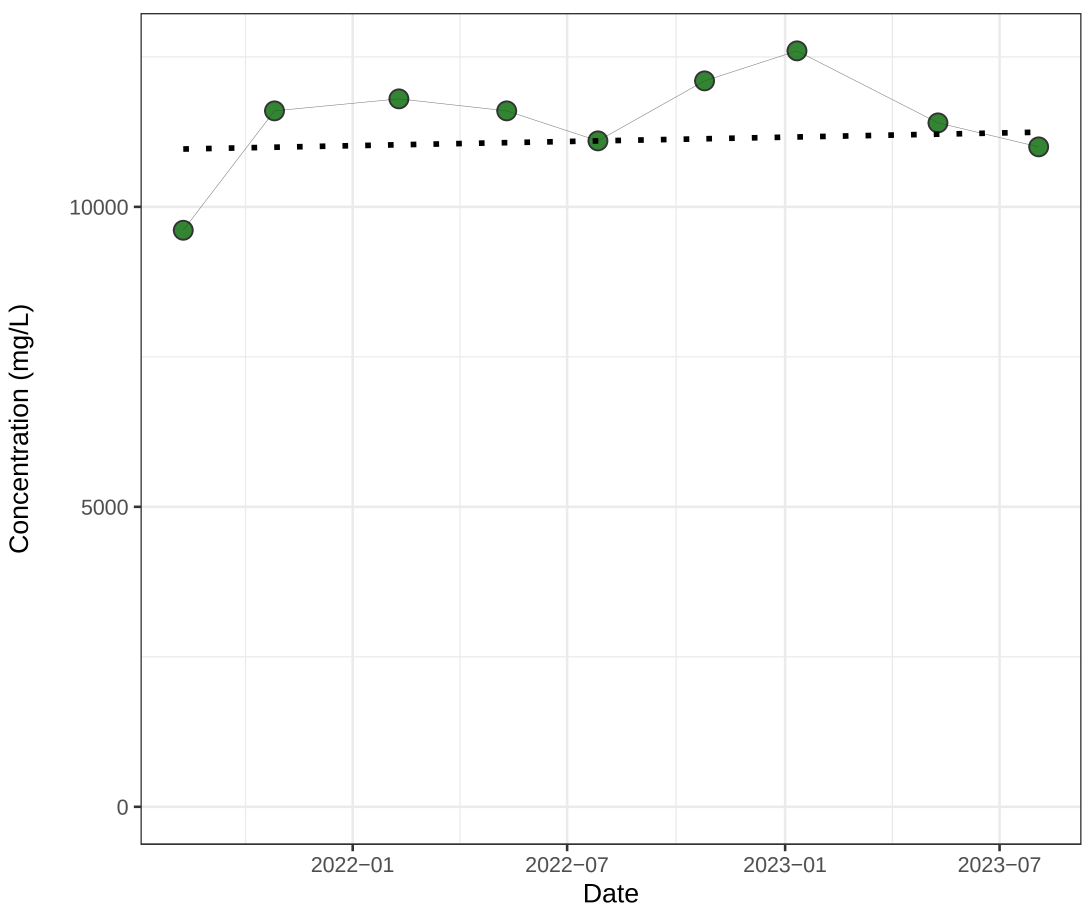
Trend: Not Significant
Confidence Level: 95%
p−value: 0.26

Symbols

Detect

Theil−Sen Regression

D106, Total Dissolved Solids (TDS) [mg/L]



Stats

N Data: 9
N Detect: 9
% Detect: 100

Trend Results

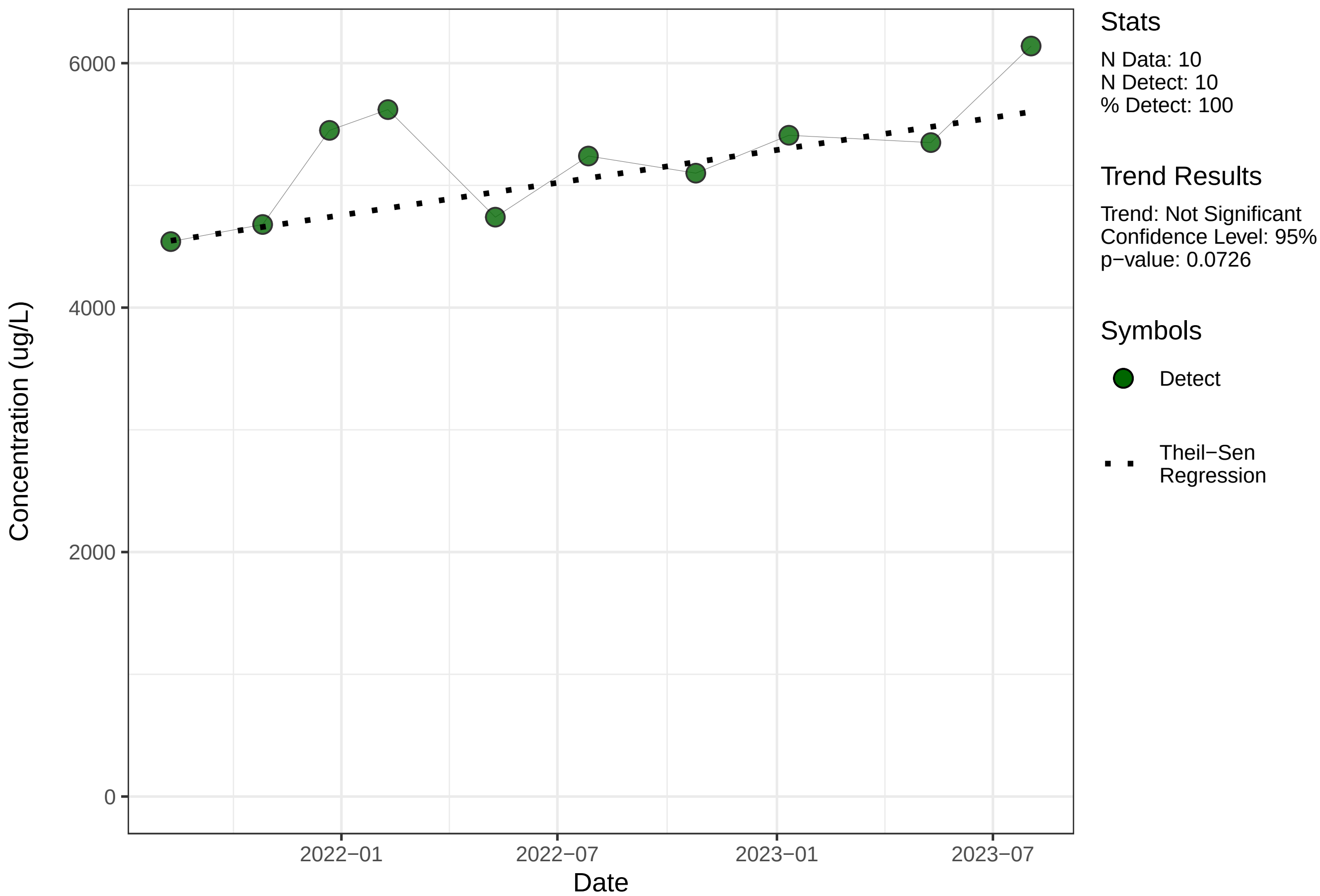
Trend: Not Significant
Confidence Level: 95%
p−value: 0.753

Symbols

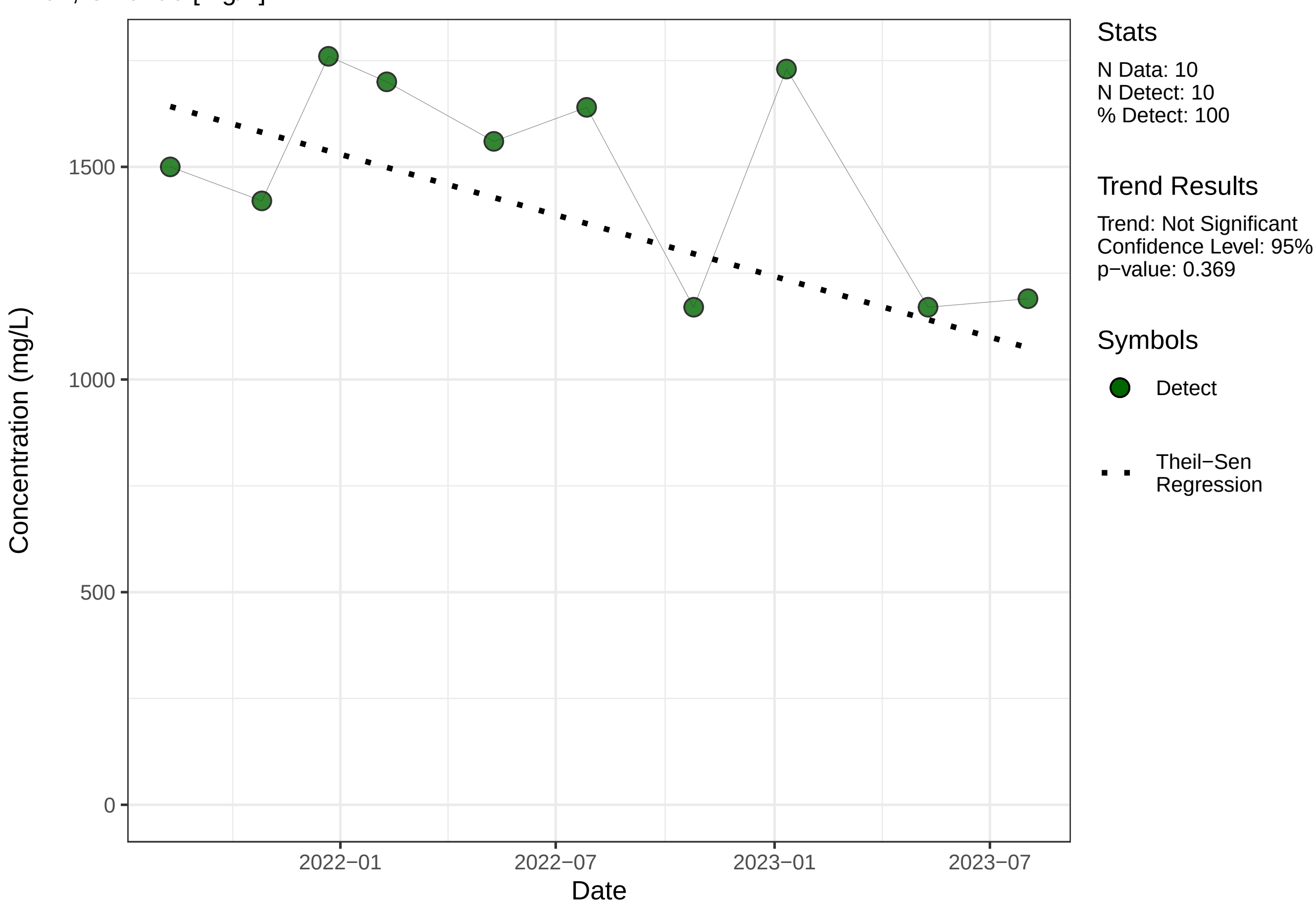
Detect

Theil−Sen Regression

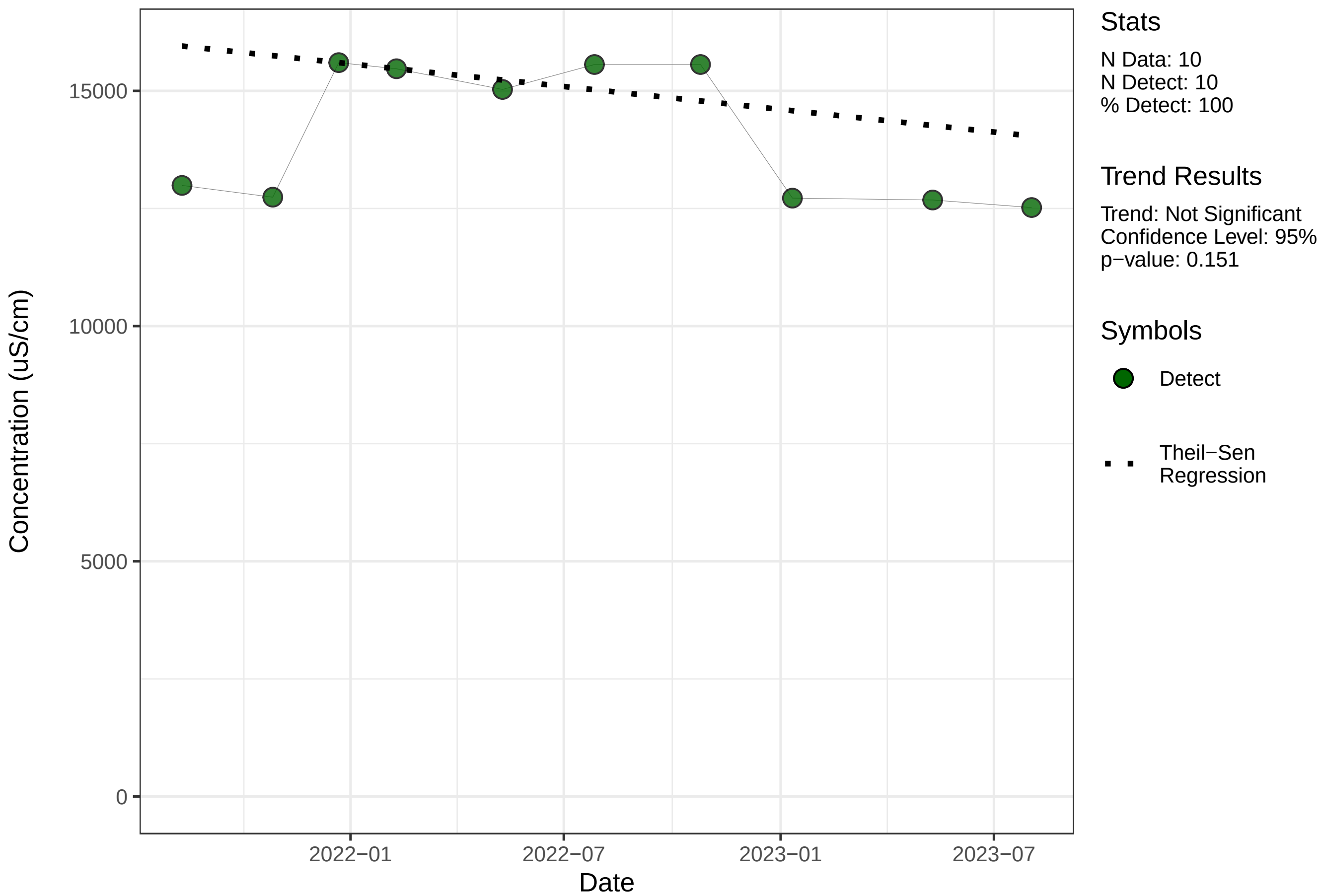
D107, Boron [ug/L]



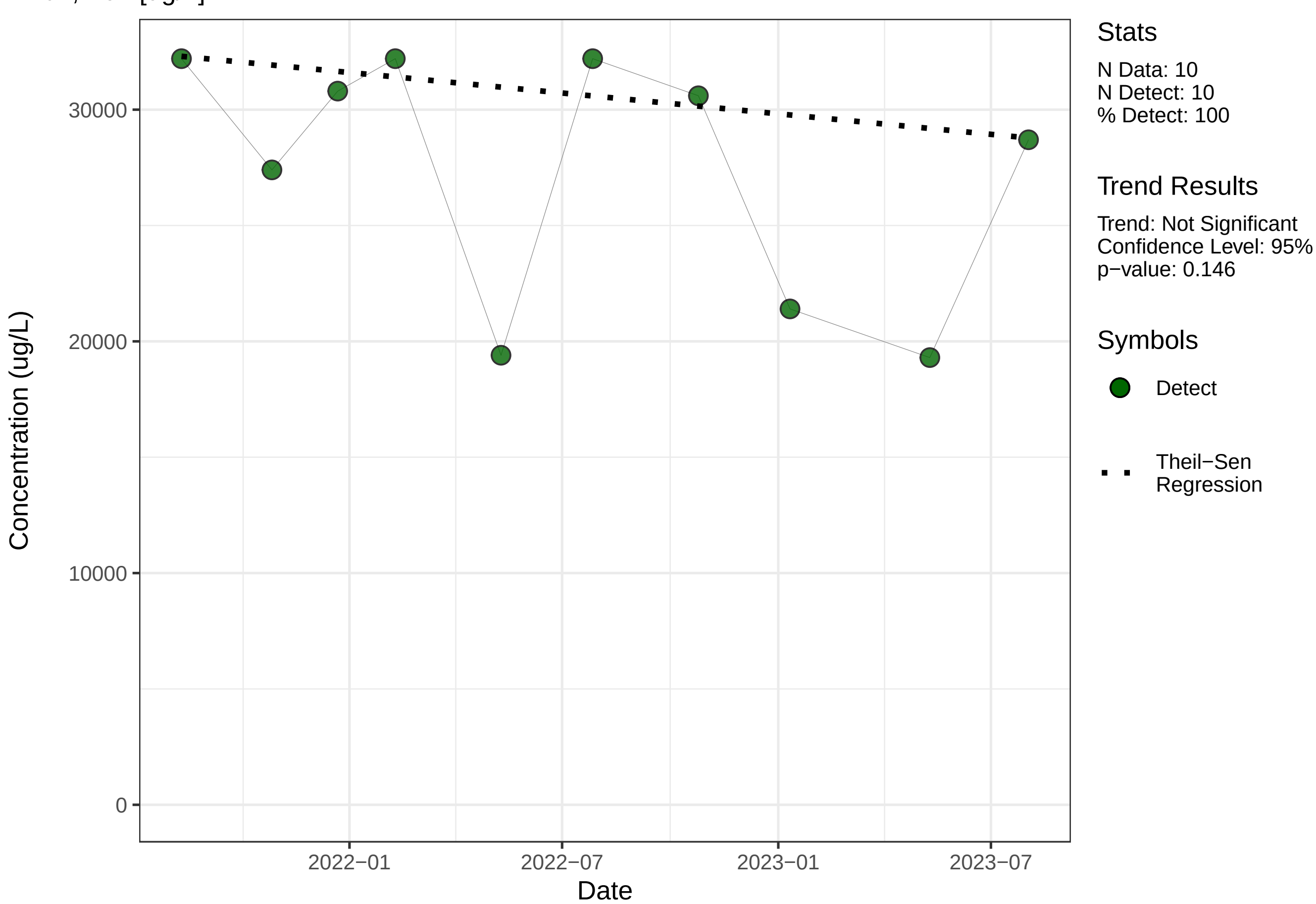
D107, Chloride [mg/L]

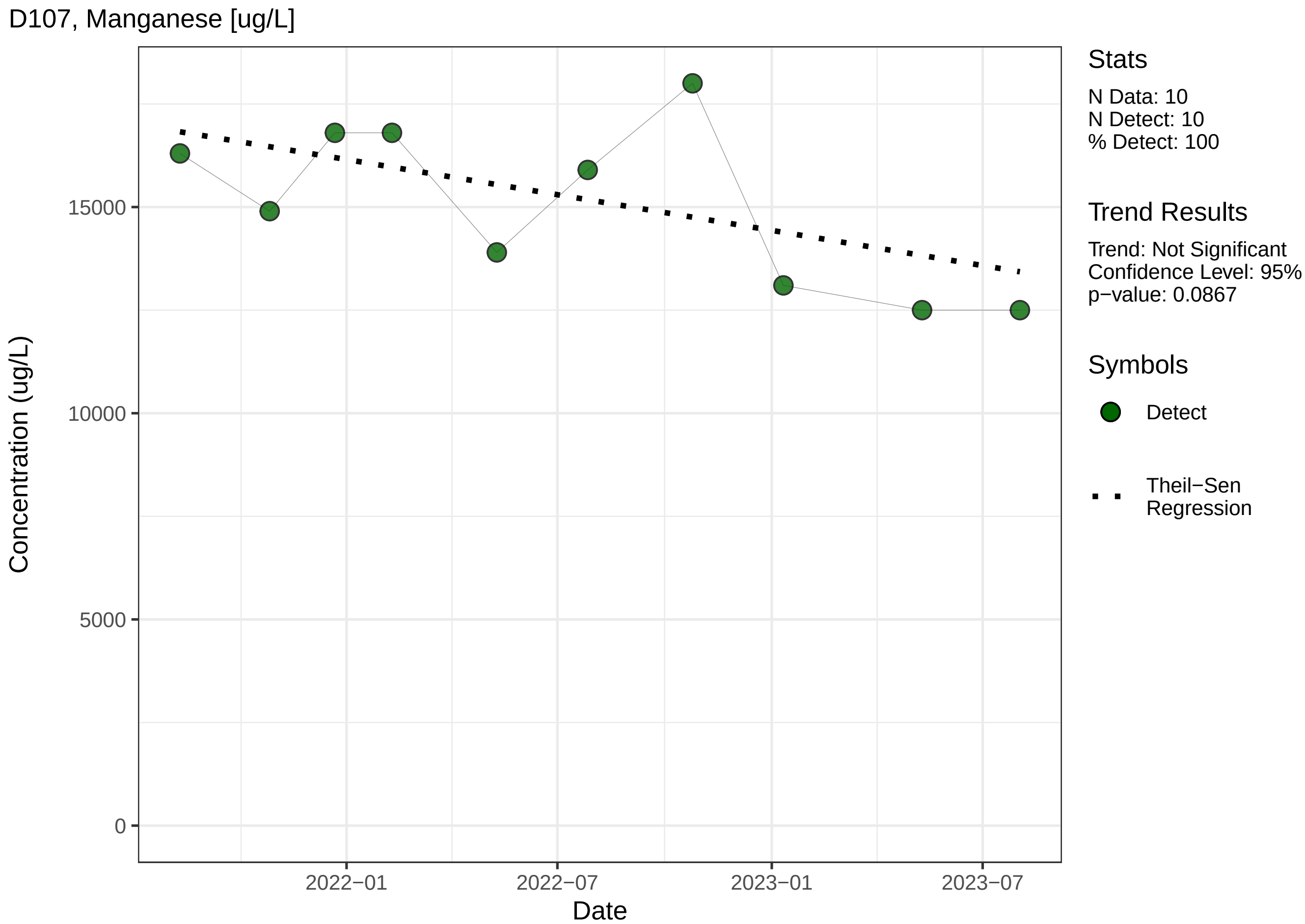


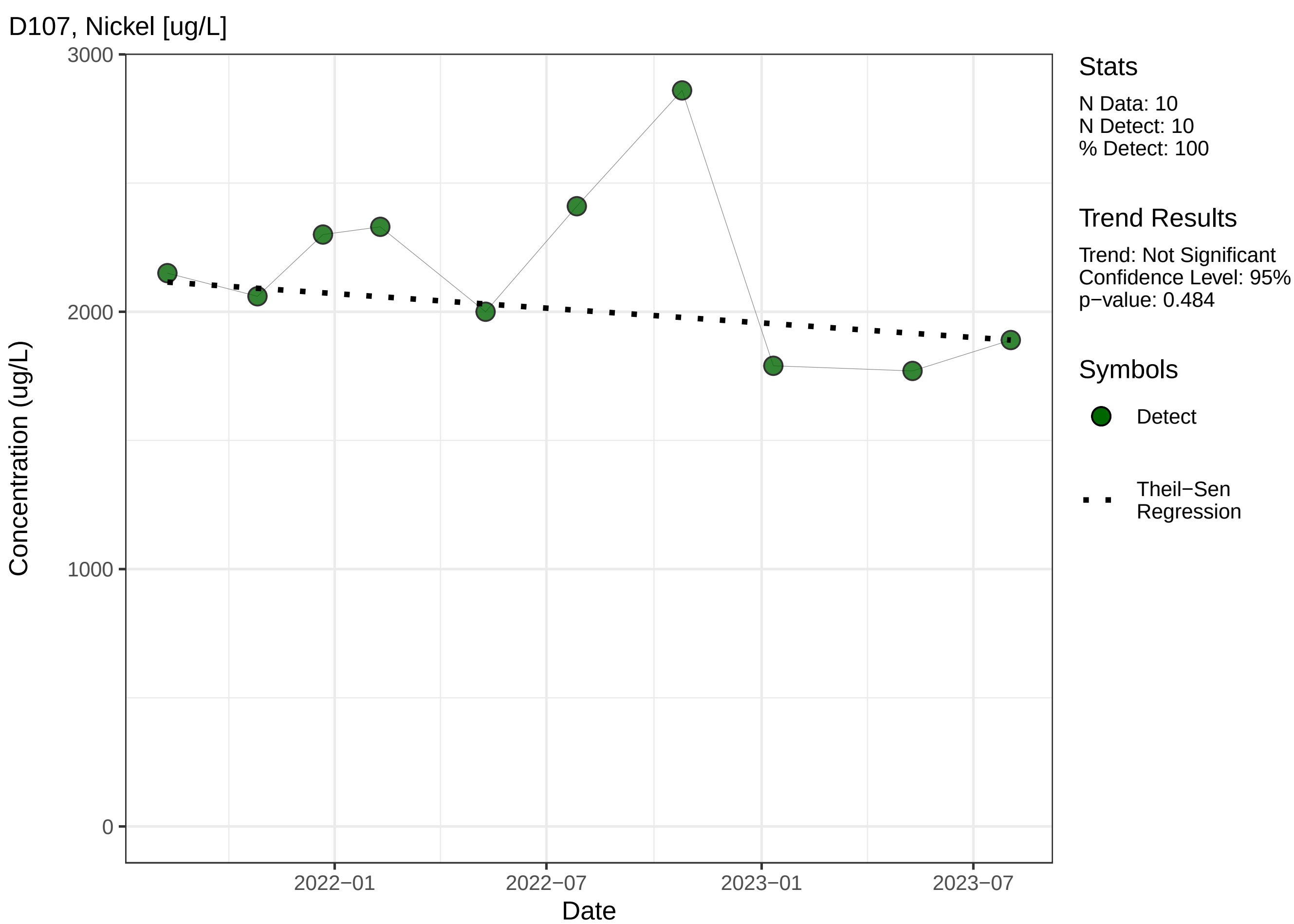
D107, Electrical Conductivity (Field) [uS/cm]



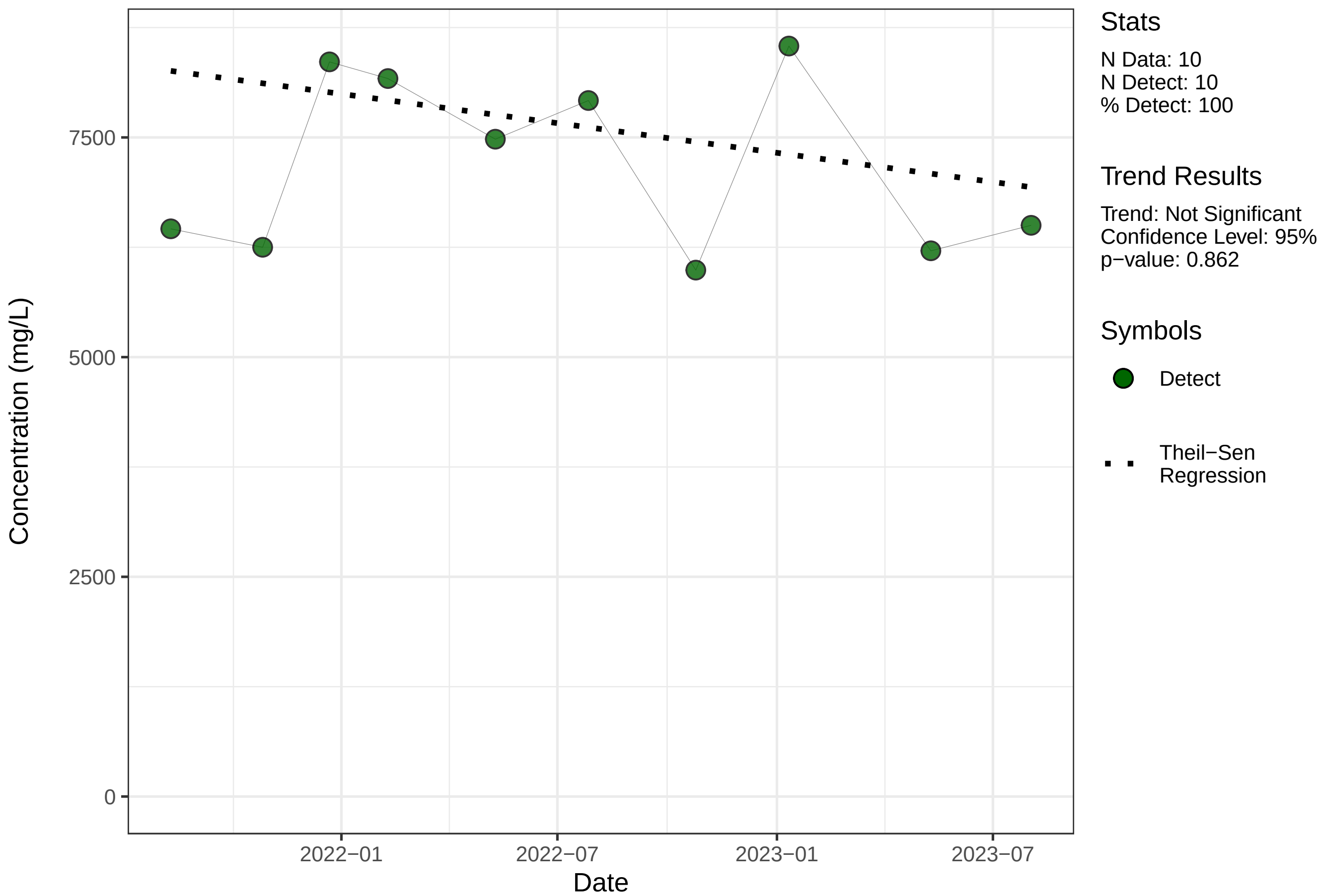
D107, Iron [ug/L]



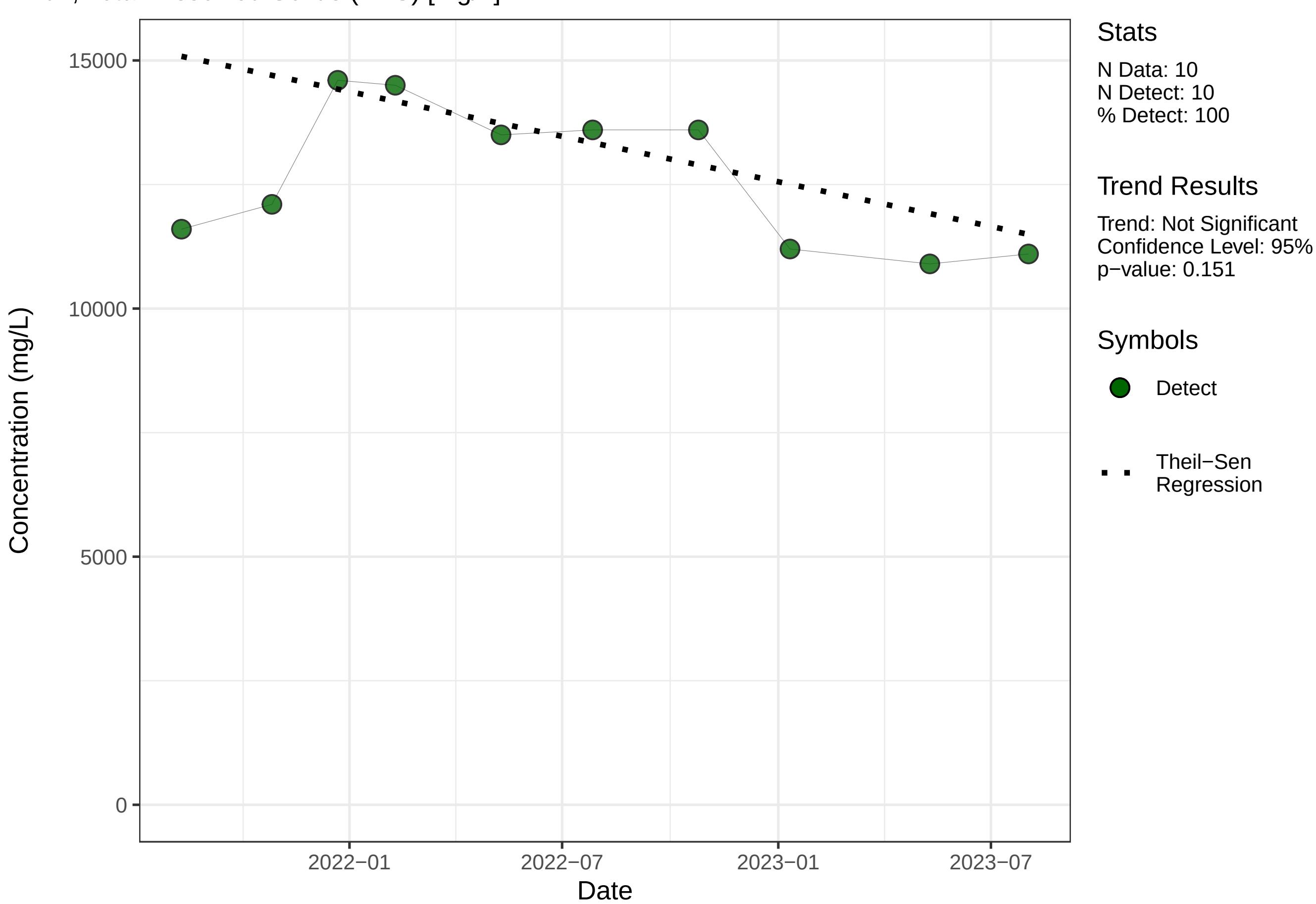

D107, Manganese [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 10
N Detect: 10
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.0867
Symbols
Detect
Theil−Sen Regression


D107, Nickel [ug/L]
Concentration (ug/L)
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 10
N Detect: 10
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.484
Symbols
Detect
Theil−Sen Regression

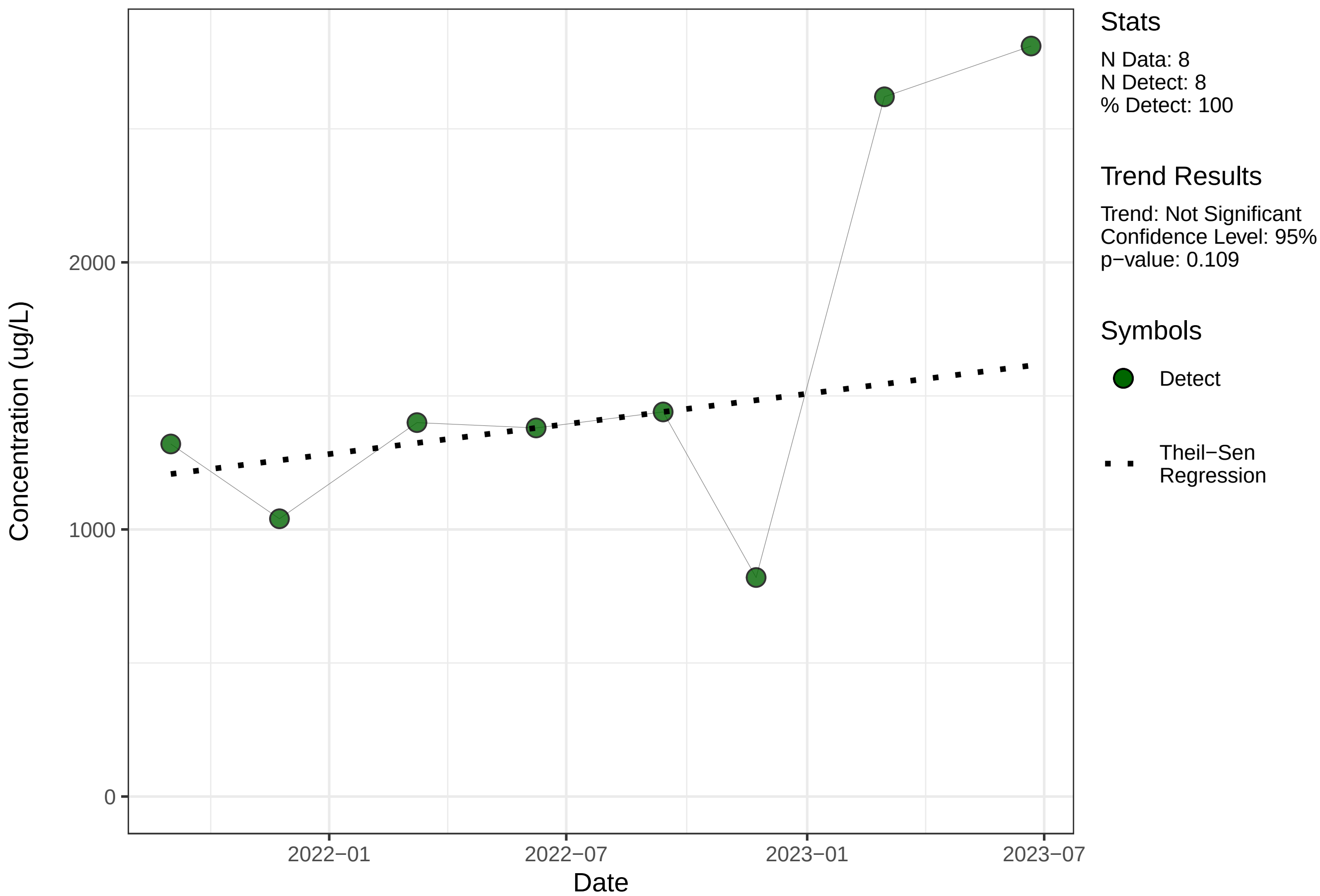
D107, Sulfate (as SO4) [mg/L]



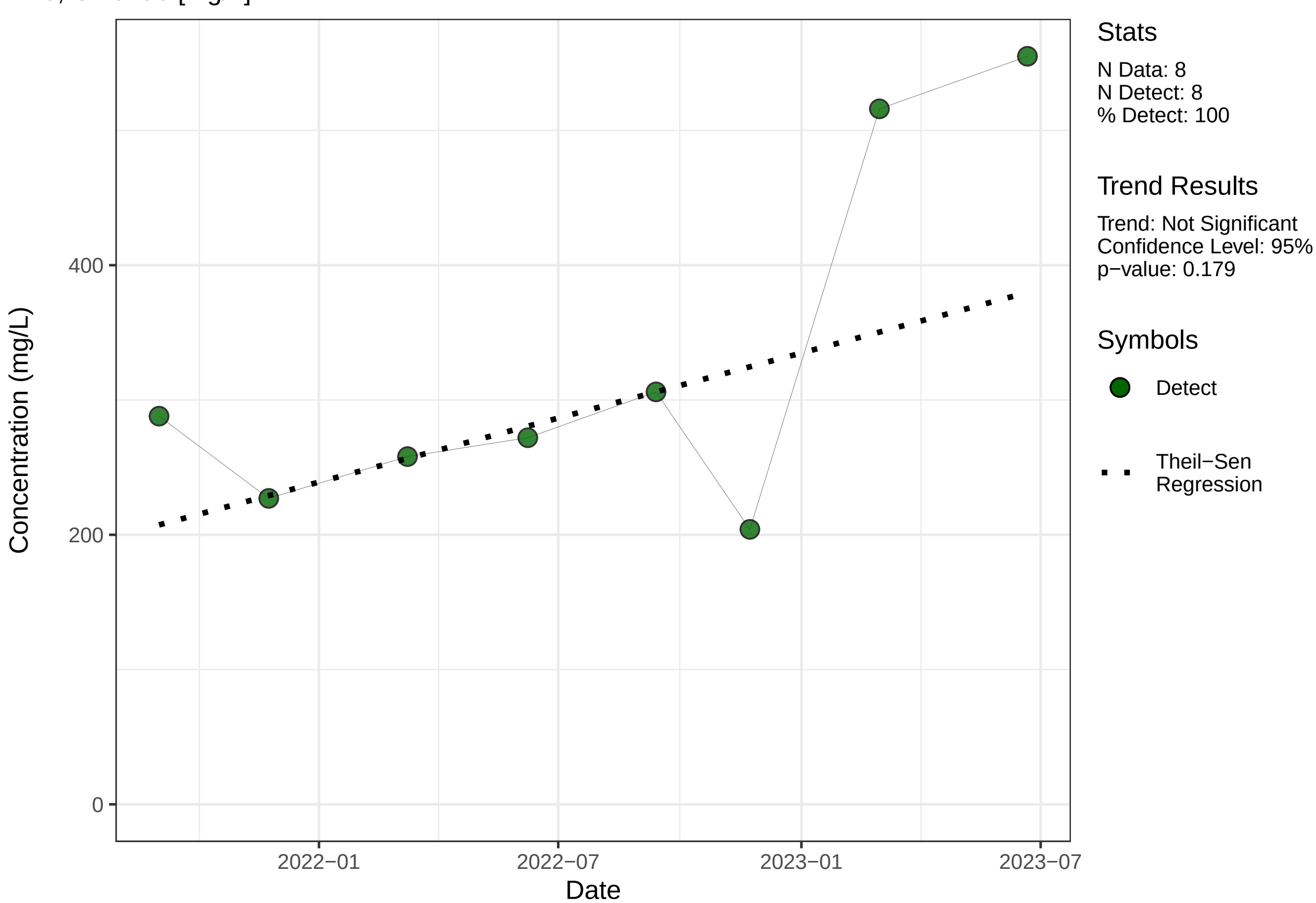
D107, Total Dissolved Solids (TDS) [mg/L]



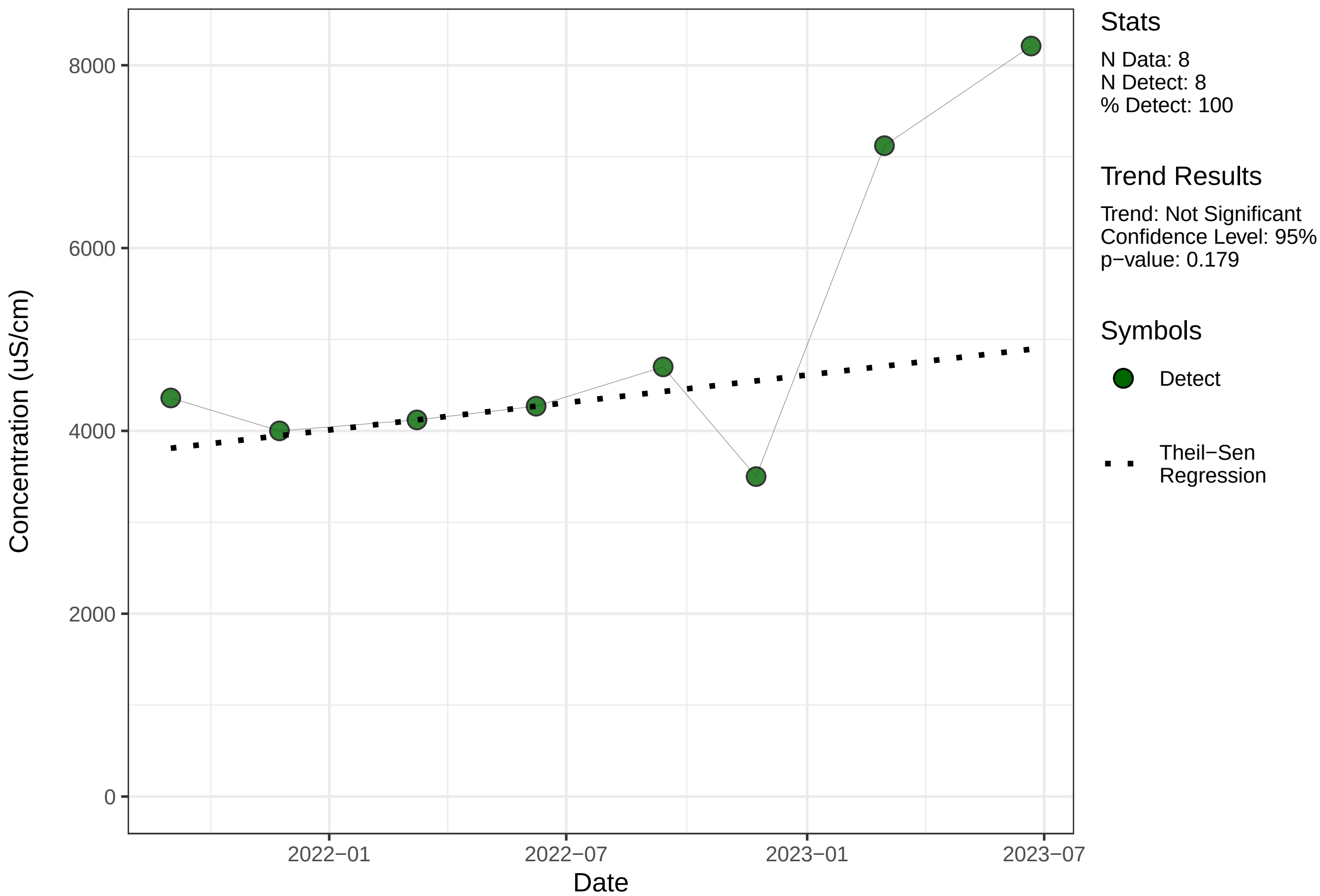
D10, Boron [ug/L]



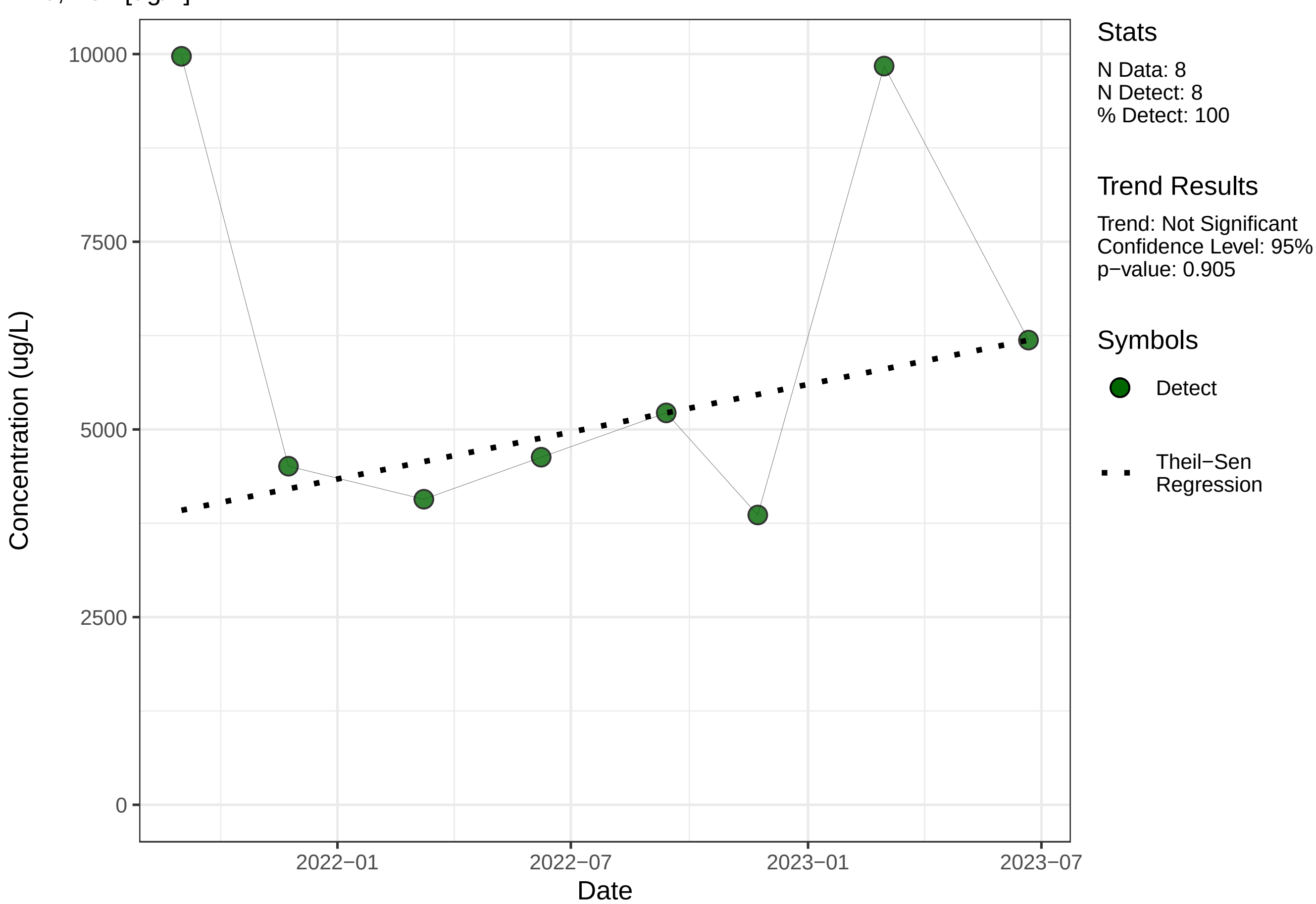
D10, Chloride [mg/L]

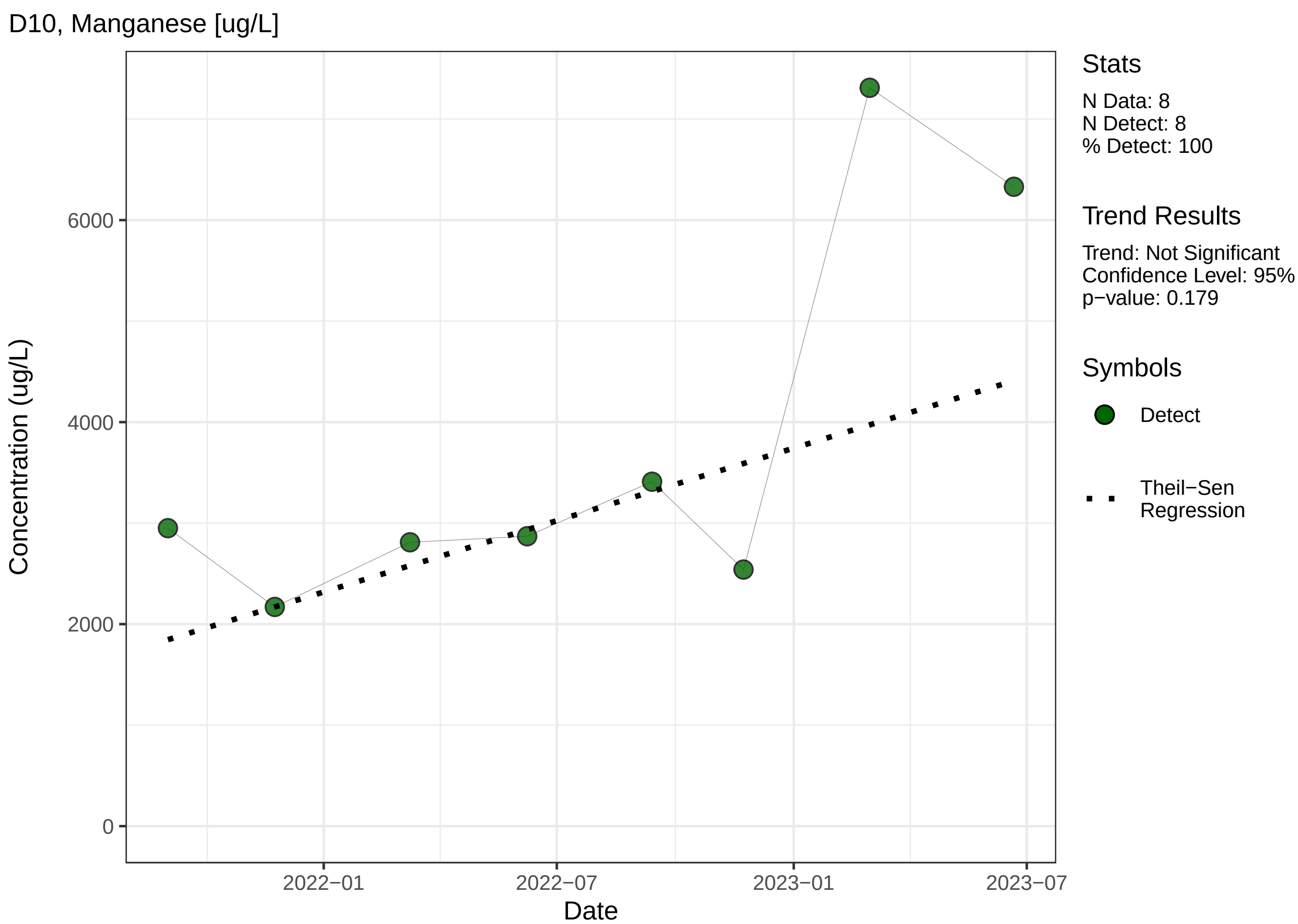


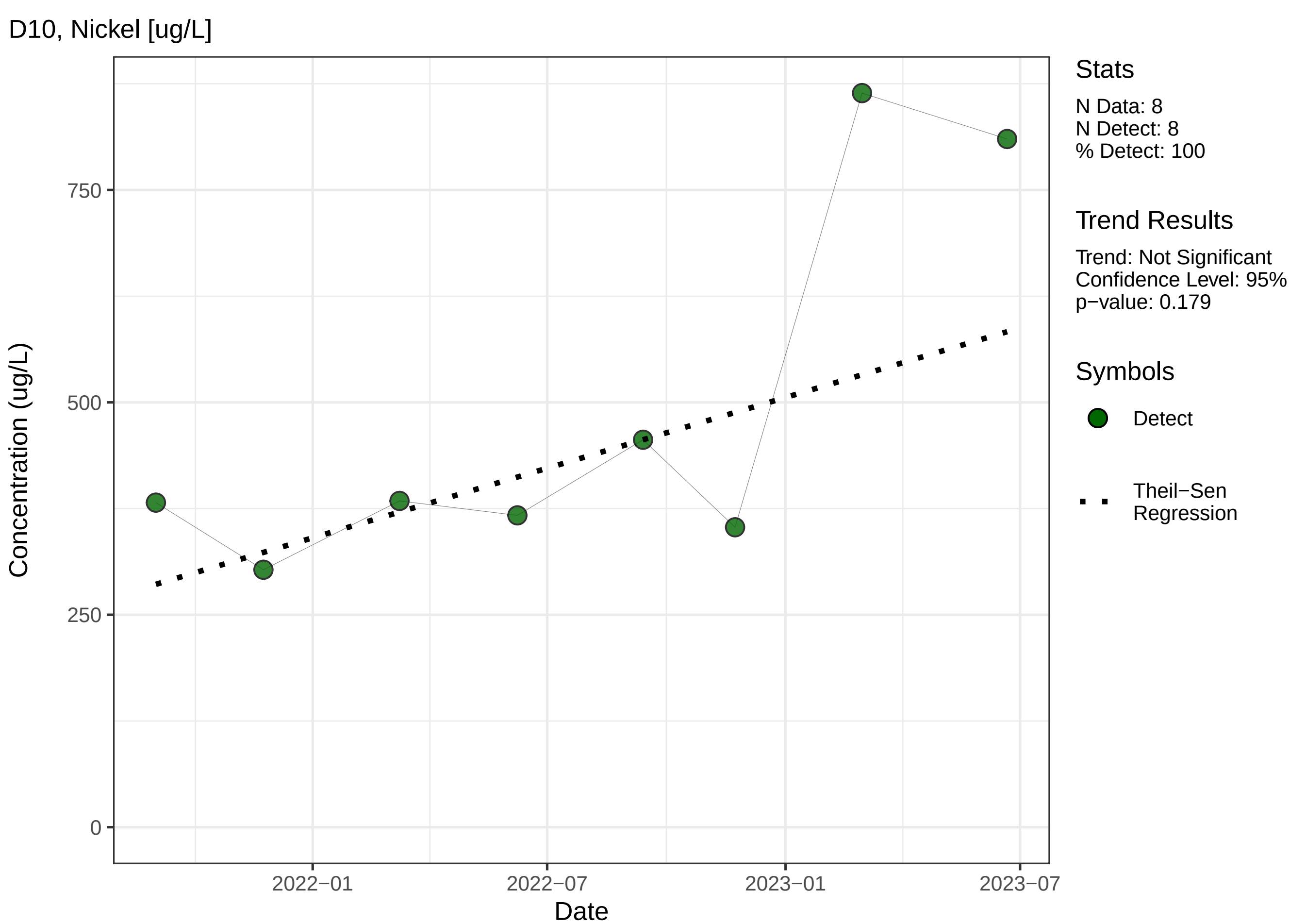
D10, Electrical Conductivity (Field) [uS/cm]



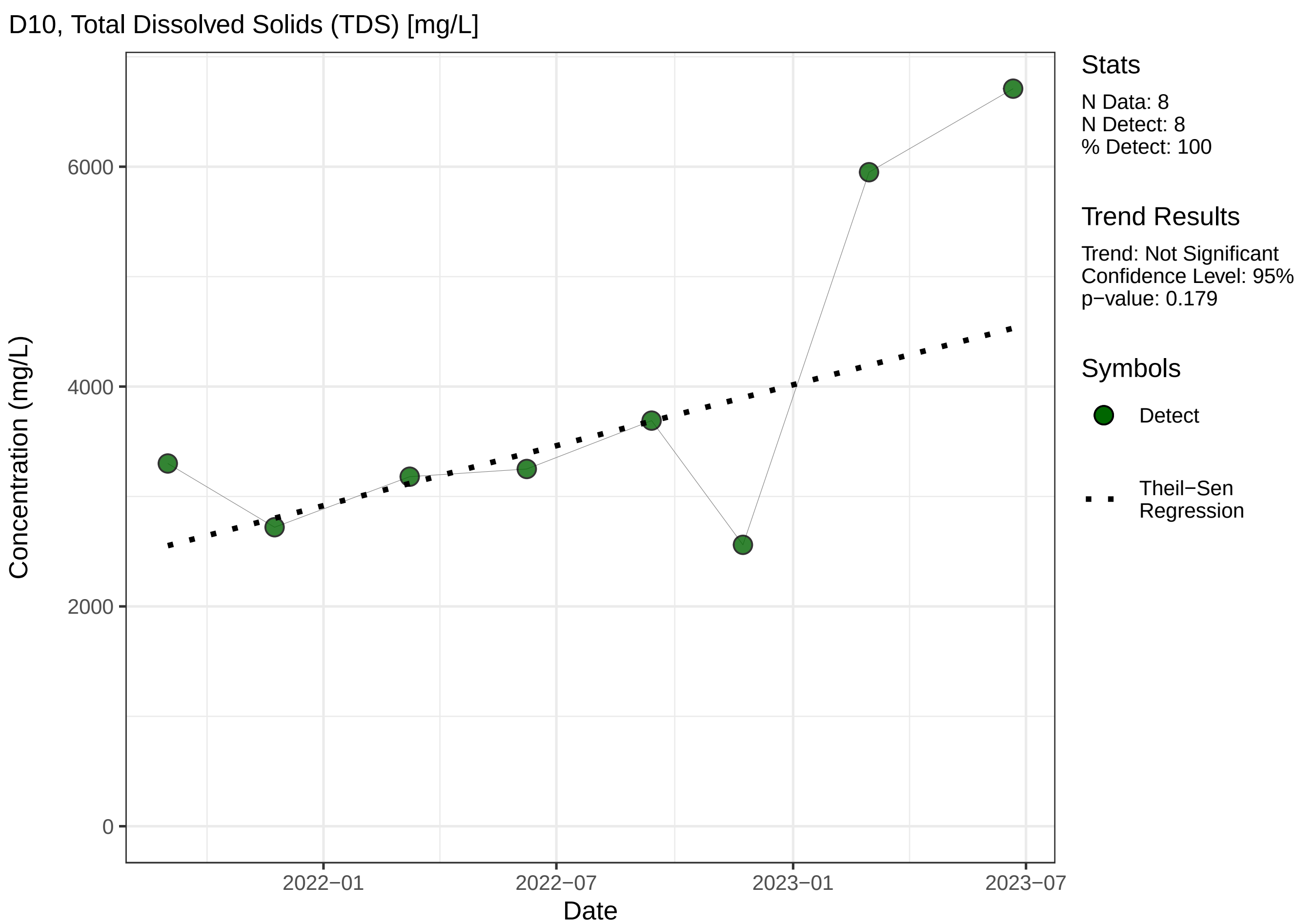
D10, Iron [ug/L]



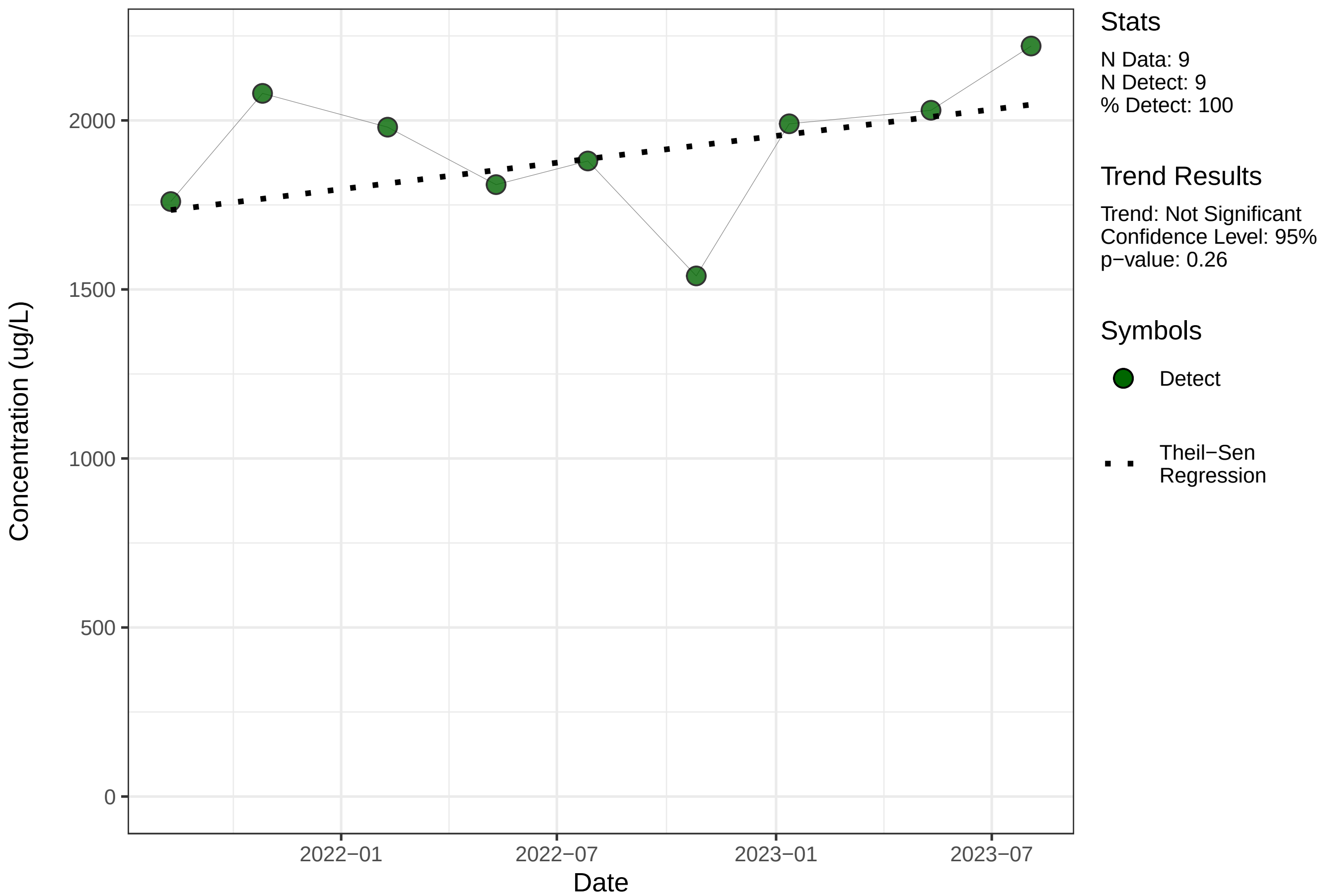

D10, Manganese [ug/L]
Concentration (ug/L)
0
2000
4000
6000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression


D10, Nickel [ug/L]
Concentration (ug/L)
0
250
500
750
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

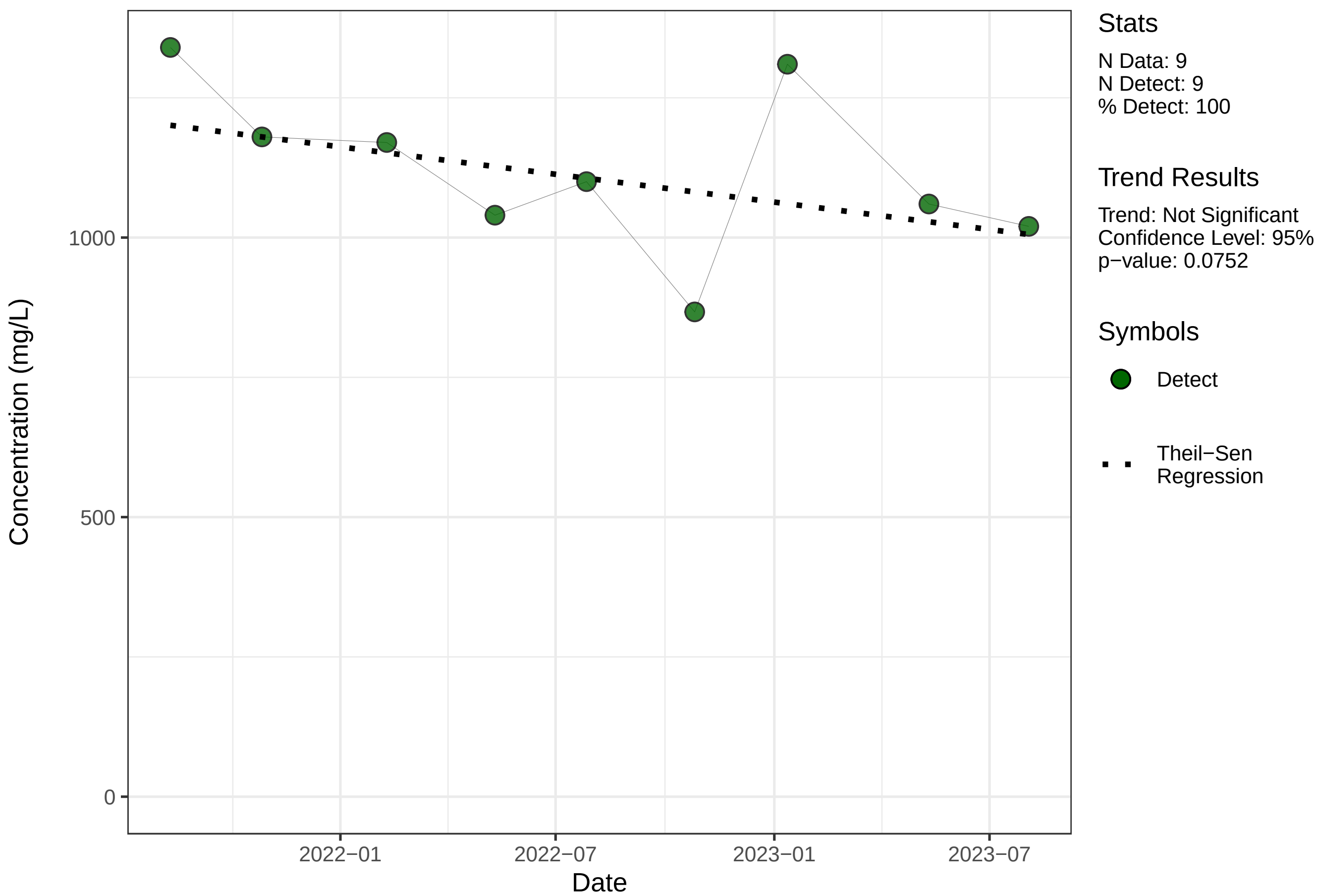

D10, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
0
1000
2000
3000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression


D10, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
0
2000
4000
6000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

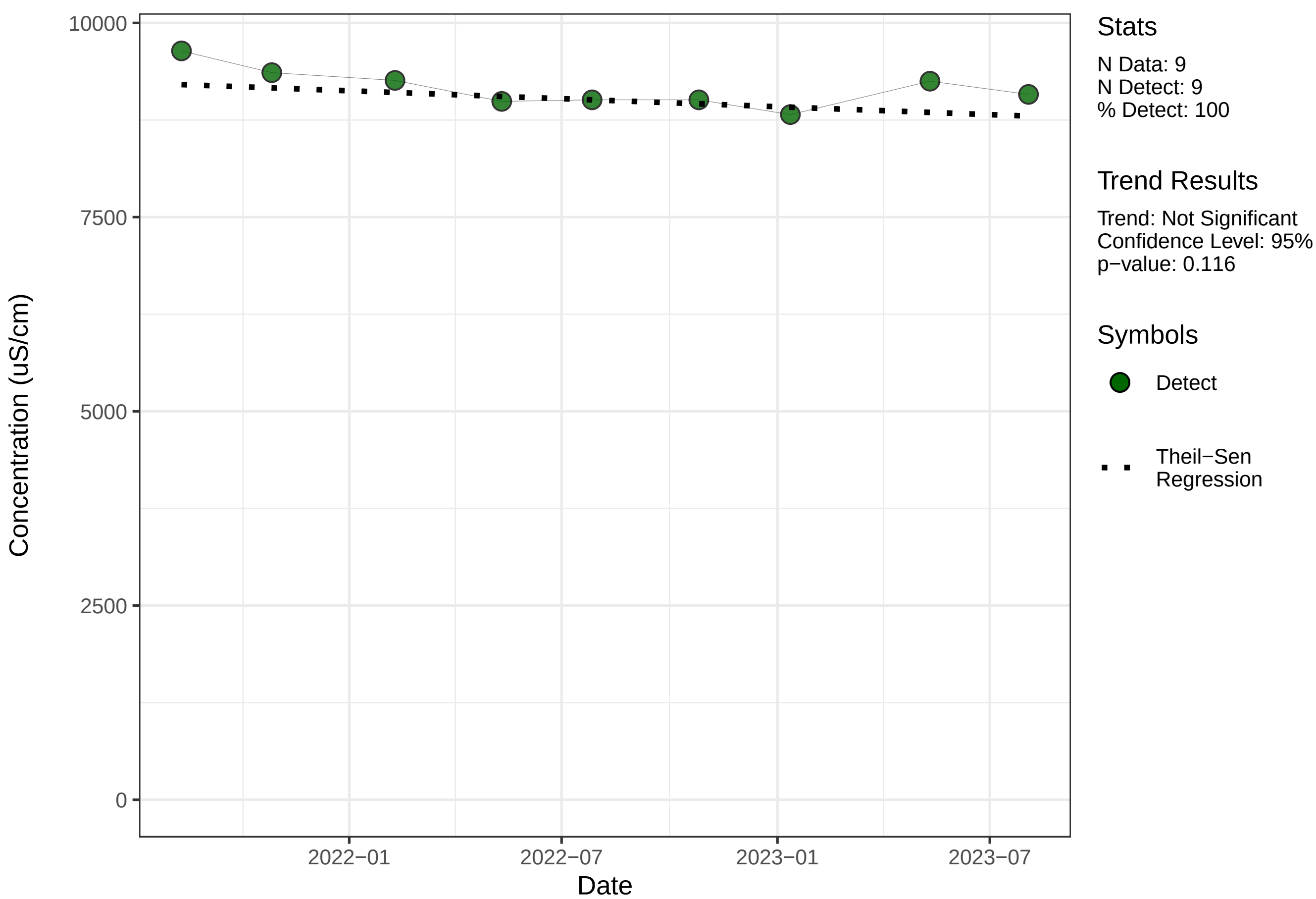
D110, Boron [ug/L]



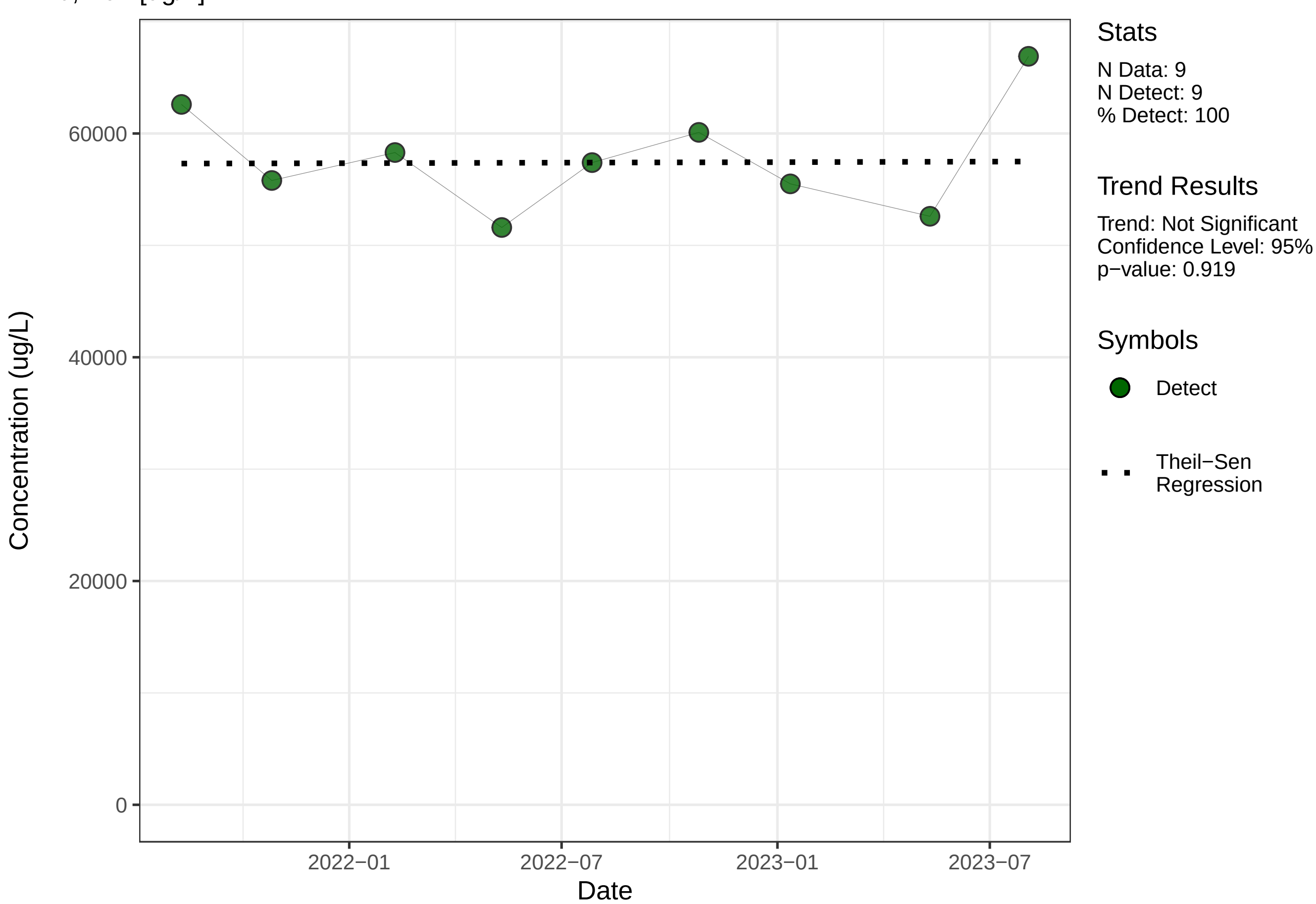
D110, Chloride [mg/L]



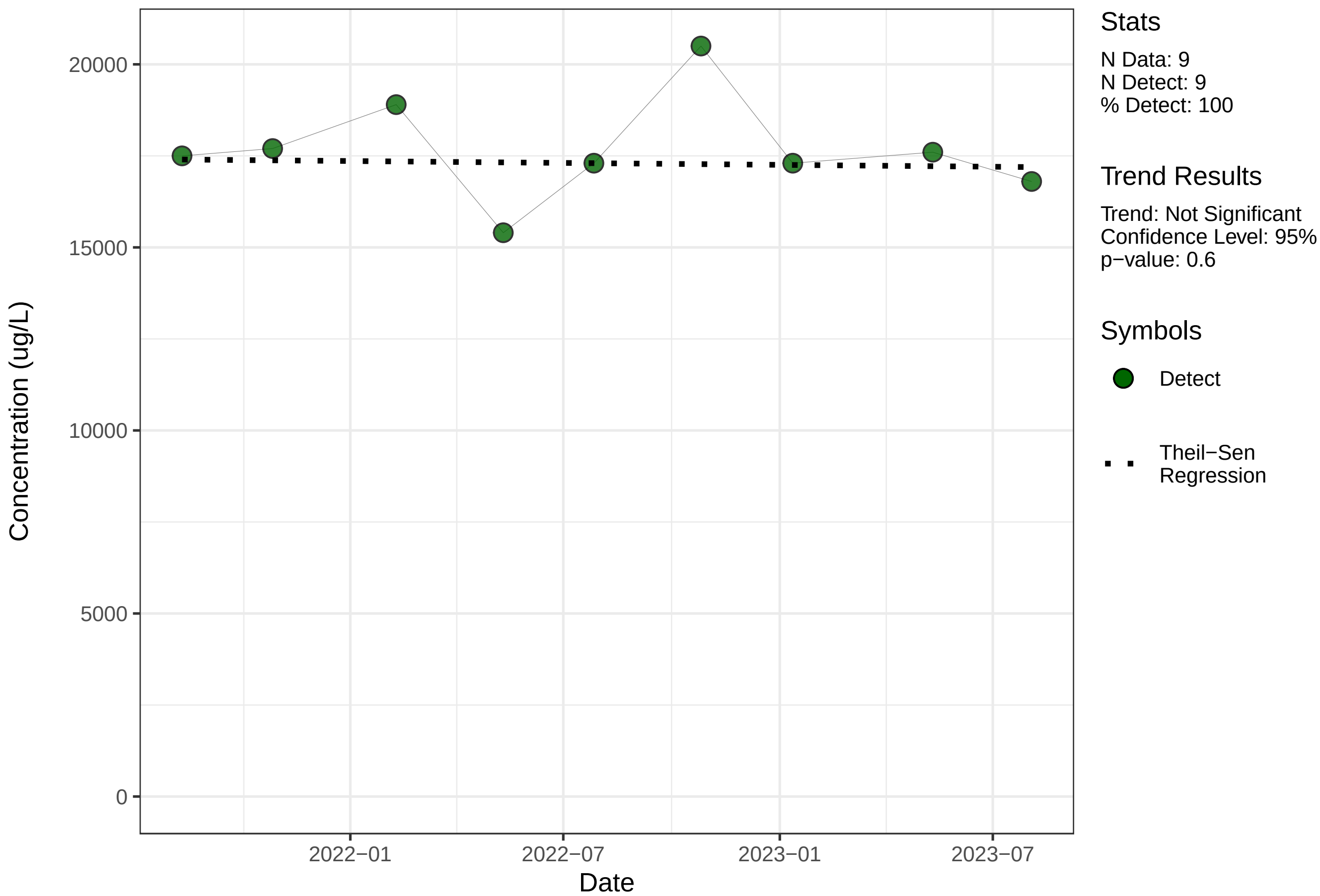
D110, Electrical Conductivity (Field) [uS/cm]



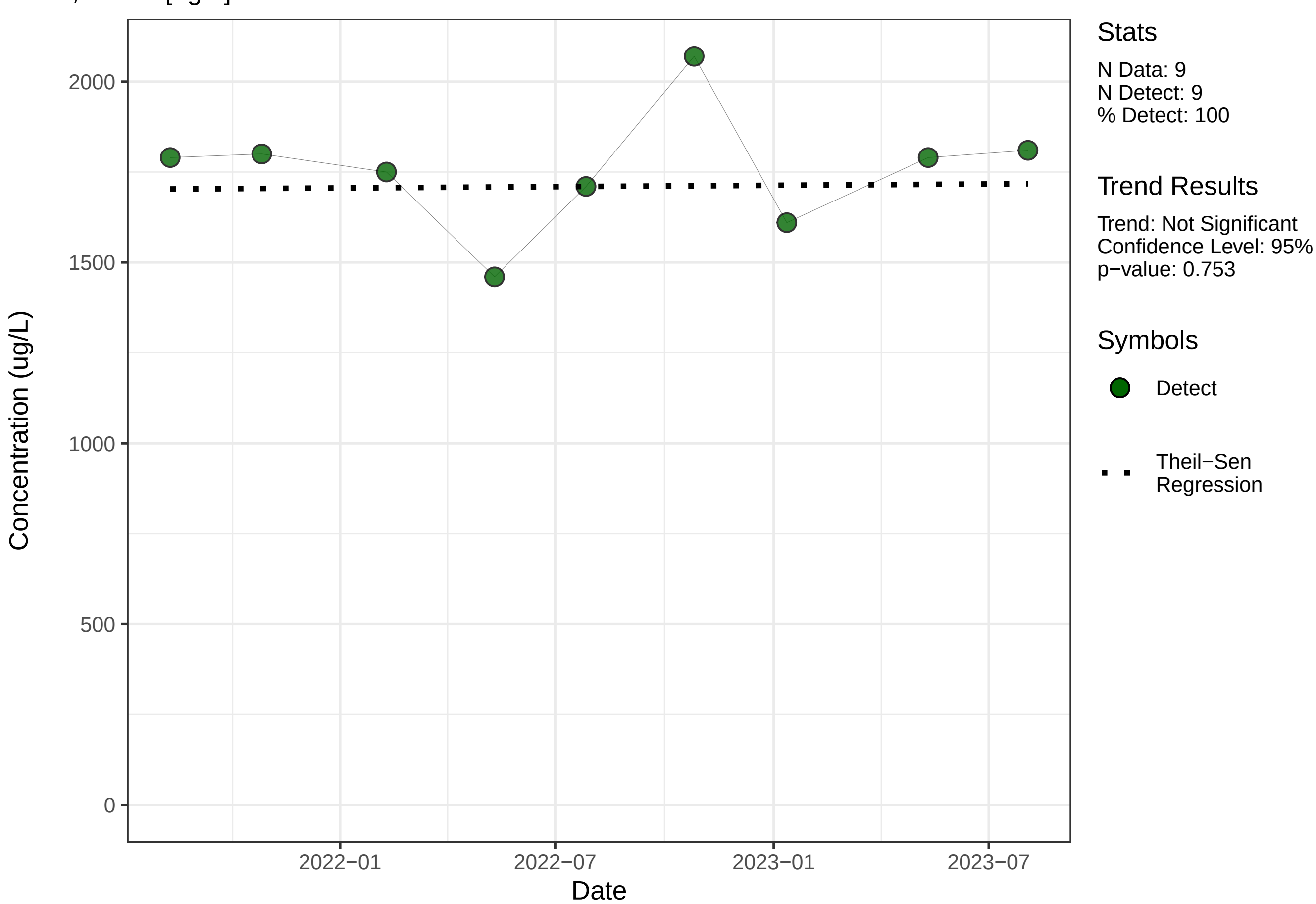
D110, Iron [ug/L]

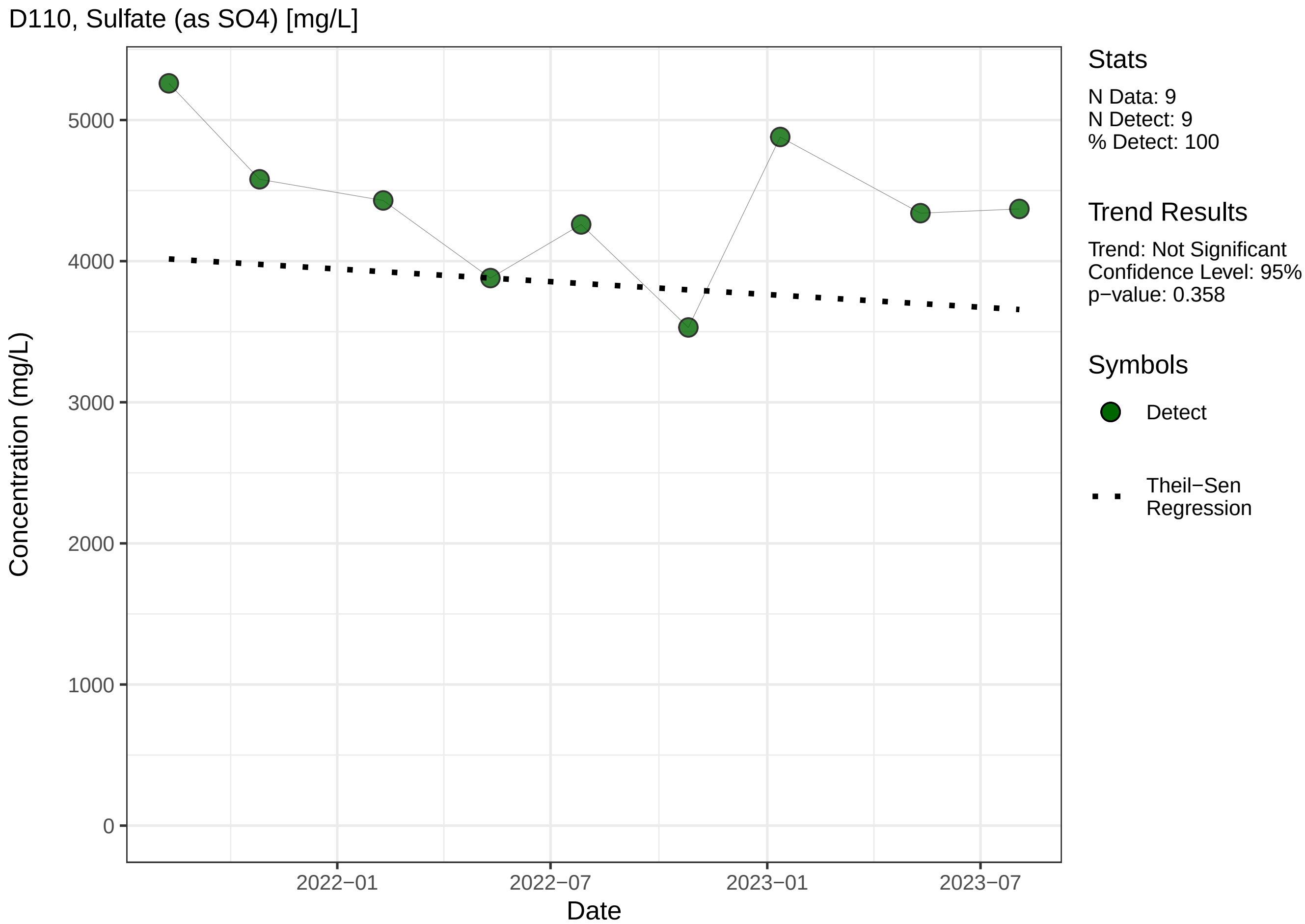


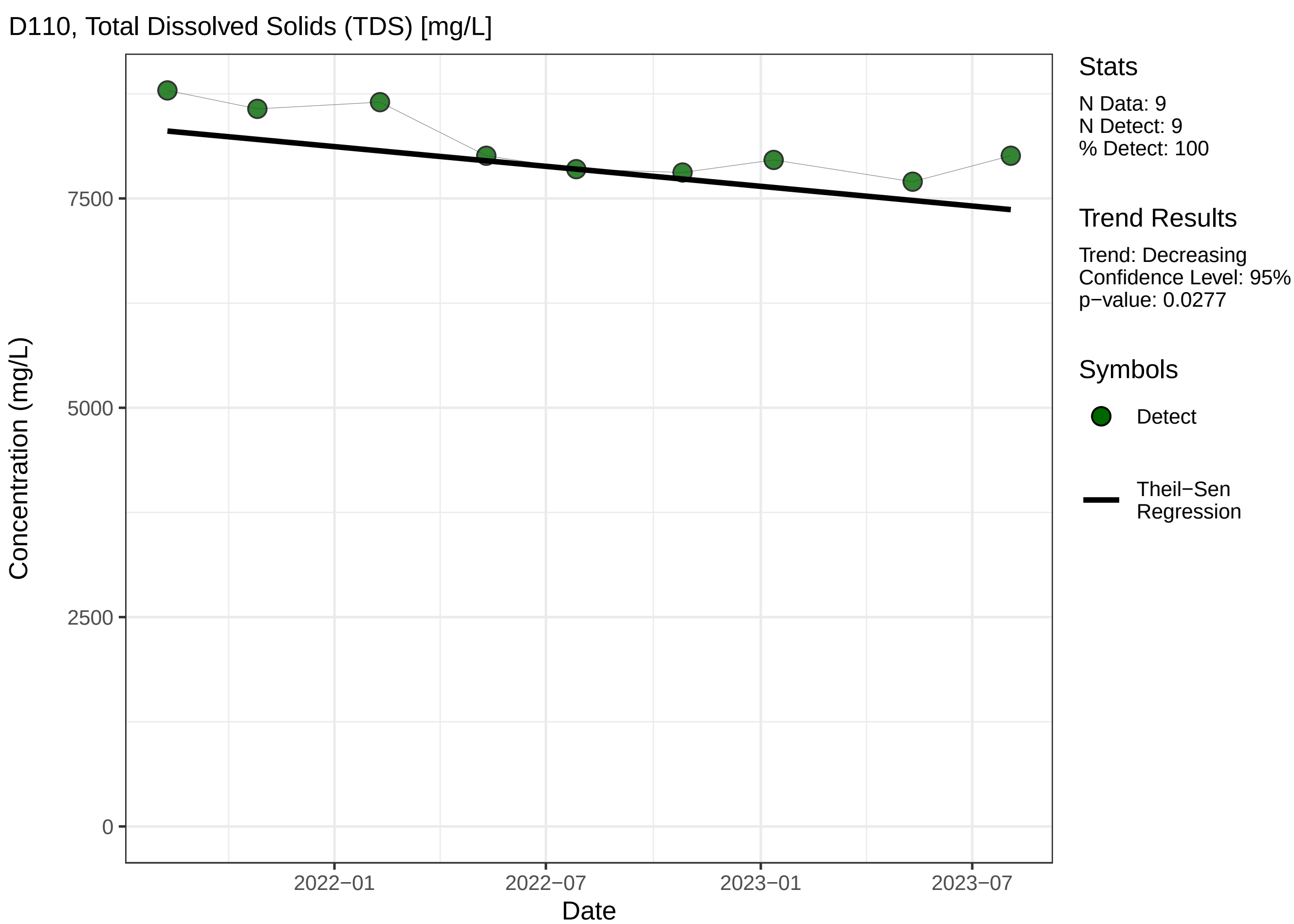
D110, Manganese [ug/L]

