Water Management Plan

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1 Introduction

1.1 Background

Evolution Mining (Cowal) Pty Limited (Evolution) is the owner and operator of Cowal Gold Operations (CGO), an open pit and underground gold mine approximately 38 kilometres (km) north-east of West Wyalong, in the central west region of New South Wales (NSW). CGO is located on the traditional lands of the Wiradjuri people and is immediately adjacent to the western foreshore of Lake Cowal, which is an ephemeral waterbody. The CGO mine is shown at a regional scale in **Figure** *1.1* and at a local scale in **Figure** *1.2*.

CGO was first approved in 1999, and open pit mining operations commenced in 2005. Underground mining operations were approved in 2021, and development works to enable underground mining are underway.

On 10 December 2024, Evolution was granted State significant development (SSD) approval (SSD-42917792) for the CGO Open Pit Continuation Project (the Project). The Project will continue the open pit and underground mining operations by approximately 10 years to 2036 and extend the total mine life by approximately two years to 2042. This will involve further development of the existing E42 pit and the development of open pit mining in three new and adjacent orebodies, known as 'E46', 'GR' and 'E41'. The three new and adjacent ore bodies are within the existing mining lease (ML 1535). A maximum ore processing rate of 9.8 million tonnes per annum (Mtpa) is approved.

In addition to SSD-42917792, Evolution holds DA 2011/64, issued by Bland Shire Council, which provides approval to develop and operate the Eastern Saline Borefield that supplies process water to the mine.

The CGO project area hosts a range of ancillary infrastructure to support mining operations. This includes ore and soil stockpiles, laydown areas, water storage dams and drainage diversion systems, workshops, offices, reagent storage, explosives magazine and other ancillary infrastructure.

1.2 Water Management Plan preparation

This Water Management Plan (WMP) has been prepared by EMM Consulting Pty Ltd (EMM) on behalf of Evolution. Endorsement from the Planning Secretary for the following suitably qualified and experienced team from EMM to prepare this WMP was sought on 11 December 2024:

- Lachlan Hammersley – Associate Water Resources Engineer
- Katharine Bond – Associate Environmental Consultant – Groundwater
- Emma Watts – Associate Hydrogeologist
- Tess Davies – Senior Water Resources Engineer.

Endorsement of the above team to prepare this WMP was received from the NSW Department of Planning, Housing and Infrastructure (DPHI) on 9 January 2025 (refer Appendix A).

In accordance with Condition 40 and 41 of the Consent, development is not to commence until this WMP is approved by the Planning Secretary. CGO will implement the approved management plan for the project.

Figure 1.1: Regional context

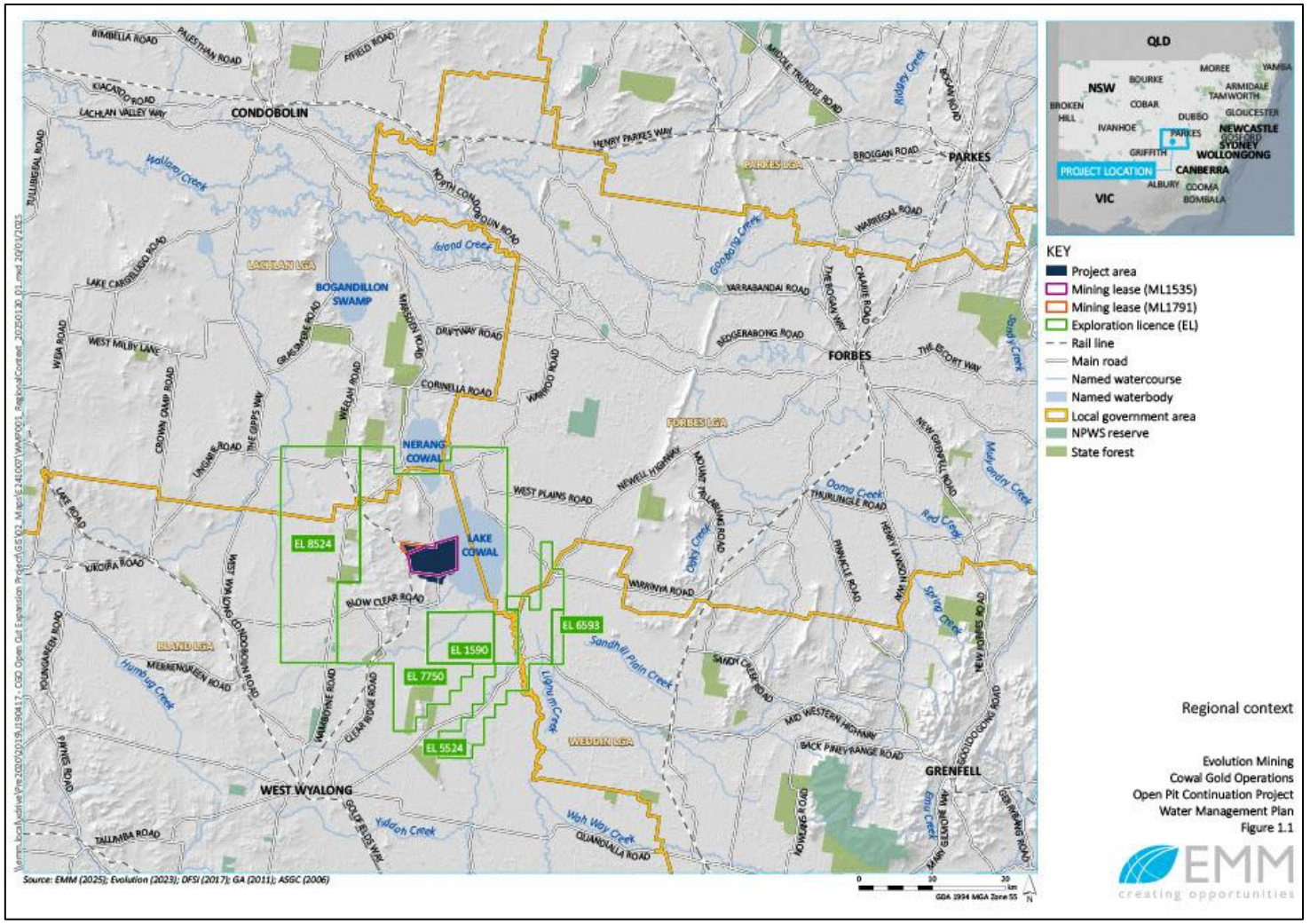
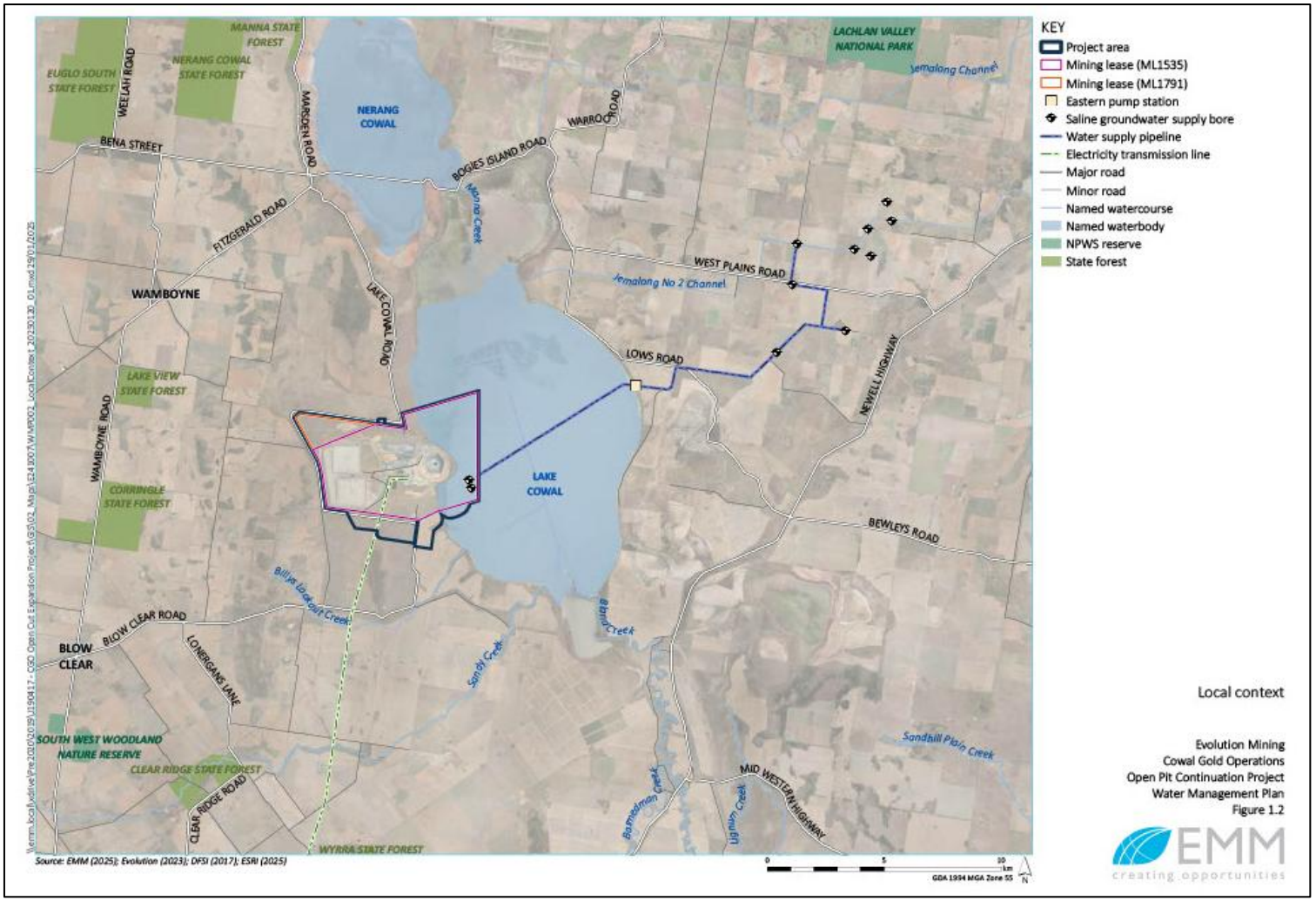


Figure 1.2: Local context



1.3 Purpose and scope

The purpose of this WMP is to provide a framework for water management at CGO and has been developed to address all stages of the Project as detailed in Chapter 2.

The WMP has been prepared to fulfil the requirements of SSD-42917792, Environment Protection Licence (EPL) 11912 and other applicable statutory requirements (refer Chapter 3). A copy of the SSD-42917792 development consent and EPL 11912 is available on Evolution's website (www.evolutionmining.com.au).

The WMP documents the site water management strategy, baseline monitoring data, monitoring and reporting requirements, performance criteria and response plans to manage potential impacts to surface water and groundwater resources.

1.4 Objectives

The WMP establishes the following objectives for the CGO site water management system:

- prevent any degradation in the quality of any surface water (including waters within Lake Cowal) and groundwater, through the containment of all potentially contaminated water (contained water) generated within the CGO area and diversion of all other water around the perimeter of the site
- manage the quantity of surface water and groundwater within and around the mine site through the appropriate design (i.e. sizing), construction and operation of water management structures
- establish a monitoring, review and reporting program that facilitates the identification of potential surface water and groundwater impacts and the development of ameliorative measures as necessary, including provision of appropriate compensation measures for landholders affected by changes to the flood regime of Nerang Cowal.

1.5 Plan structure

This WMP is structured as follows:

- **Chapter 2 – Project Description**Error! Reference source not found. describes the Project.
- **Chapter 3 – Regulatory Description**, legislation and guidelines that are applicable to this WMP.
- **Chapter 4 – Consultation** provides outcomes of consultation on this WMP.
- **Chapter 5 – Risk Assessment** discusses the environmental risk assessment for CGO.
- **Chapter 6 – Existing environment** describes the environmental setting of CGO, including the surface water and groundwater environment.
- **Chapter 7 – Water management approach** provides a detailed description of the water management system at CGO, including the site water balance.
- **Chapter 8 – Erosion and sediment control** describes erosion and sediment control measures implemented at CGO.
- **Chapter 9 – Water licensing requirements** provides details of water licensing requirements.
- **Chapter 10 – Monitoring program** outlines the water monitoring program at CGO.
- **Chapter 11 – Performance management** provides performance management and criteria that inform the trigger action response plans (TARPs).
- **Chapter 12 – Reviewing and reporting** describes the reporting and review requirements.

1.6 Related documents

The WMP is a part of a larger suite of operational environmental management documents for CGO developed as part of CGO's environmental management system. The overarching document in the environmental management system is CGO's Environmental Management Strategy (EMS). The EMS has been developed to provide a framework to ensure activities at CGO are undertaken in an environmentally responsible manner. The EMS forms part of the hierarchy of documents that enables CGO to establish and sustain a high level of environmental performance in all facets of its business.