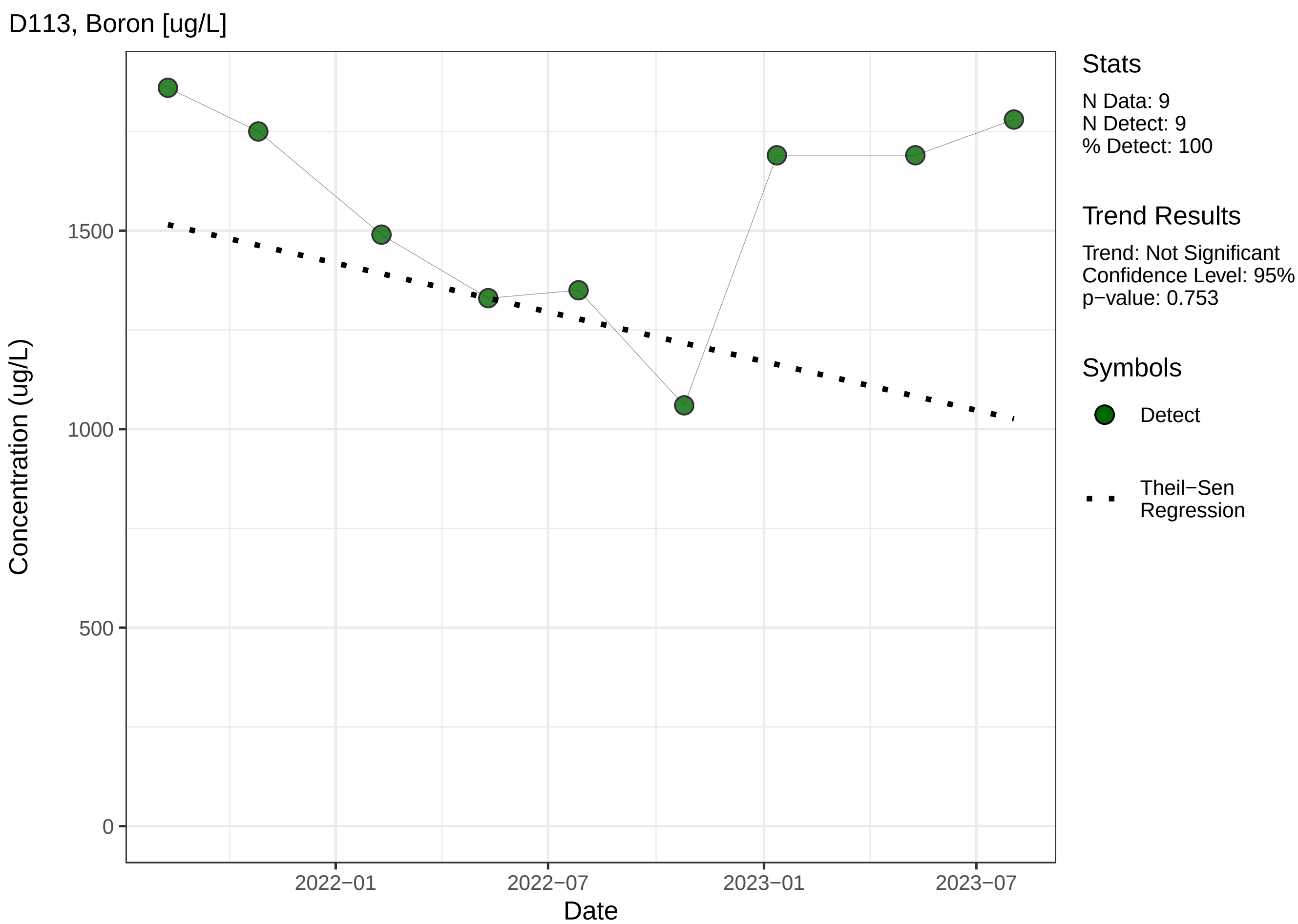


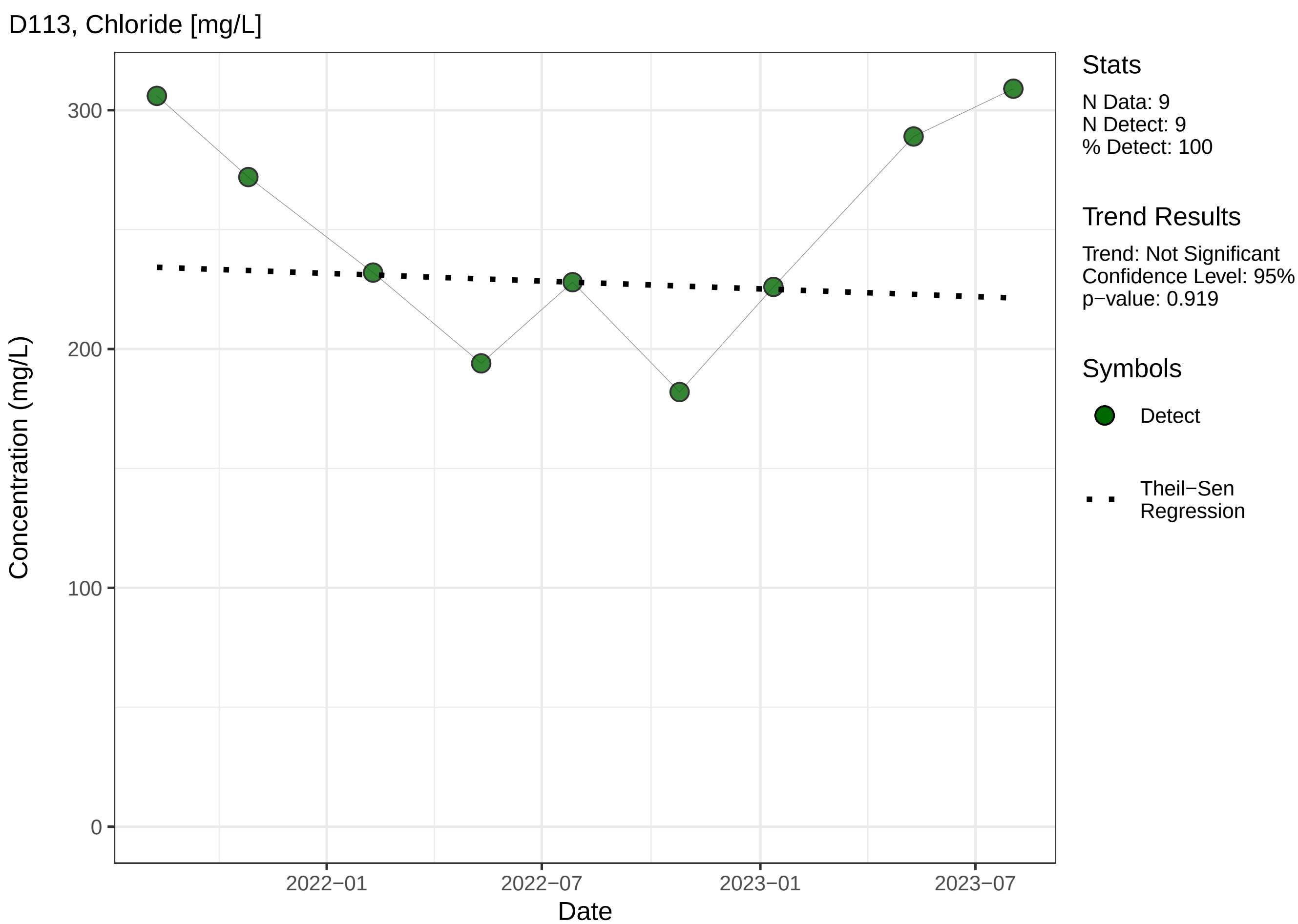
D110, Nickel [ug/L]



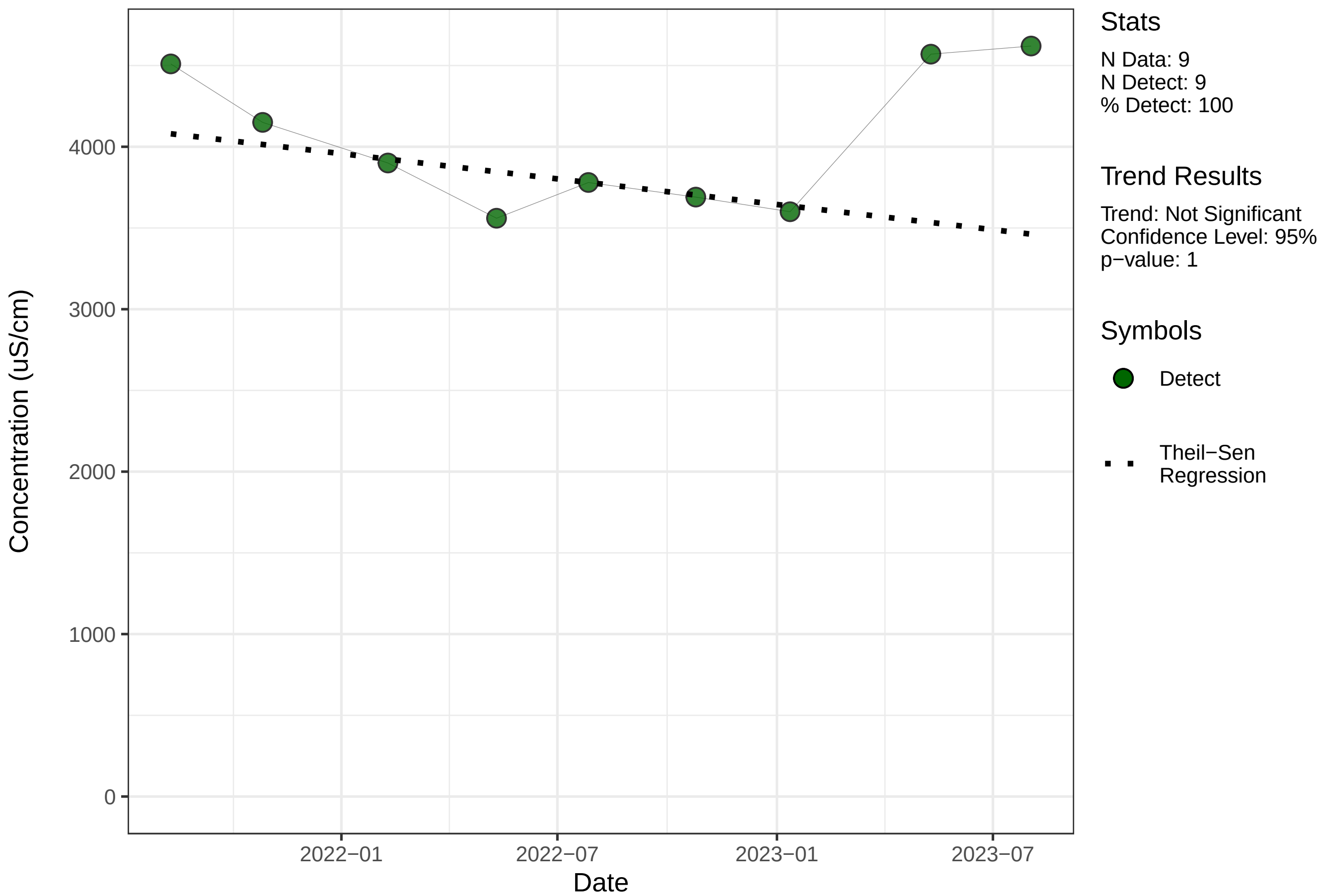

D110, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
5000
4000
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.358
Symbols
Detect
Theil−Sen Regression


D110, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
7500
5000
2500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0277
Symbols
Detect
Theil−Sen Regression

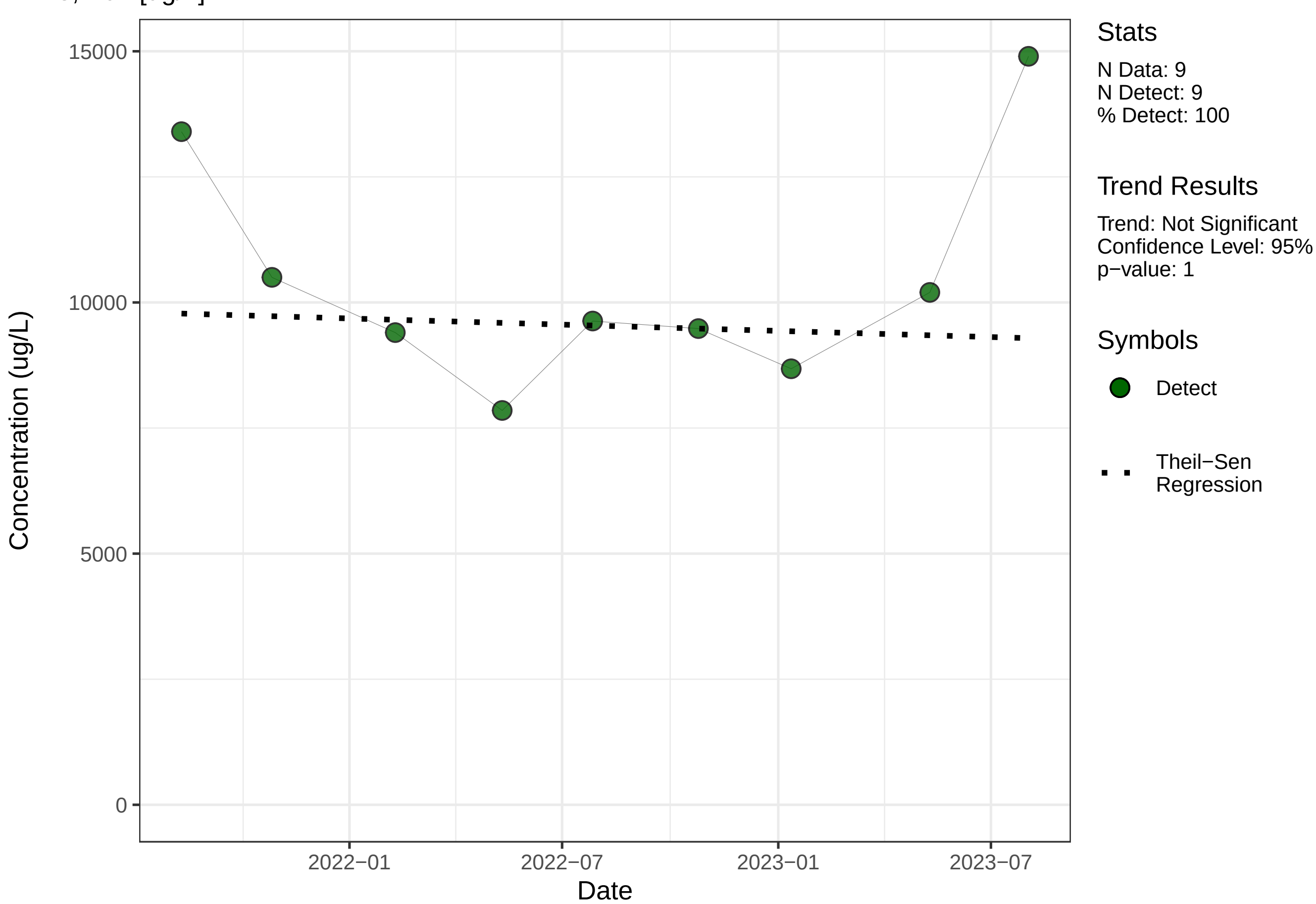

D113, Boron [ug/L]
Concentration (ug/L)
0
500
1000
1500
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.753
Symbols
Detect
Theil−Sen Regression

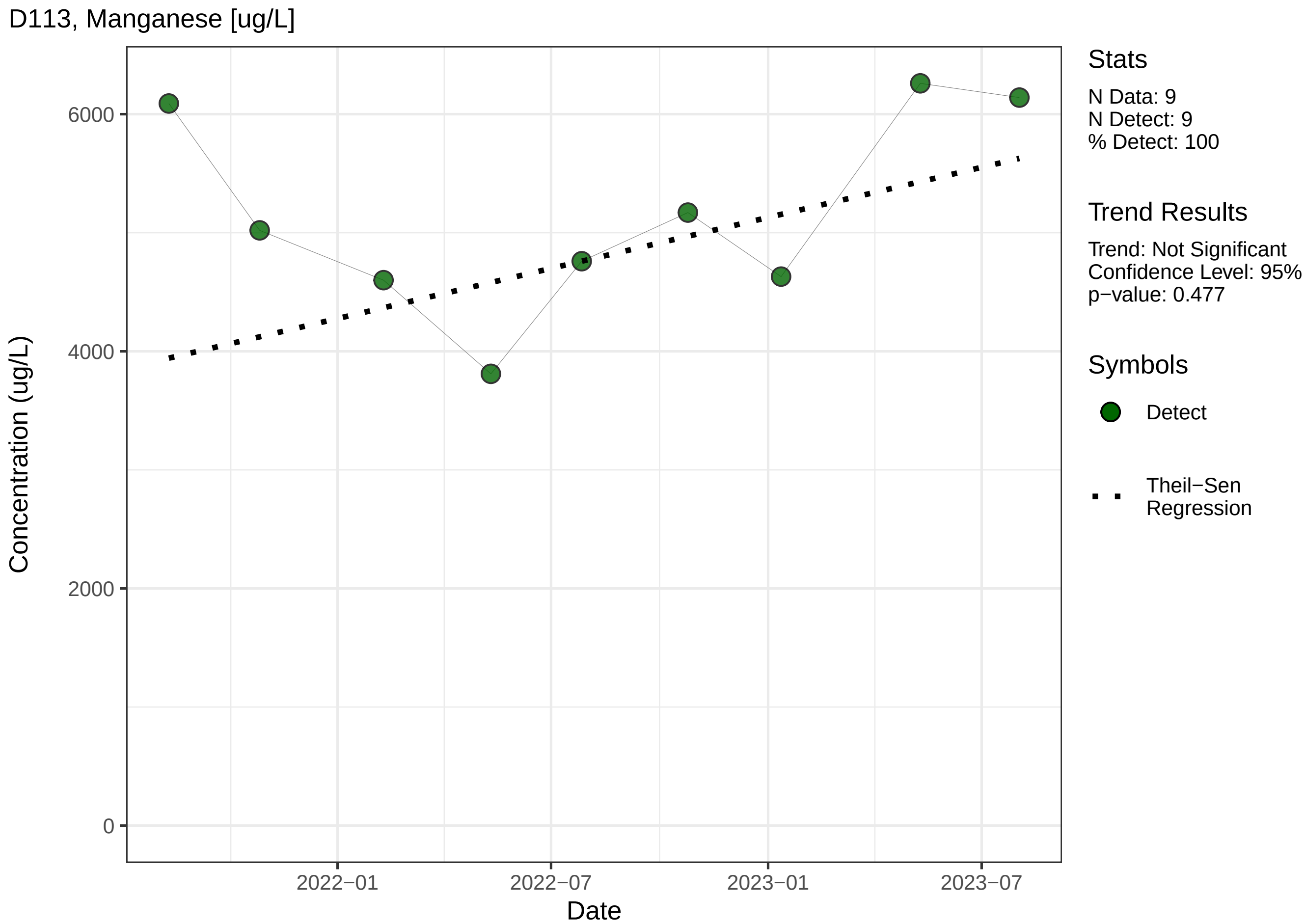

D113, Chloride [mg/L]
Concentration (mg/L)
0
100
200
300
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.919
Symbols
Detect
Theil−Sen Regression

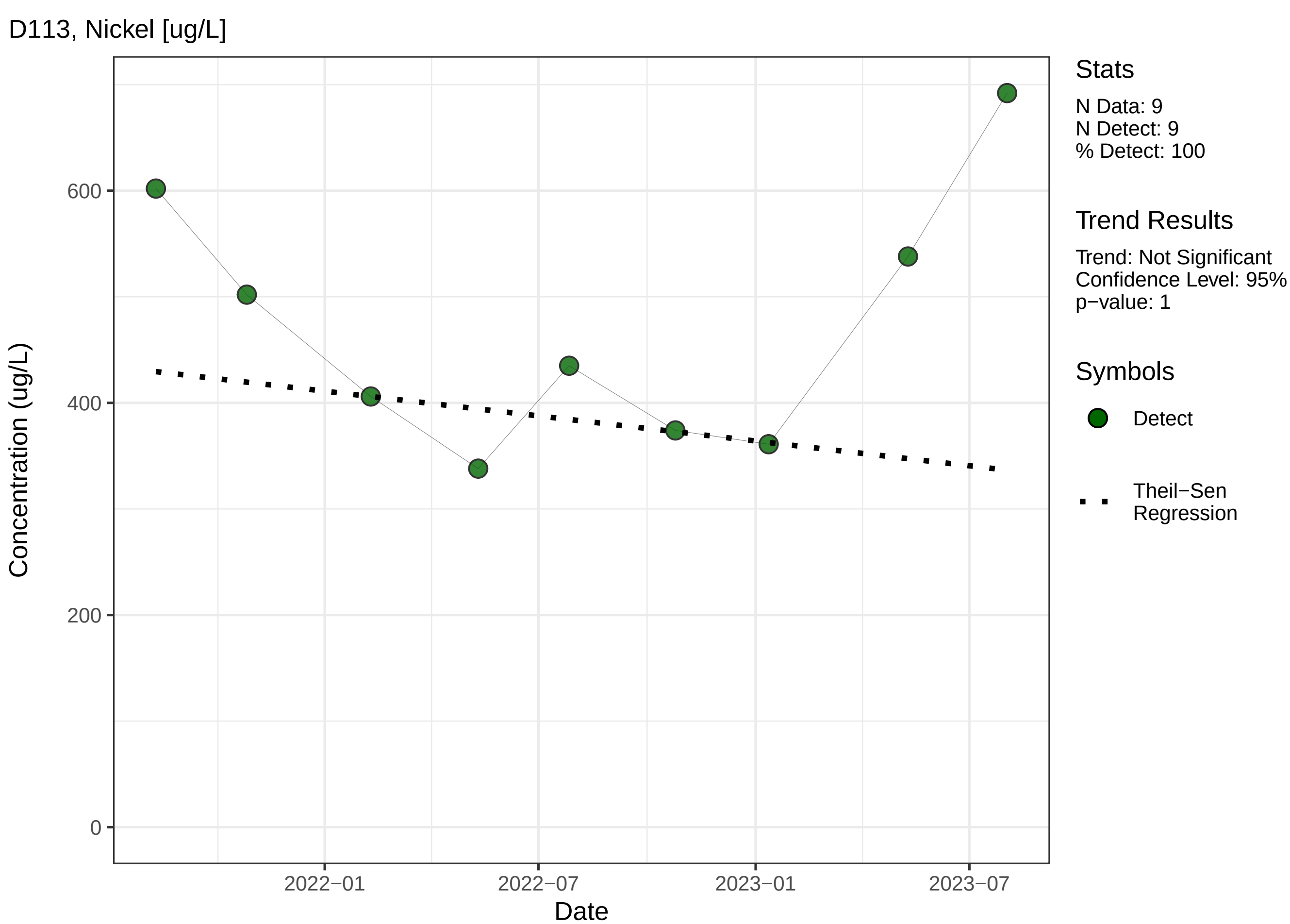
D113, Electrical Conductivity (Field) [uS/cm]

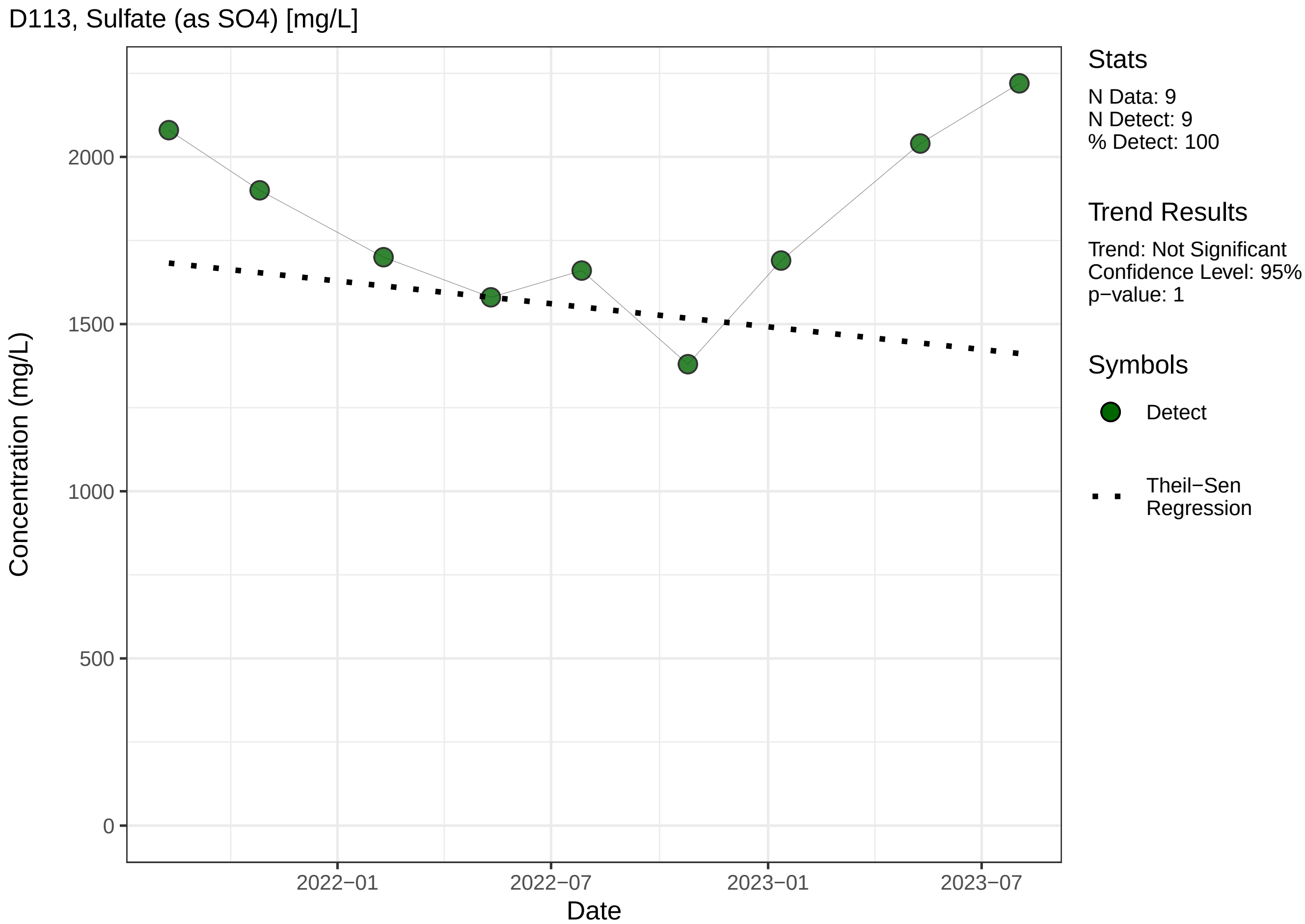


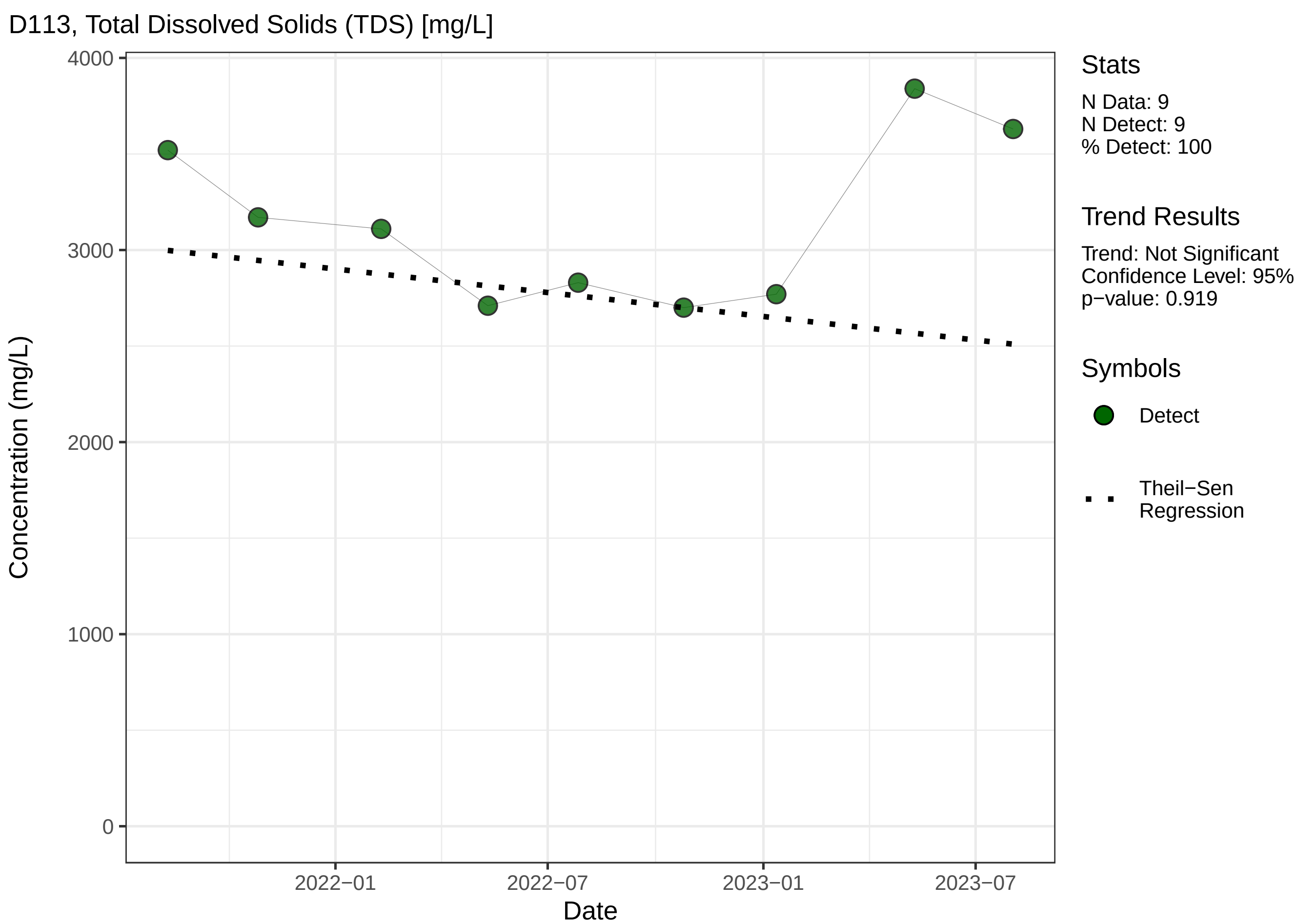
D113, Iron [ug/L]

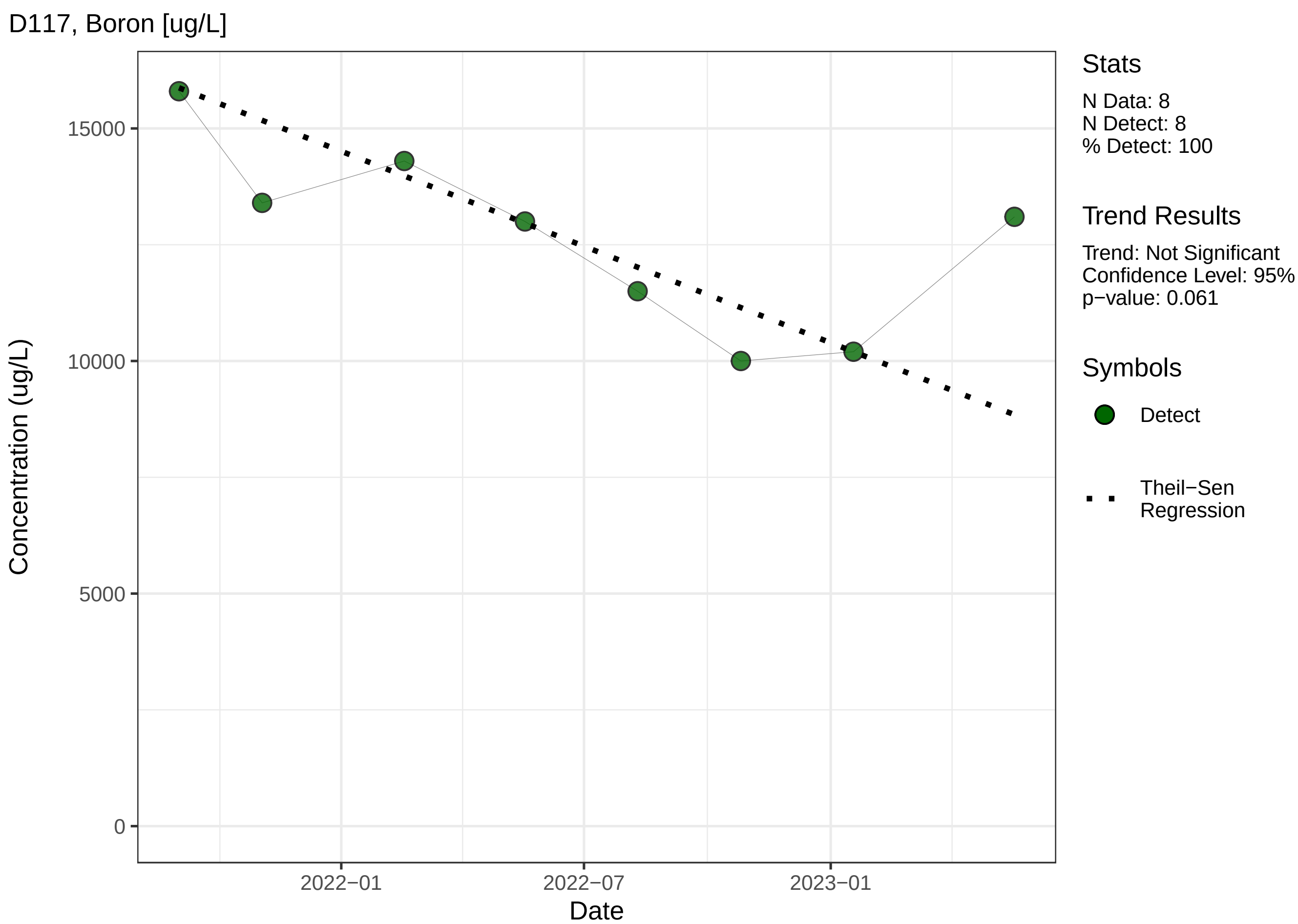


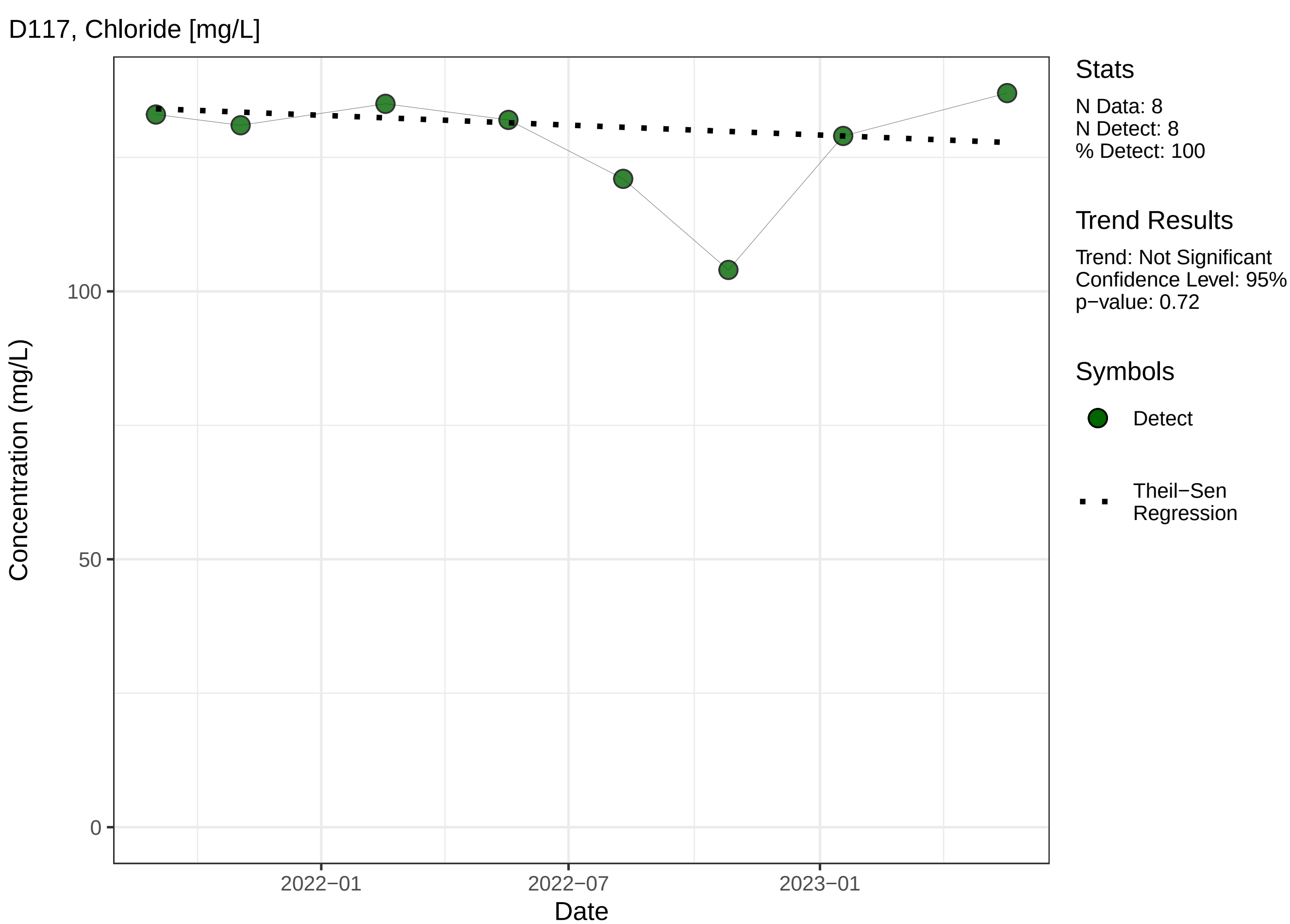

D113, Manganese [ug/L]
Concentration (ug/L)
6000
4000
2000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.477
Symbols
Detect
Theil−Sen Regression

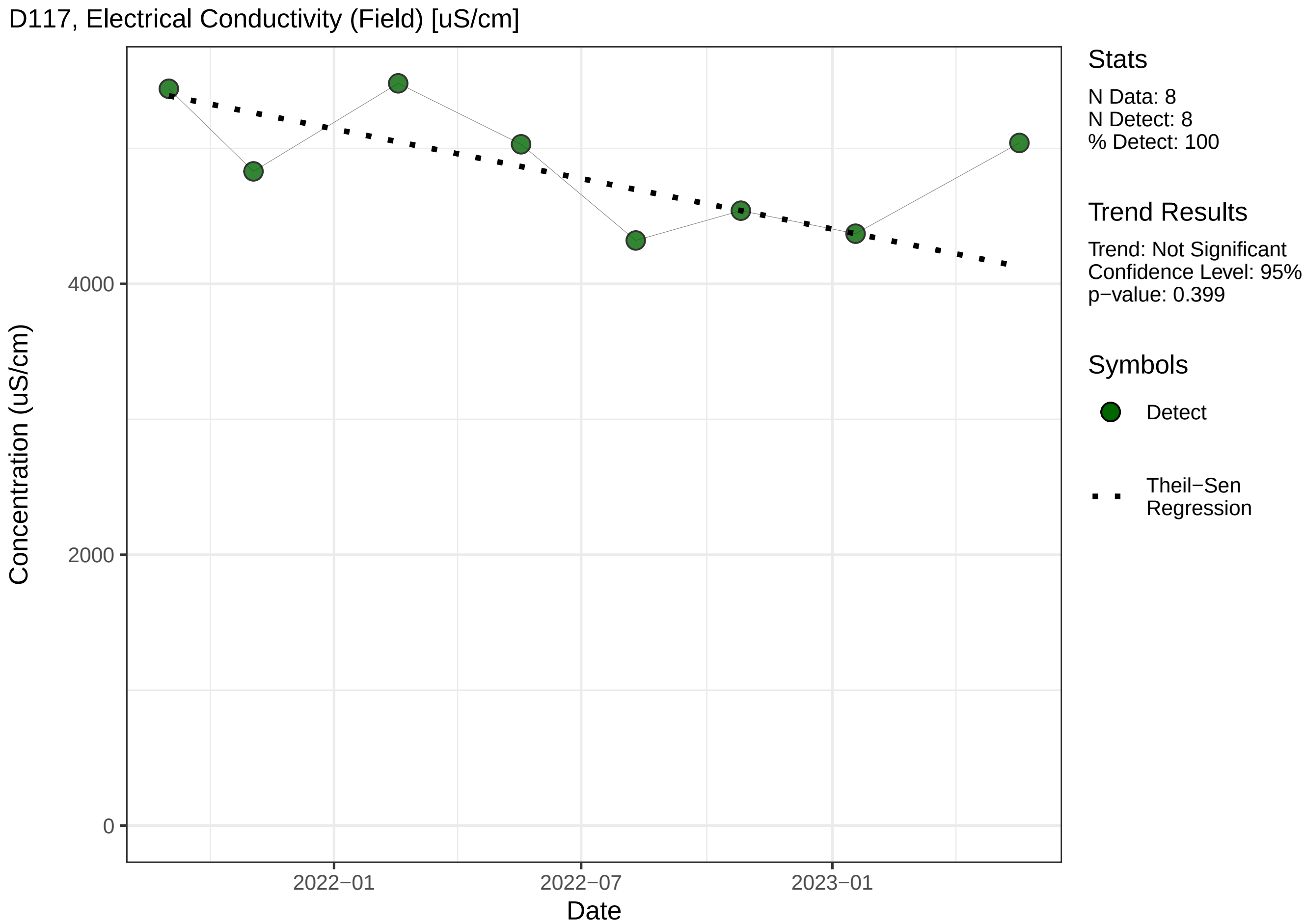

D113, Nickel [ug/L]
Concentration (ug/L)
600
400
200
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 1
Symbols
Detect
Theil−Sen Regression

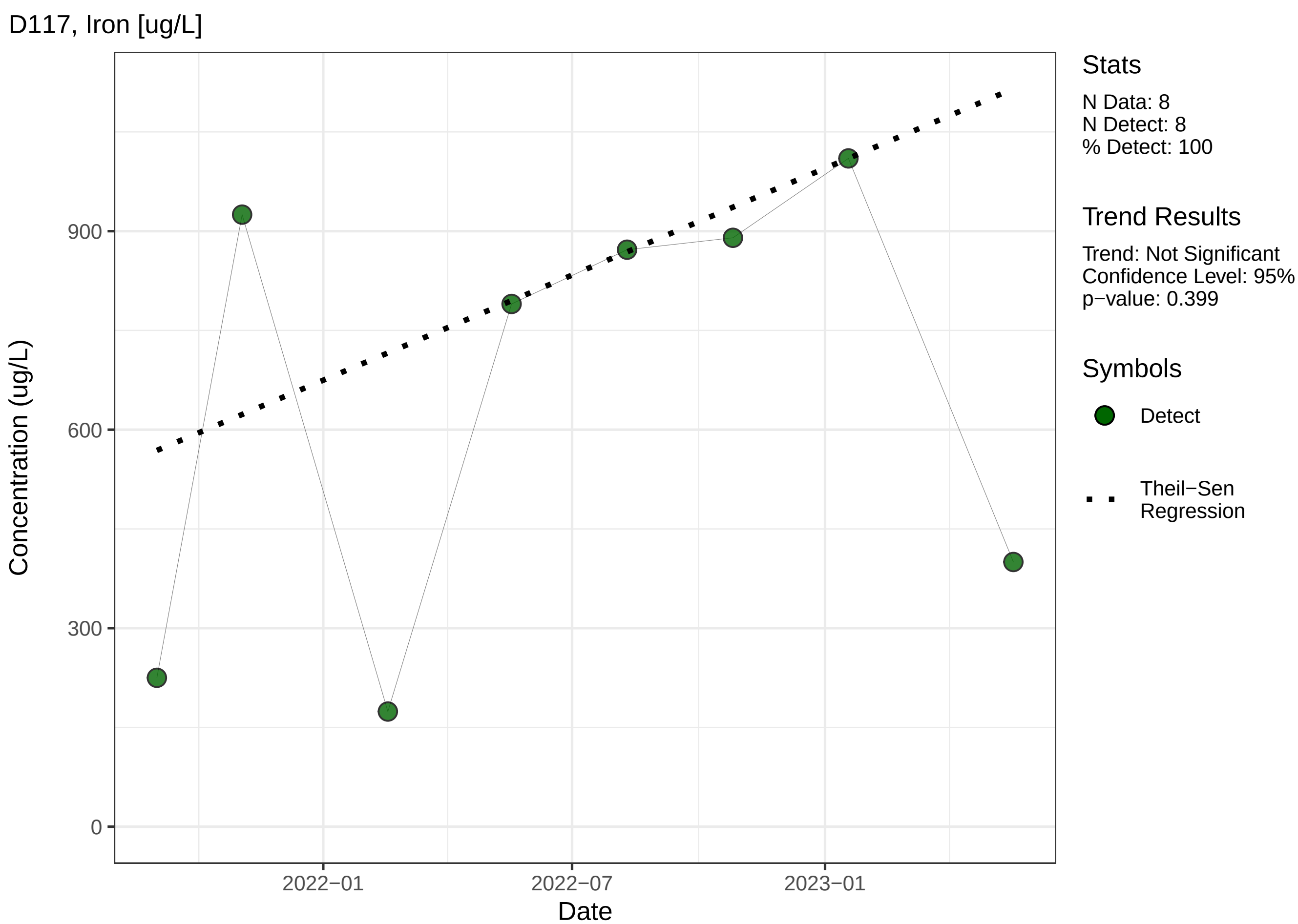

D113, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
0
500
1000
1500
2000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 1
Symbols
Detect
Theil−Sen Regression


D113, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
0
1000
2000
3000
4000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.919
Symbols
Detect
Theil−Sen Regression

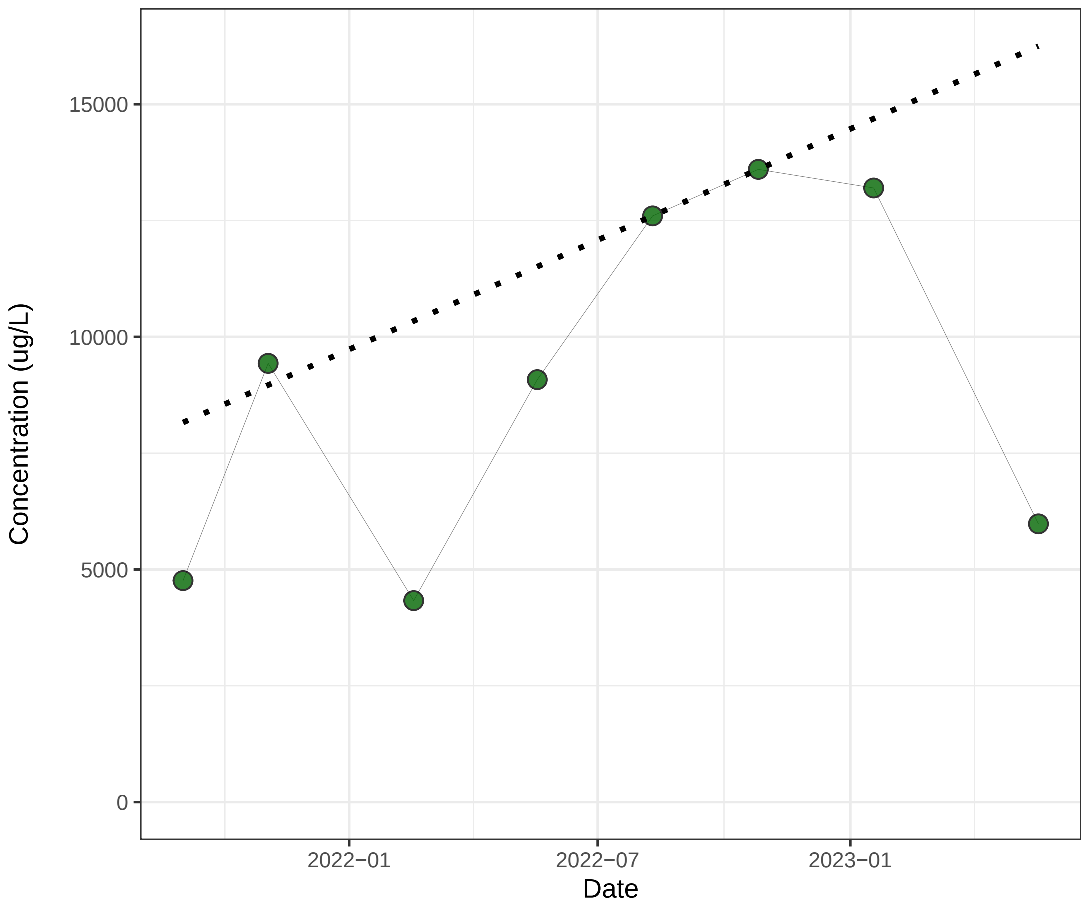

D117, Boron [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.061
Symbols
Detect
Theil−Sen Regression


D117, Chloride [mg/L]
Concentration (mg/L)
100
50
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.72
Symbols
Detect
Theil−Sen Regression


D117, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
4000
2000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.399
Symbols
Detect
Theil−Sen Regression


D117, Iron [ug/L]
Concentration (ug/L)
900
600
300
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.399
Symbols
Detect
Theil−Sen Regression

D117, Manganese [ug/L]



Stats

N Data: 8
N Detect: 8
% Detect: 100

Trend Results

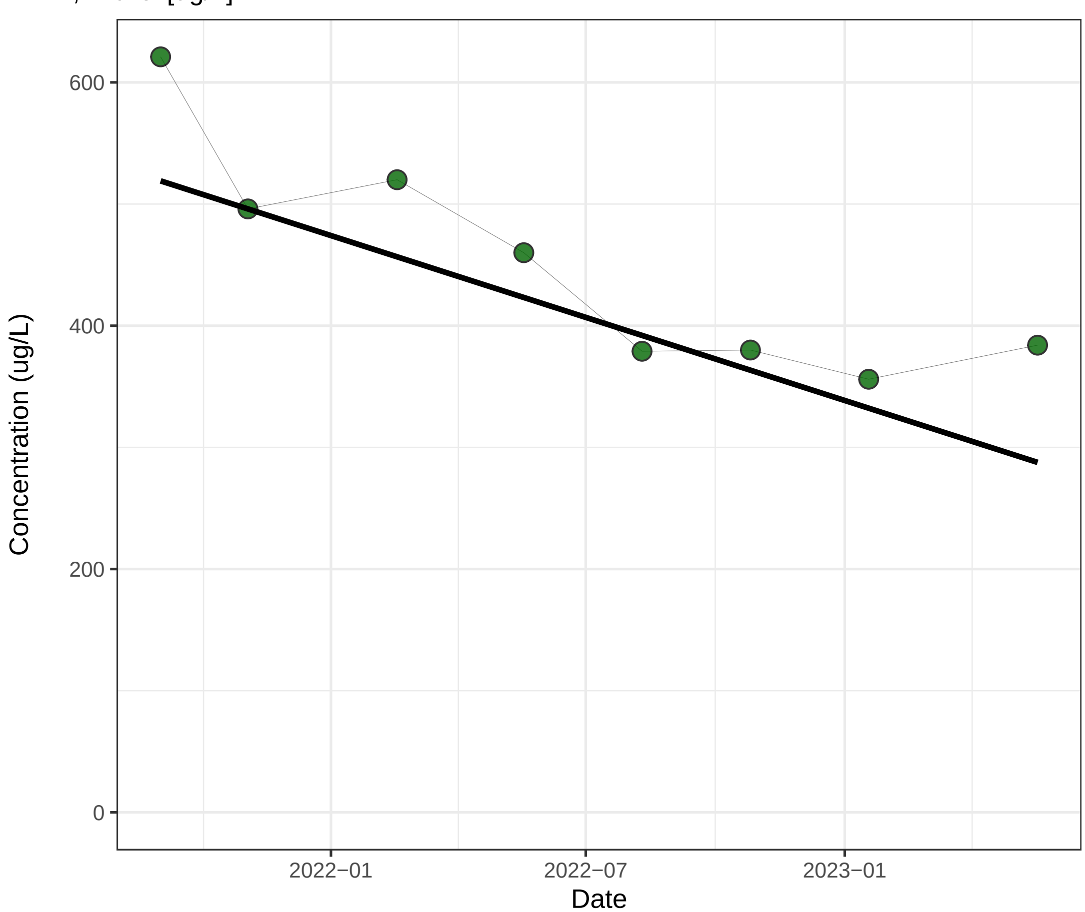
Trend: Not Significant
Confidence Level: 95%
p−value: 0.275

Symbols

Detect

Theil−Sen Regression

D117, Nickel [ug/L]



Stats

N Data: 8
N Detect: 8
% Detect: 100

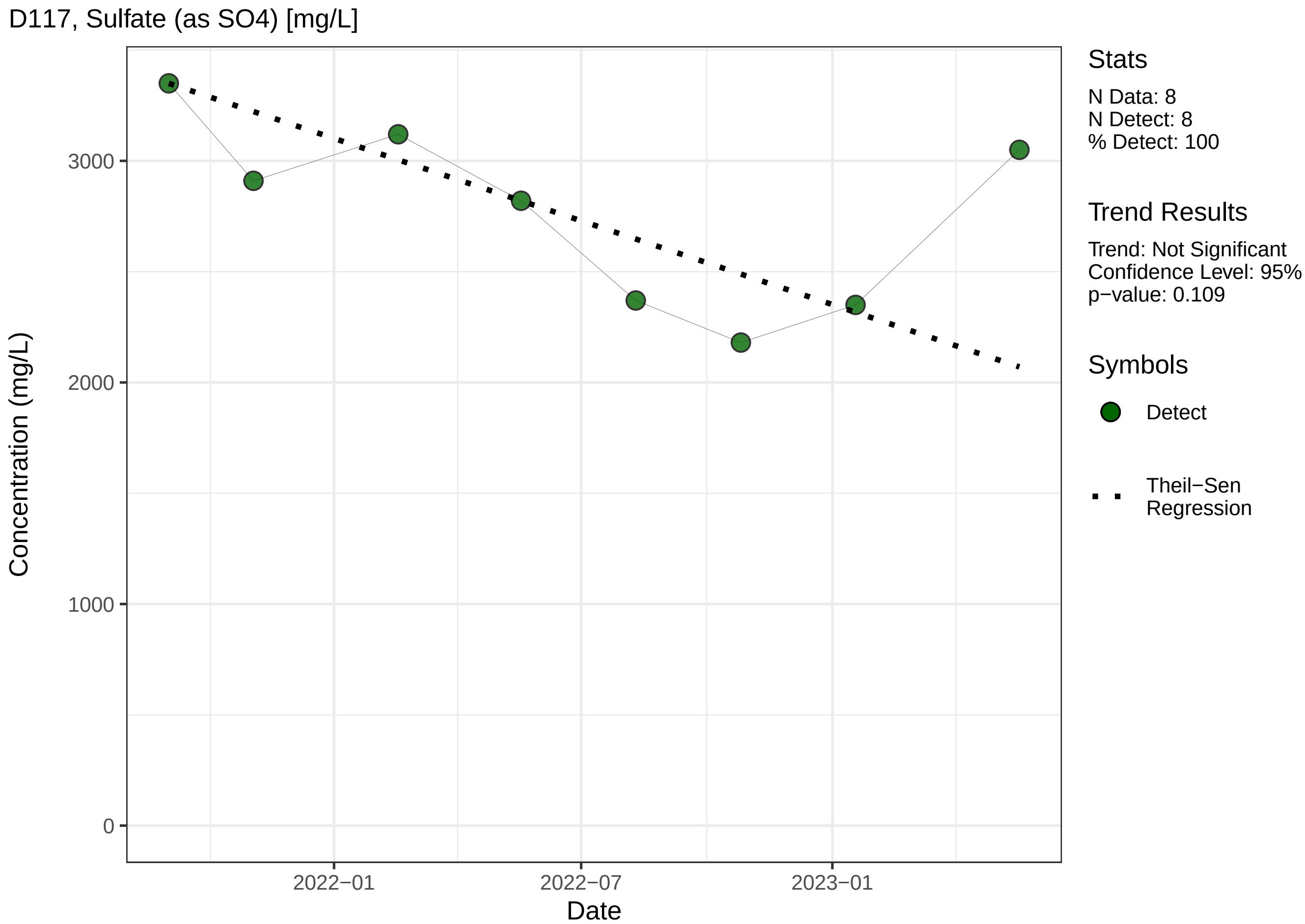
Trend Results

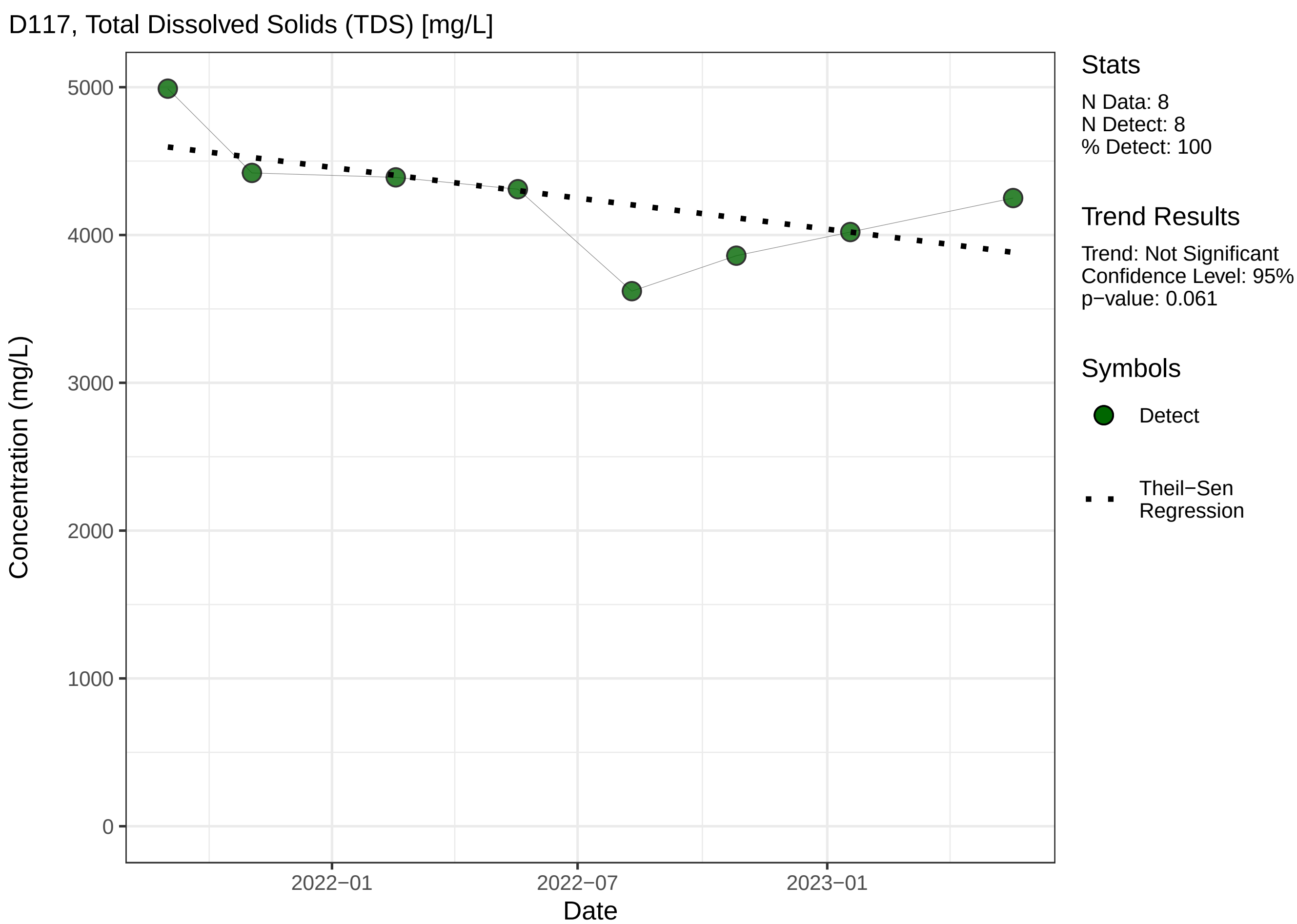
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0312

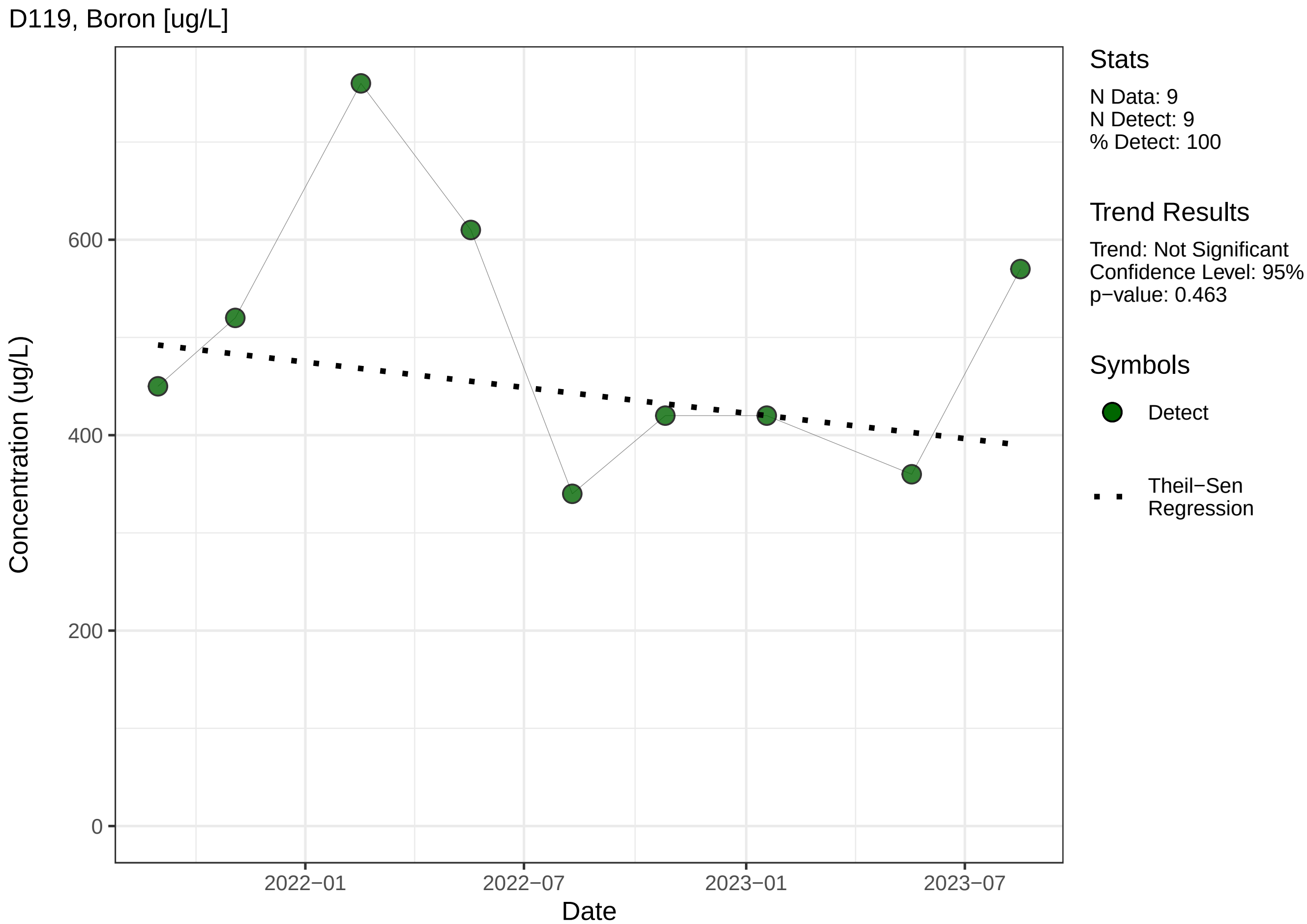
Symbols

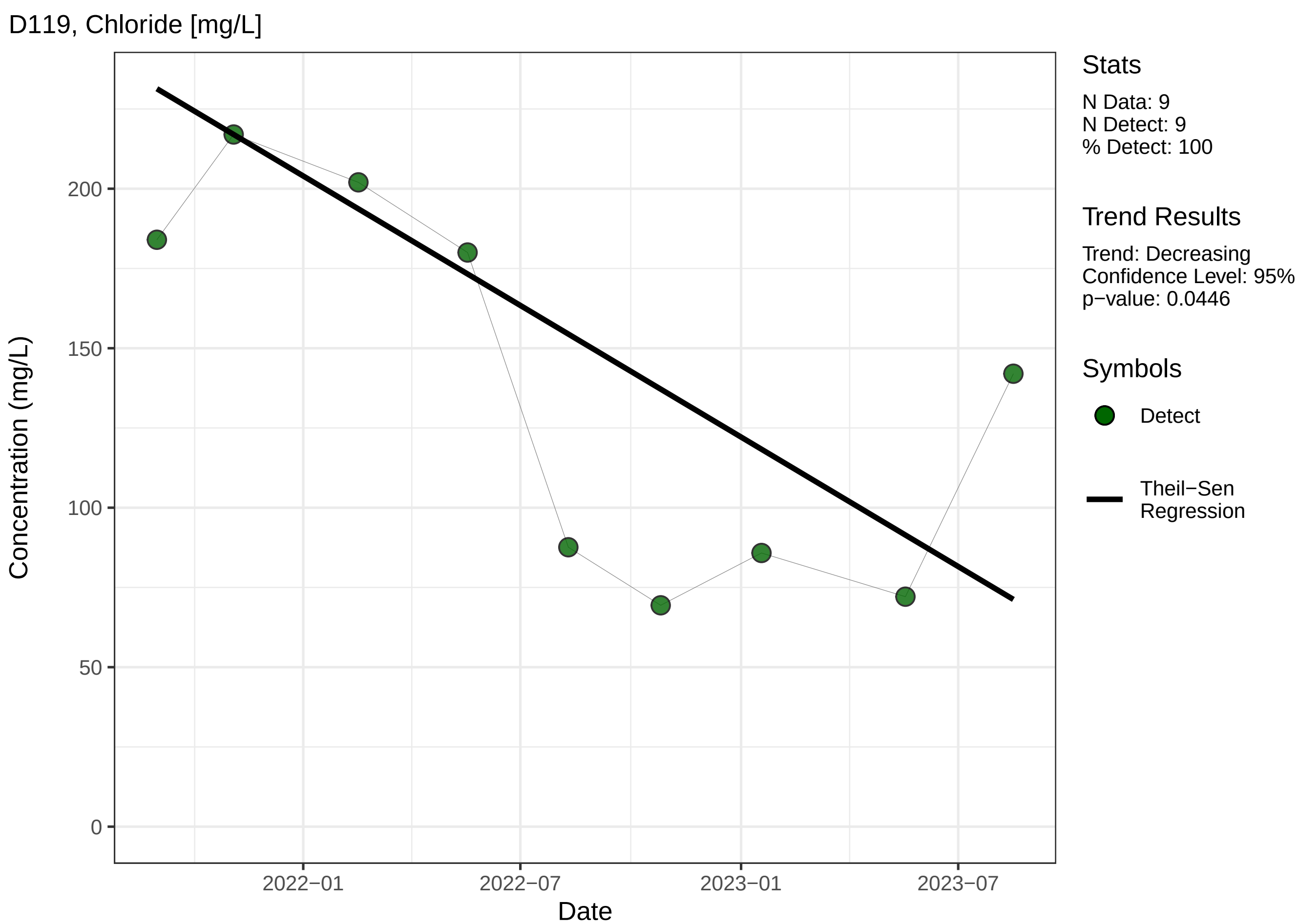
Detect

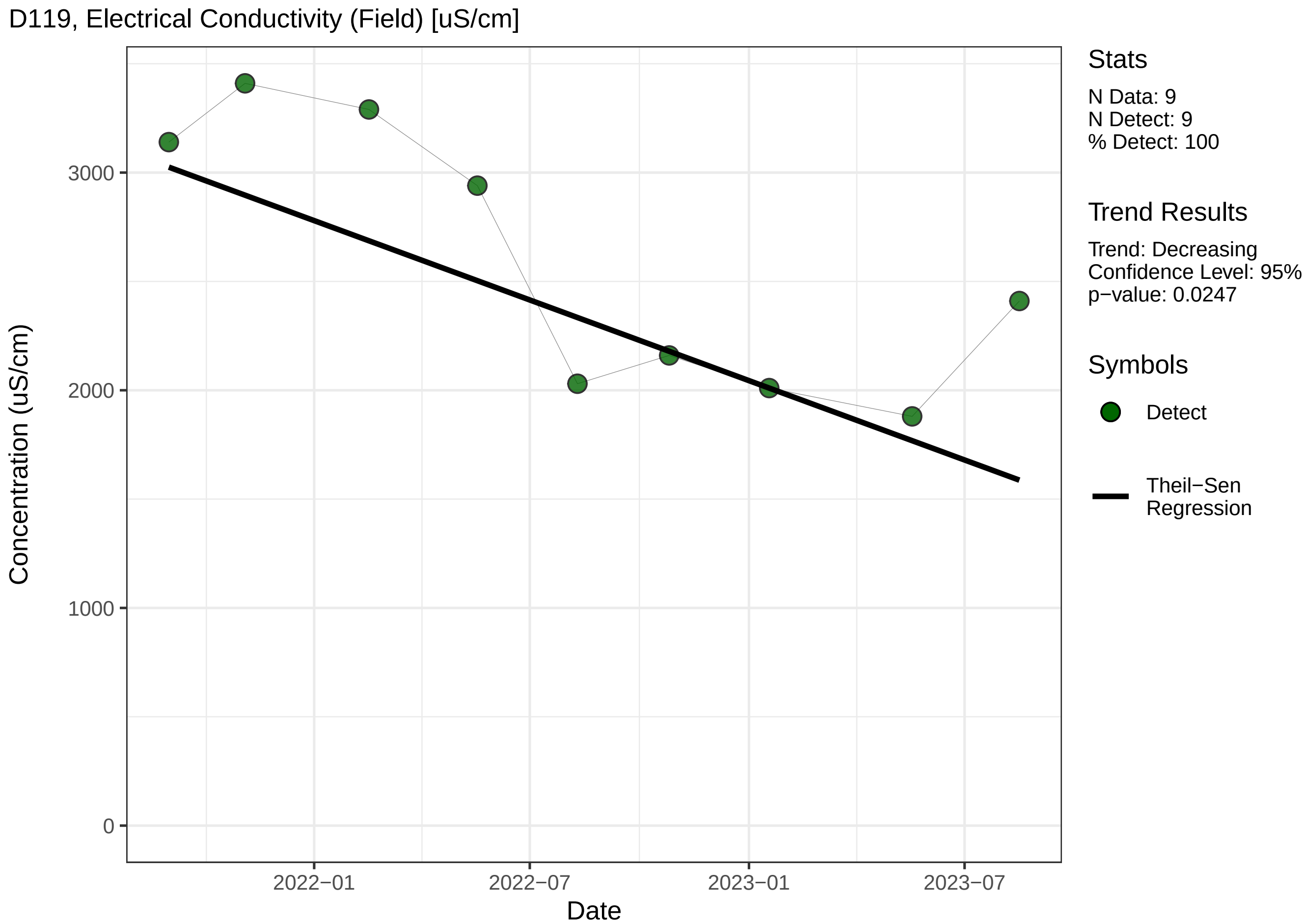
Theil−Sen Regression

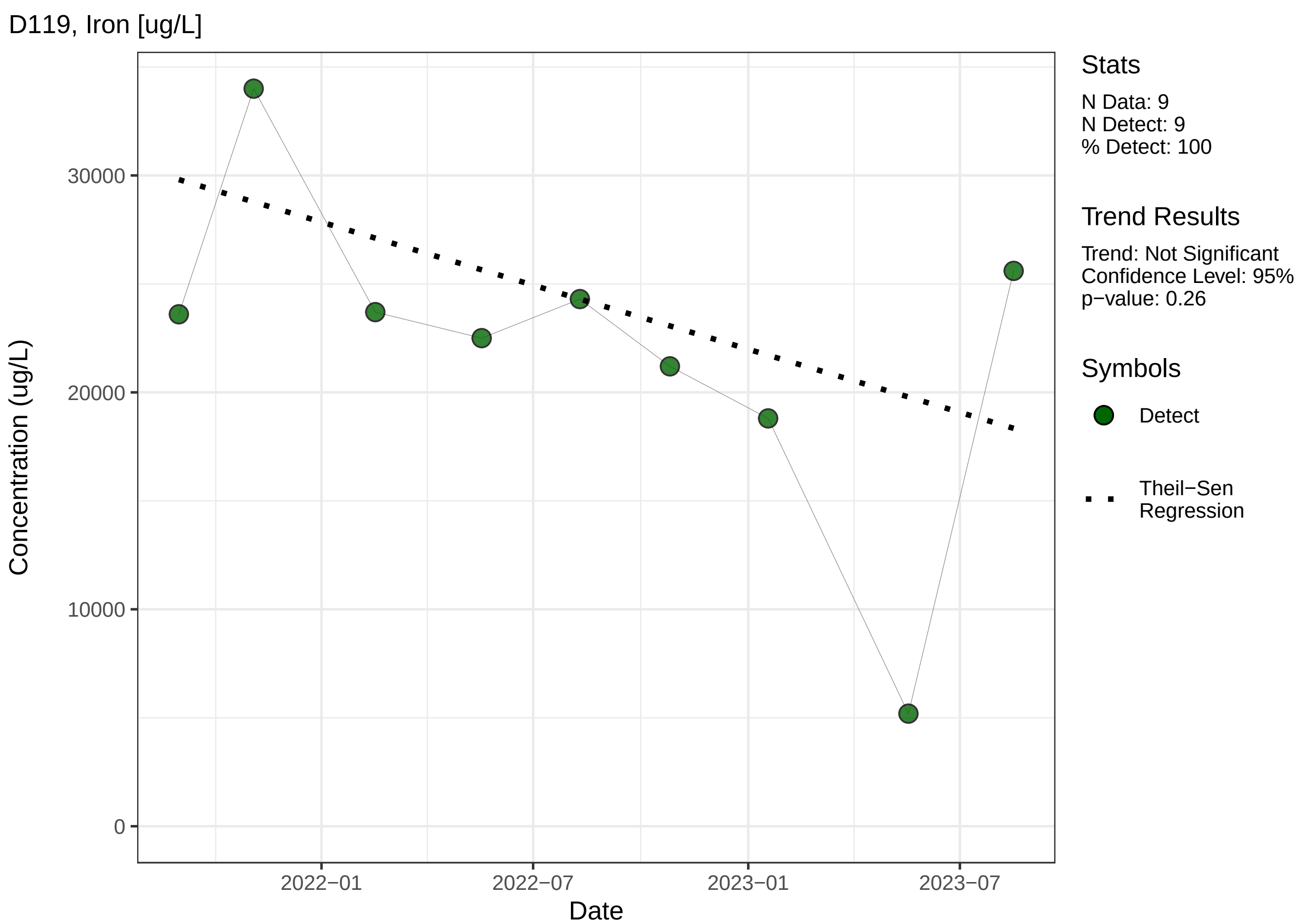

D117, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
3000
2000
1000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

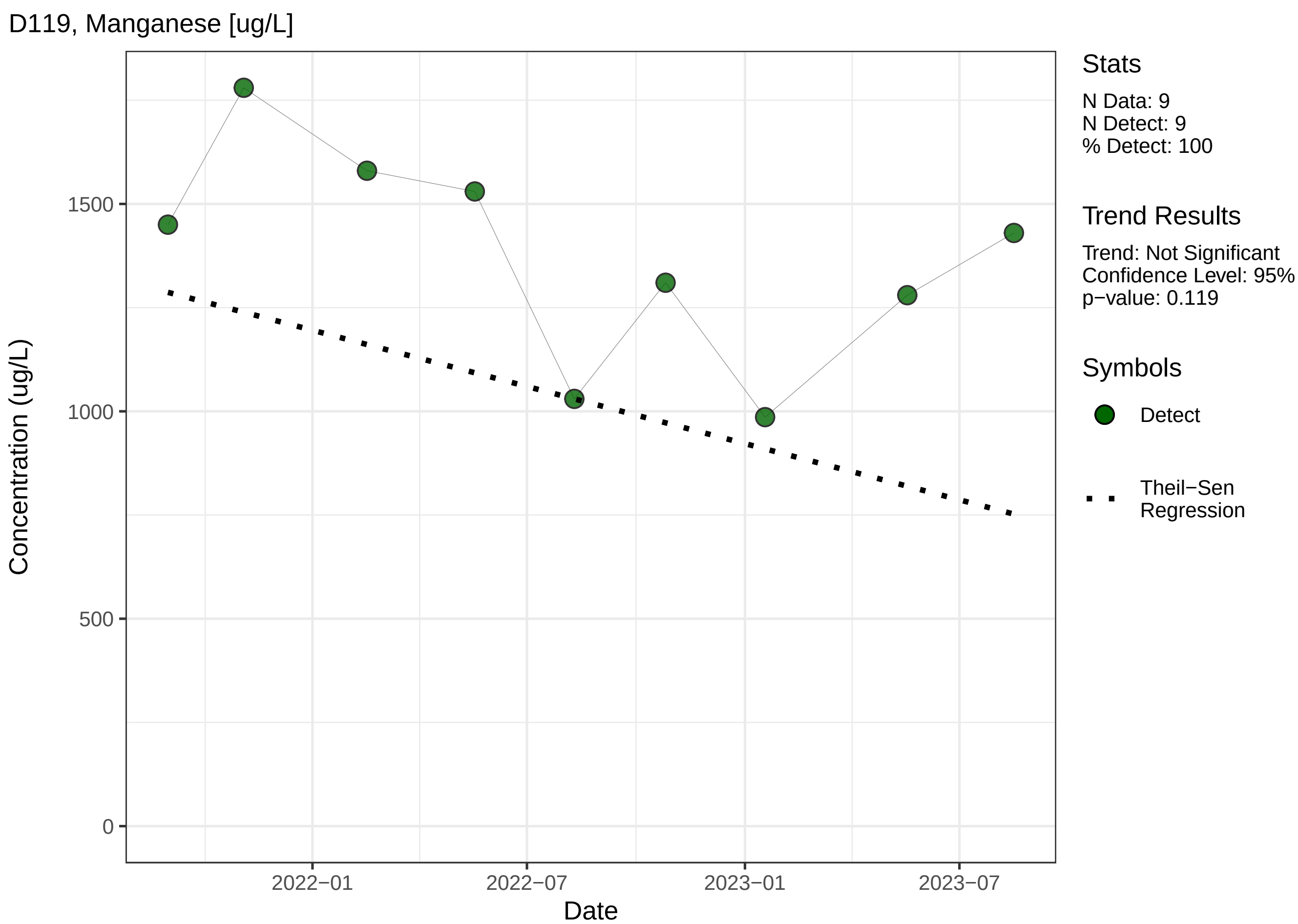

D117, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
5000
4000
3000
2000
1000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.061
Symbols
Detect
Theil−Sen Regression

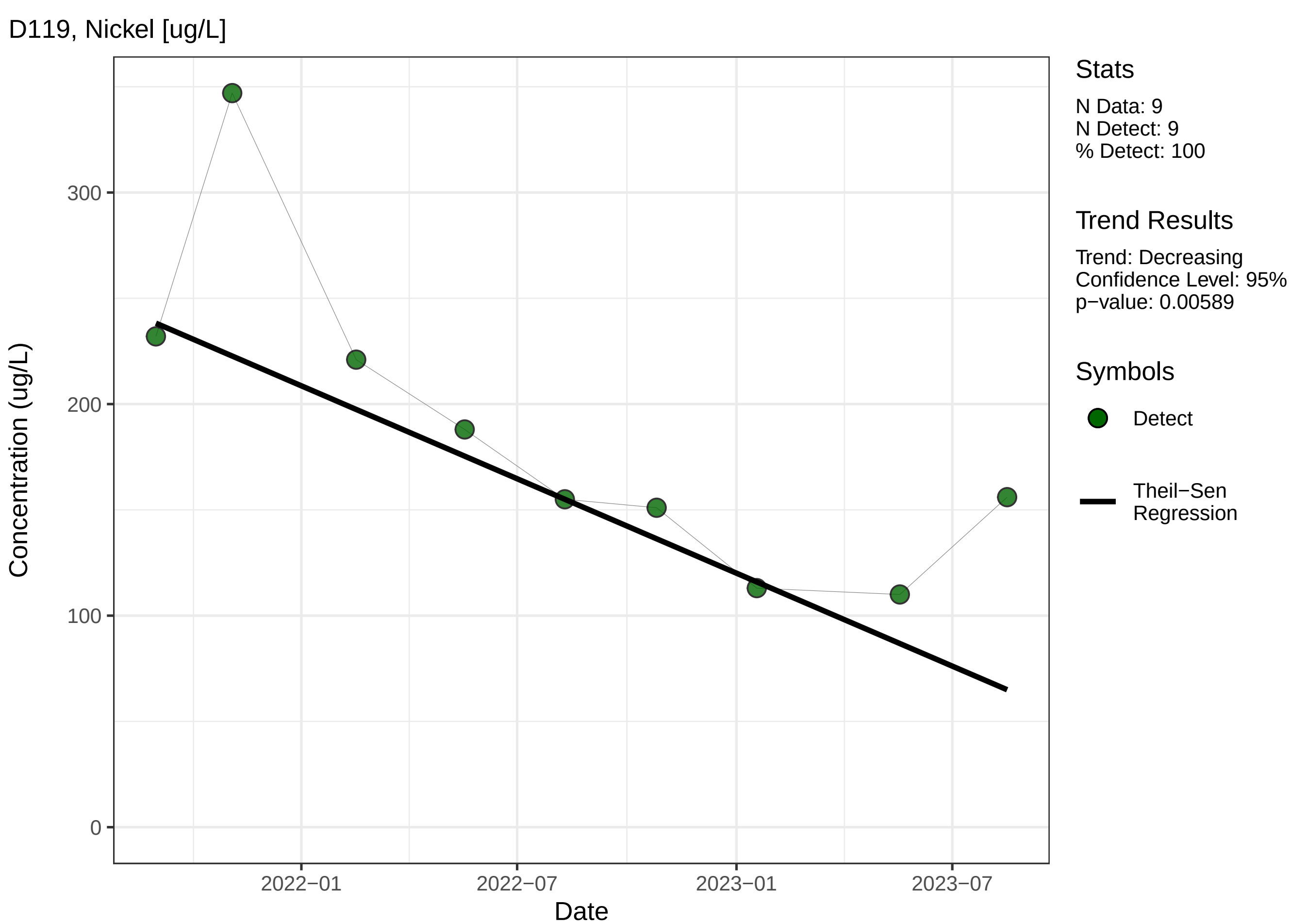

D119, Boron [ug/L]
Concentration (ug/L)
0
200
400
600
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.463
Symbols
Detect
Theil−Sen Regression


D119, Chloride [mg/L]
Concentration (mg/L)
0
50
100
150
200
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0446
Symbols
Detect
Theil−Sen Regression


D119, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0247
Symbols
Detect
Theil−Sen Regression


D119, Iron [ug/L]
Concentration (ug/L)
30000
20000
10000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.26
Symbols
Detect
Theil−Sen Regression

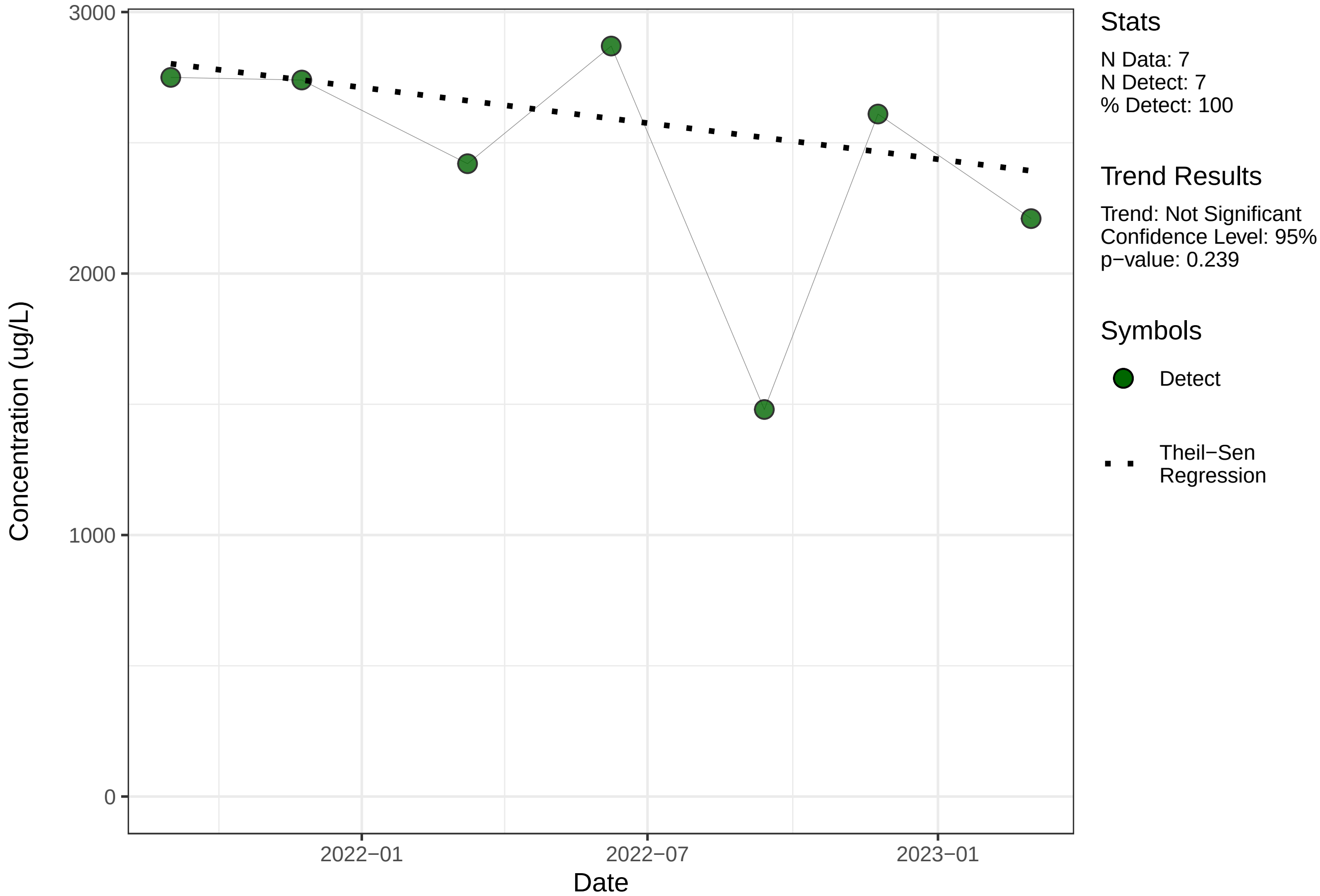

D119, Manganese [ug/L]
Concentration (ug/L)
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.119
Symbols
Detect
Theil−Sen Regression


D119, Nickel [ug/L]
Concentration (ug/L)
300
200
100
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.00589
Symbols
Detect
Theil−Sen Regression

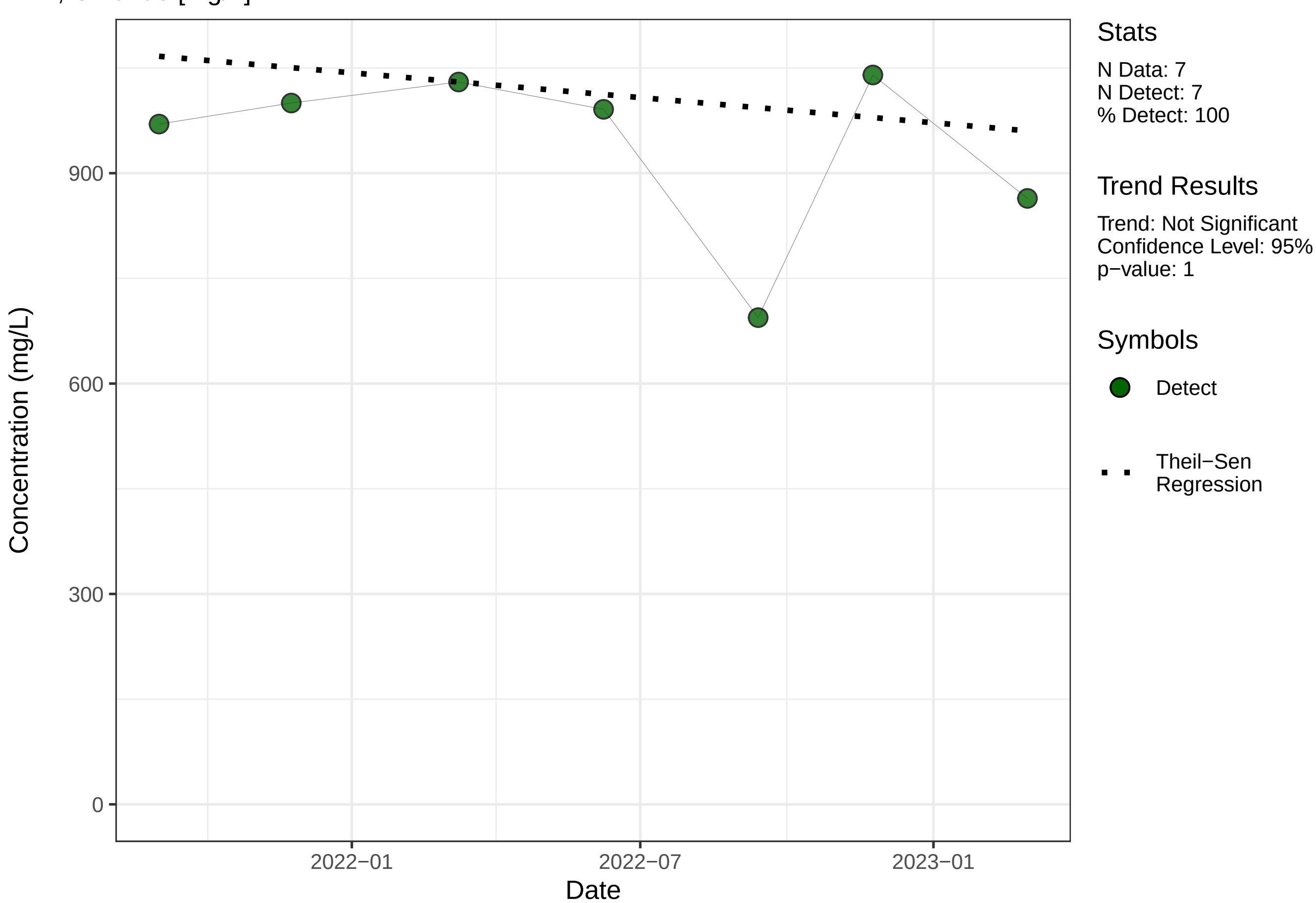

D119, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
0
500
1000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.18
Symbols
Detect
Theil−Sen Regression

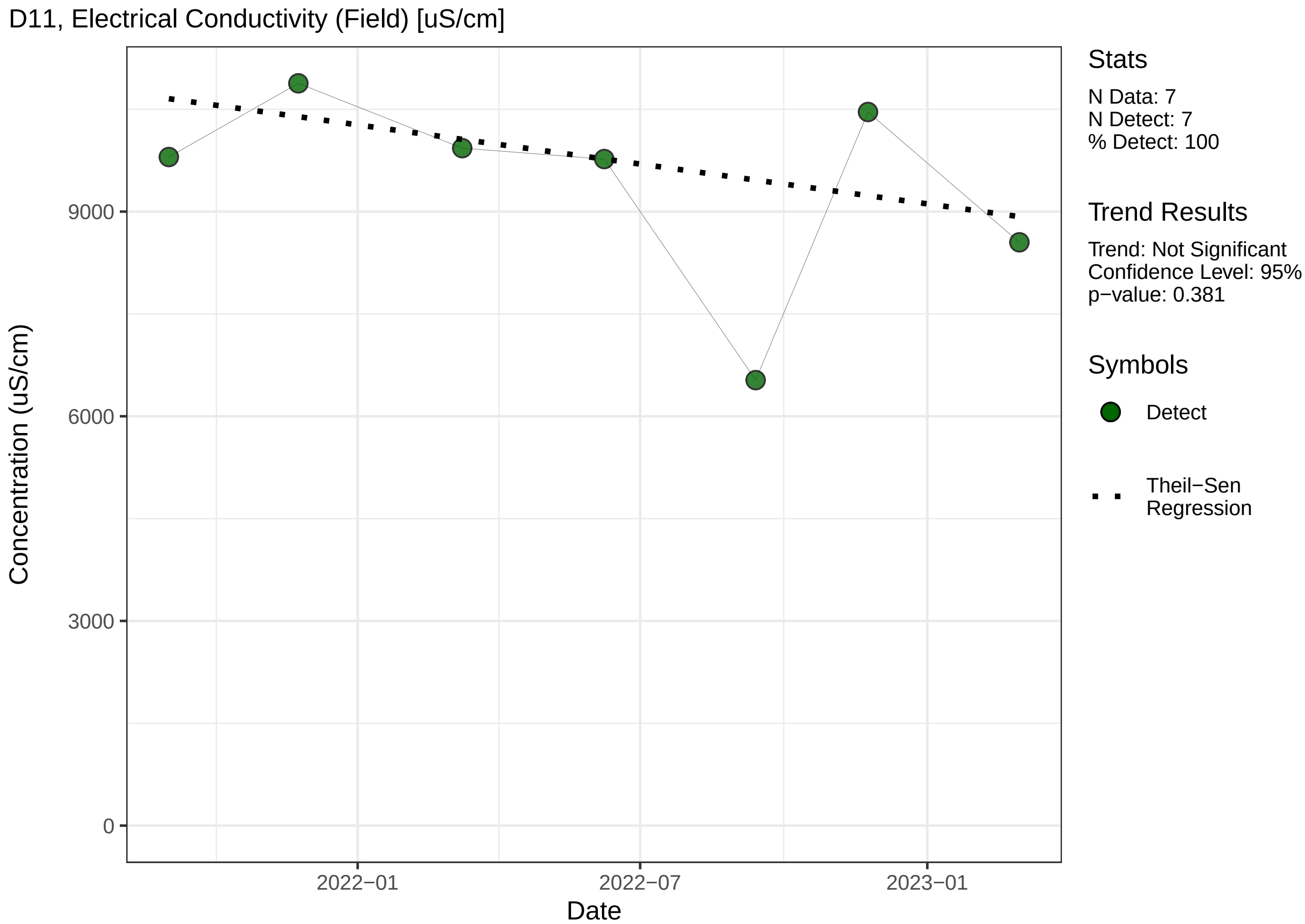

D119, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
0
500
1000
1500
2000
2500
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 9
N Detect: 9
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.0752
Symbols
Detect
Theil−Sen Regression

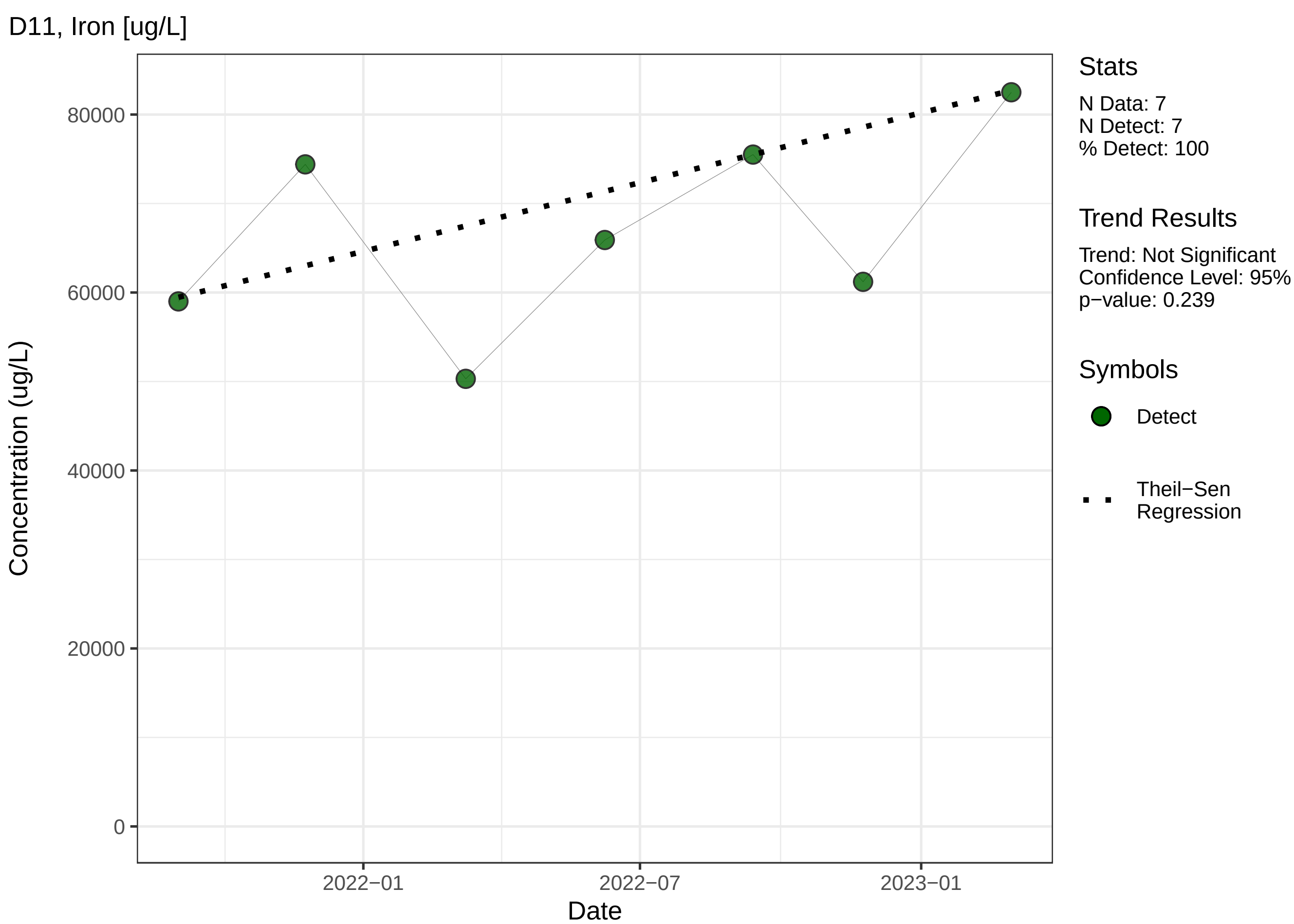
D11, Boron [ug/L]

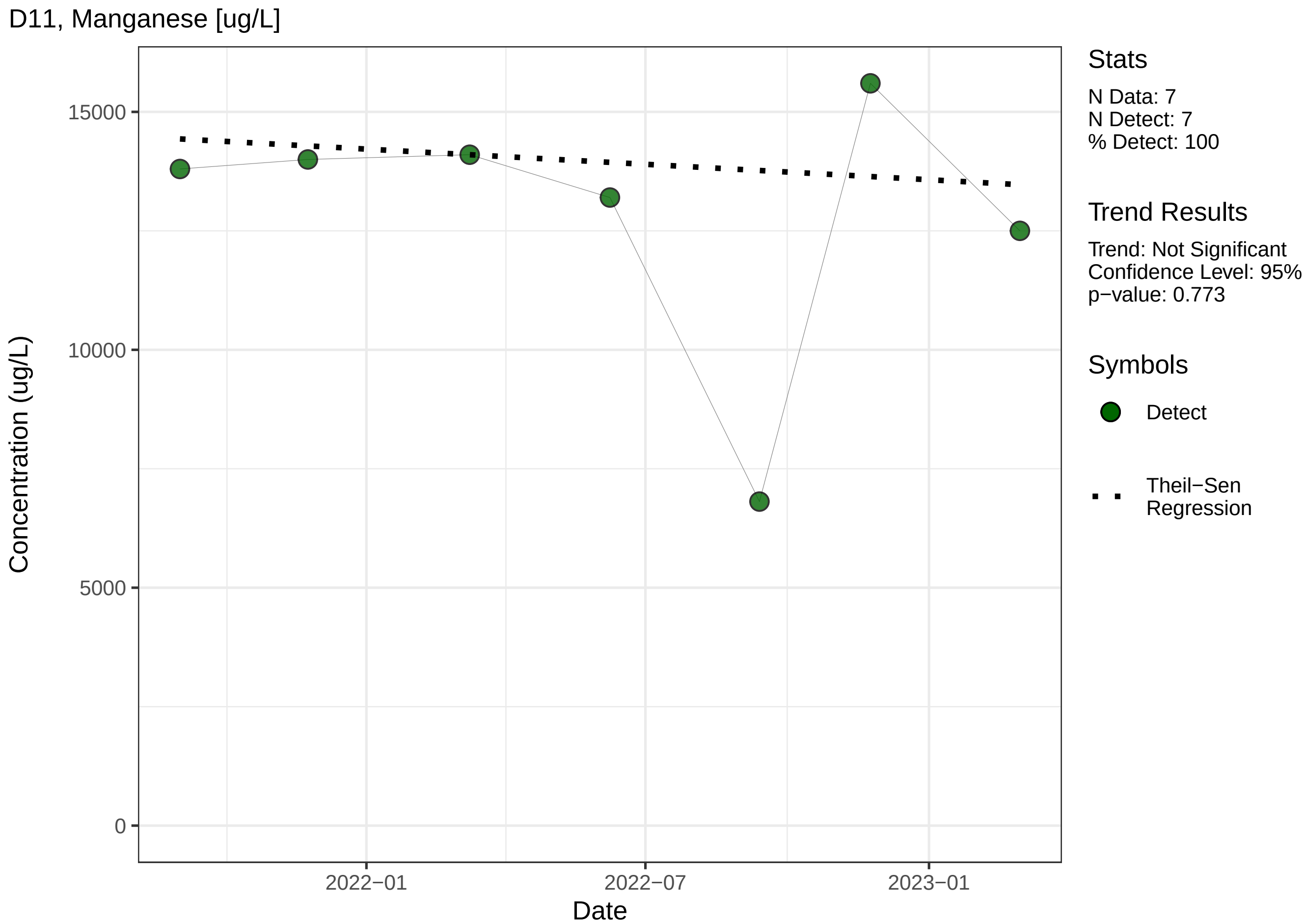


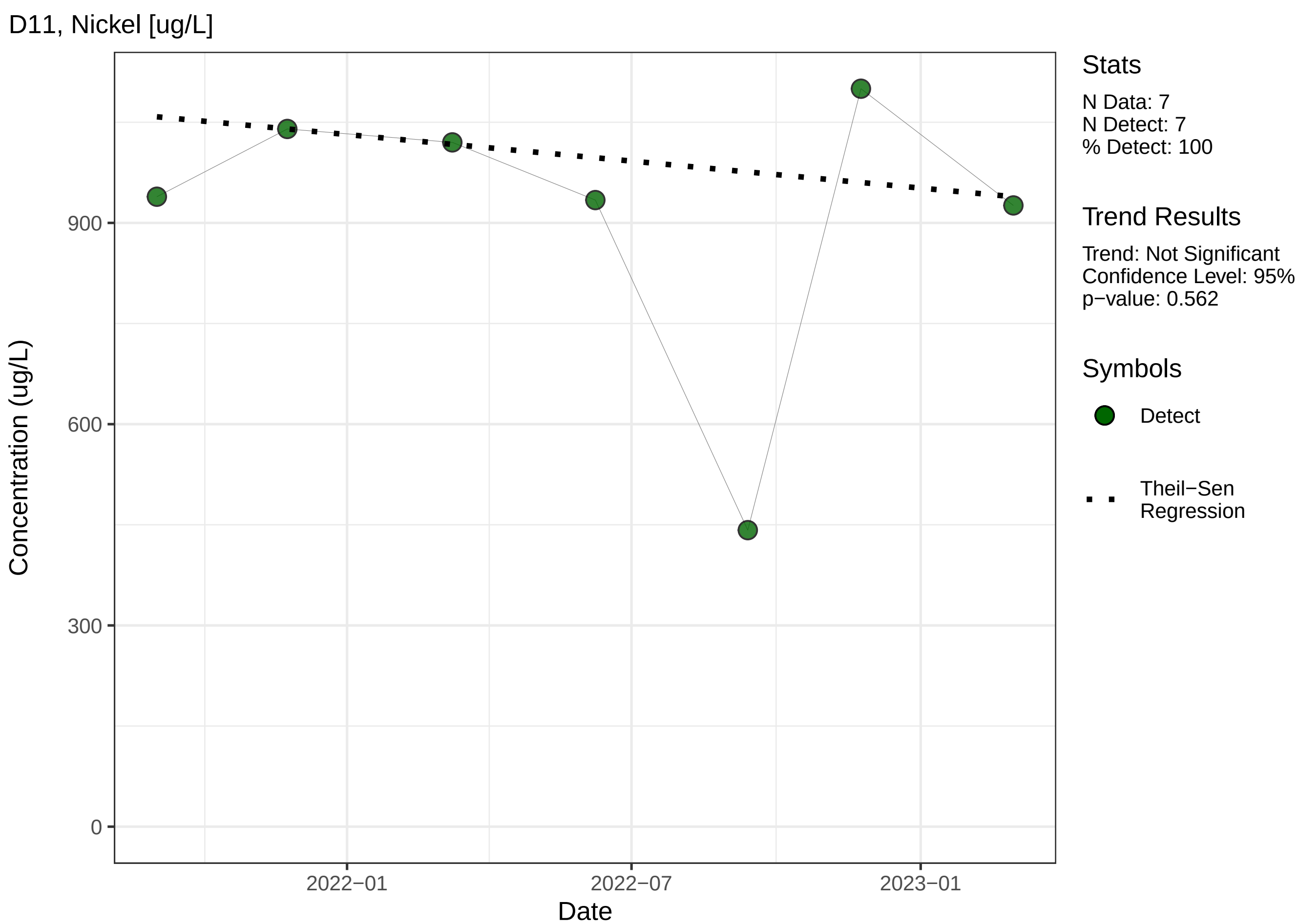
D11, Chloride [mg/L]



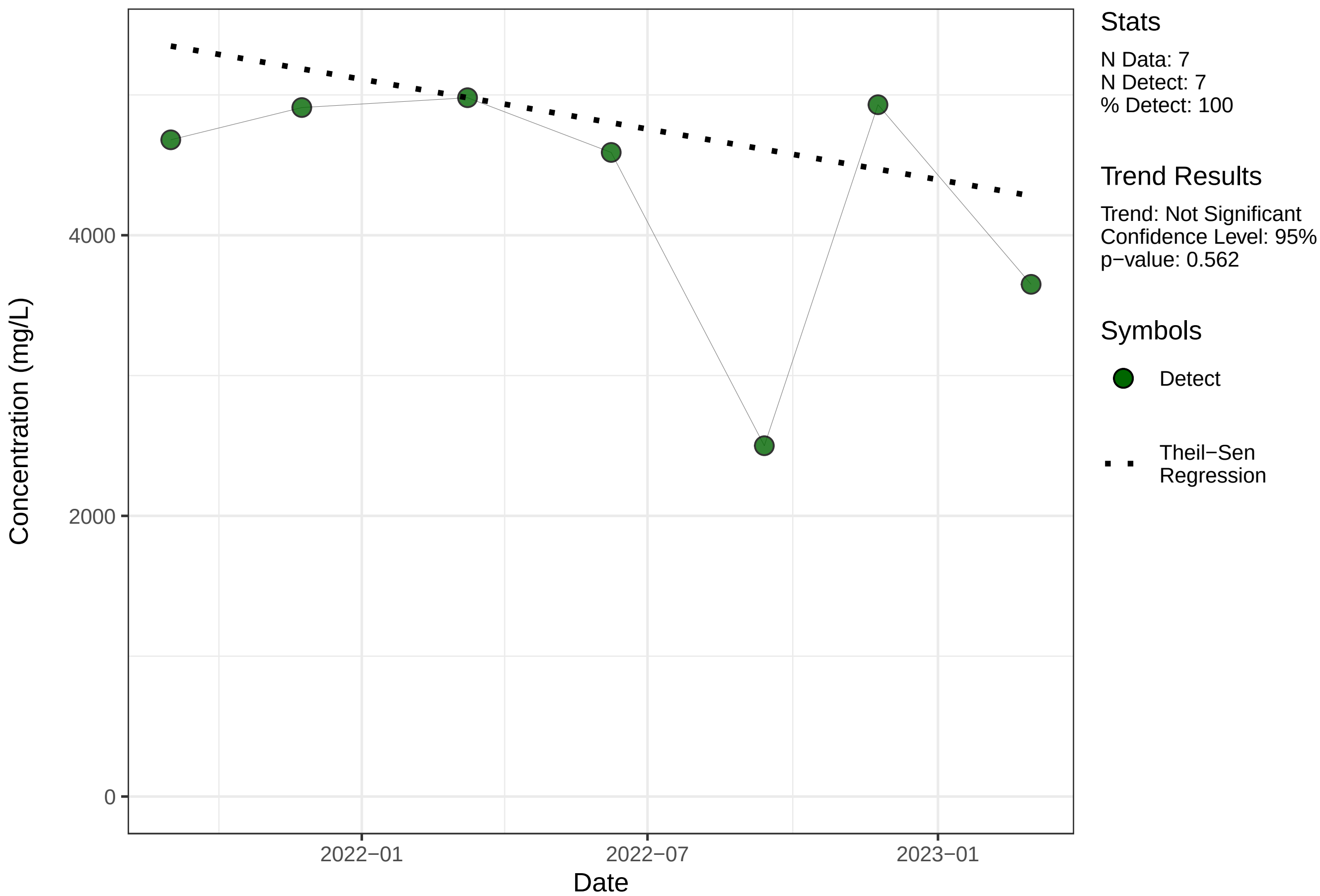

D11, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
9000
6000
3000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 7
N Detect: 7
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.381
Symbols
Detect
Theil−Sen Regression


D11, Iron [ug/L]
Concentration (ug/L)
80000
60000
40000
20000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 7
N Detect: 7
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.239
Symbols
Detect
Theil−Sen Regression

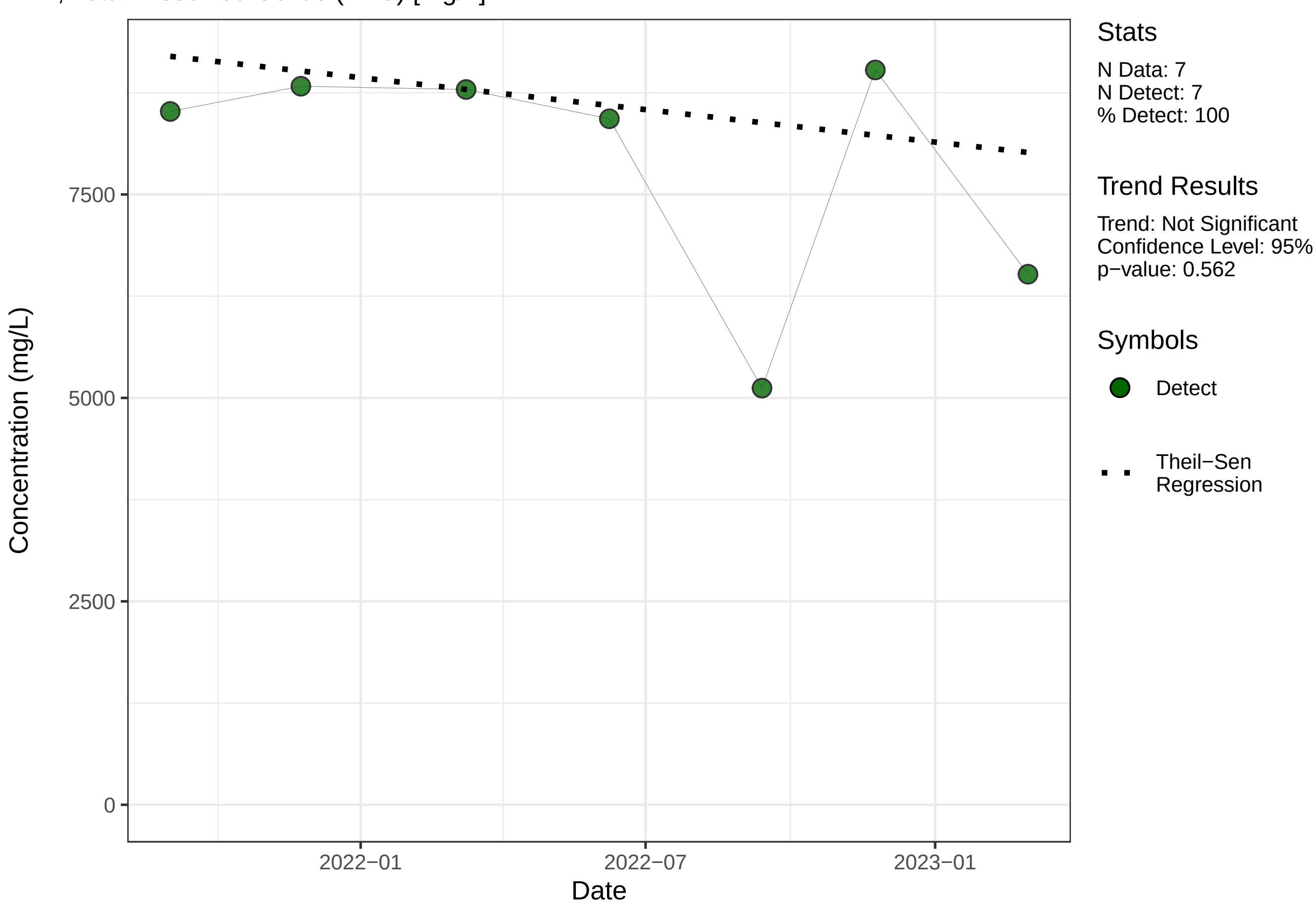

D11, Manganese [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 7
N Detect: 7
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.773
Symbols
Detect
Theil−Sen Regression

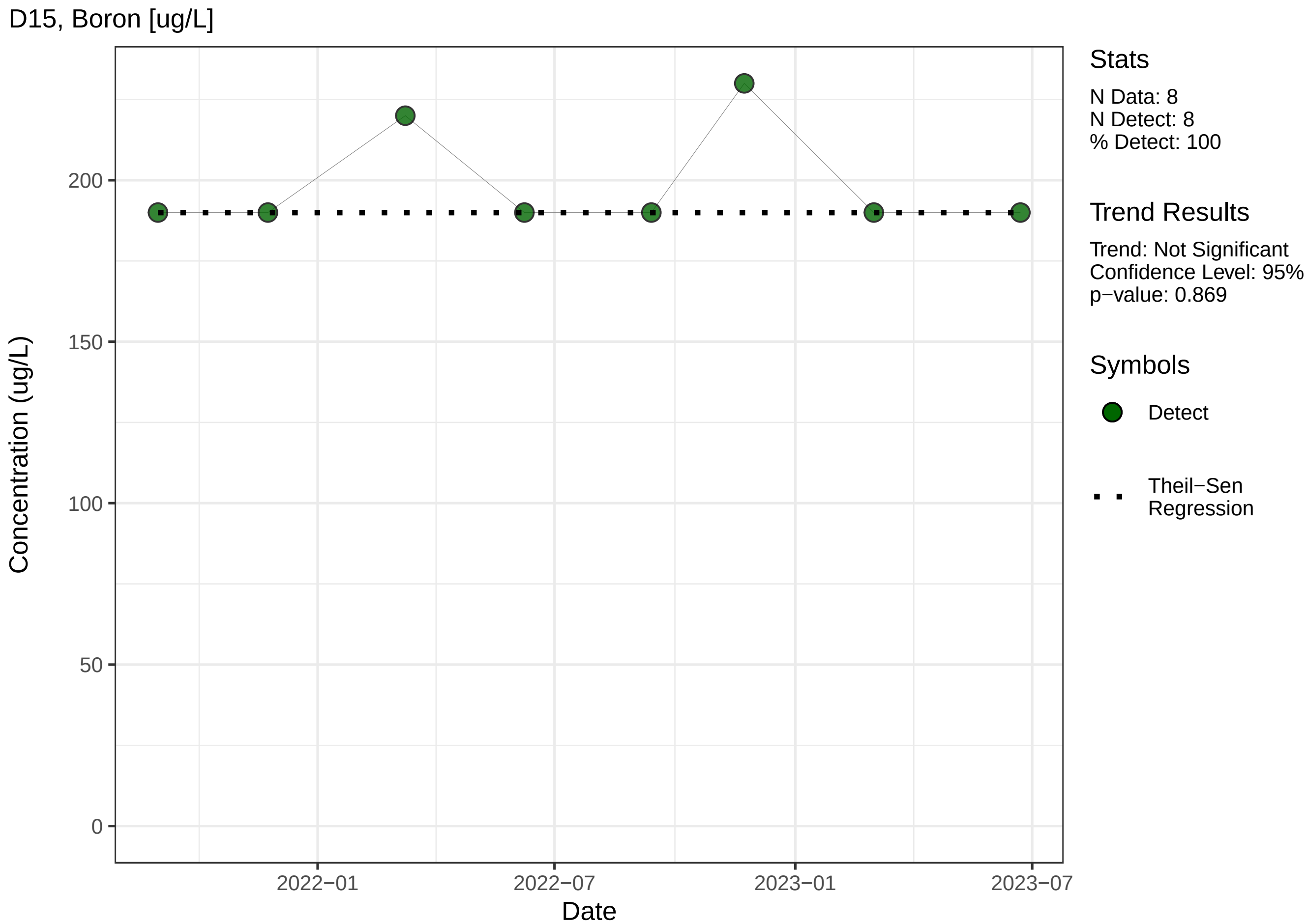

D11, Nickel [ug/L]
Concentration (ug/L)
900
600
300
0
2022−01
2022−07
2023−01
Date
Stats
N Data: 7
N Detect: 7
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.562
Symbols
Detect
Theil−Sen Regression

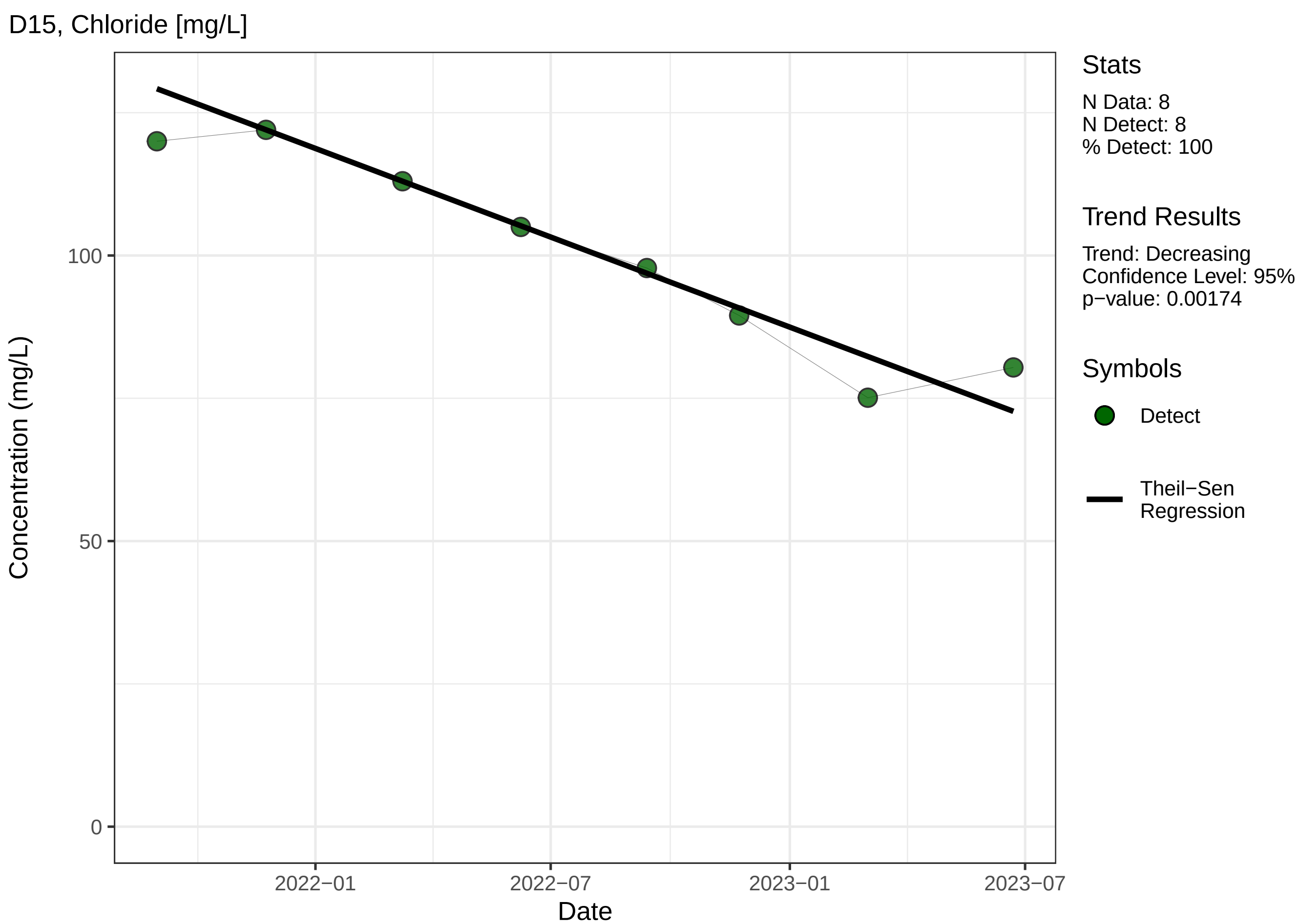
D11, Sulfate (as SO4) [mg/L]



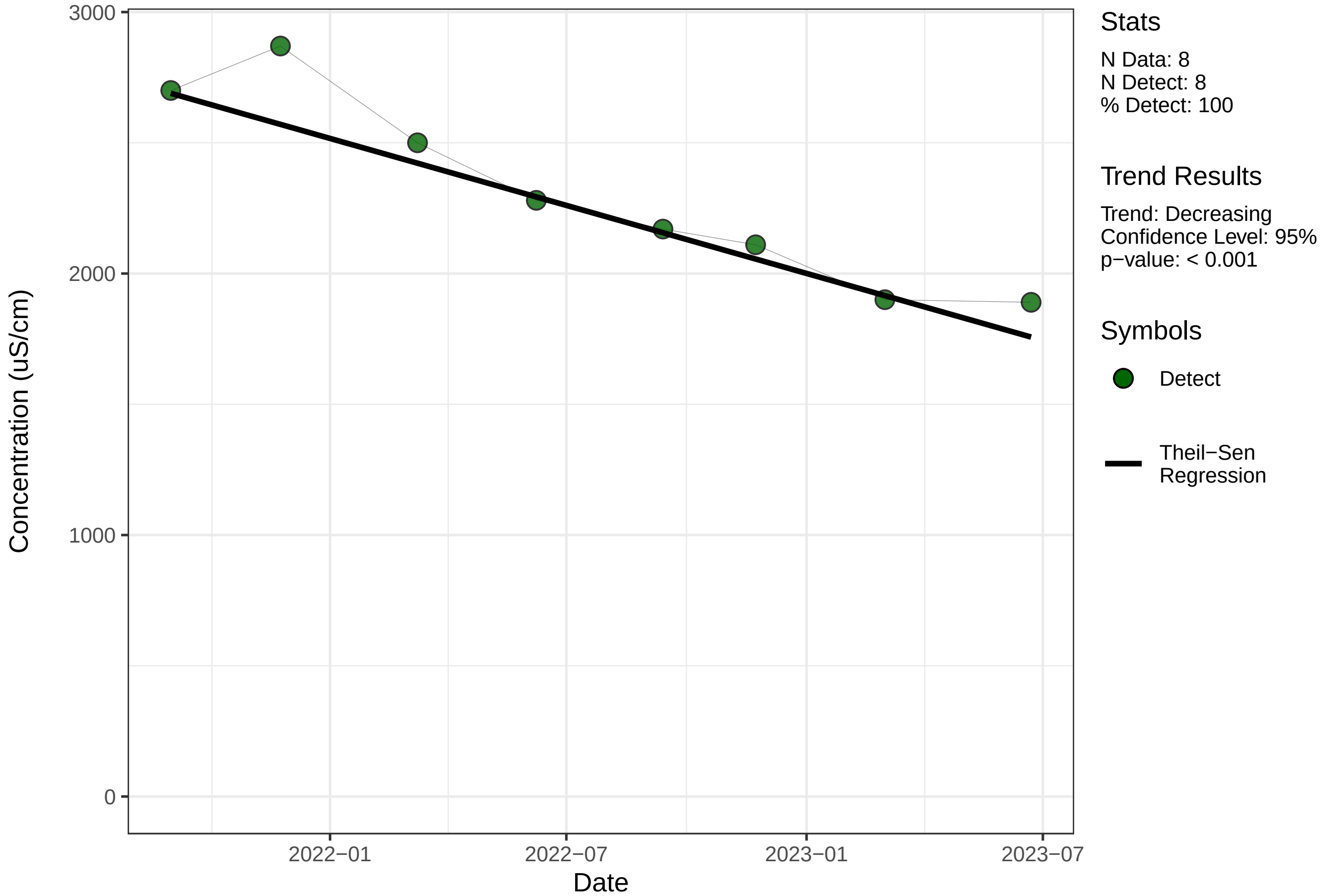
D11, Total Dissolved Solids (TDS) [mg/L]



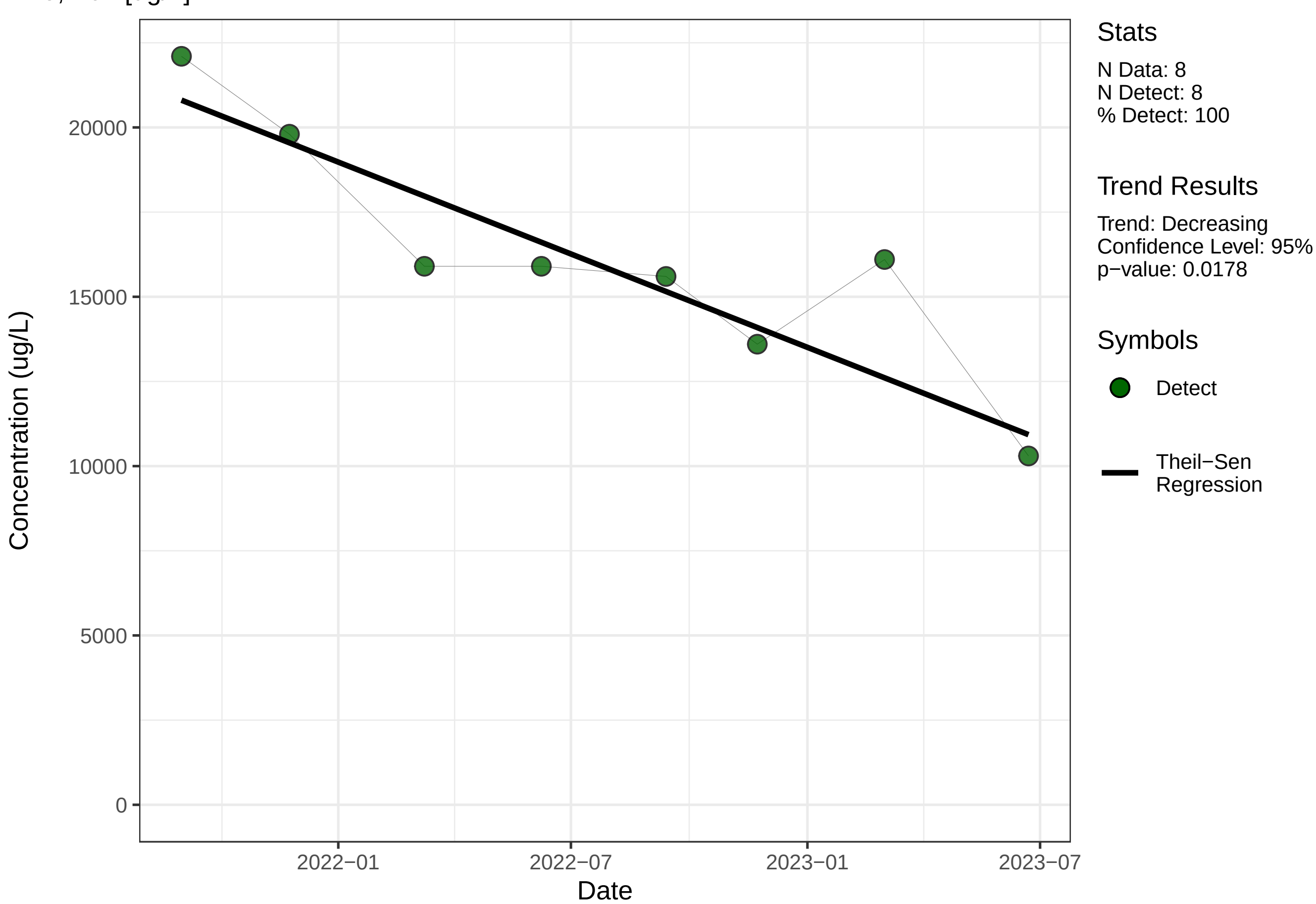

D15, Boron [ug/L]
Concentration (ug/L)
200
150
100
50
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.869
Symbols
Detect
Theil−Sen Regression


D15, Chloride [mg/L]
Concentration (mg/L)
100
50
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.00174
Symbols
Detect
Theil−Sen Regression

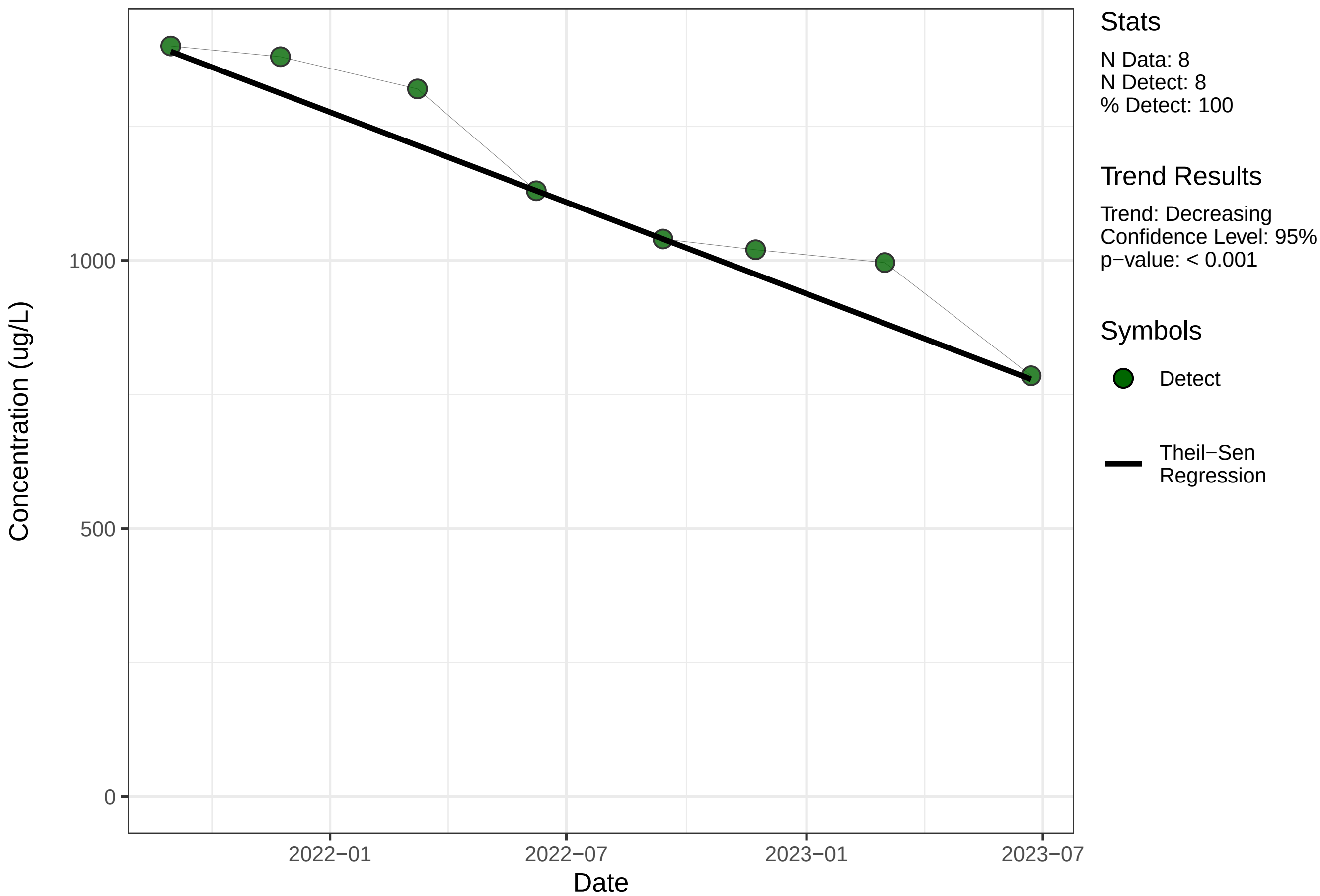
D15, Electrical Conductivity (Field) [uS/cm]



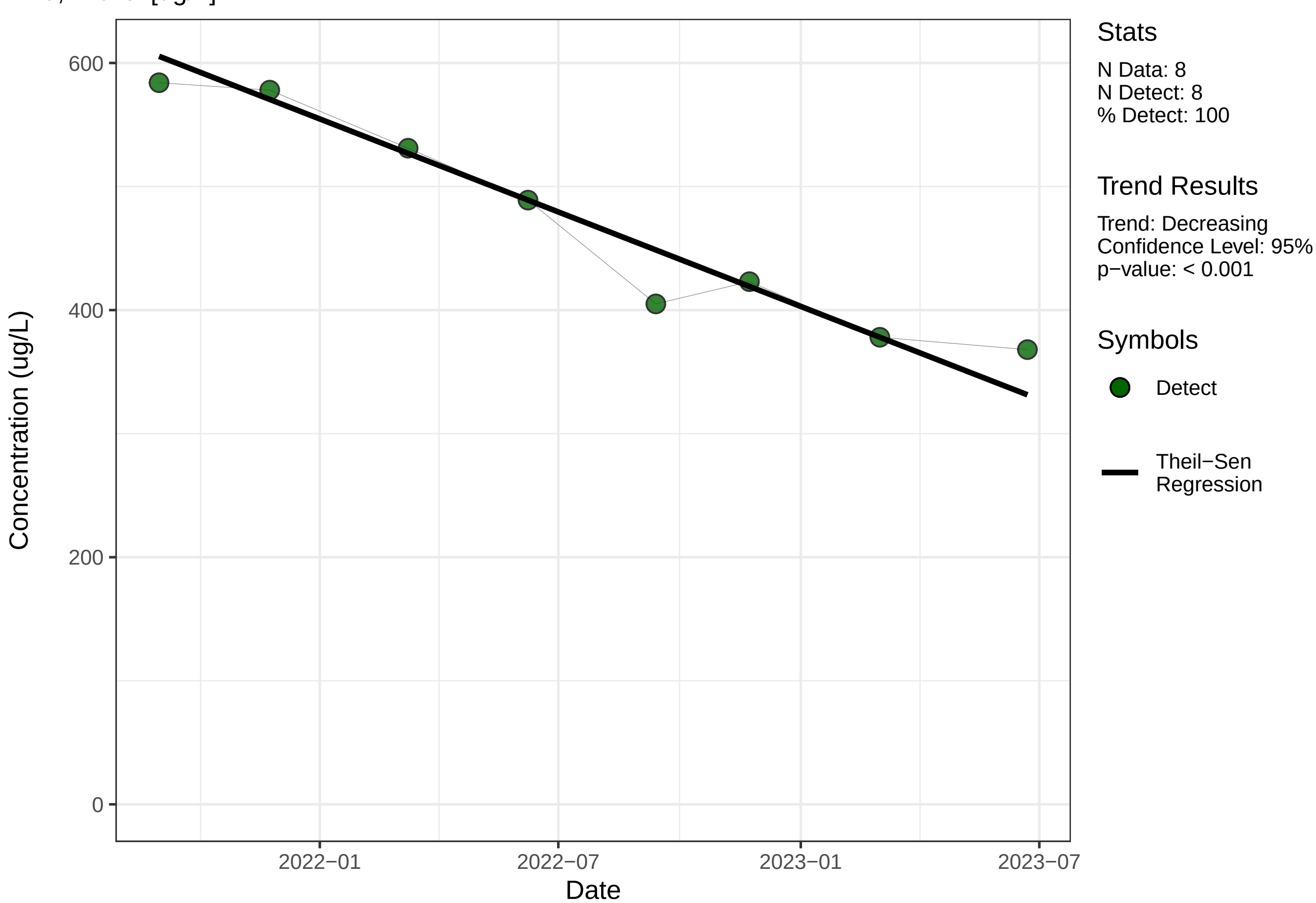
D15, Iron [ug/L]



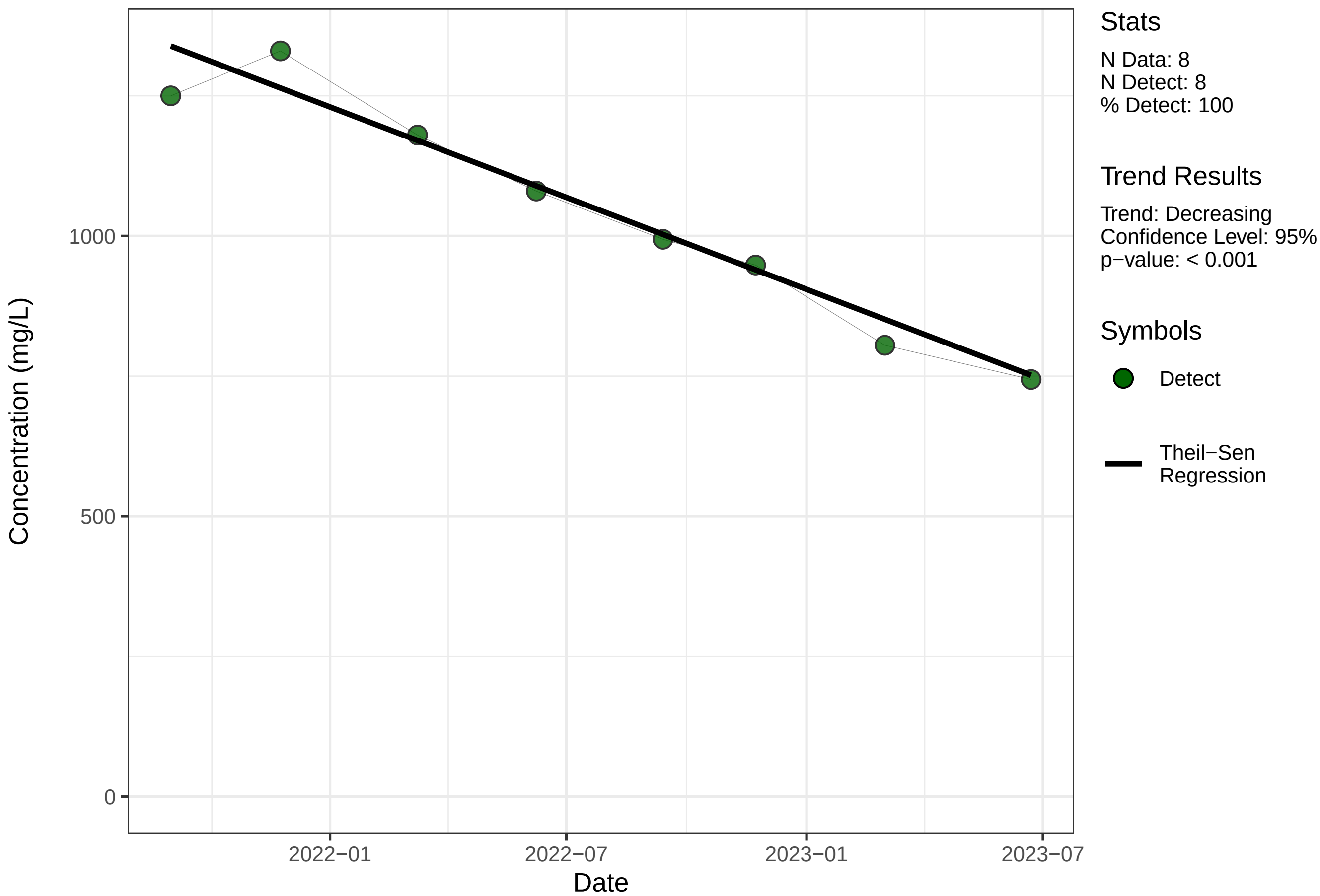
D15, Manganese [ug/L]



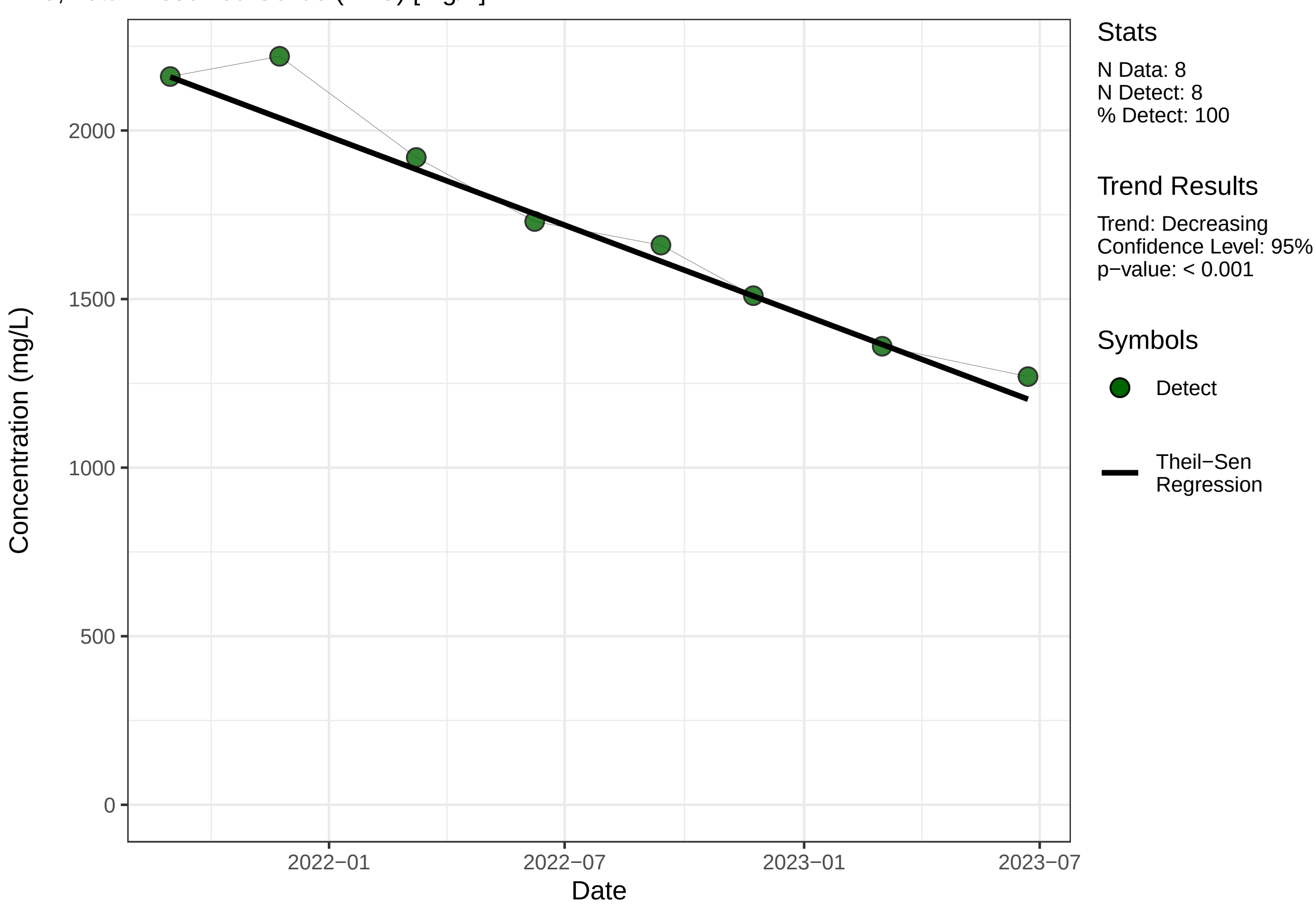
D15, Nickel [ug/L]



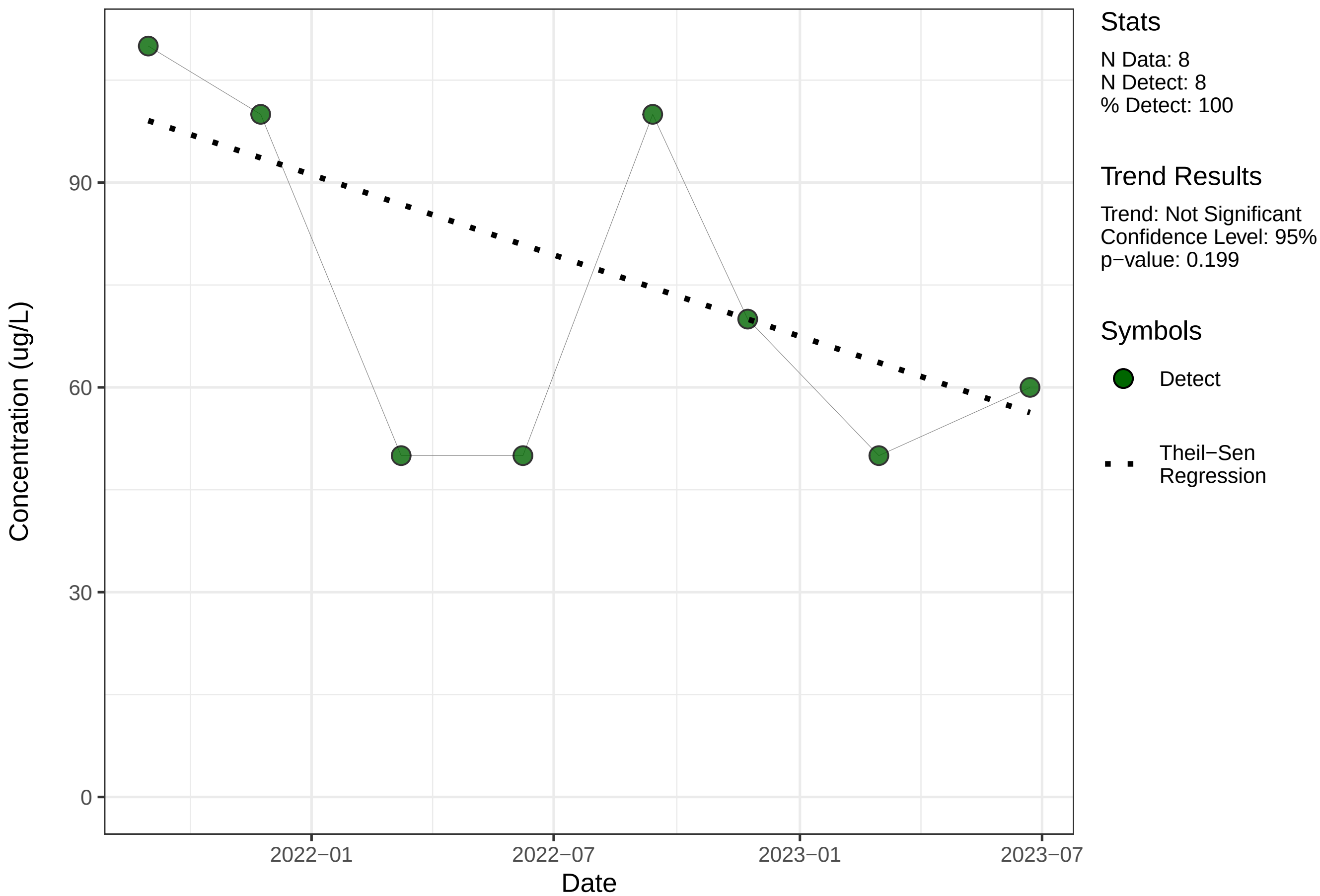
D15, Sulfate (as SO4) [mg/L]



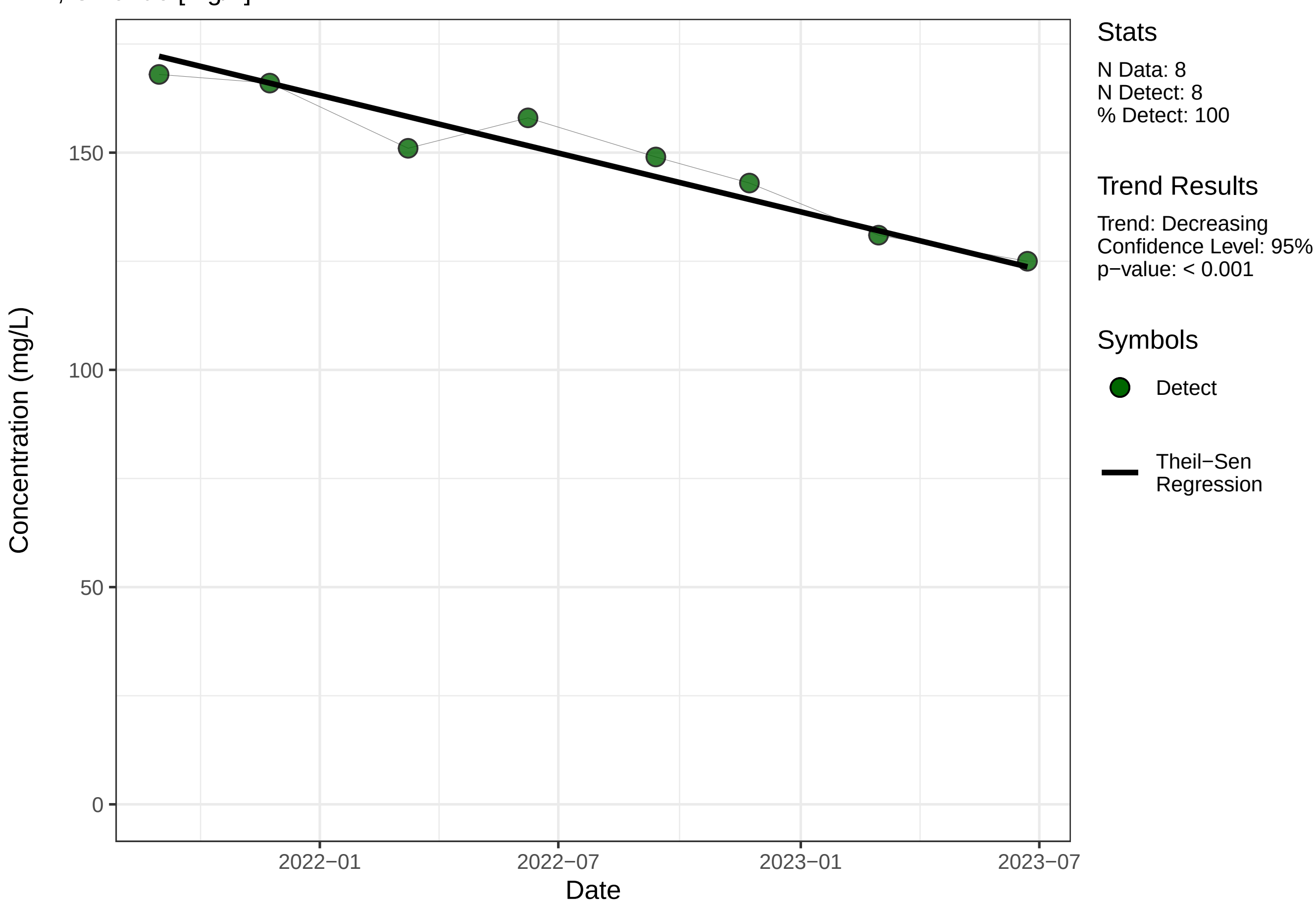
D15, Total Dissolved Solids (TDS) [mg/L]



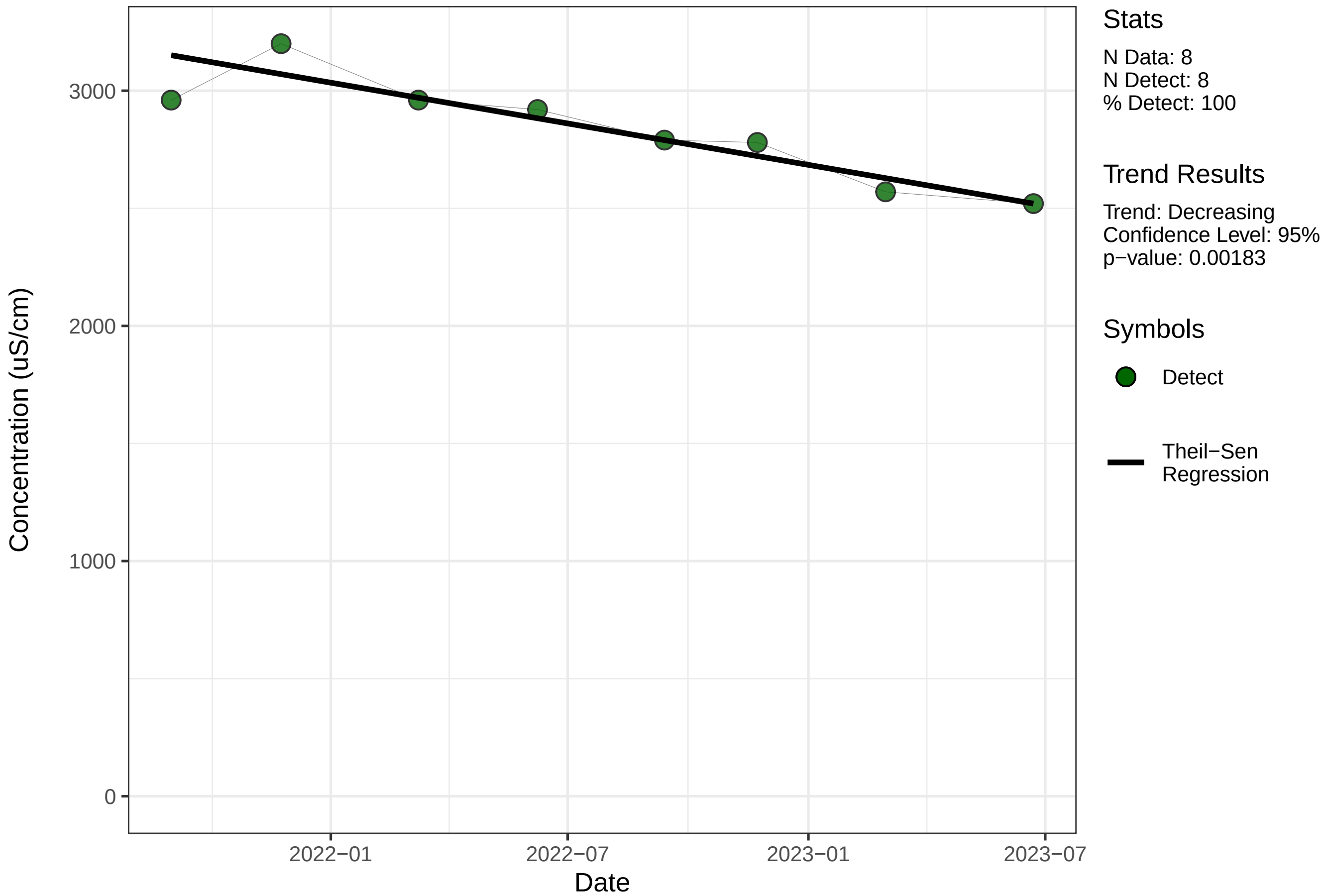
D17, Boron [ug/L]



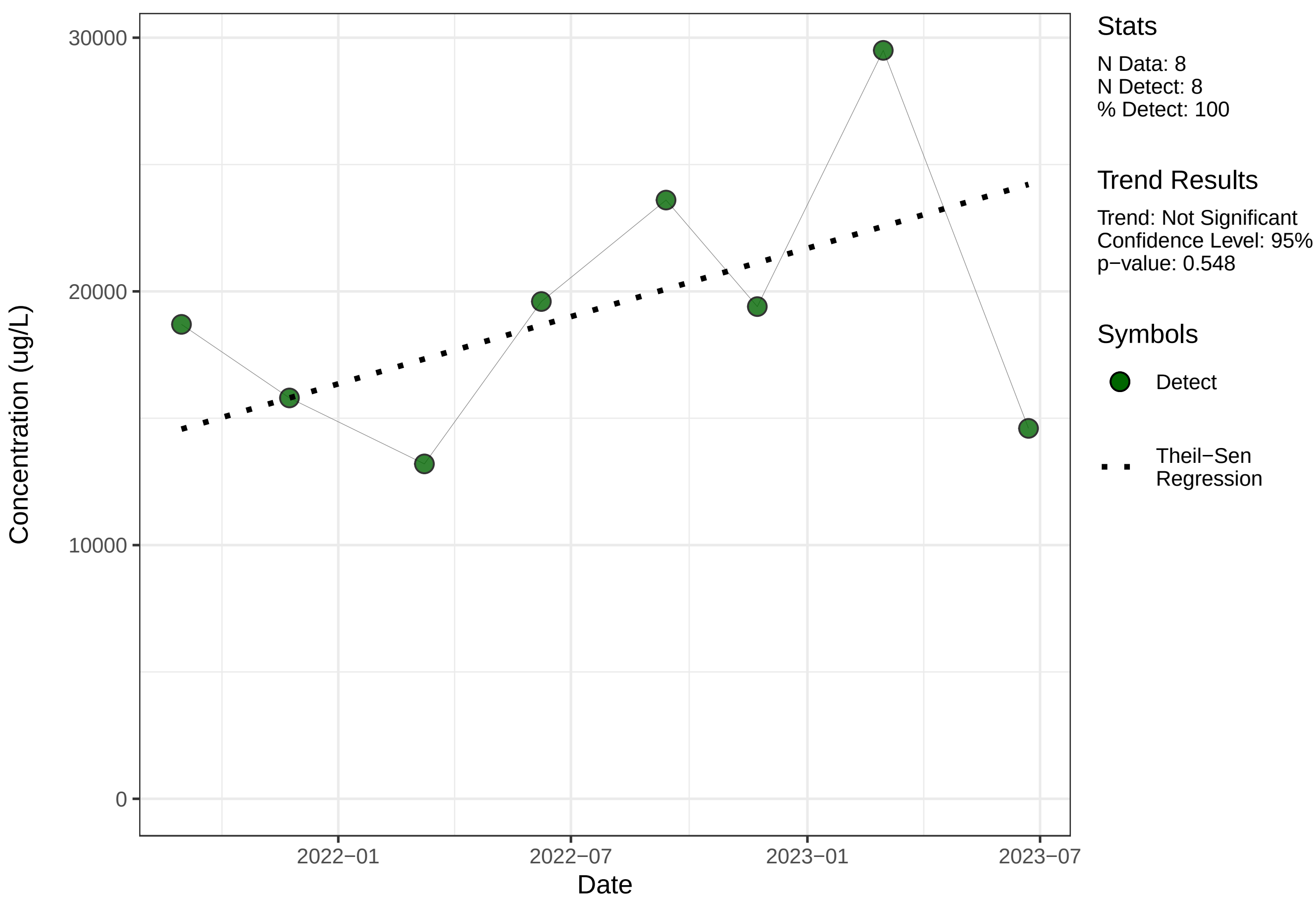
D17, Chloride [mg/L]

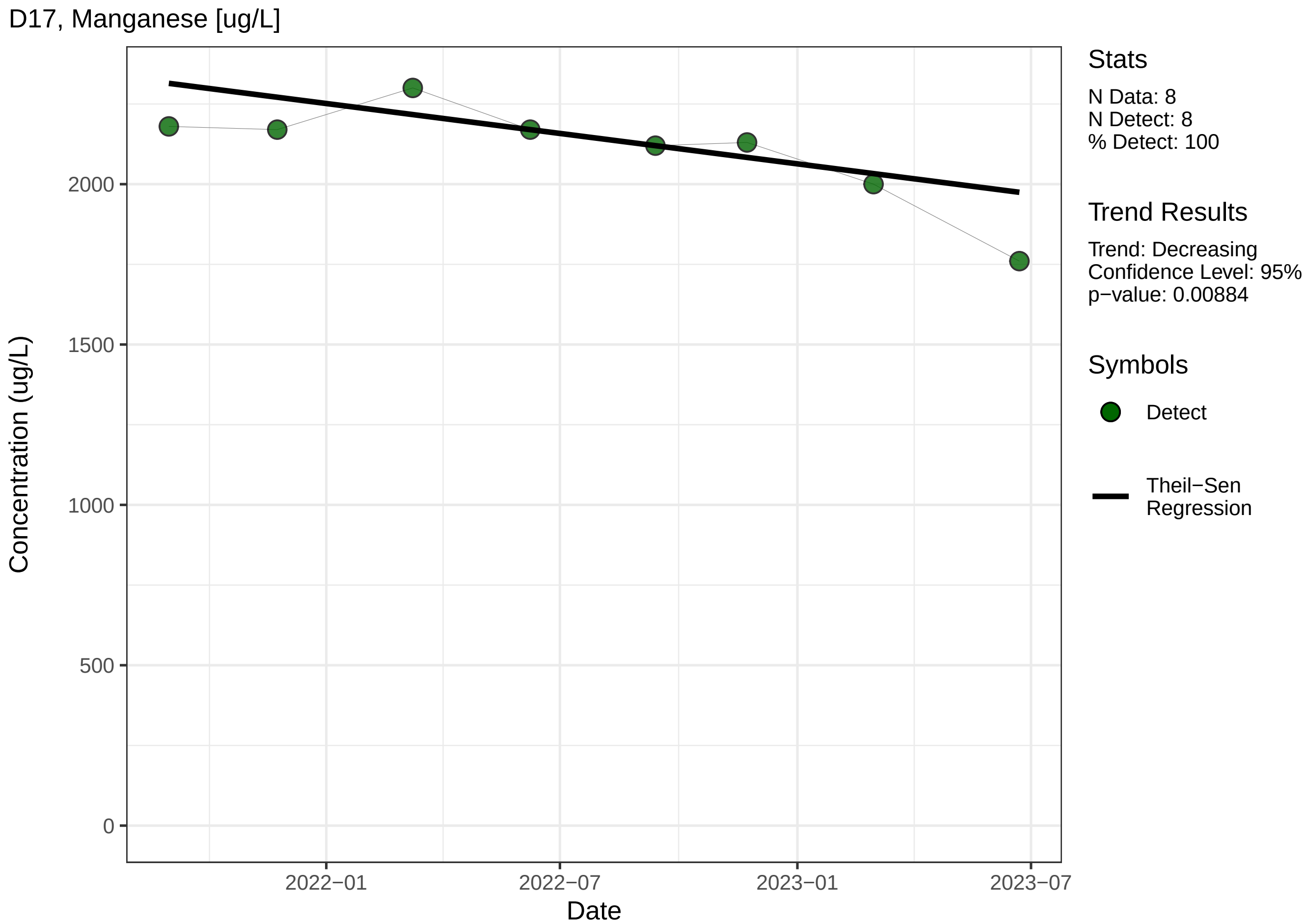


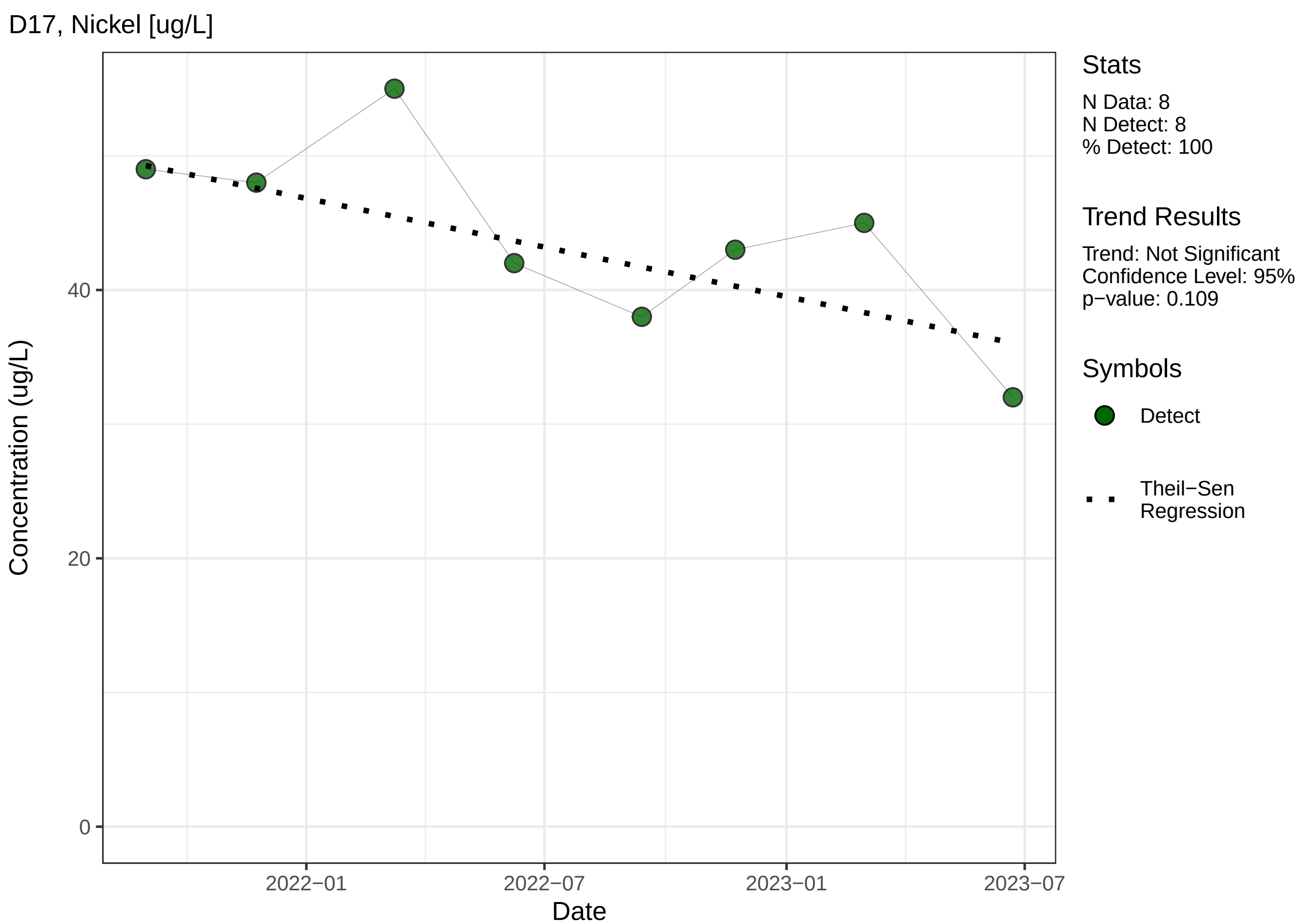
D17, Electrical Conductivity (Field) [uS/cm]



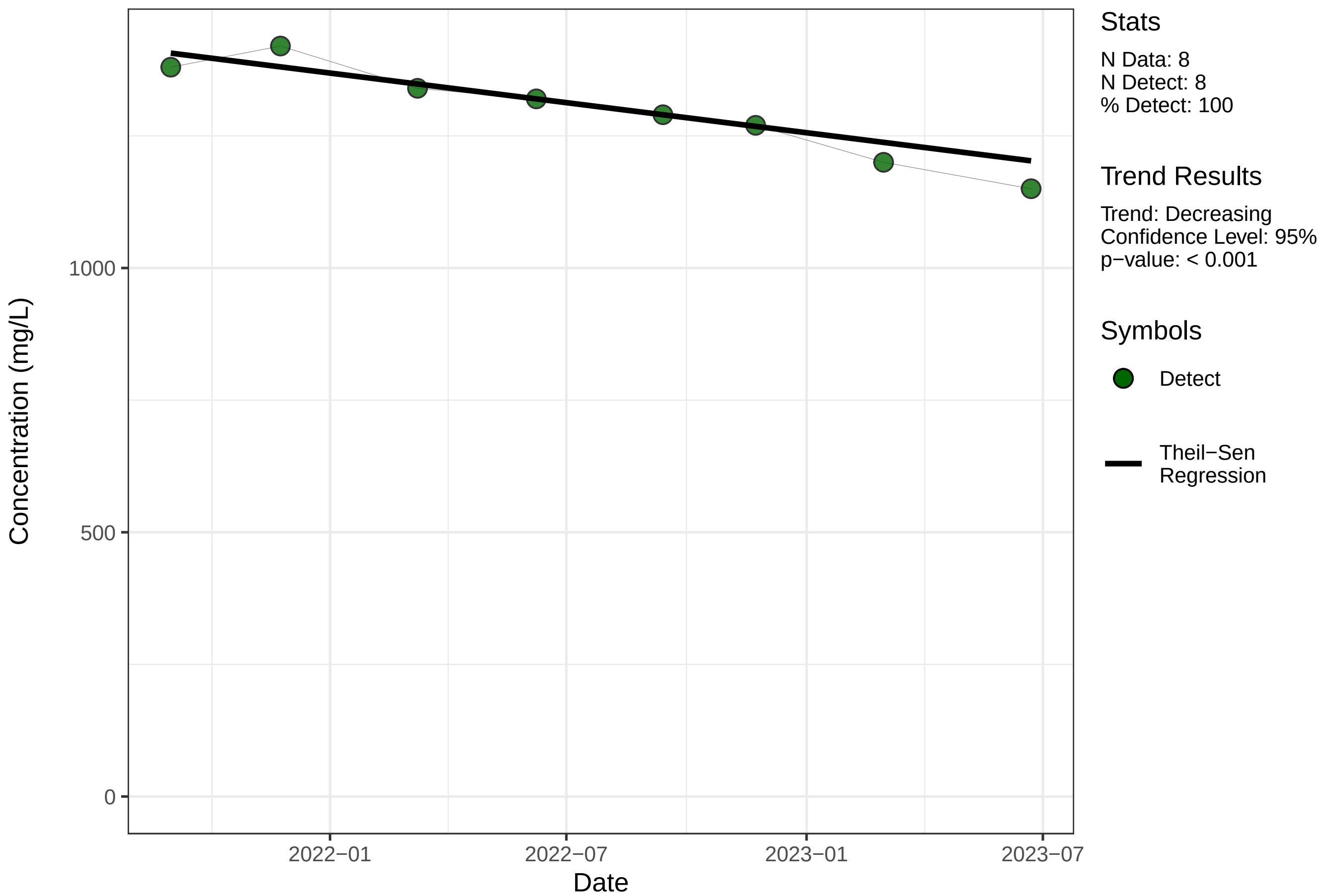
D17, Iron [ug/L]



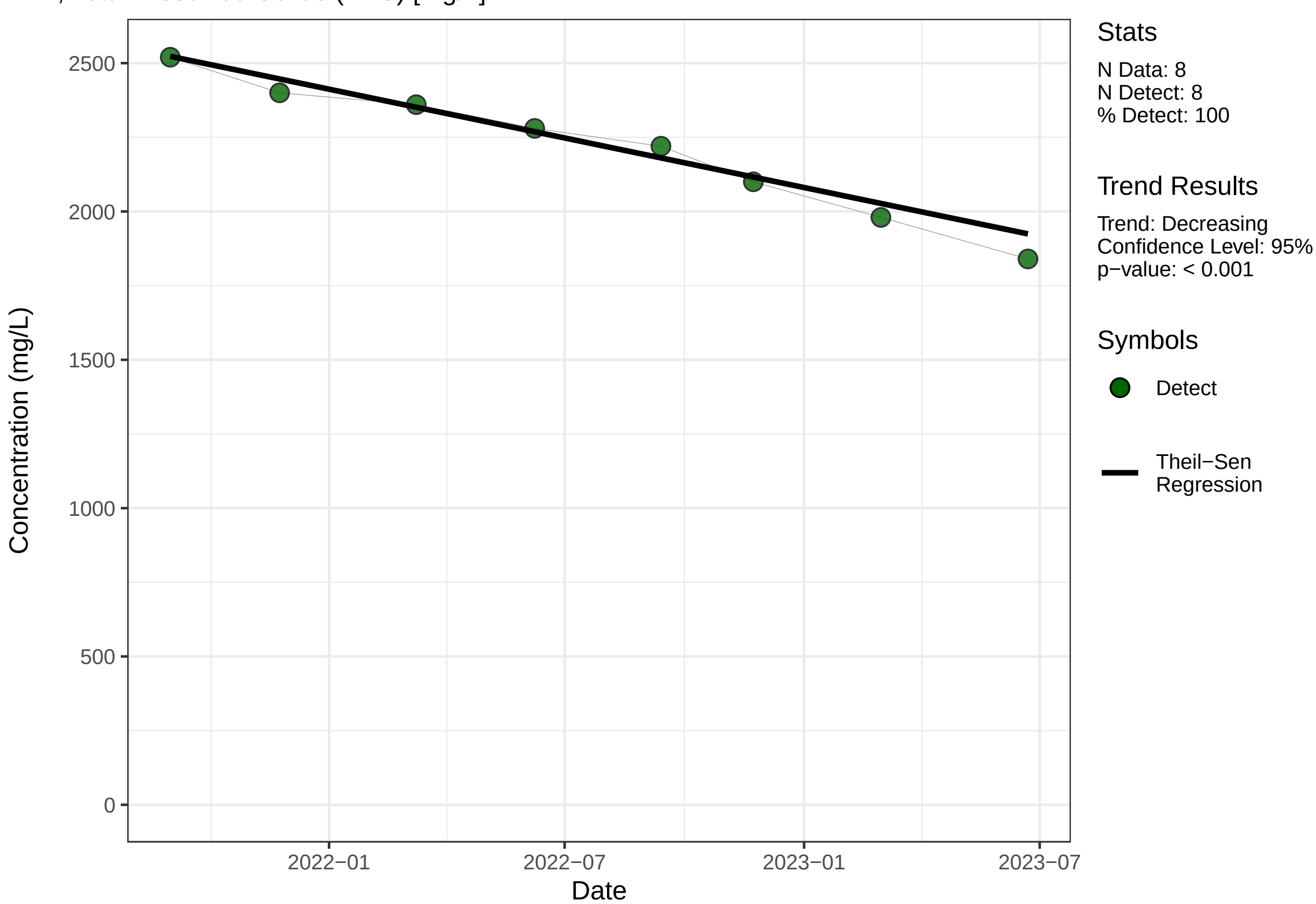

D17, Manganese [ug/L]
Concentration (ug/L)
2000
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.00884
Symbols
Detect
Theil−Sen Regression


D17, Nickel [ug/L]
Concentration (ug/L)
40
20
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

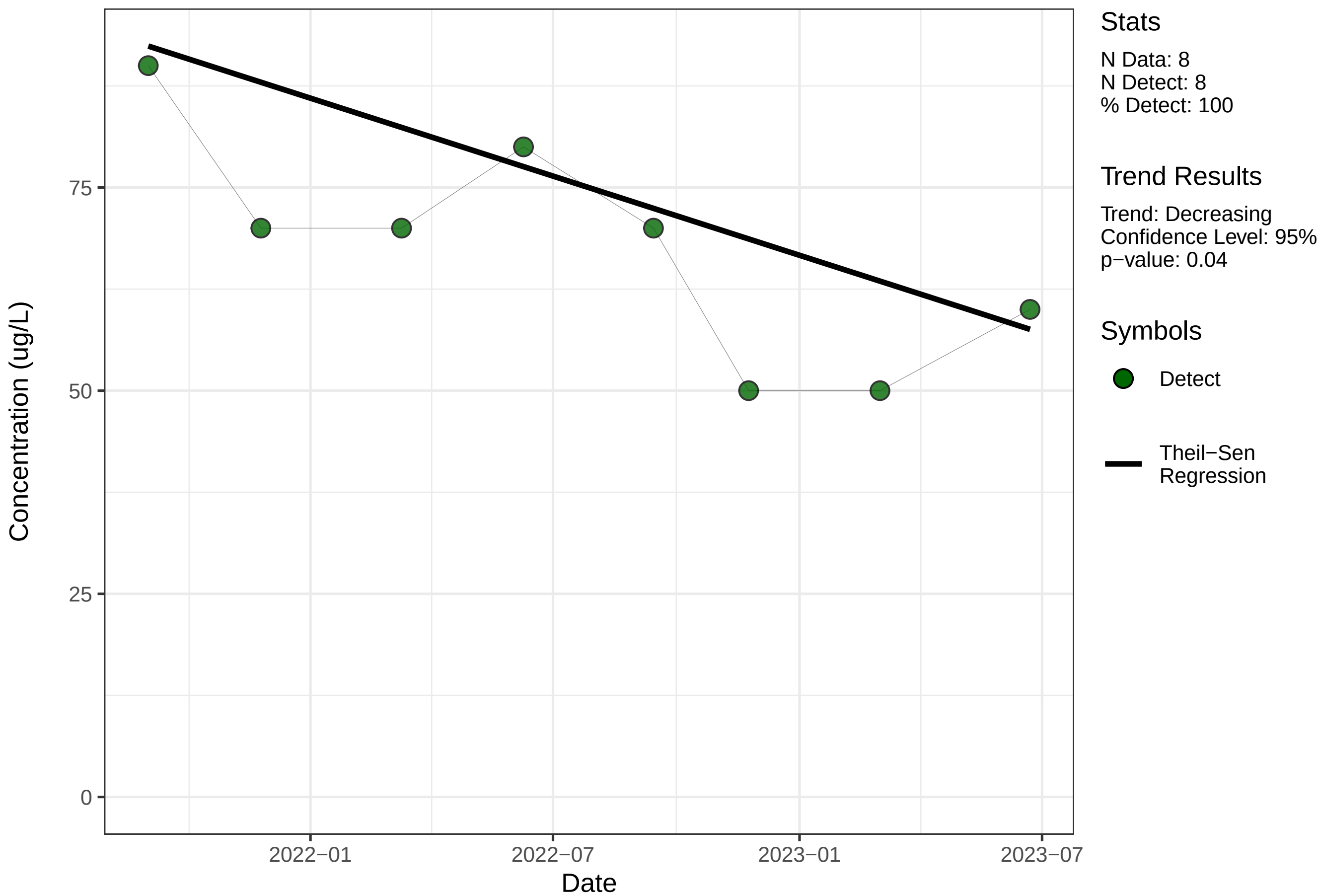
D17, Sulfate (as SO4) [mg/L]



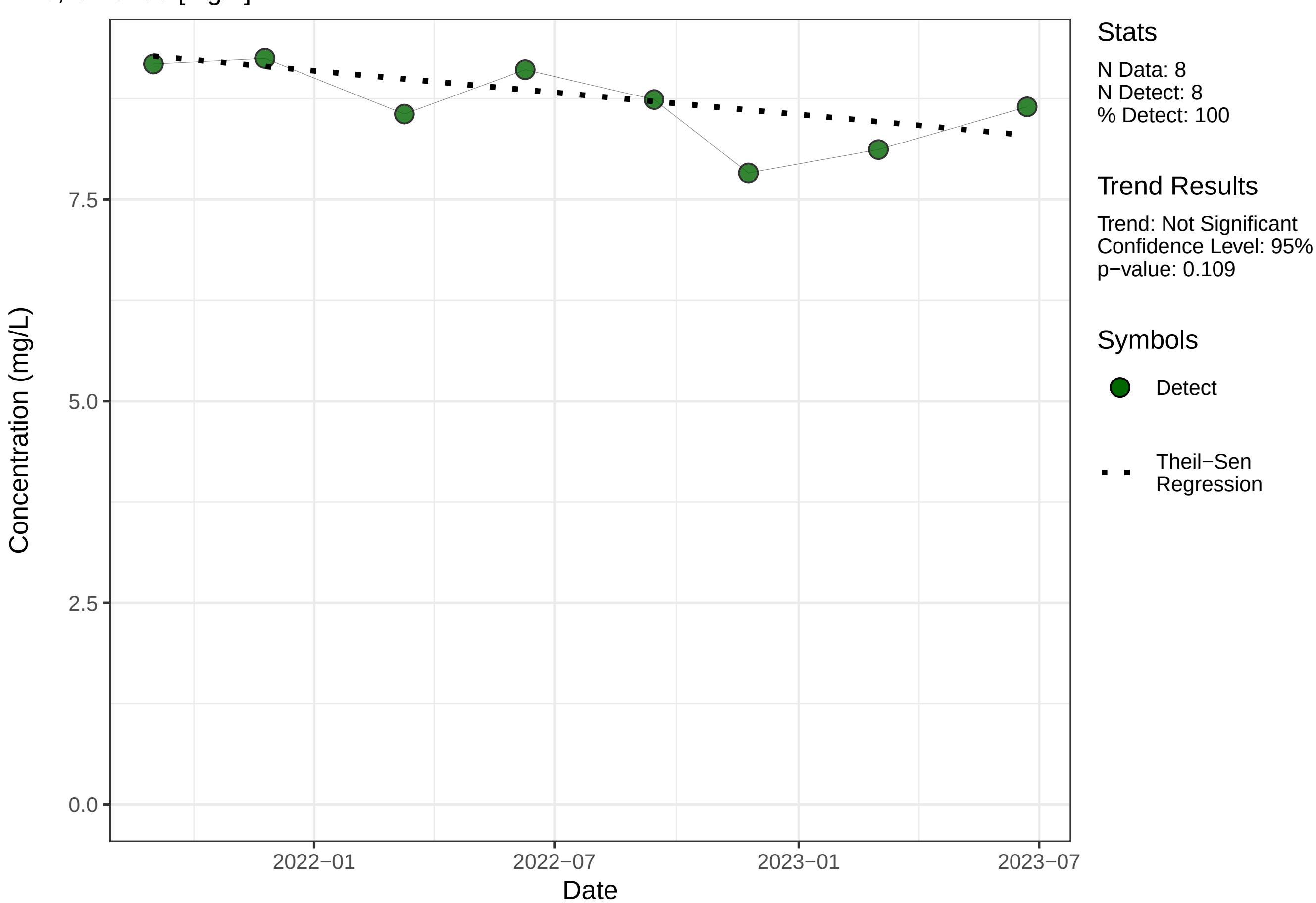
D17, Total Dissolved Solids (TDS) [mg/L]