In addition to the EMS, the following documents relate to the WMP:

- Biodiversity Management Plan
- Rehabilitation Management Plan
- Final Void Management Plan
- Cyanide Management Plan
- Tailings Management Plan
- Hazardous Materials Management Plan
- Lake Protection Bund (LPB) Dewatering Management Plan
- Soil Stripping Management Plan.

2 Project description

2.1 Overview

The key Project elements are summarised in **Table *2.1*** and are shown conceptually in ***Figure 2.1*.**

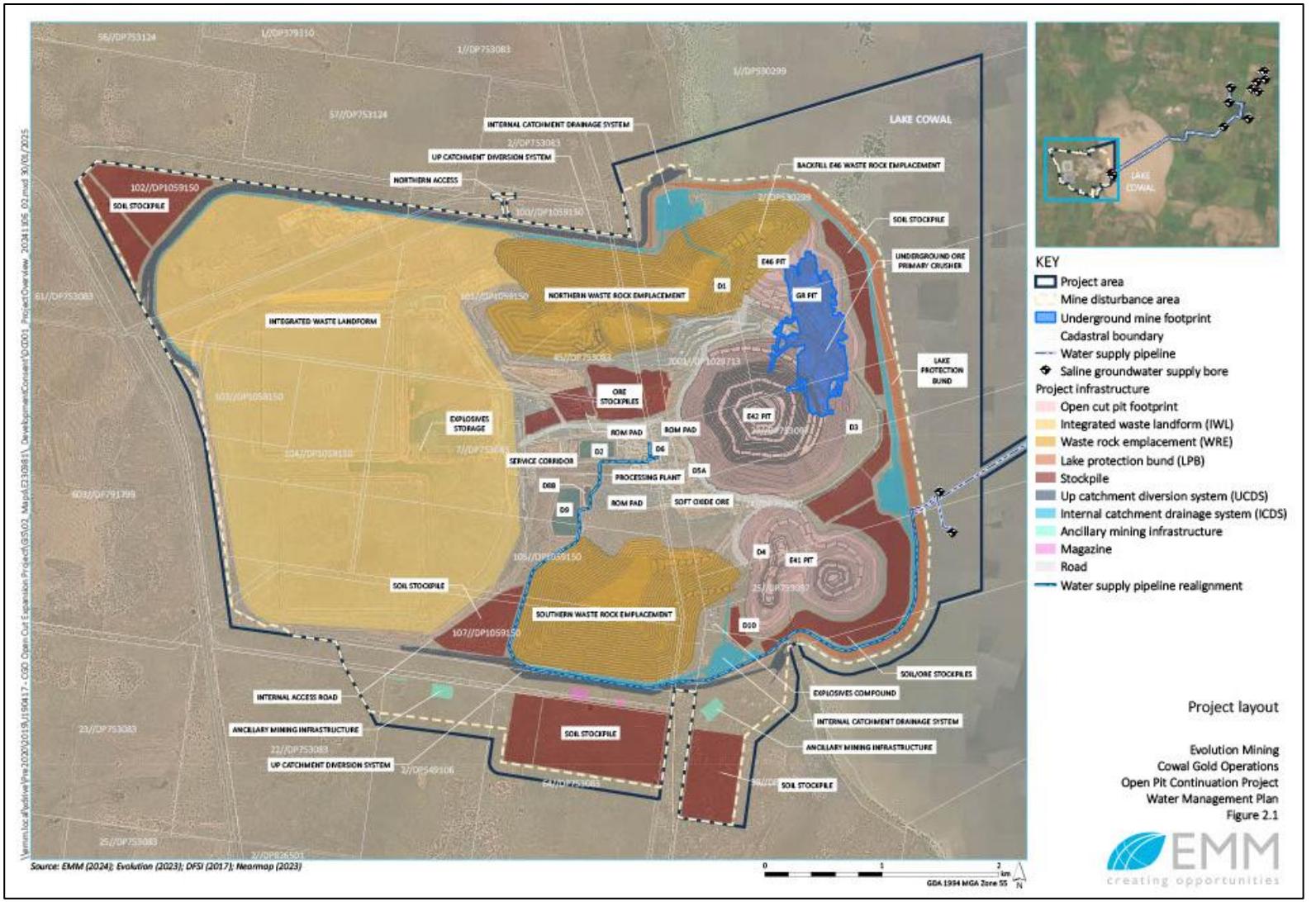
Table 2.1: Project overview

Project element	Description
Project area	CGO mine site, water supply pipeline, Bland Creek Palaeochannel Borefield and underground mine footprint, as shown in ***Figure 2.1*** area.
Mining lease	ML 1535, ML 1791 and Ancillary Mining Lease application 638.
Disturbance area	Total surface disturbance area of approximately 2,745 hectares (ha) (excluding the Bland Creek Palaeochannel Borefield and water supply pipeline).
Life of mine	Mining operations until 31 December 2042.
Open pit mining method and extent	Expansion of E42 pit to the east and south with a maximum depth of -373 metres Australian Height Datum (mAHD). Development of E46 pit with a maximum depth of 78 mAHD. Development of GR pit with a maximum depth of 105 mAHD Development of E41 pit with a maximum depth of -16 mAHD. The maximum area of open pit mining areas will be approximately 340 ha. All pits will be developed via conventional open-cut mining encompassing drill, blast, load and haul operations.
Underground mining method and extent	Top-down sub-level open stoping to a depth of -850 mAHD with approximately 1,106 stopes developed over the life of the mine. Backfilling of stopes with cemented paste.
Ore production	Open pit: approximately 251 million tonnes (Mt) of ore over the life of the Project. Underground**:** approximately 27 Mt of ore over the life of the Project extracted at a rate of up to 2.6 Mtpa of ore.
Ore processing	Gold is extracted from the ore at the process plant using a conventional carbon-in-leach (CIL) cyanide leaching circuit. Ore is processed at a rate up to 9.8 Mtpa. Processing of approximately 39.3 Mt of mineralised material.
Gold production	Approximately 9.5 million ounces over the life of the Project.
Lake isolation system	Lake isolation system (comprising the temporary isolation bund and LPB) provides separation between Lake Cowal and the Project.
Management of waste rock	Waste rock is emplaced in the Northern, Southern and Perimeter waste rock emplacements (WREs) over the life of the Project and it is used to form the embankments of the integrated waste landform (IWL). The Northern WRE has an approved maximum height of 308 mAHD and the Southern WRE has an approved maximum height of 313 mAHD. Following the extraction of ore, the E46 pit will be backfilled to form an additional WRE. The E46 WRE will be developed to a maximum height of 268 mAHD.

Project element	Description
Mineralised material stockpiling	Temporary stockpiling of mineralised material on the Northern WRE to a maximum design height of approximately 320 mAHD. This material will be processed, and the stockpile will be progressively removed to the height of the approved waste emplacement.
Tailings management	Tailings are deposited in the IWL encompassing two tailings storage facilities (TSFs) (Northern and Southern TSFs). The Northern TSF and Southern TSF are approved to be constructed to approximately 240 mAHD and 248 mAHD, respectively. The IWL is approved to be developed to a final height of 246 mAHD.
Site access	Primary site access off Bonehams Lane with all operational employee traffic movements and majority of operational site deliveries to access the CGO via this access. Construction access will be predominately via the existing secondary site access off Lake Cowal Road to the south of ML 1535.
Ancillary surface infrastructure	A range of ancillary surface infrastructure is operated to support open cut pit and underground mining operations, including that related to administration, water management, maintenance, pipelines, magazines, disturbance areas and other functions.
Soil stockpiles	Development of soil stockpiles within ML 1535, ML 1791 and to the south of ML 1535.
Water management	CGO water management infrastructure is comprised of the following key components: • up-catchment diversion system (UCDS) • internal catchment drainage system (ICDS) (including the contained water storages) • lake isolation system (comprising the temporary isolation bund, LPB and Perimeter WRE) • integrated erosion, sediment and salinity control system • open pit sump and dewatering borefield • pipeline from the tailings deslimer to the paste fill plant to send tailings to the paste fill plant and a return water pipeline from the paste fill plant to the processing facility.
Water supply	Water is preferentially sourced from internal sources and supplemented with water from external sources as follows: • internal sources: – recycled water from the TSF/IWL – open cut pit sump and pit dewatering borefield – runoff from mine WREs and other areas within the site which is collected as part of the ICDS and contained in nine on-site water storages • external sources: – saline groundwater from production bores located south-east of ML 1535 (when water levels within Lake Cowal allow) – Eastern Saline Borefield located approximately 10 km east of Lake Cowal's eastern shoreline – Bland Creek Palaeochannel Borefield located approximately 20 km northeast of the CGO – water accessed from the Lachlan River under licence, which is supplied via a pipeline from the Jemalong Irrigation Channel.
Operational workforce	CGO employs an average of 510 full time equivalent (FTE) employees and contractors between the open pit and underground mines.

Project element	Description
Construction workforce	An average of around 64 FTE peaking at around 102 construction personnel in Year 1 of the Project.
Hours of operation	Mining operations and ore processing (including development of the IWL embankments) are approved to be undertaken 24 hours a day, seven days a week. Construction hours during the Project's construction phase associated with the LPB and the UCDS will generally be carried out between 6:00 am and 6:00 pm seven days a week. Dewatering of the LPB during construction is approved to be undertaken 24 hours a day, seven days a week.
Exploration	Exploration activities undertaken within tenement areas will occur throughout the Project life.
Power supply	Electricity to the site is supplied via a 132 kilovolt electricity transmission line from Temora, approximately 90 km south of the CGO.

Figure 2.1: Project layout



2.2 Conceptual project progression

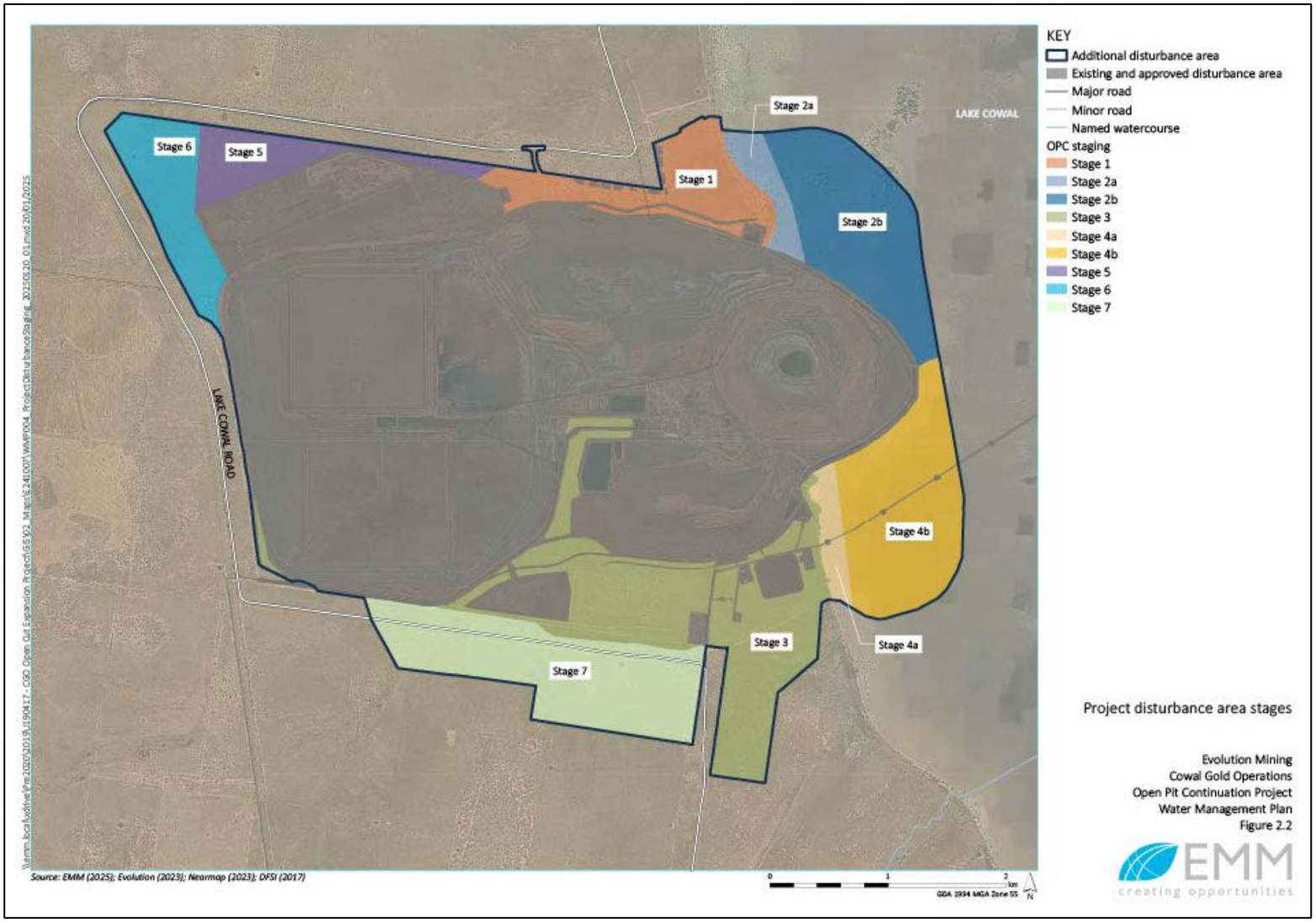
The Project will be developed in stages as follows:

- Year 1 – commencement of the Project and construction of LPB northern extension.
- Year 2 – construction of LPB southern extension and commencement of mining in E46 and E42 pits.
- Year 5 – development of Northern IWL expansion embankments, ongoing development of E42, E46 and E41 pits.
- Year 7 – commencement of mining in GR pit and backfill of the E46 pit.
- Year 13 – end of open pit mining.