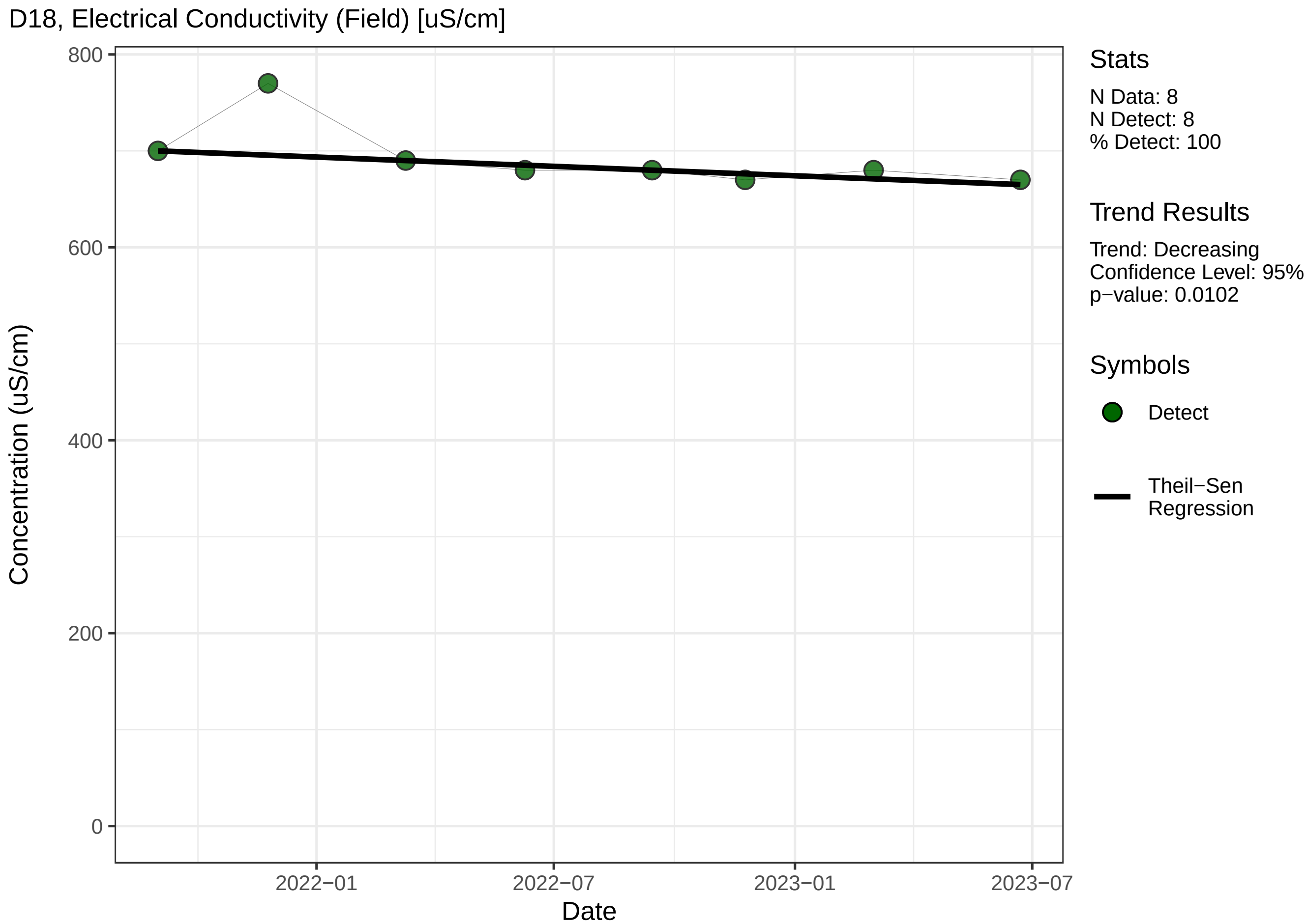


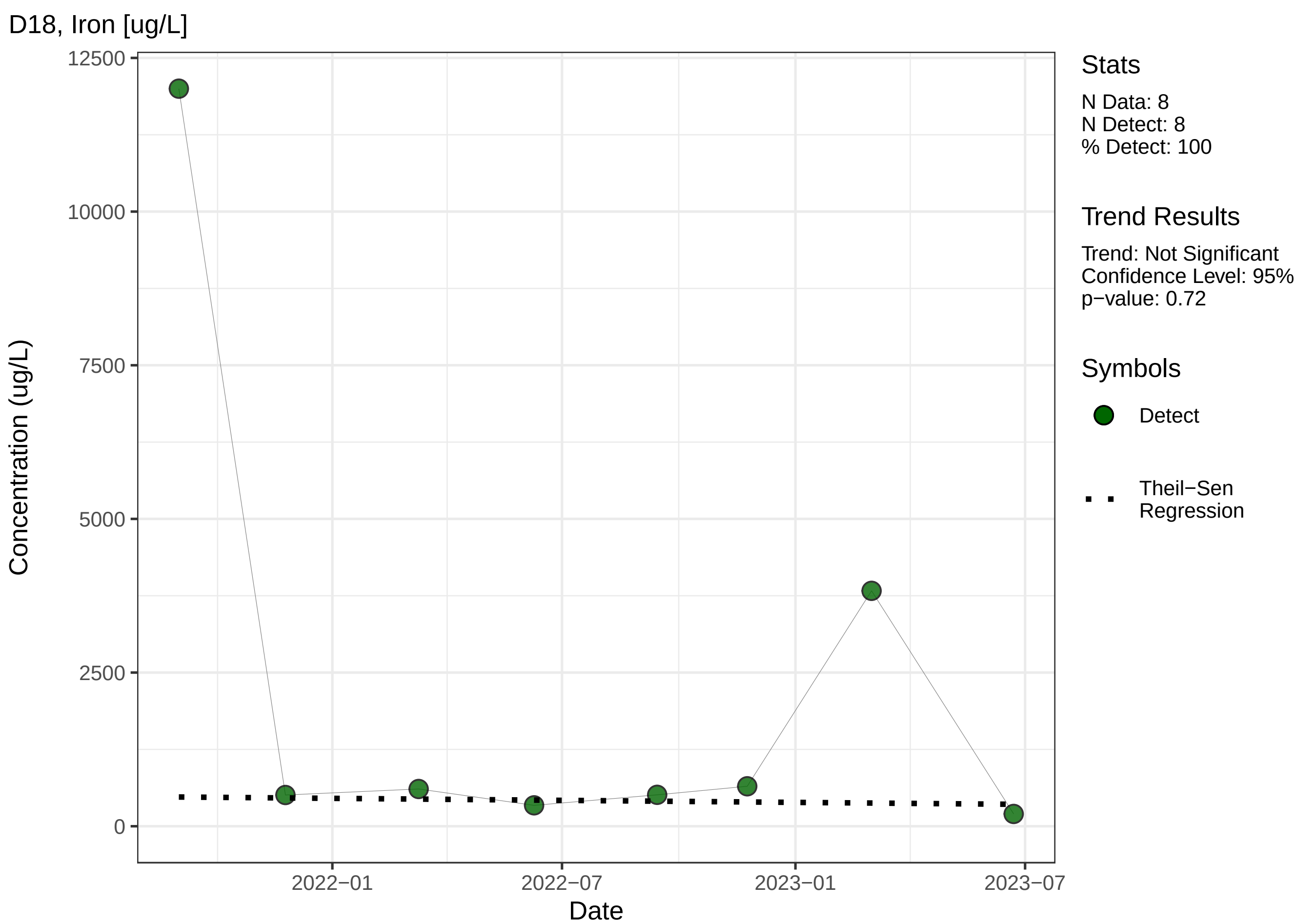
D18, Boron [ug/L]



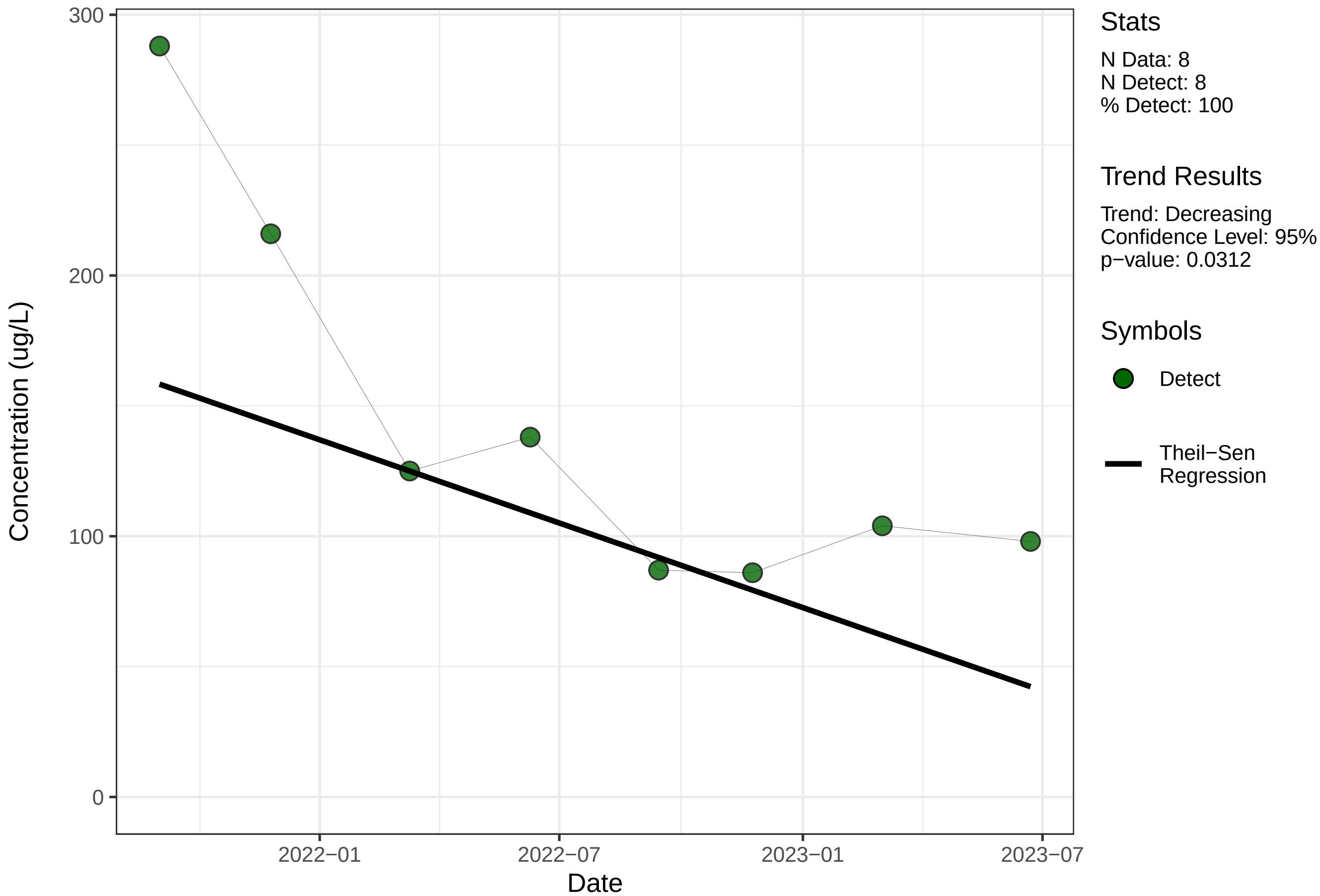
D18, Chloride [mg/L]



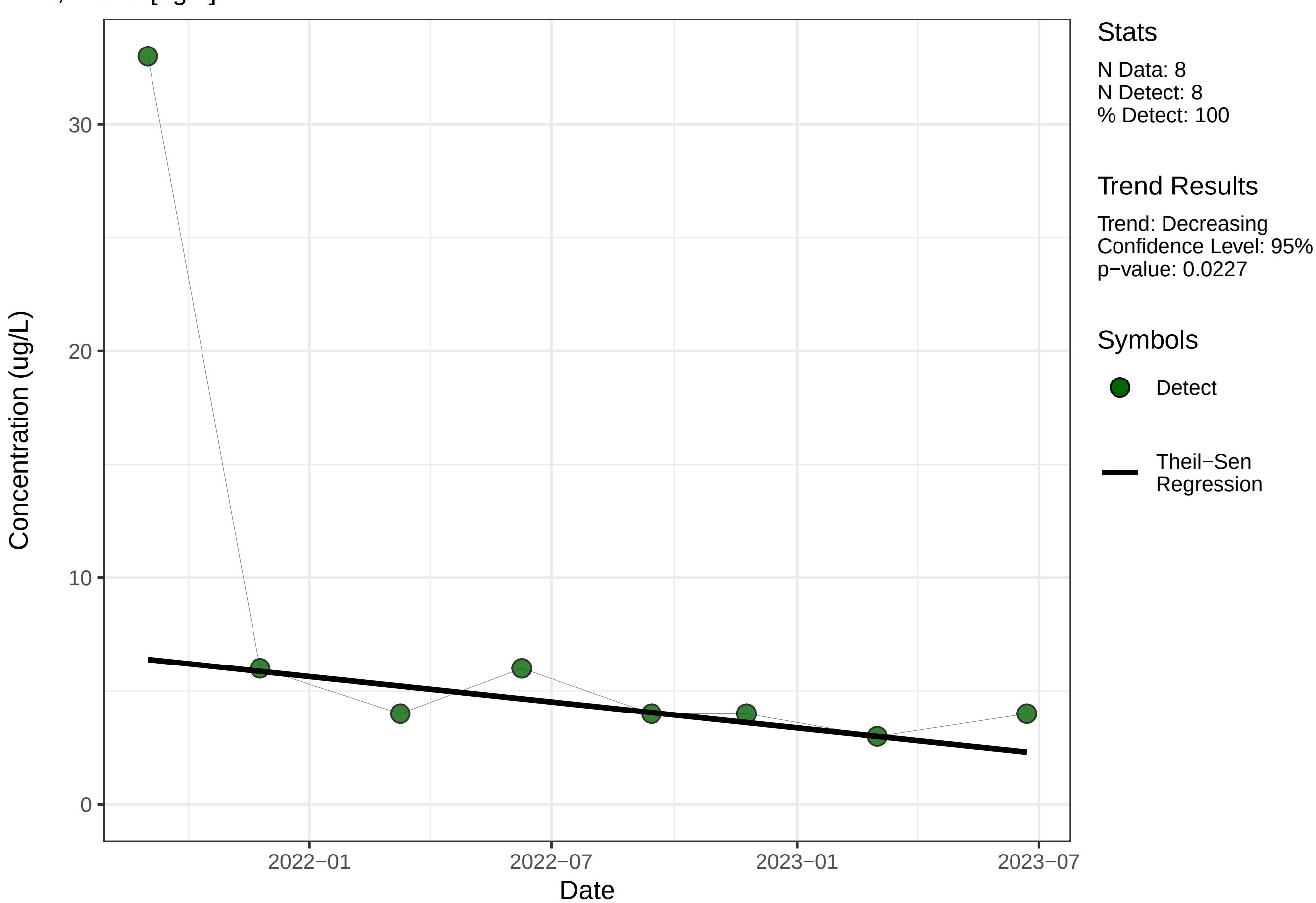

D18, Electrical Conductivity (Field) [uS/cm]
800
600
400
200
0
Concentration (uS/cm)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0102
Symbols
Detect
Theil−Sen Regression

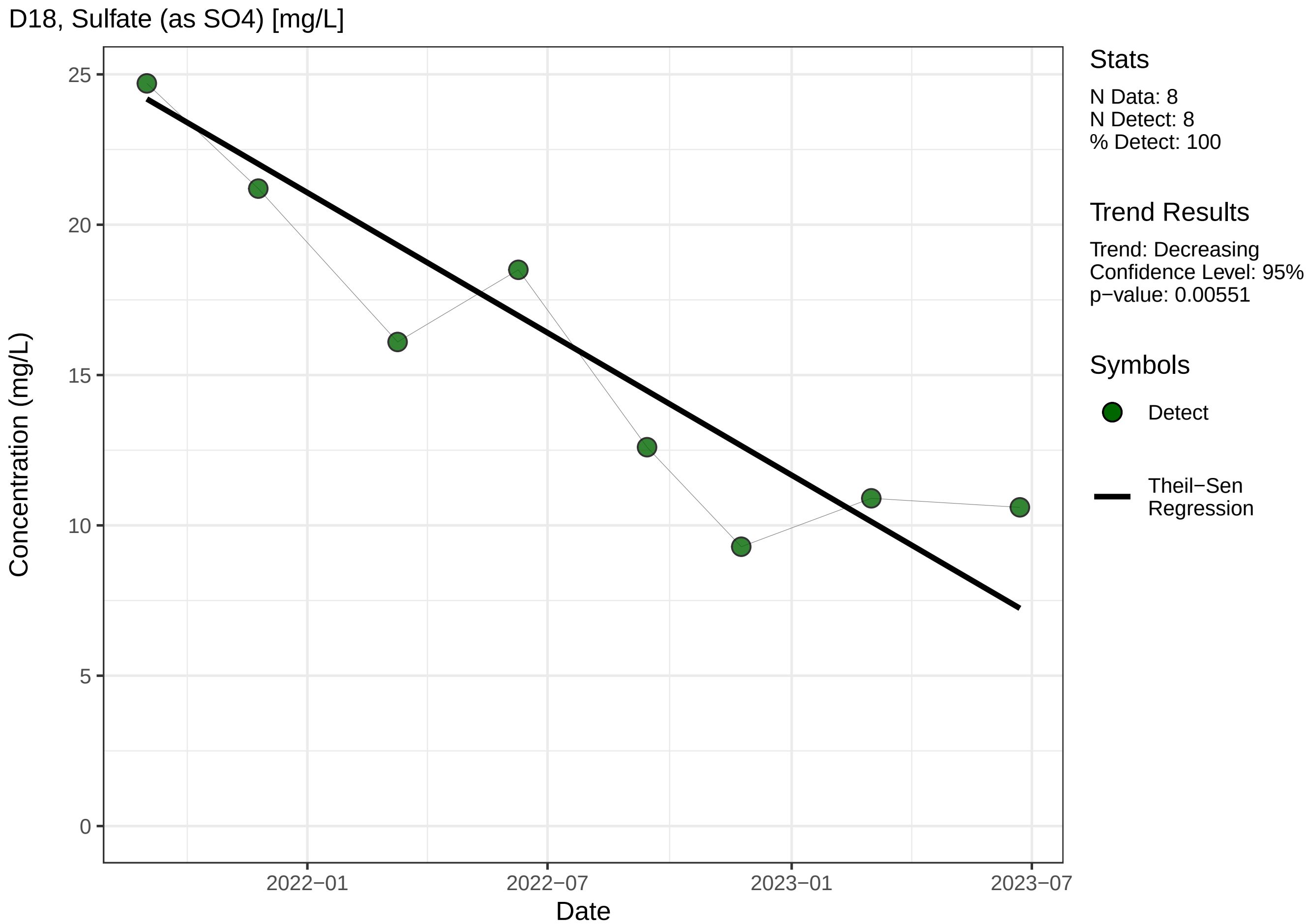

D18, Iron [ug/L]
12500
10000
7500
5000
2500
0
Concentration (ug/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.72
Symbols
Detect
Theil−Sen Regression

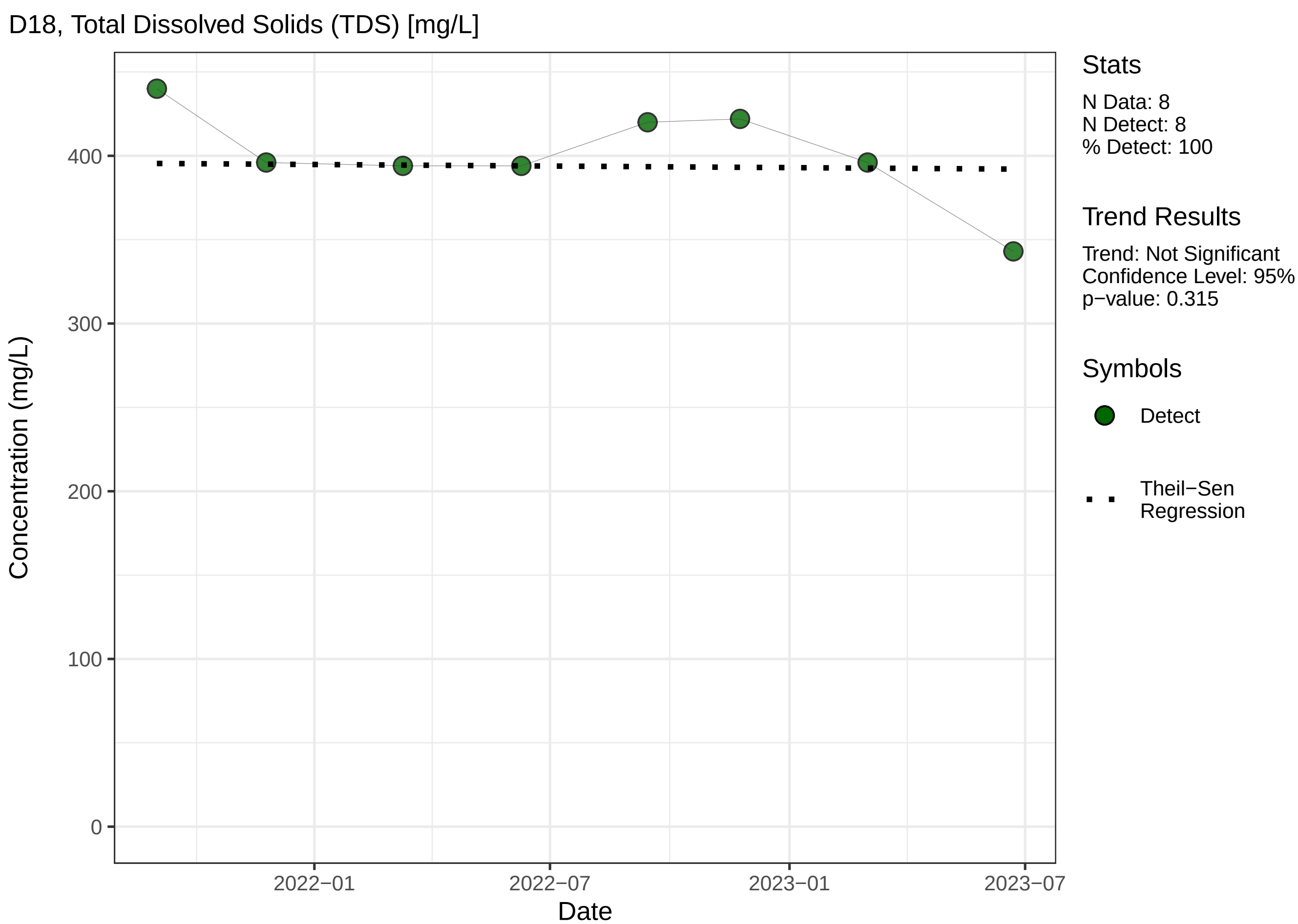
D18, Manganese [ug/L]



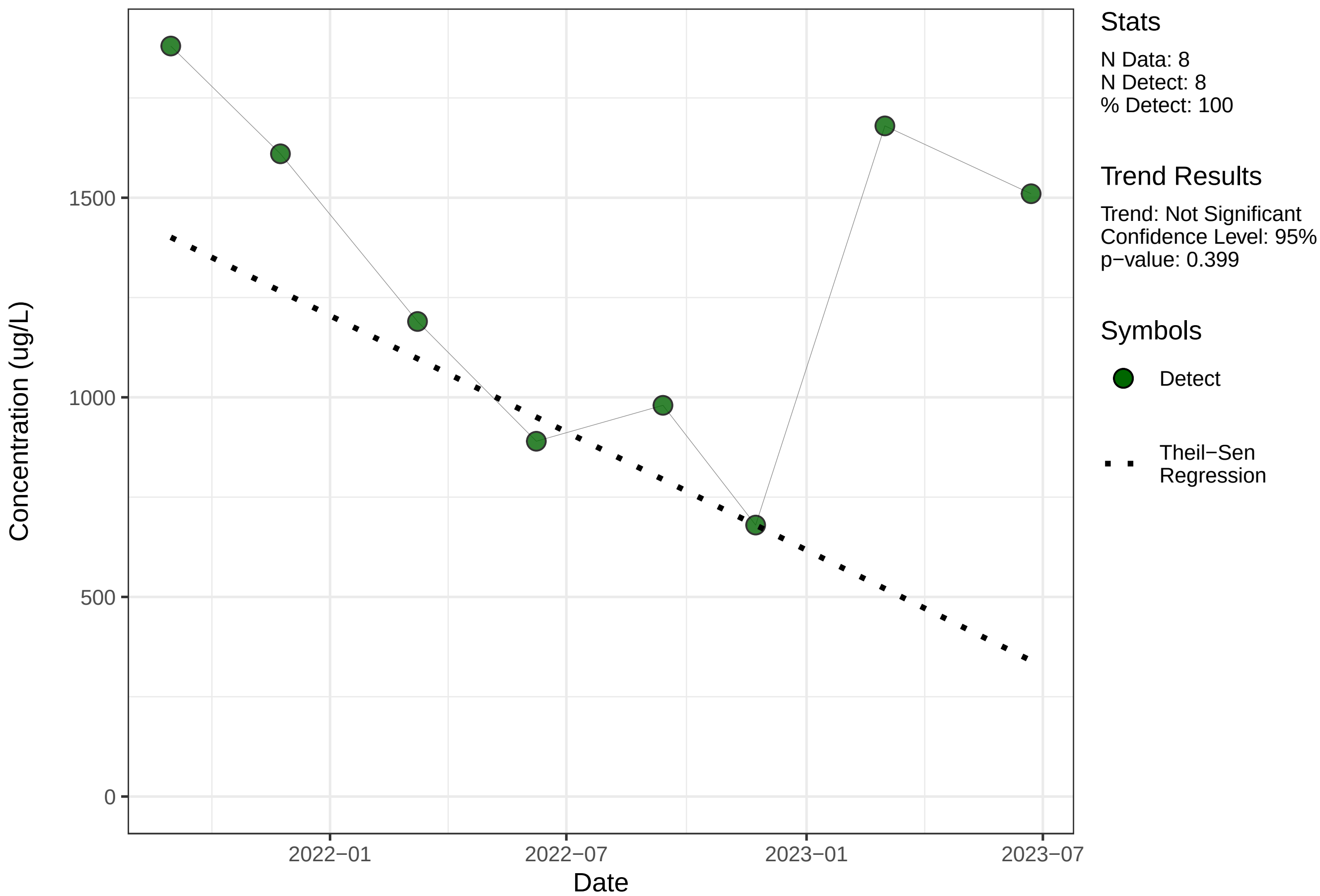
D18, Nickel [ug/L]



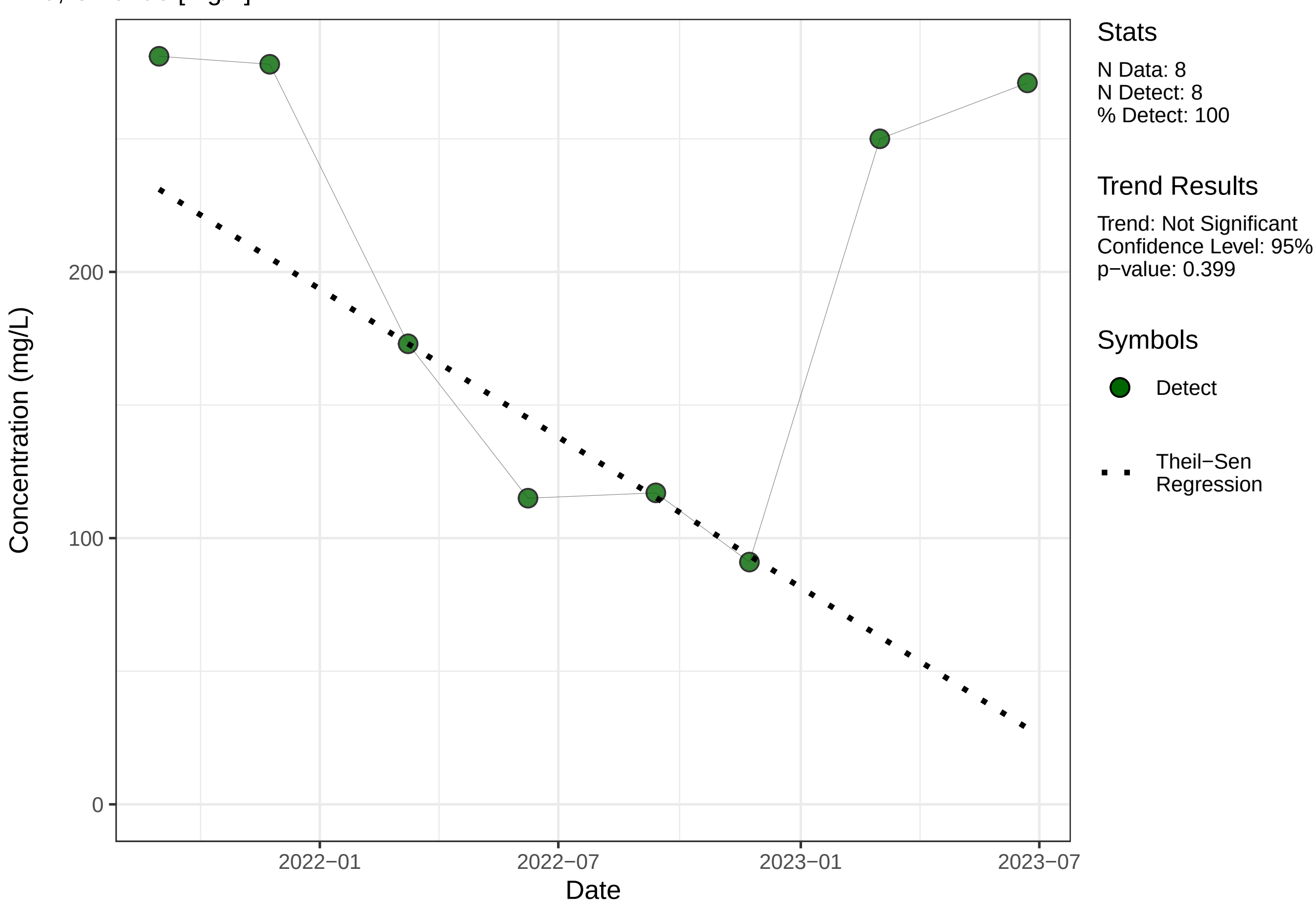

D18, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
25
20
15
10
5
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.00551
Symbols
Detect
Theil−Sen Regression


D18, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
400
300
200
100
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.315
Symbols
Detect
Theil−Sen Regression

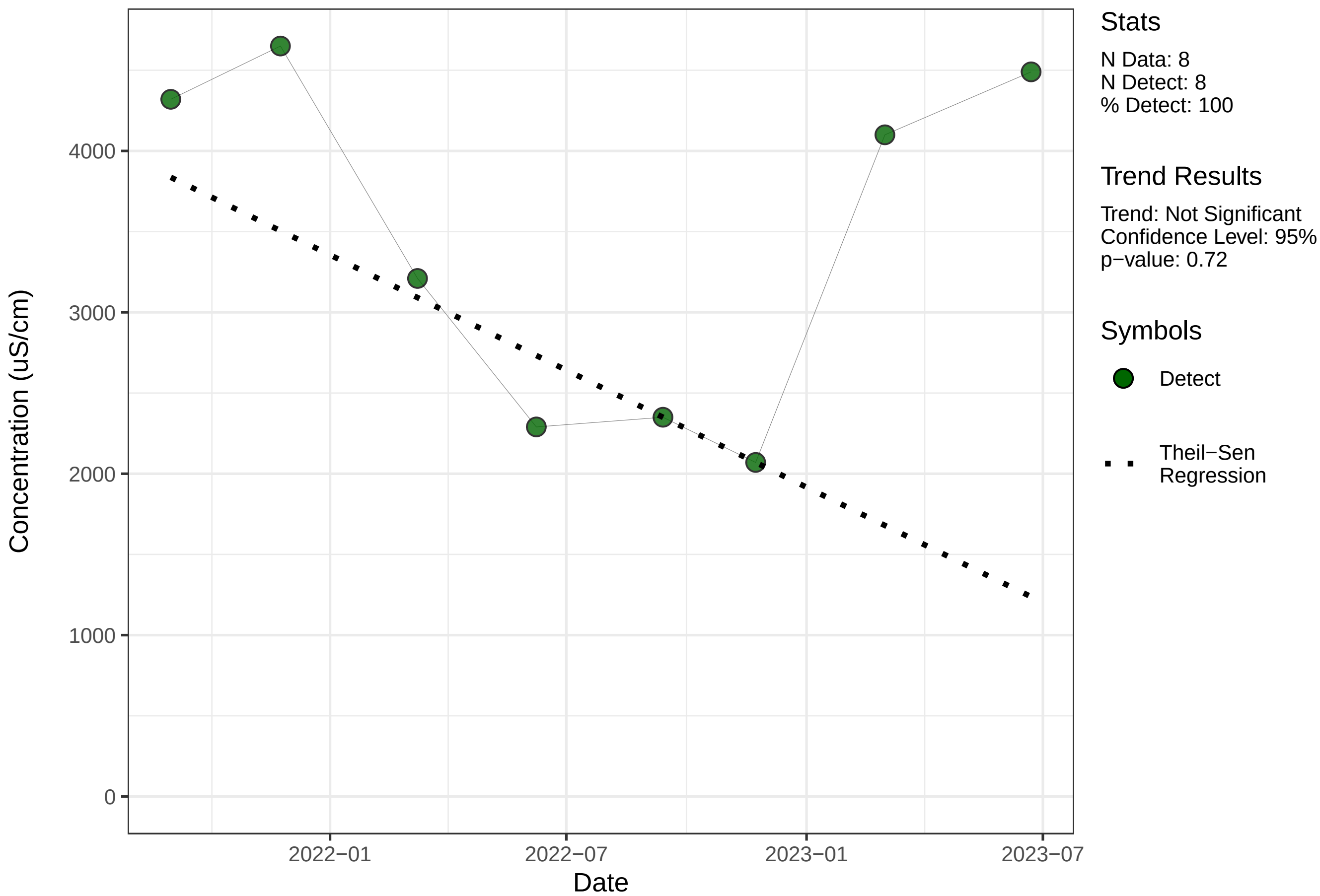
D19, Boron [ug/L]



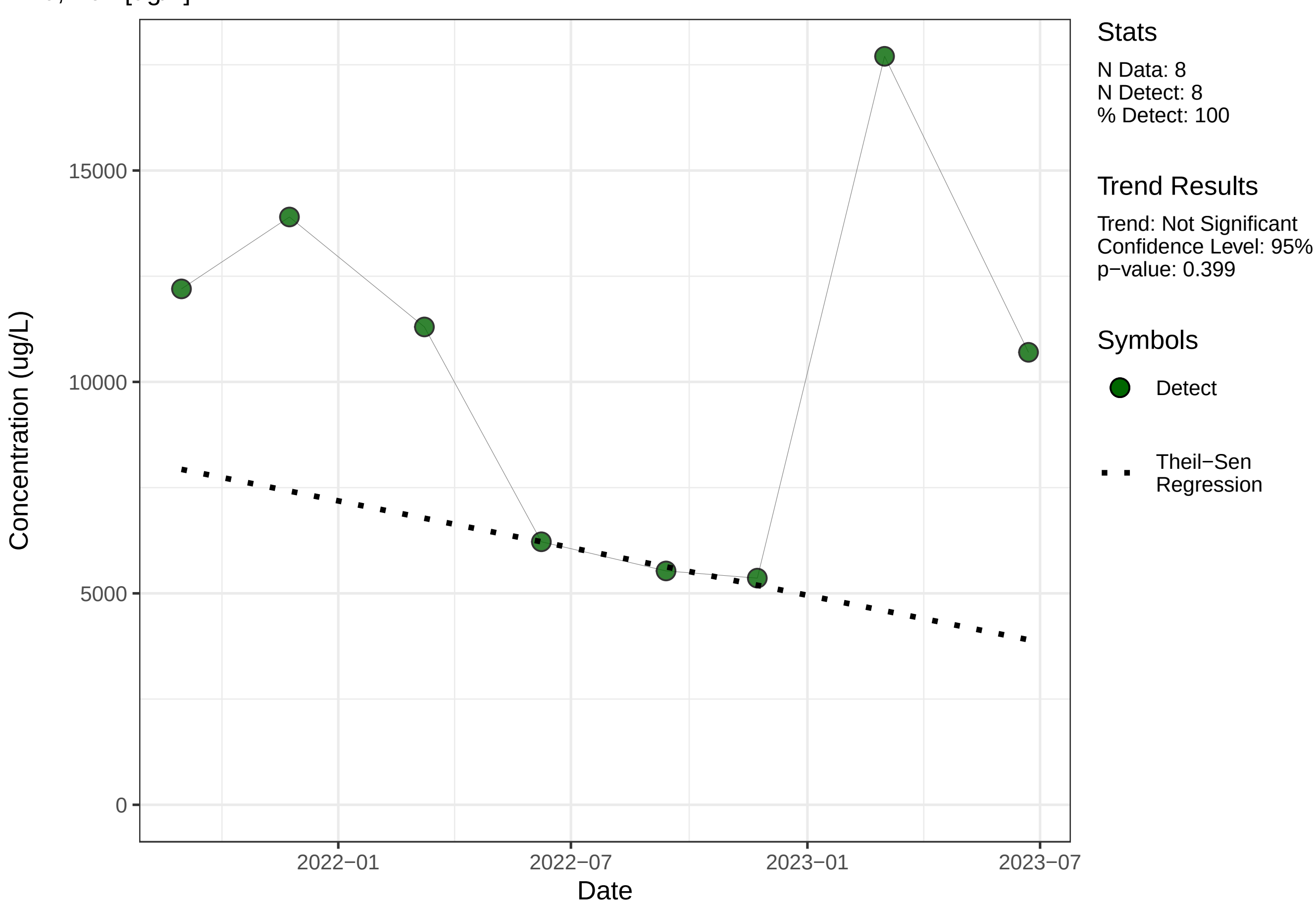
D19, Chloride [mg/L]

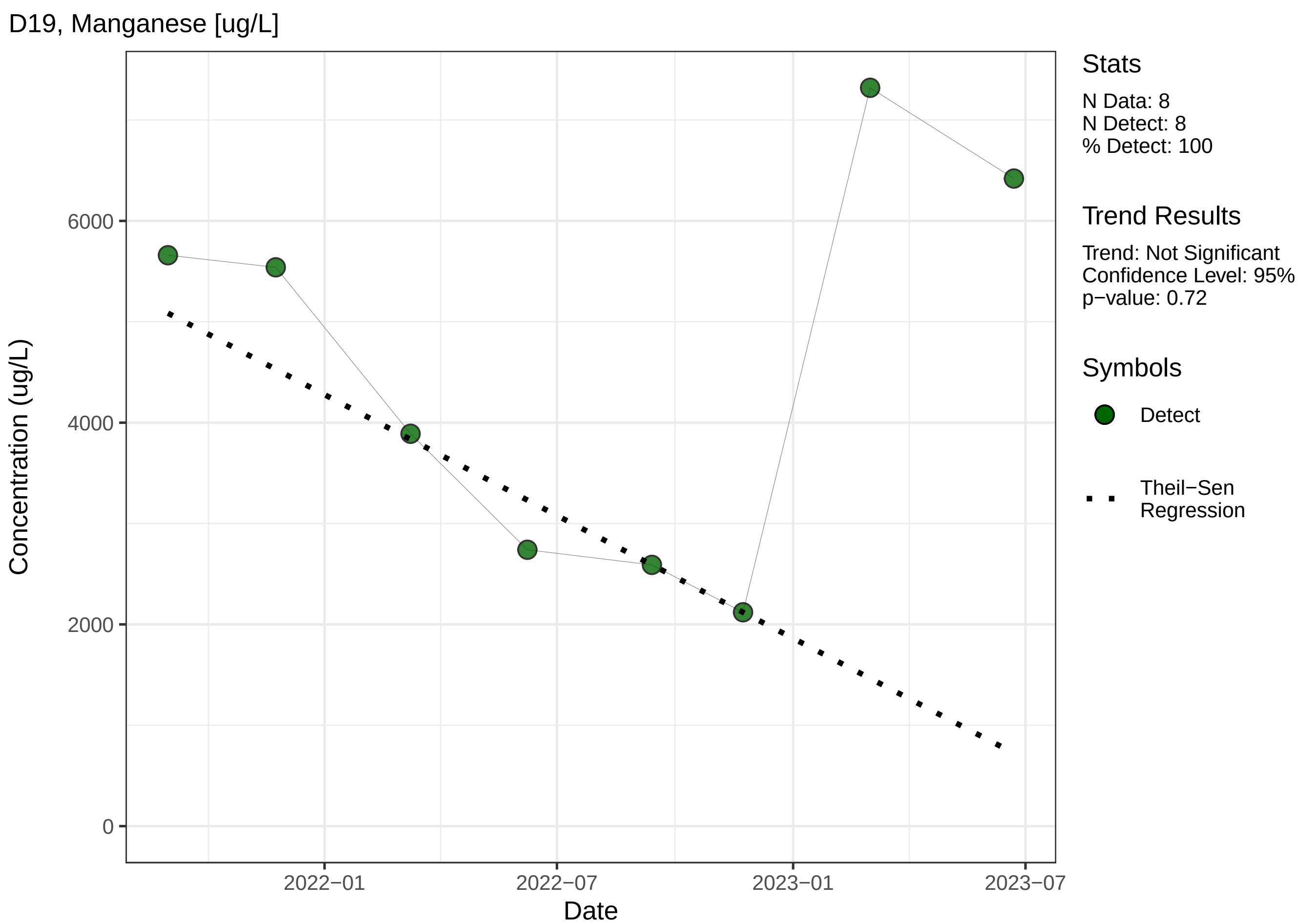


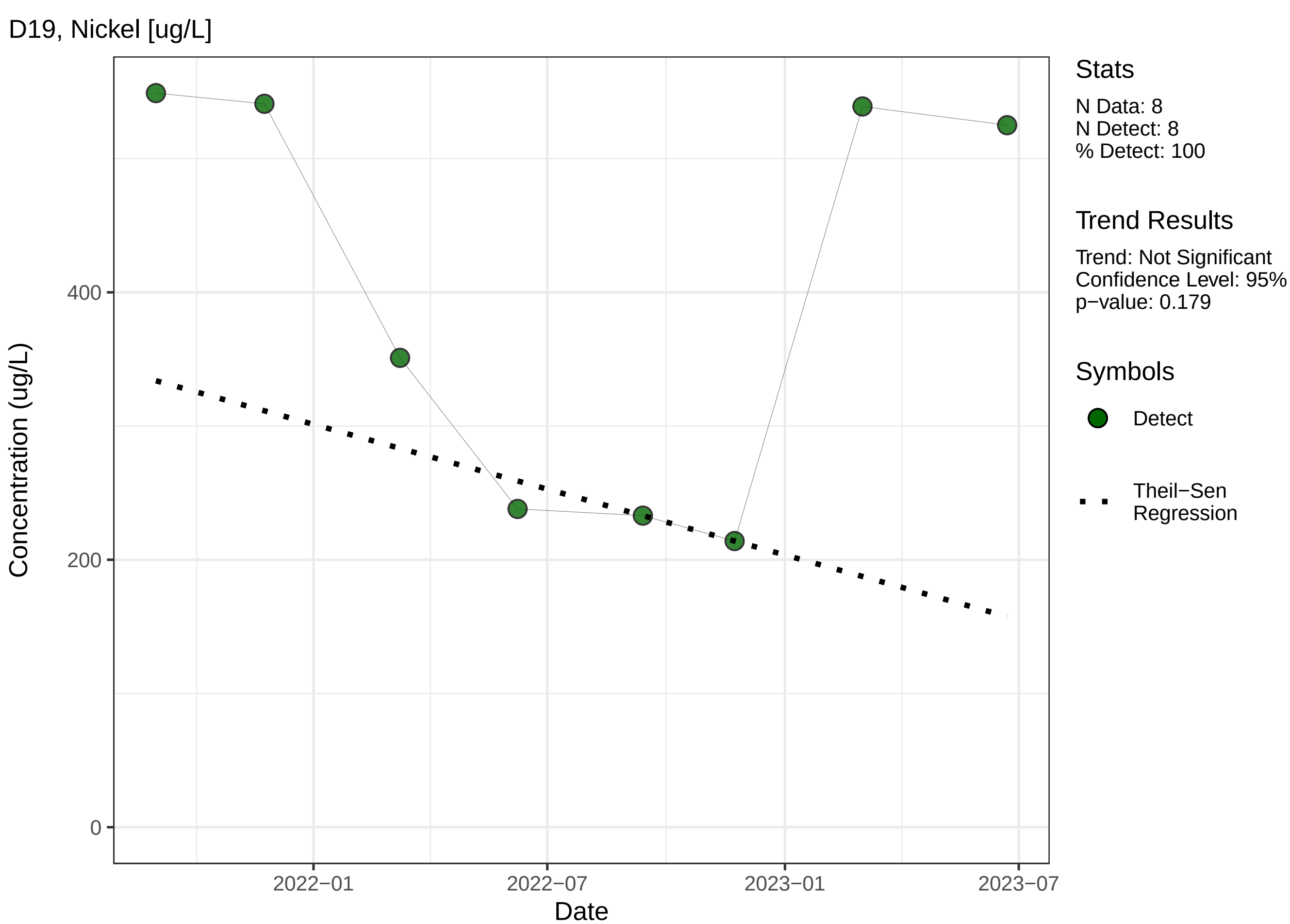
D19, Electrical Conductivity (Field) [uS/cm]



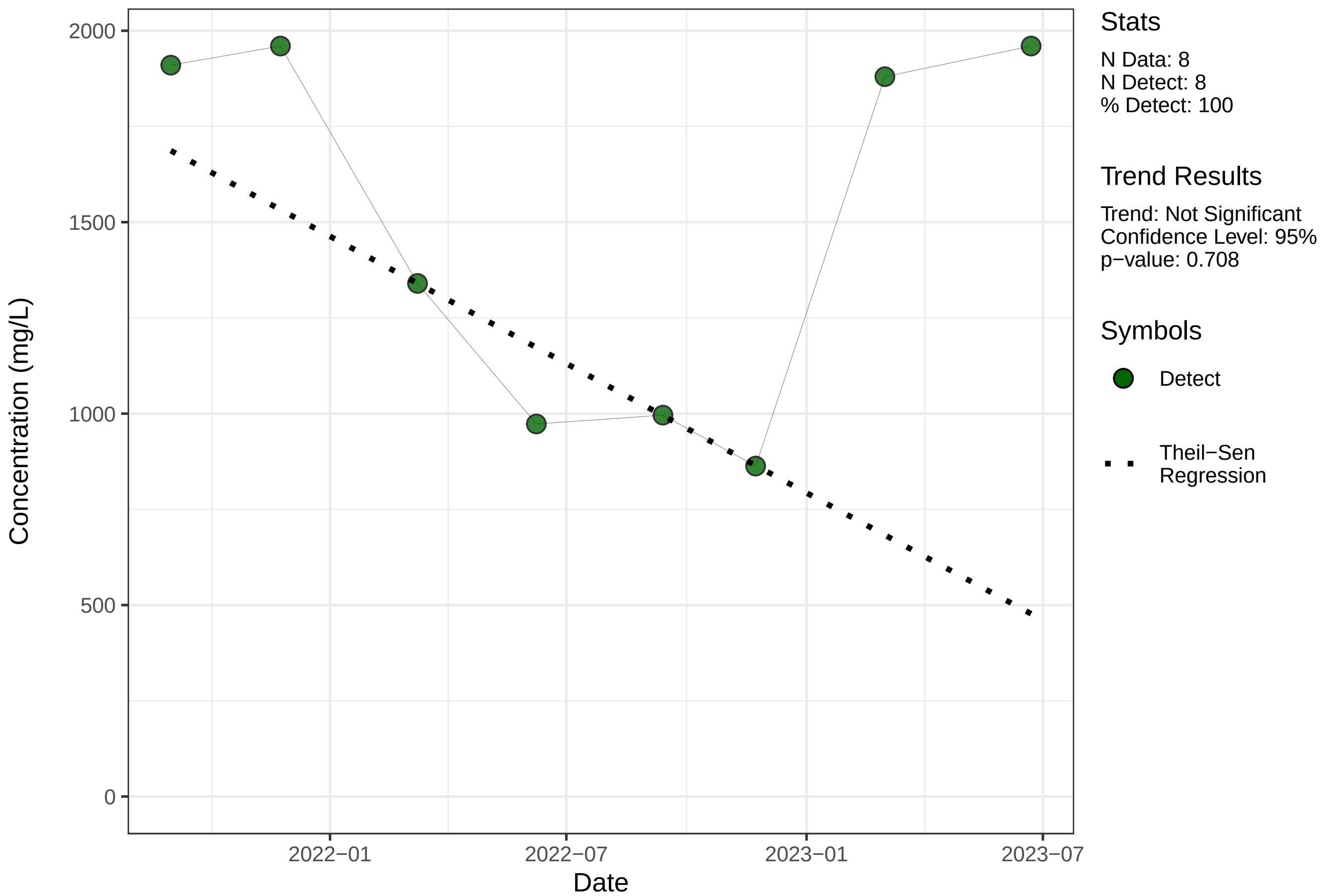
D19, Iron [ug/L]



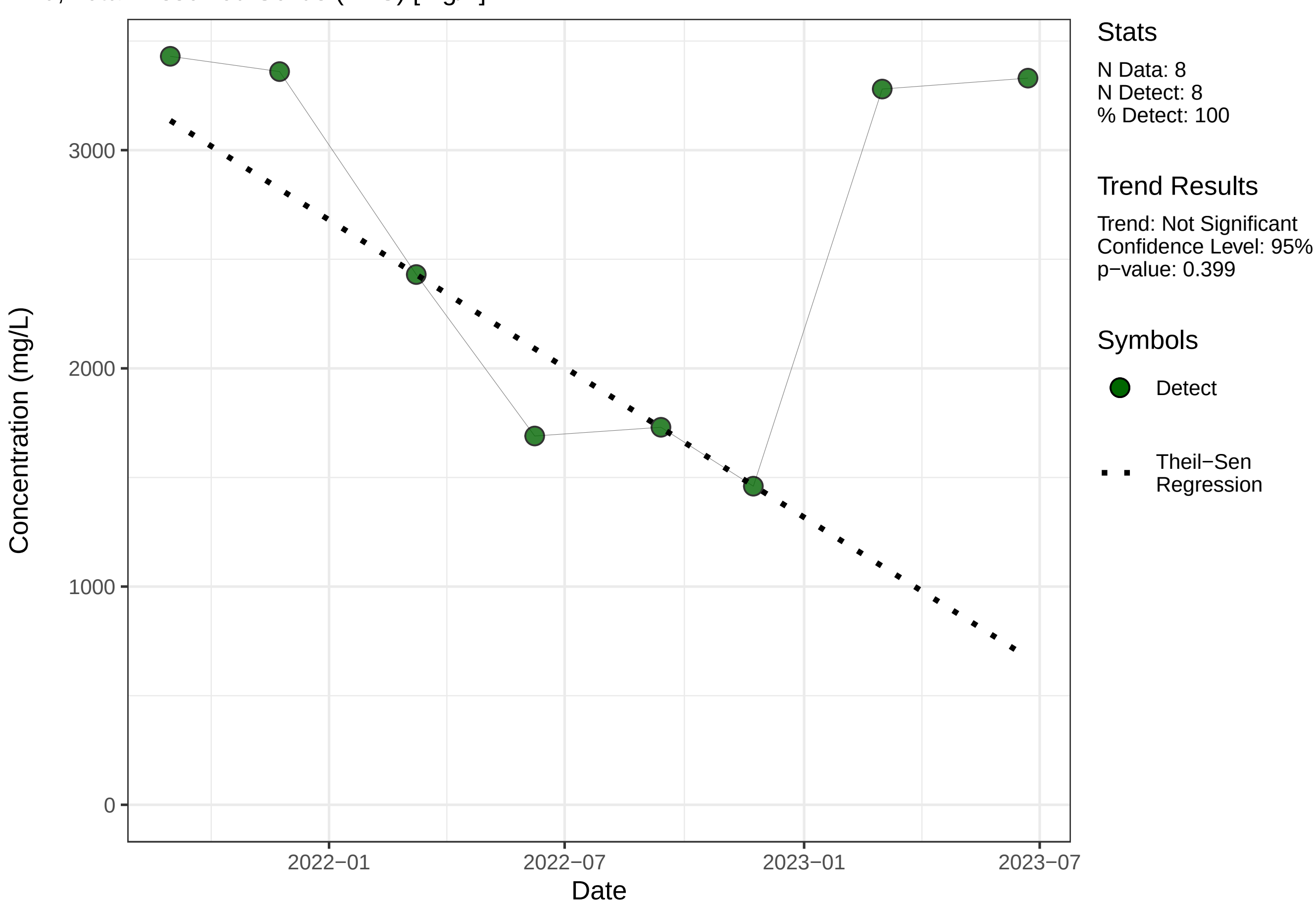

D19, Manganese [ug/L]
Concentration (ug/L)
6000
4000
2000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.72
Symbols
Detect
Theil−Sen Regression

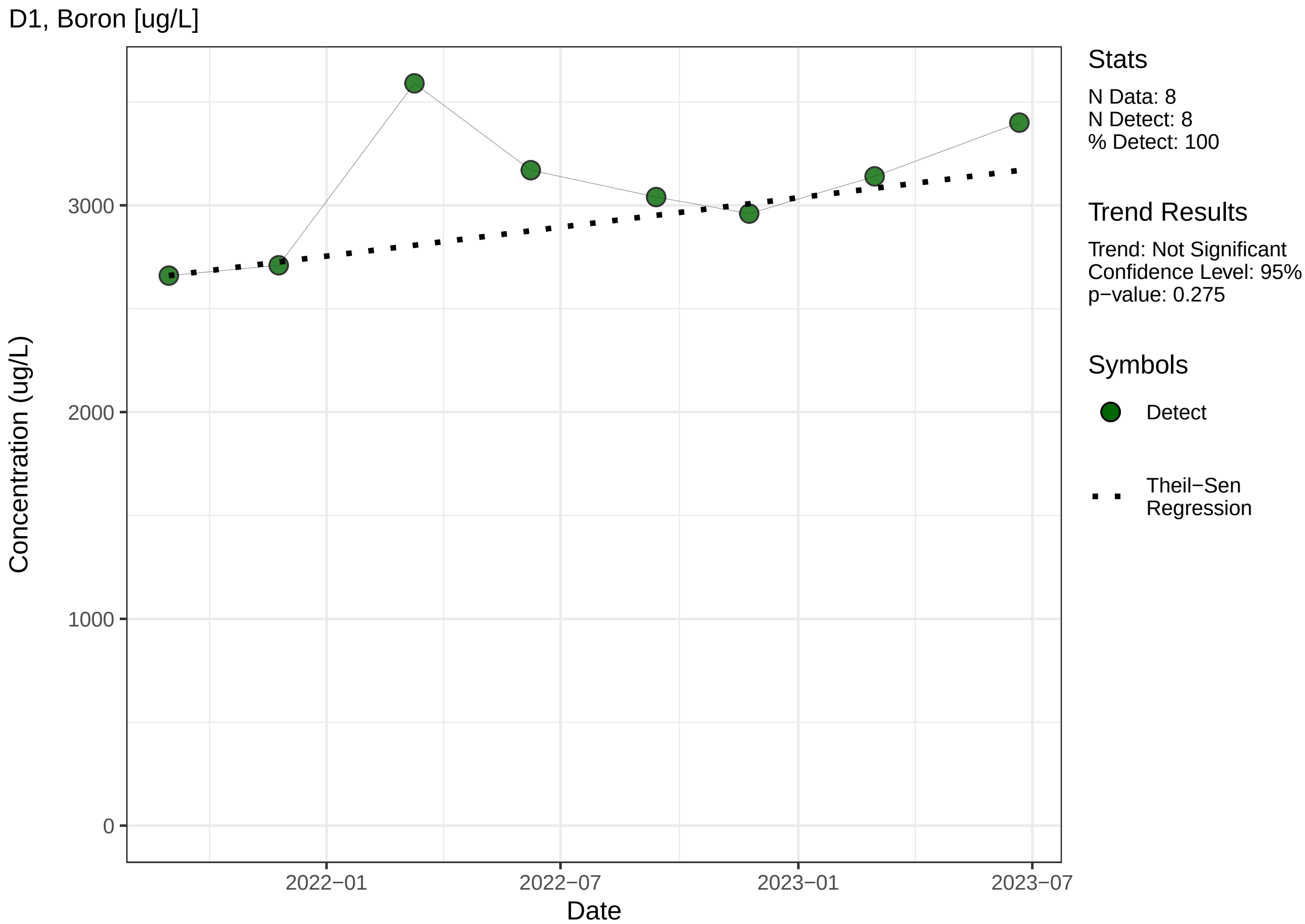

D19, Nickel [ug/L]
Concentration (ug/L)
400
200
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

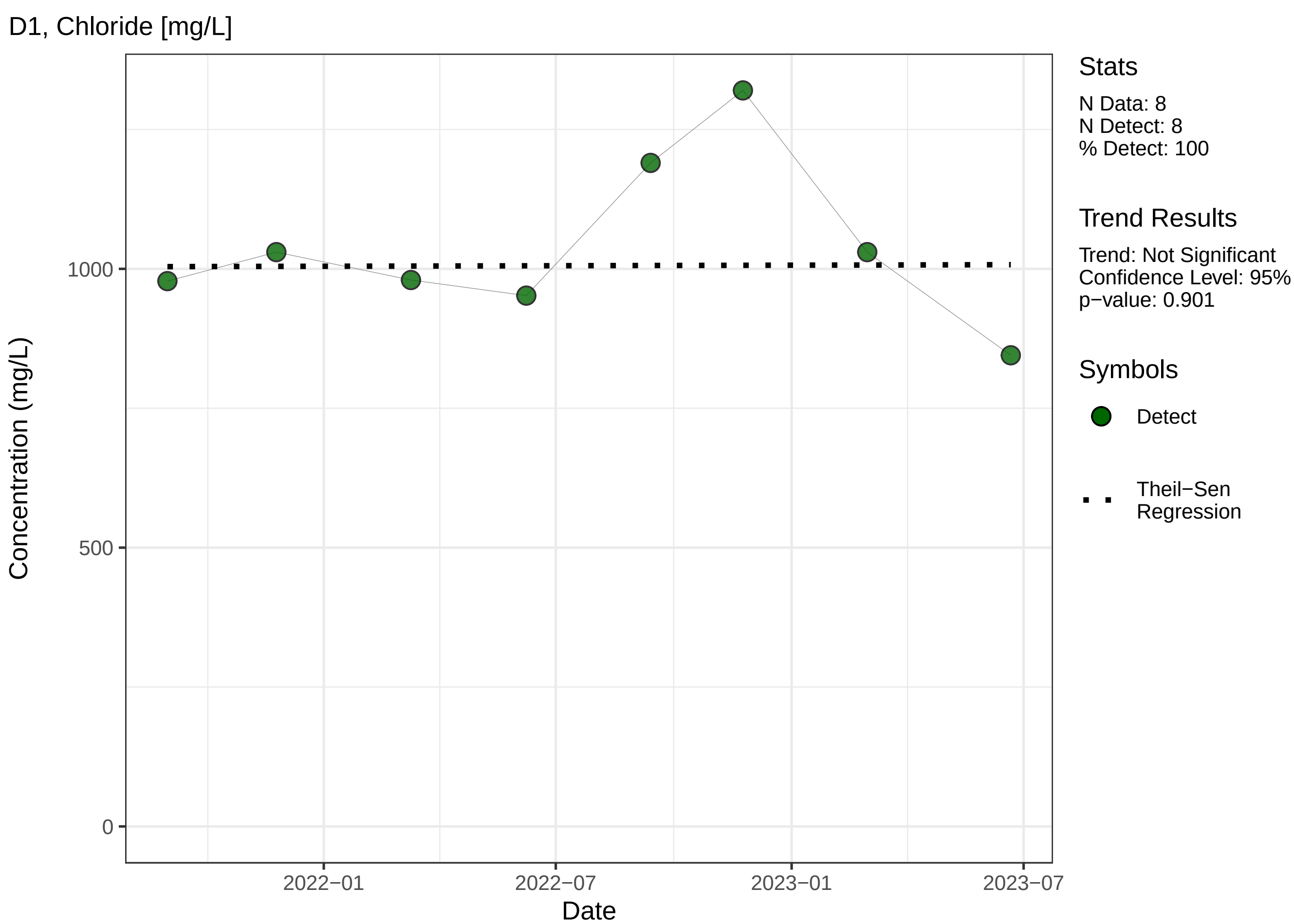
D19, Sulfate (as SO4) [mg/L]

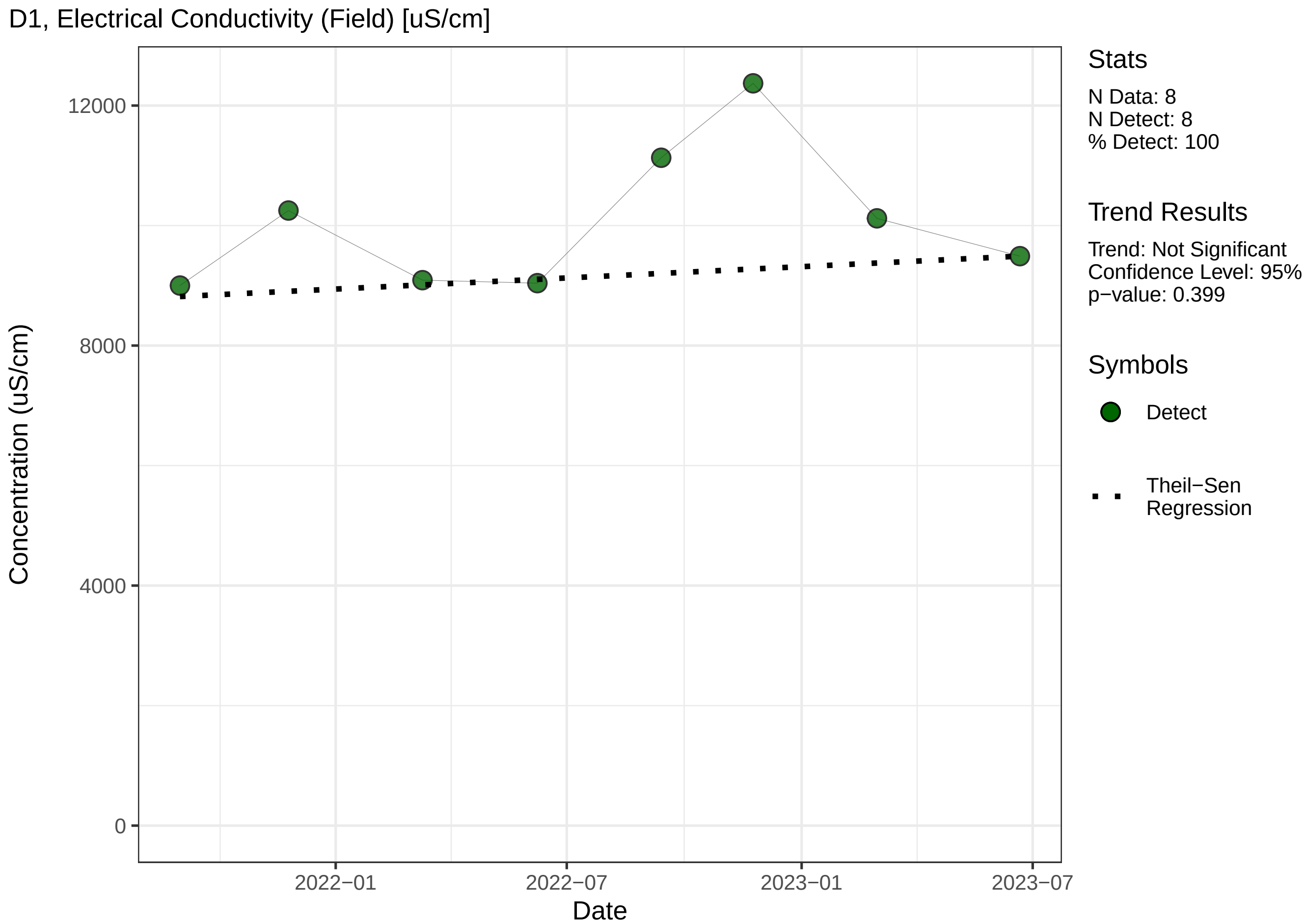


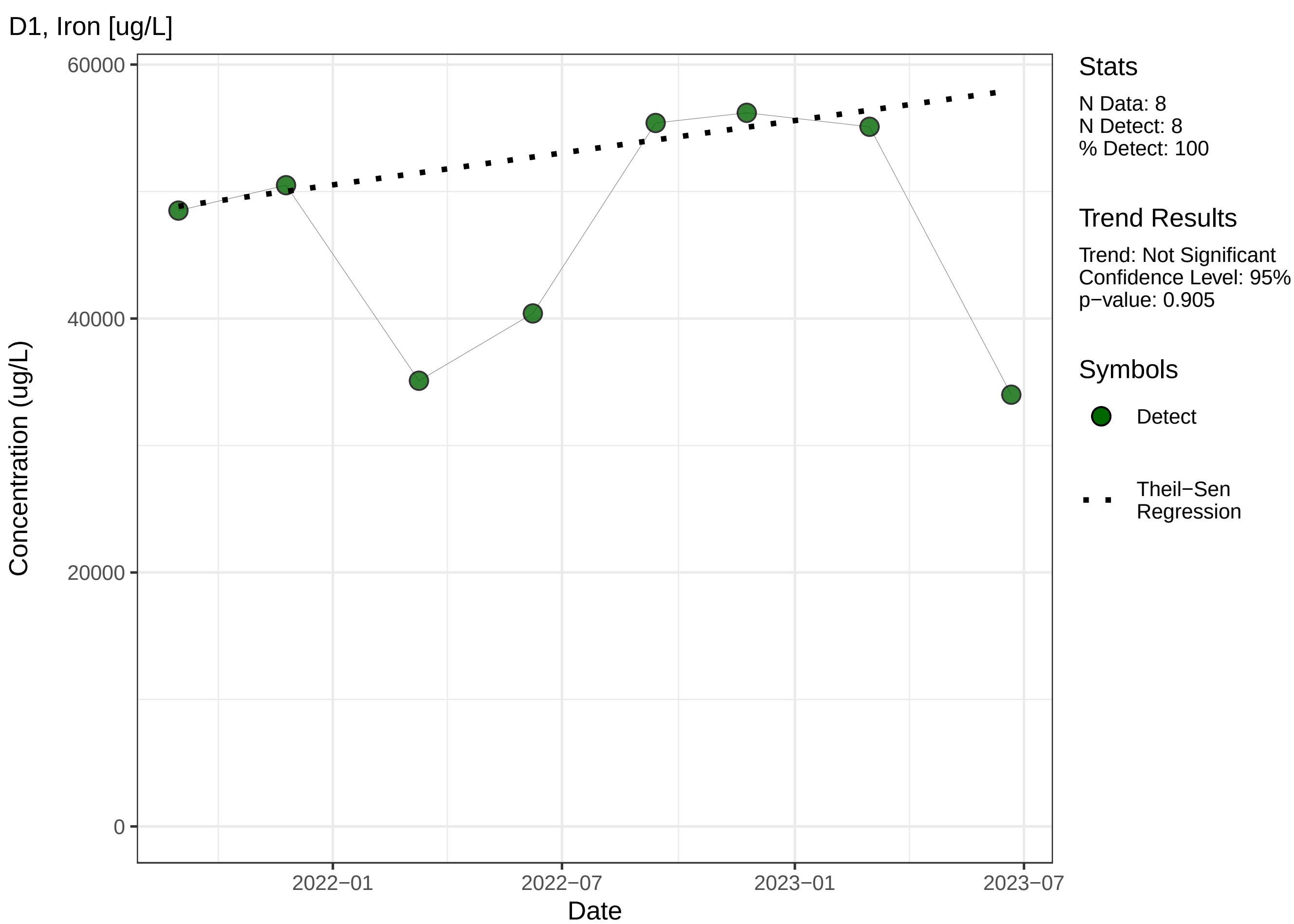
D19, Total Dissolved Solids (TDS) [mg/L]

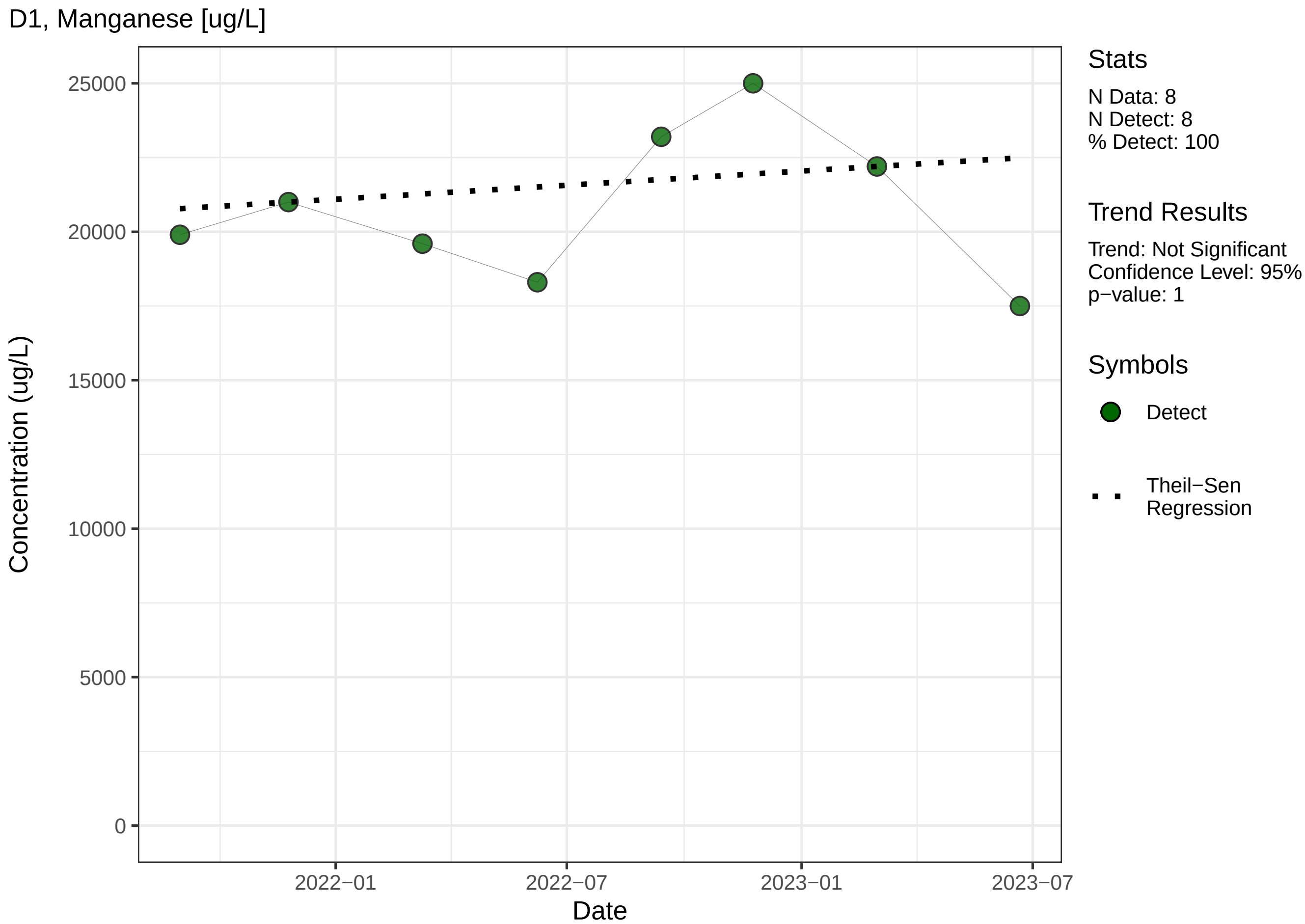


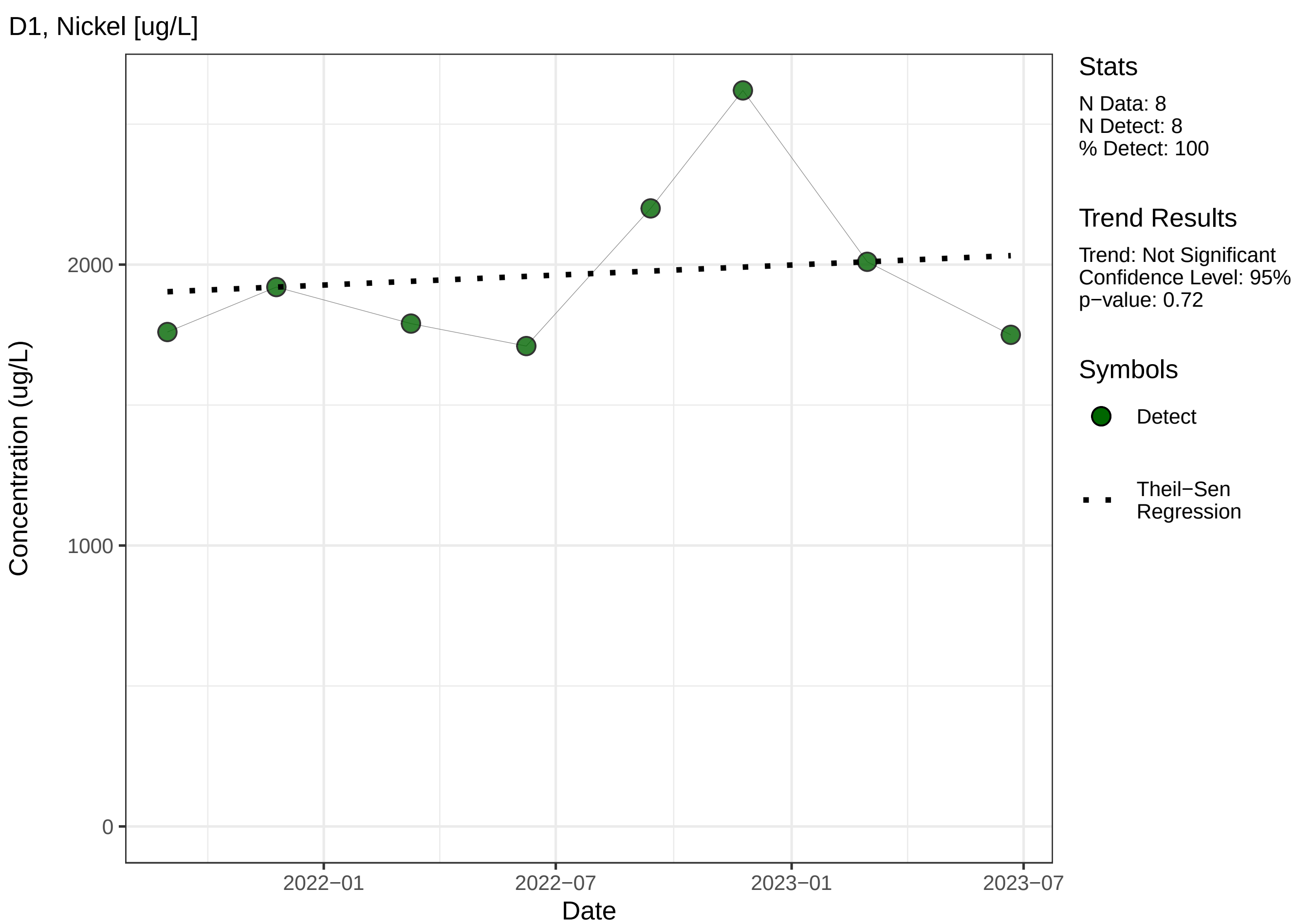

D1, Boron [ug/L]
Concentration (ug/L)
0
1000
2000
3000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.275
Symbols
Detect
Theil−Sen Regression


D1, Chloride [mg/L]
Concentration (mg/L)
0
500
1000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.901
Symbols
Detect
Theil−Sen Regression

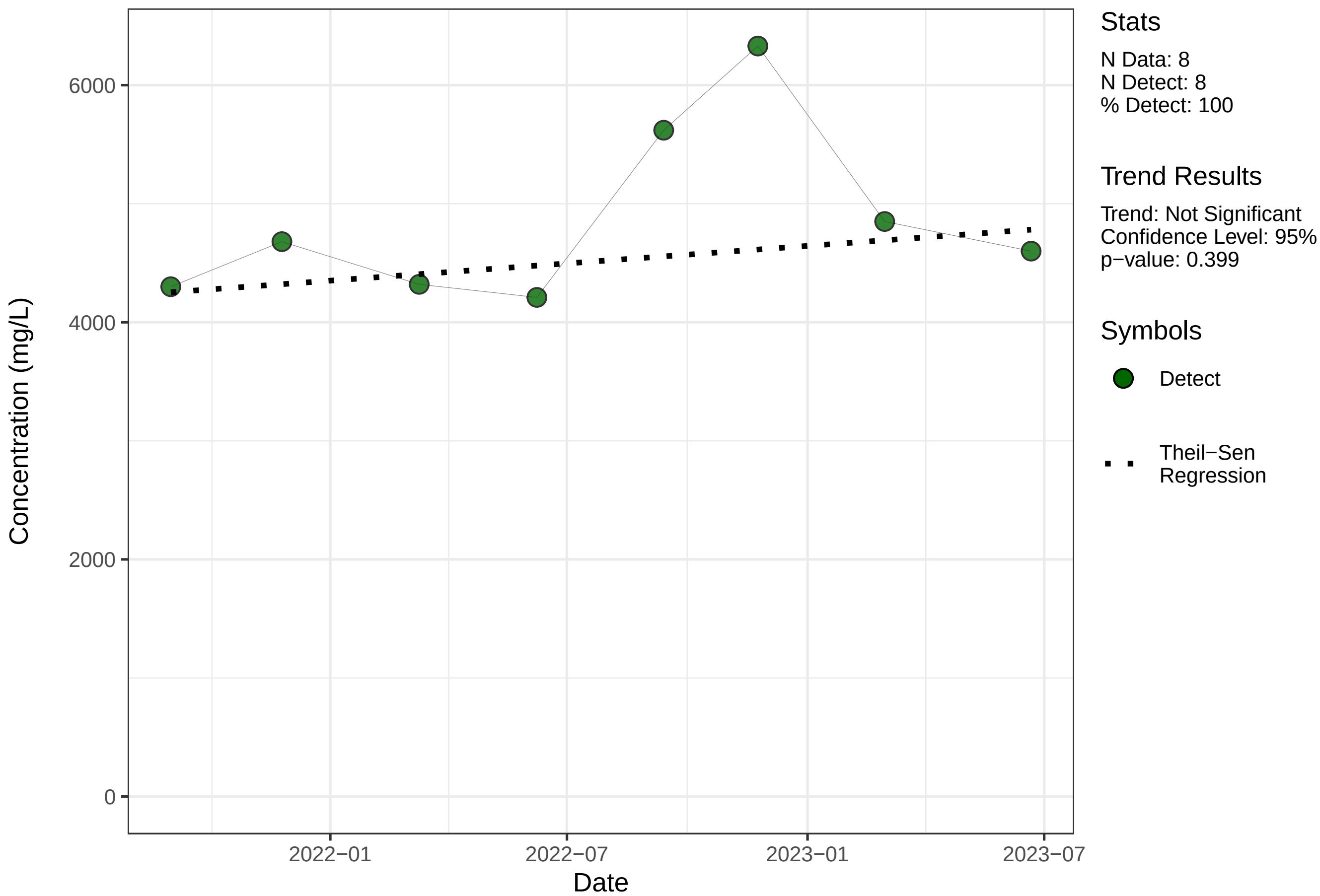

D1, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
12000
8000
4000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.399
Symbols
Detect
Theil−Sen Regression


D1, Iron [ug/L]
Concentration (ug/L)
60000
40000
20000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.905
Symbols
Detect
Theil−Sen Regression

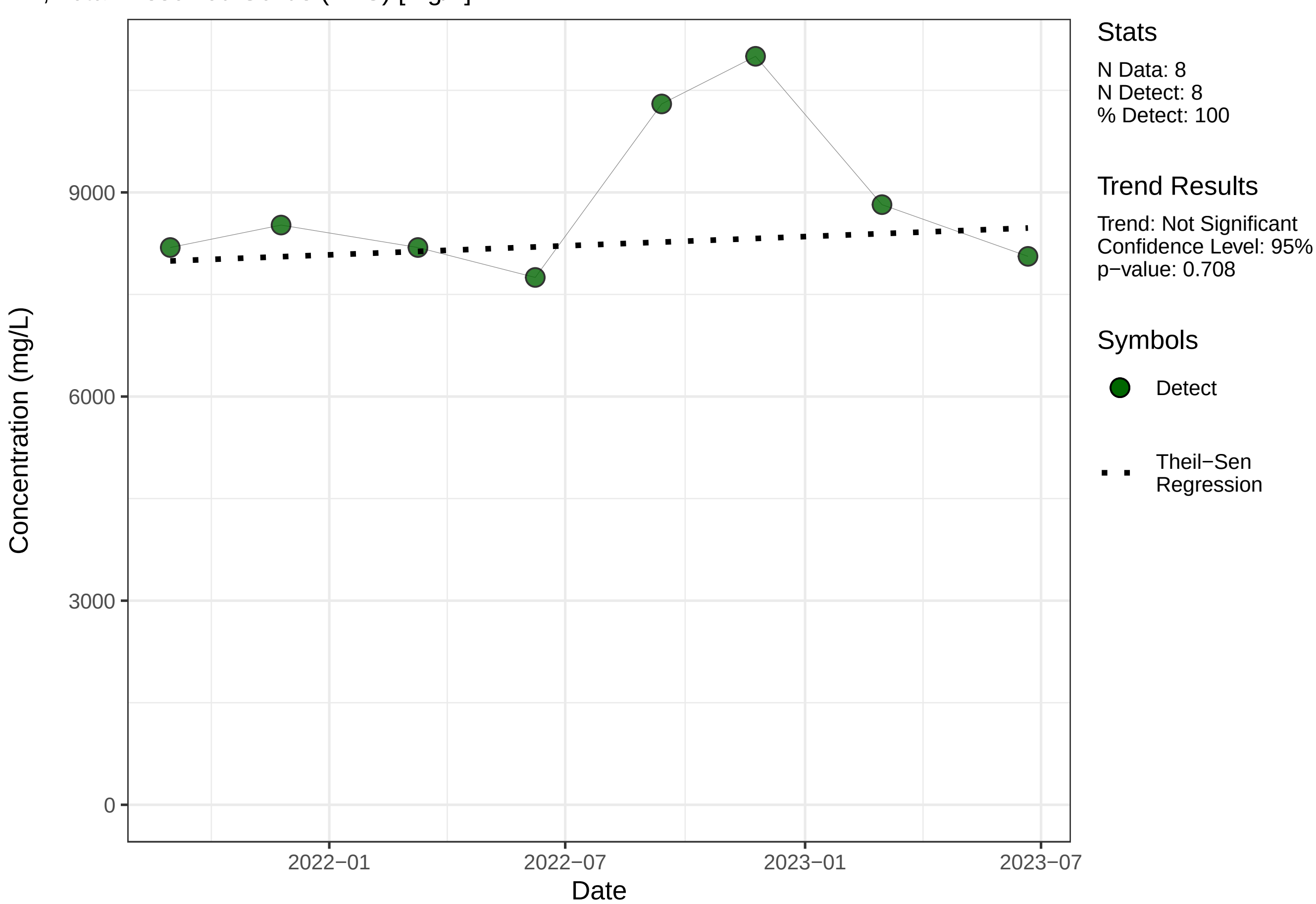

D1, Manganese [ug/L]
25000
20000
15000
10000
5000
0
Concentration (ug/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 1
Symbols
Detect
Theil−Sen Regression

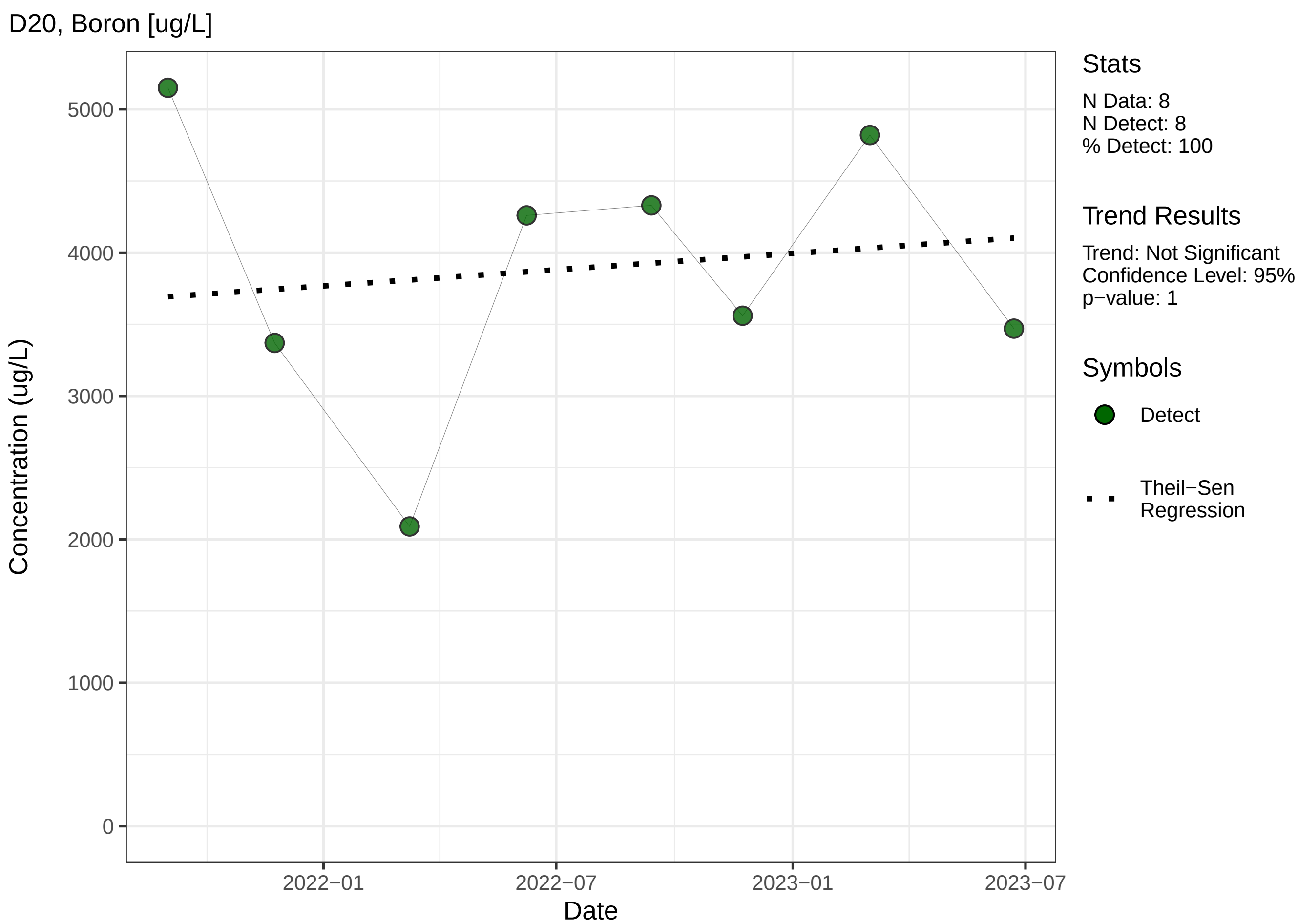

D1, Nickel [ug/L]
2000
1000
0
Concentration (ug/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.72
Symbols
Detect
Theil−Sen Regression