The above conceptual mine stages are indicative only and may be subject to change to account for detailed mine design, mine economics, geological conditions, market conditions or relevant approval conditions.

Staging of disturbance activities associated with the Project are presented in ***Figure 2.2*****.** This WMP has been developed to address all stages of the Project.

Figure 2.2: Project disturbance area stages



3 Regulatory requirements

3.1 Development consent SSD-42917792

The WMP addresses the conditions of development consent SSD-42917792 related to water management. ***Table 3.1*** outlines the relevant consent conditions and where these are addressed in this WMP.

Table 3.1: Development consent SSD-42917792 conditions relevant to water management

Condition			Where addressed
A16	**Evidence of consultation**	Where conditions of this consent require consultation with an identified party consultation must be undertaken with the relevant party prior to submitting the subject document to the Planning Secretary for approval. Documentary evidence and a tabulated summary of the consultation must be submitted with the subject document via the NSW planning portal (Major Projects), including: a) dates of the consultation with the identified party, copies of the identified party's response, and a summary of the issues raised b) the outcome of that consultation, including how the issues have been addressed in the subject document c) details of any disagreement remaining between the party consulted and the applicant, and how the applicant has addressed the matters not resolved.	**Chapter 4**
B32	**Water supply**	The applicant must ensure that it has sufficient water for all stages of the development and, if necessary, adjust the scale of the development to match its available water supply.	**Section 7.15**
B33		Water extracted from the site each year (direct and indirect), including water taken under each water licence, must be reported in the annual review Note: Under the *Water Act 1912* and/or the *Water Management Act 2000,* the applicant is required to obtain all necessary water licences for the development, including during rehabilitation and post mine closure.	**Section 12**
B34	**Compensatory water supply**	If the owner of any privately-owned land claims in writing that their water supply has been directly and adversely impacted as a result of the development then, within 3 months of receiving this claim, the applicant must: a) investigate the claim in consultation with NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group b) provide an investigation report to the landowner and to the Planning Secretary to the satisfaction of the Planning Secretary.	**Section 11.2**

Condition			Where addressed
B35		If the development has directly and adversely impacted the water supply on privately-owned land (other than an impact that is minor or negligible), the applicant must: a) provide an alternative long-term supply of water or compensation to the landowner of the impacted water supply, to the satisfaction of the Planning Secretary b) as soon as practicable ensure a temporary water supply is available to the landowner pending the provision of the long-term compensatory supply, to the satisfaction of the Planning Secretary.	**Section 11.3.2**
B36		If the applicant and the landowner cannot agree on whether the loss of water is attributed to the development or there is a dispute about the compensatory measures offered under conditions B35, then either party may refer the matter to the Planning Secretary for resolution. Notes: The water management plan (see condition 39) is required to include trigger levels for investigating potentially adverse impacts on water supplies. The burden of proof that any loss of surface water or groundwater access is not due to mining impacts rests with the applicant.	**Section 11.3.2**
37	**Water discharges**	All surface discharges from the mine disturbance area must comply with: a) discharge limits (both volume and quality) set for the development in any EPL b) all relevant provisions of the Protection of the *Environment Operations Act 1997* (POEO Act).	**Section 7.2** **Section 7.4** **LPB Dewatering Management Plan**
38	**Water management performance measures**	The development must comply with the performance measures in table 5. These performance measures apply to the entire site, including all landforms constructed under previous development consents. However, these performance measures do not require any additional earthmoving works to be undertaken for landforms that have been approved and constructed under previous consents, except where those earthworks are required for the establishment of a stable and non-polluting landform.	***Table 3.2***
39	**Water management plan**	The water management plan must be prepared for the development to the satisfaction of the Planning Secretary. This plan must: a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Planning Secretary	**Section 1.2** **Appendix A**
		b) consider the 2022 NSW Department of Planning and Environment Guidelines for Groundwater Documentation for SSD/SSI Projects – Technical guideline (DPE 2022a)	**Section 3.6**
		c) be prepared in consultation with the DCCEEW – Water Group and the Environment Protection Authority (EPA)	**Chapter 4** **Appendix A**
		d) describe the measures to be implemented to ensure that the development complies with the water management performance measures (see table 5)	**Chapter 11**

Condition		Where addressed
	e) utilise existing data from nearby mines and build on existing monitoring programs, where practicable	**CGO is an isolated operation with no nearby mines available to provide sufficient supporting data**
	f) include a:	**Section 7.15.1**
	(i) **site water balance** that includes details of:	
	• predicted annual inflows and outflows from the site	
	• sources and security of water supply for the life of the development (including authorised entitlements and licences)	**Section 7.14** **Section 7.15.2** **Chapter 8**
	• water storage capacity	**Table 7.1Table *7.1***
	• water use and management on the site	**Section 7.15.1**
	• licensed discharge points and limits	**Section 7.15.3**
	• dewatering volumes and timing for construction of the LPB, if constructed in wet conditions	**Section 7.2.2**
	• reporting procedures, including the annual preparation of an updated site water balance	**Section 12.1** **Section 12.10**
	(ii) **surface water management plan** that includes:	**Section 6.2** **Appendix C**
	• detailed baseline data on surface water flows and quality of watercourses and/or water bodies potentially impacted by the development	
	• details of the water licensing requirements for all water storages (i.e. exempt, harvestable rights and licenced)	**Chapter 8**
	• detailed plans, design objectives and performance criteria for water management infrastructure	**Section 7.4** **Section 7.13**
	• surface water performance criteria, including trigger levels for identifying and investigating any potentially adverse impacts (or trends) associated with the development, for: – water supply for other water users – downstream surface water flows, water quality and flooding impacts – lake, stream and riparian vegetation health	**Section 11.1.1** **Section 11.1.2** **Section 11.1.1** **Section 11.1.2** **Appendix E** **Biodiversity Management Plan**
	• a program to monitor and evaluate compliance with the relevant performance measures listed in table 5 and the performance criteria in this plan	**Section 10.3**

Condition		Where addressed
	• reporting procedures for the results of the monitoring program, including notifying other water users of any exceedance of relevant performance measures or performance criteria	**Section 12.3** **Section 12.4** **Section 12.5**
	• a trigger action response plan to respond to any exceedances of the relevant performance measures or performance criteria, and repair, mitigate and/or offset any adverse surface water impacts of the development, including a contingency plan to reduce cyanide if the performance criteria are exceeded	**Appendix E** **Cyanide Management Plan**
	• measures to provide compensatory water supply to any affected water user under condition B35 of this Schedule.	**Section 11.3.2**
	(iii) **groundwater management plan** that includes: • detailed baseline data on groundwater levels, yield and quality for groundwater resources and groundwater dependent ecosystems potentially impacted by the development, including groundwater supply for other water users	**Section 6.3**
	• a detailed description of the groundwater management system, including measures to ensure that long term average extraction from the borefields remains within the levels predicted in the environmental impact statement (EIS) and/or below applicable trigger levels	**Section 6.3.1** **Section 7.14**
	• groundwater performance criteria, including trigger levels for identifying and investigating any potentially adverse groundwater impacts (or trends) associated with the development, on: – regional and local aquifers (alluvial and hardrock) – groundwater supply for other water users such as licensed privately-owned groundwater bores – groundwater inflows to the mining operations – seepage/leachate (including cyanide) from water storages, the IWL, tailings storages, emplacements, infrastructure and processing areas, and the final voids – groundwater dependent ecosystems	**Section 11.2.2**

Condition		Where addressed
	• a program to monitor and evaluate: – compliance with the relevant performance measures listed in table 5 and the performance criteria in this plan – groundwater inflows to the mining operations – seepage/leachate (including cyanide) from water storages, the IWL, tailings storages, emplacements, infrastructure and processing areas, and the final voids, including migration over the short and long term – groundwater inflows, outflows and storage volumes, to inform the site water balance – any localised enhanced groundwater inflows associated with faults or other structures – impacts on groundwater dependent ecosystems – impacts on groundwater supply for other water users – the effectiveness of the groundwater management system	**Section 10.4**
	• reporting procedures for the results of the monitoring program, including notifying other water users of any elevated results	**Section 12.3** **Section 12.4** **Section 12.5**
	• a trigger action response plan to respond to any exceedances of the relevant performance measures and groundwater performance criteria, and repair, mitigate and/or offset any adverse groundwater impacts of the development	**Appendix E**
	• a program to periodically validate the groundwater model for the development, including an independent review of the model every three years (unless otherwise agreed by the Planning Secretary), and comparison of monitoring results with modelled predictions; and a protocol to report on the measures, monitoring results and performance criteria identified above, in the annual review referred to in condition D11. The modelling program must also include a review and updated model predictions of post mining drawdown to determine whether any impacts on water supply works would require compensatory water to be provided for predicted future impacts following mine closure	**Section 12.11**
	(iv) an **LPB design and verification plan** that includes: • additional geochemical and geotechnical testing to verify the suitability of the clay and other materials to be used for construction of the LPB and other components of the lake isolation system • details of a quality assurance program to demonstrate that the LPB is constructed to meet its design specifications; and • details of measures that would be implemented to minimise impacts on fish and other aquatic fauna species.	**Appendix B**
B40	Development under this consent must not commence until the water management plan is approved by the Planning Secretary.	**Appendix A** **Section 1.2**

Condition			Where addressed
B41		The water management plan as approved by the Planning Secretary must be implemented for the development.	**Appendix A** **Section 1.2**
D5	**Management plan requirements**	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) quality control information including document version control details and the management plan author(s)	**Section 3.6** **Chapter 13**
		(b) a summary of the environmental management context, including: (i) a brief project description, including visual representation of any project staging	**Chapter 2**
		(ii) the purpose and scope of the management plan	**Section 1.3**
		(c) the relationship of the management plan with other environmental management documents or systems	**Section 1.6**
		(d) a site location plan identifying the project boundary, mine disturbance area and related environmental aspects	**Figure 2.1**
		(e) a brief summary of background or baseline data, where relevant Note: If detailed baseline data must be included in a management plan, it must be appended and summarised in the main text of the management plan.	**Section 6.2** **Section 6.3** **Appendix C** **Appendix D**
		(f) a summary of consultation undertaken during the preparation of the management plan that includes when and how consultation was undertaken and the outcomes of the consultation	**Chapter 4** **Appendix A**
		(g) details of the statutory requirements, limits or performance measures and any specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures	**Chapter 3**
		(h) an environmental risk assessment and a description of the measures that will be implemented to: (i) comply with statutory requirements, limits or performance measures and criteria (ii) manage the predicted impacts identified in the EIS (iii) manage any other environmental risk or impact which has been subsequently identified after the EIS documents were submitted Note: Environmental risk assessment cannot be used to identify and assess changes to the project that are not described and assessed in the approved EIA. These may be project modifications and may need to be referred to the department.	**Chapter 5**

Condition		Where addressed
	(i) a monitoring and evaluation protocol for the measures identified in the environmental risk assessment that supports the analysis and evaluation of the implementation of the identified measures with results and records that are reliable, reproducible and traceable	**Chapter 5**
	(j) a process to review the environmental risk assessment to: (i) analyse and evaluate the implementation of the identified measures and determine whether any changes to the environmental risk assessment or identified measures is required (ii) identify any additional unexpected environmental risks and the measures that will be implemented to manage them.	**Chapter 5**
	(k) A protocol for periodic review of the plan. Note: The Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	**Section 12.9**

The water management performance measures referenced in condition B38 of SSD-42917792 are shown below in ***Table 3.2***, along with the section of the WMP where these have been addressed.