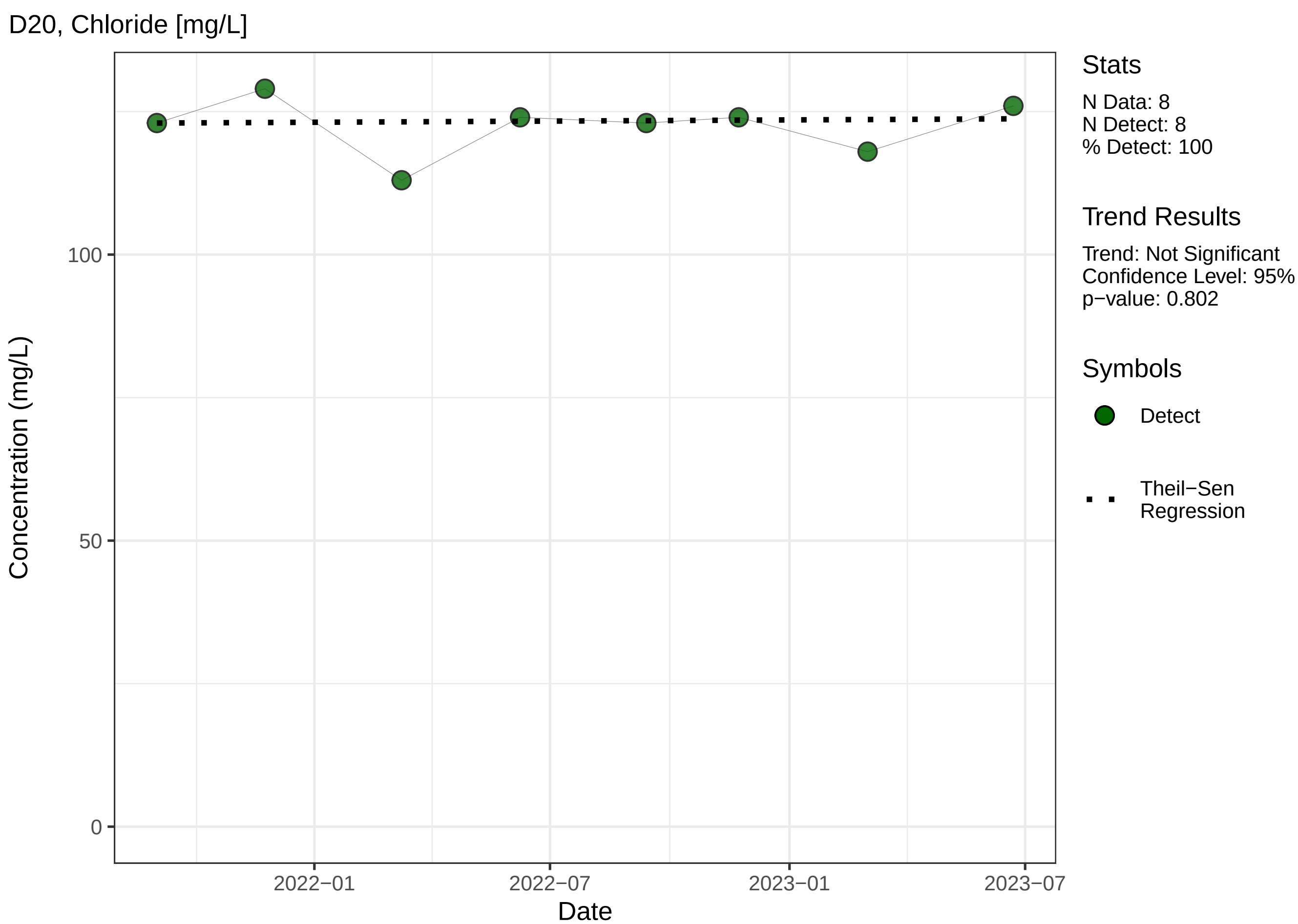
D1, Sulfate (as SO4) [mg/L]



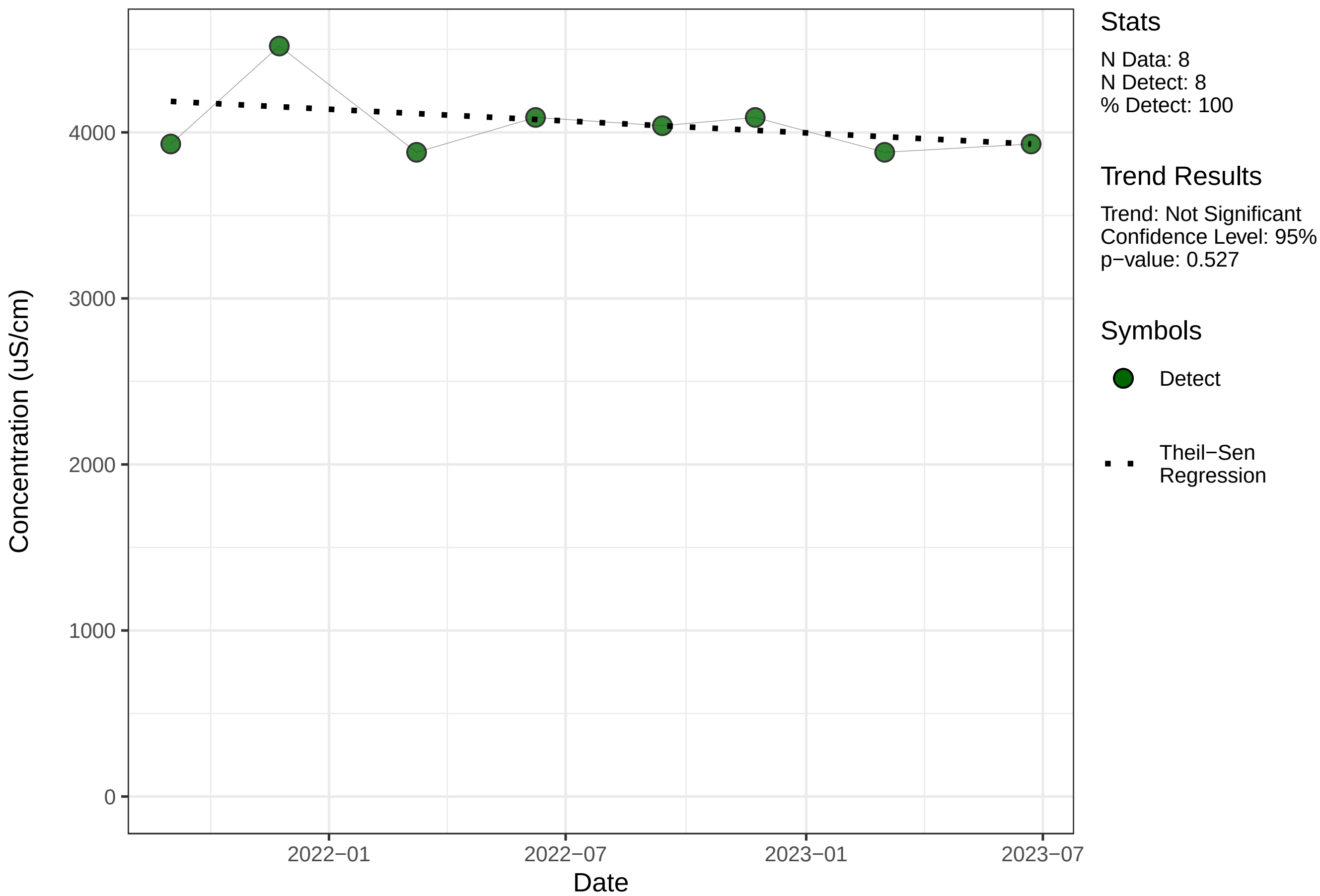
D1, Total Dissolved Solids (TDS) [mg/L]



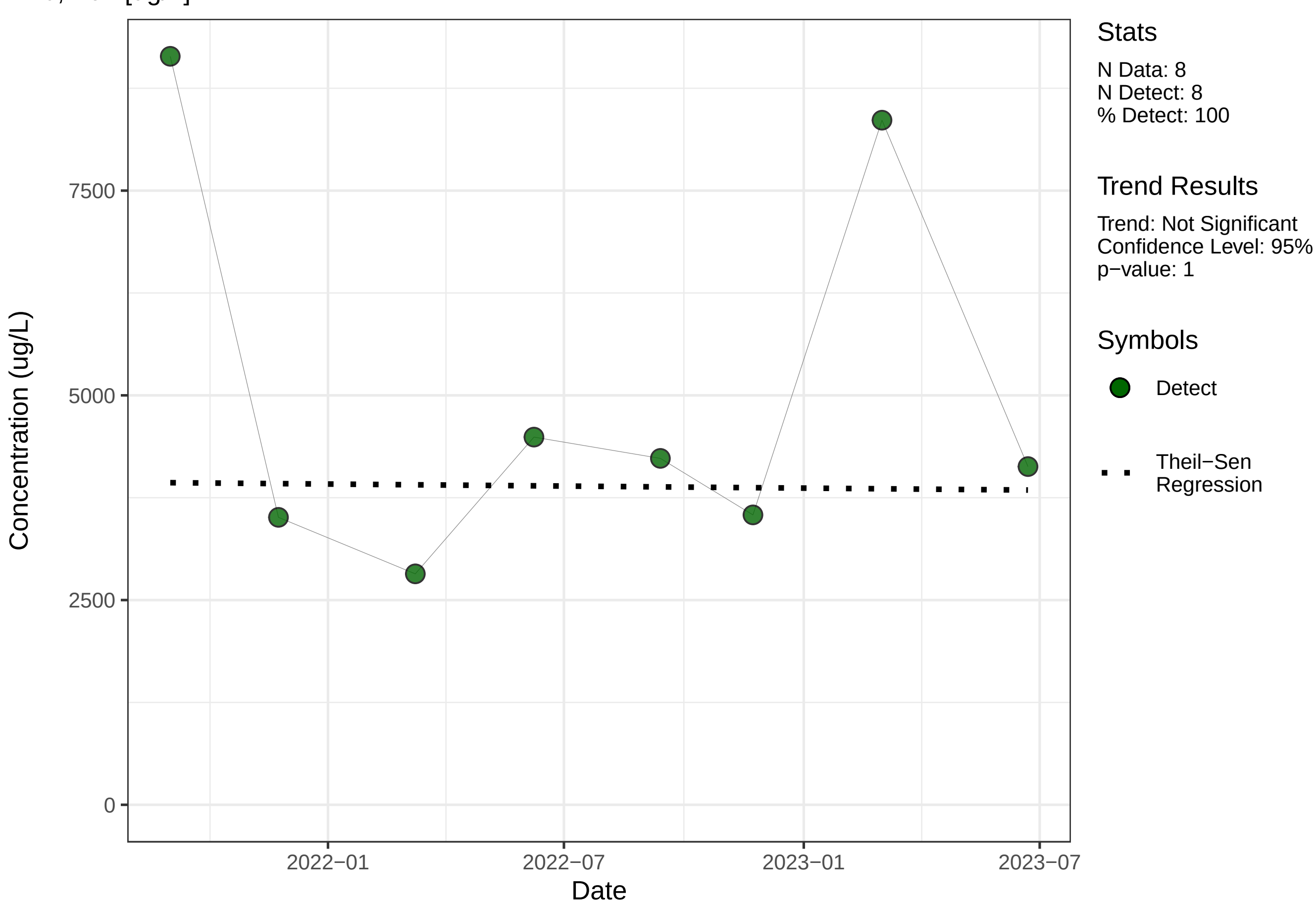

D20, Boron [ug/L]
Concentration (ug/L)
0
1000
2000
3000
4000
5000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 1
Symbols
Detect
Theil−Sen Regression


D20, Chloride [mg/L]
Concentration (mg/L)
0
50
100
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.802
Symbols
Detect
Theil−Sen Regression

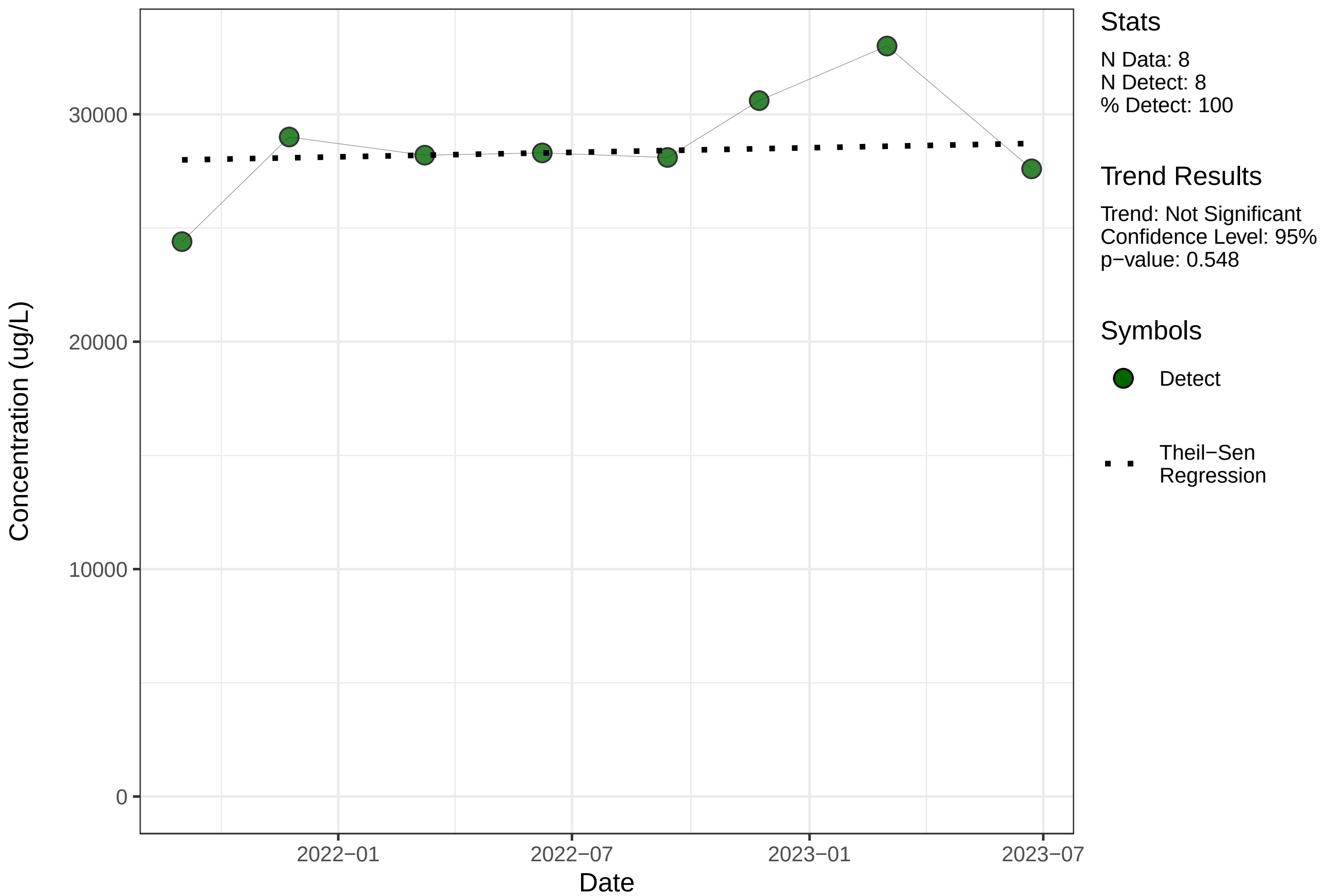
D20, Electrical Conductivity (Field) [uS/cm]



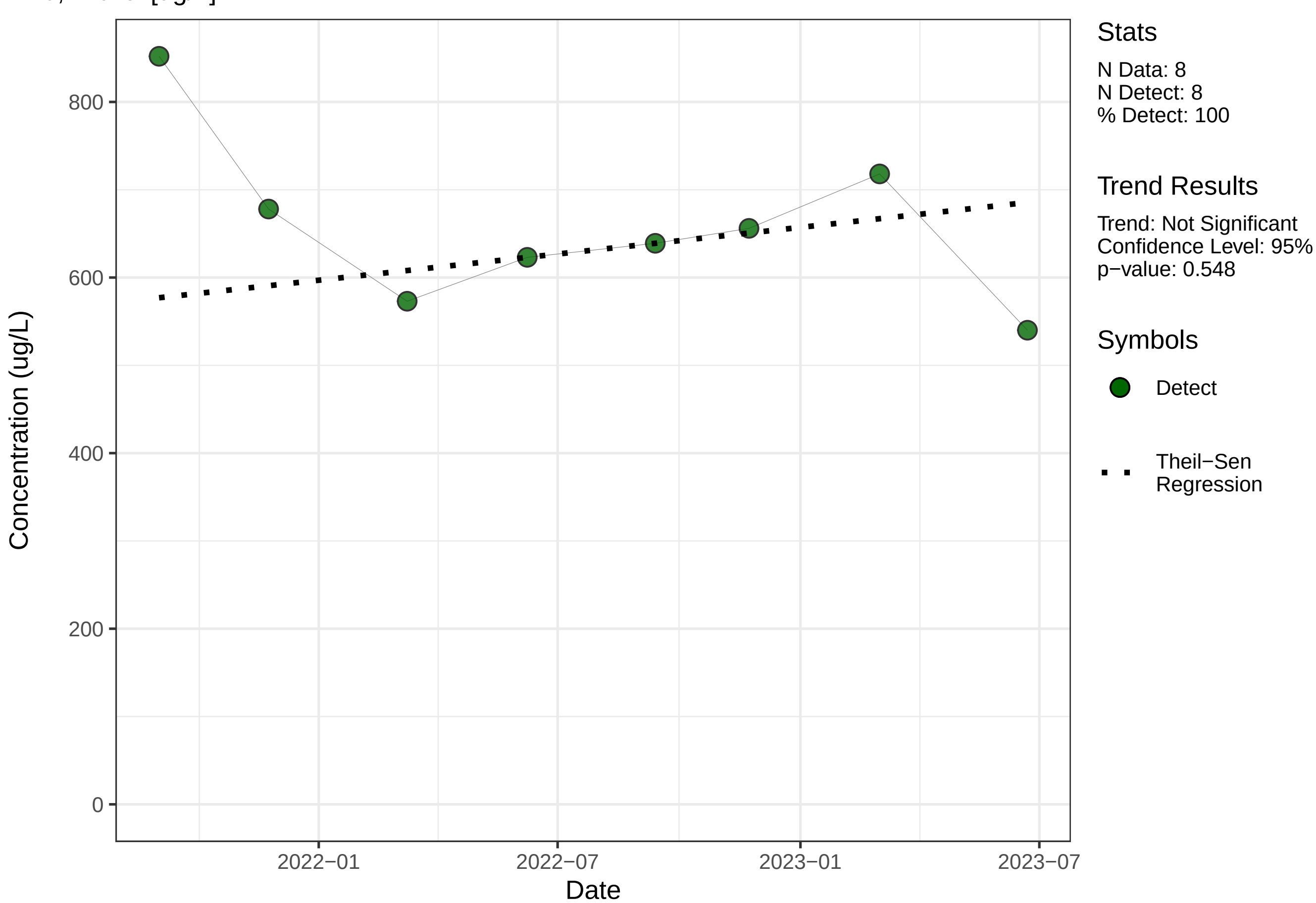
D20, Iron [ug/L]



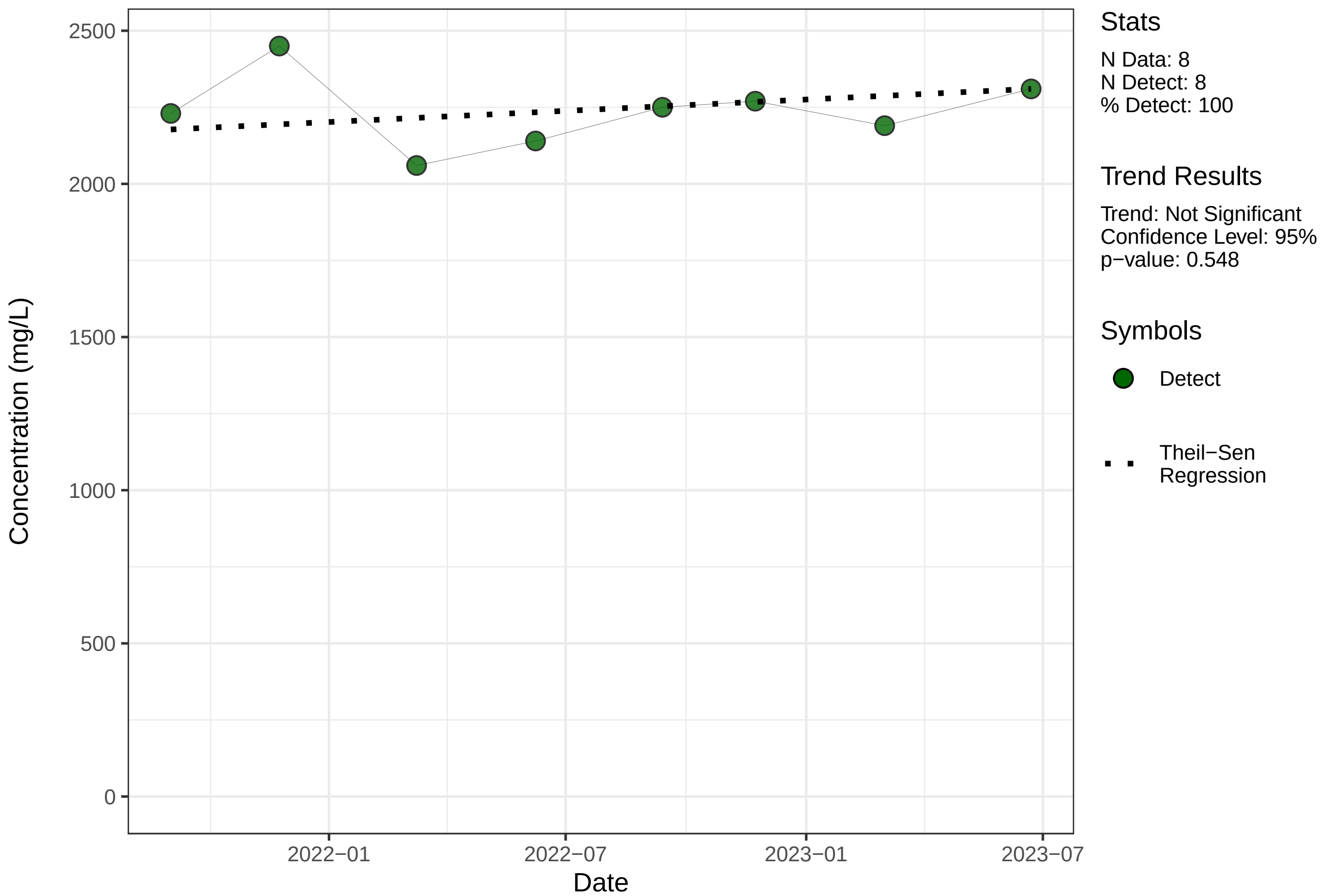
D20, Manganese [ug/L]



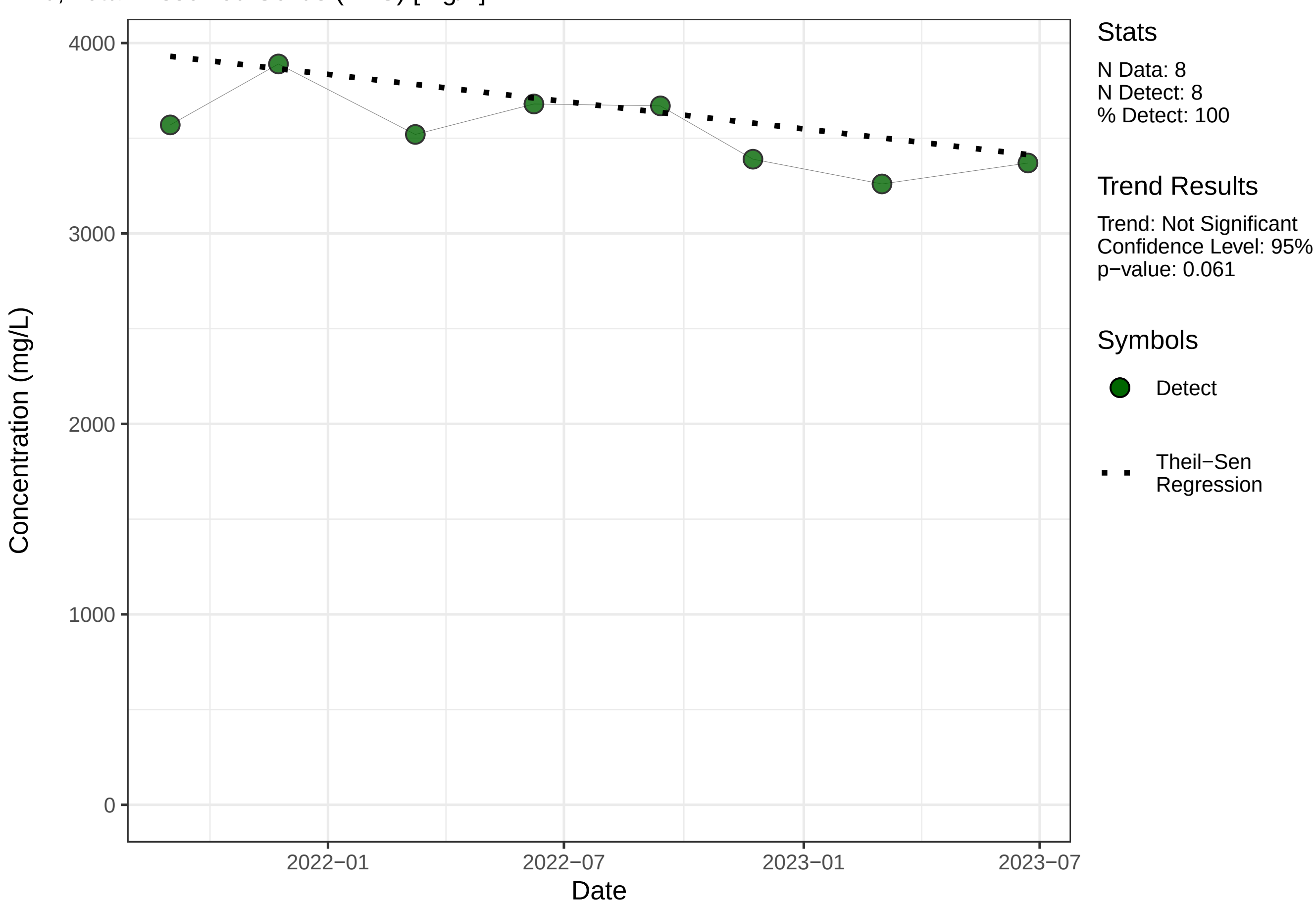
D20, Nickel [ug/L]

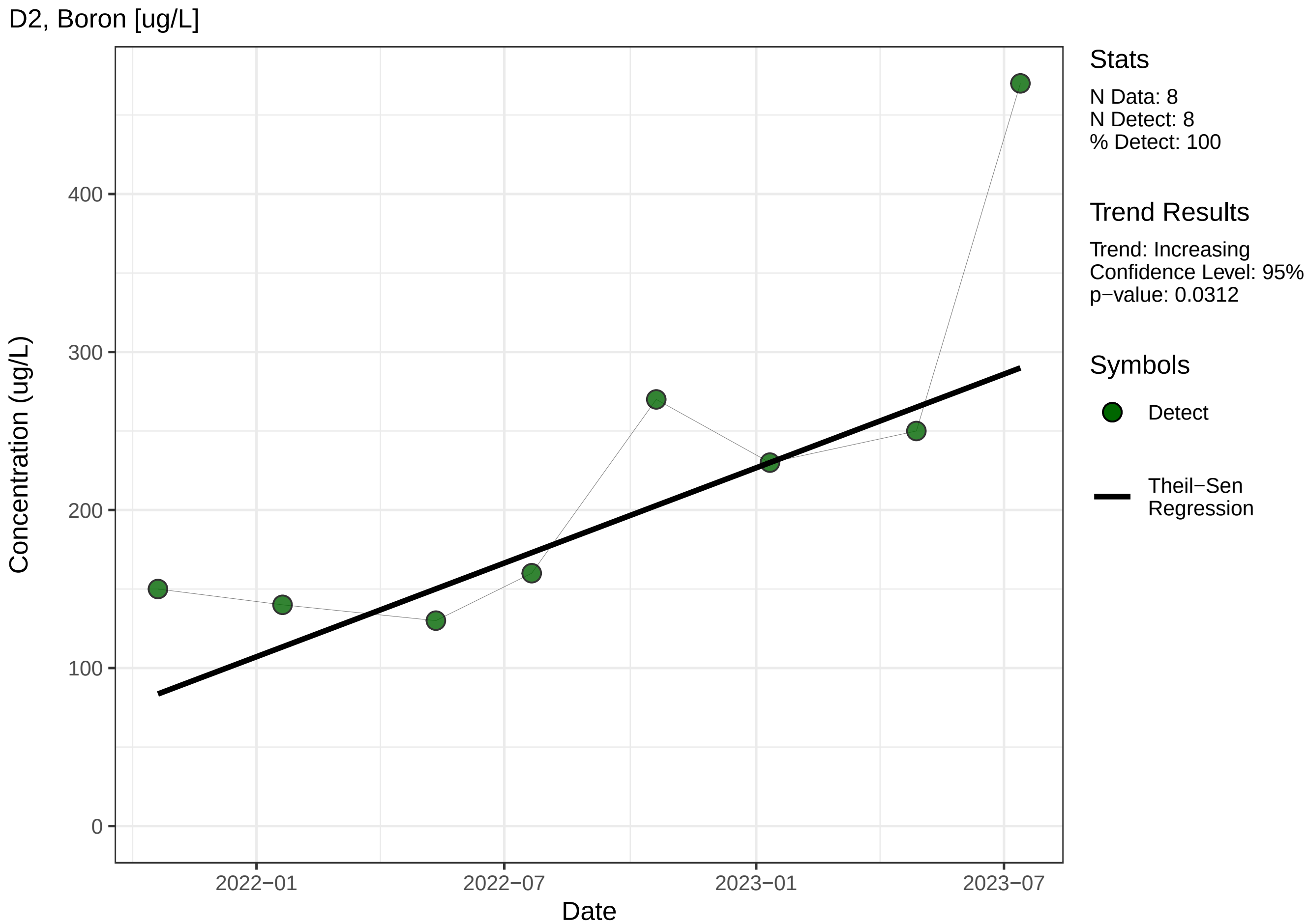


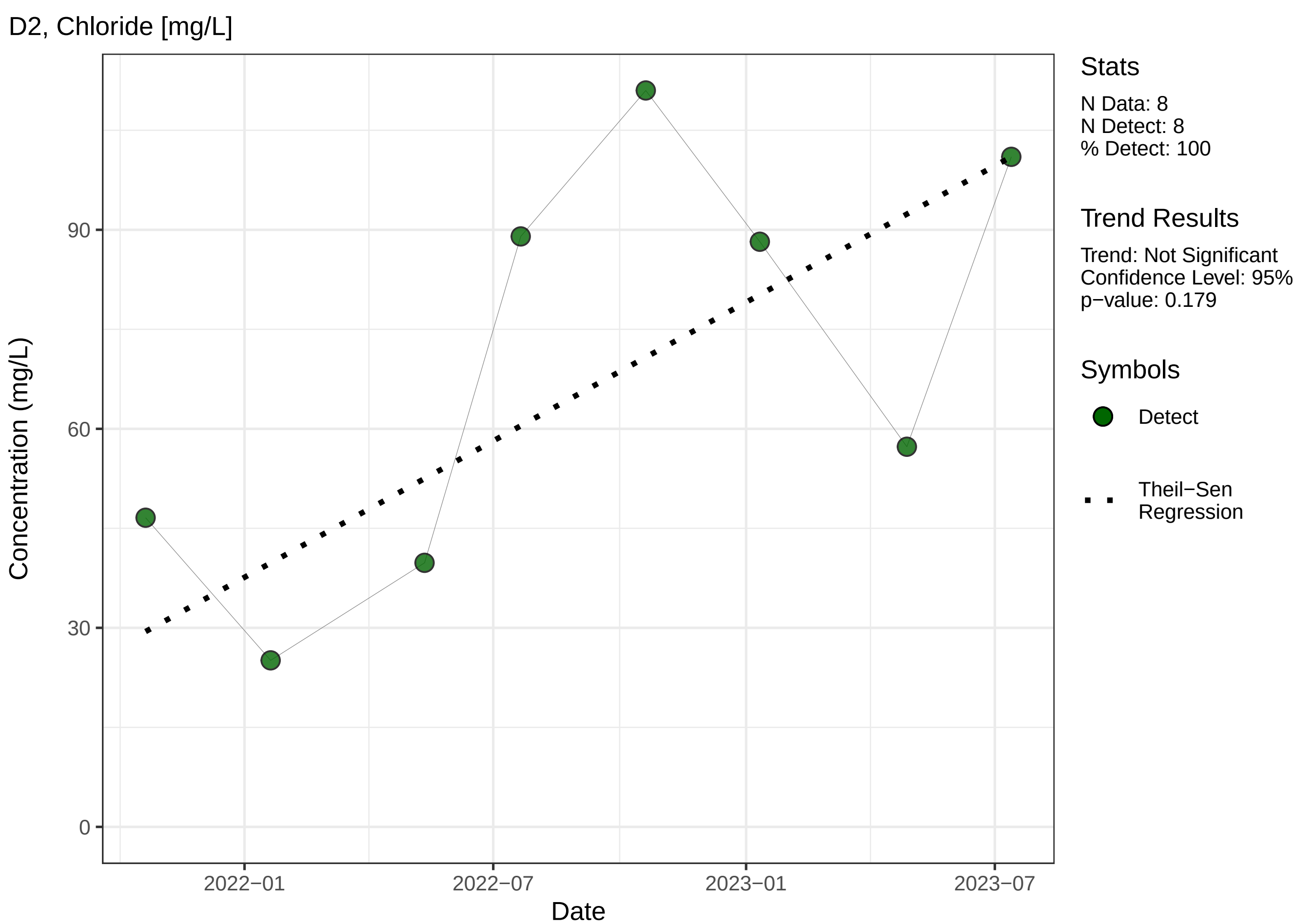
D20, Sulfate (as SO4) [mg/L]

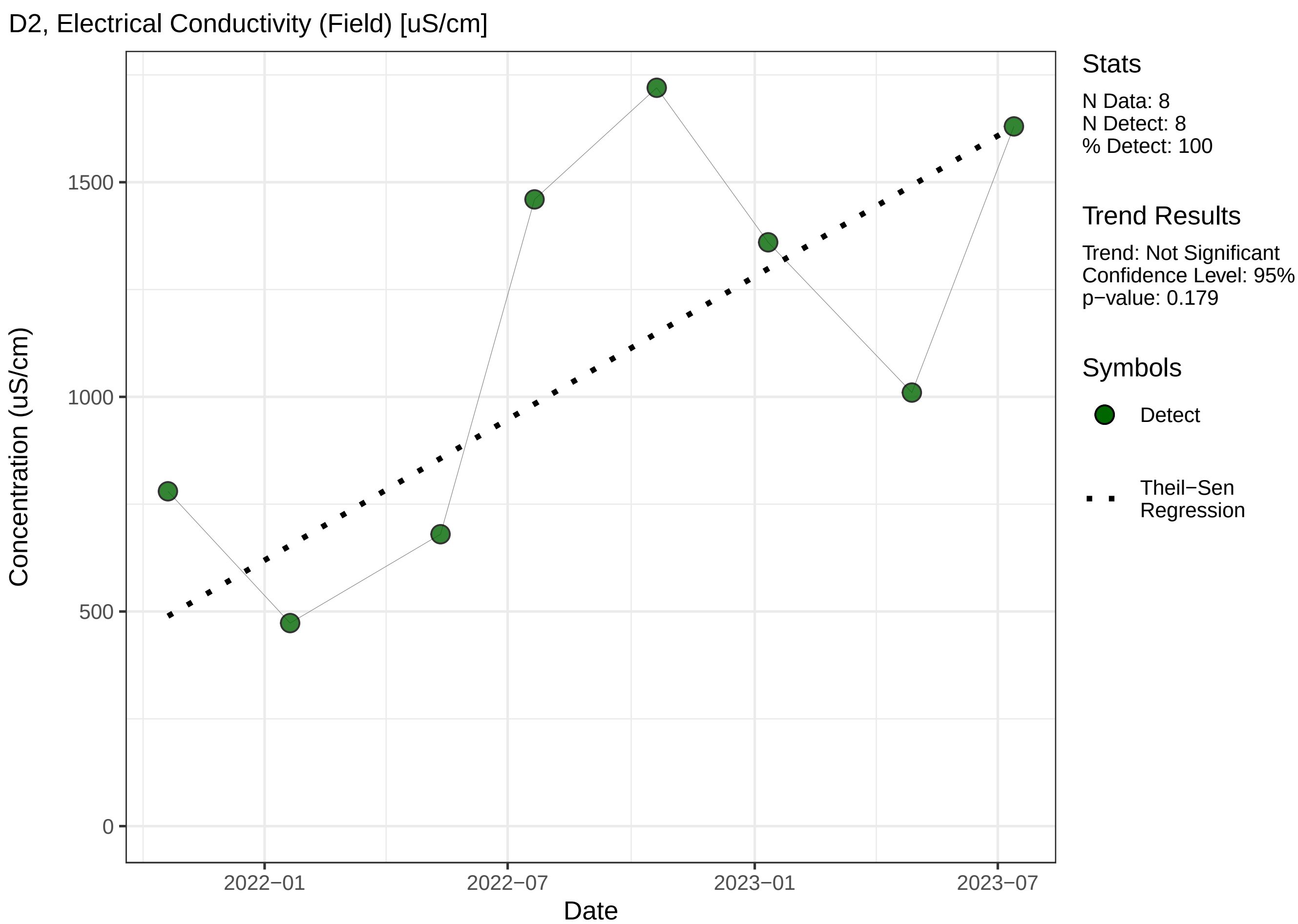


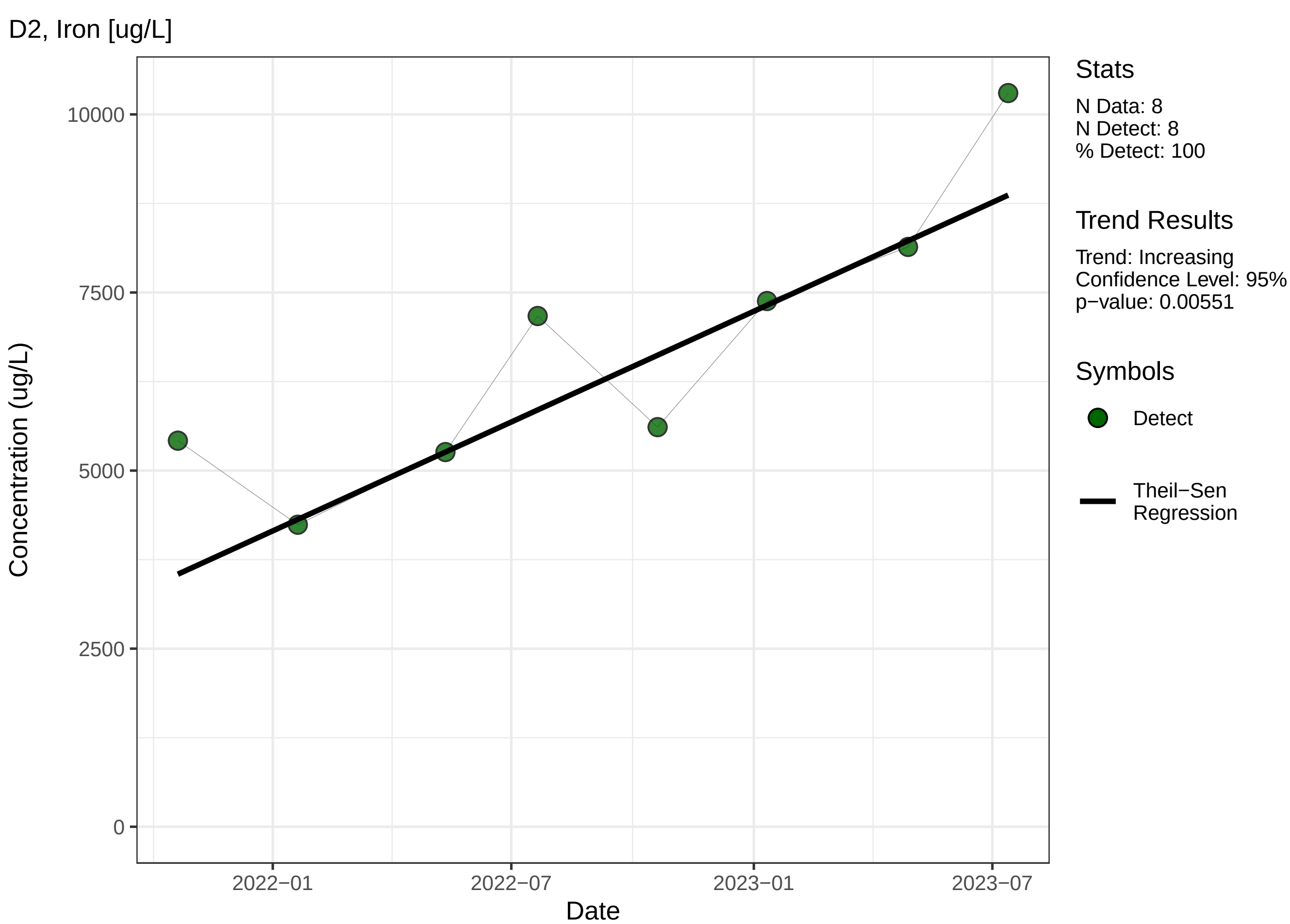
D20, Total Dissolved Solids (TDS) [mg/L]



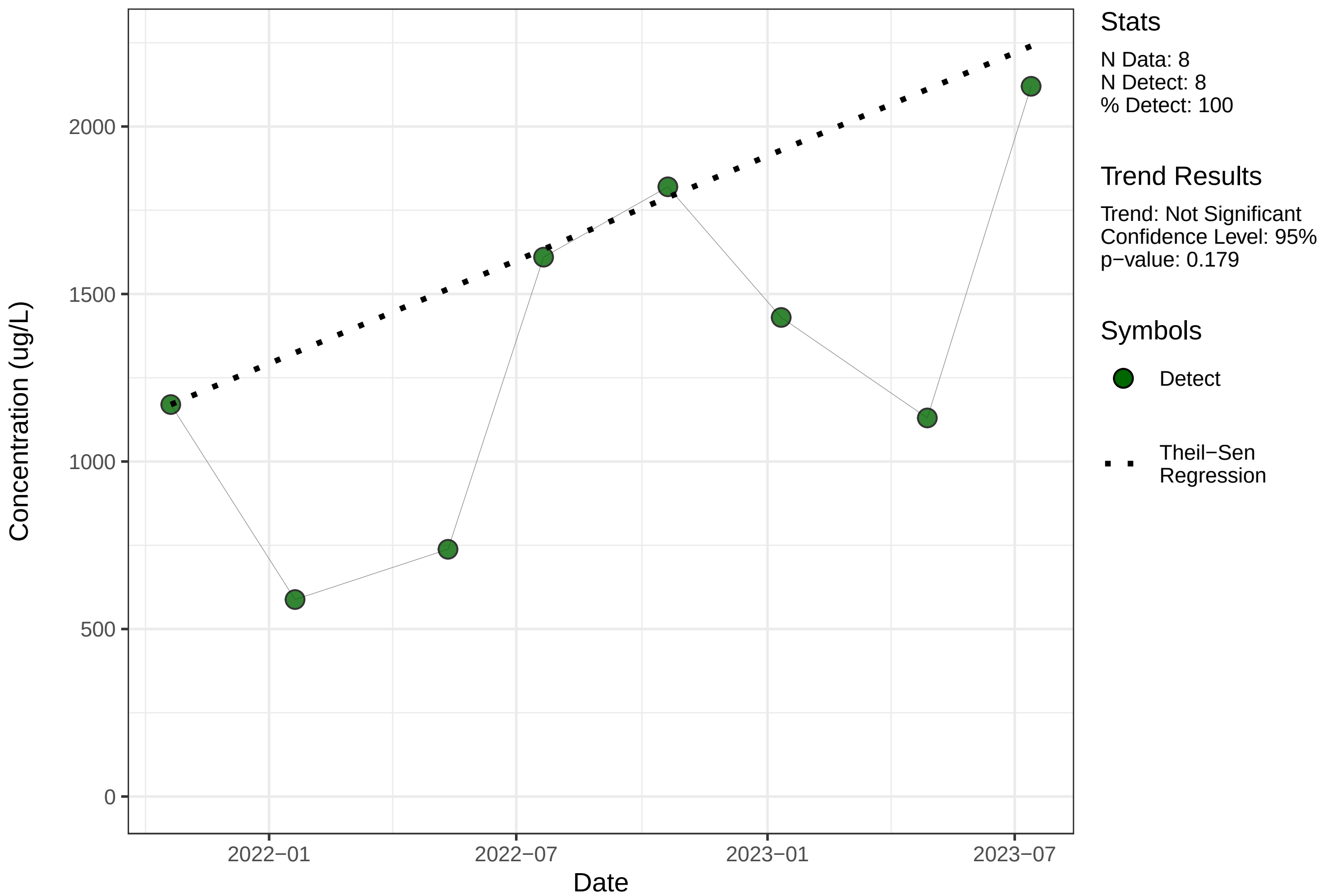

D2, Boron [ug/L]
Concentration (ug/L)
400
300
200
100
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Increasing
Confidence Level: 95%
p−value: 0.0312
Symbols
Detect
Theil−Sen Regression


D2, Chloride [mg/L]
Concentration (mg/L)
90
60
30
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

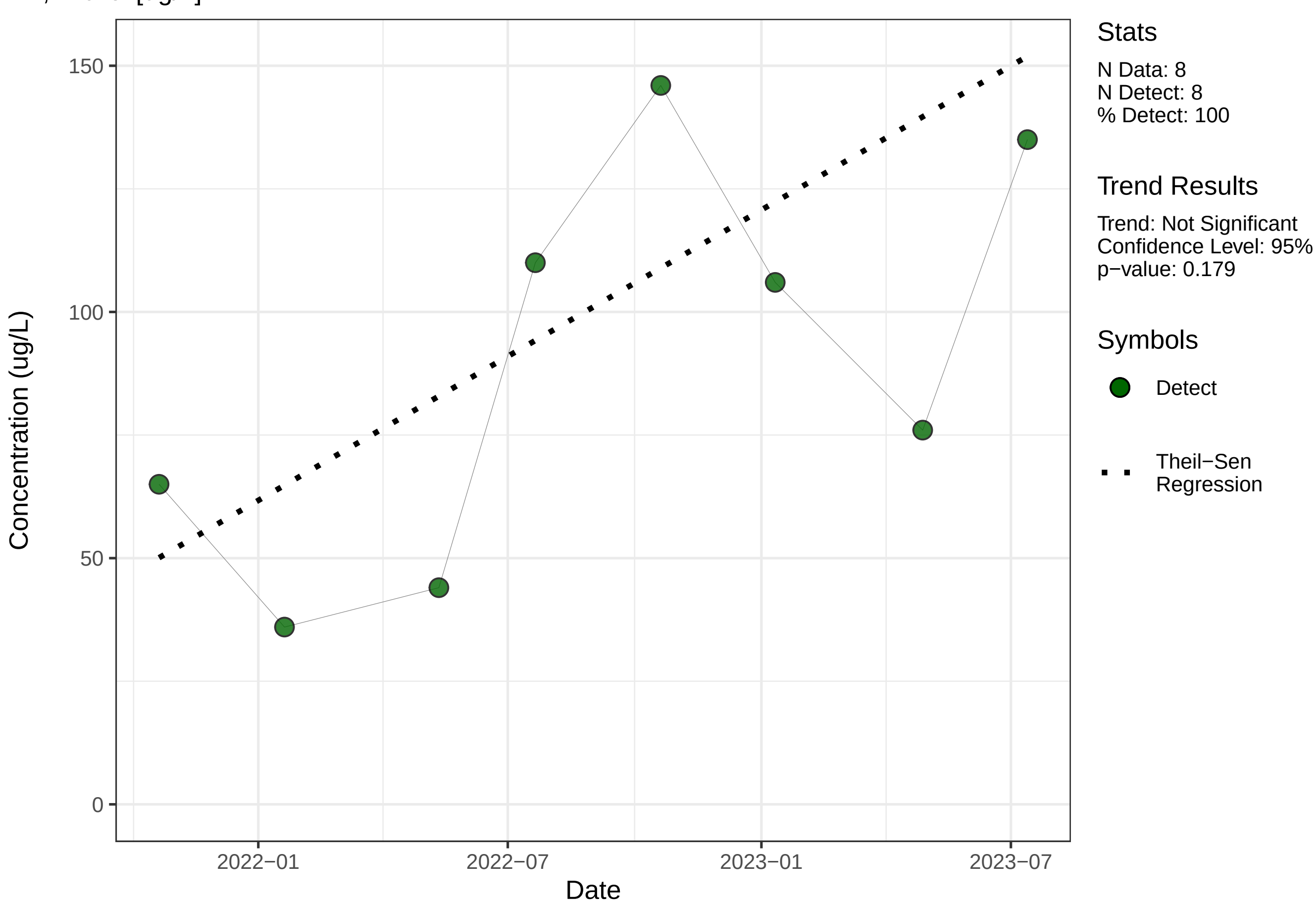

D2, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
0
500
1000
1500
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

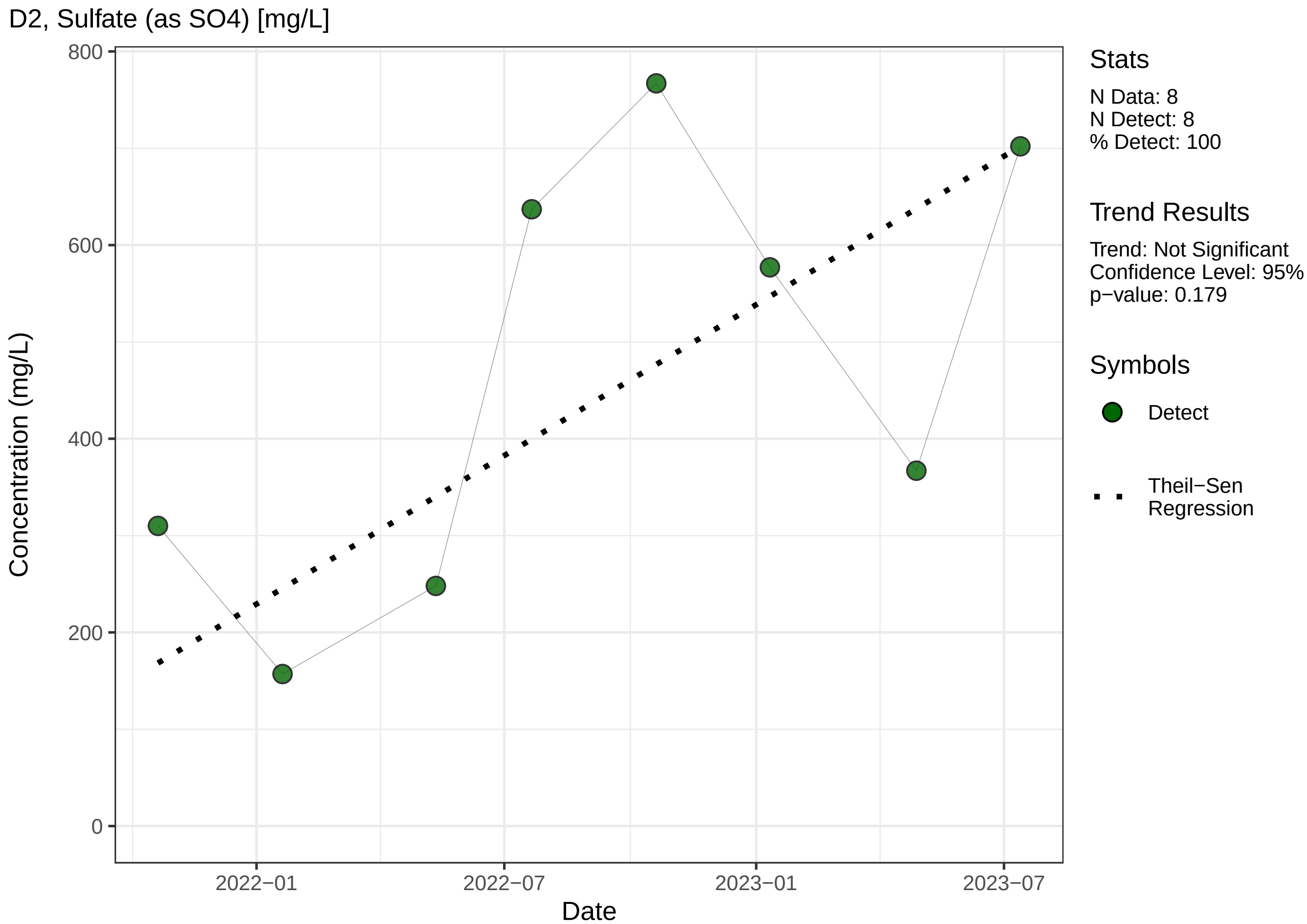

D2, Iron [ug/L]
Concentration (ug/L)
0
2500
5000
7500
10000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Increasing
Confidence Level: 95%
p−value: 0.00551
Symbols
Detect
Theil−Sen Regression

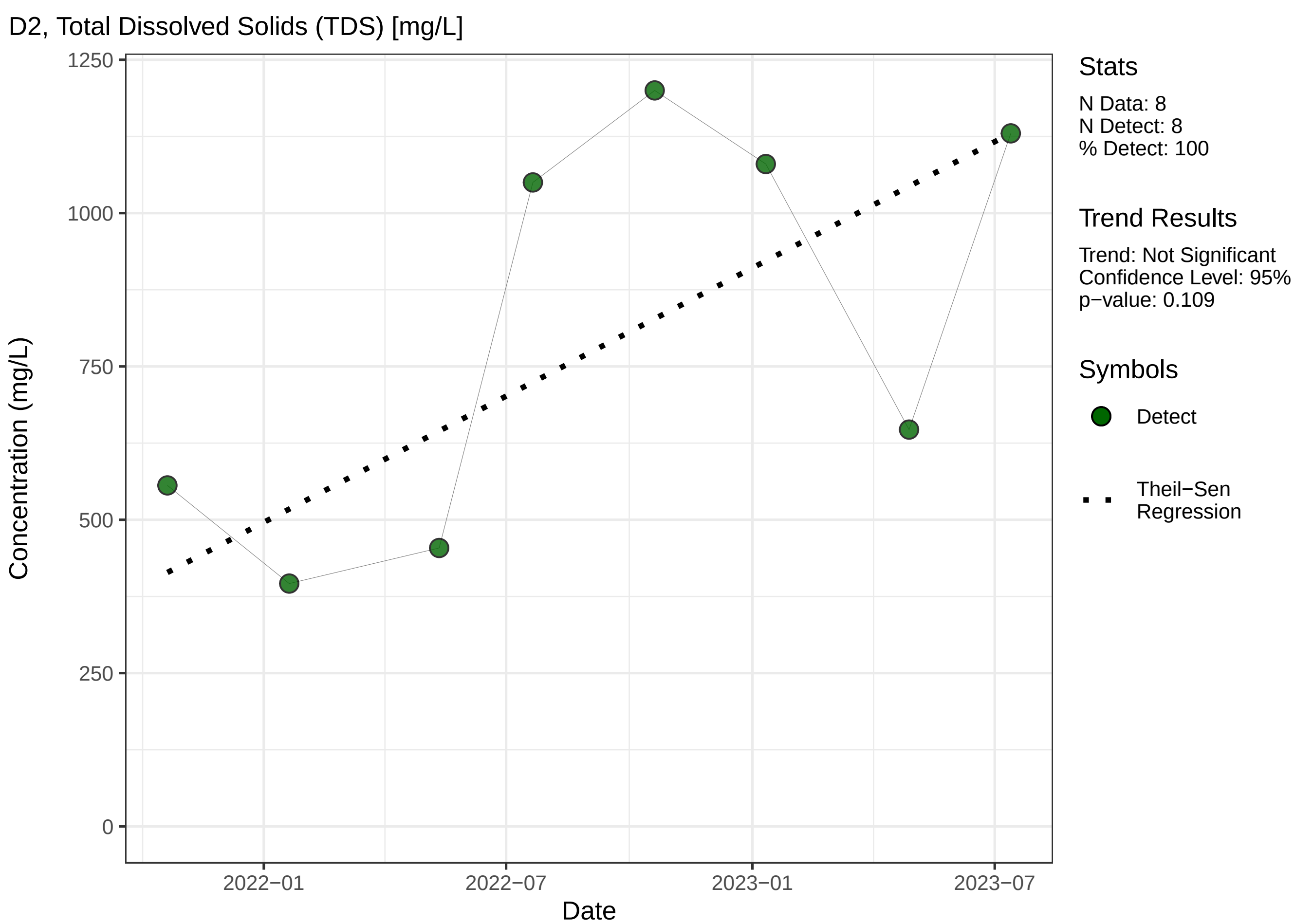
D2, Manganese [ug/L]



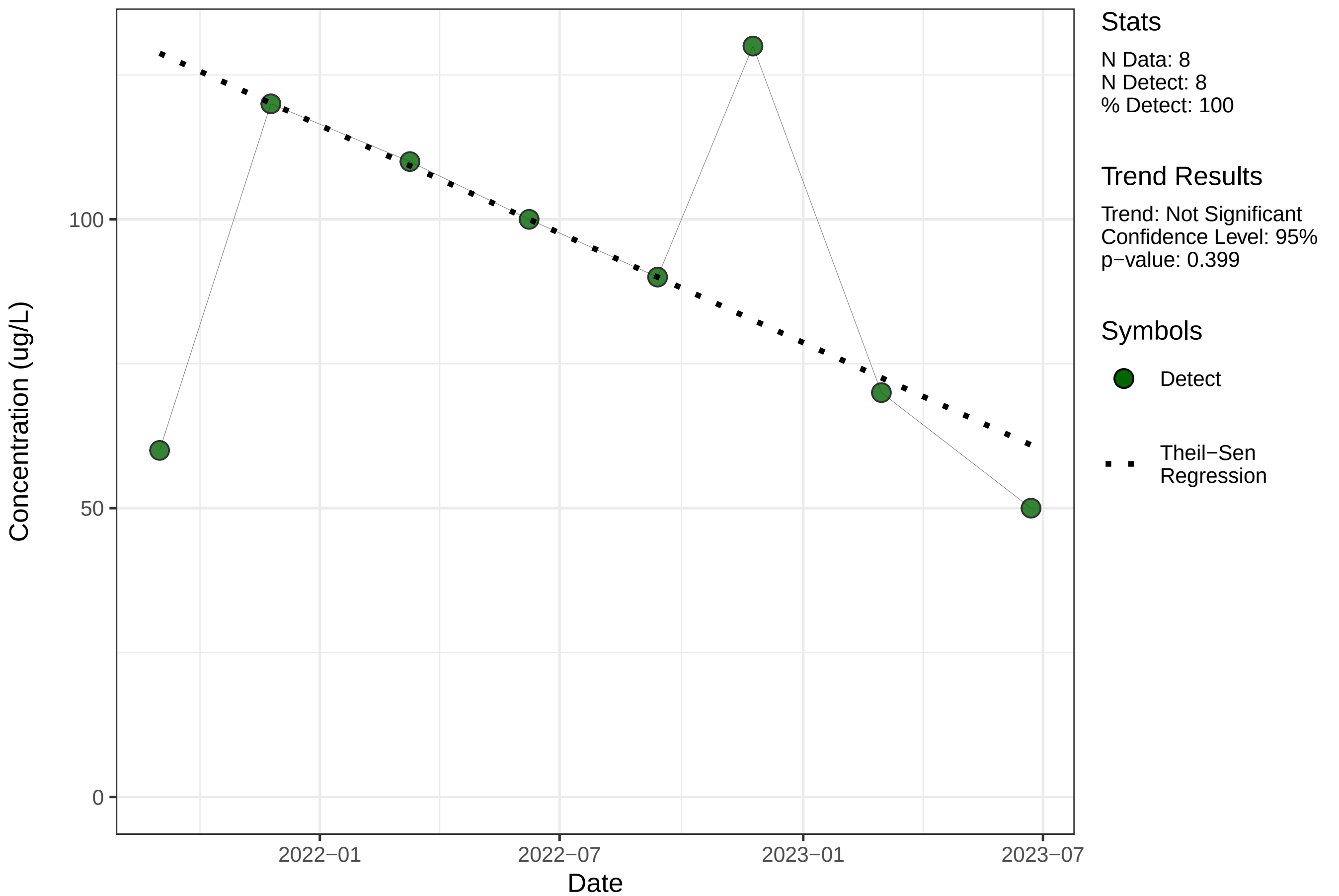
D2, Nickel [ug/L]



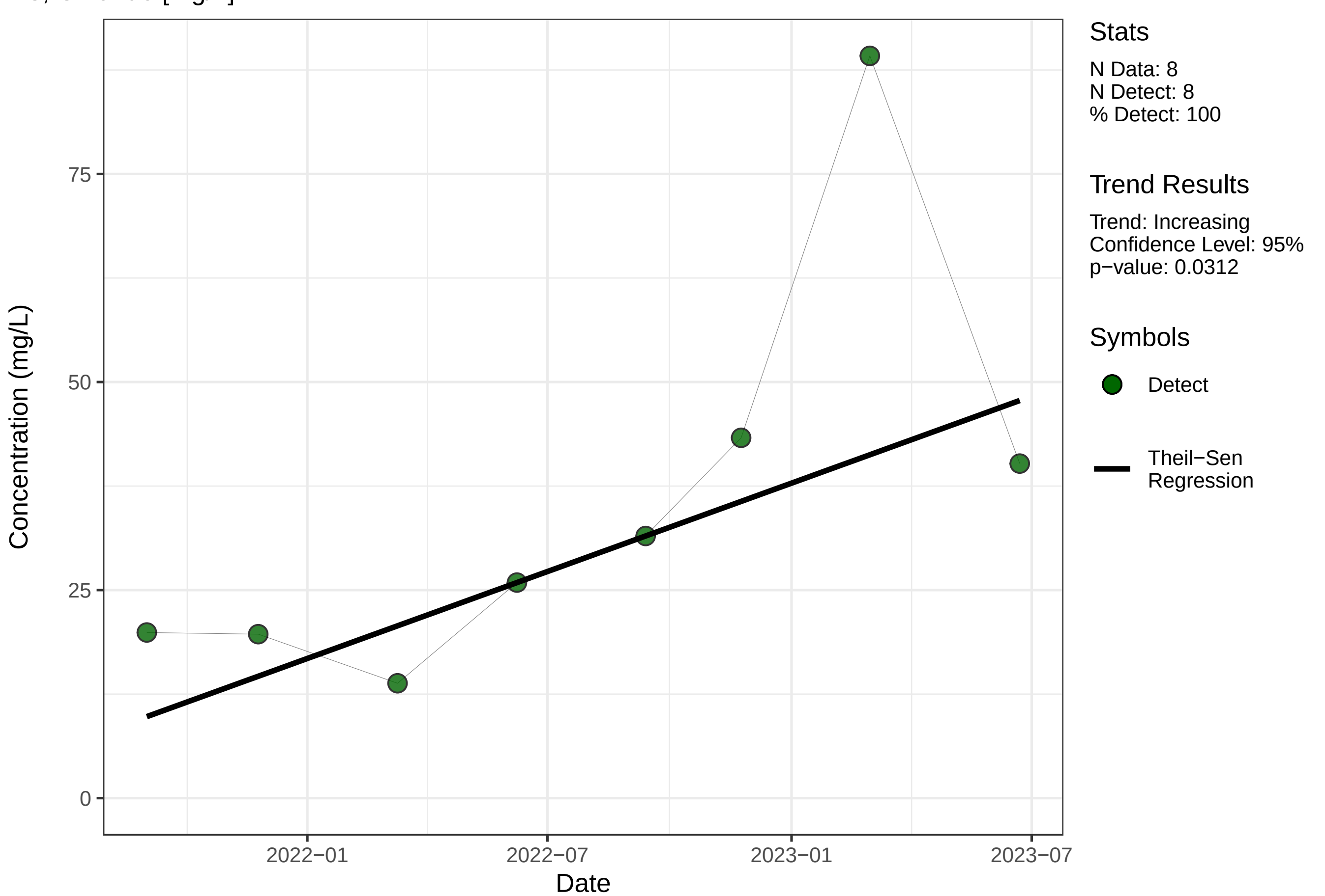

D2, Sulfate (as SO4) [mg/L]
800
600
400
200
0
Concentration (mg/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.179
Symbols
Detect
Theil−Sen Regression

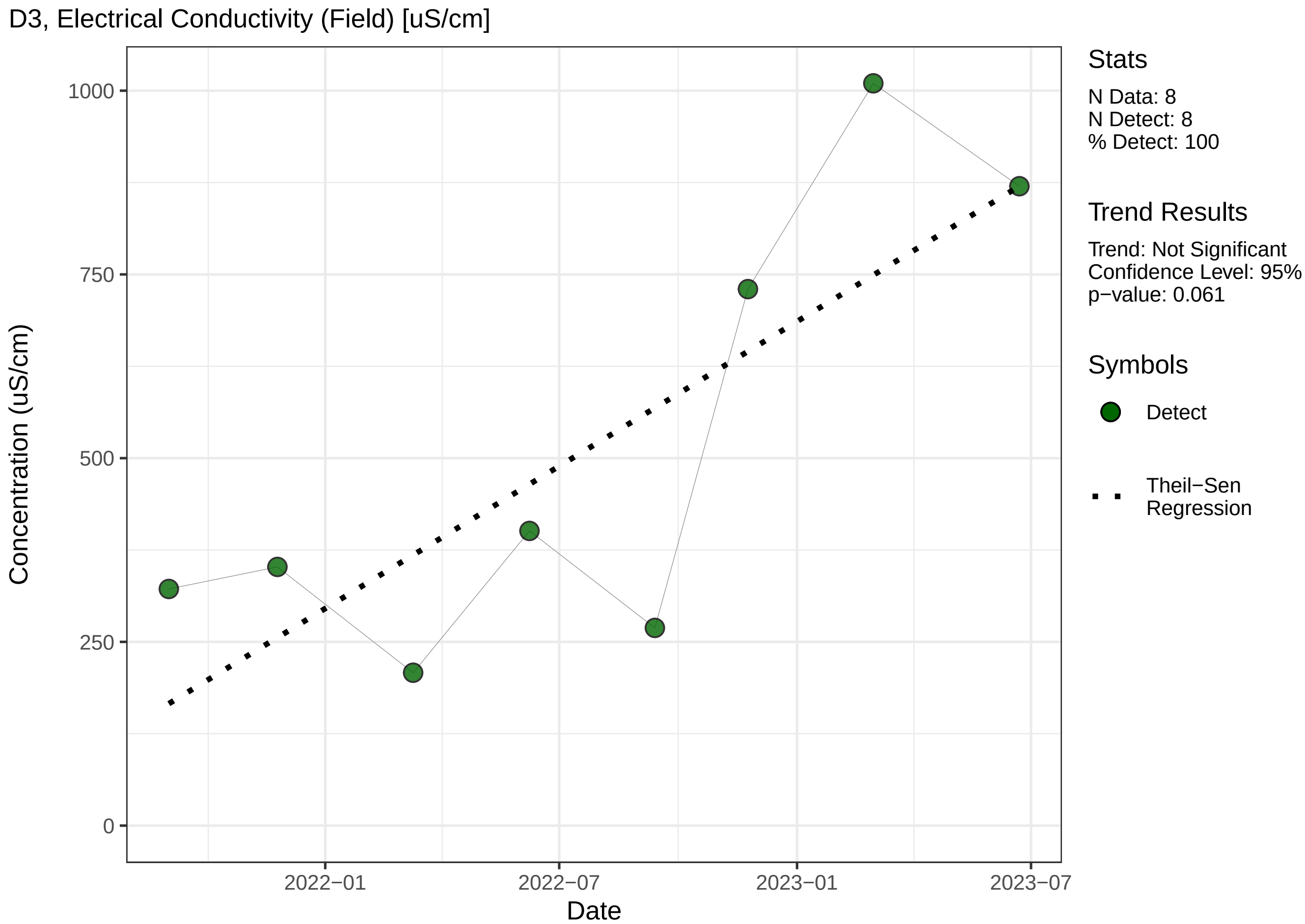

D2, Total Dissolved Solids (TDS) [mg/L]
1250
1000
750
500
250
0
Concentration (mg/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

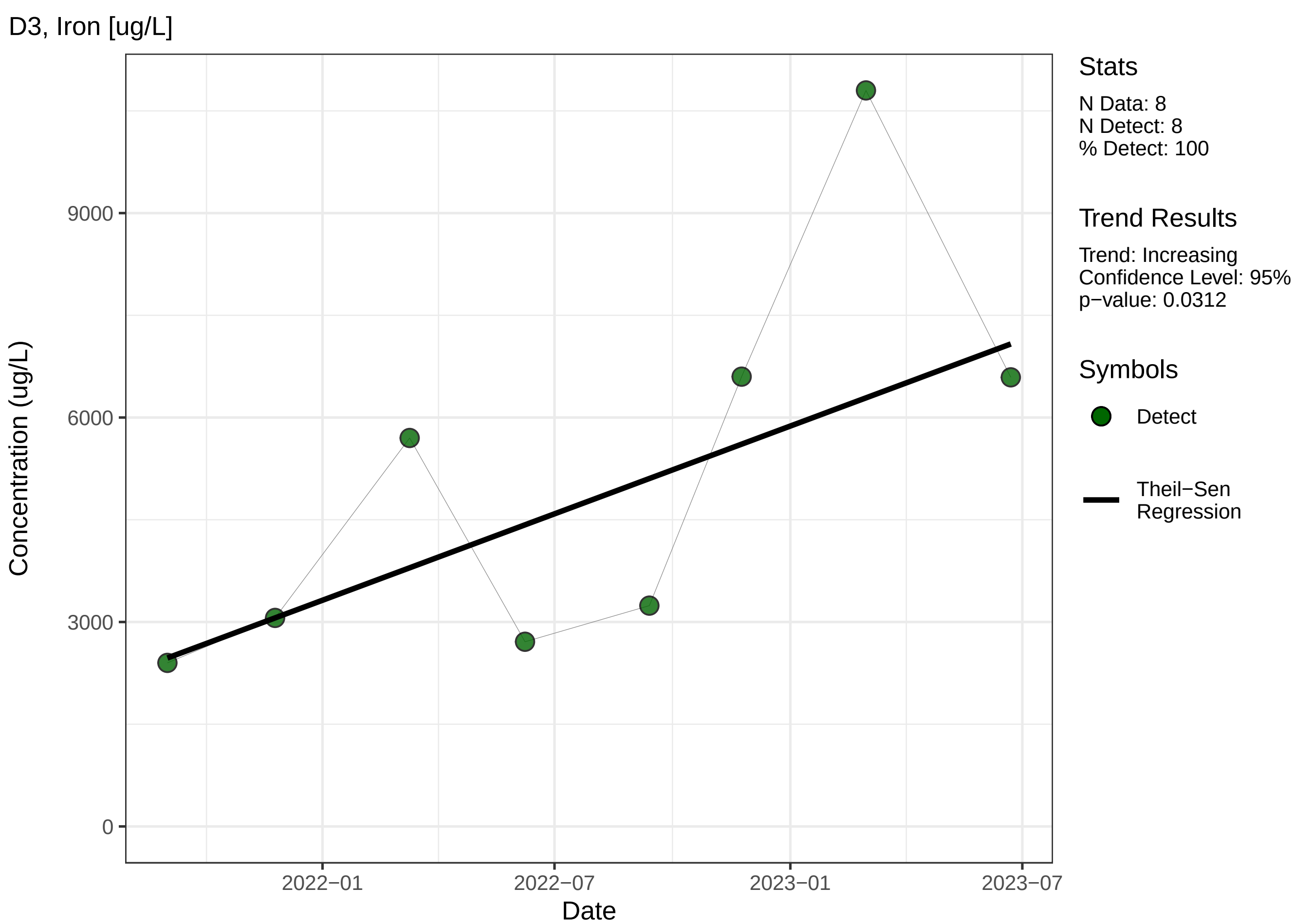
D3, Boron [ug/L]

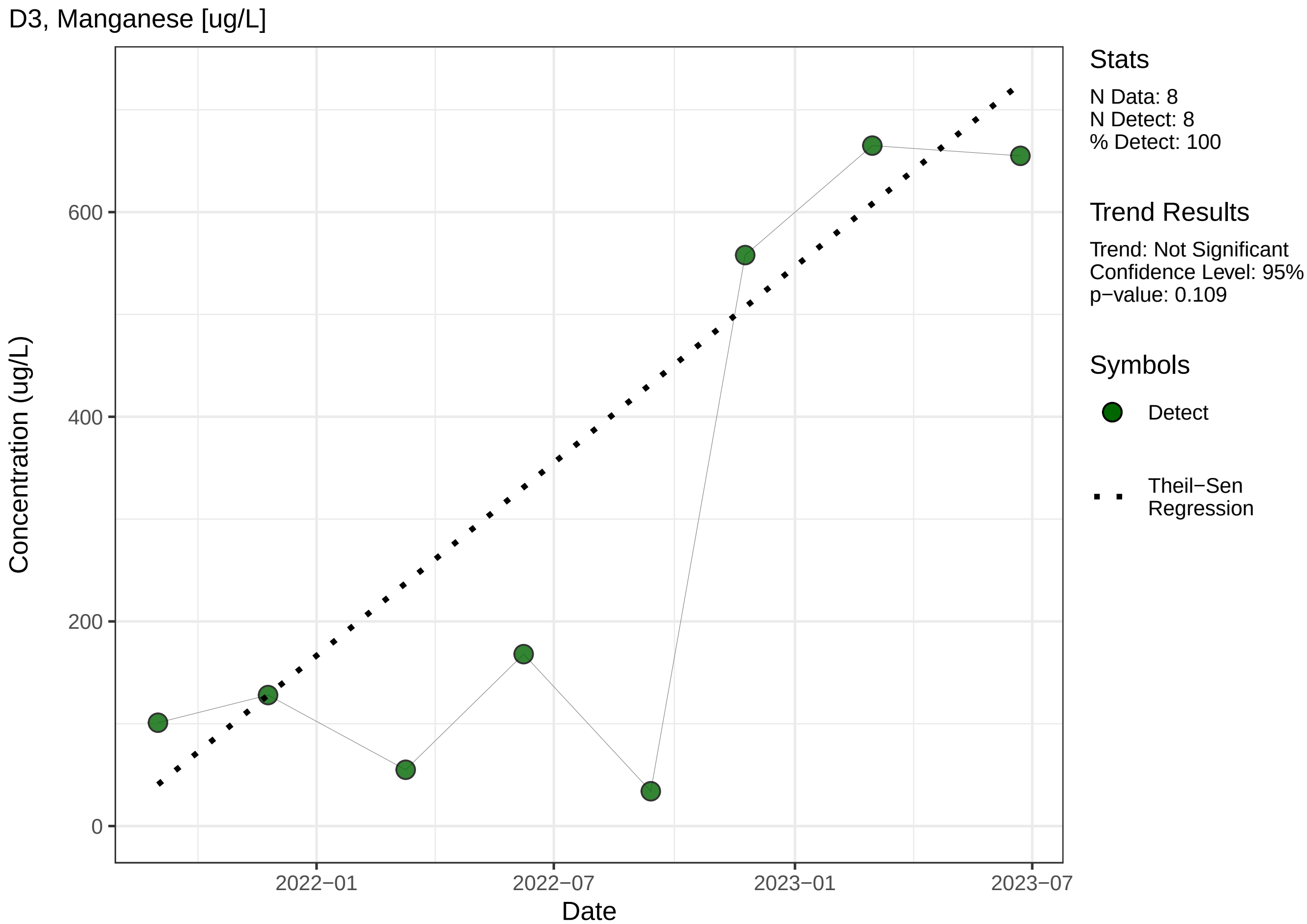


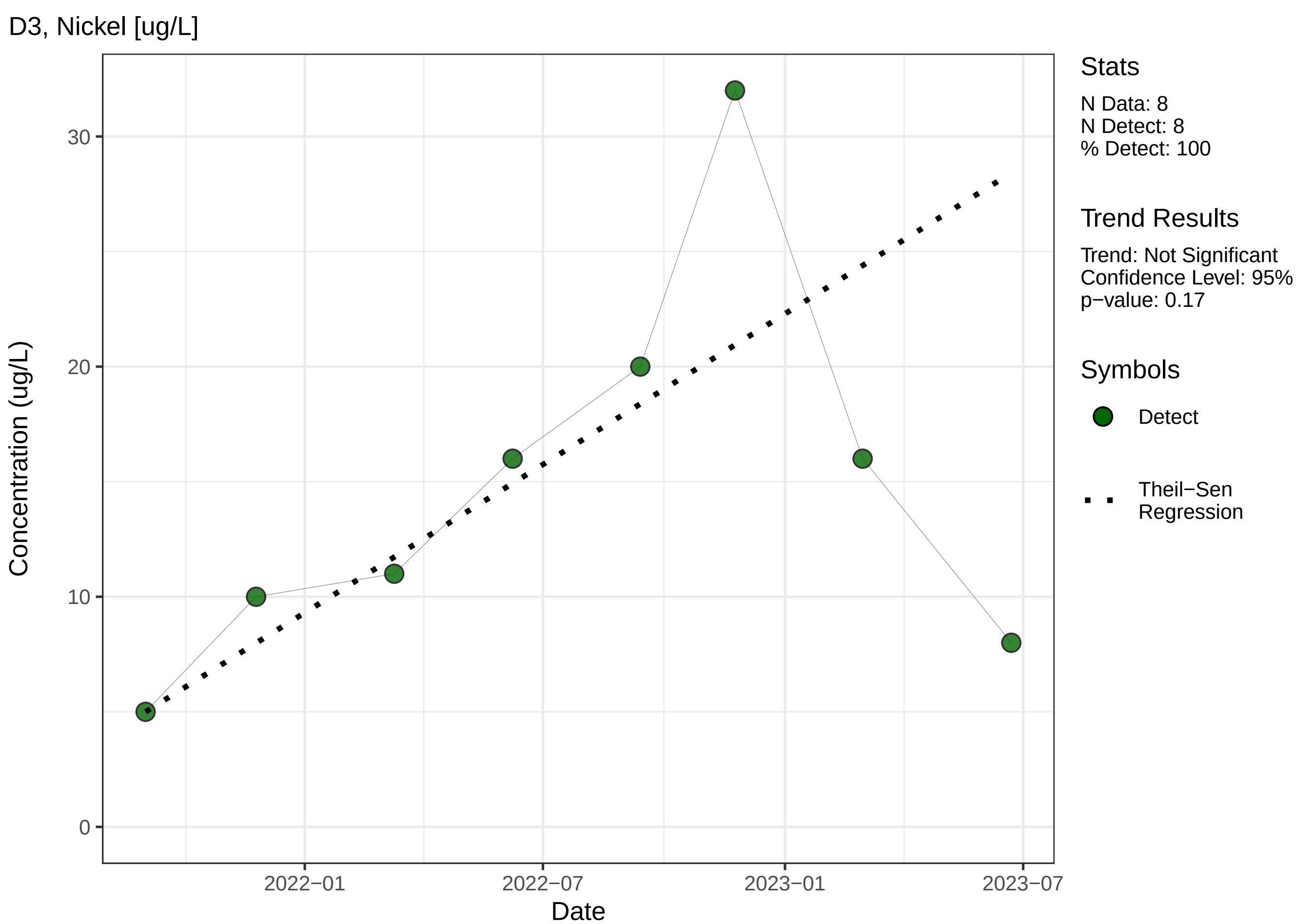
D3, Chloride [mg/L]



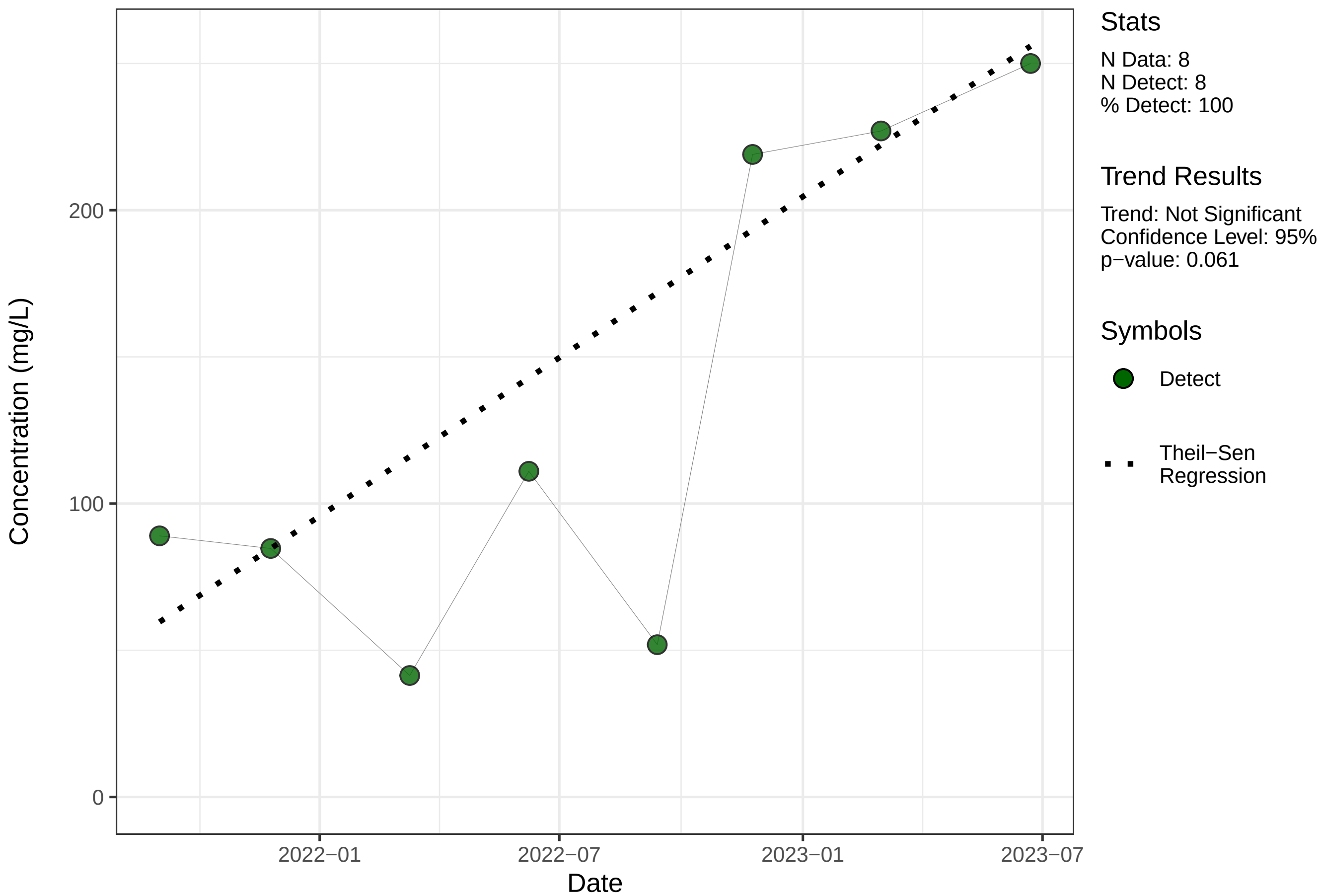

D3, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
1000
750
500
250
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.061
Symbols
Detect
Theil−Sen Regression


D3, Iron [ug/L]
Concentration (ug/L)
9000
6000
3000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Increasing
Confidence Level: 95%
p−value: 0.0312
Symbols
Detect
Theil−Sen Regression

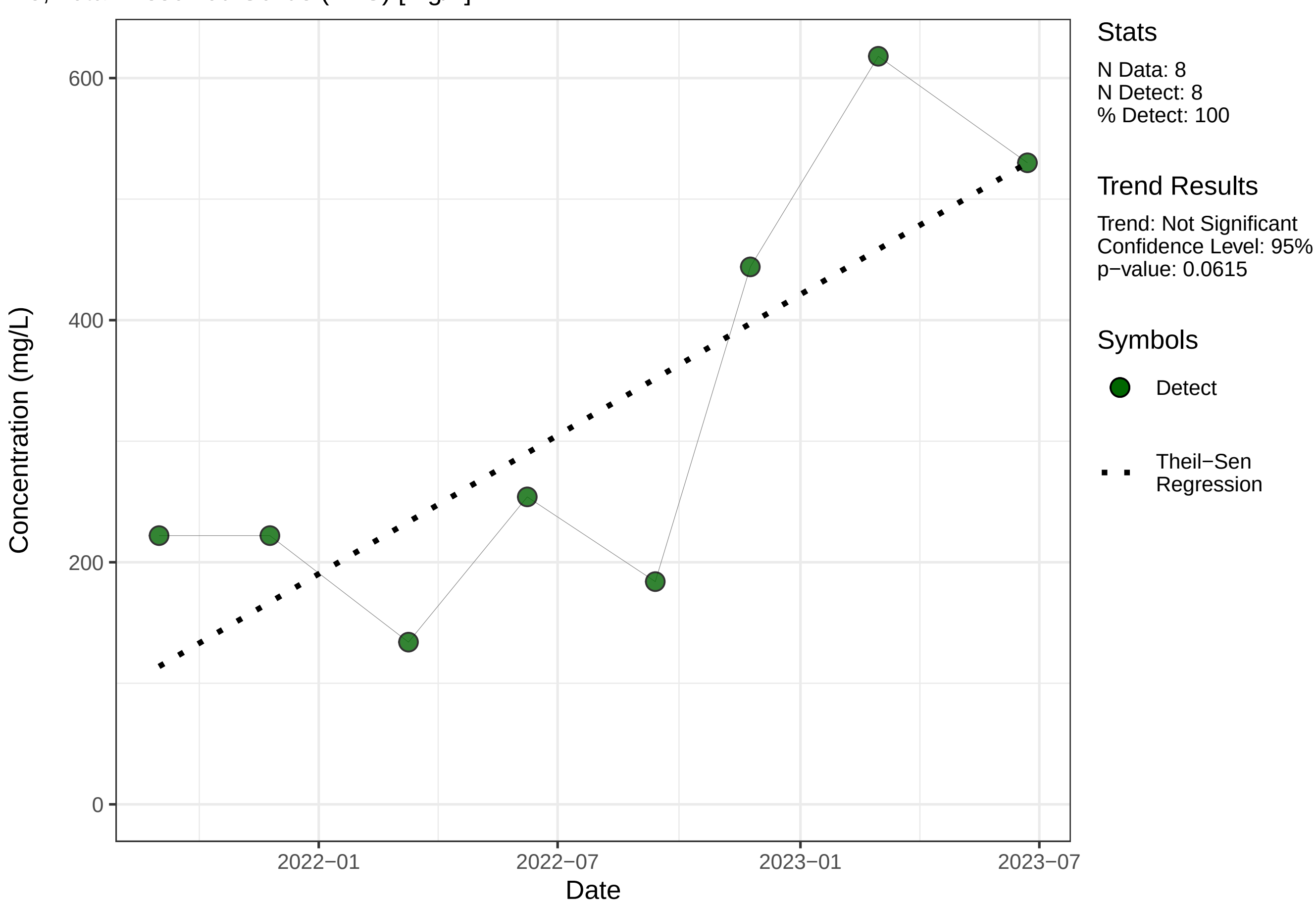

D3, Manganese [ug/L]
Concentration (ug/L)
0
200
400
600
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

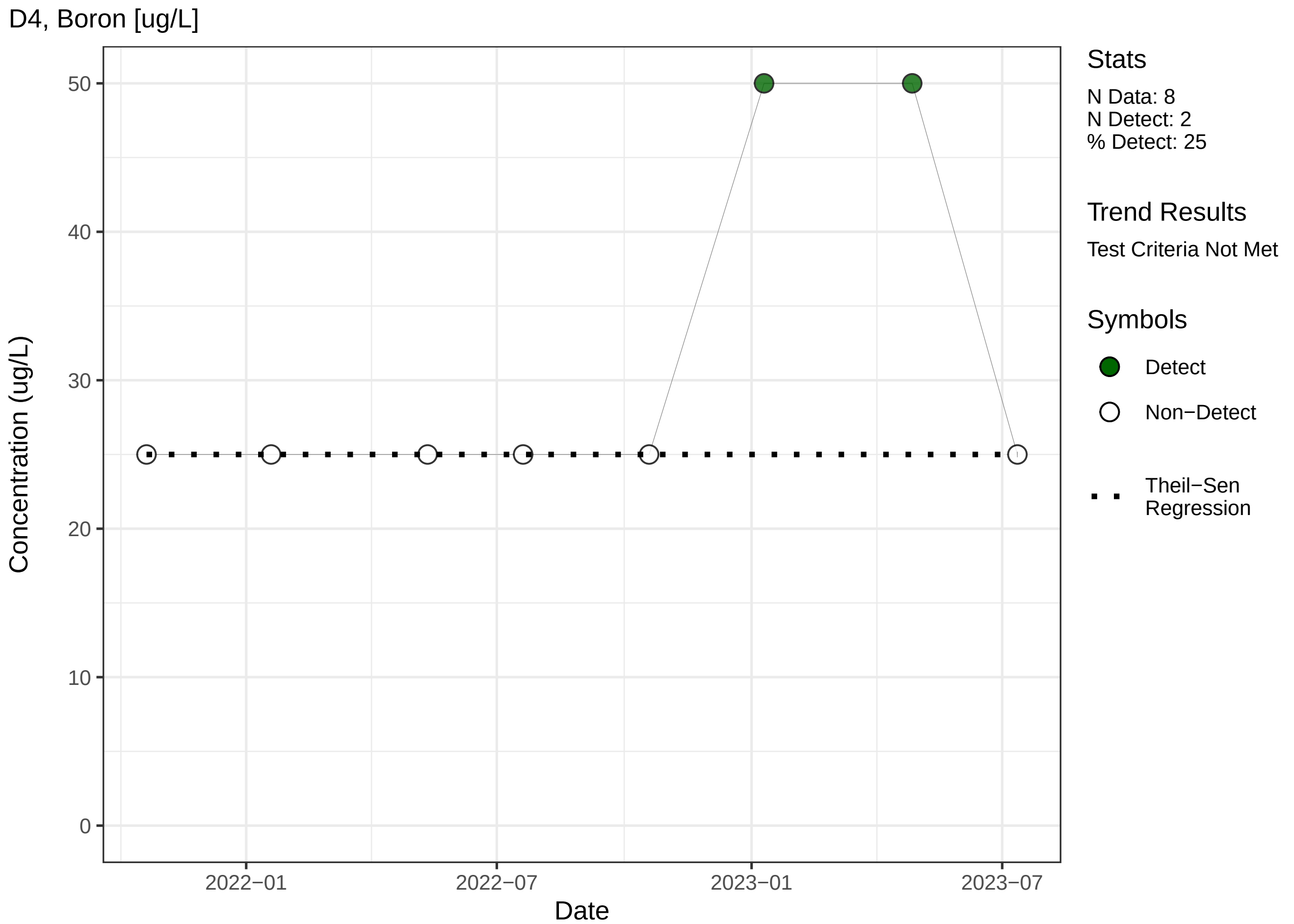

D3, Nickel [ug/L]
Concentration (ug/L)
0
10
20
30
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.17
Symbols
Detect
Theil−Sen Regression