Table 3.2: Water management performance measures

Feature	Performance measure	Where addressed
Water management – general	• Maintain separation between clean, dirty (i.e. sediment-laden) and mine water management systems. • Minimise the use of clean and potable water on the site. • Maximise water recycling, reuse and sharing opportunities. • Minimise the use of make-up water from external sources. • Design, install, operate and maintain water management systems in a proper and efficient manner. • Minimise risks to the receiving environment and downstream water users.	**Section 11.1.1** **Section 11.2.1**
Aquifers	• Negligible impacts to alluvial and fractured rock aquifers as a result of the development, beyond those predicted in the EIS.	**Section 11.1.2** **Section 11.2.2**
Lake Cowal and other surface water resources	• Negligible impacts to Lake Cowal and other surface water resources caused by the development beyond those predicted in the EIS.	**Section 11.1.1** **Section 11.2.1**
Borefields	• Negligible impact to other groundwater users caused by the extraction of water from the borefields by the applicant.	**Section 11.1.2** **Section 11.2.2**

Feature	Performance measure	Where addressed
LPB	• LPB designed, constructed and maintained to a 1 in 1,000 year annual exceedance probability (AEP) flood event height plus 0.35 metres (m) freeboard. • Designed, installed and maintained in accordance with the guidance series for *Controlled Activities on Waterfront Land* (DPE 2022b).	**Section 7.2** **Section 11.1.1** **Section 11.2.1** **Appendix B**
ICDS	• Designed, installed and maintained to ensure no discharge of mine water or sediment-laden water outside the ICDS. • Designed, installed and maintained to minimise permeability and prevent or minimise the migration of pollutants due to seepage.	**Section 7.4** **Section 11.1.1** **Section 11.2.1**
UCDS	• Designed, installed and maintained to capture and convey 1 in 1,000 year AEP rainfall event.	**Section 7.3** **Section 11.1.1** **Section 11.2.1**
Flood mitigation	• Negligible changes to offsite flood regimes caused by the development beyond those predicted in the EIS.	**Section 6.2.1** **Section 11.1.1** **Section 11.2.1**
Erosion and sediment control works	• Designed, installed and maintained in accordance with the guidance series *Managing Urban Stormwater: Soils and Construction including Volume 1: Blue Book* (Landcom 2004) and *Volume 2E: Mines and Quarries* (DECC 2008). • Designed, installed and maintained in accordance with the guidance series for *Controlled Activities on Waterfront Land* (DPE 2022b) if constructed within 40 m of watercourses.	**Chapter 8**
Tailings storages and IWL	• Designed, constructed and operated in accordance with the Australian National Committee on Large Dams guidelines and the requirements of Dam Safety NSW. • Floors and embankments constructed and compacted to achieve a permeability standard equivalent of no more than $1x10^{-9}$ metres per second (m/s) over a thickness of 1 m. • Concentration of weak acid dissociable (WAD) cyanide (CN_{WAD}) must not exceed 20 milligrams CN_{WAD} per litre (mg CN_{WAD}/L) (90th percentile) and 30 mg CN_{WAD}/L (maximum) at any time.	**Section 7.11** **Tailings Management Plan** **Cyanide Management Plan** **Section 11.1.1**
Overburden emplacements	• Designed, installed and maintained to encapsulate and minimise offsite migration of contaminants from acid forming, potentially acid forming, saline and sodic material.	**Section 7.10** **Section 11.1.1** **Section 11.2.1**

Feature	Performance measure	Where addressed
Groundwater dependent ecosystems	• Negligible environmental consequences to groundwater dependent ecosystems (GDEs). • Negligible environmental consequences to fish and aquatic habitat.	**Section 6.3.5** **Section 11.1.2** **Section 11.2.2** **Section 6.3.5ii** **Biodiversity Management Plan**

3.2 Mining leases

The Conditions of Authority for mining lease ML 1535 regulated by the Resources Regulator includes requirements that relate to water pollution prevention, which are outlined in ***Table 3.3,*** along with the section of the WMP where these have been addressed.

Table 3.3: Mining lease conditions relevant to water management

Condition			Where addressed
12. Rehabilitation	a)	Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that: – there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion – the state of the land is compatible with the surrounding land and land use requirements – the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land – in cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density – the land does not pose a threat to public safety.	**Chapter 8** **Rehabilitation Management Plan**
	b)	Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.	
14. Prevention of soil erosion and pollution		Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	**Chapter 8**

A new mining lease was granted on 20 June 2019 for the ML 1791 area. Currently, that lease contains no specific requirements for water management; however, as the tenement is contiguous with ML 1535, CGO will include it in all aspects of planning and implementation of water management principles and practices.

3.3 Environment protection licence

CGO operate in accordance with EPL 11912 issued by the EPA under the POEO Act. EPL 11912 includes requirements relevant to surface water and groundwater monitoring locations and parameters, cyanide monitoring and cyanide concentration limits, incident notification and reporting.

EPL 11912 includes a number of surface water and groundwater monitoring points within the CGO site and the surrounding environment. The monitoring program detailed in Chapter 10 incorporates the monitoring requirements detailed within EPL 11912.

The notification and reporting requirements of EPL 11912 relevant to this WMP are outlined in Chapter 12.

3.4 *Water Management Act 2000*

3.4.1 Water sharing plans

Water sharing plans (WSPs) are statutory documents developed under the *Water Management Act 2000* (WM Act) that establish the rules for the sustainable sharing of water between the environment and water users, and between different types of water use at a water source scale and for specific water resource types (regulated rivers, unregulated rivers and groundwater). Long-term average annual extraction limits are set by WSPs to define the limit of water that can sustainably be taken for all purposes. WSPs set the rules for managing water in licence accounts, for trading licence entitlements and allocations, and for managing the works used to take licensed water.

The WSPs and water sources relevant to CGO are:

- *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020*:
  - - Lachlan Fold Belt MDB Groundwater Source (Lachlan Fold Belt MDB (Other) Management Zone) – groundwater contained within the fractured rock and alluvial sediments within outcropped areas.
- *Water Sharing Plan for the Lachlan Alluvial Groundwater Sources 2020*:
  - Upper Lachlan Alluvial Groundwater Source (Upper Lachlan Alluvial Zone 7 Management Zone) – groundwater contained within unconsolidated alluvial sediments below the surface of the ground.
- *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*:
  - Lachlan Regulated River Water Source – the water between the banks of the Lachlan River, from the upper limits of Wyangala Dam water storage downstream to the junction of the Lachlan River with the Murrumbidgee River. This water source is separated into multiple management zones.
- *Water Sharing Plan for the Lachlan Unregulated River Water Sources 2012*:
  - Bogandillon and Manna Creeks Water Source – water that occurs naturally on the surface of the ground and in rivers, lakes and wetlands.

3.4.2 Non-urban water metering policy

Water metering requirements are prescribed in the WM Act and are set out in the NSW Non-Urban Water Metering Policy (DPIE 2020a). Metering requirements apply to works taking water from regulated rivers, unregulated rivers and groundwater systems under a licence, where the take can be measured with a meter, including:

- all works with a metering condition on a water access licence (WAL) or approval
- all works that take water from an at-risk groundwater source, as set out in Schedule 9 of the Water Management (General) Regulation 2018 (WM Regulation), which includes the Upper Lachlan Alluvial Groundwater Source
- all surface water works, except pumps less than 100 millimetres (mm) in diameter
- all groundwater works, except bores less than 200 mm in diameter

- all pumps and bores for multiple works nominated on an approval, WAL or property, except multiple works below multiple thresholds (refer to the NSW Non-Urban Water Metering Policy for thresholds).

There are various exemptions from the non-urban metering rules, including for works that cannot physically comply with the metering rules. In these cases, an exemption under clause 233 of the WM Regulation from the metering requirements may apply as it is not physically possible to measure the water take by metering equipment. For any unmetered works, water take must be recorded within 24 hours and reported within 28 days of the end of the water year on 30 June.

3.4.3 Aquifer Interference Policy

The Aquifer Interference Policy (AIP) was released by the NSW Government in September 2012 (DPI 2012). The purpose of the AIP is to explain the water licensing and assessment processes for aquifer interference activities under the WM Act and other relevant legislative frameworks.

The dictionary to the WM Act (under Section 91) defines an 'aquifer interference activity' as an activity involving any of the following:

- penetration of an aquifer
- interference with water in an aquifer
- obstruction of the flow of water in an aquifer
- taking of water from an aquifer in the course of carrying out mining, or any other activity prescribed by the regulations, or
- disposal of water taken from an aquifer in the course of carrying our mining or any other activity prescribed in the regulations.

The AIP (DPI 2012) clarifies the requirements for obtaining water licences for aquifer interference activities and defines considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset.

The key requirements of the AIP are to:

- **Account for, or prevent, the take of water.** Where a proposed activity will take water from an aquifer or connected surface water source, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to enable this to be estimated to a suitable level of accuracy, and to ensure necessary WALs are obtained and held.

- **Address the 'minimal impact considerations'.** Aquifer interference activities can adversely impact groundwater and connected surface water sources by decreasing groundwater pressure and/or lowering the watertable; deteriorating groundwater and surface water quality either due to pollution or increases in salinity; by affecting the health or viability of a groundwater dependent ecosystem; or impacting on a culturally significant site. The AIP provides objective, measurable thresholds for considering the degree of impact an activity may have on the watertable, groundwater pressure and water quality changes. The assessment criteria differ between aquifer types (for example alluvial, porous, fractured) and whether the aquifer is deemed 'highly' or 'less' productive on the basis of natural water quality and extraction yields.

- **Propose remedial actions.** Where impacts are greater than those that were predicted as part of the relevant approval, proposed remedial actions shall be specified to manage those impacts.

3.5 *Dams Safety Act 2015* and Dams Safety Regulation 2019

The Dams Safety Regulation 2019 sets out the operational details for the *Dams Safety Act 2015*, along with the safety standards that declared dam owners must comply with. The legislation has been updated to improve

safety management practices of declared dams and to improve the regulator's ability to enforce requirements and standards.

Dams Safety NSW 'declares' dams that can potentially endanger life downstream, cause major damage or loss to infrastructure, the environment or have major health and social impacts. Each dam is given a consequence category that reflects this potential.

According to Part 2 Section 4 of the Dams Safety Regulation 2019, this includes:

- a dam with a wall that is more than 15 m high
- an existing or proposed dam that Dams Safety NSW is reasonably satisfied would endanger the life of a person, or result in a major or catastrophic level of severity of damage or loss if it failed (note some of these can be quite small)
- dams that were 'prescribed' under the old *Dams Safety Act 1978* became declared dams under the new Act.

Once a dam is declared by Dams Safety NSW, the dam owner must comply with dams safety legislation.

The Project includes four declared dams: Northern TSF, Southern TSF, the IWL and D9 water storage dams. These dams were constructed in the period 2005 to 2006. Specific management requirements are addressed in the respective Dam Safety Emergency Plans and Operation and Maintenance Manuals developed for each dam.

3.6 Guidelines

The following guidelines have been utilised during the preparation of this WMP:

- *Guidelines for Groundwater Documentation for SSD/SSI Projects – Technical guideline* (DPE 2022a)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000; ANZG 2018)
- *Using the ANZECC Guidelines and Water Quality Objectives in NSW* (DEC 2006)
- *Managing Urban Stormwater: Soils and Construction Volume 1* (Blue Book) (Landcom 2004)
- *Managing Urban Stormwater: Soils and Construction Volume 2E – Mines and Quarries* (DECC 2008)
- *Best Practice Erosion and Sediment Control* (ICEA 2008)
- *Bunding and spill management guidelines: Storing and Handling Liquids: Environmental Protection: Participant's Manual* (DECC 2007)
- suite of guidelines for controlled activities on waterfront land in NSW (DPE 2022b).

4 Consultation

In accordance with the requirements of Schedule 2, condition B39(c) of SSD-42917792, this WMP has been prepared in consultation with the DCCEEW – Water Group and the EPA. All correspondence regarding the WMP is provided in Appendix A. A summary of consultation undertaken, key issues raised and how matters have been addressed is presented in **Table *4.1***.

Table 4.1: Water Management Plan consultation summary

Agency	Date	Description	Matters raised	Response
EPA	20 November 2024	Project update and overview of WMP approach and requirements	–	–
DCCEEW – Water Group	5 December 2024	Project update and overview of WMP approach and requirements	–	–
DPHI	11 December 2024	Request for endorsement of team to prepare the WMP	–	–
EPA	11 April 2025	Draft WMP issued for review	No comment	n/a
DCCEEW – Water Group	10 March 2025	Draft WMP issued for review	The proponent should clarify the catchment runoff identified in the site water balance. The site water balance identifies a volume of catchment runoff but it is unclear where this is occurring. The proponent must consider this in terms of licensing requirements unless an exemption can be identified.	Catchment runoff in the site water balance refers to the runoff volume captured within the water storages within the ICDS, as described in Section 7.4. As described in Section 9.2, all contained water storages within the water management system are excluded works and are therefore exempt from licensing.

Agency	Date	Description	Matters raised	Response
			The proponent should confirm the maximum annual volume of groundwater take associated with the project due to inflows into the underground and open cut voids. The site water balance quantifies groundwater inflows into the open cut and underground mines as 1,066 ML/year but section 9.3 quantifies inflows as 1,664 ML/year in the Lachlan Fold Belt MDB Groundwater Source with an additional 121 ML/year in the Lachlan Alluvial Groundwater Source. Clarification is requested to ensure that sufficient entitlement is held in each impacted groundwater source to account for the maximum potential water take.	As discussed in Section 7.15, the annual site water balance results prepared by ATCW (2023) are averaged over the project life which was simulated to extend from the start of 2025 to 30 June 2042. The groundwater licensing requirements presented in Section 9.3 are the maximum annual groundwater inflow volumes predicted by hydrogeological modelling. Table 9.3 provides a summary of the predicted water licensing requirements, including the maximum predicted groundwater inflow into the pit and underground mine workings, and the current entitlement held for CGO. Sufficient entitlement is held for the predicted water take from groundwater sources and no additional entitlement is expected to be required for the Project.
			The proponent should review held water access licences (WALs) to ensure all management zones, extraction limits and WALs are linked to relevant extraction points. Additionally, the proponent must ensure that relevant nomination of work dealing applications for WALs proposed to account for water take by the project have been completed prior to the water take occurring. Table 9.1 summarises all held WALs associated with the project, however it includes some inconsistencies with department records, including: • WAL 14981 and WAL 42993 are incorrectly listed as being part of the upstream of Lake Cargelligo Weir Management Zone; however, the NSW Water Register indicates these WALs are in the Management Zone “That part of the water source downstream of Lake Cargelligo Weir”. • WAL 1990, WAL 42993 and WAL 40424 are not currently linked to a nominated work or extraction	Table 9.1 correctly identifies all water sources and management zones for all WALs and is consistent with information provided by the NSW Water Register. WAL 1990, WAL 42993 and WAL 40424 do not nominate a work approval as the licences are used to trade allocation to other licences with nominated works within the Lachlan Regulated River Water Source each year as required to account for water supplied from the Lachlan River. A dealing to nominate 70MW604511 on WAL 31568 was approved by WaterNSW on 10 February 2025 and was lodged for registration with the NSW Land Registry Services on 28 February 2025. Sufficient entitlement is held for the Upper Lachlan Alluvial Groundwater Source for the predicted water take due to pit and underground mine dewatering as well as water supply from the Bland Creek

Agency	Date	Description	Matters raised	Response
			point, until this occurs water take should not be occurring. • WAL 31568 does not appear to nominate an extraction point represented by 70MW604511. A dealing to nominate this work should occur prior to water take occurring. Table 9.2 notes that the Eastern Saline Borefield will take a 90th percentile volume of 1,460 ML/year, however, Table 9.1 indicates that the WAL associated with this borefield (WAL 36569) has only 300 unit shares. This should be reviewed to ensure sufficient entitlement is linked to each extraction point to account for maximum take from that extraction point. The proponent should note that annual bore extraction limits applying to bores in the Eastern Saline Borefield (authorised by approval 70WA614933) may have operational impacts.	Palaeochannel Borefield, Eastern Saline Borefield and saline groundwater supply borefield within ML 1535, as shown in ***Table 9.3***. There was an error in the first draft of this WMP that mixed up the Bland Creek Palaeochannel Borefield and Eastern Saline Borefield annual extraction (Table 9.2), this has now been rectified, and it is not anticipated that the Eastern Saline Borefield will extract more than the 300 unit shares and no operational impacts are expected.

Agency	Date	Description	Matters raised	Response
			Where data is insufficient at this stage to set site specific water quality trigger criteria, the proponent should set interim water quality criteria based on a broad regional dataset and/or to the ANZG (2018) water quality guidelines. The proponent has indicated some site specific (e.g. underground lake area) water quality trigger criteria need refining in the future when there is sufficient data to define these triggers: • "Based on ANZG (2018) guidelines where insufficient site data (<8 measurements above the LOR) exists for a particular area/water quality parameter. It is recommended these are updated as further data is acquired. • Not enough data exists for the underground lake area bores (which commenced monitoring in late 2023) to form site-specific triggers. It is recommended that these are assigned a site-specific trigger after two full years of quarterly monitoring data." Whilst this approach is reasonable and good practice in the interim it would better aid the project to set trigger criteria based on broad regional data and/or the ANZG (2018) water quality guidelines to enable better assessment of any potential impacts.	The ANZG (2018) guidelines are not considered suitable at the CGO site and have not been used in the generation of any trigger levels. They are therefore not recommended for use in determining interim triggers for the underground lake area monitoring bores. Across the CGO site, there is high variability in water quality across multiple aquifers, and therefore it is not considered suitable to use an average of the total monitoring to assign interim triggers here. Interim triggers have been assigned based on the nearby 'pit area', which are spatially closest to the underground lake monitoring bores. It is recommended that these interim triggers are critically evaluated at each annual review and reviewed as soon as possible to produce site-specific triggers.
DPHI	14/06/2025		Minor comments throughout document	All addressed in final version submitted to DPHI

5 Risk assessment

CGO has developed a site wide environmental risk assessment that includes a description of the measures that would be implemented to:

a) comply with statutory requirements, limits, or performance measures and criteria
b) manage the predicted impacts identified in the Project's EIS
c) manage any other environmental risk or impact that has been identified since the EIS documents were submitted.

The environmental risk assessment forms a key component of the sites EMS.

The site wide environmental risk assessment is reviewed annually as part of the site's annual review process or following any significant incident or non-compliance. The purpose of the risk assessment review process is to:

a) monitor, analyse and evaluate the implementation of the identified measures and determine whether any changes to the environmental risk assessment or identified measures is required
b) identify any additional unexpected environmental risks and the measures that will be implemented to manage them.
c) record and document mitigation measures over time that are reliable, reproducible and traceable.

This WMP has been developed in consideration to the key risks to water resources identified through the site wide environmental risk assessment.

6 Existing environment

6.1 Climate

6.1.1 Rainfall

CGO is located in a semi-arid climate region in Central West NSW and is dominated by cool conditions in winter and hot and relatively dry conditions in summer. CGO maintains a rainfall gauge on site, with data available from 2014 to 2023 (10 years). There are also several Bureau of Meteorology (BOM) operated rainfall gauges nearby.

Daily rainfall data was obtained as patched point data from the Scientific Information for Landowners (SILO) database hosted by the Queensland Government. SILO patched point data is based on historical data from the BOM rainfall stations, with missing data 'patched' in by interpolating data from nearby operating stations. SILO data was obtained for the grid centred at coordinates 33.65S, 147.40E from January 1970 to December 2024 (55 years).

Monthly rainfall statistics for the site using SILO data between 1970 and 2024 are shown in ***Figure 6.1***. Median monthly rainfall totals recorded at the site rainfall gauge are also shown for comparative purposes.

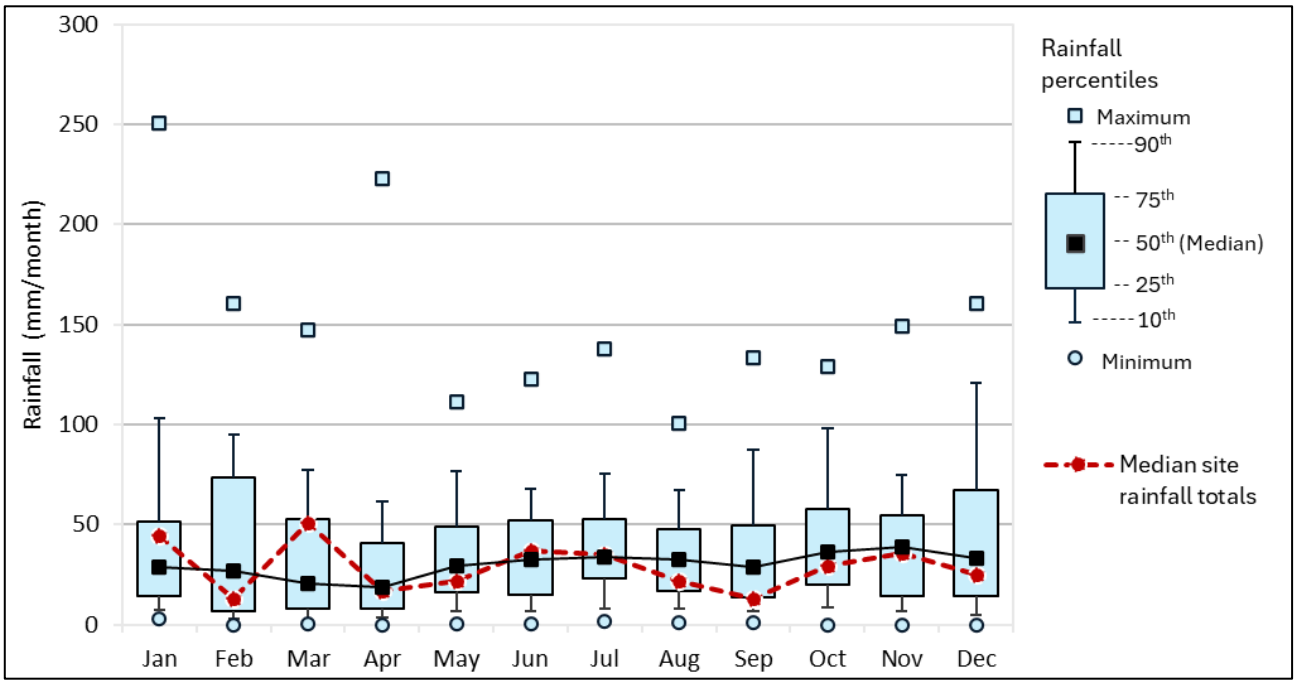


Figure 6.1: Long-term monthly rainfall statistics

The rainfall data in **Figure *6.1*** shows rainfall is relatively consistent between months, with slightly higher rainfall totals generally experienced from November to March. Larger difference between the 25th and 75th percentile values indicate greater rainfall variation also occurs from November to March. While less rainfall typically occurs from May to September, larger monthly rainfall totals (greater than 150 millimetres per month (mm/month)) have occurred in November to April.

Median monthly rainfall totals at the site gauge are similar to median monthly totals for the long-term SILO data, except during March and September. The larger median rainfall totals at the site gauge can be attributed to a disproportionate number of high rainfall periods occurring in March and September over the 10 year (2014 to

2023) data record. It is expected the median March and September rainfall totals at the site gauge will trend towards the median values for the SILO data as more data becomes available over time.

6.1.2 Evaporation

Daily evaporation rates were obtained as SILO patched point data for the grid centred at coordinates 33.65S, 147.40E from January 1970 to December 2024. **Figure *6.2*** presents the monthly Class A pan evaporation data compared to rainfall obtained as SILO patched point data.

Figure *6.2* shows monthly evaporation totals are up to four times larger in summer compared to winter. Median monthly evaporation totals are shown to exceed the median monthly rainfall totals throughout the year.