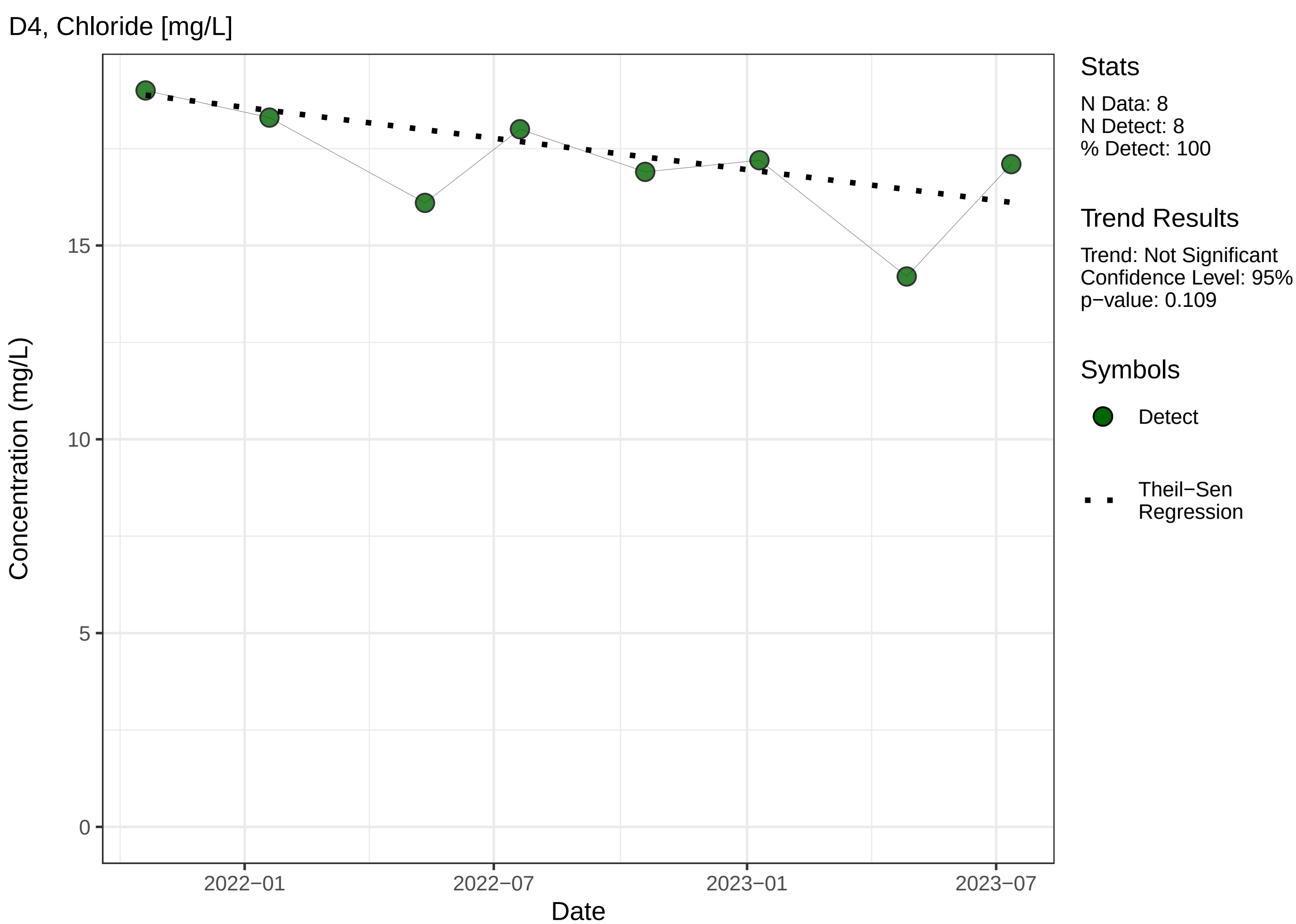
D3, Sulfate (as SO4) [mg/L]

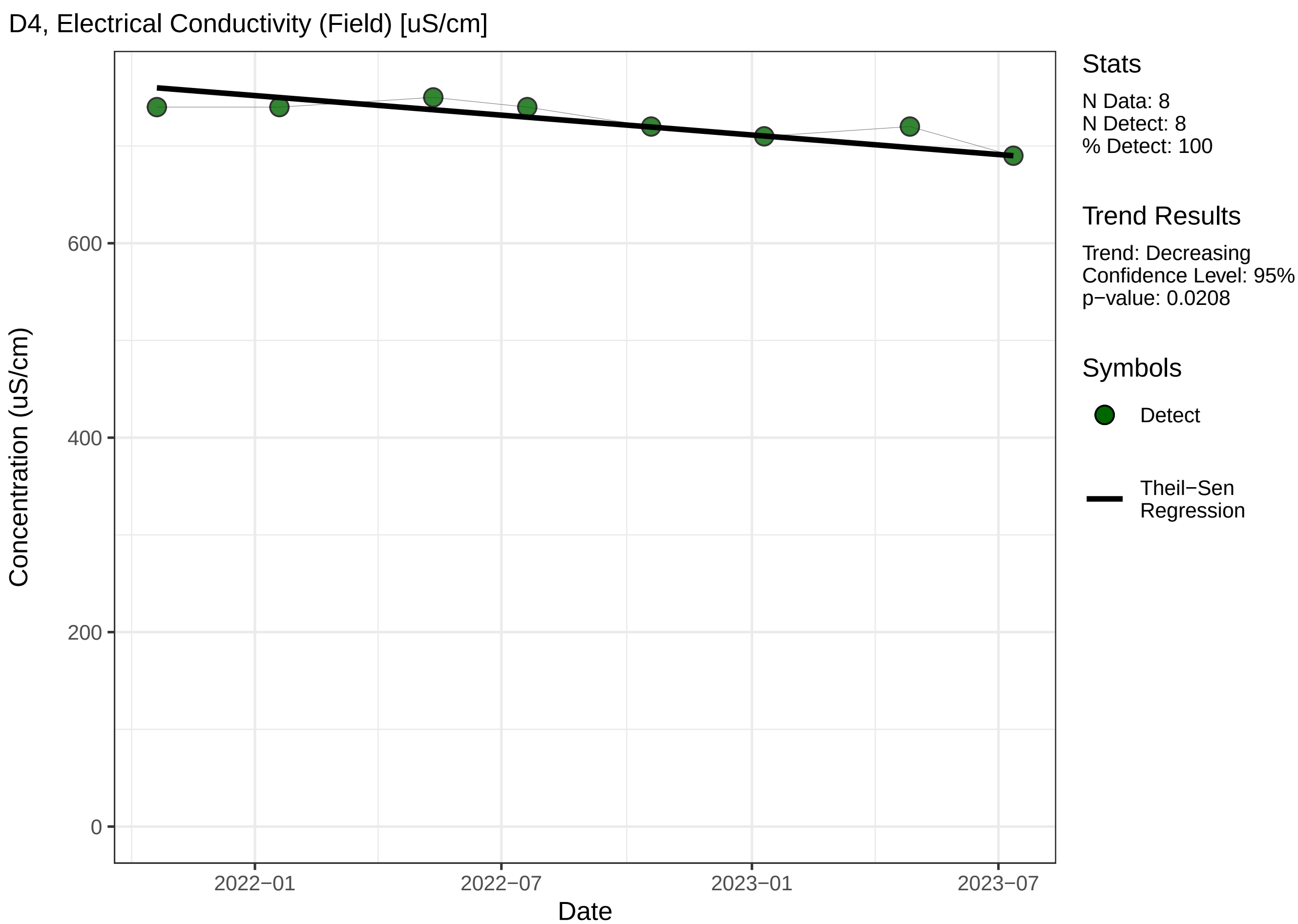


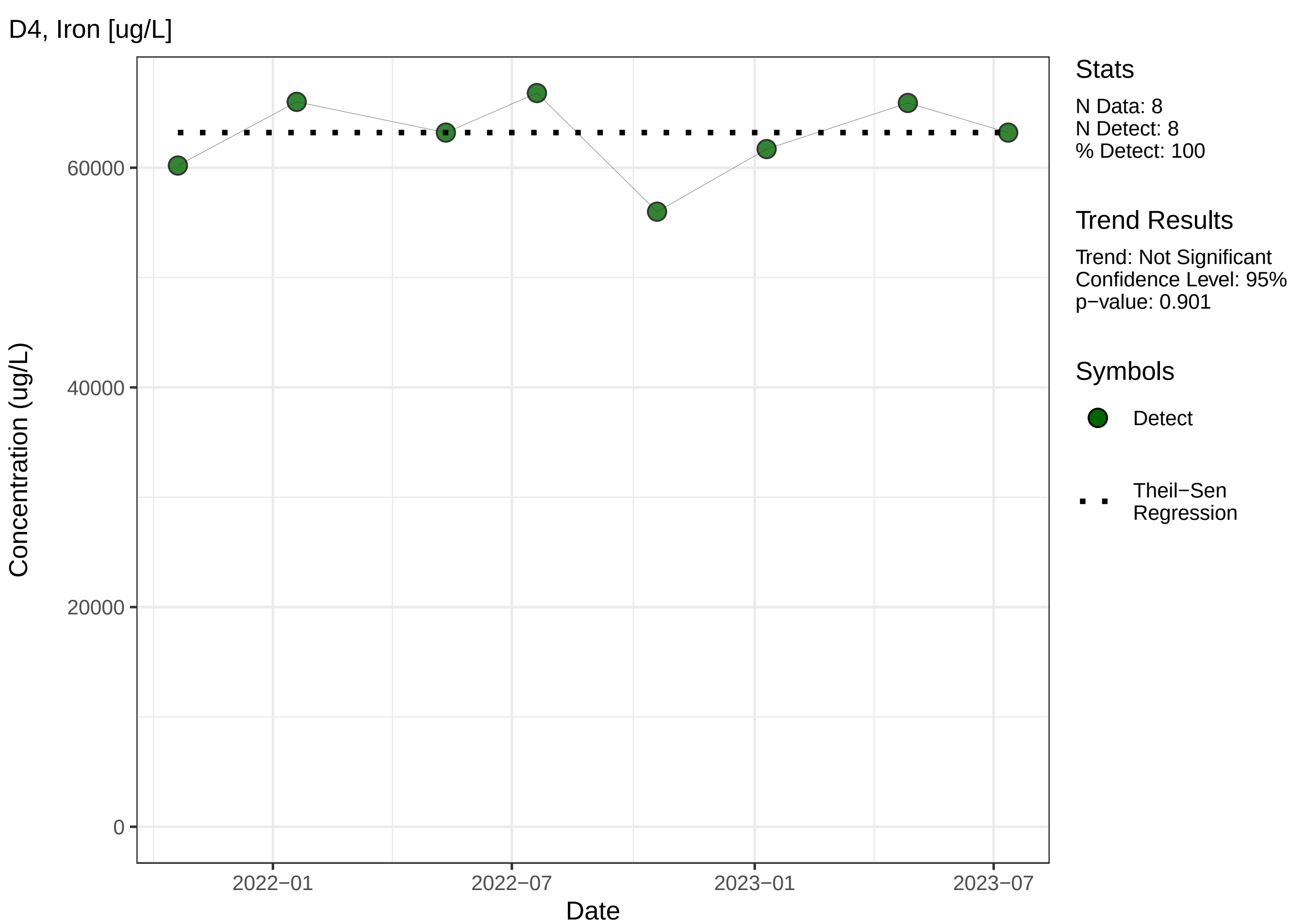
D3, Total Dissolved Solids (TDS) [mg/L]



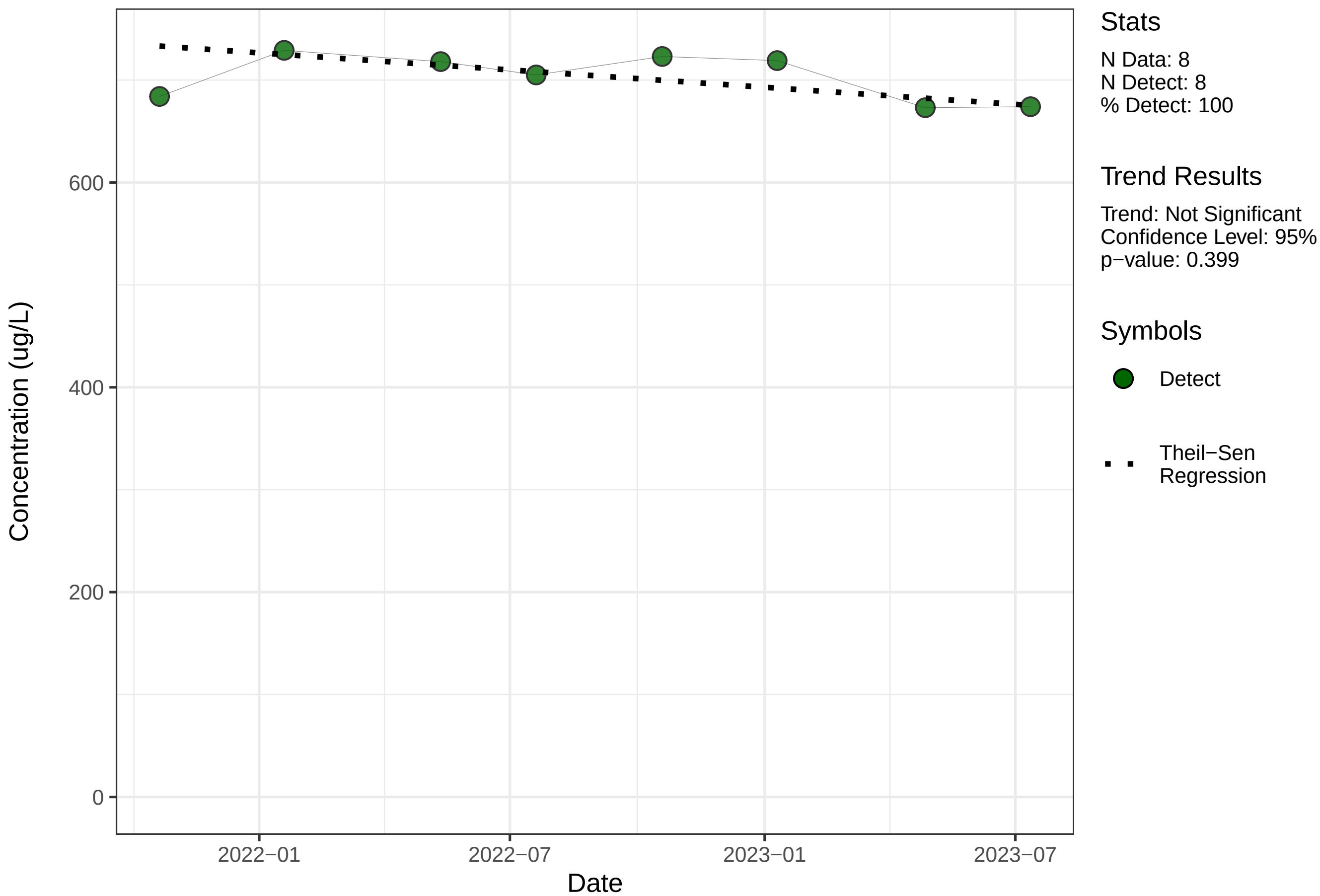

D4, Boron [ug/L]
Concentration (ug/L)
50
40
30
20
10
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 2
% Detect: 25
Trend Results
Test Criteria Not Met
Symbols
Detect
Non−Detect
Theil−Sen Regression


D4, Chloride [mg/L]
Concentration (mg/L)
15
10
5
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

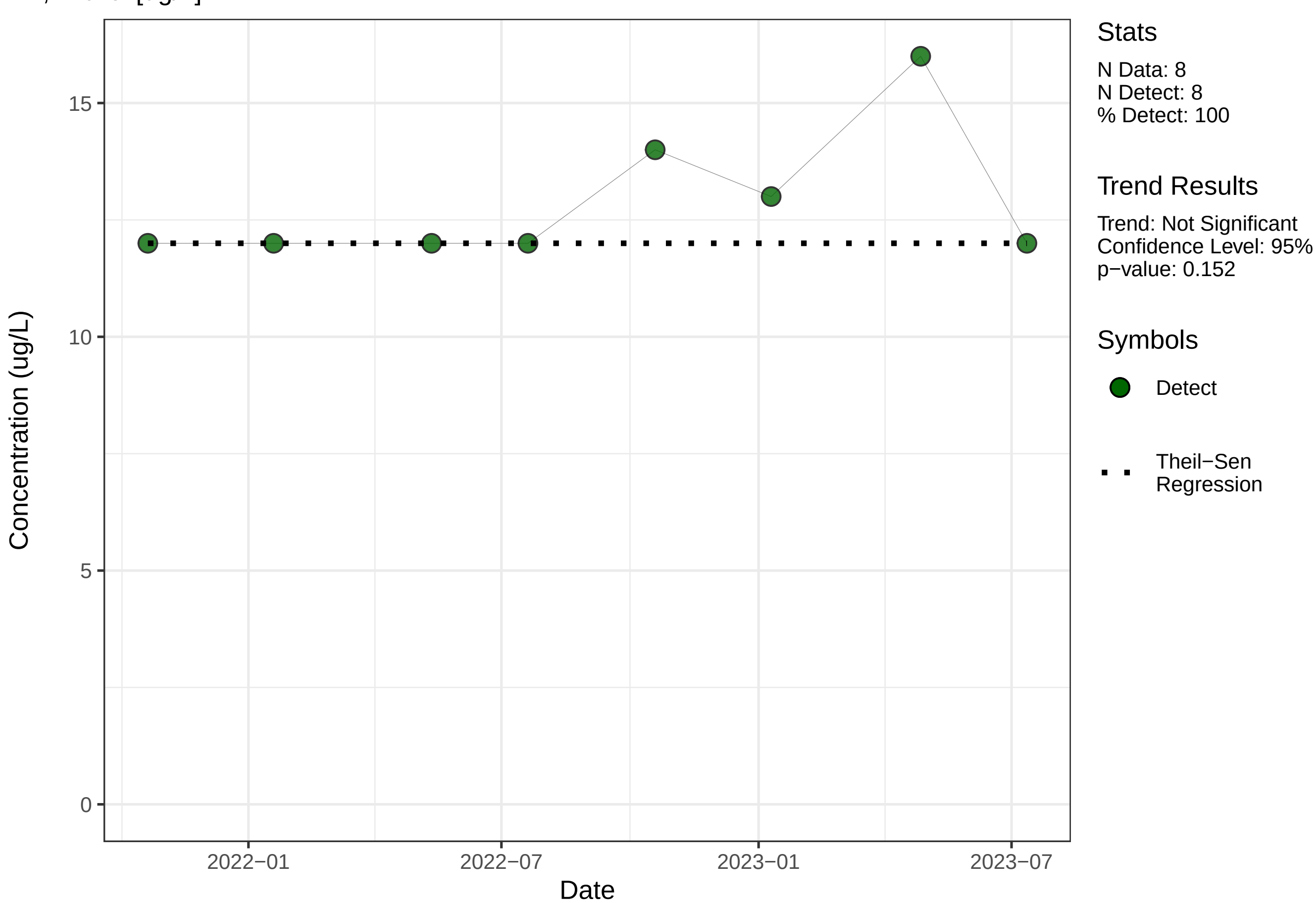

D4, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
0
200
400
600
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Decreasing
Confidence Level: 95%
p−value: 0.0208
Symbols
Detect
Theil−Sen Regression


D4, Iron [ug/L]
Concentration (ug/L)
0
20000
40000
60000
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.901
Symbols
Detect
Theil−Sen Regression

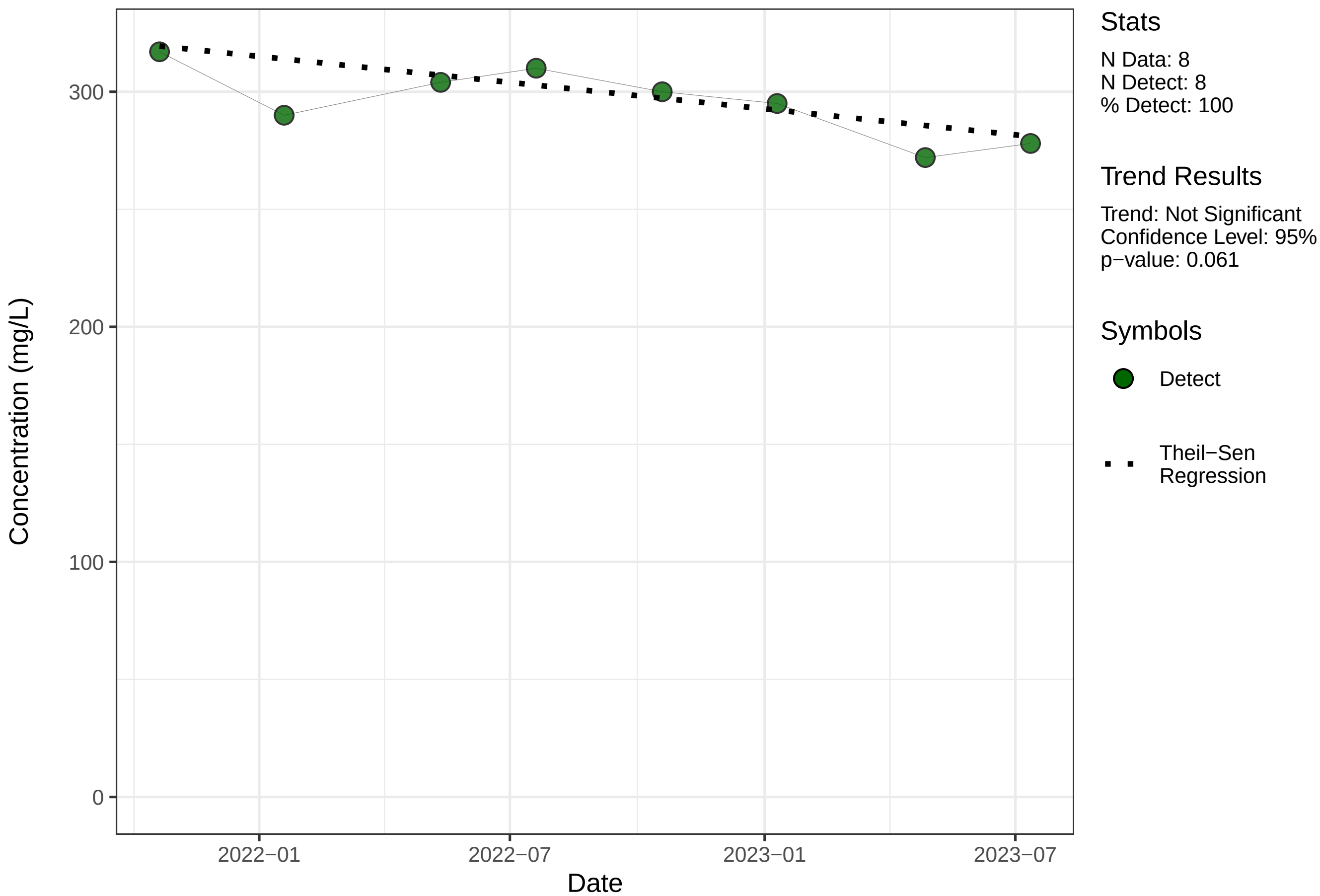
D4, Manganese [ug/L]



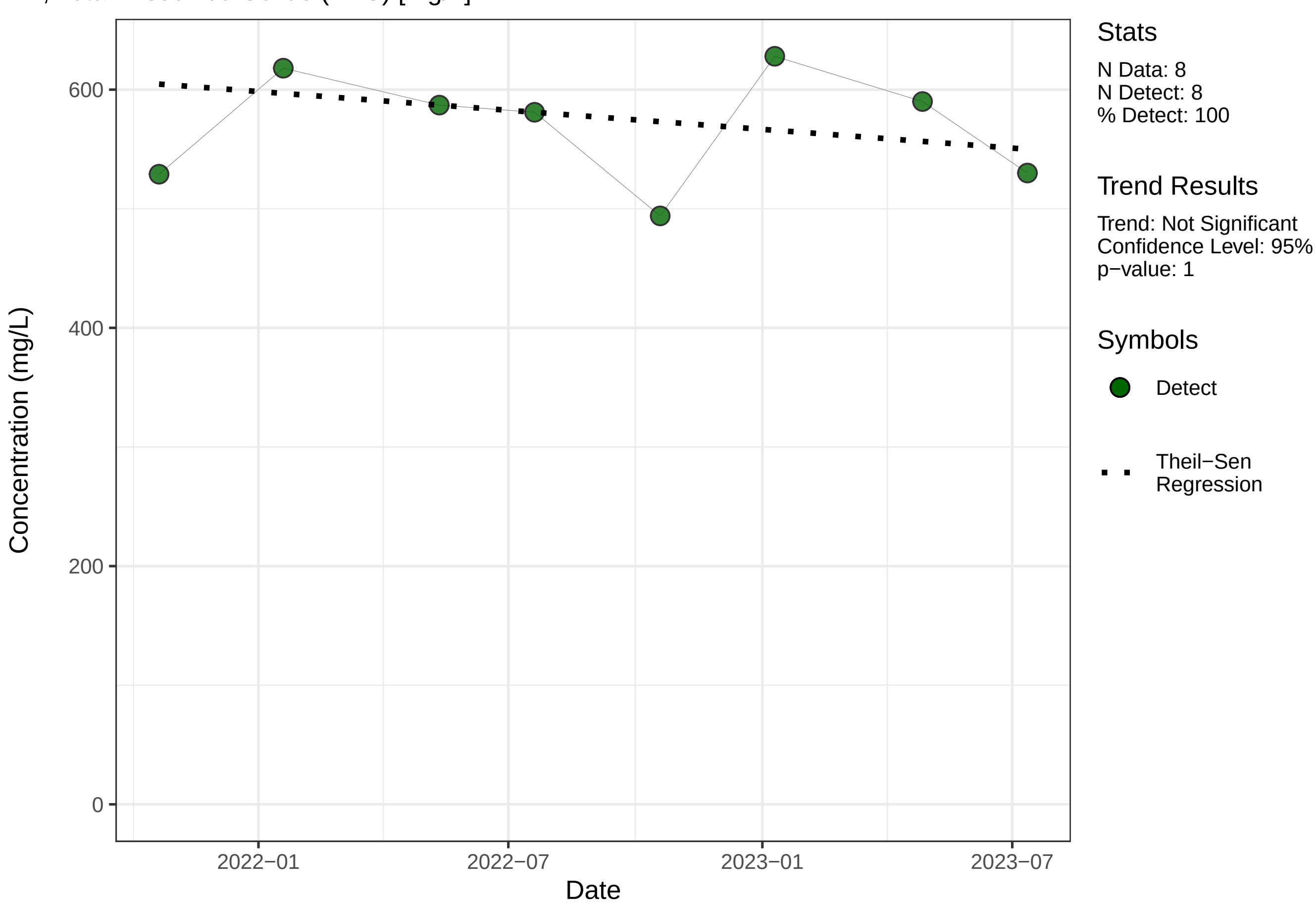
D4, Nickel [ug/L]



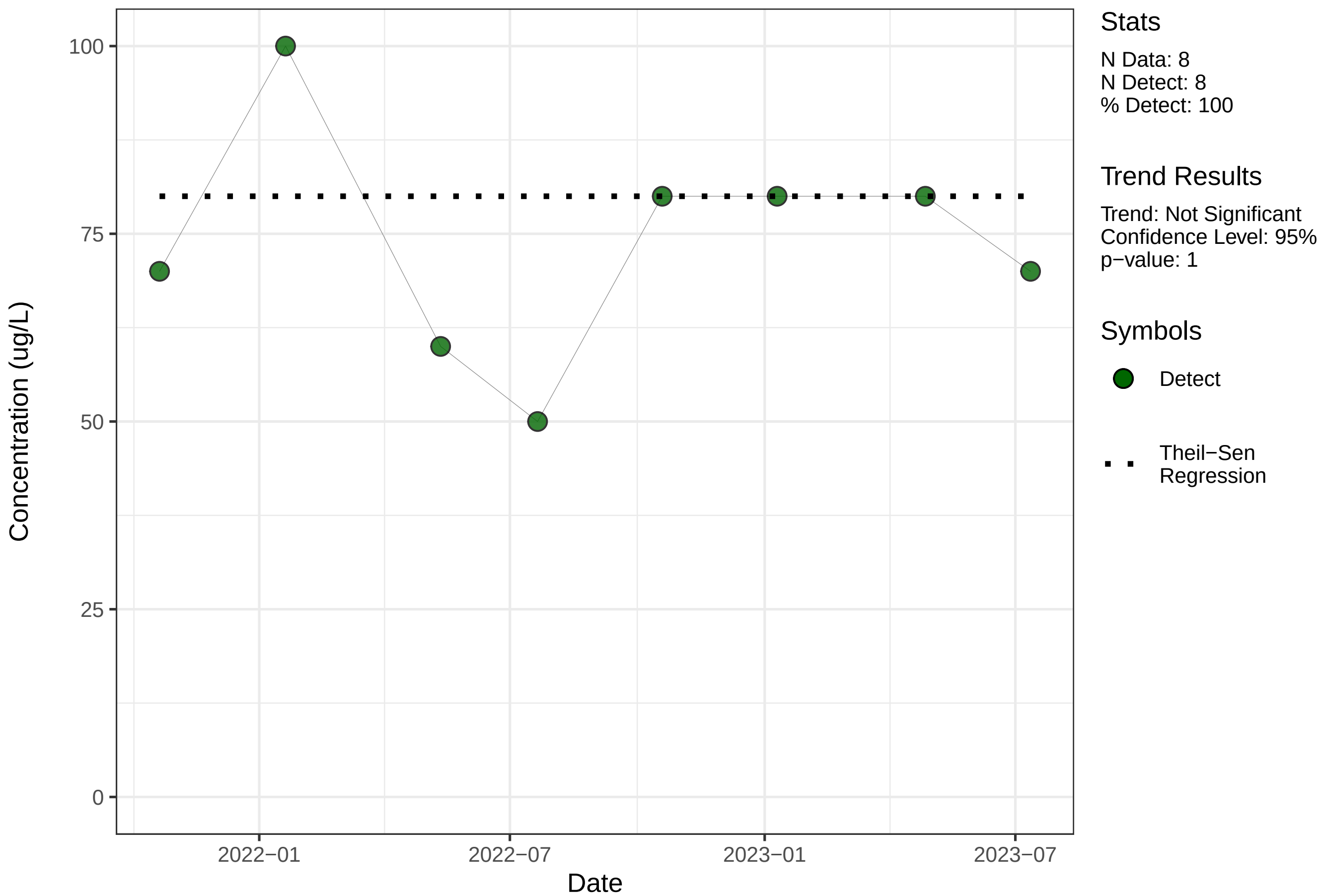
D4, Sulfate (as SO4) [mg/L]



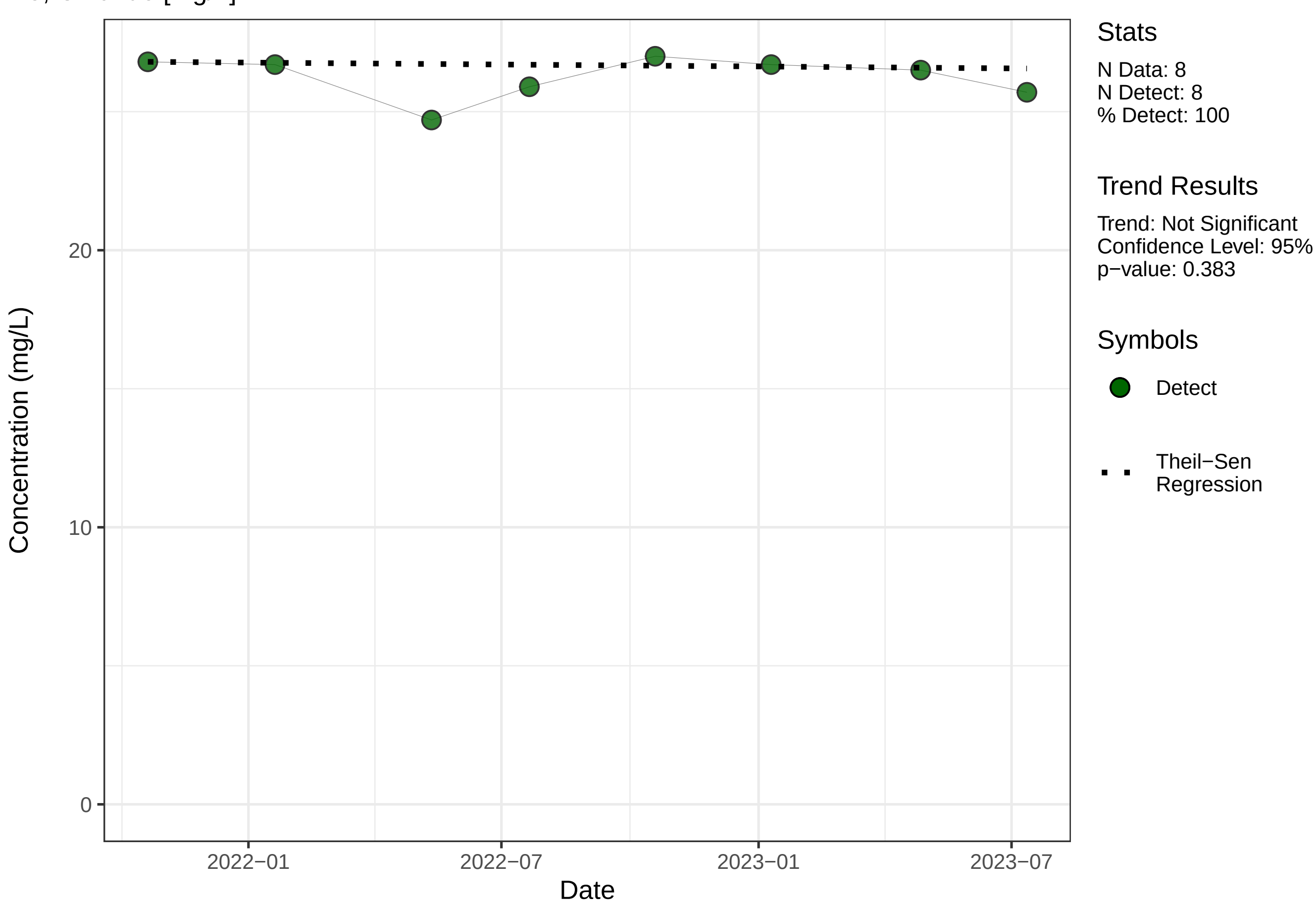
D4, Total Dissolved Solids (TDS) [mg/L]



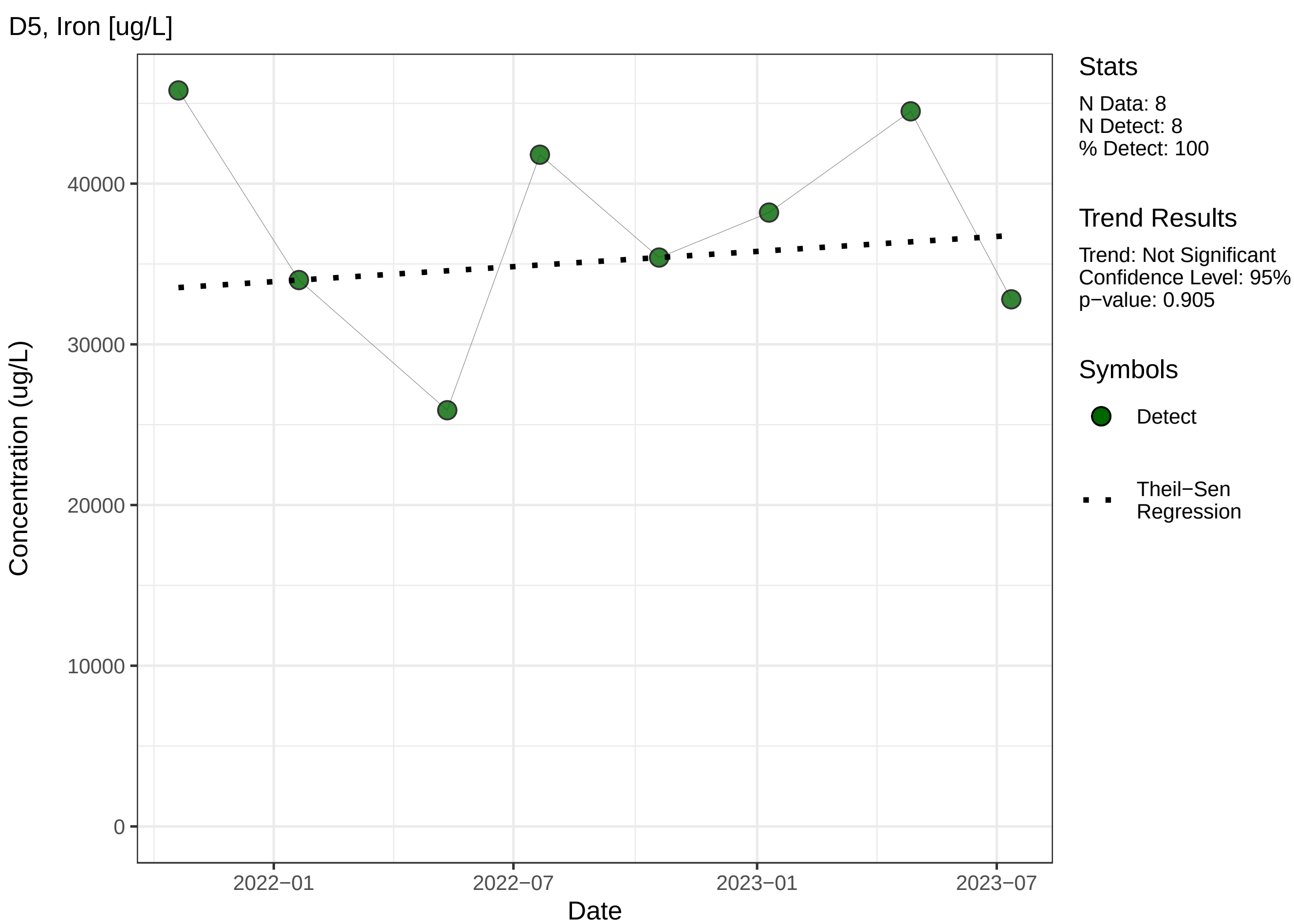
D5, Boron [ug/L]

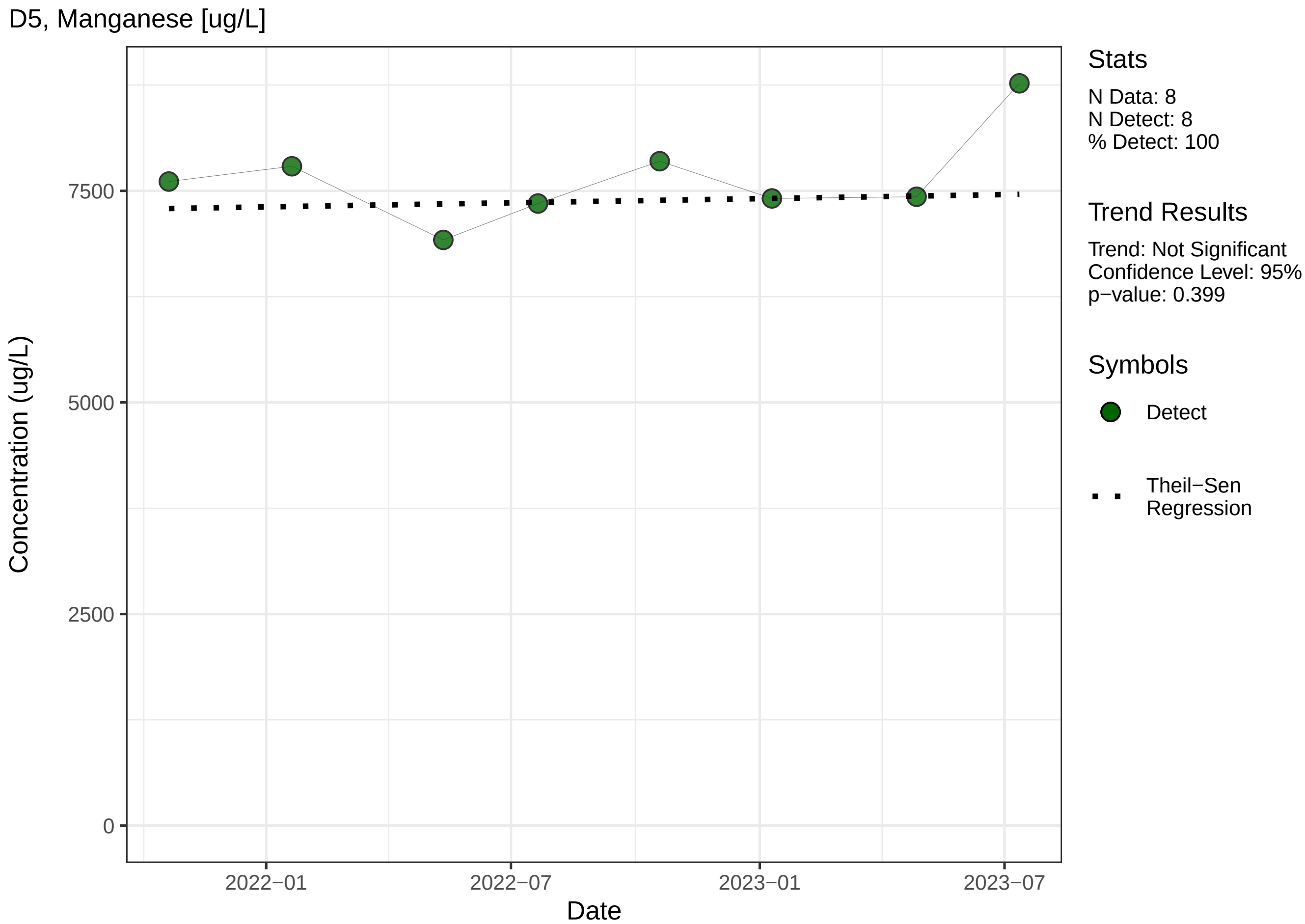


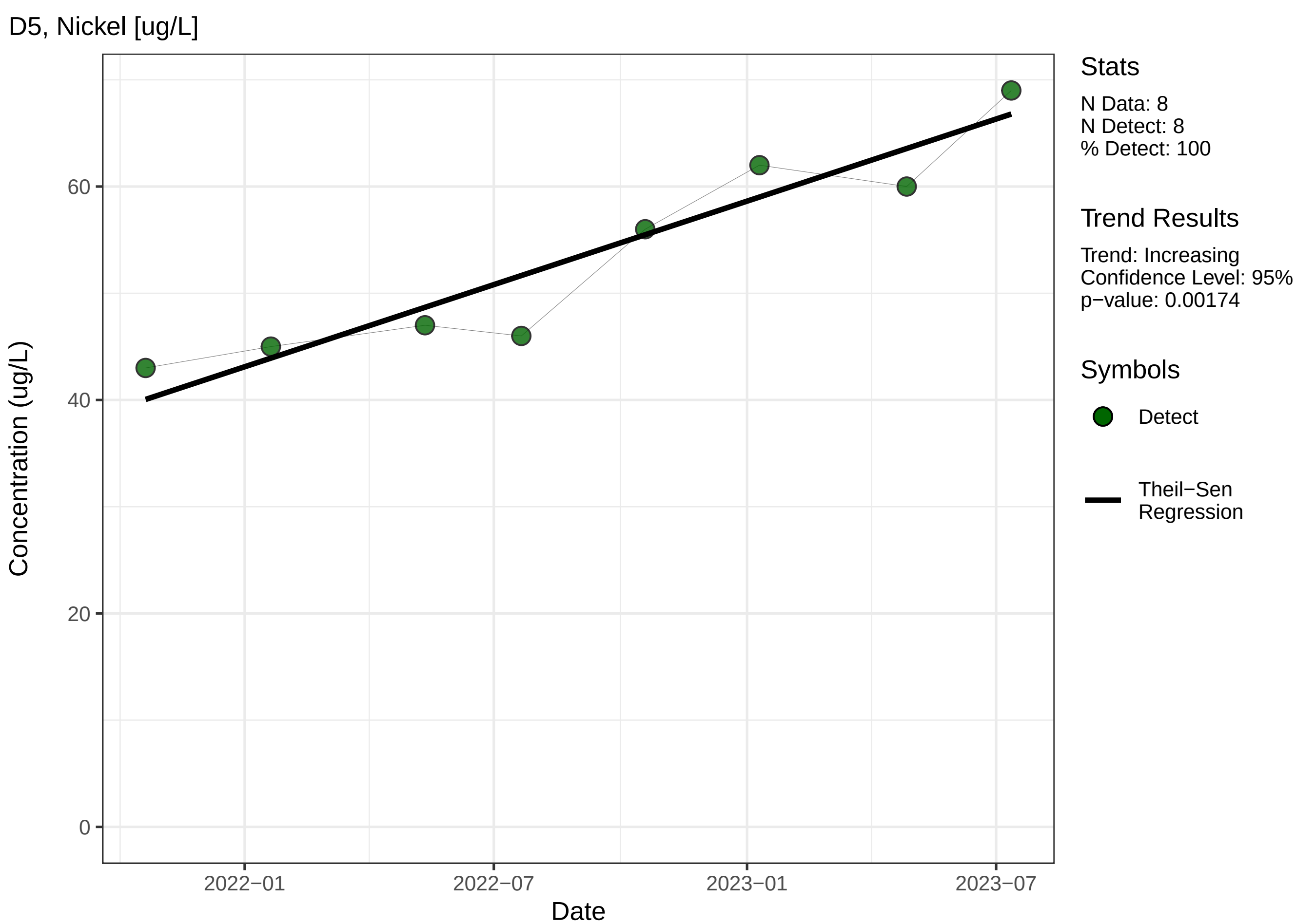
D5, Chloride [mg/L]



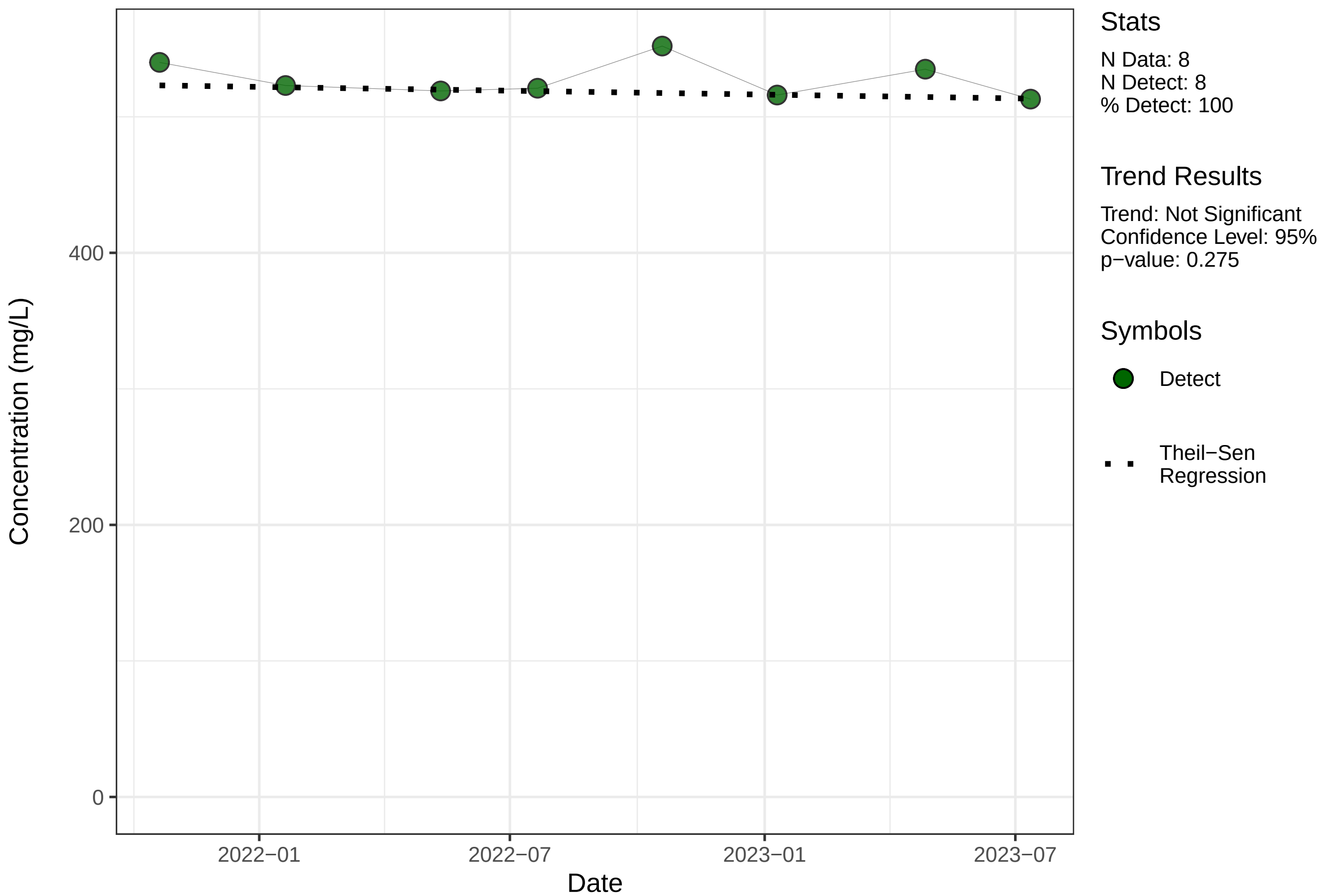

D5, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
1250
1000
750
500
250
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.441
Symbols
Detect
Theil−Sen Regression


D5, Iron [ug/L]
Concentration (ug/L)
40000
30000
20000
10000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.905
Symbols
Detect
Theil−Sen Regression

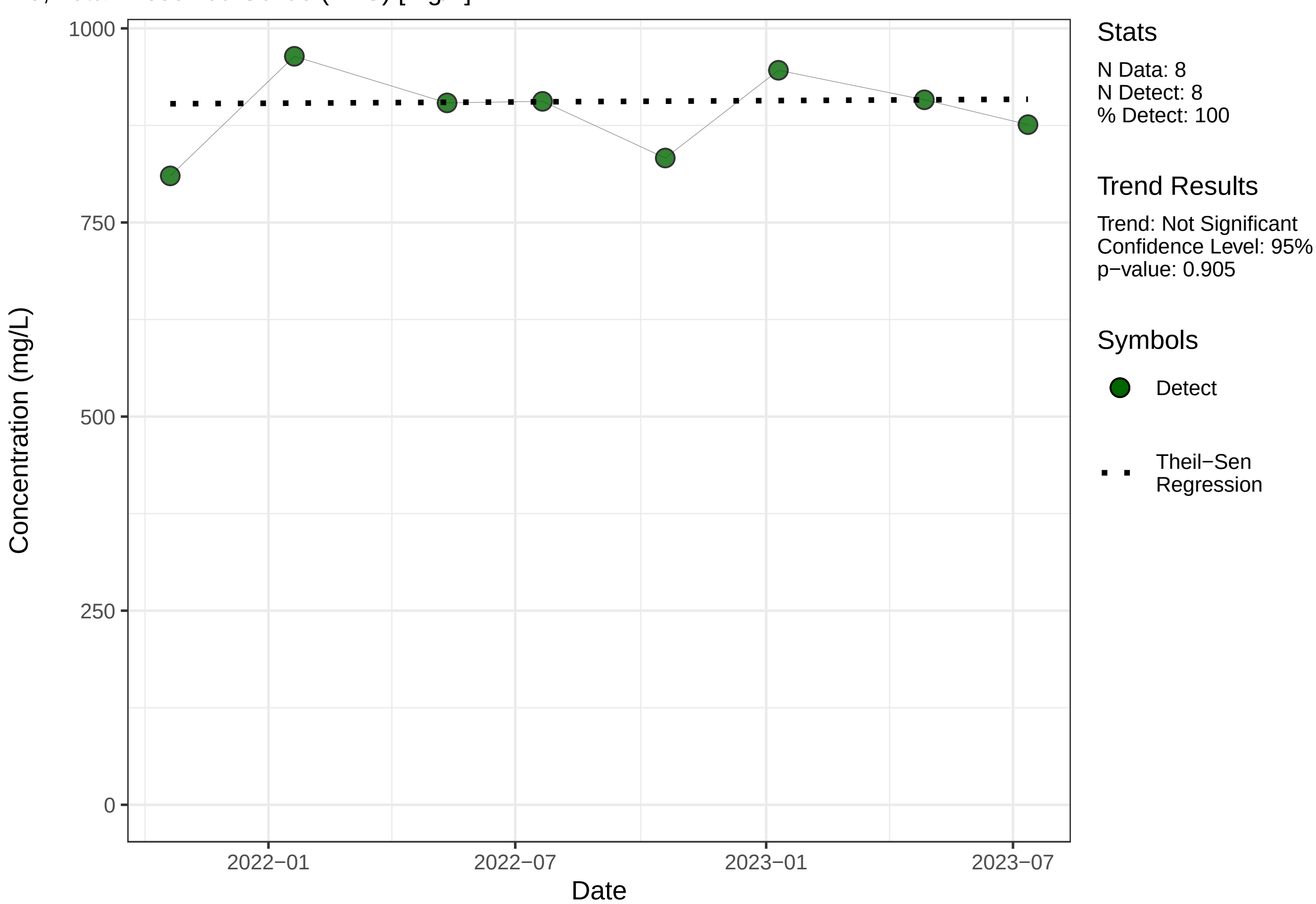

D5, Manganese [ug/L]
Concentration (ug/L)
7500
5000
2500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.399
Symbols
Detect
Theil−Sen Regression


D5, Nickel [ug/L]
Concentration (ug/L)
60
40
20
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Increasing
Confidence Level: 95%
p−value: 0.00174
Symbols
Detect
Theil−Sen Regression

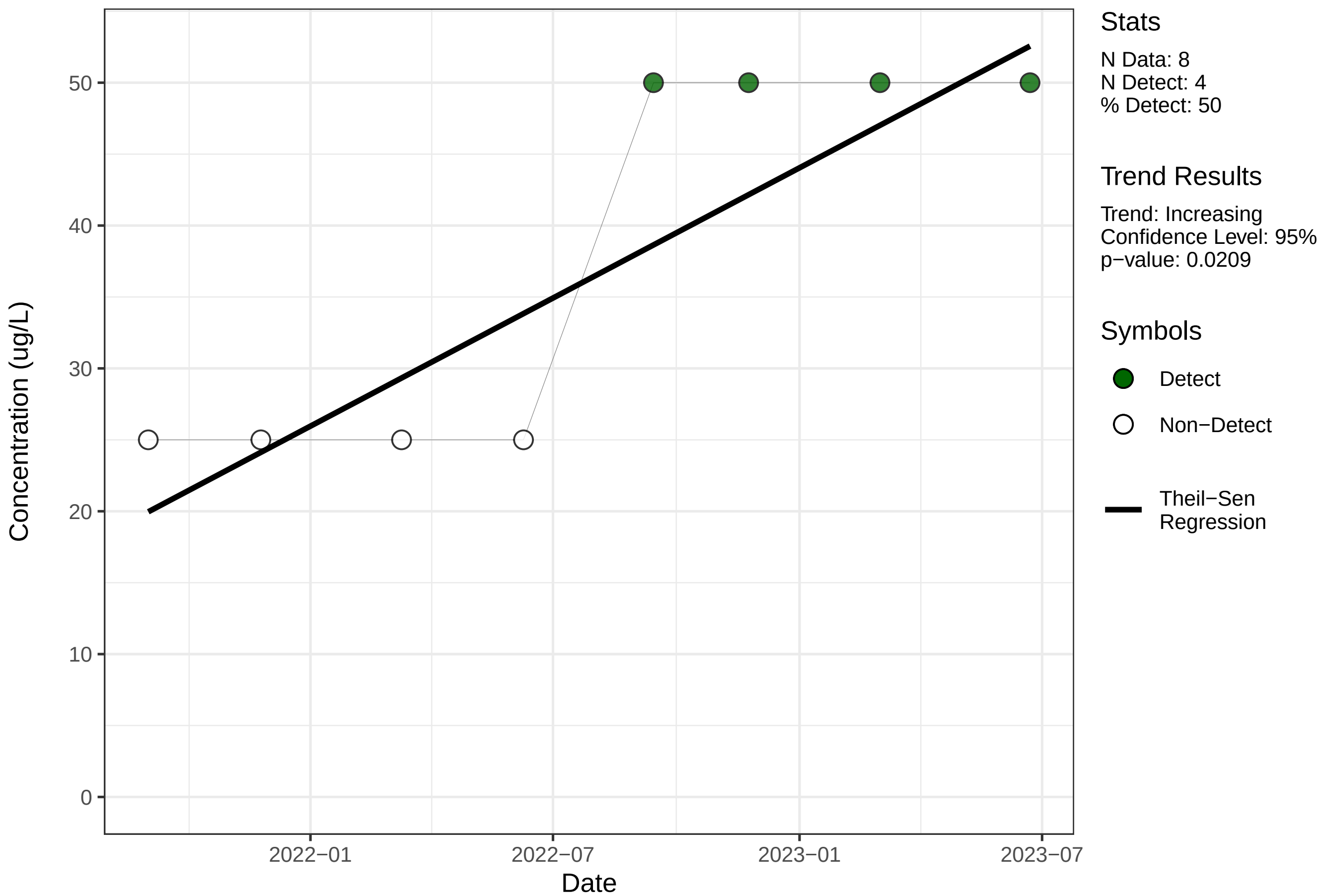
D5, Sulfate (as SO4) [mg/L]



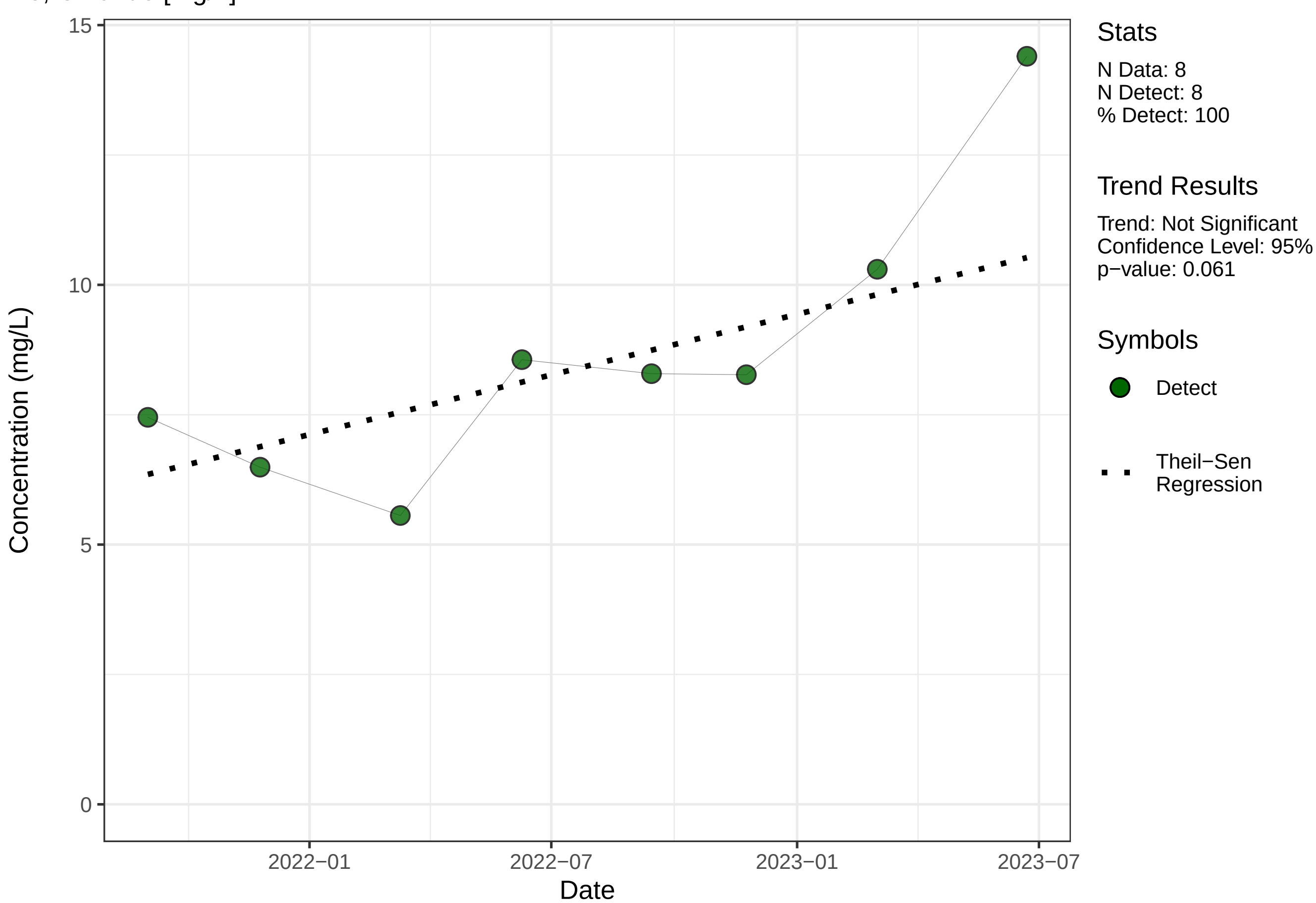
D5, Total Dissolved Solids (TDS) [mg/L]



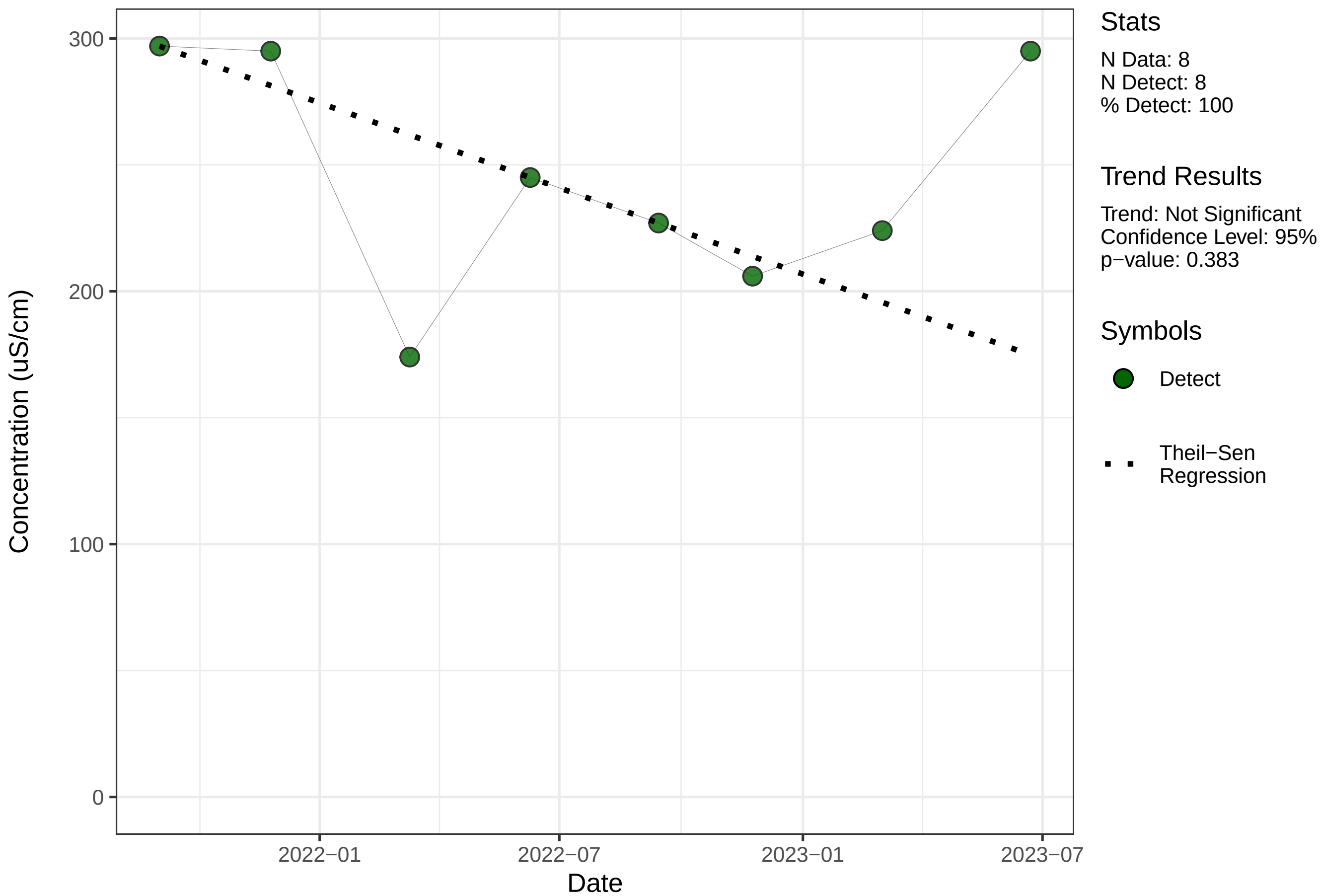
D8, Boron [ug/L]



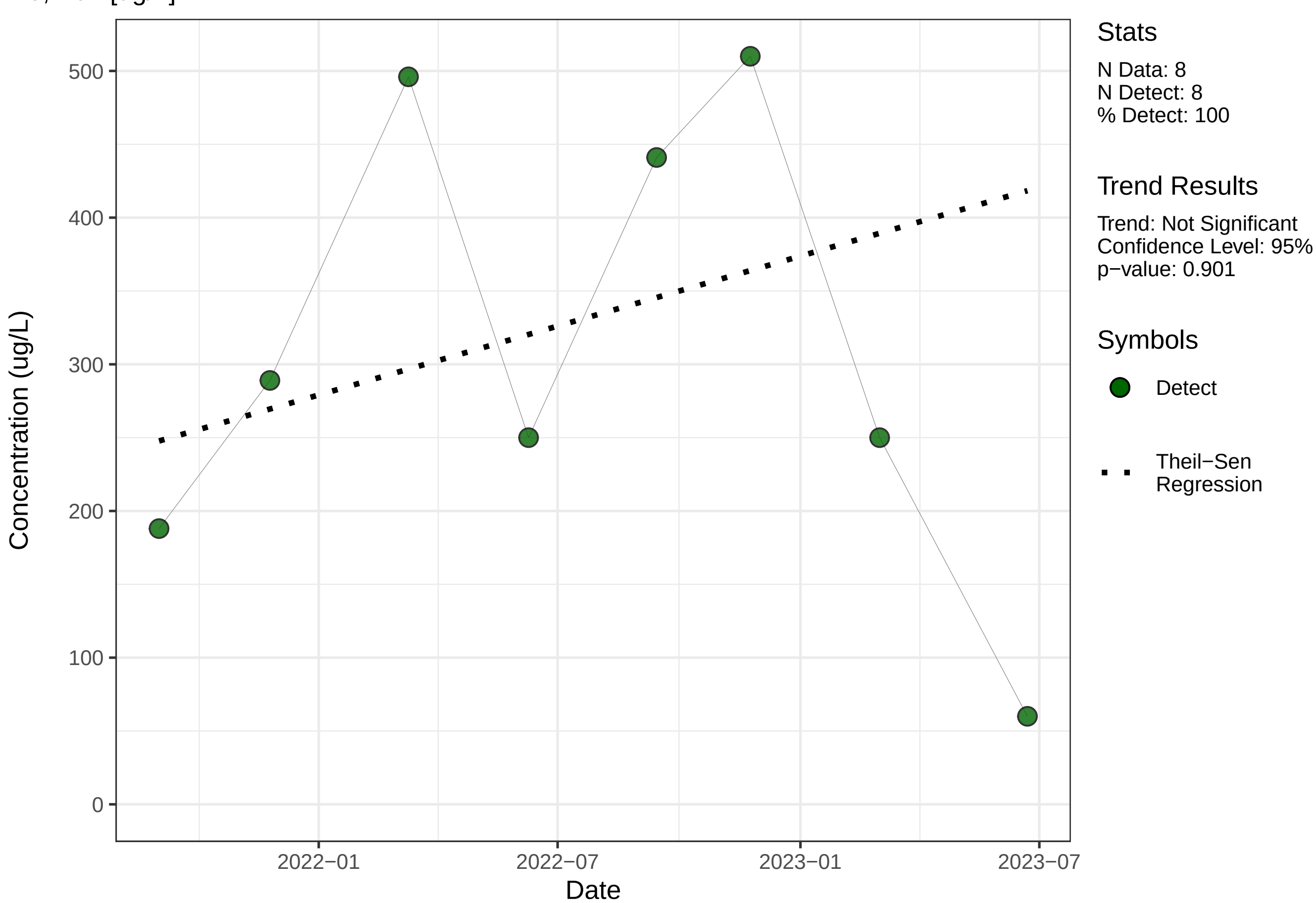
D8, Chloride [mg/L]



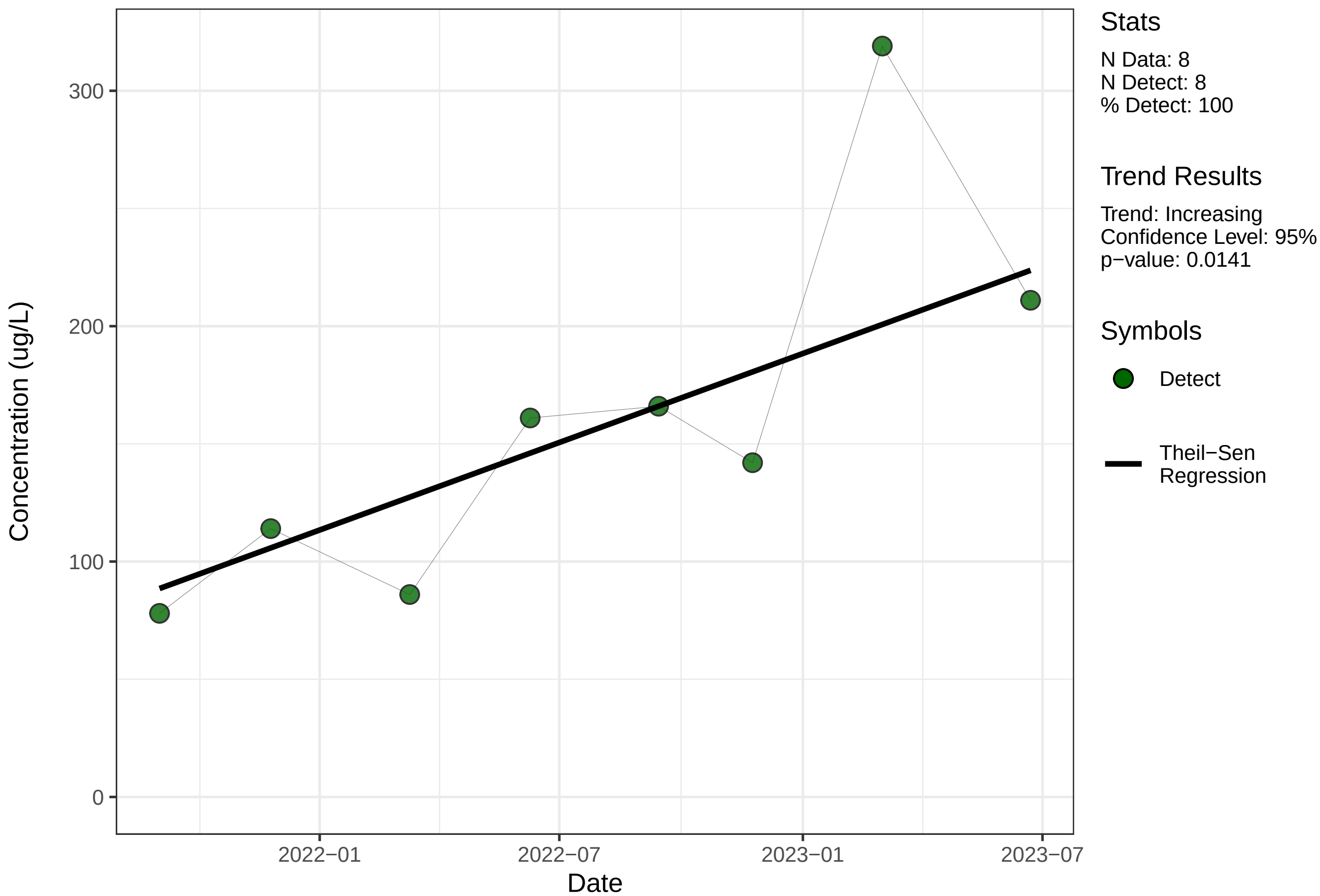
D8, Electrical Conductivity (Field) [uS/cm]



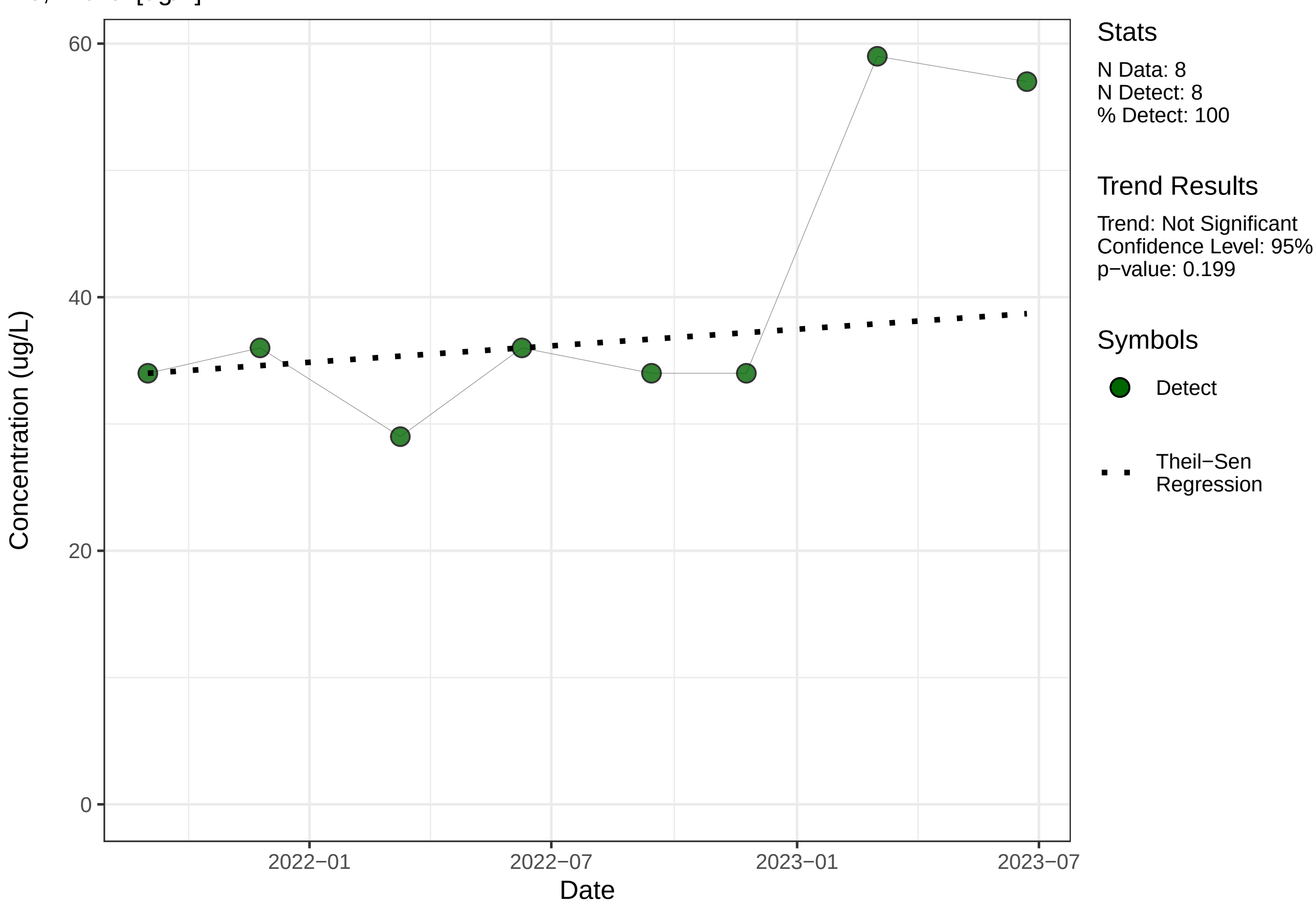
D8, Iron [ug/L]

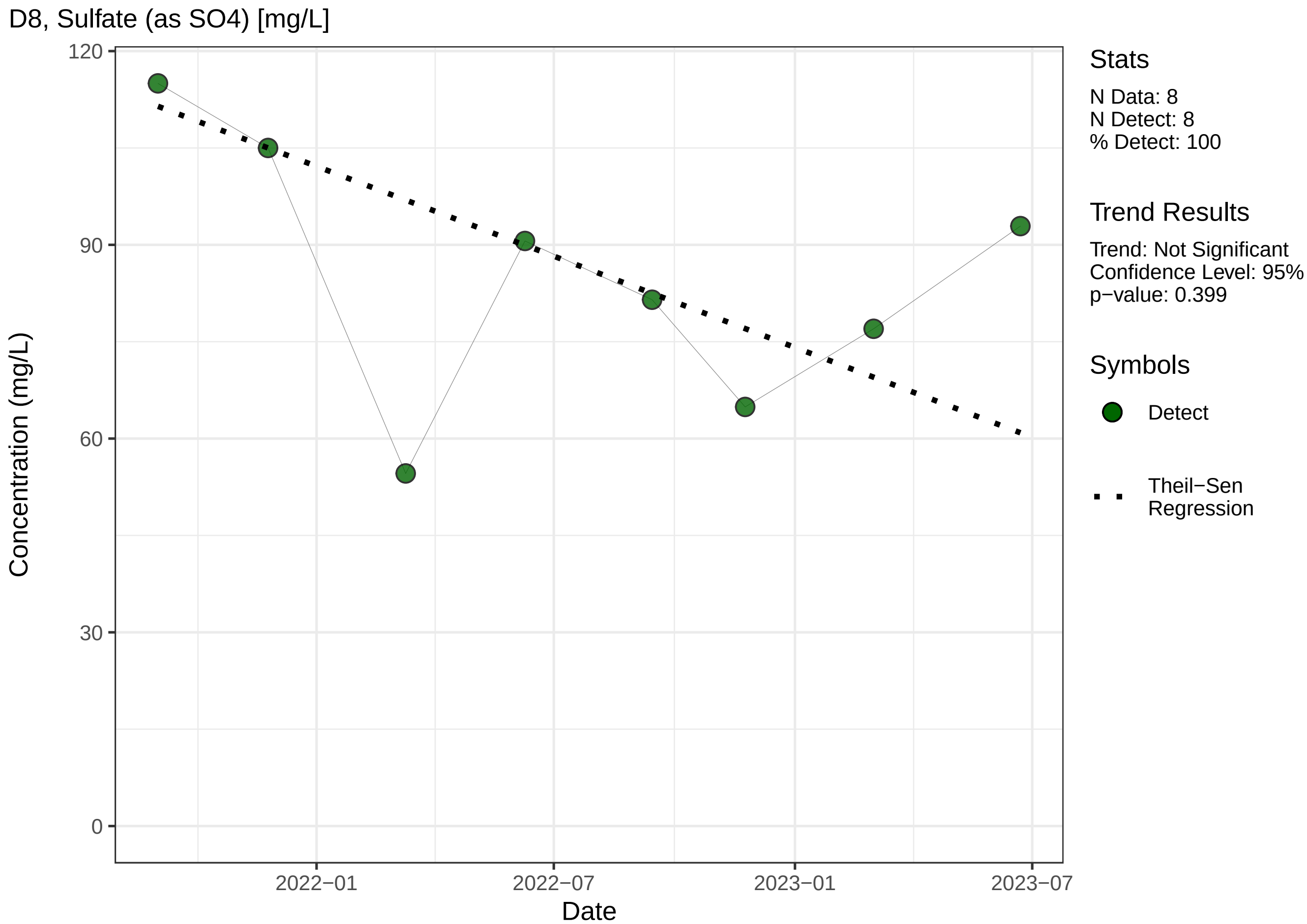


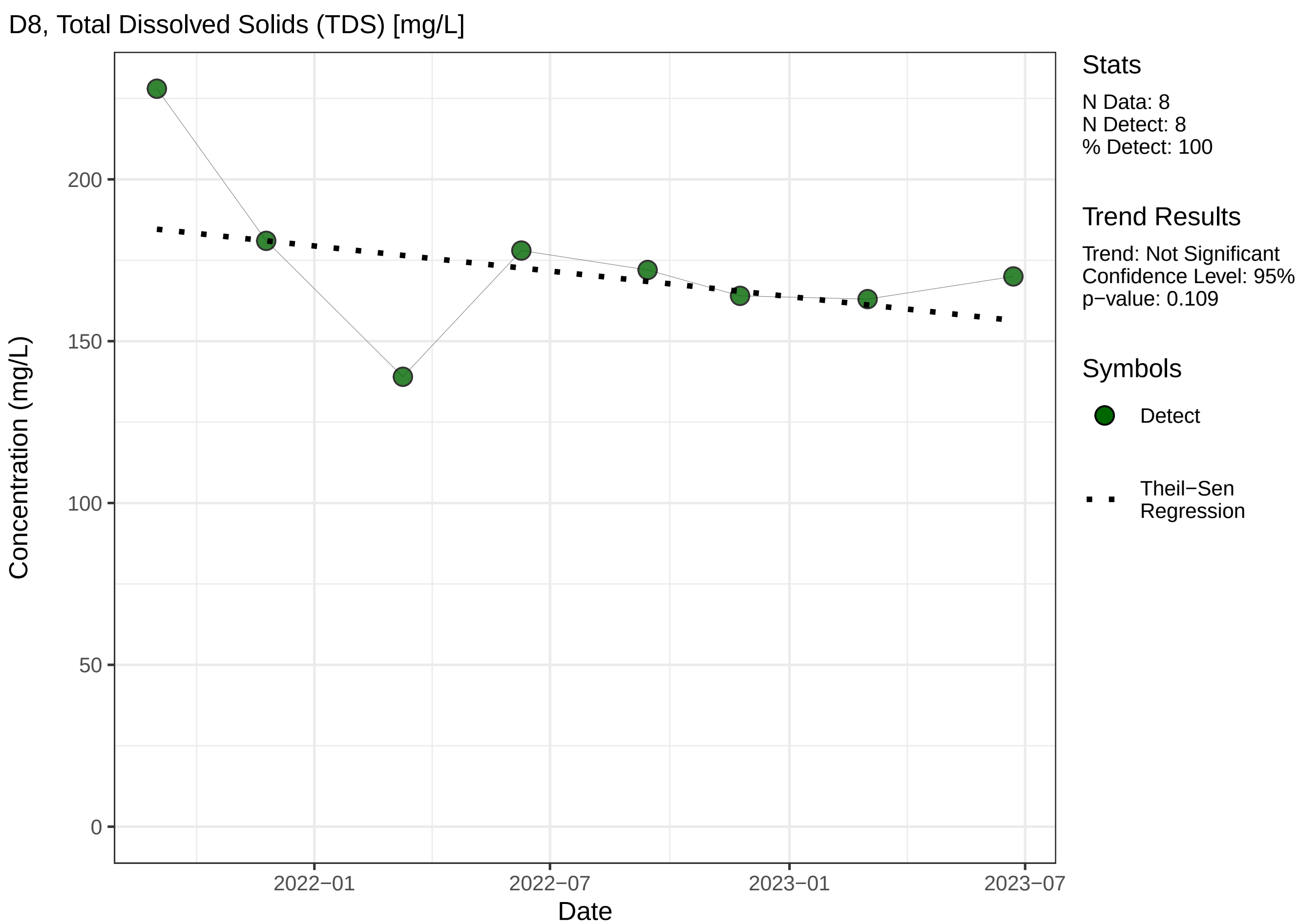
D8, Manganese [ug/L]



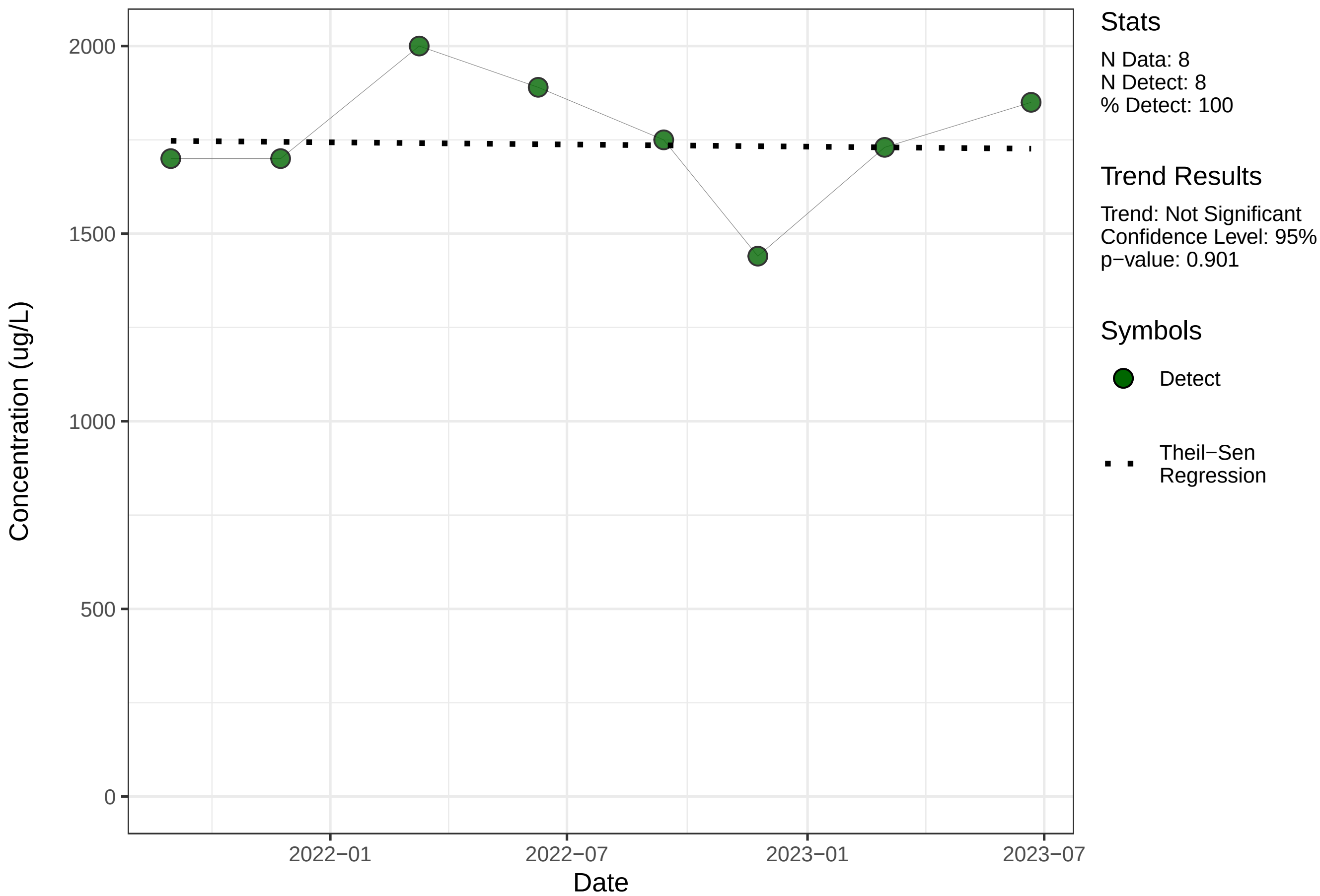
D8, Nickel [ug/L]



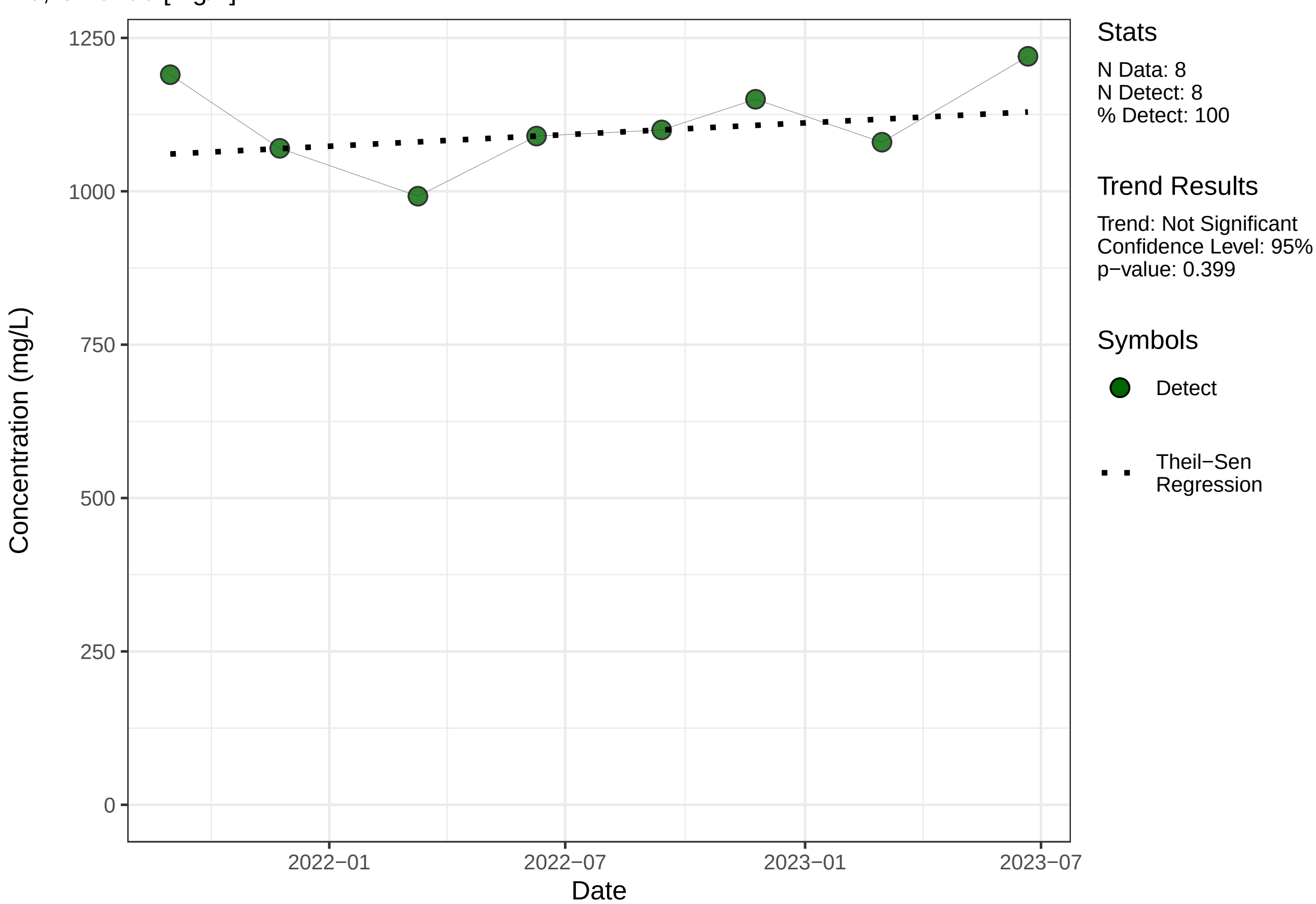

D8, Sulfate (as SO4) [mg/L]
120
90
60
30
0
Concentration (mg/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.399
Symbols
Detect
Theil−Sen Regression