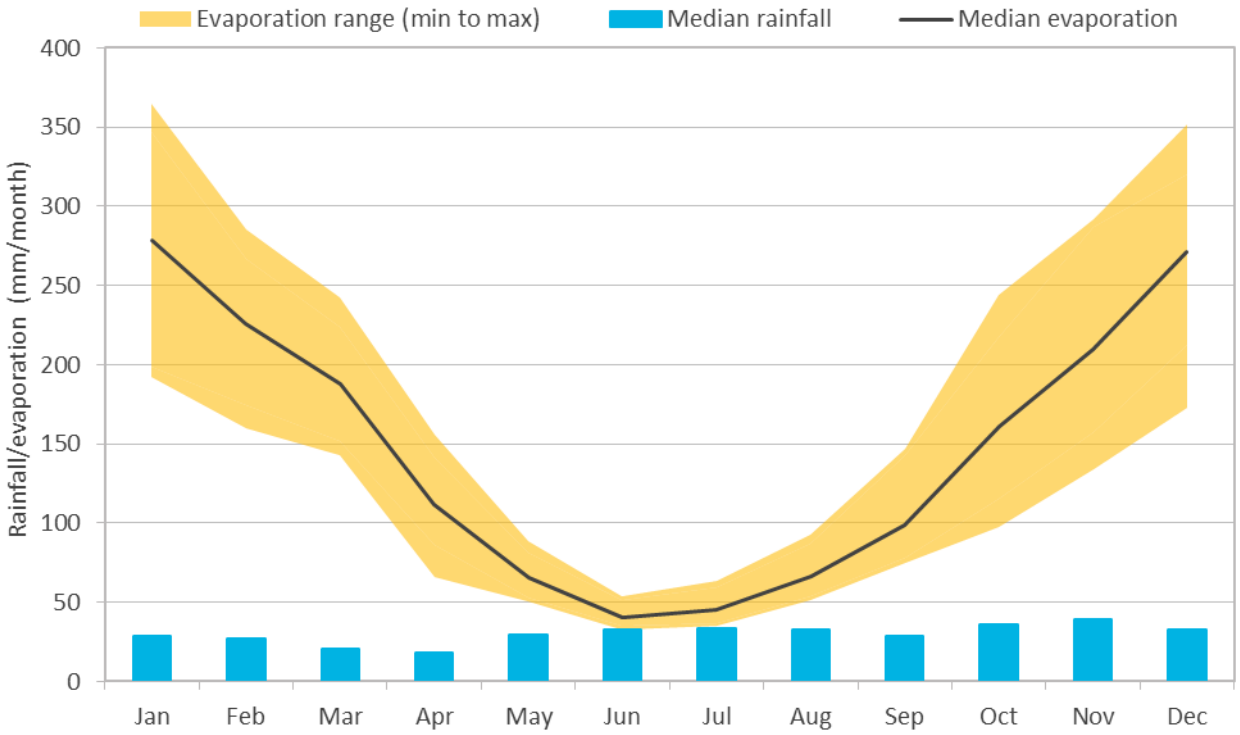


Figure 6.2: Monthly evaporation and rainfall

6.2 Surface water

6.2.1 Hydrological context

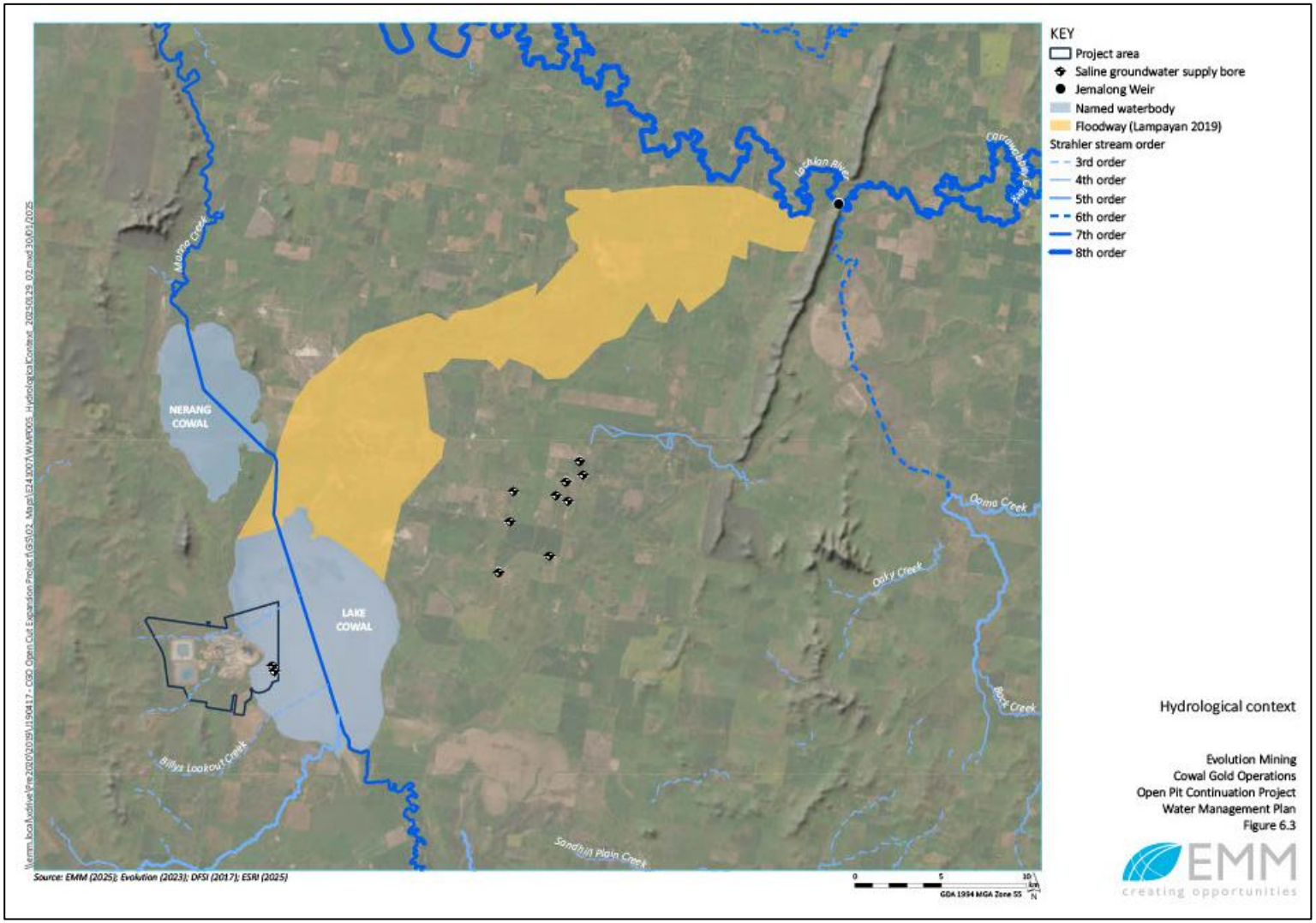
Key hydrological features and watercourses are presented in

Figure 6.3.

CGO is located within the Lachlan River catchment, which covers around 90,000 square kilometres (km2) in southern NSW and forms part of the Murray Darling Basin. The headwaters of the Lachlan River are in the Great Dividing Range near Gunning and the river flows around 1,400 km across western NSW to its terminal at the Great Cumbung Swamp near Oxley. During times of very high floods, Lachlan River flows reach the Murrumbidgee River. Flows in the Lachlan River are regulated by releases from Wyangala Dam.

Lake Cowal flooding behaviour for the 1 in 100 year AEP event is presented in **Figure *6.4***, as modelled by ATCW (2023).

Figure 6.3: Hydrological context



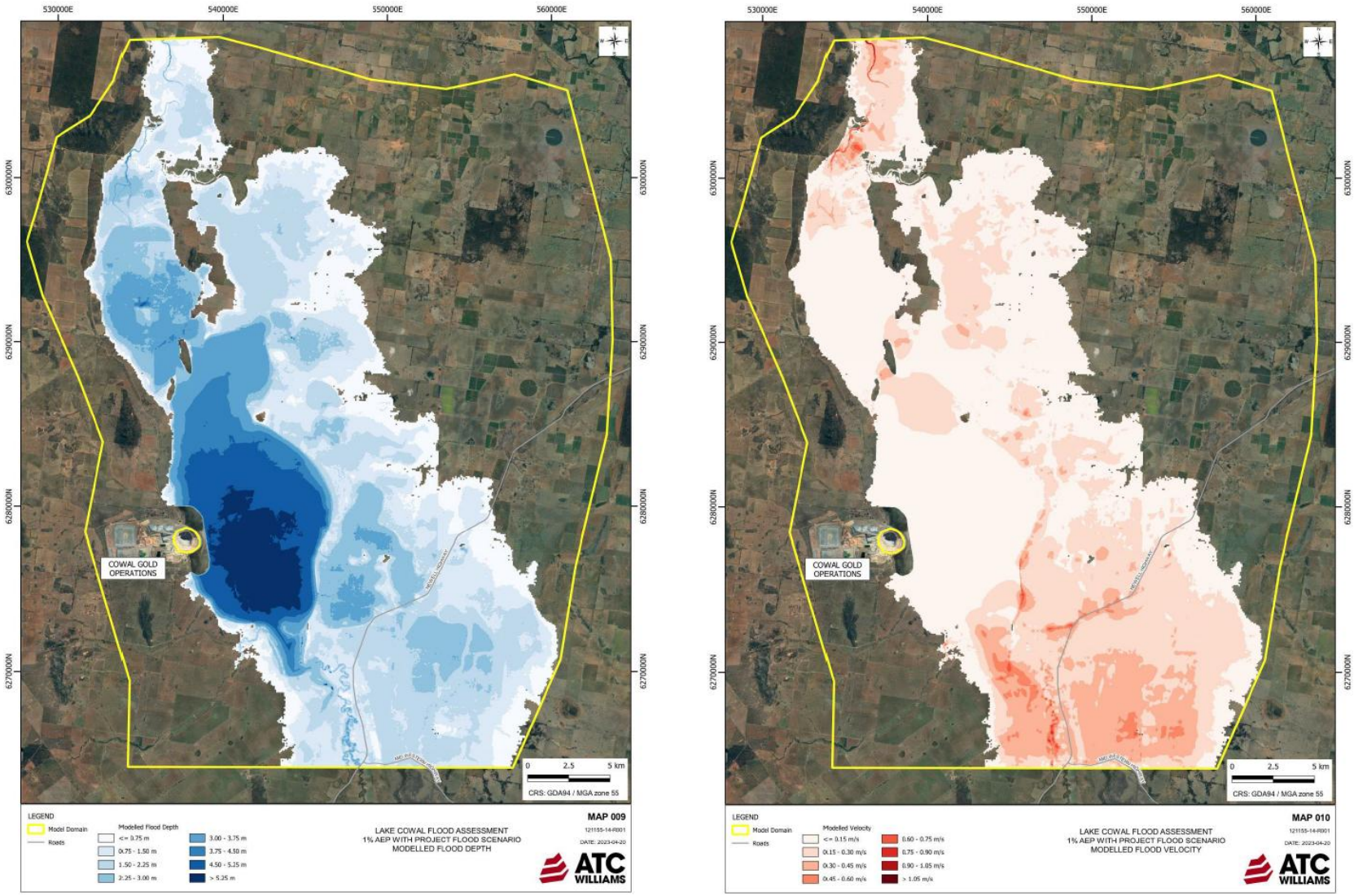


Figure 6.4: Lake Cowal flood depth (left) and velocity (right) for the 1 in 100 year annual exceedance probability event (ATCW 2023)

CGO is immediately adjacent to the western foreshore of Lake Cowal, which is an ephemeral, freshwater lake that forms part of the nationally important Wilbertroy-Cowal Wetlands. When full, Lake Cowal covers an area of around 16,150 ha, with a maximum depth of 4.2 m and volume of 150 gigalitres. The lake system also includes Nerang Cowal and Bogandillon Swamp to the north of Lake Cowal and covers a total area of around 20,500 ha. The Wilbertroy-Cowal Wetlands form the terminal drainage of Bland Creek, which has a catchment area of around 400,000 ha upstream of Lake Cowal.

Lake Cowal is filled predominantly by Bland Creek from the south and is also fed by the Lachlan River during major flood events. Historically, Lake Cowal contains some water around half the time; however, prolonged dry periods of up to 30 years have occurred since the early 20th century. In more recent years, Lake Cowal has experienced a prolonged dry period.

When inundated, the Lake Cowal system supports large numbers of waterbirds including breeding colonies of up to 79 different species. Fourteen bird species are listed as threatened in NSW and 15 internationally listed migratory species use the lake system as part of their migratory pathway.

When dry, the Lake Cowal lakebed vegetation is dominated by native and exotic grasses and is used for agriculture. Grazing and opportunistic cropping within the lake occurs when the water level has receded, and moisture and market conditions are suitable. Occasional commercial fishing operations are undertaken in Lake Cowal when the lake is inundated.

The area surrounding CGO is drained by ephemeral drainage lines that flow into Lake Cowal. Bland Creek and all other tributaries of Lake Cowal (including the drainage lines surrounding the CGO) are ephemeral. Flow records for Bland Creek between 1998 and 2004 indicate that runoff in the Bland Creek catchment is low, averaging approximately 5% of rainfall (ATCW 2023).

The Jemalong Irrigation District is located to the north-east of CGO and is managed by Jemalong Irrigation Limited. Over 300 km of interconnected artificial supply canals convey surface water via gravity from the Lachlan River within the irrigation district.

6.2.2 Lake Cowal water levels

Figure 6.5 presents the recorded water level of Lake Cowal from October 2010 to November 2024. Note that lake levels below 203.5 mAHD are not recorded, with the data record defaulting to that level when actual levels were lower.

The lake was completely dry from 2001 to 2010, and again in December 2014. Lake Cowal partially filled in July to December 2015, until rainfall across the region in June, July and September 2016 saw its capacity reached and exceed 100% later in 2016. Rainfall in December 2017 saw the lake retain water into 2018, but with the return of drought conditions in 2018 and 2019, the lake became dry again in 2019. Rainfall events in 2021 and during late 2022 saw the lake inundated with water. More recently, drier conditions have seen the Lake Cowal levels decreasing over 2023 and 2024.

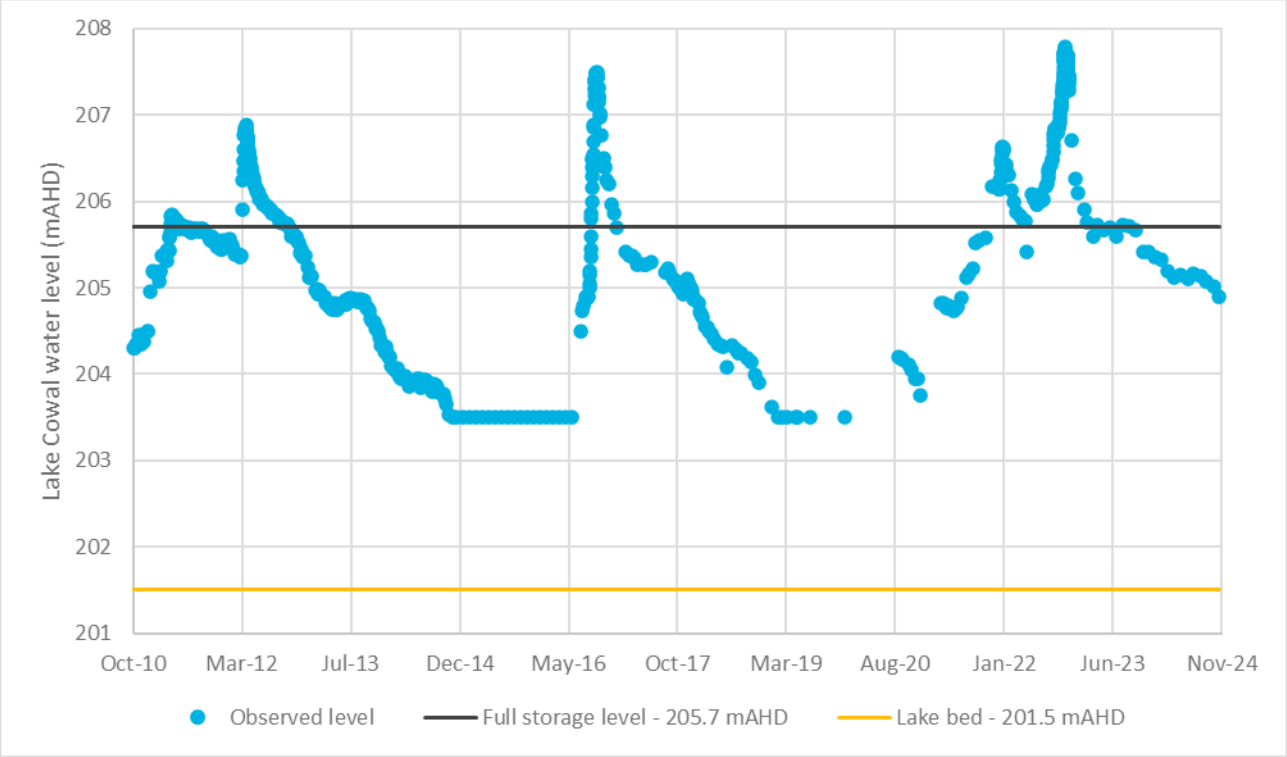


Figure 6.5: Recorded Lake Cowal water level

6.2.3 Lake Cowal water quality

Baseline water quality in Lake Cowal prior to the commencement of mining operations reported in the initial Cowal Gold Project EIS (North Limited 1998) was based on results of a sampling program conducted between 1991 and 1995 and included 34 monitoring locations along four transects across Lake Cowal.

Water quality was found to be typically slightly to moderately alkaline (pH 8.27 to 8.67) with low to moderate suspended solids concentrations (total suspended solids (TSS) concentrations of 22 milligrams per litre (mg/L) to 224 mg/L) (North Limited 1998).

Electrical conductivity (EC) was also low, varying between 222 and 1,557 microSiemens per centimetre (µS/cm), and was inversely related to lake volume (i.e. solute concentrations increased as lake volumes decreased through evaporation) (North Limited 1998).

Baseline arsenic, cadmium, lead, mercury and levels were low, and mostly below the relevant limit of reporting (LOR), however, copper and zinc concentrations were found to be higher than the ANZG (2018) limit for the protection of aquatic ecosystems (ATCW 2023).

Baseline water quality monitoring has been supplemented by monitoring campaigns undertaken (when sufficient water is present in Lake Cowal) from November 2010 to July 2014, from August 2016 to July 2018 and from December 2021 to February 2022. Sampling of Lake Cowal inflow from Sandy Creek and Bland Creek was also undertaken from November 2010 to July 2014 and from August 2016 to January 2017 when sufficient flow permitted. A summary of water quality monitoring results between April 2021 and November 2024 is presented in Appendix C. Further details of the monitoring program, including locations, parameters and frequency, is presented in Section 10.3.

The results of monitoring since 2010 are summarised in **Table *6.1*** and **Table *6.2*** for physicochemical parameters and total metals respectively. Results are compared to relevant default guideline values (DGVs)

recommended by the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000; ANZG 2018).

Review of water quality monitoring results to date indicates the following (ATCW 2023):

- the range of pH was high relative to DGV and baseline ranges, however, has been similarly elevated at sites near and distant to CGO
- average turbidity was significantly higher than the DGV and higher than baseline levels, however turbidity levels have been relatively uniform at sites across transects within the lake
- total phosphorous concentrations were significantly higher than the DGV for freshwater lakes, however, concentrations have been similar at sites both close to CGO and on the other side of Lake Cowal and lower than inflow site records (it is also noted that the average total phosphorus is less than the baseline average)
- average total copper, iron, lead and zinc concentrations were high relative to both DGVs and baseline concentrations, however, were lower than inflow site concentrations and have been similarly elevated at sites near and distant to CGO.

As runoff and water within CGO is fully contained within the ICDS, there is no obvious causal link between the mining operations and the water quality in Lake Cowal (ATCW 2023). Given that groundwater, including any seepage from on-site storages, will flow toward the open pit (EMM 2023a), the only plausible links between mining activity at CGO and lake water quality will be overflow from dams D1 and/or D4 or runoff/wash-off from the outside batters of the Perimeter WRE when the temporary isolation bund is inundated. Both D1 and D4 storages are fitted with pump back systems to D6 and/or D9 and CGO has advised that they have never overflowed to date (ATCW 2023). The data supports that there is no evidence that activities at CGO have resulted in changes to water quality in Lake Cowal (ATCW 2023).

Table 6.1: Summary of Lake Cowal water quality – physicochemical parameters

Parameter (units)	Default guideline value	Lake Cowal baseline data [4]	Inflow sites baseline data [5]	Lake Cowal transect monitoring [5]	Lake Cowal transect monitoring [5]	Inflow sites monitoring [5]	Lake Cowal transect monitoring [6]	Inflow sites monitoring [6]
		1991–1995	1991–1992, Dec 1993	1991–1995	Nov 2010–Feb 2023	Nov 2010–July 2022	Aug 2021–Nov 2024	July 2022–Nov 2024
Total nitrogen (mg/L)	0.35 [2]	–	0.66–2.61 (average 1.2)	0.061–0.257 (average 0.136)	0.01–5.62 (average 0.671)	0.01–2.7 (average 1.317)	–	–
Total phosphorus (mg/L)	0.01 [2]	–	0.029–0.216 (average 0.079)	0.97–2.64 (average 1.667)	0.01–3.95 (average 386)	0.07–1.86 (average 0.496)	0.01–3.95 (average 0.32)	0.09–0.8 (average 0.35)
pH (pH units)	6.5–8.0 [2]	8.27–8.67	7.6–8.2	7.72–9.80 (average 8.48)	5.56–11.42 (average 8.01)	5.78–9.39 (average 7.5)	6.49–9.24 (average 7.97)	7.25–8.41 (average 7.80)
TSS (mg/L)	–	22–224	0.54–150 (average 37.9)	13–271 (average 103)	2–1,210 (average 101)	4–640 (average 113)	3–448 (average 71)	13–801 (average 158)
Turbidity (NTU [1])	1–20 [3]	–	0.62–234 (average 70.5)	7–566 (average 111)	7.8–2,562 (average 287)	13.4–2,819 (average 356)	4.6–497 (average 150)	41–840 (average 196)
EC (µS/cm)	20–30 [3]	222 – 1,557	382–1,260 (average 726)	160–3,130 (average 881)	2.09–1,801 (average 382)	34–871 (average 218)	41–912 (average 353)	28–940 (average 455)

1. NTU – nephelometric turbidity units.
2. DGV for south-east Australia for slightly disturbed ecosystems (freshwater lakes and reservoirs) recommended by ANZECC (2000; Table 3.3.2).
3. DGV for south-east Australia for slightly disturbed ecosystems (lakes and reservoirs) recommended by ANZECC (2000; Table 3.3.3).
4. Reported in Cowal Gold Project EIS (North Limited 1998).
5. Reported in Project Surface Water Impact Assessment (ATCW 2023).
6. Derived from monitoring data summarised in Appendix C.

Table 6.2: Summary of Lake Cowal water quality – total metals

Parameter (units)	Default guideline value	Lake Cowal baseline data [4]	Inflow sites baseline data [5]	Lake Cowal transect monitoring [5]	Lake Cowal transect monitoring [5]	Inflow sites monitoring [5]	Lake Cowal transect monitoring [6]	Inflow sites monitoring [6]
		1991–1995	1991–1992, Dec 1993	1991–1995	Nov 2010–Feb 2023	Nov 2010–July 2022	Aug 2021–Nov 2024	July 2022–Nov 2024
Arsenic (mg/L)	0.013 [1]	0.003 (average)	<0.0001–0.004 (average 0.001)	<0.0005–0.004 (average 0.003)	0.001–0.027 (average 0.005)	0.001–0.026 (average 0.005)	0.001–0.007 (average 0.003)	<0.001–0.005 (average 0.003)
Cadmium (mg/L)	0.0002 [1]	0.00006 (average)	<0.0005–0.0005 (average 0.0001)	<0.0005–0.0005 (average 0.00006)	0.0001–0.001 (average 0.0001)	0.0001–0.0003 (average 0.0001)	All samples below LOR of 0.0001	All samples below LOR of 0.0001
Copper (mg/L)	0.0014 [1]	0.006 (average)	0.002–0.008 (average 0.004)	0.002–0.016 (average 0.006)	0.001–0.032 (average 0.008)	0.002–0.07 (average 0.011)	<0.001–0.015 (average 0.005)	<0.001–0.014 (average 0.006)
Iron (mg/L)	0.3 [2]	–	–	–	0.05–33.6 (average 9.6)	0.9–180 (average 18.6)	0.07–25.3 (average 5.9)	0.74–20.1 (average 6.7)
Lead (mg/L)	0.0034 [1]	0.003 (average)	<0.0005–0.007 (average 0.002)	<0.0005–0.007 (average 0.003)	0.001–0.015 (average 0.004)	0.001–0.007 (average 0.003)	<0.001–0.011 (average 0.003)	<0.001–0.014 (average 0.004)
Manganese (mg/L)	1.9 [1]	–	–	–	0.055–0.509 (average 0.163)	0.043–0.509 (average 0.212)	–	–
Mercury (inorganic) (mg/L)	0.00006 [3]	>50% samples below LOR of 0.0001	<0.0001–0.0004 (average 0.0002)	<0.0001–0.0004 (average 0.0001)	All samples below LOR of 0.0001	All samples below LOR of 0.0001	All samples below LOR of 0.0001	All samples below LOR of 0.0001
Nickel (mg/L)	0.011 [1]	–	–	–	0.002–0.026 (average 0.010)	0.003–0.077 (average 0.013)	0.002–0.02 (average 0.007)	0.002–0.015 (average 0.007)

Parameter (units)	Default guideline value	Lake Cowal baseline data [4]	Inflow sites baseline data [5]	Lake Cowal transect monitoring [5]	Lake Cowal transect monitoring [5]	Inflow sites monitoring [5]	Lake Cowal transect monitoring [6]	Inflow sites monitoring [6]
		1991–1995	1991–1992, Dec 1993	1991–1995	Nov 2010–Feb 2023	Nov 2010–July 2022	Aug 2021–Nov 2024	July 2022–Nov 2024
Zinc (mg/L)	0.008 [1]	0.0012 (average)	<0.003–0.022 (average 0.009)	<0.003–0.030 (average 0.012)	0.005–0.079 (average 0.018)	0.006–0.234 (average 0.032)	<0.005–0.039 (average 0.012)	<0.005–0.044 (average 0.016)

1. DGV for 95% species protection for slightly to moderately disturbed ecosystems recommended by ANZG (2018).
2. Interim indicative working DGV for freshwater ecosystems based on Canadian guideline level recommended by ANZECC (2000).
3. DGV for 99% species protection for slightly to moderately disturbed ecosystems recommended by ANZG (2018) to account for the bioaccumulating nature of mercury.
4. Reported in Cowal Gold Project EIS (North Limited 1998).
5. Reported in Project Surface Water Impact Assessment (ATCW 2023).
6. Derived from monitoring data summarised in Appendix C

6.3 Groundwater

6.3.1 Existing groundwater systems

Within the saturated zone (i.e. below the water table) Cenozoic alluvial sediments support alluvial groundwater systems. Groundwater flows through pore spaces within the sediments, with hydraulic conductivity increasing proportionally to sediment grain size (Freeze and Cherry 1979). The surficial sediments facilitate vertical infiltration from rainfall recharge and surface water however, recharge is limited by the extent and thickness of the Lacustrine Clay.