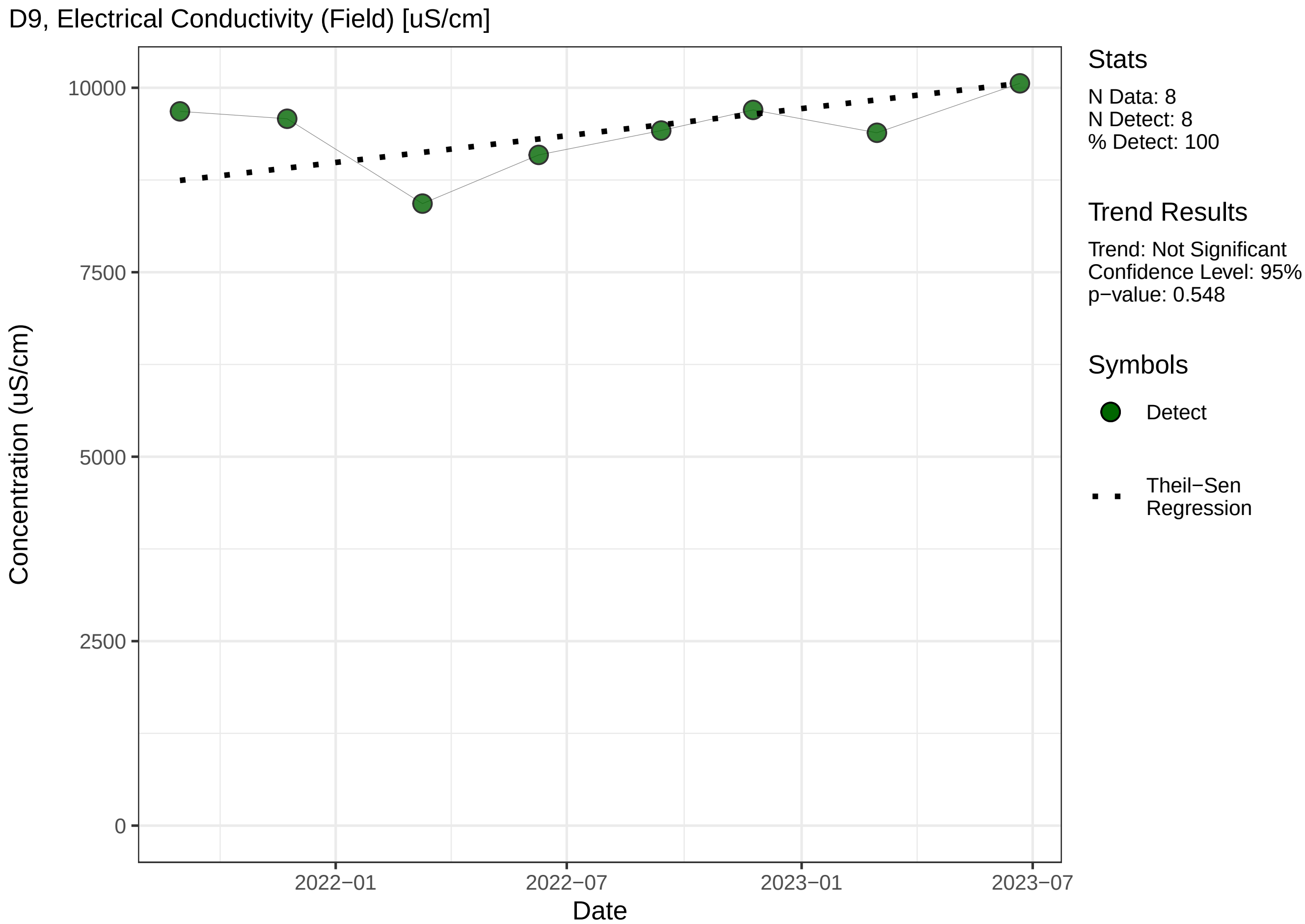

D8, Total Dissolved Solids (TDS) [mg/L]
200
150
100
50
0
Concentration (mg/L)
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression

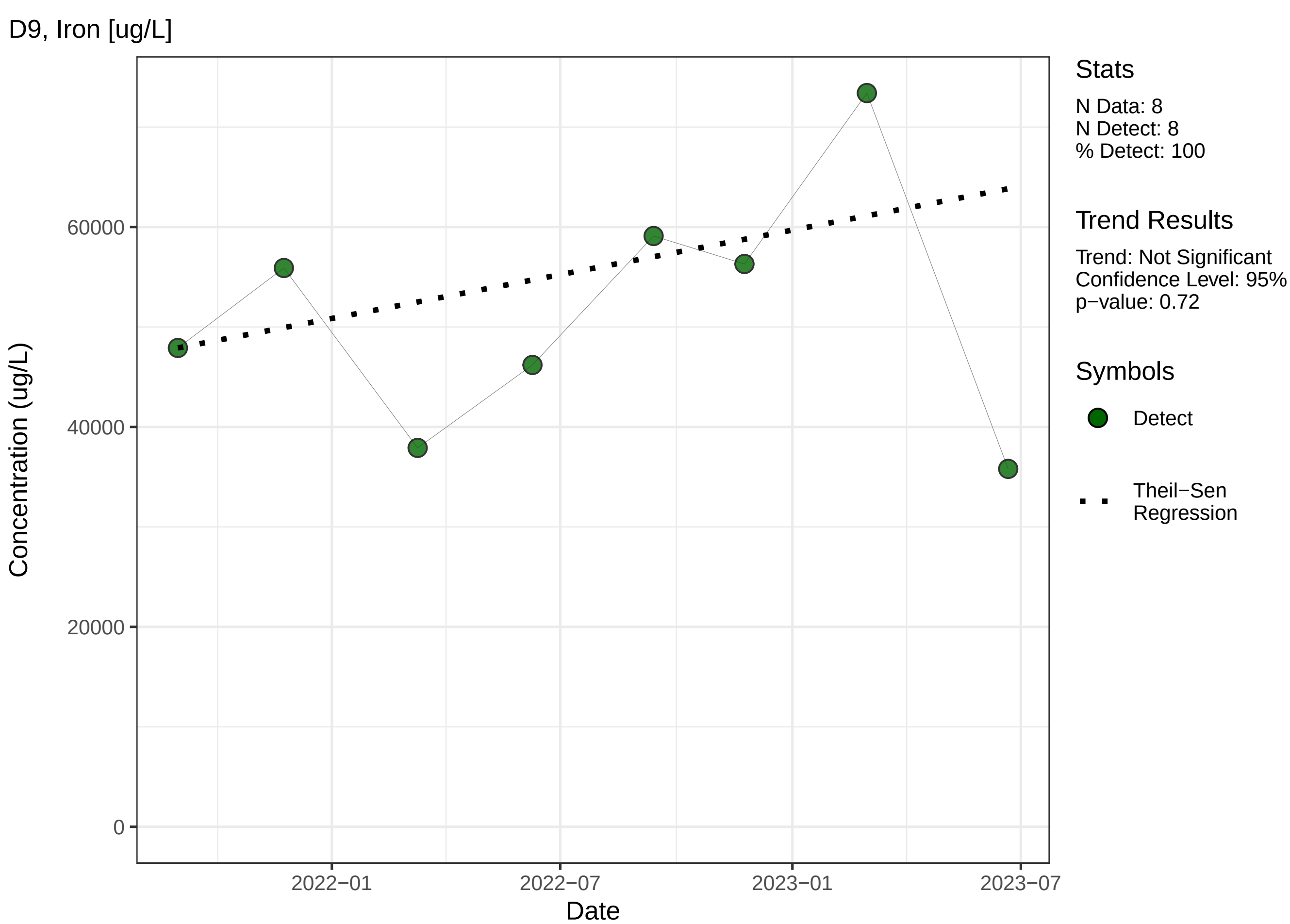
D9, Boron [ug/L]

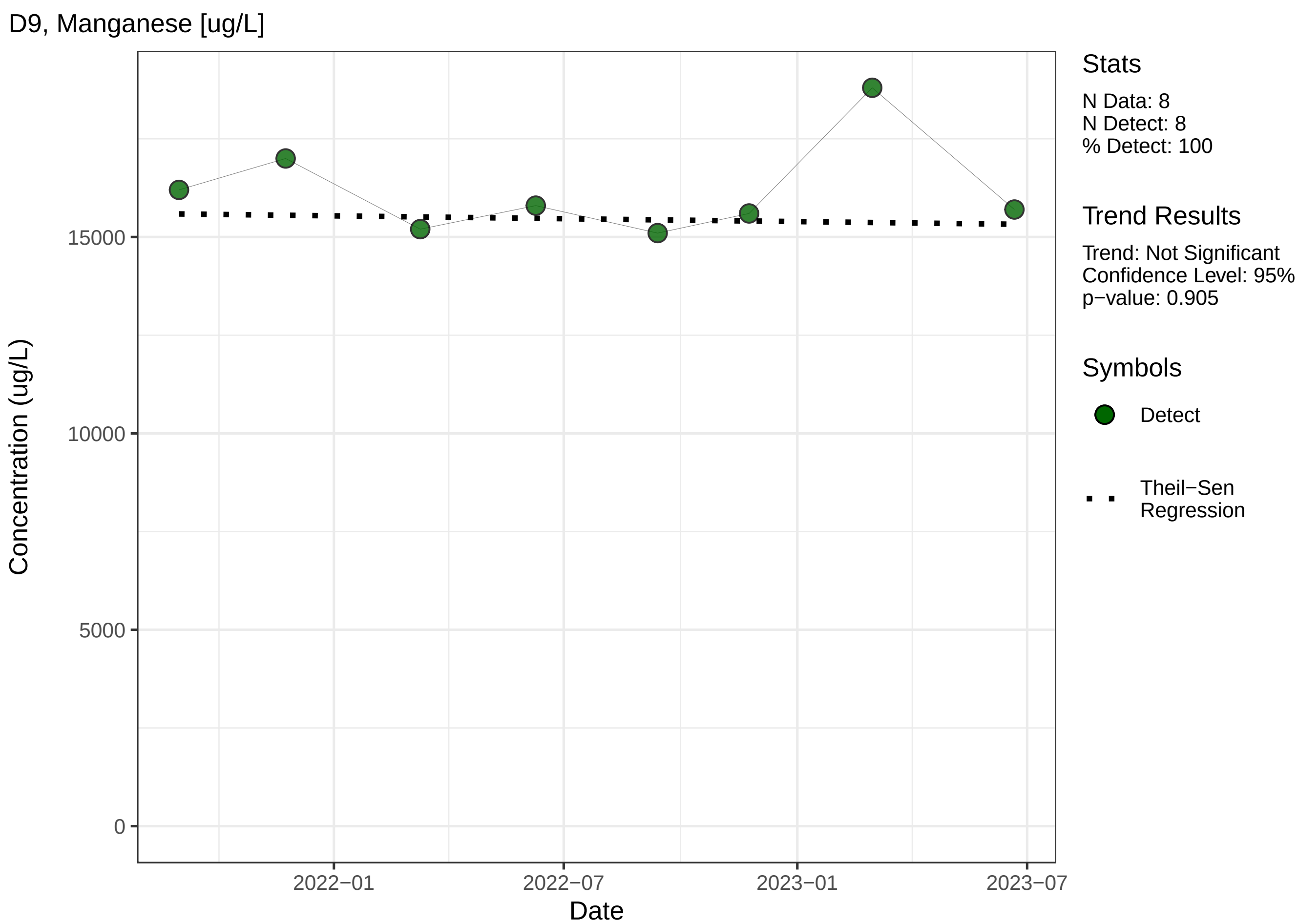


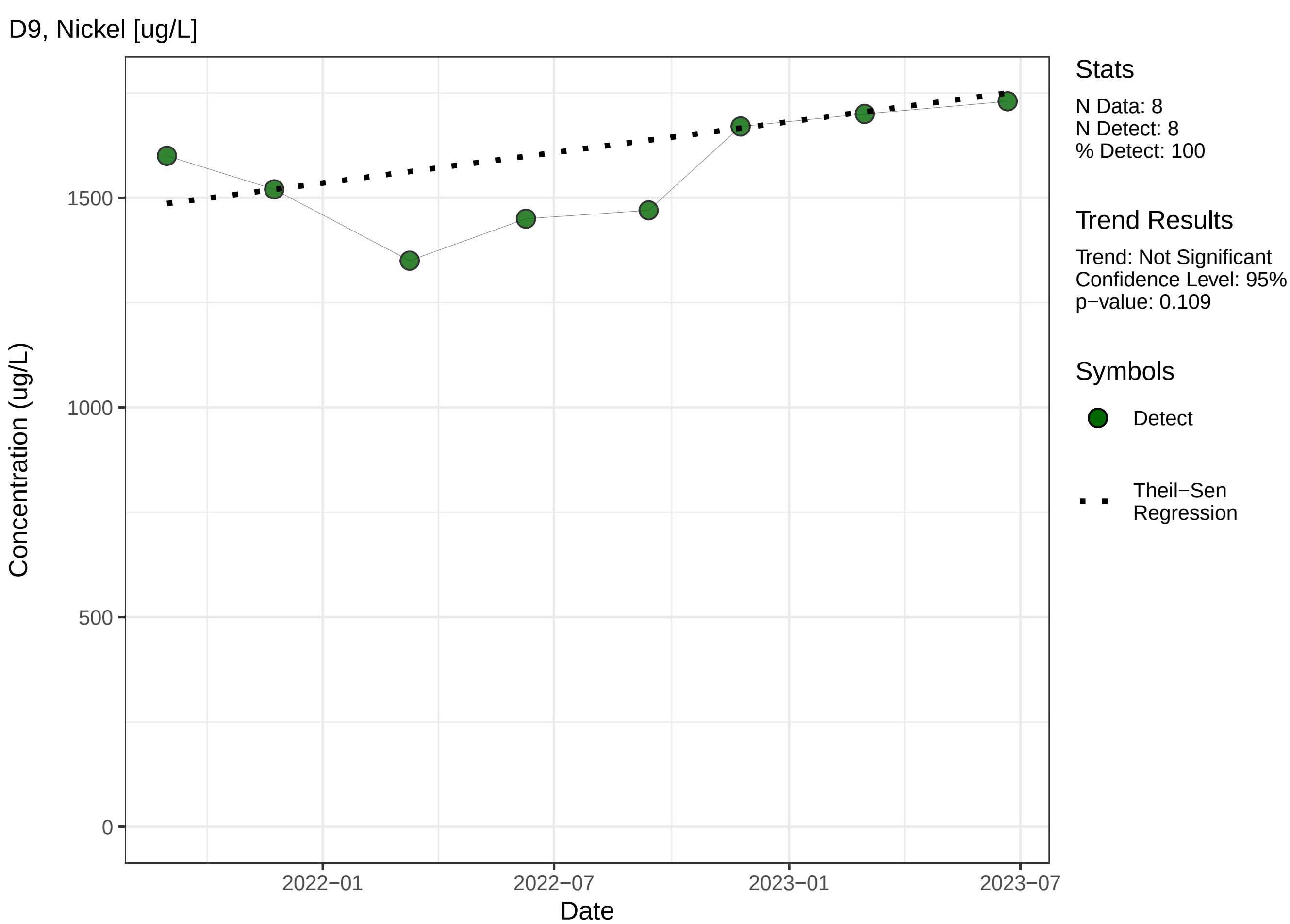
D9, Chloride [mg/L]

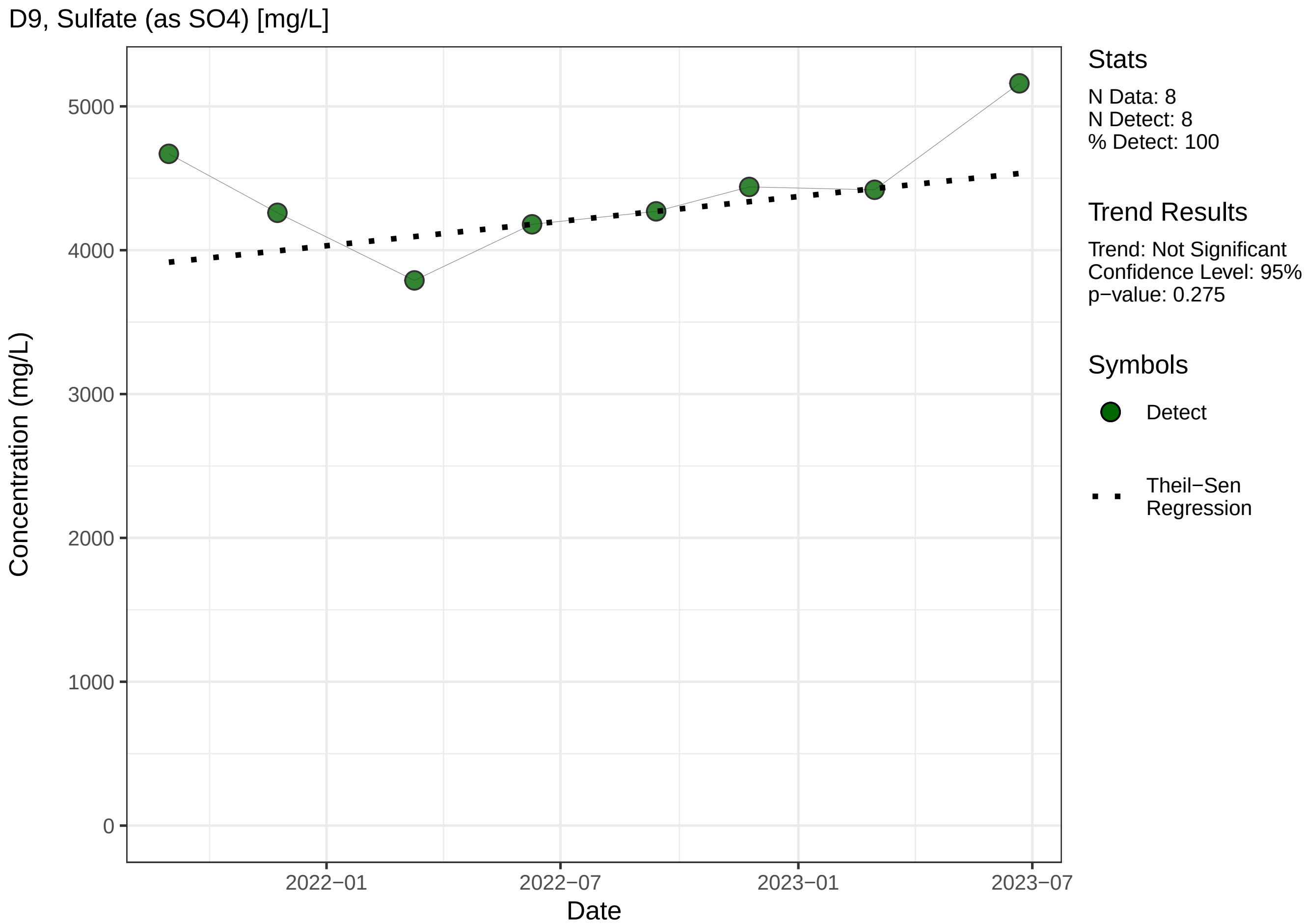


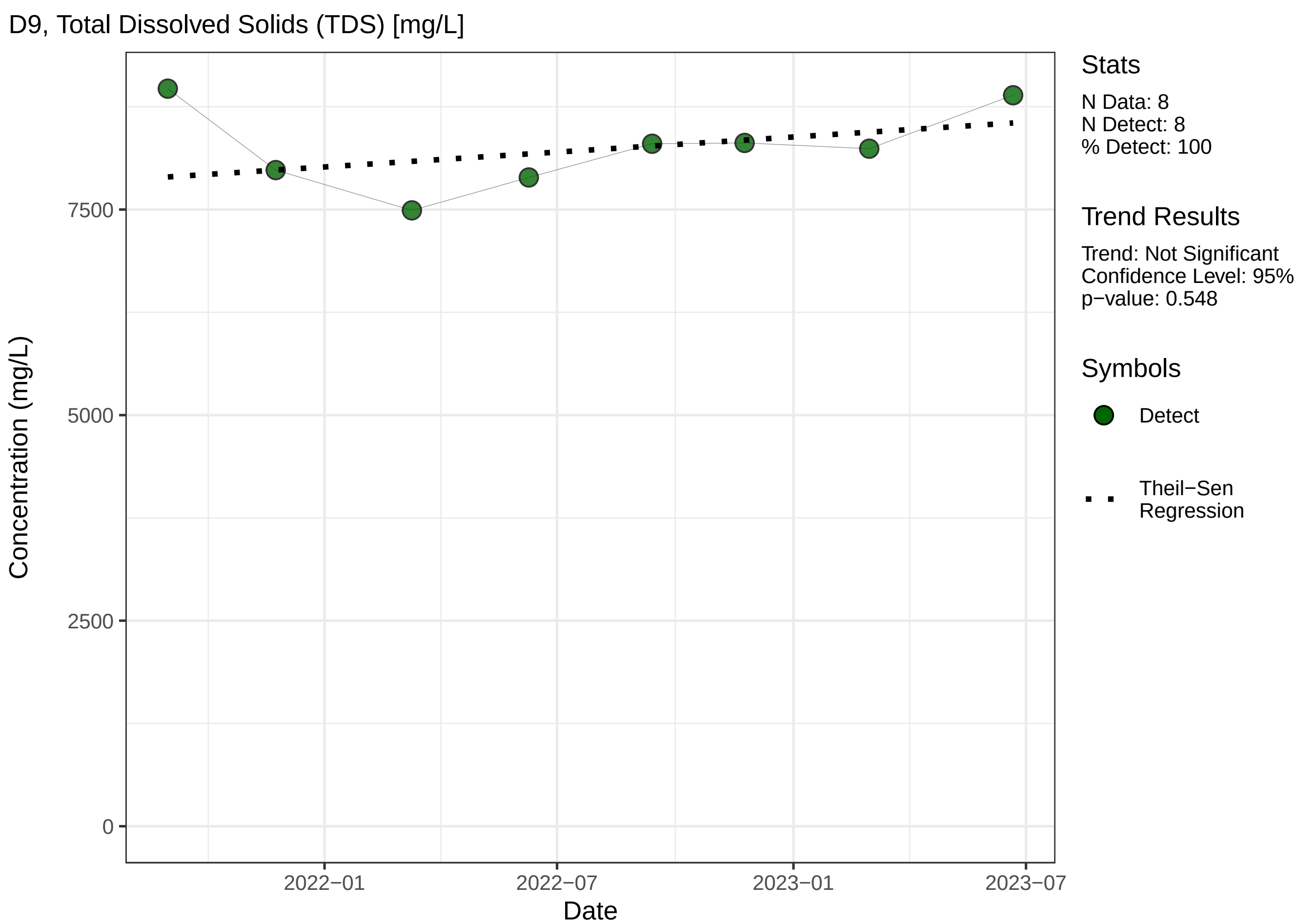

D9, Electrical Conductivity (Field) [uS/cm]
Concentration (uS/cm)
10000
7500
5000
2500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.548
Symbols
Detect
Theil−Sen Regression


D9, Iron [ug/L]
Concentration (ug/L)
60000
40000
20000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.72
Symbols
Detect
Theil−Sen Regression


D9, Manganese [ug/L]
Concentration (ug/L)
15000
10000
5000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.905
Symbols
Detect
Theil−Sen Regression


D9, Nickel [ug/L]
Concentration (ug/L)
1500
1000
500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.109
Symbols
Detect
Theil−Sen Regression


D9, Sulfate (as SO4) [mg/L]
Concentration (mg/L)
5000
4000
3000
2000
1000
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.275
Symbols
Detect
Theil−Sen Regression


D9, Total Dissolved Solids (TDS) [mg/L]
Concentration (mg/L)
7500
5000
2500
0
2022−01
2022−07
2023−01
2023−07
Date
Stats
N Data: 8
N Detect: 8
% Detect: 100
Trend Results
Trend: Not Significant
Confidence Level: 95%
p−value: 0.548
Symbols
Detect
Theil−Sen Regression

APPENDIX M MANN-KENDALL METHODOLOGY

Trend Analysis Report

13 November 2023

1. USER WARNINGS

Trend analysis is a commonly used statistical tool for assessing changes in concentration over time. Like most statistical analyses, trend tests involve some assumptions about the data being analyzed. If these assumptions are not met, the results of the test may be wrong or misleading. The final section of this memo discusses scenarios that will likely require the input of a qualified statistician to ensure that the results of the trend test are appropriate for your data. A careful review of the results tables and figures can help identify any anomalies in the data that merit further assessment.

Selection of an appropriate significance level (α): Statistical convention typically uses an α equal to 0.05 which sets the probability of drawing a false positive conclusion (saying there is a trend when one does not exist) in the statistical analysis at 5 percent. The significance level can be adjusted up or down to meet specific programmatic needs or to meet data quality objectives, but changes in α should be made a priori and should not be changed in an attempt to obtain a more 'favorable' result. Often decreasing α will result in a reduction in the probability of finding a false negative result (saying there is no trend when one actually exists).

2. INTRODUCTION

This report addresses data quality, descriptive statistics, and trend analysis for the MT PIPER-LNAR project.

- The data file used in this report (LNAR_MK_Input_230926_TC.xlsx) consists of samples from August 2021 to August 2023.
- The analysis includes 24 unique wells and 8 analytes.
- Descriptive statistics and trend analysis are run for every unique combination of: sys_loc_code, chemical_name (referred to as *Group* from hereon). There are 192 unique Groups.
- Trend tests were conducted at 95% confidence with minimum data requirements of at least 4 detected values and 50% detection frequency for each Group.

3. DATA HANDLING

This section describes the data included in this evaluation, the handling of field duplicates, data qualifiers, censored values, and handling of anomalous data points.

3.1 Field Duplicates

Only one set of primary and field duplicate measurements are generally retained for statistical evaluation. While field duplicates can provide useful information on the sampling methodology, the duplicates are almost always statistically dependent on the parent sample (USEPA 2009, Page 6-27). Although complicated methods can be used to allow the inclusion of both values in statistical tests, simpler strategies involve keeping the maximum value between the two samples, randomly selecting one of the two samples, or removing the duplicates altogether (USEPA 2009, Page 6-28).

Field duplicates were omitted from this analysis. Only the parent samples were retained.

3.2 Data Qualifiers

Data was qualified by a data validator to ensure the quality of the reported results. Consistent with lab conventions, J-flagged values were estimated quantities. Guidance allows for J-flagged values to be used with reported concentrations but cautions against making regulatory decision based on these values (USEPA 2014).

Measurements that have an R-flag had their concentration rejected; the result is rejected due to serious deficiencies in meeting quality control criteria and the analyte may or may not be present in the sample (USEPA 2014). The data quality review found the results to be valid, reliable and usable for decision making purposes with the listed qualifiers. Any records with validator_qualifiers containing "R" or reportable_result = "N" or "No" in the dataset were removed prior to analysis.

3.3 Non-Detects

Non-detects (NDs) commonly reported in water monitoring are statistically known as "left censored" measurements because the concentration of any ND can only be estimated. NDs are assumed to fall between zero and the reporting limit (USEPA 2009). USEPA (2015) offers a number of options for handling non-detected values, including Kaplan-Meier estimators, Regression on Order Statistics, and replacement with surrogate values. The appropriate handling of NDs depends on the statistical test being used and will be discussed in the following sections as appropriate.

4. DESCRIPTIVE STATISTICS

Descriptive statistics were calculated for all Groups and can be found in Table 1. Non-detects were substituted with a value of half the reporting limit for calculations. The descriptive statistics highlight a number of relevant characteristics about the datasets, including:

- There are a total of 192 Groups.
- 191 Groups have detection rates greater than or equal to 50 percent.
- 0 Groups have 100 percent non-detects.
- 190 Groups have 100 percent detects.
- 154 Groups follow a normal distribution (using Shapiro-Wilks Normality Test) and 15 Groups follow a log-normal distribution. 16 Groups follow a gamma distribution (using Anderson-Darling Normality Test). The remaining 7 Groups have no discernible distribution.

5. TESTING FOR TRENDS

Trend tests are a commonly used tool to assess the effectiveness of remediation efforts. By examining whether concentrations are increasing, decreasing, or not statistically significant, trend tests provide one line of evidence about the directional change in concentrations over time.

5.1 Trend Testing Approach

A Mann-Kendall test was used to detect changes in concentrations over time. The Mann-Kendall test is a non-parametric method that tests the following null hypothesis (USEPA 2009):

- Null Hypothesis (Ho): No monotonic trend exists.
- Alternative Hypothesis (Ha): A monotonic trend exists.

A monotonic upward (downward) trend means that the variable consistently increases (decreases) through time, but the trend may or may not be linear. The Mann-Kendall test is based on the premise that the lack of monotonic trend should correspond to a time series plot fluctuating randomly about a constant median with no visually apparent upward or downward pattern (Helsel and Hirsch 2002). Significantly increasing or decreasing trends (τ) are identified at a significance level (α) of less than or equal to 0.05. τ^2 can be used like an R^2 value to estimate how much variance in y is explained by x (i.e., what proportion of the variability in concentration is explained by time). USEPA 2009 guidance and/or Helsel and Hirsch (2002) may be consulted for further details about trend analysis. With the specified 95% confidence, significantly increasing or decreasing trends are identified with p-values as follows:

Tau	p-value	Conclusion	Trend
Positive	p <= 0.05	Ho Rejected	Increasing
Negative	p <= 0.05	Ho Rejected	Decreasing
Positive or Negative	p > 0.05	Ho Accepted	Not Significant

5.2 Data Constraints

Guidance recommends that trend tests be performed with at least eight detected data points to ensure a reasonable amount of confidence in results (USEPA 2009, p. 17-24). However, it is mathematically possible to carry out the test with five detected samples. The consequences of using the minimum sample size is that there is a greater chance of concluding that there is no trend when, in fact there is a trend (USEPA 2009). If a dataset is comprised of more than 50 percent ND values, the loss of information is considered too great to support a reliable analysis of trends, so no trend test was performed.

5.3 Results

Trend tests were calculated with 95% confidence for all Groups that met the minimum data requirements of at least 4 detected values and 50% detection frequency. A full report of the trend test results and time series plots can be found in Table 2. The following summarize the results of the trend analysis:

- There are a total of 192 Groups in the dataset.
- 191 Groups meet the data requirements of the trend test. Of those:
  - 8 Groups had a significant increasing trend,
  - 40 Groups had a significant decreasing trend,
  - 143 Groups had no significant trend.

Time series scatterplots are provided in Figure 1 for each Group. Detection limits for each sample are also plotted for an easy visual assessment of changing detection limits over time. A Theil-Sen regression line is shown on each figure to provide a visual guide for temporal trends.

6. SPECIAL CONSIDERATIONS

Like most statistical analyses, these trend tests involve some assumptions about the data being analyzed including:

- Observations or data obtained over time are independent.
- The observations obtained over time are representative of the true conditions at sampling times.
- The sample collection, handling, and measurement methods provide unbiased and representative observations of the underlying populations over time.

> There is no requirement that the measurements be normally distributed. The Mann-Kendall test can be computed if there are missing values and varying detection limits, but the performance of the test will be adversely affected by such events. The assumption of independence requires that the time between samples be sufficiently large so that there is no correlation between measurements collected at different times.

The Mann-Kendall test does not assume that the underlying relationship is linear. However, in cases where the data are clearly curvilinear, it may be more appropriate to consult with a statistician to employ different statistical techniques that more accurately characterize the changes in concentration over time.

Special consideration should be given to dataset with clear seasonality and/or NDs. These are considered in the following sections.

6.1 Seasonality

Seasonal changes in precipitation and temperature can cause cyclical fluctuations in groundwater concentrations. These seasonal fluctuations functionally add 'noise' to the data. This type of noise is called serial dependence and can make it difficult to determine trends in the data because of a long-term persistent pattern (like seasonality) or whether it represents a true, underlying change. USEPA Guidance (2009) strongly recommends accounting for seasonality when performing linear trends in hydrologic data. Seasonality has not been explicitly handled in the data described herein.

6.2 Non-Detects and Detection Limits

Non-detects (NDs) commonly reported in water monitoring are statistically known as "left censored" measurements because the concentration of any non-detect either cannot be estimated or is not reported directly. Rather, it is known or assumed only to fall within a certain range of concentration values (USEPA 2009 p. 15-1). With higher detection limits, that uncertainty is greater because the true value lies somewhere in a larger range of possible values.

USEPA (2006) notes that no general procedures exist for the statistical analyses of censored datasets. If a dataset is comprised of more than 50 percent non-detected (ND) values, guidance cautions the user when interpreting the results of statistical tests, especially for relatively small datasets (USEPA 2009). In the context of the trend tests described herein, there is general agreement that substituting a constant below the lowest detected value is the best solution for handling non-detected values.

When detection rates are below 85 percent, however, this simple substitution method may lead to bias in the trend tests. Visually reviewing the data is a key step in interpreting the appropriateness of the statistical results. The time series plots have been generated using the detection limit for non-detects so that detection rates and multiple detection limits can be visualized. Additional statistical testing may be needed to address datasets with low detection rates or elevated detection limits.

7. REFERENCES

Helsel and Hirsch. 2002. *Statistical Methods in Water Resources.* Chapter A3. U.S. Department of the Interior, U.S. Geological Survey.

USEPA. 2006. *Data Quality Assessment: Statistical Methods for Practitioners.* EPA QA/G-9S. Office of Environmental Information. Washington, DC.

USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities.* Unified Guidance. EPA/530/R/09/007. Office of Resource Conservation and Recovery. Washington, D.C.

USEPA. 2014. *National Functional Guidelines for Superfund Organic Methods Data Review.* USEPA 540-R-014-002. OSWER 9355.0-132. August.

USEPA. 2015. *ProUCL Version 5.1.002 Technical Guide: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations.* Publication EPA/600/R-07/041, October.

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APPENDIX N LNAR LEACHATE MONITORING INFORMATION

Work Order

ServiceStream

Printed ☑

Work Order No
142398

Asset Information

Asset No: MPSLNDENV0 Environmental

Asset No	Asset Description
MP	CEM Mt Piper
MPSLND	Land Management Dump Site
MPSLNDENV0	Environmental

Comments:

Last Reading: **Date:**

Work Details

Job Description: LNAR 1A - Ash Repository Leachate System Daily Inspections
Instructions: Complete Inspection sheet attached
Safety Notes:
Priority: 2 Change Weekly Plan **Job Type:** PM07
Status: 1 - Scheduled
Account Code: 8R1323-B10011-L **Reference No:** **Frequency:** 7 Days
Duration: 1.00 h **Policy No:** 4714 **Department:** 85MP01 14

Raised: 29/09/2022 **Due Start:** 2/10/2022 **Start:** **Due Finish** 8/10/2022 **Finish:**

Contractor Information

Contractor:

Contact: **Ph No:**

Warranty Start: **Warranty Finish:**

Completion Details

Trades Name	Date Started	Date Finished	Hours Worked	Signature

Work History Comments

SERVICE STREAM

LNAR 1A - Ash Repository Leachate System Daily Inspection - MP-SF-713H

Daily Inspection Monday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Tuesday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Wednesday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Thursday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Friday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Saturday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

Daily Inspection Sunday						
Area	**Inspection Criteria**	**Inspection Criteria**			**Inspected By**	**Date**
Liner Perimeter	Inspect Liner Perimeter and Anchor Trench for Subsidence / Deformation	Free From Deformation	YES	NO		
Liner Separation Berm / Rainflap	Inspect FBA Batter for Weather Erosion Damage	Free From Damage	YES	NO		
	Inspect LLDPE Flap to Ensure Correct Placement Over FBA Batter	Correctly in Place	YES	NO		
	Inspect LLDPE Flap to Ensure Sandbagging is in Place	Correctly in Place	YES	NO		
Leachate Liner Sump 1	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Leachate Liner Sump 2	Inspect and Report on Free Water Above Liner / FBA Layer	Free Water Present	YES	NO		
Comment						

SERVICE STREAM

LNAR 1A - Ash Repository Leachate Management Pumpout Record - MP-SF-713J

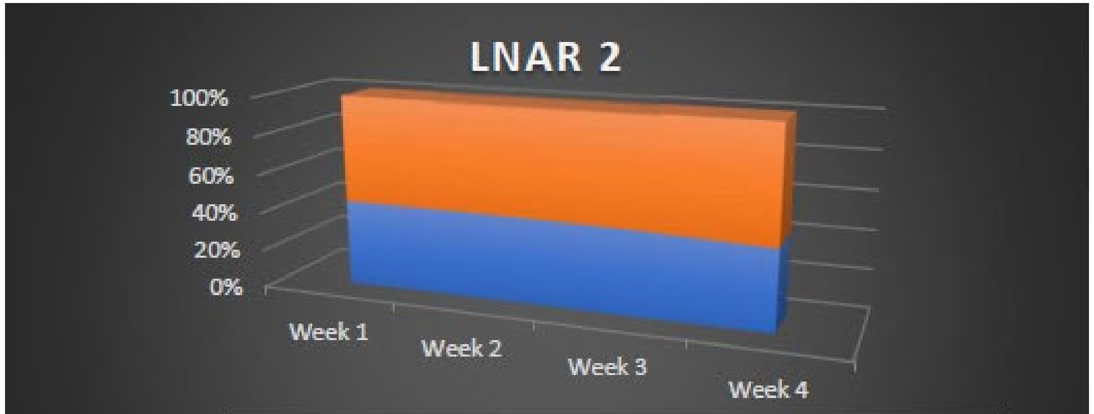
Underliner Leachate Collection Sump 1	Actions			Inspected By	Date
LNAR Stage 1A Underliner Leachate Pipeline Sump 1	Water Present in Sump	YES	NO		
LNAR Stage 1A Underliner Leachate Pipeline Sump 1	Sump Pumped Out	YES	NO		
Leachate Totaliser Detail	Pump Start Time			Pump Finish Time	
Leachate Totaliser Detail	Meter at Start (L)			Meter at Finish (L)	
Comment					

Leachate Collection Sump 1	Actions			Inspected By	Date
LNAR Stage 1A Liner Leachate Pipeline Sump 1	Water Present in Sump	YES	NO		
LNAR Stage 1A Liner Leachate Pipeline Sump 1	Sump Pumped Out	YES	NO		
Leachate Totaliser Detail	Pump Start Time			Pump Finish Time	
Leachate Totaliser Detail	Meter at Start (L)			Meter at Finish (L)	
Comment					

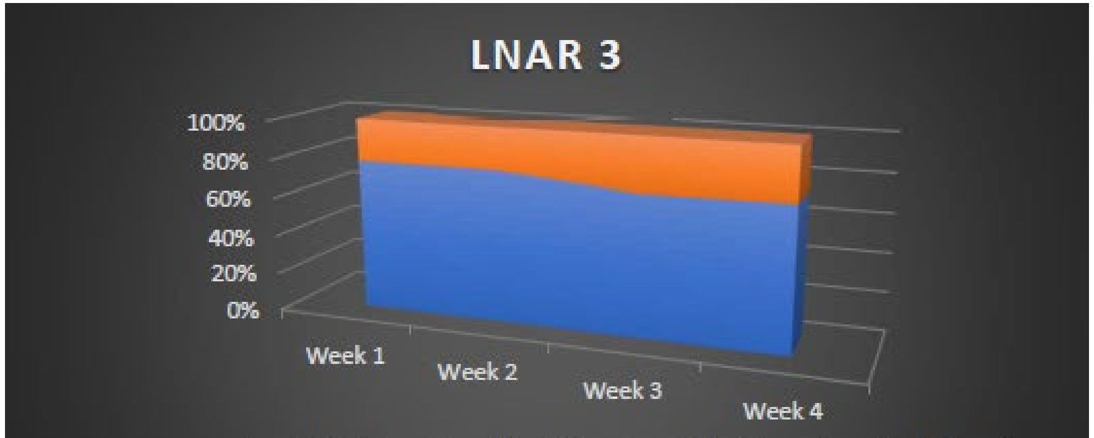
Underliner Leachate Collection Sump 2	Actions			Inspected By	Date
LNAR Stage 1A Underliner Leachate Pipeline Sump 2	Water Present in Sump	YES	NO		
LNAR Stage 1A Underliner Leachate Pipeline Sump 2	Sump Pumped Out	YES	NO		
Leachate Totaliser Detail	Pump Start Time			Pump Finish Time	
Leachate Totaliser Detail	Meter at Start (L)			Meter at Finish (L)	
Comment					

Leachate Collection Sump 2	Actions			Inspected By	Date
LNAR Stage 1A Liner Leachate Pipeline Sump 2	Water Present in Sump	YES	NO		
LNAR Stage 1A Liner Leachate Pipeline Sump 2	Sump Pumped Out	YES	NO		
Leachate Totaliser Detail	Pump Start Time			Pump Finish Time	
Leachate Totaliser Detail	Meter at Start (L)			Meter at Finish (L)	
Comment					

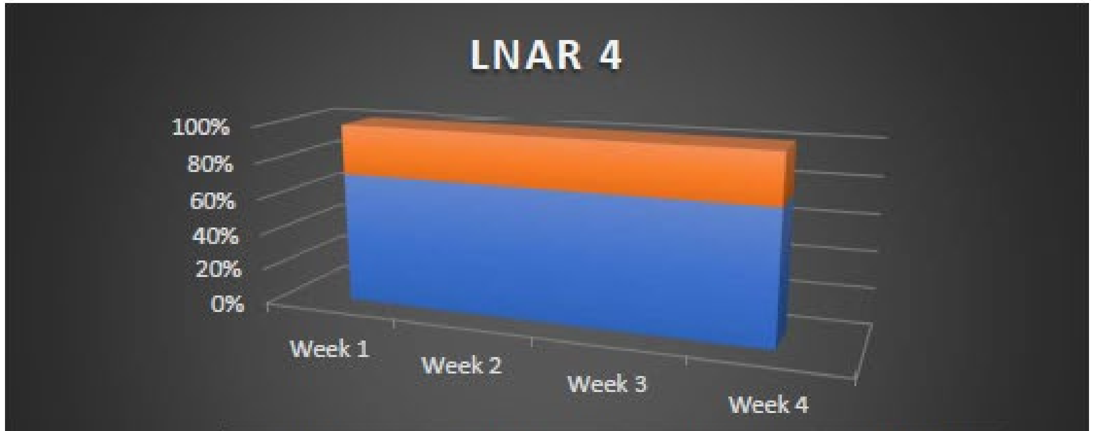
LNAR Lined Ponds – Storage Summary Example (January 2023)



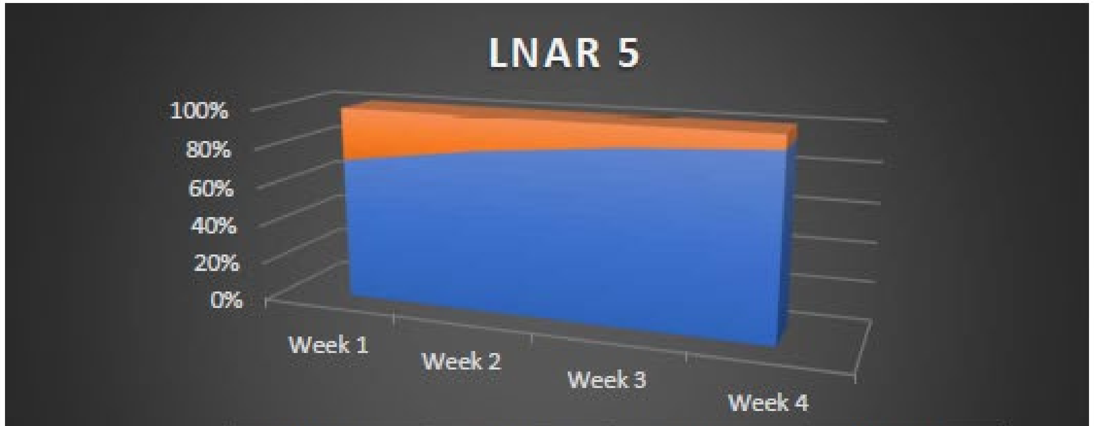
	Week 1	Week 2	Week 3	Week 4
Freeboard	7.02	7.02	7.12	7.43
Water Level	5.63	5.63	5.53	5.22



	Week 1	Week 2	Week 3	Week 4
Freeboard	4.11	4.08	5.27	5.14
Water Level	14.89	14.92	13.73	13.86



	Week 1	Week 2	Week 3	Week 4
Freeboard	5.05	5.05	5.05	5.05
Water Level	13.45	13.45	13.45	13.45



	Week 1	Week 2	Week 3	Week 4
Freeboard	5.12	3.28	2.05	1.32
Water Level	13.88	15.72	16.95	17.68

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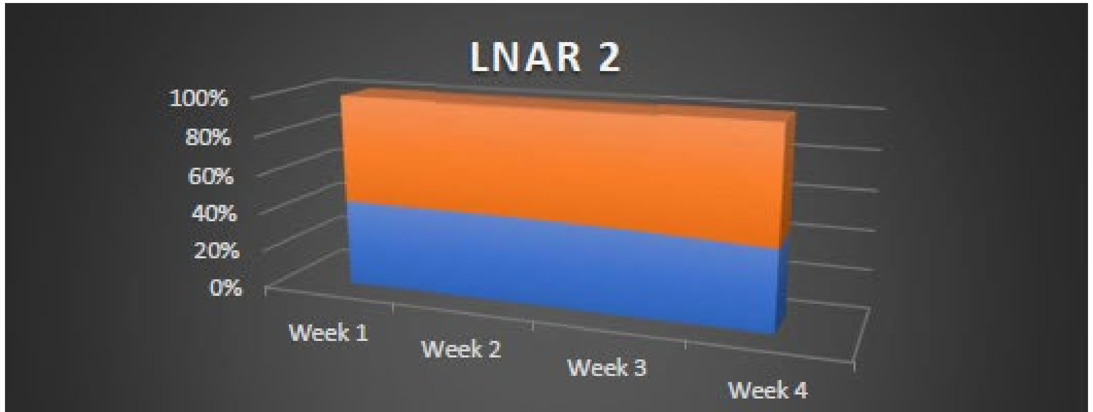
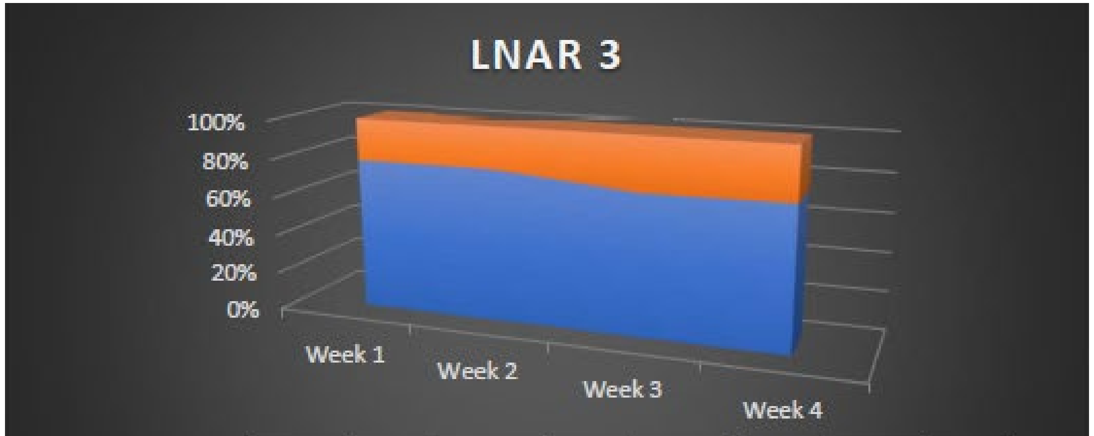
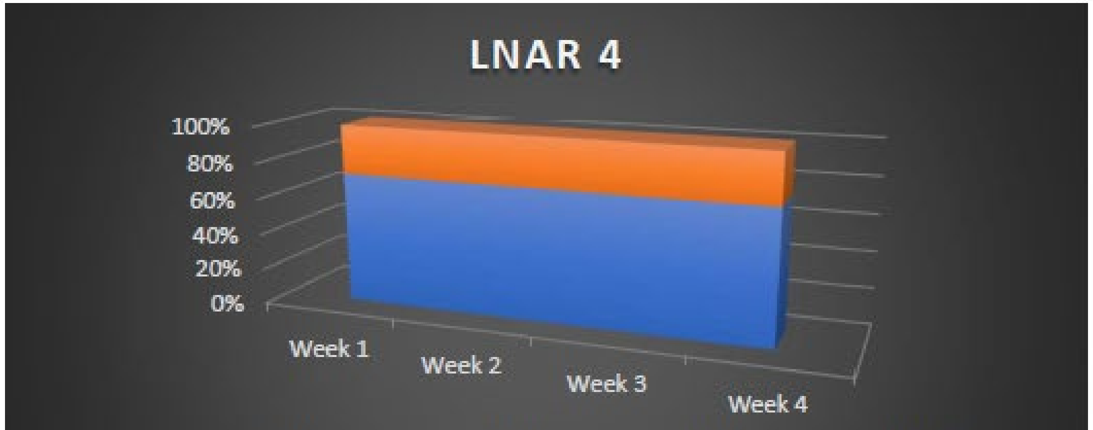
LNAR Lined Ponds – Storage Summary Example (July 2023)



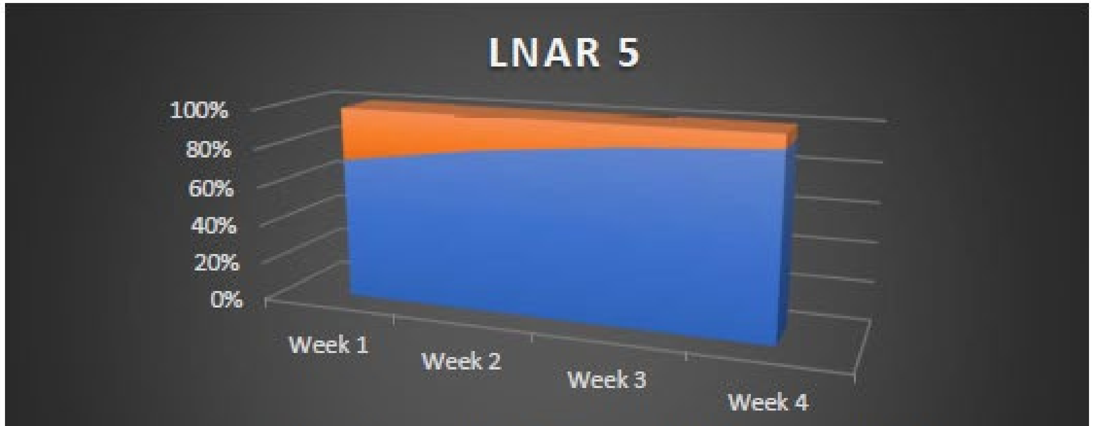
	Week 1	Week 2	Week 3	Week 4
Freeboard	7.02	7.02	7.12	7.43
Water Level	5.63	5.63	5.53	5.22



	Week 1	Week 2	Week 3	Week 4
Freeboard	4.11	4.08	5.27	5.14
Water Level	14.89	14.92	13.73	13.86



	Week 1	Week 2	Week 3	Week 4
Freeboard	5.05	5.05	5.05	5.05
Water Level	13.45	13.45	13.45	13.45



	Week 1	Week 2	Week 3	Week 4
Freeboard	5.12	3.28	2.05	1.32
Water Level	13.88	15.72	16.95	17.68

LNAR2 **Operating Level - 12.6 ML**

Colour Legend Instructions	Copy Formula	Enter Data	Enter Data

Date	FREEBOARD	INFLOWS		OUTFLOWS			Comments
	Calculated (ML)	Transfers from SW1 (ML)	Other (ML)	Dust Suppression (ML)	Transfers to LNAR5 (ML)	Other Transfers (e.g. to SW2)	
1/01/2023	6.93			0.330			
2/01/2023	7.10			0.170			
3/01/2023	7.65			0.550			
4/01/2023	7.09			0.560			
5/01/2023	7.09						
6/01/2023	7.19			0.100			
7/01/2023	7.29			0.100			
8/01/2023	7.70			0.410			
9/01/2023	8.31			0.610			
10/01/2023	8.84			0.530			
11/01/2023	9.29			0.450			
12/01/2023	6.13		3.64	0.480			Settling pond B
13/01/2023	6.67			0.540			
14/01/2023	7.51			0.840			
15/01/2023	9.19			0.580		1.1	1.1ML sent to SW2
16/01/2023	8.25		1.04	0.100			Transfer Settling Pond D
17/01/2023	8.25						
18/01/2023	8.25						
19/01/2023	6.82		1.43				Received 1.43ML Directly from D Settling Pond Overnight
20/01/2023	6.82						
21/01/2023	6.82						
22/01/2023	7.08					0.26	0.26ML Tranferred SW2?
23/01/2023	7.08						
24/01/2023	7.08						
25/01/2023	7.08						
26/01/2023	7.08						
27/01/2023	6.28	0.800					
28/01/2023	5.08	1.200					
29/01/2023	3.82	1.460		0.200			
30/01/2023	3.82						
31/01/2023	3.22	0.600					
1/02/2023	3.22						
2/02/2023	3.82			0.600			
3/02/2023	4.02			0.200			
4/02/2023	4.25			0.230			
5/02/2023	4.40			0.150			
6/02/2023	4.53			0.130			
7/02/2023	4.63			0.100			
8/02/2023	4.73			0.100			
9/02/2023	4.73						
10/02/2023	5.03			0.300			
11/02/2023	5.23			0.200			
12/02/2023	5.46			0.230			
13/02/2023	5.56			0.100			
14/02/2023	5.61			0.050			
15/02/2023	5.71			0.100			
16/02/2023	4.40	1.510		0.200			
17/02/2023	4.60			0.200			
18/02/2023	4.85			0.250			
19/02/2023	4.89			0.040			
20/02/2023	4.96			0.070			
21/02/2023	5.02			0.060			
22/02/2023	7.06				2.3		
23/02/2023	6.52	0.900		0.340	0.7		
24/02/2023	6.03			0.490			
25/02/2023	6.03						
26/02/2023	6.14			0.110			
27/02/2023	6.24			0.100			
28/02/2023	6.38			0.140			
1/03/2023	6.48			0.100			
2/03/2023	6.58			0.100			
3/03/2023	6.63			0.050			
4/03/2023	6.66			0.030			
5/03/2023	6.03	0.630					
6/03/2023	6.24			0.210			
7/03/2023	6.52			0.280			
8/03/2023	6.65			0.130			
9/03/2023	6.81			0.160			
10/03/2023	6.91			0.100			
11/03/2023	7.05			0.140			
12/03/2023	7.15			0.100			
13/03/2023	7.15						
14/03/2023	7.15						
15/03/2023	7.36			0.210			
16/03/2023	7.46			0.100			
17/03/2023	6.69	0.870		0.100			
18/03/2023	6.82			0.130			
19/03/2023	6.03	0.790					0.04 Dust Supression?
20/03/2023	6.03						0.02 Dust Supression?
21/03/2023	6.03						
22/03/2023	6.03						
23/03/2023	6.03						
24/03/2023	6.03						
25/03/2023	6.03						
26/03/2023	6.03						
27/03/2023	5.54	0.490					
28/03/2023	5.39	0.890			0.74		
29/03/2023	6.42	0.800			1.83		
30/03/2023	5.72	0.700					
31/03/2023	4.95	0.770					
1/04/2023	4.95						
2/04/2023	6.13				1.18		
3/04/2023	7.07				0.94		
4/04/2023	6.51	0.560					
5/04/2023	6.51						
6/04/2023	6.51						
7/04/2023	4.96	1.550					
8/04/2023	4.96						
9/04/2023	4.98			0.020			
10/04/2023	4.98						
11/04/2023	4.98						
12/04/2023	4.98						
13/04/2023	4.98						
14/04/2023	6.52				1.54		
15/04/2023	6.55			0.030			

Date	FREEBOARD	INFLOWS		OUTFLOWS			Comments
	Calculated (ML)	Transfers from SW1 (ML)	Other (ML)	Dust Suppression (ML)	Transfers to LNAR5 (ML)	Other Transfers (e.g. to SW2)	
16/04/2023	6.60			0.050			
17/04/2023	6.65			0.050			
18/04/2023	6.65						
19/04/2023	6.71			0.060			
20/04/2023	6.72			0.010			
21/04/2023	6.72						
22/04/2023	6.72						
23/04/2023	6.72						
24/04/2023	6.72						
25/04/2023	6.75			0.030			
26/04/2023	6.75						
27/04/2023	6.81			0.060			
28/04/2023	6.88			0.070			
29/04/2023	6.94			0.060			
30/04/2023	6.94						
1/05/2023	6.03	0.760	0.15				Significant rain event 40mm
2/05/2023	6.50	0.880			1.35		
3/05/2023	7.30				0.8		
4/05/2023	7.44			0.140			
5/05/2023	7.47			0.030			
6/05/2023	7.50			0.030			
7/05/2023	7.50						
8/05/2023	7.07	0.430					
9/05/2023	7.07						
10/05/2023	7.07						
11/05/2023	7.07						
12/05/2023	7.07						
13/05/2023	7.10			0.030			
14/05/2023	7.10						
15/05/2023	7.11			0.010			
16/05/2023	7.13			0.020			
17/05/2023	7.16			0.030			
18/05/2023	7.21			0.050			
19/05/2023	7.21						
20/05/2023	7.26			0.050			
21/05/2023	7.26						
22/05/2023	7.32			0.060			
23/05/2023	7.40			0.080			
24/05/2023	7.47			0.070			
25/05/2023	7.50			0.030			
26/05/2023	7.60			0.100			
27/05/2023	7.60						
28/05/2023	7.60						
29/05/2023	7.60						
30/05/2023	7.64			0.040			
31/05/2023	7.64						
1/06/2023	7.66			0.020			
2/06/2023	7.66						
3/06/2023	7.68			0.020			
4/06/2023	7.68						
5/06/2023	7.68						
6/06/2023	7.68						
7/06/2023	7.68						
8/06/2023	7.68						
9/06/2023	7.68						
10/06/2023	7.68						
11/06/2023	7.69			0.010			
12/06/2023	7.69						
13/06/2023	7.69						
14/06/2023	7.69						
15/06/2023	7.68	0.052		0.040			
16/06/2023	7.68						
17/06/2023	7.70			0.020			
18/06/2023	7.70						
19/06/2023	7.76			0.060			
20/06/2023	7.77			0.010			
21/06/2023	7.77						
22/06/2023	7.77						
23/06/2023	7.77						
24/06/2023	7.77						
25/06/2023	7.77						
26/06/2023	7.77						
27/06/2023	7.77						
28/06/2023	7.77						
29/06/2023	7.79			0.020			
30/06/2023	7.80			0.010			
1/07/2023	7.82			0.020			
2/07/2023	7.82						
3/07/2023	7.82						
4/07/2023	7.82						
5/07/2023	7.82						
6/07/2023	7.46	0.360					
7/07/2023	7.46						
8/07/2023	7.46						
9/07/2023	7.46						
10/07/2023	7.46						
11/07/2023	7.46						
12/07/2023	7.46						
13/07/2023	7.46						
14/07/2023	7.46						
15/07/2023	7.46						
16/07/2023	7.46						
17/07/2023	6.96	0.500					
18/07/2023	6.96						
19/07/2023	7.56				0.6		
20/07/2023	7.56						
21/07/2023	7.56						
22/07/2023	7.56						
23/07/2023	7.56						
24/07/2023	7.56						
25/07/2023	7.56						
26/07/2023	7.56						
27/07/2023	7.57			0.010			
28/07/2023	7.87				0.3		
29/07/2023	7.87						
30/07/2023	7.87						
31/07/2023	8.85				0.98		
1/08/2023	8.85						
2/08/2023	8.85						

Date	FREEBOARD Calculated (ML)	INFLOWS Transfers from SW1 (ML)	INFLOWS Other (ML)	OUTFLOWS Dust Suppression (ML)	OUTFLOWS Transfers to LNAR5 (ML)	OUTFLOWS Other Transfers (e.g. to SW2)	Comments
3/08/2023	8.85						
4/08/2023	8.85						
5/08/2023	9.08			0.230			
6/08/2023	9.39			0.310			
7/08/2023	9.56			0.170			
8/08/2023	9.58			0.020			
9/08/2023	9.58						
10/08/2023	9.58						
11/08/2023	9.84			0.260			
12/08/2023	10.14			0.300			
13/08/2023	10.35			0.210			
14/08/2023	10.35			0.000			Will Receive Inflow from SW1 Due to Rain Event
15/08/2023	10.35			0.000			
16/08/2023	10.35			0.000			
17/08/2023	9.65	0.693		0.000			
18/08/2023	9.65			0.000			
19/08/2023	8.86	0.790		0.000			
20/08/2023	8.86			0.000			
21/08/2023	8.86			0.000			
22/08/2023	8.86			0.000			
23/08/2023	8.87			0.001			
24/08/2023	8.87			0.000			
25/08/2023	8.87			0.000			
26/08/2023	8.87			0.000			
27/08/2023	8.92			0.050			
28/08/2023	8.95			0.030			
29/08/2023	8.95			0.000			
30/08/2023	9.05			0.100			
31/08/2023	9.15			0.100			
1/09/2023	9.15			0.000			
2/09/2023	9.15			0.000			
3/09/2023	9.15			0.000			
4/09/2023	9.15			0.000			
5/09/2023	9.17			0.020			
6/09/2023	9.18			0.018			
7/09/2023	9.18			0.000			
8/09/2023	9.18			0.000			
9/09/2023	9.18			0.000			
10/09/2023	9.18			0.000			
11/09/2023	9.18			0.000			
12/09/2023	9.18			0.000			
13/09/2023	9.20			0.020			
14/09/2023	9.20			0.000			

LNAR3 Operating Level - 19 ML

Colour Legend Instructions	Copy Formula	Enter Data	Enter Data

Date	FREEBOARD	INFLOWS			OUTFLOWS				Comments
	Calculated (ML)	Surface Water Runoff (tranferred via Sump) (ML)	LNAR Leachate (ML)	Transfers from Waste Ponds (ML)	LNAR Irrigation (ML)	LNAR Tanker (ML)	Overflow to LNAR4 (ML)	Volume for BCA Ash Conditioning (ML)	
1/01/2023	14.27								
2/01/2023	14.27								
3/01/2023	14.27								
4/01/2023	14.27								
5/01/2023	14.27								
6/01/2023	14.27								
7/01/2023	14.27								
8/01/2023	14.27								
9/01/2023	14.27								
10/01/2023	14.27								
11/01/2023	14.27								
12/01/2023	14.27								
13/01/2023	14.27								
14/01/2023	14.27								
15/01/2023	14.27								
16/01/2023	14.27								
17/01/2023	14.27								
18/01/2023	14.27								
19/01/2023	13.93	0.340							Received 0.34 ML APA Sump
20/01/2023	13.46	0.470							Received Inflows LNAR / APA sump 0.47ML
21/01/2023	13.46								
22/01/2023	13.46								
23/01/2023	13.46								
24/01/2023	13.46								
25/01/2023	13.32	0.140							Received 0.14ML Transfer APA Sump
26/01/2023	13.32								
27/01/2023	12.72	0.500	0.100						Received 0.5ML APA Bin Sump/ 0.1 LNAR
28/01/2023	12.02	0.600	0.100						Received 0.6ML APA Bin Sump/ 0.1 LNAR
29/01/2023	11.82	0.200							Received 0.2ML APA SUMP
30/01/2023	11.82								
31/01/2023	11.82								
1/02/2023	11.77		0.050						
2/02/2023	11.72	0.050							Received inflows APA bin sump
3/02/2023	11.72		0.001						
4/02/2023	11.72								
5/02/2023	11.72								
6/02/2023	11.72								
7/02/2023	11.72								
8/02/2023	11.72								
9/02/2023	11.72								
10/02/2023	11.72								
11/02/2023	11.72								
12/02/2023	11.72								
13/02/2023	11.71	0.010							APA bin/LNAR
14/02/2023	11.71								
15/02/2023	11.71								
16/02/2023	11.71								
17/02/2023	10.97			0.74					
18/02/2023	9.91			1.06					Opus Waste
19/02/2023	9.91								
20/02/2023	9.91								
21/02/2023	9.69		0.220						APA sump/LNAR
22/02/2023	9.69								
23/02/2023	9.69								
24/02/2023	9.73				0.040				
25/02/2023	9.73								
26/02/2023	10.00				0.270				
27/02/2023	10.00								
28/02/2023	10.06				0.060				
1/03/2023	10.12				0.060				
2/03/2023	10.17				0.050				
3/03/2023	10.22				0.050				
4/03/2023	10.26				0.040				
5/03/2023	10.32				0.060				

Date	FREEBOARD	INFLOWS			OUTFLOWS				Comments
	Calculated (ML)	Surface Water Runoff (tranferred via Sump) (ML)	LNAR Leachate (ML)	Transfers from Waste Ponds (ML)	LNAR Irrigation (ML)	LNAR Tanker (ML)	Overflow to LNAR4 (ML)	Volume for BCA Ash Conditioning (ML)	
6/03/2023	10.32								
7/03/2023	10.38				0.060				
8/03/2023	10.43				0.050				
9/03/2023	10.48				0.050				
10/03/2023	10.52				0.040				
11/03/2023	10.57				0.050				
12/03/2023	10.42	0.200			0.050				0.2 Ash sump
13/03/2023	10.42								
14/03/2023	9.22			1.20					1.2ML Opus
15/03/2023	9.26				0.040				
16/03/2023	9.31				0.050				
17/03/2023	9.35				0.040				
18/03/2023	9.40				0.050				
19/03/2023	9.45				0.050				
20/03/2023	9.48				0.030				
21/03/2023	9.48								
22/03/2023	9.48								
23/03/2023	9.48								
24/03/2023	9.47		0.010						
25/03/2023	9.47								
26/03/2023	9.46		0.010						
27/03/2023	9.24	0.220							
28/03/2023	9.14	0.100							Rainflap
29/03/2023	9.14								
30/03/2023	9.14								
31/03/2023	9.14								
1/04/2023	9.14								
2/04/2023	9.14								
3/04/2023	9.14								
4/04/2023	9.06		0.080						
5/04/2023	9.06								
6/04/2023	9.06								
7/04/2023	8.98	0.080							Received 0.08 Rain Flap LNAR
8/04/2023	8.98								
9/04/2023	8.99				0.010				
10/04/2023	8.99								
11/04/2023	8.08			0.91					0.91ML Opus Transfer Received
12/04/2023	6.08			2.00					2ML Opus Transfer Received
13/04/2023	6.06		0.020						
14/04/2023	6.06								
15/04/2023	6.06								
16/04/2023	6.06								
17/04/2023	6.06								
18/04/2023	6.06								
19/04/2023	6.06								
20/04/2023	5.96		0.100						
21/04/2023	5.96								
22/04/2023	5.96								
23/04/2023	5.96								
24/04/2023	5.96								
25/04/2023	5.96								
26/04/2023	5.96								
27/04/2023	5.96								
28/04/2023	5.96								
29/04/2023	5.91		0.050						
30/04/2023	5.91								
1/05/2023	5.76		0.150						Inflows LNAR + Significant Rain Event 40mm?
2/05/2023	5.58	0.180							Inflows LNAR/Rainflap?

Date	FREEBOARD	INFLOWS			OUTFLOWS				Comments
	Calculated (ML)	Surface Water Runoff (tranferred via Sump) (ML)	LNAR Leachate (ML)	Transfers from Waste Ponds (ML)	LNAR Irrigation (ML)	LNAR Tanker (ML)	Overflow to LNAR4 (ML)	Volume for BCA Ash Conditioning (ML)	
3/05/2023	5.58								
4/05/2023	5.56		0.020						
5/05/2023	5.54		0.024						
6/05/2023	5.53		0.010						
7/05/2023	5.52		0.010						
8/05/2023	5.51		0.010						
9/05/2023	5.49		0.020						
10/05/2023	5.47		0.020						
11/05/2023	5.45		0.020						
12/05/2023	5.45								
13/05/2023	5.42		0.030						
14/05/2023	5.40		0.020						
15/05/2023	5.38		0.020						
16/05/2023	5.38								
17/05/2023	5.36		0.02						No number in original; guessing based on change.
18/05/2023	5.36								
19/05/2023	5.36								
20/05/2023	5.38		0.009		0.030				
21/05/2023	5.40		0.012		0.040				
22/05/2023	5.45				0.049				Might be 0.59
23/05/2023	5.42		0.080		0.050				
24/05/2023	5.41		0.017						
25/05/2023	5.39		0.012						
26/05/2023	5.39		0.006						
27/05/2023	5.08		0.310						
28/05/2023	5.01		0.090		0.024				Received 0.09 LNAR Used 0.024 Opus Irrigation
29/05/2023	4.96		0.060		0.012				Received 0.06 LNAR Used 0.012 Opus Irrigation
30/05/2023	4.96		0.007						Received 0.007 LNAR
31/05/2023	4.81		0.144						Received 0.144
1/06/2023	4.80		0.010						Received 0.01 LNAR
2/06/2023	4.81		0.008		0.015				Received 0.008 LNAR 0.015 Used Opus Irrigation
3/06/2023	4.80		0.007						Received 0.007 LNAR Used 0.046 Opus Irrigation
4/06/2023	4.82		0.007		0.019				Received 0.007 LNAR 0.019 Opus Irrigation
5/06/2023	4.81		0.010						Received 0.01 LNAR Wet Misty Conditions
6/06/2023	4.80		0.006						Received 0.006 LNAR
7/06/2023	4.81		0.006		0.020				Received 0.006 LNAR Used 0.02 Opus Irrigation
8/06/2023	4.82		0.009		0.018				Received 0.009 LNAR Used 0.018 Opus Irrigation
9/06/2023	4.87		0.002		0.054				Received 0.002 LNAR Used 0.054 Opus Irrigation
10/06/2023	4.86		0.014						Received 0.014 LNAR
11/06/2023	4.87		0.012		0.024				Received 0.012 LNAR Used 0.024 Opus Irrigation
12/06/2023	4.56	0.340	0.012		0.042				Received 0.012 LNAR Used 0.042 Opus Irrigation Received 0.34 Sump
13/06/2023	4.30	0.260	0.001						Received 0.001 LNAR 0.26 Sump
14/06/2023	4.29		0.013						Received 0.013 LNAR
15/06/2023	4.21	0.100			0.023				Received 0.1 Sump Used 0.023 Opus Irrigation
16/06/2023	4.21								
17/06/2023	4.24		0.010		0.038				Received 0.01 Used 0.038 Opus Irrigation
18/06/2023	4.24								
19/06/2023	4.28		0.012		0.056				Received 0.012 Used 0.056 Opus Irrigation
20/06/2023	4.29		0.011		0.022				Received 0.011 Used 0.022 Opus Irrigation
21/06/2023	4.29		0.009						Received 0.009 Opus Irrigation Out Of Service For LNAR Project Works
22/06/2023	4.26		0.030						Received 0.03 LNAR
23/06/2023	4.20		0.056						Received 0.056 LNAR (Continuing Due to Rain event)
24/06/2023	4.19		0.010						Received 0.01 LNAR
25/06/2023	4.18		0.010						Received 0.01 LNAR
26/06/2023	4.17		0.007						Received 0.007 LNAR
27/06/2023	4.16		0.011						Received 0.011 LNAR
28/06/2023	4.16								
29/06/2023	4.15		0.012						Received 0.012 LNAR
30/06/2023	4.14		0.010						Received 0.01 LNAR
1/07/2023	4.13		0.011						Received 0.011 LNAR
2/07/2023	4.12		0.011						Received 0.011 LNAR
3/07/2023	4.11		0.009						Received 0.009 LNAR
4/07/2023	4.10		0.010						Received 0.01 LNAR
5/07/2023	4.00	0.100							Received 0.1 ML LNAR/RainFlap 0.1ML In Correct column
6/07/2023	3.98		0.020						Received 0.02 LNAR
7/07/2023	3.98								
8/07/2023	3.98		0.001						Received 0.001 LNAR

Date	FREEBOARD	INFLOWS			OUTFLOWS				Comments
	Calculated (ML)	Surface Water Runoff (tranferred via Sump) (ML)	LNAR Leachate (ML)	Transfers from Waste Ponds (ML)	LNAR Irrigation (ML)	LNAR Tanker (ML)	Overflow to LNAR4 (ML)	Volume for BCA Ash Conditioning (ML)	
9/07/2023	3.97		0.003						Received 0.003LNAR
10/07/2023	3.97								
11/07/2023	3.97								
12/07/2023	3.97								
13/07/2023	3.96	0.012							
14/07/2023	3.95		0.010						
15/07/2023	3.94		0.008						
16/07/2023	3.94								
17/07/2023	3.92	0.022							
18/07/2023	3.92	0.004							
19/07/2023	3.91	0.010							
20/07/2023	5.15	0.010						1.25	1.25 ML Transfer To Brine Waste Pond A
21/07/2023	5.15		0.001						
22/07/2023	5.15								
23/07/2023	5.13	0.010	0.003						
24/07/2023	5.13		0.003						
25/07/2023	5.12	0.010							
26/07/2023	5.11	0.011							
27/07/2023	5.11		0.001						
28/07/2023	5.01	0.099	0.002						
29/07/2023	4.90	0.100	0.004						
30/07/2023	4.67	0.230	0.005						
31/07/2023	4.53	0.140	0.000						
1/08/2023	4.52	0.000	0.005						
2/08/2023	4.38	0.140	0.004						
3/08/2023	4.31	0.010	0.063						
4/08/2023	4.19	0.120							
5/08/2023	4.10	0.000	0.087						In Conjunction With Rain Flap Removal /Dewatering
6/08/2023	3.89	0.140	0.070						
7/08/2023	3.71	0.130	0.053						
8/08/2023	3.68	0.000	0.027						
9/08/2023	3.65	0.030	0.002						
10/08/2023	3.64	0.010	0.000						
11/08/2023	3.63		0.012						
12/08/2023	3.61		0.014						
13/08/2023	3.31	0.240	0.059						Rain Event
14/08/2023	2.89	0.370	0.051						Rain Event
15/08/2023	2.66	0.170	0.060						
16/08/2023	2.61	0.000	0.050						
17/08/2023	2.46	0.150	0.000						
18/08/2023	2.23	0.250	0.000		0.022				Opus Irrigation Placed into Service
19/08/2023	2.21	0.000	0.025						
20/08/2023	2.21	0.000	0.000						
21/08/2023	2.10	0.100	0.034		0.026				
22/08/2023	2.06	0.000	0.050		0.009				
23/08/2023	2.07	0.000	0.036		0.049				
24/08/2023	2.03	0.000	0.082		0.042				
25/08/2023	2.06	0.000	0.033		0.063				
26/08/2023	2.11	0.000	0.000		0.043				
27/08/2023	2.11	0.000	0.076		0.083				
28/08/2023	2.14	0.000	0.060		0.084				
29/08/2023	2.08	0.000	0.096		0.040				
30/08/2023	2.08	0.000	0.056		0.050				
31/08/2023	2.01	0.068	0.051		0.058				
1/09/2023	1.97	0.000	0.108		0.061				
2/09/2023	2.07	0.000	0.017		0.120				
3/09/2023	1.97	0.000	0.270		0.168				
4/09/2023	1.87	0.000	0.160		0.065				
5/09/2023	1.85	0.000	0.097		0.072				
6/09/2023	1.86	0.000	0.087		0.100				44 of 55 Sprinklers In Service Due To Wind Drift
7/09/2023	1.88	0.000	0.086		0.109				45 of 55 Sprinklers In Service Due To Wind Drift (4 x Rotations)
8/09/2023	1.93	0.000	0.085		0.131				49 of 55 Sprinklers in Service + 4 Rotations Due to Windy Conditions
9/09/2023	1.83	0.000	0.103		0.000				No Opus Irrigation Due to Weather Conditions
10/09/2023	1.81	0.000	0.051		0.033				
11/09/2023	1.86	0.000	0.049		0.097				
12/09/2023	1.92	0.000	0.051		0.110				
13/09/2023	2.00	0.000	0.030		0.113				
14/09/2023	3.05	0.000	0.061		0.109			1	1ML Transferred to BWPA Overnight

LNAR4 Operating Level - 18.5 ML

Colour Legend Instructions | Copy Formula | Enter Data | Enter Data

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
1/01/2023	12.48						
2/01/2023	12.48						
3/01/2023	12.48						
4/01/2023	12.48						
5/01/2023	12.48						
6/01/2023	12.48						
7/01/2023	12.48						
8/01/2023	12.48						
9/01/2023	12.48						
10/01/2023	12.48						
11/01/2023	12.48						
12/01/2023	12.48						
13/01/2023	12.48						
14/01/2023	12.48						
15/01/2023	10.57	1.91					LNAR 5 Overboard
16/01/2023	7.92	2.65					LNAR 5 Overboard
17/01/2023	7.92						
18/01/2023	7.92						
19/01/2023	6.80			1.12			B Settling Pond
20/01/2023	3.43			3.37			B Settling Pond
21/01/2023	0.09			3.34			B Settling Pond
22/01/2023	0.09						
23/01/2023	0.09						
24/01/2023	0.09						
25/01/2023	0.09						
26/01/2023	0.09						
27/01/2023	0.09						
28/01/2023	0.09						
29/01/2023	0.09						
30/01/2023	0.09						
31/01/2023	0.09						
1/02/2023	0.09						
2/02/2023	0.09						
3/02/2023	1.47					1.38	1.38 Transferred SW2 Water Tanker Fill Point
4/02/2023	1.47						
5/02/2023	2.19					0.72	0.72 Transferred SW2 Water Tanker Fill Point
6/02/2023	2.19						
7/02/2023	2.19						
8/02/2023	2.80					0.61	0.61 Transferred SW2 Water Tanker Fill Point
9/02/2023	2.80						
10/02/2023	2.80						
11/02/2023	2.80						

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
12/02/2023	3.48					0.68	0.68 Transferred Water Tanker Fill Point
13/02/2023	3.48						
14/02/2023	3.48						
15/02/2023	3.48						
16/02/2023	3.48						
17/02/2023	3.48						
18/02/2023	3.48						
19/02/2023	3.48						
20/02/2023	3.48						
21/02/2023	3.28			0.20			SW2
22/02/2023	3.08			0.20			SW2
23/02/2023	3.08						
24/02/2023	3.08						
25/02/2023	3.08						
26/02/2023	3.08						
27/02/2023	3.08						
28/02/2023	3.08						
1/03/2023	3.08						
2/03/2023	3.08						
3/03/2023	3.08						
4/03/2023	3.08						
5/03/2023	3.08						
6/03/2023	3.08						
7/03/2023	3.08						
8/03/2023	3.08						
9/03/2023	3.08						
10/03/2023	3.08						
11/03/2023	3.08						
12/03/2023	3.08						
13/03/2023	3.08						
14/03/2023	3.08						
15/03/2023	3.08						
16/03/2023	3.08						
17/03/2023	3.08						
18/03/2023	3.08						
19/03/2023	3.08						
20/03/2023	3.08						
21/03/2023	3.08						
22/03/2023	3.08						
23/03/2023	3.08						
24/03/2023	3.08						
25/03/2023	3.08						
26/03/2023	3.08						
27/03/2023	3.08						
28/03/2023	3.08						
29/03/2023	3.08						

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
30/03/2023	3.08						
31/03/2023	3.08						
1/04/2023	3.08						
2/04/2023	3.08						
3/04/2023	3.08						
4/04/2023	3.08						
5/04/2023	3.08						
6/04/2023	3.08						
7/04/2023	3.08						
8/04/2023	3.08						
9/04/2023	3.08						
10/04/2023	3.08						
11/04/2023	3.08						
12/04/2023	3.08						
13/04/2023	3.08						
14/04/2023	3.08						
15/04/2023	3.08						
16/04/2023	3.08						
17/04/2023	3.08						
18/04/2023	3.08						
19/04/2023	3.08						
20/04/2023	3.08						
21/04/2023	3.08						
22/04/2023	3.08						
23/04/2023	3.08						
24/04/2023	3.08						
25/04/2023	3.08						
26/04/2023	3.08						
27/04/2023	3.08						
28/04/2023	3.08						
29/04/2023	3.08						
30/04/2023	3.08						
1/05/2023	2.93			0.15			0.15ML Significant Rain Event
2/05/2023	2.93						
3/05/2023	2.93						
4/05/2023	2.93						
5/05/2023	2.93						
6/05/2023	2.93						
7/05/2023	2.93						
8/05/2023	2.83			0.10			0.1ML Minor Rain Event
9/05/2023	2.83						
10/05/2023	2.83						
11/05/2023	2.83						
12/05/2023	2.83						
13/05/2023	2.83						
14/05/2023	2.83						

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
15/05/2023	2.83						
16/05/2023	2.83						
17/05/2023	2.83						
18/05/2023	2.83						
19/05/2023	2.83						
20/05/2023	2.83						
21/05/2023	2.83						
22/05/2023	2.83						
23/05/2023	2.83						
24/05/2023	2.83						
25/05/2023	2.83						
26/05/2023	2.83						
27/05/2023	2.83						
28/05/2023	2.83						
29/05/2023	2.83						
30/05/2023	2.83						
31/05/2023	2.83						
1/06/2023	2.83						
2/06/2023	2.83						
3/06/2023	2.83						
4/06/2023	2.83						
5/06/2023	2.83						
6/06/2023	2.83						
7/06/2023	2.83						
8/06/2023	2.83						
9/06/2023	2.83						
10/06/2023	2.83						
11/06/2023	2.83						
12/06/2023	2.72	0.11					
13/06/2023	2.72						
14/06/2023	2.72						
15/06/2023	2.72						Received 0.28 Overflow LNAR5
16/06/2023	2.72						
17/06/2023	2.35	0.37					Received 0.37 Overflow LNAR5
18/06/2023	2.35						
19/06/2023	2.35						
20/06/2023	2.35						
21/06/2023	2.35						
22/06/2023	2.35						
23/06/2023	2.35						
24/06/2023	2.35						
25/06/2023	2.35						
26/06/2023	2.35						
27/06/2023	2.35						
28/06/2023	2.35						
29/06/2023	2.25	0.10					

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
30/06/2023	2.68				0.43		
1/07/2023	3.10				0.43		
2/07/2023	3.53				0.43		
3/07/2023	3.96				0.43		
4/07/2023	4.41				0.45		
5/07/2023	4.66				0.25		
6/07/2023	5.04				0.38		
7/07/2023	5.04						
8/07/2023	5.04						
9/07/2023	5.04						
10/07/2023	5.04						
11/07/2023	5.04						
12/07/2023	5.04						
13/07/2023	5.04						
14/07/2023	5.04						
15/07/2023	5.04						
16/07/2023	5.04						
17/07/2023	5.04						
18/07/2023	5.04						
19/07/2023	5.04						
20/07/2023	5.04						
21/07/2023	5.04						
22/07/2023	5.04						
23/07/2023	5.04						
24/07/2023	5.04						
25/07/2023	5.04						
26/07/2023	5.04						
27/07/2023	5.04						
28/07/2023	5.04						
29/07/2023	5.04						
30/07/2023	5.04						
31/07/2023	5.04						
1/08/2023	5.04						
2/08/2023	5.04						
3/08/2023	5.04						
4/08/2023	5.04						
5/08/2023	5.04						
6/08/2023	6.58				1.54		
7/08/2023	7.71				1.13		
8/08/2023	7.71						
9/08/2023	7.71						
10/08/2023	7.71						
11/08/2023	7.71						
12/08/2023	7.71						
13/08/2023	7.71						
14/08/2023	7.71						

Date	FREEBOARD	INFLOWS			OUTFLOWS		Comments
	Calculated (ML)	Transfers from LNAR5 (ML)	Transfers from LNAR3 (ML)	Transfers from Other Ponds (ML)	Transfers to LNAR5 (ML)	Transfers to SW2 (ML)	
15/08/2023	7.71						
16/08/2023	7.71						
17/08/2023	7.71						
18/08/2023	7.71						
19/08/2023	7.71						
20/08/2023	7.71						
21/08/2023	7.53	0.18					Overflow From LNAR5
22/08/2023	7.53						
23/08/2023	7.53						
24/08/2023	7.53						
25/08/2023	7.53						
26/08/2023	7.53						
27/08/2023	7.53						
28/08/2023	7.53						
29/08/2023	7.53						
30/08/2023	7.53						
31/08/2023	7.53						
1/09/2023	7.53						
2/09/2023	7.53						
3/09/2023	7.53						
4/09/2023	7.53						
5/09/2023	7.53						
6/09/2023	7.53						
7/09/2023	7.53						
8/09/2023	7.53						
9/09/2023	7.53						
10/09/2023	7.53						
11/09/2023	7.53						
12/09/2023	7.53						
13/09/2023	7.53						
14/09/2023	7.53						

LNAR5 Operating Level - 19ML

Colour Legend Instructions | Copy Formula | Enter Data | Enter Data |

	FREEBOARD	INFLOWS					OUTFLOWS						
Date	Calculated (ML)	Transfers from LNAR2 (ML)	Transfers from LNAR4 (ML)	Transfers from SW2 (ML)	Transfers from CT Basin (ML)	Transfers from Settling Ponds (ML)	Volume to Evaps / Atomisers (ML)	Volume for Dust Suppression (incl Tanker) (ML)	Volume for WCA Ash Conditioning (ML)	Daily Total Volume Used at the Repository (ML)	Overflow to LNAR4 (ML)	Transfers to SW2 (ML)	Transfers to Settling Ponds (ML)
1/01/2023	4.51							0.38		0.38			
2/01/2023	4.90							0.39		0.39			
3/01/2023	5.70							0.80		0.80			
4/01/2023	5.70									0.00			
5/01/2023	5.80							0.10		0.10			
6/01/2023	5.80									0.00			
7/01/2023	5.80									0.00			
8/01/2023	6.30							1.50		1.50			
9/01/2023	5.44					2.00		1.14		1.14			
10/01/2023	4.18					2.33		1.07		1.07			
11/01/2023	4.93							0.75		0.75			
12/01/2023	6.07							0.80		0.80		0.34	
13/01/2023	2.89					3.60		0.42		0.42			
14/01/2023	0.54					3.24		0.89		0.89			
15/01/2023	0.00					3.42		0.97		0.97	1.91		
16/01/2023	2.85							0.20		0.20	2.65		
17/01/2023	3.55							0.70		0.70			
18/01/2023	4.67							1.12		1.12			
19/01/2023	1.75					2.92				0.00			
20/01/2023	1.75									0.00			
21/01/2023	1.75									0.00			
22/01/2023	0.20							0.20		0.20			
23/01/2023	0.69								0.490	0.49			
24/01/2023	1.09								0.400	0.40			
25/01/2023	1.45							0.36		0.36			
26/01/2023	2.63							1.18		1.18			
27/01/2023	2.63							0.35		0.35			
28/01/2023	2.94							0.31		0.31			
29/01/2023	4.18							1.24		1.24			
30/01/2023	4.76								0.580	0.58			
31/01/2023	5.06								0.300	0.30			
1/02/2023	4.78					1.43		0.80	0.350	1.15			
2/02/2023	6.15							0.91	0.460	1.37			
3/02/2023	6.75					0.82		1.01	0.410	1.42			
4/02/2023	6.65					1.82		1.24	0.480	1.72			
5/02/2023	6.75					1.39		1.03	0.460	1.49			
6/02/2023	6.69					1.67		1.15	0.460	1.61			
7/02/2023	5.49					2.51		1.06	0.250	1.31			
8/02/2023	5.69					1.23		1.22	0.210	1.43			
9/02/2023	6.29					1.57		1.86	0.310	2.17			
10/02/2023	6.78					1.52		1.55	0.460	2.01			
11/02/2023	4.15				1.05	1.58				0.00			
12/02/2023	4.13							1.10	0.430	1.53			
13/02/2023	2.15					2.53		0.55		0.55			
14/02/2023	2.85							0.40	0.300	0.70			
15/02/2023	3.95							1.10		1.10			
16/02/2023	2.84					2.12		1.01		1.01			
17/02/2023	4.46							1.62		1.62			
18/02/2023	5.72							1.26		1.26			
19/02/2023	5.47					1.53		1.28		1.28			
20/02/2023	6.09					0.71		1.33		1.33			
21/02/2023	6.72							0.63		0.63			
22/02/2023	3.05	2.30				1.58			0.210	0.21			
23/02/2023	1.62	0.70				1.79		0.83	0.230	1.06			

	FREEBOARD	INFLOWS					OUTFLOWS						
Date	Calculated (ML)	Transfers from LNAR2 (ML)	Transfers from LNAR4 (ML)	Transfers from SW2 (ML)	Transfers from CT Basin (ML)	Transfers from Settling Ponds (ML)	Volume to Evaps / Atomisers (ML)	Volume for Dust Suppression (incl Tanker) (ML)	Volume for WCA Ash Conditioning (ML)	Daily Total Volume Used at the Repository (ML)	Overflow to LNAR4 (ML)	Transfers to SW2 (ML)	Transfers to Settling Ponds (ML)
24/02/2023	0.90					1.00			0.280	0.28			
25/02/2023	1.19								0.290	0.29			
26/02/2023	1.60					1.49		1.60	0.300	1.90			
27/02/2023	2.31					1.39		1.82	0.280	2.10			
28/02/2023	1.87					2.54		1.73	0.370	2.10			
1/03/2023	2.05					1.58		1.54	0.220	1.76			
2/03/2023	2.47					1.68		1.88	0.220	2.10			
3/03/2023	2.43					1.47		1.30	0.130	1.43			
4/03/2023	1.98					1.05		0.60		0.60			
5/03/2023	3.01							1.03		1.03			
6/03/2023	1.60					2.68		1.27		1.27			
7/03/2023	1.63					1.98	0.58	1.43		2.01			
8/03/2023	0.78					2.49	0.43	1.21		1.64			
9/03/2023	0.41					2.29	0.40	1.52		1.92			
10/03/2023	2.10					1.77	0.43	0.91	0.270	1.61		0.50	
11/03/2023	2.15					2.00	0.37	1.68		2.05			
12/03/2023	1.75					2.26	0.58	1.04	0.240	1.86			
13/03/2023	0.61					2.21	0.66	0.41		1.07			
14/03/2023	1.43						0.41			0.41		0.41	
15/03/2023	1.23					1.84	0.47	1.17		1.64			
16/03/2023	1.12					1.78	0.40	1.27		1.67			
17/03/2023	0.20					2.37	0.43	1.02		1.45			
18/03/2023	1.99						0.40	1.39		1.79			
19/03/2023	3.21					0.72	0.41	1.53		1.94			
20/03/2023	3.32					1.28	0.24	1.15		1.39			
21/03/2023	2.72					0.80	0.10	0.10		0.20			
22/03/2023	1.50					1.22				0.00			
23/03/2023	1.45					0.66	0.51		0.100	0.61			
24/03/2023	0.93					1.41	0.89			0.89			
25/03/2023	0.00					2.31	1.07		0.280	1.35			
26/03/2023	0.00					2.34	1.02		0.210	1.23			
27/03/2023	1.08						0.80		0.280	1.08			
28/03/2023	0.73	0.74					0.29		0.100	0.39			
29/03/2023	0.00	1.83					0.76		0.210	0.97			
30/03/2023	1.04						0.92		0.120	1.04			
31/03/2023	2.48						0.94	0.50		1.44			
1/04/2023	3.88						0.85	0.39	0.160	1.40			
2/04/2023	3.76	1.18					0.86		0.200	1.06			
3/04/2023	2.82	0.94								0.00			
4/04/2023	0.51					3.38	0.92		0.150	1.07			
5/04/2023	0.00			0.89		2.51	0.96		0.170	1.13			
6/04/2023	1.53						0.88	0.65		1.53			
7/04/2023	2.23						0.70			0.70			
8/04/2023	0.00					3.60	1.06	0.04		1.10			
9/04/2023	0.99			0.05			1.04			1.04			
10/04/2023	2.16						0.94	0.23		1.17			
11/04/2023	1.15					2.35	0.97	0.37		1.34			
12/04/2023	2.05					0.30	0.95	0.25		1.20			
13/04/2023	3.04						0.99			0.99			
14/04/2023	0.00	1.54				2.58	0.94			0.94			
15/04/2023	1.45						0.81	0.64		1.45			
16/04/2023	0.07			0.20		2.64	0.90	0.56		1.46			
17/04/2023	1.63						1.00	0.56		1.56			
18/04/2023	1.05					2.40	0.96	0.66	0.200	1.82			
19/04/2023	1.15					2.23	0.92	0.54	0.870	2.33			
20/04/2023	0.06					2.30	0.95	0.26		1.21			
21/04/2023	1.09						1.03			1.03			
22/04/2023	2.51						1.04	0.38		1.42			

	FREEBOARD	INFLOWS					OUTFLOWS						
Date	Calculated (ML)	Transfers from LNAR2 (ML)	Transfers from LNAR4 (ML)	Transfers from SW2 (ML)	Transfers from CT Basin (ML)	Transfers from Settling Ponds (ML)	Volume to Evaps / Atomisers (ML)	Volume for Dust Suppression (incl Tanker) (ML)	Volume for WCA Ash Conditioning (ML)	Daily Total Volume Used at the Repository (ML)	Overflow to LNAR4 (ML)	Transfers to SW2 (ML)	Transfers to Settling Ponds (ML)
23/04/2023	1.72					1.80	1.01			1.01			
24/04/2023	2.87					0.40	1.00	0.55		1.55			
25/04/2023	2.66					1.10	0.89			0.89			
26/04/2023	1.63					2.07	0.83	0.21		1.04			
27/04/2023	1.13					1.76	0.96	0.30		1.26			
28/04/2023	0.90					1.82	1.09	0.50		1.59			
29/04/2023	2.52						1.05	0.57		1.62			
30/04/2023	3.54						1.02			1.02			
1/05/2023	1.85					2.87	1.18			1.18			
2/05/2023	1.24	1.35				1.72	1.09		0.372	1.46		1.00	
3/05/2023	2.03	0.80					1.01	0.58		1.59			
4/05/2023	3.40						0.69	0.68		1.37			
5/05/2023	3.10					1.59	0.88	0.41		1.29			
6/05/2023	1.89					2.53	0.91	0.41		1.32			
7/05/2023	3.52						0.89	0.22	0.520	1.63			
8/05/2023	3.44					1.56	0.89		0.590	1.48			
9/05/2023	2.89					2.11	1.03		0.530	1.56			
10/05/2023	1.56					2.74	0.96	0.45		1.41			
11/05/2023	1.90						0.34			0.34			
12/05/2023	2.94						0.52	0.52		1.04			
13/05/2023	1.45					2.51	0.61	0.41		1.02			
14/05/2023	2.60						0.94	0.21		1.15			
15/05/2023	4.39						1.08	0.28		1.36			0.43
16/05/2023	2.12					2.37	1.09	0.25		1.34			
17/05/2023	3.56						1.00	0.44		1.44			
18/05/2023	5.03						0.96	0.51		1.47			
19/05/2023	3.58					2.64	0.98	0.21		1.19			
20/05/2023	2.40					2.43	0.78	0.47		1.25			
21/05/2023	3.76						0.85	0.51		1.36			
22/05/2023	3.05					2.43	0.95	0.77		1.72			
23/05/2023	4.05						0.72	0.28		1.00			
24/05/2023	3.41					2.15	0.85	0.66		1.51			
25/05/2023	3.18					1.17	0.52	0.42		0.94			
26/05/2023	2.29					2.42	0.74	0.79		1.53			
27/05/2023	3.43						1.03	0.11		1.14			
28/05/2023	3.76						0.33			0.33			
29/05/2023	1.51					2.93	0.53	0.15		0.68			
30/05/2023	2.89						0.77	0.61		1.38			
31/05/2023	4.19						0.79	0.51		1.30			
1/06/2023	2.80					2.59	0.94	0.26		1.20			
2/06/2023	4.13						0.74	0.59		1.33			
3/06/2023	4.78						0.38		0.270	0.65			
4/06/2023	3.23					1.65		0.10		0.10			
5/06/2023	1.59					1.64				0.00			
6/06/2023	0.59					1.68		0.31	0.370	0.68			
7/06/2023	1.34						0.54		0.212	0.75			
8/06/2023	0.59					2.38	0.84	0.44	0.350	1.63			
9/06/2023	1.92						0.89	0.12	0.319	1.33			
10/06/2023	1.36					2.11	0.80	0.37	0.374	1.54			
11/06/2023	0.88					2.27	0.76	0.62	0.410	1.79			
12/06/2023	0.04					1.42	0.28	0.19		0.47	0.11		
13/06/2023	0.57						0.53			0.53			
14/06/2023	1.35						0.66	0.12		0.78			
15/06/2023	0.17					2.62	0.90	0.54		1.44			
16/06/2023	2.68						2.10	0.41		2.51			
17/06/2023	1.11					3.25	0.84	0.47		1.31	0.37		
18/06/2023	1.87						0.76			0.76			
19/06/2023	0.21					3.32	0.85	0.81		1.66			

	FREEBOARD	INFLOWS					OUTFLOWS						
Date	Calculated (ML)	Transfers from LNAR2 (ML)	Transfers from LNAR4 (ML)	Transfers from SW2 (ML)	Transfers from CT Basin (ML)	Transfers from Settling Ponds (ML)	Volume to Evaps / Atomisers (ML)	Volume for Dust Suppression (incl Tanker) (ML)	Volume for WCA Ash Conditioning (ML)	Daily Total Volume Used at the Repository (ML)	Overflow to LNAR4 (ML)	Transfers to SW2 (ML)	Transfers to Settling Ponds (ML)
20/06/2023	1.12						0.59	0.32		0.91			
21/06/2023	0.77					2.50	1.86	0.29		2.15			
22/06/2023	3.19						1.88	0.54		2.42			
23/06/2023	1.43					2.59	0.73	0.10		0.83			
24/06/2023	2.21						0.68	0.10		0.78			
25/06/2023	1.51					1.95	0.75	0.50		1.25			
26/06/2023	0.68					2.42	0.85	0.74		1.59			
27/06/2023	0.48					2.03	0.89	0.94		1.83			
28/06/2023	1.44						0.84	0.12		0.96			
29/06/2023	0.03					2.32	0.81			0.81	0.10		
30/06/2023	2.00		0.43				2.10	0.30		2.40			
1/07/2023	4.16		0.43				2.17	0.42		2.59			
2/07/2023	6.09		0.43				1.36	0.54	0.456	2.36			
3/07/2023	5.52		0.43			2.07	1.32	0.27	0.333	1.92			
4/07/2023	3.04		0.45			2.69	0.66			0.66			
5/07/2023	3.63		0.25				0.84			0.84			
6/07/2023	4.00		0.38			2.05	2.15	0.28	0.370	2.80			
7/07/2023	5.15						1.04	0.11		1.15			
8/07/2023	3.48					1.67				0.00			
9/07/2023	2.96					1.24	0.32	0.40		0.72			
10/07/2023	0.90					2.06				0.00			
11/07/2023	2.07						0.87	0.30		1.17			
12/07/2023	0.21					2.38	0.52			0.52			
13/07/2023	2.05						1.53	0.31		1.84			
14/07/2023	3.31						0.87	0.39		1.26			
15/07/2023	3.89					0.82	0.84	0.56		1.40			
16/07/2023	2.50					2.89	0.94	0.56		1.50			
17/07/2023	3.54						0.98	0.06		1.04			
18/07/2023	4.84					1.49	2.17	0.13	0.482	2.79			
19/07/2023	2.51	0.60				3.05	0.81	0.19	0.323	1.32			
20/07/2023	3.50					0.00	0.81	0.18		0.99			
21/07/2023	2.08					2.73	1.04	0.27		1.31			
22/07/2023	0.13					3.08	0.81	0.32		1.13			
23/07/2023	0.90					0.00	0.63	0.14		0.77			
24/07/2023	1.07					2.73	2.15	0.27	0.488	2.90			
25/07/2023	1.22					2.60	2.45	0.30		2.75			
26/07/2023	2.43					0.00	0.83	0.38		1.21			
27/07/2023	3.72					0.00	0.88	0.41		1.29			
28/07/2023	1.35	0.30				2.17	0.00	0.10		0.10			
29/07/2023	1.78					0.64	0.52	0.55		1.07			
30/07/2023	3.27					0.00	1.00	0.49		1.49			
31/07/2023	2.94	0.98				1.00	0.82	0.83		1.65			
1/08/2023	1.52					2.65	0.88	0.35		1.23			
2/08/2023	1.18					1.58	0.86	0.37		1.24			
3/08/2023	2.54					0.00	0.86	0.50		1.36			
4/08/2023	1.58					2.65	0.96	0.72		1.69			
5/08/2023	2.62					0.00	0.56	0.48		1.04			
6/08/2023	2.85		1.54			0.00	1.68	0.09		1.77			
7/08/2023	2.09		1.13			0.00	0.37	0.00		0.37			
8/08/2023	0.76					2.87	1.02	0.52		1.54			
9/08/2023	0.29					1.74	0.84	0.43		1.27			
10/08/2023	0.43					2.76	2.59	0.31		2.90			
11/08/2023	0.17					2.59	0.83	1.50		2.33			
12/08/2023	1.35					0.00	0.98	0.25		1.18			
13/08/2023	2.99					0.00	0.90	0.74		1.64			
14/08/2023	1.61					2.51	1.03	0.09		1.13			
15/08/2023	1.61									0.00			
16/08/2023	1.61									0.00			

	FREEBOARD	INFLOWS					OUTFLOWS						
Date	Calculated (ML)	Transfers from LNAR2 (ML)	Transfers from LNAR4 (ML)	Transfers from SW2 (ML)	Transfers from CT Basin (ML)	Transfers from Settling Ponds (ML)	Volume to Evaps / Atomisers (ML)	Volume for Dust Suppression (incl Tanker) (ML)	Volume for WCA Ash Conditioning (ML)	Daily Total Volume Used at the Repository (ML)	Overflow to LNAR4 (ML)	Transfers to SW2 (ML)	Transfers to Settling Ponds (ML)
17/08/2023	0.08					2.70	0.83	0.34		1.17			
18/08/2023	0.59						0.51			0.51			
19/08/2023	0.59												
20/08/2023	1.58						0.99			0.99			
21/08/2023	-0.18					2.98	0.90			1.22			
22/08/2023	0.97						0.75	0.40		1.15			
23/08/2023	0.02					2.85	1.29	0.61		1.90			
24/08/2023	1.36						0.84	0.50		1.34			
25/08/2023	2.29						0.71	0.22		0.93			
26/08/2023	0.59					3.00	0.72	0.58		1.30			
27/08/2023	1.67						0.67	0.41		1.08			
28/08/2023	2.97						0.77	0.53		1.30			
29/08/2023	1.05					3.25	0.92	0.41		1.33			
30/08/2023	2.55						0.98	0.52		1.50			
31/08/2023	4.23						0.88	0.80		1.68			
1/09/2023	2.01					3.02	0.71	0.09		0.80			
2/09/2023	3.03					0.00	0.36	0.66		1.02			
3/09/2023	3.87					0.00	0.65	0.19		0.84			
4/09/2023	1.27					3.14	0.00	0.54		0.54			
5/09/2023	1.75						0.00			0.48			
6/09/2023	2.54						0.00	0.79		0.79			
7/09/2023	3.26						0.00	0.72		0.72			
8/09/2023	0.66					3.29	0.00	0.69		0.69			
9/09/2023	0.66						0.00	0.00		0.00			
10/09/2023	0.93						0.00	0.27		0.27			
11/09/2023	1.52						0.00	0.59		0.59			
12/09/2023	0.13					2.20	0.00	0.81		0.81			
13/09/2023	1.38					0.00	0.00	1.25		1.25			
14/09/2023	2.05					0.00	0.00	0.67		0.67			

Comments
0.38ML Used Dust Suppression
0.39 ML Used Dust Suppression
0.8 Used Dust Suppression
0.1 Used Dust Suppression
1.5ML Used Dust Suppression
1.14 Used Dust Suppression/ Received External Transfer Sett pond B 2ML (un metered)
1.07ML Used Dust Supression Received 2.33ML External Transfer Sett Pond B
0.75ML Used Dust Suppression
0.8ML Used dust suppression 0.34ML Transferred SW2 Water Tanker Fill Point
0.42 Ml Used Dust Suppression received External transfer Sett Pond B 1.04ML + 2.56 ML Overnight
0.89ML Used Dust suppression Received 3.24ML Sett Pond B
0.97 Used Dust Suppression Received 3.42 ML Sett Pond B (Overboarding LNAR4)
0.2ML used Dust Suppression
0.7 Used Dust Suppression
1.12ML Used Dust Suppression
Received B Pond Inflow 2.92 ML (Overboard to 4)
Used 0.2ML Dust Suppression
0.49ML Used Ash Conditioning
0.4ML Used Ash Conditioning
0.36 ML Used Dust Suppression
1.18 Used Dust Suppression
0.35 Used Dust Suppression
0.31 Used Dust Suppression
1.24 Used Dust Suppression
0.58 Used Ash Conditioning
0.3 Used Ash Conditioning
0.35 Used Ash Conditioner 0.8 Used Dust Suppression Received 1.43ML C Settling Pond
0.91 used Dust Suppression 0.46ML Used Ash Conditioning
0.41 Used Ash Conditioning 1.01 Used Dust Suppression (Received Overnight Transfer B Settling Pond 0.82ML)
0.48 Used Dust Suppression 1.24 Used Dust Suppression Received 1.82ML B Settling Pond
0.46 Used AshCond 1.03 Used Dust Suppression Received 1.39 ML Overnight Sett Pond B
0.46 ML used Dust Suppression 1.15 Used Dust Suppression Received 1.67ML B Settling Pond Overnight
0.25 ML used as ash conditioning, 1.06 Used as dust suppression, Received 2.51 B settling pond overnight
0.21 Used A/C 1.22 Used D/S Received 1.23ML Settling Pond B Overnight
0.31 Used A/C 1.86 Used D/S Received 1.57ML Sett Pond B Overnight
0.46 Used A/C 1.55 Used D/S Received 1.52ML Sett Pond B Overnight
Received 1.05ML cooling Tower Basin Daily & 1.58 Sett Pond D Overnight
0.43 Used A/C 1.1 Used D/S Received Transfer B Sett Pond Overnight
Brine Ashing 0.55 Used Dust Suppression 2.53ML Received Overnight
0.3 Used Ash Conditioning 0.4 Used Dust Suppression
Brine Ashing 1.1 ML Used Dust Suppression
Brine Ashing 1.01 used dust suppression Received 2.12 transfer Sett Pond D Overnight
Brine Ashing 1.62ML Used Dust Suppression
Brine Ashing 1.26 Used dust Suppression
Brine Ashing 1.28 Used dust Suppression 1.53 ML Received Sett Pond D Overnight
Brine Ashing 1.33 used dust suppression received sett pond B overnight
Brine Ashing 0.63 Used Dust Suppression
0.21 Used Ash Conditioning Received 2.3ML LNAR2 Received 1.58 Sett Pond D
0.23 Used Ash conditioning received 0.7ML LNAR2 Used 0.83 Dust suppression Received 1.79 D Settling Pond overnight

Comments
0.28 Used Ash Conditioning Nil Dust Suppression Received 1 ML D Settling Pond Overnight
0.29 Used Ash Conditioning
0.3 Ash Cond 1.6 used Dust suppression received 1.49ML Sett Pond D Overnight
0.28 Used Ash cond 1.82 used dust suppression Received 1.39ML Sett Pond D Overnight
0.37 Used Ash cond 1.73 Used Dust Suppression Received 2.54ML Sett Pond B Overnight
0.22 Used Ash Cond 1.54 Used Dust Suppression Received 1.58ML Sett Pond B Overnight
0.22 Used Ash Cond 1.88 Used Dust Suppression Received 1.68ML Sett Pond B Overnight
0.13 Ash Cond 1.3 Used Dust Suppression Received 1.47 Sett Pond B Overnight
0.6 Used Dust Suppression Received 1.05 ML Overnight
1.03 Used dust suppression NIL Transfers Due To Pond Levels 0.36ML Used Ash cond B Sett Pond
1.27Used Dust Suppression Received 2.68 ML Sett Pond B Overnight 0.17 Used Ash Cond B Pond
1.43 Used Dust Suppression 0.58 Evaps Received 1.98ML D Pond Overnight
1.21 Used Dust Suppression 0.43 Evaps Received 2.49 Sett Pond D Overnight
1.52 Used Dust Suppression 0.4 Evaps Received 2.29 ML D Pond Overnight
0.91 Used Dust Suppression 0.43 Evaps 0.27 Ash Cond D Pond Received 1.77ML D Pond Overnight 0.5 ML Transferred SW2
1.68 Used D/S 0.37 Evaps Received2ML D Pond Overnight
0.24 A/C 1.04 A/C 0.58 Evaps Received2.26 D Pond Overnight
0.41 D/S 0.66 Evaps Received 2.21 ML
0.41 SW2 0.41 Evaps NO fresh transfer due to Opus transfer
1.17 D/S 0.47 Evaps Received 1.84 D Pond Overnight
1.27 D/S 0.4 Evaps Received 1.78 D Pond Overnight
1.02 D/S 0.43 Evaps Received 2.37 Sett Pond C Overnight
1.39 D/S 0.4 Evaps Nil External Transfers
1.53 D/S 0.41 Evaps Received 0.72ML D Pond Overnight
1.15D/S 0.24 Evaps 1.28ML Received D Pond Overnight
0.1 D/S 0.1 Evaps Reveived Daily Transfer D Pond 0.8ML
Received 1.22ML Daily Transfer D Pond
LNAR5 0.39 Evaps 0.51 Ash Cond 0.1 Received 0.66 D Pond
Evaps 0.89 Received 1.41ML D Pond Daily Transfer
Evaps 1.07 Ash Cond 0.28 0.8 Transferred SW2 Received 2.31 ML D Pond
Evaps 1.02 Ash Cond 0.21 Received 2.34 ML D Pond
Evaps 0.8 Ash Cond 0.28 Nil External Transfers Due To Rain Event
Evaps 0.29 Ash Cond 0.1 Nil External Transfers Due To Rain Event
Evaps 0.76 A/C 0.21 Received 1.83 LNAR2
Evaps 0.92 A/C 0.12
Evaps0.94 D/S 0.5
Evaps 0.85 D/S 0.39 A/C 0.16
Evaps 0.86 A/C 0.2 received 1.18ML LNAR2
Received 0.94 LNAR2
Evaps 0.92 A/C 0.15 Received 3.38 D Pond
Evaps 0.96 A/C 0.17 SW2 0.89 Received 2.51 D Pond Overnight
Evaps 0.88 D/S 0.65 Nil Transfers Overnight
Evaps 0.7
Evaps 1.06 D/S 0.04 Received 3.6ML D Pond Overnight
Evaps 1.04 SW2 0.05
Evaps 0.94 D/S 0.23
Evaps 0.97 D/S0.37 Received 2.35 D Pond Overnight
Evaps 0.95 D/S 0.25 Received 0.3ML D Pond
Evaps 0.99
Evaps 0.94 Received 1.54 LNAR2 Received 2.58 D Pond Overnight
Evaps 0.81 SW2 0.64 Nil Transfers Overnight
Evaps 0.9 D/S 0.56 SW2 0.2 Received 2.64 D Pond overnight
Evaps 1 D/S0.56 Nil Transfers
Evaps 0.96 D/S 0.66 W/C0.2 Received 2.4ML D Pond Overnight
Evaps 0.92 D/S 0.54 W/T 0.87 Received 2.23 ML D Pond Overnight
Evaps 0.95 D/S 0.26 Received 2.3 ML D Pond Overnight
Evaps 1.03
Evaps 1.04 D/S 0.38 Nil Transfers Overnight

Comments
Evaps 1.01 Received 1.8ML Sett Pond B Overnight
Evaps 1.0 D/S 0.55 Received 0.4ML D Pond Overnight
Evaps 0.89 Received 1.1 D Pond Pump needs change out due to delivery capacity
Evaps 0.83 D/S 0.21 Received 2.07 D Pond Overnight
Evaps 0.96 D/S 0.3 Received 1.76 ML D Pond Overnight
Evaps 1.09 D/S 0.5 Received 1.82 D Pond Overnight
Evaps 1.05 D/S 0.57
Evaps 1.02
Evaps 1.18 Received 2.87 ML D Pond Overnight Significant Rain Event
Evaps 1.09 BAC 0.372 Received 1.72 D Pond Overnight Received 1.35LNAR2 Transferred 2.35 SW2
Evaps 1.01 D/S 0.58 Received 1.48 LNAR2
Evaps 0.69 D/S 0.68 NIL Transfers Due To EA Circulation
Evaps 0.88 D/S 0.27 Received 1.59 ML B Settling Pond Overnight
Evaps 0.91 D/S 0.41 Received 2.53ML Sett Pond B Overnight
Evaps 0.89 D/S 0.22 Ash Cond 0.52
Evaps 0.89 Ash Cond 0.59 Received 1.56ML B Settling Overnight
Evaps 1.03 Ash Cond 0.53 Reaceived 2.11 B Settling Pond Overnight
Evaps 0.96 D/S 0.45 Received 2.74 B Settling Pond Overnight
Evaps 0.34
Evaps 0.52 D/S 0.52
Evaps 0.61 D/S 0.41 Received 2.51 C Settling Pond
Evaps 0.94 D/S 0.21
Evaps 1.08 D/S 0.28 0.43 Transferred 0.43 to SW2
Evaps 1.09 D/S 0.25 2.37 Received 2.37 C Settling Pond Overnight
Evaps 1.0 D/S 0.44
Evaps 0.96 D/S 0.51
Evaps 0.98 D/S0.21 Received 2.64 B Sett Pond Overnight
Evaps 0.78 D/S 0.47 Received 2.43 C Settling Pond Overnight
Evaps 0.85 D/S 0.51 No Overnight Transfers Due To Low Level Settling Ponds
Evaps 0.95 D/S 0.77 Received 2.43 C Settling Pond Overnight
Evaps 0.72 D/S 0.28 No Transfers Due To Low Level Settling Ponds
Evaps 0.85 D/S 0.66 Received 2.15ML settling Pond C Overnight
Evaps 0.52 D/S 0.42 Received 1.17ML Settling Pond C Overnight
Evaps 0.74 D/S 0.79 Received 2.42ML Settling Pond C Overnight
Evaps 1.03 D/S 0.11
Evaps 0.33
Evaps 0.53 D/S 0.15 Received 2.93 ML C Pond Overnight
Evaps 0.77 D/S 0.61
Evaps 0.79 D/S 0.51
Evaps 0.94 D/S 0.26 Received 2.59 ML C Pond Overnight
Evaps0.74 D/S 0.59
Evaps 0.38
D/S 0.1 Received 1.65 ML C Sett Pond Overnight
Received 1.64 ML C Sett Pond Overnight
Received 1.68ML C Sett Pond Overnight
Evaps 0.54 Ash Cond 0.212
Evaps 0.84 WCA 0.35 D/S 0.44 Received 2.38ml C sett pond overnight
Evaps 0.89 WCA 0.319 D/S 0.12
Evaps 0.8 D/S 0.37 WCA 0.374 Received 2.11ML B sett Pond Overnight
Evaps 0.76 D/S 0.62 WCA 0.41 Received 2.27 B Sett Pond Overnight
Evaps 0.28 D/S 0.19 Received 1.42 B Sett Pond Overnight
Evaps 0.66 D/S 0.12 Nil Transfers
Evaps 0.9 D/S 0.54 Received 2.62ML B Sett Pond Overnight
Evaps 2.1 D/S 0.41
Evaps 0.84 D/S 0.47 Received 3.25ML B Sett Pond Overnight
Evaps 0.76
Evaps 0.85 D/S 0.81 Received 3.32ML B Sett Pond Overnight

Comments
Evaps 0.59 D/S 0.32
Evaps 1.86 D/S 0.29 Received 2.5ML B Sett Pond Overnight
Evaps 1.88 D/S0.54
Evaps 0.73 D/S 0.1 Received 2.59 ML C Settling Pond Overnight
Evaps 0.68 D/S 0.1
Evaps 0.75 D/S 0.5 Received 1.95ML C Sett Pond Overnight
Evaps 0.85 D/S 0.74 Received 2.42 C Sett Pond Overnight
Evaps 0.89 D/S 0.94 Received 2.03 ML Sett Pond C Overnight
Evaps 0.84 D/S 0.12 NIL External Transfers
Evaps 0.81 received 2.32 ML C Sett Pond Overnight
Evaps 2.1 D/S 0.3 Received 0.427 LNAR4
Evaps 2.17 D/S 0.42 Received 0.427 LNAR4
Evaps 1.36 D/S0.54 Received 0.427 LNAR4 WCA 0.456
Evaps 1.32 D/S 0.27 Received 0.427 LNAR4 Received 2.07 ML Sett Pond C WCA 0.333
Evaps 0.66 Received 2.69ML C Sett Pond Received .45 LNAR4
Evaps 0.84 Received 0.25 LNAR4
Evap[s 2.15 Received 0.38 LNAR4 D/S 0.28 WCA 0.37 Received 2.05ML C Sett Pond
Evaps 1.04 D/s 0.11 No Internal Transfers due to low sett pond level
Evaps 0 D/S 0 1.67 Received sett Pond B
Evaps 0.32 D/S 0.4 Received 1.24 Sett Pond B
Evaps 0 D/S 0 Received 2.06 Sett Pond B
Evaps 0.87 D/S 0.3
Daily transfer due to Rain Event
Nil Transfers Due To Opus transfer
Late Start Due To Heavy Frost
Late Start Due To Large Frost
Sett Pond Level Low
B/C Sett Pond Level Low
SS Replaced Pre filter & Fuel Filter On Sett Pond Trailer Mount Pump
B/C Sett Pond Level Low
B/C Sett Pond Level Low
B/C Sett Pond Level Low
CSP Level Is Getting Low
Both Settling Pond levels Low
Wet Weather

Comments
Advised By EA Settling Pond C Will Be Receiving Inflows From CSP
Sett Pond Levels Low
Sett Pond Levels Low
Sett Pond Levels Low
Evaps not run for water conservation due to sett pond low level management
Evaps not run for water conservation due to sett pond low level management
Evaps not run for water conservation due to sett pond low level management
Rain Event

ASH CONDITIONING SUMMARY

Colour Legend Instructions	Copy Formula	Enter Data	Enter Data

Date	WCA			BCA			
	From LNAR5 (ML)	From Settling Ponds (ML)	Total (ML)	From LNAR3 (ML)	From Waste Pond A (ML)	From Waste Pond B (ML)	TOTAL (kL)
1/01/2023			0				0
2/01/2023			0				0
3/01/2023			0				0
4/01/2023			0				0
5/01/2023			0				0
6/01/2023			0				0
7/01/2023			0				0
8/01/2023			0				0
9/01/2023			0				0
10/01/2023			0				0
11/01/2023			0				0
12/01/2023			0				0
13/01/2023			0				0
14/01/2023			0				0
15/01/2023			0				0
16/01/2023			0				0
17/01/2023			0				0
18/01/2023			0				0
19/01/2023			0				0
20/01/2023			0				0
21/01/2023			0				0
22/01/2023			0				0
23/01/2023	0.49		490				0
24/01/2023	0.40		400				0
25/01/2023			0				0
26/01/2023			0				0
27/01/2023			0				0
28/01/2023			0				0
29/01/2023			0				0
30/01/2023	0.58		580				0
31/01/2023	0.30		300				0
1/02/2023	0.35		350				0
2/02/2023	0.46		460				0
3/02/2023	0.41		410				0
4/02/2023	0.48		480				0
5/02/2023	0.46		460				0
6/02/2023	0.46		460				0
7/02/2023	0.25		250				0
8/02/2023	0.21		210				0
9/02/2023	0.31		310				0
10/02/2023	0.46		460				0
11/02/2023			0				0
12/02/2023	0.43		430				0
13/02/2023			0				0
14/02/2023	0.30		300				0
15/02/2023			0				0
16/02/2023			0				0
17/02/2023			0				0
18/02/2023			0				0
19/02/2023			0				0
20/02/2023			0				0
21/02/2023			0				0
22/02/2023	0.21		210				0
23/02/2023	0.23		230				0
24/02/2023	0.28		280				0
25/02/2023	0.29		290				0
26/02/2023	0.30		300				0
27/02/2023	0.28		280				0
28/02/2023	0.37		370				0
1/03/2023	0.22		220				0
2/03/2023	0.22		220				0
3/03/2023	0.13		130				0
4/03/2023			0				0
5/03/2023			0				0

Date	WCA			BCA			
	From LNAR5 (ML)	From Settling Ponds (ML)	Total (ML)	From LNAR3 (ML)	From Waste Pond A (ML)	From Waste Pond B (ML)	TOTAL (kL)
6/03/2023			0				0
7/03/2023			0				0
8/03/2023			0				0
9/03/2023			0				0
10/03/2023	0.27		270				0
11/03/2023			0				0
12/03/2023	0.24		240				0
13/03/2023			0				0
14/03/2023			0				0
15/03/2023			0				0
16/03/2023			0				0
17/03/2023			0				0
18/03/2023			0				0
19/03/2023			0				0
20/03/2023			0				0
21/03/2023			0				0
22/03/2023			0				0
23/03/2023	0.10		100				0
24/03/2023			0				0
25/03/2023	0.28		280				0
26/03/2023	0.21		210				0
27/03/2023	0.28		280				0
28/03/2023	0.10		100				0
29/03/2023	0.21		210				0
30/03/2023	0.12		120				0
31/03/2023			0				0
1/04/2023	0.16		160				0
2/04/2023	0.20		200				0
3/04/2023			0				0
4/04/2023	0.15		150				0
5/04/2023	0.17		170				0
6/04/2023			0				0
7/04/2023			0				0
8/04/2023			0				0
9/04/2023			0				0
10/04/2023			0				0
11/04/2023			0				0
12/04/2023			0				0
13/04/2023			0				0
14/04/2023			0				0
15/04/2023			0				0
16/04/2023			0				0
17/04/2023			0				0
18/04/2023	0.20		200				0
19/04/2023	0.87		870				0
20/04/2023			0				0
21/04/2023			0				0
22/04/2023			0				0
23/04/2023			0				0
24/04/2023			0				0
25/04/2023			0				0
26/04/2023			0				0
27/04/2023			0				0
28/04/2023			0				0
29/04/2023			0				0
30/04/2023			0				0
1/05/2023			0				0
2/05/2023	0.37		372				0
3/05/2023			0				0
4/05/2023			0				0
5/05/2023			0				0
6/05/2023			0				0
7/05/2023	0.52		520				0
8/05/2023	0.59		590				0
9/05/2023	0.53		530				0
10/05/2023			0				0
11/05/2023			0				0
12/05/2023			0				0
13/05/2023			0				0

Date	WCA			BCA			
	From LNAR5 (ML)	From Settling Ponds (ML)	Total (ML)	From LNAR3 (ML)	From Waste Pond A (ML)	From Waste Pond B (ML)	TOTAL (kL)
14/05/2023			0				0
15/05/2023			0				0
16/05/2023			0				0
17/05/2023			0				0
18/05/2023			0				0
19/05/2023			0				0
20/05/2023			0				0
21/05/2023			0				0
22/05/2023			0				0
23/05/2023			0				0
24/05/2023			0				0
25/05/2023			0				0
26/05/2023			0				0
27/05/2023			0				0
28/05/2023			0				0
29/05/2023			0		0.467		467
30/05/2023			0		0.410		410
31/05/2023			0		0.403		403
1/06/2023		0.272	272		0.383		383
2/06/2023		0.377	377		0.000		0
3/06/2023		0.190	190		0.000		0
4/06/2023			0		0.000		0
5/06/2023		0.312	312		0.583		583
6/06/2023		0.213	213		0.000		0
7/06/2023	0.212		212		0.000		0
8/06/2023	0.350		350		0.000		0
9/06/2023	0.319		319		0.000		0
10/06/2023	0.374		374		0.000		0
11/06/2023	0.410		410		0.000		0
12/06/2023			0		0.490		490
13/06/2023		0.081	81		0.326		326
14/06/2023		0.238	238		0.084		84
15/06/2023			0		0.431		431
16/06/2023			0		0.367		367
17/06/2023			0		0.384		384
18/06/2023			0		0.527		527
19/06/2023			0		0.482		482
20/06/2023			0		0.820		820
21/06/2023			0		0.375		375
22/06/2023			0		0.721		721
23/06/2023			0		0.359		359
24/06/2023			0		0.556		556
25/06/2023			0		0.455		455
26/06/2023			0		0.519		519
27/06/2023			0		0.461		461
28/06/2023			0		0.428		428
29/06/2023			0		0.584		584
30/06/2023			0		0.582		582
1/07/2023			0		0.394		394
2/07/2023	0.456		456		0.000		0
3/07/2023	0.333		333		0.398		398
4/07/2023			0		0.384		384
5/07/2023			0		0.491		491
6/07/2023	0.370		370		0.167		167
7/07/2023			0		0.327		327
8/07/2023			0		0.460		460
9/07/2023			0		0.416		416
10/07/2023			0		0.477		477
11/07/2023			0		0.572		572
12/07/2023			0		0.318		318
13/07/2023			0		0.360		360
14/07/2023			0		0.279		279
15/07/2023			0		0.315		315
16/07/2023			0		0.291		291
17/07/2023			0		0.593		593
18/07/2023	0.48		482		0.239		239
19/07/2023	0.32		323		0.000		0
20/07/2023			0		0.290		290
21/07/2023			0		0.429		429

Date	WCA			BCA			
	From LNAR5 (ML)	From Settling Ponds (ML)	Total (ML)	From LNAR3 (ML)	From Waste Pond A (ML)	From Waste Pond B (ML)	TOTAL (kL)
22/07/2023			0		0.417		417
23/07/2023			0		0.523		523
24/07/2023	0.49		488		0.323		323
25/07/2023			0		0.408		408
26/07/2023			0				0
27/07/2023			0				0
28/07/2023			0				0
29/07/2023			0				0
30/07/2023			0		0.772		772
31/07/2023			0		0.502		502
1/08/2023			0		0.072		72
2/08/2023			0		0.496		496
3/08/2023			0		0.439		439
4/08/2023			0		0.343		343
5/08/2023			0		0.366		366
6/08/2023			0		0.429		429
7/08/2023			0		0.465		465
8/08/2023			0		0.469		469
9/08/2023			0		0.457		457
10/08/2023			0		0.416		416
11/08/2023			0		0.377		377
12/08/2023			0		0.413		413
13/08/2023			0		0.343		343
14/08/2023			0		0.748		748
15/08/2023			0		0.330		330
16/08/2023			0		0.427		427
17/08/2023			0		0.457		457
18/08/2023			0		0.345		345
19/08/2023			0		0.404		404
20/08/2023			0		0.421		421
21/08/2023			0		0.393		393
22/08/2023			0		0.390		390
23/08/2023			0		0.336		336
24/08/2023			0		0.297		297
25/08/2023			0		0.304		304
26/08/2023			0		0.358		358
27/08/2023			0		0.565		565
28/08/2023			0		0.457		457
29/08/2023			0		0.412		412
30/08/2023			0		0.326		326
31/08/2023			0		0.385		385
1/09/2023			0		0.420		420
2/09/2023			0		0.372		372
3/09/2023			0		0.469		469
4/09/2023			0		0.508		508
5/09/2023			0		0.467		467
6/09/2023			0		0.559		559
7/09/2023			0		0.389		389
8/09/2023			0		0.397		397
9/09/2023			0		0.260		260
10/09/2023			0		0.429		429
11/09/2023			0		0.483		483
12/09/2023			0		0.468		468
13/09/2023			0		0.438		438
14/09/2023			0		0.417		417

APA Receival Bin Sump

Date	Flow to Settling Pond C (ML)
28/05/2023	
29/05/2023	
30/05/2023	
31/05/2023	
1/06/2023	
2/06/2023	
3/06/2023	
4/06/2023	
5/06/2023	
6/06/2023	
7/06/2023	
8/06/2023	
9/06/2023	
10/06/2023	
11/06/2023	
12/06/2023	0.04
13/06/2023	0.01
14/06/2023	
15/06/2023	
16/06/2023	
17/06/2023	
18/06/2023	0.06
19/06/2023	
20/06/2023	
21/06/2023	
22/06/2023	
23/06/2023	0.20
24/06/2023	
25/06/2023	
26/06/2023	
27/06/2023	
28/06/2023	
29/06/2023	0.02
30/06/2023	
1/07/2023	
2/07/2023	
3/07/2023	
4/07/2023	
5/07/2023	
6/07/2023	
7/07/2023	0.08
8/07/2023	
9/07/2023	
10/07/2023	
11/07/2023	
12/07/2023	
13/07/2023	
14/07/2023	
15/07/2023	
16/07/2023	
17/07/2023	
18/07/2023	
19/07/2023	
20/07/2023	
21/07/2023	

Date	Flow to Settling Pond C (ML)
22/07/2023	
23/07/2023	
24/07/2023	
25/07/2023	
26/07/2023	
27/07/2023	
28/07/2023	
29/07/2023	
30/07/2023	
31/07/2023	
1/08/2023	
2/08/2023	
3/08/2023	
4/08/2023	
5/08/2023	0.03
6/08/2023	
7/08/2023	
8/08/2023	
9/08/2023	
10/08/2023	0.03
11/08/2023	
12/08/2023	
13/08/2023	
14/08/2023	
15/08/2023	0.10
16/08/2023	0.04
17/08/2023	
18/08/2023	
19/08/2023	0.79
20/08/2023	
21/08/2023	
22/08/2023	
23/08/2023	
24/08/2023	
25/08/2023	
26/08/2023	
27/08/2023	
28/08/2023	
29/08/2023	
30/08/2023	
31/08/2023	
1/09/2023	0.07
2/09/2023	
3/09/2023	
4/09/2023	
5/09/2023	
6/09/2023	
7/09/2023	
8/09/2023	
9/09/2023	0.13
10/09/2023	
11/09/2023	
12/09/2023	
13/09/2023	
14/09/2023	

Leachate Collection Sump 1 and 2	Leachate Volume (L)	Leachate Delivery
LNAR Stage 1A Underliner Leachate Pipeline Sump 1	-	LNAR 3
LNAR Stage 1A Liner Leachate Pipeline Sump 1	77	LNAR 3
LNAR Stage 1A Underliner Leachate Pipeline Sump 2	21	LNAR 3
LNAR Stage 1A Liner Leachate Pipeline Sump 2	12,823	LNAR 3

Annual Summary - 2022

Leachate Collection Sump 1 and 2	Leachate Volume (L)												
	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Totals
LNAR 1A Underliner Leachate Pipeline Sump 1	0	0	0	0	0	0	0	0	0	0	0	0	-
LNAR 1A Liner Leachate Pipeline Sump 1	0	0	0	0	0	0	0	77	0	0	0	0	77
LNAR 1A Underliner Leachate Pipeline Sump 2	0	0	0	0	0	0	0	0	21	0	0	0	21
LNAR 1A Liner Leachate Pipeline Sump 2	12,000	0	0	0	0	0	0	0	430	205	188	0	12,823

Annual Summary - 2022

LNAR Lined Storage Ponds	Inter Liner Leak Detection Sump											
	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23
LNAR 3 (Formerly BWA)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LNAR 4 (Formerly BWB)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
LNAR 5 (Formerly BWC)	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

LocCode	Field_ID	Sampled_Date-Time	Field Parameters						Ionic Balance	Major Anions and Cations														
			Dissolved Oxygen (Field)	Dissolved Oxygen (Field) (Filtered)	Electrical Conductivity (Field)	pH (Field)	Redox (Field)	Temperature (Field)	Hardness as CaCO3 (Filtered)	Carbonate (as CaCO3)	Bicarbonate Alkalinity (as CaCO3)	Calcium	Calcium (Filtered)	Carbonate Alkalinity (as CaCO3)	Chloride	Fluoride	Magnesium	Magnesium (Filtered)	Phenolphthalein Alkalinity	Potassium	Potassium (Filtered)	Sodium	Sodium (Filtered)	Sulfate (as SO4)
			mg/L	mg/L	uS/cm	pH units	mV	oC	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC (2000) or Local Guidelines - Surface Water					2200	6.5-8									350	1.5								1000
LN Pond 2	Lamberts North Pond 2	28/09/2022	-	-	278	7.83	-	14	61.1	-	50.75	13.1	28.5	50.75	6.89	0.289	9	7.92	0	7.69	5.56	30.6	31.2	83
LN Pond 2	Lamberts North Pond 2	18/10/2022	7	7	233	6.95	162.2	16.5	48.3	-	45.77	9.61	8.82	45.77	5.5	0.285	7.71	6.39	0	5.84	4.51	24.7	22.6	65.6
LN Pond 2	Lamberts North Pond 2	23/11/2022	-	9.3	221	7.54	162.5	-	-	-	44.22	10.6	8.07	44.22	5.08	0.251	7.48	5.86	0	7.13	4.19	25.5	24.4	62.1
LN Pond 2	Lamberts North Pond 2	12/12/2022	-	6.1	376	7.96	140.6	-	-	-	61.31	15.4	39	61.31	9.6	0.383	10.9	10	0	7.53	6.85	41.5	42.5	112
LN Pond 2	Lamberts North Pond 2	9/01/2023	-	6.1	1650	8.74	116.2	-	-	-	125.6	29.1	69.2	125.6	48.5	1.15	15.8	15.2	0	27.2	26	296	291	590
LN Pond 2	Lamberts North Pond 2	14/02/2023	-	6	1440	9.56	146.1	-	-	42.21	84.42	29.9	69.4	126.6	60.5	0.949	15.9	14.5	21.11	22	22.1	235	224	574
LN Pond 2	Lamberts North Pond 2	21/03/2023	-	6.8	1180	8.28	92.1	-	-	-	117.3	32	29.4	117.3	58.3	0.944	18.1	16.6	0	19	17.9	196	184	578
LN Pond 2	Lamberts North Pond 2	18/04/2023	-	8.8	870	8.05	15.1	-	-	-	98	26.3	26.5	98	33.7	0.637	14.8	14.7	0	15.2	14.8	123	130	305
LN Pond 2	Lamberts North Pond 2	17/05/2023	-	10.6	780	8.12	111.9	-	-	-	75.33	26.4	24.5	75.33	26.6	0.601	14.5	13.5	0	13.3	12.6	107	105	262
LN Pond 2	Lamberts North Pond 2	27/06/2023	-	9.7	900	8.15	110.2	-	-	-	88.32	31.3	32.9	88.32	26.8	<1	16.8	17.2	0	13.7	14.2	114	118	305
LN Pond 2	Lamberts North Pond 2	27/07/2023	-	10.3	940	8.18	54.3	-	-	-	89.7	36.4	34.5	89.7	27.7	0.506	18.9	18.4	0	15.1	14.8	122	120	309
LN Pond 2	Lamberts North Pond 2	23/08/2023	-	10.2	800	8.22	95.2	-	-	-	75.21	30.9	30.1	75.21	26.9	0.546	17	16.7	0	14	13.9	104	102	287
LNAR 3	LNAR 3	28/09/2022	-	-	354	8.36	-	15.5	65.7	-	77.61	13.9	33	77.61	10.5	0.332	8.43	7.96	0	7.39	6.38	45.7	46.3	101
LNAR 3	LNAR 3	18/10/2022	7.5	7.5	352	7.95	136.4	14.8	61.3	-	65.67	13.2	12.4	65.67	10.3	0.365	8.47	7.37	0	6.87	5.81	44	40.1	96.4
LNAR 3	LNAR 3	23/11/2022	-	9.7	338	7.61	198.6	-	-	-	65.33	13.1	12.1	65.33	9.25	0.335	7.53	6.76	0	6.37	5.09	43.7	41.8	90.3
LNAR 3	LNAR 3	12/12/2022	-	6.4	361	7.73	165.2	-	-	-	71.36	14.8	31.7	71.36	10.3	0.34	9.49	7.49	0	6.98	5.49	46.7	42.7	96.5
LNAR 3	LNAR 3	9/01/2023	-	5.2	59,600	10.49	73.7	-	-	32,960	1005	26.9	45.9	33,970	7150	53.2	26.6	14.8	16,480	1640	1800	21,700	23,600	12,300
LNAR 3	LNAR 3	14/02/2023	-	8.3	9570	10.41	132.6	-	-	2303	344.7	5.74	15.6	2648	914	6.28	4.14	4.27	1152	170	168	2360	2290	1820
LNAR 3	LNAR 3	21/03/2023	-	1.4	63,900	10.38	40.8	-	-	32,400	2900	15.7	11.7	35,300	8380	69.6	31.8	23.9	16,200	1800	1890	26,400	27,600	14,400
LNAR 3	LNAR 3	18/04/2023	-	15.8	60,090	10.5	14.8	-	-	31,200	-	24.6	8.78	31,200	6760	51.4	45.7	21.7	15,600	1670	1530	24,100	22,500	13,200
LNAR 3	LNAR 3	17/05/2023	-	16.3	48,220	10.21	88.9	-	-	6520	570	20.6	16.3	7090	10,700	27.1	65.5	59.6	3260	1270	1180	15,200	14,100	19,600
LNAR 3	LNAR 3	27/06/2023	-	9.9	56,110	10.32	89.9	-	-	57,130	3726	32.9	8.38	60,860	10,600	35.6	72.4	65.8	28,570	1460	1490	18,000	18,400	19,300
LNAR 3	LNAR 3	27/07/2023	-	22.6	50,250	9.99	116.3	-	-	6251	1573	22.4	19.5	7825	8790	41.9	78.3	64.6	3126	1500	1280	16,700	14,700	17,100
LNAR 3	LNAR 3	23/08/2023	-	12.4	59,000	10.07	100.4	-	-	9005	-	22.3	18.6	11,330	11,200	47.1	84.3	73.1	6831	1550	1490	18,200	17,300	22,200
LNAR 4	LNAR 4	28/09/2022	-	-	2760	9.97	-	14.2	70.7	111.4	53.73	18.8	45.2	165.2	356	1.5	6.81	6.2	55.72	44.8	44.3	529	526	760
LNAR 4	LNAR 4	18/10/2022	11.3	11.3	2980	9.18	117.4	14.7	98.3	11.94	89.55	26.8	26.9	101.5	395	1.82	8.25	7.56	5.97	52.6	52.8	574	536	801
LNAR 4	LNAR 4	23/11/2022	-	13.2	4690	10.09	116.2	-	-	-	37.19	31.6	30.1	157.8	629	2.59	8.68	7.8	60.3	85.3	78.7	920	867	1260
LNAR 4	LNAR 4	12/12/2022	-	6.2	6080	9.58	123.3	-	-	68.34	91.46	32.4	85.9	159.8	869	2.63	11.4	11	34.17	117	116	1350	1340	1660
LNAR 4	LNAR 4	9/01/2023	-	6.3	6600	9.26	98.4	-	-	-	3216	43.8	108	321.6	1170	3.88	13.7	13.3	0	127	132	1530	1590	2200
LNAR 4	LNAR 4	14/02/2023	-	7.9	2610	9.8	140.1	-	-	56.28	57.29	29.8	66.4	113.6	384	1.66	7.59	6.85	28.14	47.8	46	515	472	1100
LNAR 4	LNAR 4	21/03/2023	-	11.1	2890	9.56	56.2	-	-	-	-	29	28.1	123	316	1.51	7.6	7.37	25.33	48.2	48	582	560	895
LNAR 4	LNAR 4	18/04/2023	-	9.9	3130	9.51	15	-	-	67.33	63.67	29.6	30.6	131	372	1.49	7.72	7.63	33.67	53.9	55.4	603	631	968
LNAR 4	LNAR 4	17/05/2023	-	12.5	3290	9.61	103.8	-	-	49.33	78.33	30.2	28.7	127.7	379	1.59	7.72	7.29	24.67	58.4	56.6	646	624	955
LNAR 4	LNAR 4	27/06/2023	-	10.4	3400	9.38	97.5	-	-	43.47	90.74	28.4	30.5	134.2	406	1.6	7.34	7.63	21.74	54	57.2	636	665	1020
LNAR 4	LNAR 4	27/07/2023	-	11.3	3440	9.35	85.9	-	-	28.98	103.8	31.2	29.9	132.8	409	1.56	7.98	7.78	14.49	56.1	57.9	639	655	1020
LNAR 4	LNAR 4	23/08/2023	-	11.6	3410	9.38	106.7	-	-	48.99	91.08	31.5	30.4	140.1	446	1.79	8.34	8.06	24.5	63.1	61.7	645	628	1100
LNAR 5	LNAR 5	28/09/2022	-	-	631	8.09	-	13.8	72.6	-	71.64	15.2	36.2	71.64	16.6	0.438	9.38	8.83	0	10.2	9.35	94.4	94.6	218
LNAR 5	LNAR 5	18/10/2022	7.2	7.2	444	7.77	151.7	14.8	60.4	-	56.72	12.8	11.6	56.72	10.9	0.376	9.91	7.64	0	8.45	6.57	65.8	52.7	140
LNAR 5	LNAR 5	23/11/2022	-	9.3	670	7.53	182.2	-	-	-	1534	15	13.5	1534	14.6	0.534	8.94	7.84	0	11	9.32	102	99	235
LNAR 5	LNAR 5	12/12/2022	-	7.4	1250	8.08	135.7	-	-	-	99.5	19.6	49.9	99.5	31.9	0.85	11.8	11	0	19.3	19	214	220	456
LNAR 5	LNAR 5	9/01/2023	-	7.4	1850	8.71	105.8	-	-	-	131.7	24.6	56.2	131.7	60.4	1.26	12.2	11.2	0	31.5	28.5	367	344	733
LNAR 5	LNAR 5	14/02/2023	-	6	1430	7.98	175.6	-	-	-	75.38	20.5	48.4	75.38	69.2	0.683	4.66	4.46	0	18.6	19	233	224	502
LNAR 5	LNAR 5	21/03/2023	-	2.3	1710	8.48	81.5	-	-	-	112	22.1	20.8	112	56.1	1.11	7.03	6.66	0	24.5	24.3	342	325	700
LNAR 5	LNAR 5	18/04/2023	-	7.5	1660	8.57	15.6	-	-	-	117.3	19.8	20.5	117.3	74.2	0.958	7.51	7.49	0	24.8	25.2	297	313	563
LNAR 5	LNAR 5	17/05/2023	-	3.8	1750	9.65	95.5	-	-	106.7	117	12.8	11.7	223.7	53.1	0.987	4.61	4.11	53.33	20.2	19.3	346	332	557
LNAR 5	LNAR 5	27/06/2023	-	7.3	1270	8.94	94.7	-	-	-	135.6	12	10.1	135.6	18.4	<1	2.87	2.53	0	11.7	11.5	208	213	385
LNAR 5	LNAR 5	27/07/2023	-	4.3	1110	6.84	136.4	-	-	-	25.58	14.7	13.5	25.58	33	0.529	2.84	2.76	0	11.2	10.4	190	181	332
LNAR 5	LNAR 5	23/08/2023	-	8.6	1460	8.73	97.2	-	-	-	96.95	15.7	14.7	96.95	40.8	0.807	3.52	3.32	0	13.7	13.4	219	213	491
Statistical Summary																								
Number of Results			4	44	48	48	44	8	8	19	45	48	48	48	48	48	48	48	48	48	48	48	48	48
Number of Detects			4	44	48	48	44	8	8	19	45	48	48	48	48	46	48	48	48	48	48	48	48	48
Minimum Concentration			7	1.4	221	6.84	14.8	13.8	48.3	11.94	25.58	5.74	8.07	25.58	5.08	0.251	2.84	2.53	0	5.84	4.19	24.7	22.6	62.1
Minimum Detect			7	1.4	221	6.84	14.8	13.8	48.3	11.94	25.58	5.74	8.07	25.58	5.08	0.251	2.84	2.53	5.97	5.84	4.19	24.7	22.6	62.1
Maximum Concentration			11.3	22.6	63900	10.5	198.6	16.5	98.3	57130	3726	43.8	108	60860	11200	69.6	84.3	73.1	28570	1800	1890	26400	27600	22200
Maximum Detect			11.3	22.6	63900	10.5	198.6	16.5	98.3	57130	3726	43.8	108	60860	11200	69.6	84.3	73.1	28570	1800	1890	26400	27600	22200
Average Concentration			8.3	8.8	9965	8.9	107	15	67	9390	398	23	31	4083	1489	7.8	17	14	1909	256	250	3252	3203	2977
Median Concentration			7.35	8.45	1655	8.735	106.25	14.75	63.5	106.7	89.7	22.35	28.6	120.15	59.35	0.9725	8.97	7.88	0	23.25	23.2	296.5	302	576
Standard Deviation			2	3.8	19718	1	45	0.88	15	16442	854	8.5	21	11784	3245	17	19	16	5625	547	540	7177	7145	5969
Number of Guideline Exceedances			0	0	20	37	0	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	15
Number of Guideline Exceedances(Detects Only)			0	0	20	37	0	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	15

LocCode	Field_ID	Sampled_Date-Time	Minor Anions and Cations		NA		Nutrients										
			Silica (Total)	Silica, Molybdate Reactive (Dissolved)	Oil & Grease	Ortho Phosphorus (as P) (Filtered)	Ammonia	Sulfur	Nitrate	Nitrite (as NO2-)	Nitrite + Nitrate (as N)	Nitrogen (N) - Kjeldahl	Nitrogen (N)	Total Phosphate (PO4)	Total Phosphate (PO4) (Filtered)	Phosphorus	Phosphorus (Filtered)
			µg/L	µg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZECC (2000) or Local Guidelines - Surface Water																	
LN Pond 2	Lamberts North Pond 2	28/09/2022	23,800	4090	<5	-	-	27	300	<10	0.3	0.5	0.8	0.35	<0.1	0.11	0.02
LN Pond 2	Lamberts North Pond 2	18/10/2022	17,700	3810	-0.13	<0.01	<100	19	370	<10	0.37	0.5	0.9	0.52	<0.1	0.17	0.01
LN Pond 2	Lamberts North Pond 2	23/11/2022	-	-	0.03	-	<100	18	290	<10	0.29	1.1	1.4	1.17	<0.1	0.38	<0.05
LN Pond 2	Lamberts North Pond 2	12/12/2022	-	-	0.07	-	<100	35	400	<10	0.4	1.1	1.5	0.67	<0.1	0.22	0.02
LN Pond 2	Lamberts North Pond 2	9/01/2023	-	-	0.64	-	100	205	1510	90	1.6	1.2	2.8	2.79	2.48	0.91	0.81
LN Pond 2	Lamberts North Pond 2	14/02/2023	-	-	<5	-	<100	146	130	90	0.22	1.2	1.4	0.41	0.29	0.14	0.1
LN Pond 2	Lamberts North Pond 2	21/03/2023	-	-	<5	-	460	121	460	50	0.51	1.3	1.8	0.66	0.35	0.22	0.12
LN Pond 2	Lamberts North Pond 2	18/04/2023	-	-	<5	-	240	89	550	<10	0.55	1.4	2	0.86	0.26	0.28	0.08
LN Pond 2	Lamberts North Pond 2	17/05/2023	-	-	<5	-	220	86	510	<10	0.51	1.1	1.6	0.74	<0.1	0.24	0.03
LN Pond 2	Lamberts North Pond 2	27/06/2023	-	-	<5	-	120	97	580	<10	0.58	0.7	1.3	0.16	<0.1	0.05	<0.01
LN Pond 2	Lamberts North Pond 2	27/07/2023	-	-	<5	-	40	103	620	<10	0.62	0.5	1.1	0.25	<0.1	0.08	0.01
LN Pond 2	Lamberts North Pond 2	23/08/2023	-	-	<5	-	20	89	620	<10	0.62	0.4	1	0.13	<0.1	0.04	0.01
LNAR 3	LNAR 3	28/09/2022	14,600	3110	<5	-	-	33	300	<10	0.3	0.7	1	0.41	<0.1	0.13	0.03
LNAR 3	LNAR 3	18/10/2022	15,800	3200	0.01	<0.01	<100	29	340	<10	0.34	0.6	0.9	0.82	<0.1	0.27	0.02
LNAR 3	LNAR 3	23/11/2022	-	-	0.18	-	100	28	290	<10	0.29	0.6	0.9	0.38	<0.1	0.12	<0.05
LNAR 3	LNAR 3	12/12/2022	-	-	0.08	-	<100	29	320	<10	0.32	1.5	1.8	1.38	0.24	0.45	0.08
LNAR 3	LNAR 3	9/01/2023	-	-	5	-	3300	3440	<100	<100	<0.1	23.4	23.4	33.1	26.9	10.8	8.78
LNAR 3	LNAR 3	14/02/2023	-	-	<5	-	200	482	30	240	0.27	2.7	3	1.9	1.5	0.62	0.49
LNAR 3	LNAR 3	21/03/2023	-	-	<5	-	1750	4070	2150	<10	2.15	14.9	17	22.4	21.8	7.31	7.1
LNAR 3	LNAR 3	18/04/2023	-	-	6	-	300	4930	6150	50	6.2	18.5	24.7	21.3	17.5	6.95	5.72
LNAR 3	LNAR 3	17/05/2023	-	-	<5	-	90	4750	20,500	1760	22.3	2.1	24.4	4.59	4.75	1.5	1.55
LNAR 3	LNAR 3	27/06/2023	-	-	<5	-	100	5530	24,200	560	24.8	5	29.8	7.57	2.51	2.47	0.82
LNAR 3	LNAR 3	27/07/2023	-	-	<5	-	570	5790	10,500	17,300	27.8	14.1	41.9	19.3	16	6.3	5.22
LNAR 3	LNAR 3	23/08/2023	-	-	9	-	930	7500	27,500	5310	32.8	10.9	43.7	13.8	11.4	4.5	3.73
LNAR 4	LNAR 4	28/09/2022	12,000	2740	<5	-	-	213	240	20	0.26	0.9	1.2	0.49	0.25	0.16	0.08
LNAR 4	LNAR 4	18/10/2022	8500	3050	0.73	0.03	200	245	400	100	0.5	3.3	3.8	1.27	0.28	0.41	0.09
LNAR 4	LNAR 4	23/11/2022	-	-	0.48	-	<100	396	460	80	0.54	1.7	2.2	1.02	0.6	0.33	0.2
LNAR 4	LNAR 4	12/12/2022	-	-	0.16	-	<100	534	520	60	0.58	0.6	1.2	0.34	0.3	0.11	0.1
LNAR 4	LNAR 4	9/01/2023	-	-	0.24	-	200	671	1070	110	1.18	1	2.2	0.57	0.48	0.19	0.16
LNAR 4	LNAR 4	14/02/2023	-	-	<5	-	<100	237	760	3700	4.46	2	6.5	0.56	0.37	0.18	0.12
LNAR 4	LNAR 4	21/03/2023	-	-	<5	-	40	270	1480	2180	3.66	2.3	6	0.48	0.28	0.16	0.09
LNAR 4	LNAR 4	18/04/2023	-	-	<5	-	20	312	500	1410	1.91	1.4	3.3	0.31	0.28	0.1	0.09
LNAR 4	LNAR 4	17/05/2023	-	-	<5	-	10	279	1390	840	2.23	0.9	3.1	0.22	0.24	0.07	0.08
LNAR 4	LNAR 4	27/06/2023	-	-	<5	-	660	304	1400	540	1.94	1.5	3.4	0.24	0.14	0.08	0.05
LNAR 4	LNAR 4	27/07/2023	-	-	<5	-	410	302	1630	420	2.05	1.5	3.6	0.51	0.17	0.17	0.06
LNAR 4	LNAR 4	23/08/2023	-	-	<5	-	10	359	1720	260	1.98	2	4	0.33	0.2	0.11	0.06
LNAR 5	LNAR 5	28/09/2022	14,900	4960	<5	-	-	71	690	<10	0.69	0.3	1	0.23	0.11	0.08	0.04
LNAR 5	LNAR 5	18/10/2022	23,100	4420	-0.09	<0.01	<100	43	530	<10	0.53	0.9	1.4	0.9	0.1	0.29	0.03
LNAR 5	LNAR 5	23/11/2022	-	-	0.06	-	<100	70	820	<200	0.82	1	1.8	1.04	0.57	0.34	0.19
LNAR 5	LNAR 5	12/12/2022	-	-	0.12	-	100	137	1550	<10	1.55	1.9	3.4	2.45	2.13	0.8	0.69
LNAR 5	LNAR 5	9/01/2023	-	-	0.09	-	200	242	2610	10	2.62	1.6	4.2	4.13	3.78	1.35	1.23
LNAR 5	LNAR 5	14/02/2023	-	-	<5	-	9900	141	3190	590	3.78	12.1	15.9	0.71	0.64	0.23	0.21
LNAR 5	LNAR 5	21/03/2023	-	-	<5	-	800	179	5480	40	5.52	3	8.5	0.98	0.45	0.32	0.15
LNAR 5	LNAR 5	18/04/2023	-	-	<5	-	470	184	3700	320	4.02	2.6	6.6	0.76	0.42	0.25	0.14
LNAR 5	LNAR 5	17/05/2023	-	-	<5	-	5860	163	1380	3900	5.28	7.6	12.9	0.77	0.44	0.25	0.14
LNAR 5	LNAR 5	27/06/2023	-	-	<5	-	8900	124	<10	7430	4.66	12.5	17.2	2.45	0.4	0.8	0.13
LNAR 5	LNAR 5	27/07/2023	-	-	<5	-	3810	117	<200	17,000	14.2	4.5	18.7	1.49	<0.1	0.49	0.03
LNAR 5	LNAR 5	23/08/2023	-	-	<5	-	20,100	153	<10	9590	4.1	19.7	23.8	0.32	0.27	0.1	0.09
Statistical Summary																	
Number of Results			8	8	48	4	44	48	48	48	48	48	48	48	48	48	48
Number of Detects			8	8	18	1	33	48	44	29	47	48	48	48	36	48	45
Minimum Concentration			8500	2740	-0.13	<0.01	10	18	<10	<10	<0.1	0.3	0.8	0.13	<0.1	0.04	<0.01
Minimum Detect			8500	2740	ND	0.03	10	18	30	10	0.22	0.3	0.8	0.13	0.1	0.04	0.01
Maximum Concentration			23800	4960	9	0.03	20100	7500	27500	17300	32.8	23.4	43.7	33.1	26.9	10.8	8.78
Maximum Detect			23800	4960	9	0.03	20100	7500	27500	17300	32.8	23.4	43.7	33.1	26.9	10.8	8.78
Average Concentration			16300	3673	2	0.011	1381	904	2715	1548	4	4	8	3.3	2.5	1.1	0.81
Median Concentration			15350	3505	2.5	0.005	110	171	600	70	1	1.5	3.05	0.75	0.28	0.25	0.09
Standard Deviation			5195	775	1.7	0.013	3620	1837	5920	3830	7.5	5.7	11	6.9	5.9	2.2	1.9
Number of Guideline Exceedances			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LocCode	Field_ID	Sampled_Date-Time	Total Dissolved Solids (TDS)	Total Dissolved Solids (TDS) (Filtered)	Total Suspended Solids (TSS)	Turbidity	TRH >C10-C14 Fraction	TRH >C10-C36 Fraction	TRH >C15-C28 Fraction	TRH >C29-C36 Fraction	TRH >C6-C9 Fraction	Aluminium	Aluminium (Filtered)	Antimony	Antimony (Filtered)	Arsenic	Arsenic (Filtered)	Arsenic III	Arsenic V	Barium	Barium (Filtered)	Beryllium	Beryllium (Filtered)
			Physical Parameters				TRH					Metals											
			mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Surface Water			1500	1500												24	24	24	13	700	700	100	100
LN Pond 2	Lamberts North Pond 2	28/09/2022	202	202	400	-	<50	<50	<100	<50	<20	5540	60	<1	<1	6	<1	-	-	53	18	<1	<1
LN Pond 2	Lamberts North Pond 2	18/10/2022	116	116	78	461	<50	<50	<100	<50	<20	5460	50	<1	<1	5	<1	<1	<1	42	15	<1	<1
LN Pond 2	Lamberts North Pond 2	23/11/2022	-	760	486	1232	-	-	-	-	-	8020	50	<1	<1	6	<1	<1	<1	65	17	<1	-
LN Pond 2	Lamberts North Pond 2	12/12/2022	-	400	31	262	-	-	-	-	-	2640	10	<1	<1	3	<1	<1	<1	39	24	<1	-
LN Pond 2	Lamberts North Pond 2	9/01/2023	-	1156	20.33	51.1	-	-	-	-	-	510	30	<1	<1	9	8	<1	10.5	54	51	<1	-
LN Pond 2	Lamberts North Pond 2	14/02/2023	-	950	38.5	61.4	-	-	-	-	-	280	140	2	2	5	4	<1	3.5	48	45	<1	-
LN Pond 2	Lamberts North Pond 2	21/03/2023	-	976	7	208	-	-	-	-	-	3820	20	<1	<1	8	3	<1	3.6	63	52	<1	-
LN Pond 2	Lamberts North Pond 2	18/04/2023	-	800	11	308	-	-	-	-	-	4810	20	3	<1	6	<1	<1	1.7	58	38	<1	-
LN Pond 2	Lamberts North Pond 2	17/05/2023	-	574	4.5	186	-	-	-	-	-	3200	20	<1	<1	4	<1	<1	1	46	34	<1	-
LN Pond 2	Lamberts North Pond 2	27/06/2023	-	598	-	96.4	-	-	-	-	-	2260	20	<1	<1	3	<1	<1	<1	48	44	<1	-
LN Pond 2	Lamberts North Pond 2	27/07/2023	-	738	-	18.3	-	-	-	-	-	1890	20	<1	<1	2	<1	<1	<1	54	42	<1	-
LN Pond 2	Lamberts North Pond 2	23/08/2023	-	528	-	65.8	-	-	-	-	-	570	20	<1	<1	1	<1	<1	<1	44	40	<1	-
LNAR 3	LNAR 3	28/09/2022	242	242	127.8	-	<50	<50	<100	<50	<20	2960	20	<1	<1	4	<1	-	-	30	16	<1	<1
LNAR 3	LNAR 3	18/10/2022	198	198	26.4	213	<50	<50	<100	<50	<20	3320	20	<1	<1	4	<1	<1	1.1	34	16	<1	<1
LNAR 3	LNAR 3	23/11/2022	-	326	12	166	-	-	-	-	-	2320	30	<1	<1	3	<1	<1	<1	28	16	<1	-
LNAR 3	LNAR 3	12/12/2022	-	142	708	1016	-	-	-	-	-	3550	20	<1	<1	5	<1	<1	2.1	53	16	<1	-
LNAR 3	LNAR 3	9/01/2023	-	89,120	311	162	-	-	-	-	-	700	<100	146	161	222	245	11.7	187	20	13	<10	-
LNAR 3	LNAR 3	14/02/2023	-	8514	36.5	16.7	-	-	-	-	-	550	100	36	37	45	46	1.9	43.1	12	13	<1	-
LNAR 3	LNAR 3	21/03/2023	-	10,570	31	16.6	-	-	-	-	-	<100	<100	208	229	234	270	<4	239	11	<10	<10	-
LNAR 3	LNAR 3	18/04/2023	-	65,430	38	40	-	-	-	-	-	<100	<100	191	189	244	222	<40	206	<10	<10	<10	-
LNAR 3	LNAR 3	17/05/2023	-	42,240	33.33	26.7	-	-	-	-	-	150	<100	126	125	182	180	5.6	130	<10	<10	<10	-
LNAR 3	LNAR 3	27/06/2023	-	50,020	-	74.2	-	-	-	-	-	1110	<100	158	140	423	401	5.9	405	<10	<10	<10	-
LNAR 3	LNAR 3	27/07/2023	-	46,120	-	28.1	-	-	-	-	-	<100	<100	280	275	1530	1500	<20	1470	18	10	<10	-
LNAR 3	LNAR 3	23/08/2023	-	54,000	-	14.8	-	-	-	-	-	<100	<100	405	387	2180	2200	<10	1910	43	35	<10	-
LNAR 4	LNAR 4	28/09/2022	1700	1700	59.6	-	<50	<50	<100	<50	<20	2830	100	10	12	25	21	-	-	38	26	<1	<1
LNAR 4	LNAR 4	18/10/2022	1702	1702	70	89.6	<50	<50	<100	<50	<20	1870	110	13	14	20	14	<1	16.6	48	38	<1	<1
LNAR 4	LNAR 4	23/11/2022	-	3054	21.67	13.4	-	-	-	-	-	450	310	19	18	56	55	<1	43.1	51	37	<1	-
LNAR 4	LNAR 4	12/12/2022	-	4090	14.5	6.24	-	-	-	-	-	280	180	22	23	61	58	<1	56.5	48	46	<1	-
LNAR 4	LNAR 4	9/01/2023	-	4580	195.3	55.2	-	-	-	-	-	1160	160	20	24	50	52	<1	60.8	53	52	<1	-
LNAR 4	LNAR 4	14/02/2023	-	1680	22	11.4	-	-	-	-	-	200	90	12	11	14	13	<1	10.2	42	41	<1	-
LNAR 4	LNAR 4	21/03/2023	-	1874	10	7.72	-	-	-	-	-	140	80	9	10	14	17	<1	13.1	44	48	<1	-
LNAR 4	LNAR 4	18/04/2023	-	2322	33.5	19.7	-	-	-	-	-	210	90	11	11	17	16	<1	11	45	43	<1	-
LNAR 4	LNAR 4	17/05/2023	-	2162	8.5	6.31	-	-	-	-	-	120	90	8	9	16	17	<1	10.3	43	45	<1	-
LNAR 4	LNAR 4	27/06/2023	-	2140	-	18.7	-	-	-	-	-	440	80	8	8	18	17	<1	16	44	42	<1	-
LNAR 4	LNAR 4	27/07/2023	-	2304	-	16.5	-	-	-	-	-	380	70	10	10	19	19	<1	14.9	47	44	<1	-
LNAR 4	LNAR 4	23/08/2023	-	2228	-	17.2	-	-	-	-	-	420	80	11	12	20	20	2.2	12.9	46	44	<1	-
LNAR 5	LNAR 5	28/09/2022	406	406	107	-	<50	<50	<100	<50	<20	2430	20	<1	<1	4	1	-	-	37	26	<1	<1
LNAR 5	LNAR 5	18/10/2022	228	228	120.7	530	<50	<50	<100	<50	<20	6320	20	<1	<1	7	<1	<1	1.4	53	19	<1	<1
LNAR 5	LNAR 5	23/11/2022	-	588	46	426	-	-	-	-	-	3460	20	<1	<1	7	2	<1	2.6	44	26	<1	-
LNAR 5	LNAR 5	12/12/2022	-	954	234	219	-	-	-	-	-	3240	20	<1	<1	11	7	<1	7.2	53	36	<1	-
LNAR 5	LNAR 5	9/01/2023	-	1332	12.67	76	-	-	-	-	-	1000	30	<1	<1	12	11	<1	14.3	51	47	<1	-
LNAR 5	LNAR 5	14/02/2023	-	928	17.5	13.3	-	-	-	-	-	350	150	8	8	6	6	<1	6.2	35	34	<1	-
LNAR 5	LNAR 5	21/03/2023	-	1058	10.5	6.62	-	-	-	-	-	120	70	4	4	6	8	<1	7.5	42	44	<1	-
LNAR 5	LNAR 5	18/04/2023	-	1228	14.6	15.3	-	-	-	-	-	260	70	9	3	6	6	<1	5.3	38	35	<1	-
LNAR 5	LNAR 5	17/05/2023	-	1020	110	144	-	-	-	-	-	1400	240	2	<1	6	5	<1	4.6	24	17	<1	-
LNAR 5	LNAR 5	27/06/2023	-	748	-	968	-	-	-	-	-	5180	20	2	4	8	4	<1	4.9	40	13	1	-
LNAR 5	LNAR 5	27/07/2023	-	794	-	136	-	-	-	-	-	2170	<10	4	4	4	2	<1	3.8	22	14	<1	-
LNAR 5	LNAR 5	23/08/2023	-	828	-	107	-	-	-	-	-	1140	60	7	9	7	6	<1	5.2	31	23	<1	-
Statistical Summary																							
Number of Results			8	48	36	44	8	8	8	8	8	48	48	48	48	48	48	44	44	48	48	48	12
Number of Detects			8	48	36	44	0	0	0	0	0	44	40	29	27	48	34	5	37	45	44	1	4
Minimum Concentration			116	116	4.5	6.24	<50	<50	<100	<50	<20	<100	<10	<1	<1	1	<1	<1	<1	<10	<10	<1	<1
Minimum Detect			116	116	4.5	6.24	ND	ND	ND	ND	ND	120	10	2	2	1	1	1.9	1	11	10	1	ND
Maximum Concentration			1702	89120	708	1232	<50	<50	<100	<50	<20	8020	310	405	387	2180	2200	<40	1910	65	52	<10	<1
Maximum Detect			1702	89120	708	1232	ND	ND	ND	ND	ND	8020	310	405	387	2180	2200	11.7	1910	65	52	1	ND
Average Concentration			599	8639	97	173	25	25	50	25	10	1863	66	37	36	116	114	1.9	112	40	29	1.2	0.5
Median Concentration			235	1039	33.415	63.6	25	25	50	25	10	1125	50	4	4	8	6.5	0.5	7.35	43.5	34	0.5	0.5
Standard Deviation			685	19708	154	278	0	0	0	0	0	1959	61	83	82	382	382	3.7	360	15	15	1.6	0
Number of Guideline Exceedances			2	20	0	0	0	0	0	0	0	0	0	0	0	12	11	1	16	0	0	0	0
Number of Guideline Exceedances(Detects Only)			2	20	0	0	0	0	0	0	0	0	0	0	0	12	11	0	16	0	0	0	0

LocCode	Field_ID	Sampled_Date-Time	Boron	Boron (Filtered)	Cadmium	Cadmium (Filtered)	Chromium	Chromium (Filtered)	Chromium (Hexavalent)	Chromium (Trivalent)	Cobalt	Cobalt (Filtered)	Copper	Copper (Filtered)	Iron	Iron (Filtered)	Lead	Lead (Filtered)	Manganese	Manganese (Filtered)	Mercury	Molybdenum	Molybdenum (Filtered)	Nickel	Nickel (Filtered)	Selenium	Selenium (Filtered)	Silver	Silver (Filtered)	Strontium	Strontium (Filtered)	Vanadium	Vanadium (Filtered)	Zinc	Zinc (Filtered)
			Metals																																
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L
ANZECC (2000) or Local Guidelines - Surface Water			370	370	0.85	0.85	2	2	1	3.3			3.5	3.5	300	300	5	5	1900	1900	0.06	10	10	17	17	5	5	0.05	0.05					116	116
LN Pond 2	Lamberts North Pond 2	28/09/2022	190	180	<0.1	<0.1	6	<1	<10	<10	6	<1	13	<1	5860	110	13	<1	200	12	<0.04	2	4	19	2	<10	<10	<1	<1	0.129	0.108	10	<10	33	<5
LN Pond 2	Lamberts North Pond 2	18/10/2022	220	190	<0.1	<0.1	6	<1	<10	<10	4	<1	10	<1	4780	110	10	<1	111	8	<0.04	2	3	15	2	<10	<10	<1	<1	0.115	0.089	<10	<10	30	<5
LN Pond 2	Lamberts North Pond 2	23/11/2022	160	150	<0.1	<0.1	9	<1	<10	<10	7	<1	15	<1	10,900	80	17	<1	208	5	<0.04	4	-	23	2	<10	<10	<1	-	0.107	-	20	<10	59	<5
LN Pond 2	Lamberts North Pond 2	12/12/2022	300	270	<0.1	<0.1	3	<1	<10	<10	2	<1	5	<1	2810	<50	5	<1	53	7	<0.04	10	-	9	1	<10	<10	<1	-	0.179	-	<10	<10	22	<5
LN Pond 2	Lamberts North Pond 2	9/01/2023	610	540	<0.1	<0.1	2	1	<10	<10	<1	<1	92	56	640	140	1	<1	61	14	0.07	68	-	23	14	<10	<10	<1	-	0.203	-	<10	<10	336	93
LN Pond 2	Lamberts North Pond 2	14/02/2023	440	500	0.1	<0.1	<1	<1	<10	<10	1	1	20	13	300	230	1	<1	95	21	<0.04	63	-	10	7	<10	<10	<1	-	0.265	-	<10	<10	35	14
LN Pond 2	Lamberts North Pond 2	21/03/2023	560	570	<0.1	<0.1	4	<1	<10	<10	3	<1	12	3	3890	<50	5	<1	208	104	<0.04	42	-	15	8	<10	<10	<1	-	0.322	-	<10	<10	47	<5
LN Pond 2	Lamberts North Pond 2	18/04/2023	500	490	<0.1	<0.1	5	<1	<10	<10	4	<1	11	3	5030	<50	6	<1	151	54	<0.04	25	-	18	7	<10	<10	<1	-	0.298	-	<10	<10	44	<5
LN Pond 2	Lamberts North Pond 2	17/05/2023	530	390	<0.1	<0.1	3	<1	<10	<10	2	<1	7	1	3340	<50	4	<1	75	26	<0.04	12	-	14	6	<10	<10	<1	-	0.279	-	<10	<10	28	<5
LN Pond 2	Lamberts North Pond 2	27/06/2023	650	600	<0.1	<0.1	2	<1	<10	<10	2	<1	5	2	2070	<50	2	<1	48	17	<0.04	15	-	12	7	<10	<10	<1	-	0.404	-	<10	<10	22	<5
LN Pond 2	Lamberts North Pond 2	27/07/2023	720	710	<0.1	<0.1	2	<1	<10	<10	2	<1	5	<1	1590	60	2	<1	35	9	<0.04	14	-	10	6	<10	<10	<1	-	0.44	-	<10	<10	20	<5
LN Pond 2	Lamberts North Pond 2	23/08/2023	530	660	<0.1	<0.1	<1	<1	<10	<10	<1	<1	3	2	510	<50	<1	<1	26	14	<0.04	17	-	7	5	<10	<10	<1	-	0.338	-	<10	<10	9	<5
LNAR 3	LNAR 3	28/09/2022	170	160	<0.1	<0.1	3	<1	<10	<10	2	<1	7	<1	2880	<50	5	<1	44	3	<0.04	6	6	8	1	<10	<10	<1	<1	0.118	0.11	<10	<10	19	<5
LNAR 3	LNAR 3	18/10/2022	190	180	<0.1	<0.1	4	<1	<10	<10	2	<1	9	<1	2760	<50	6	<1	46	2	<0.04	6	5	10	1	<10	<10	<1	<1	0.128	0.106	<10	<10	23	<5
LNAR 3	LNAR 3	23/11/2022	170	170	<0.1	<0.1	2	<1	<10	<10	1	<1	5	<1	2560	<50	3	<1	30	3	<0.04	5	-	6	1	<10	<10	<1	-	0.108	-	<10	<10	14	<5
LNAR 3	LNAR 3	12/12/2022	160	170	0.1	<0.1	4	<1	<10	<10	5	<1	19	1	3530	<50	11	<1	201	<1	<0.04	4	-	14	1	<10	<10	<1	-	0.129	-	<10	<10	40	<5
LNAR 3	LNAR 3	9/01/2023	2440	3230	1.1	1.3	<10	<10	<100	<100	38	42	149	60	260	<100	<10	<10	36	12	<0.04	5640	-	348	398	<100	<100	<10	-	0.087	-	220	250	204	182
LNAR 3	LNAR 3	14/02/2023	780	920	1.4	1.4	2	2	<10	<10	5	5	35	35	<50	<50	<1	1	2	5	<0.04	924	-	50	49	70	80	<1	-	0.167	-	50	50	21	25
LNAR 3	LNAR 3	21/03/2023	2740	3120	5.3	7.7	<10	<10	<10	<10	46	50	78	79	<100	<100	<10	<10	70	57	<0.04	6730	-	439	490	<100	<100	<10	-	0.03	-	280	300	248	238
LNAR 3	LNAR 3	18/04/2023	4750	4710	8.5	6.1	<10	<10	<10	<10	37	38	107	99	220	<100	<10	<10	204	175	<0.04	7640	-	394	393	320	290	<10	-	0.248	-	240	240	276	236
LNAR 3	LNAR 3	17/05/2023	15,500	15,100	20.4	21.3	<10	<10	<10	<10	17	17	119	116	<100	<100	<10	<10	337	284	<0.04	8670	-	334	342	1320	1320	<10	-	0.356	-	180	180	164	152
LNAR 3	LNAR 3	27/06/2023	15,800	15,300	23.2	20.8	12	13	<10	10	24	22	149	137	220	<100	<10	<10	378	259	<0.04	9630	-	385	349	1400	1350	<10	-	0.744	-	420	400	260	224
LNAR 3	LNAR 3	27/07/2023	15,800	15,800	23.6	22.6	61	60	<10	60	16	15	438	413	<100	<100	<10	<10	144	101	<0.04	6960	-	359	339	2220	2220	<10	-	1.64	-	1600	1350	579	549
LNAR 3	LNAR 3	23/08/2023	19,600	18,700	28.6	27.2	87	80	120	<100	23	23	579	583	120	<100	<10	<10	348	318	<0.04	10,800	-	436	432	3130	3040	<10	-	3.02	-	2260	2230	747	774
LNAR 4	LNAR 4	28/09/2022	660	640	0.4	0.4	4	1	<10	<10	2	<1	10	5	2330	<50	3	<1	37	<1	<0.04	599	511	13	9	110	110	<1	<1	0.29	0.273	30	20	18	<5
LNAR 4	LNAR 4	18/10/2022	870	860	0.4	0.3	3	1	<10	<10	1	<1	10	5	1240	<50	2	<1	32	2	<0.04	646	526	13	9	130	110	<1	<1	0.428	0.388	20	10	24	7
LNAR 4	LNAR 4	23/11/2022	1140	1010	1.2	0.7	3	3	<10	<10	<1	<1	6	6	80	<50	<1	<1	4	<1	<0.04	967	-	13	15	190	200	<1	-	0.615	-	60	60	8	<5
LNAR 4	LNAR 4	12/12/2022	1620	1370	1.8	0.7	4	3	<10	<10	<1	<1	7	6	50	<50	<1	<1	3	<1	<0.04	1370	-	19	19	250	250	<1	-	0.815	-	60	50	9	5
LNAR 4	LNAR 4	9/01/2023	1670	1850	1	1	3	3	<10	<10	1	1	15	12	340	<50	<1	<1	16	2	<0.04	1390	-	23	21	240	240	<1	-	0.885	-	40	40	43	25
LNAR 4	LNAR 4	14/02/2023	500	550	0.4	0.4	<1	<1	<10	<10	<1	<1	39	31	130	80	<1	<1	10	4	<0.04	362	-	14	12	40	40	<1	-	0.237	-	10	10	74	55
LNAR 4	LNAR 4	21/03/2023	610	780	0.3	0.6	<1	<1	<10	<10	<1	<1	33	29	110	60	<1	<1	11	5	<0.04	376	-	14	16	50	50	<1	-	0.269	-	20	20	87	79
LNAR 4	LNAR 4	18/04/2023	780	770	0.6	0.2	<1	<1	<10	<10	<1	<1	24	23	70	<50	<1	<1	7	4	<0.04	413	-	16	15	60	60	<1	-	0.339	-	10	10	58	51
LNAR 4	LNAR 4	17/05/2023	890	790	0.4	0.4	<1	<1	<10	<10	<1	<1	19	18	<50	<50	<1	<1	6	3	<0.04	480	-	14	15	50	50	<1	-	0.328	-	10	10	45	47
LNAR 4	LNAR 4	27/06/2023	810	780	0.3	0.4	<1	<1	<10	<10	<1	<1	18	12	150	<50	<1	<1	25	<1	<0.04	484	-	16	13	50	50	<1	-	0.359	-	10	10	56	43
LNAR 4	LNAR 4	27/07/2023	890	940	0.4	0.2	<1	<1	<10	<10	<1	<1	16	11	150	<50	<1	<1	9	<1	<0.04	520	-	16	15	50	50	<1	-	0.382	-	10	10	52	42
LNAR 4	LNAR 4	23/08/2023	820	1000	0.4	0.3	1	<1	<10	<10	<1	<1	17	12	240	<50	<1	<1	12	<1	<0.04	516	-	16	15	50	50	<1	-	0.376	-	10	10	54	43
LNAR 5	LNAR 5	28/09/2022	220	210	<0.1	<0.1	3	<1	<10	<10	1	<1	8	2	2390	<50	4	<1	39	4	<0.04	15	20	9	3	<10	<10	<1	<1	0.112	0.105	<10	<10	24	<5
LNAR 5	LNAR 5	18/10/2022	260	250	<0.1	<0.1	7	<1	<10	<10	4	<1	15	<1	5340	<50	12	<1	135	2	<0.04	10	13	18	2	<10	<10	<1	<1	0.13	0.094	10	<10	45	<5
LNAR 5	LNAR 5	23/11/2022	280	200	<0.1	<0.1	4	<1	<10	<10	2	<1	36	6	3930	60	6	<1	81	7	0.06	32	-	16	4	<10	<10	<1	-	0.123	-	<10	<10	120	8
LNAR 5	LNAR 5	12/12/2022	380	330	0.1	<0.1	3	<1	<10	<10	2	<1	128	37	2110	60	5	<1	84	6	0.11	88	-	26	11	<10	<10	<1	-	0.132	-	<10	<10	416	64
LNAR 5	LNAR 5	9/01/2023	450	520	<0.1	<0.1	3	2	<10	<10	<1	<1	141	85	1110	150	2	<1	79	25	0.14	88	-	31	21	<10	<10	<1	-	0.095	-	<10	<10	562	186
LNAR 5	LNAR 5	14/02/2023	190	230	0.1	0.1	<1	<1	<10	<10	<1	<1	58	53	220	100	2	2	53	41	<0.04	84	-	10	10	<10	<10	<1	-	0.076	-	10	10	149	136
LNAR 5	LNAR 5	21/03/2023	400	400	0.8	0.8	<1	<1	<10	<10	1	1	103	90	160	<50	<1	<1	77	5	0.06	87	-	21	21	<10	<10	<1	-	0.078	-	<10	<10	359	338
LNAR 5	LNAR 5	18/04/2023	370	390	0.4	0.4	<1	<1	<10	<10	2	2	106	109	170	<50	1	<1	40	17	<0.04	81	-	30	27	<10	<10	<1	-	0.101	-	<10	<10	337	346
LNAR 5	LNAR 5	17/05/2023	320	230	0.2	0.2	<1	<1	<10	<10	2	1	62	43	680	<50	3	<1	46	14	<0.04	69	-	18	15	<10	<10	<1	-	0.061	-	10	10	149	110
LNAR 5	LNAR 5	27/06/2023	220	180	0.1	<0.1	3	<1	20	<10	2	<1	39	14	3780	<50	18	<1	73	19	<0.04	50	-	11	5	<10	<10	<1	-	0.06	-	30	10	99	37
LNAR 5	LNAR 5	27/07/2023	260	260	<0.1	<0.1	1	<1	<10	<10	<1	<1	16	10	860	<50	3	<1	28	21	<0.04	57	-	5	3	<10	<10	<1	-	0.072	-	20	10	32	22
LNAR 5	LNAR 5	23/08/2023	270	380	0.1	0.1	2	<1	<10	<10	1	<1	20	12	660	<50	3	<1	38	12	<0.04	80	-	6	4	10	<10	<1	-	0.094	-	20	20	38	11
Statistical Summary																																			
Number of Results			48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	12	48	48	48	48	48	12	48	12	48	48	48	48
Number of Detects			48	48	29	25	32	11	2	2	34	13	48	39	43	12	28	2	48	41	5	48	12	48	48	19	18	0	4	48	12	28	25	48	30
Minimum Concentration			160	150	<0.1	<0.1	<1	<1	<10	<10	<1	<1	3	<1	<50	<50	<1	<1	2	<1	<0.04	2	3	5	1	<10	<10	<1	<1	0.03	0.089	<10	<10	8	<5
Minimum Detect			160	150	0.1	0.1	1	1	20	10	1	1	3	1	50	60	1	1	2	2	0.06	2	3	5	1	10	40	ND	ND	0.03	0.089	10	10	8	5
Maximum Concentration			19600	18700	28.6	27.2	87	80	120	<100	46	50	579	583	10900	230	18	<10	378	318	0.14	10800	526	439	490	3130	3040	<10	<1	3.02	0.388	2260	2230	747	774
Maximum Detect			19600	18700	28.6	27.2	87	80	120	60	46	50	579	583	10900	230	18	2	378	318	0.14	10800	526	439	490	3130	3040	ND	ND	3.02	0.388	2260	2230	747	774
Average Concentration			2050	2036	2.6	2.4	6	4.3	8.6	8.1	5.8	4.9	59	47	1683	48	4.1	1.2	85	36	0.027	1378	136	70	66	208	204	1.2	0.5	0.34	0.16	120	113	128	87
Median Concentration			530	545	0.1	0.1	3	0.5	5	5	2	0.5	18.5	12	650	25	3	0.5	47	7.5	0.02	82.5	9.5	16	10.5	5	5	0.5	0.5	0.22	0.107	10	10	46	23.5
Standard Deviation			4554	4429	6.7	6.5	15	14	18	12	11	11	105	103	2168	41	4.2	1.6	92	73	0.023	2863	236	133	138	596	584	1.6	0	0.48	0.11	396	375	169	152
Number of Guideline Exceedances			32	32	11	9	34	12	48	48	0	0	47	32	28	0	20	7	0	0	5	41	4	20	13	48	48	48	8	0	0	0	0	15	11
Number of Guideline Exceedances(Detects Only)			32	32	11	9	30	8	2	2	0	0	47	32	28	0	13	0	0	0	5	41	4	20	13	19	18	0	0	0	0	0	0	15	11

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