The alluvial sequence within the palaeochannel area is split into three groundwater systems, generally based on varying hydrogeological properties (i.e. yield, water quality and confinement). The alluvial groundwater systems include the:

- Upper Cowra groundwater system, an unconfined, phreatic groundwater system supporting the water table (where present). This sequence generally occurs from ground surface to an average depth of approximately 45 m to 50 m over most of the CGO site and surrounding area, with an average depth to groundwater of approximately 7 m (Evolution 2022a). The Upper Cowra groundwater system is rarely utilised for water supply, generally providing low yields (less than 1 litre per second (L/s) (Lampayan 2001)) of saline (approximately 39,000 µs/cm) groundwater (Evolution 2022b).

- Lower Cowra groundwater system, an unconfined/confined groundwater system (Bilge 2012) underlying the Upper Cowra groundwater system. Yield from the Lower Cowra groundwater system is highly dependent on intercepting extensive sand and gravel lenses within the formation. Groundwater from the Lower Cowra system can provide up to 40 L/s of saline (approximately 22,500 µs/cm) groundwater (Evolution 2022b).

- Lachlan groundwater system, a confined, highly productive groundwater system underlying the Lower Cowra groundwater system, which does not extend to the mining areas. This sequence generally occurs over an average depth interval of around 90 m to 120 m in the Bland Creek Palaeochannel (Evolution 2022a). The Lachlan groundwater system has been reported to provide up to 200 L/s (Lampayan 2001) of brackish (approximately 2,600 µs/cm) groundwater (Evolution 2022b). Vertical head differences between the Lachlan and Lower Cowra formation, especially in areas near pumping centres, indicates the presence of large vertical anisotropy, likely attributed to multiple clay layers observed in the Cowra Formation (EMM 2023a).

A fractured rock groundwater system is supported within the laterally continuous Lachlan Fold Belt rock units. Groundwater flows within the discontinuities (i.e. fractures, joints, shear-zones, etc.), with negligible flow though the undisturbed rock matrix. The fractured rock groundwater system is generally confined under the alluvial sequence (where present) and unconfined to semi-confined across the remaining extent. Bore yields are highly dependent on intercepting connected discontinuities within the rock unit, however, are reported as typically low (less than 1 L/s) (Lampayan 2001). Groundwater within the fractured rock groundwater system is generally saline (approximately 52,000 µs/cm) (Evolution 2022b).

6.3.2 Groundwater levels

The groundwater table (i.e. phreatic surface) is predominantly within the Upper Cowra groundwater system where present. Beyond the extents of the alluvial groundwater systems, the water table is within the fractured rock groundwater system. Around Lake Cowal the depth to groundwater is between approximately 2 m to 4 m, therefore resulting in a thin unsaturated zone.

Groundwater levels and flow direction in the alluvial groundwater systems are largely influenced by the Lachlan River and local topography. Interpreted groundwater levels for the Upper Cowra Formation, Lower Cowra Formation and Lachlan Formation provided in the Groundwater Impact Assessment (GIA) for the Project (EMM 2023a), indicate that the flow direction within the alluvial groundwater systems is generally towards the south-

west near the Lachlan River within the northern portion of the study area, tending towards an east to west flow direction further south in the study area.

Groundwater levels and flow direction in the fractured rock groundwater system predominantly follow a muted reflection of topography, generally flowing east to west.

Vertical groundwater flow is generally downward within the alluvial groundwater systems (i.e. from the Upper Cowra Formation towards the underlying Lower Cowra and Lachlan formations). This is likely exacerbated near large pumping centres extracting groundwater from the Lachlan Formation. Similarly, the Lachlan Formation alluvial groundwater system typically flows downward into the fractured rock groundwater system, west of the Project, exacerbated by the geological discontinuities associated with the Gilmore Fault Zone, apart from the south-eastern portion of the study area where groundwater level contours indicate an upward flow (i.e. from the fractured rock groundwater system to the overlying Lachlan Formation). It is considered the reversal of typical vertical groundwater flow direction in the south-eastern portion of the study area is due to a combination of:

- landholder extraction within the Lachlan alluvial groundwater system
- proximity to recharge zones for the respective groundwater systems.

There is an extensive groundwater monitoring network near the Project, discussed in further detail in Section 10.4. Regionally, there is also groundwater monitoring data available from DCCEEW – Water Group monitoring bores. Standing water levels measured at the CGO and DCCEEW – Water Group monitoring bores are provided in Appendix D.

As reported in the CGO 2023 Annual Review (Evolution 2024), the historical water levels in the Cowal groundwater system generally show some, but limited, response to rainfall. Within the Bland Creek Palaeochannel Borefield there is an inferred relationship where above average rainfall results in less reliance on the borefield and consequent recovery of borefield water levels. For the mine site area there is no relationship observed between rainfall and water levels, with the main groundwater level response linked to pumping for water supply and pit dewatering.

Groundwater levels in the Bland Creek Palaeochannel Borefield area are observed to generally reflect the pumping schedule. Pumping resulted in a maximum groundwater drawdown of approximately 67 m (in bore BLPR5) since April 2004 with the greatest drawdown recorded in BLPR5 in October 2018. As of December 2023, the average drawdown in the bores (since April 2004) was approximately 37 m. Less impact (drawdown of about 20 m) is observed in BLPR3 due to the higher screened interval of that bore, which intersects the Lower Cowra Formation rather than the Lachlan Formation (SLR 2024).

In the CGO mine area, piezometric levels generally decline toward the pit, however a localised increase in groundwater levels is observed in the vicinity of the IWL/TSF area. Recent work by SLR (2023), has attributed this groundwater level rise to compression of aquifer materials below the tailings dams and not the result of tailings seepage. Aquifer compression is due to the high clay content and low hydraulic conductivities of the strata underlying the IWL.

6.3.3 Groundwater quality

Assessment of baseline groundwater salinity levels undertaken for the initial Cowal Gold Project EIS by Coffey (1997) reported that:

- the alluvial groundwater system had very high salinity in the range of 19,000 µS/cm to 72,000 µS/cm within the open pit extent and 6,000 µS/cm to 44,400 µS/cm beneath the TSF area
- the fractured rock groundwater system also had very high salinity in the range of 50,900 µS/cm to 63,700 µS/cm.

Groundwater is typically saline within the study area, with the exception of the Lachlan groundwater system, which is brackish. The water quality is generally of a sodium chloride type. The 2024 groundwater monitoring results are generally consistent with the baseline conditions.

Based on previous studies of the Jemalong Irrigation Area (Lampayan 2001), salinity concentrations are understood to vary spatially, generally decreasing in the alluvial groundwater systems near the Lachlan River (likely due to freshwater recharge). Salinity is also increasing within the region, predominantly due to irrigation induced rising water tables, leading to dryland salinity.

Groundwater monitoring undertaken within the Project area indicates pH is slightly acidic to neutral, with the exception of groundwater near the IWL where the pH is acidic (i.e. between 4.5 and 6 pH units) (Coffey 2020a). Cyanide is used in the gold extraction process and can potentially leach into groundwater at the existing IWL. However, Coffey (2020a) reported that cyanide has not been observed at detectable concentrations in groundwater and that the levels observed in groundwater are not dangerous to human health or the environment.

Monitoring data indicates that, while open pit dewatering is causing a localised reduction in groundwater levels, no changes in groundwater chemistry appear to be associated with this drawdown (Coffey 2020a).

Groundwater quality records from monitoring bores in the Bland Creek Palaeochannel Borefield indicate decreasing salinity with depth (Coffey 2020b). Salinity levels in the Cowra Formation are high in the Upper Cowra (i.e. up to approximately 39,000 µS/cm), lower in the Lower Cowra and approximately 2,600 µS/cm in the Lachlan Formation (Coffey 2020b).

EC records from groundwater monitoring bores in the Bland Creek Palaeochannel indicate that salinity levels have remained reasonably constant within the three alluvial sequences since monitoring commenced in 2004 (Coffey 2020b). While fluctuations at BLPR2 have been recorded, salinity levels fell substantially in late 2013 before indicating an overall upward trend since late 2014 (Coffey 2020b).

6.3.4 Geochemistry

A range of geochemistry studies have been undertaken on the CGO's mine rock, surface material, waste rock (primary waste and oxide), low grade ore (LGO), ore and tailings materials. The findings of these studies included (EMM 2023a):

- Oxide waste: saline and sodic. Lacks reactive sulfide in rock samples meaning low acid neutralisation capacity (ANC) and the classification as non-acid forming (NAF) to barren.
- Primary (fresh) waste rock: non- to slightly saline and non- to slightly sodic. Contained relatively high levels of reactive sulfide but also high ANC, indicating NAF and potentially acid consuming conditions. Oxidisation of reactive sulfide is expected to be neutralised by the available ANC, limiting acid generation. There is still a risk that the drainage from the waste rock will become saline.
- The waste rock is typically enriched with antimony and arsenic with some samples enriched with cadmium, selenium and silver. Leach testing identified molybdenum and selenium as potentially readily soluble under near neutral to slightly alkaline pH conditions. Sequential batch water extractions indicated that leaching is unlikely to be a concern, provided near neutral pH values were maintained.
- The LGO and ore: non-saline. Reactive sulfides are, however, present in the samples tested and although most samples are classified as NAF, a number of samples from the E41 East deposit are potentially acid forming (PAF) or PAF low capacity. In addition, although most LGO and ore is expected to have sufficient acid buffering capacity, the reactive sulfides may result in an increase in salinity following exposure on the surface of the LGO and ore stockpiles.
- The LGO and ore is enriched in antimony and arsenic, with some samples also enriched in cadmium, copper, mercury, selenium, silver and zinc. Leach testing found arsenic, molybdenum and selenium to be readily soluble.
- Tailings: low salinity and non-sodic. Reactive sulfides present, however presence of ANC is expected to limit acid generation with the majority of the tailings being classified as NAF. There was some risk of small quantities of PAF ore and PAF LGO in the E41 deposit acidifying. Tailings contained high concentrations of arsenic, cadmium, lead, molybdenum, antimony and zinc. There is a potential first flush of copper and zinc, however the majority of this would be associated with processing and would not present a long-term concern for water quality.

6.3.5 Sensitive receivers

i. Landholder bores

Water users within the study area predominantly access surface water from the Lachlan River and groundwater from the Lachlan alluvial groundwater system. The National Groundwater Information System database (BOM 2022) listed 312 bores within the study area as active, in use or unknown. Groundwater bores are used for commercial and industrial, irrigation, stock and domestic, water supply, dewatering and unknown purposes.

Locations of registered groundwater bores are presented on Figure 6.6

ii. Groundwater dependent ecosystems

Mapping provided in the Water Sharing Plan for the Lachlan Alluvial Groundwater Sources 2020 indicates that high priority GDEs may be found within the study area. Further assessment indicates the high priority GDEs align with the terrestrial GDEs categorised as high–very high priority within the publicly available high ecological values aquatic ecosystems (HEVAE) GDE dataset (DPE 2022c) and generally align with aquatic GDEs categorised as high potential within the publicly available GDE atlas (BOM 2017).

Ramsar wetlands are not mapped within the study area (DCCEEW 2022).

Locations of relevant mapped potential GDEs are presented in Figure 6.7, however it should be noted that assessments undertaken as part of the EIS found no terrestrial plant communities reliant on accessing groundwater within the Upper Cowal Formation (EMM 2024).

Figure 6.6: Sensitive receivers – registered groundwater bores

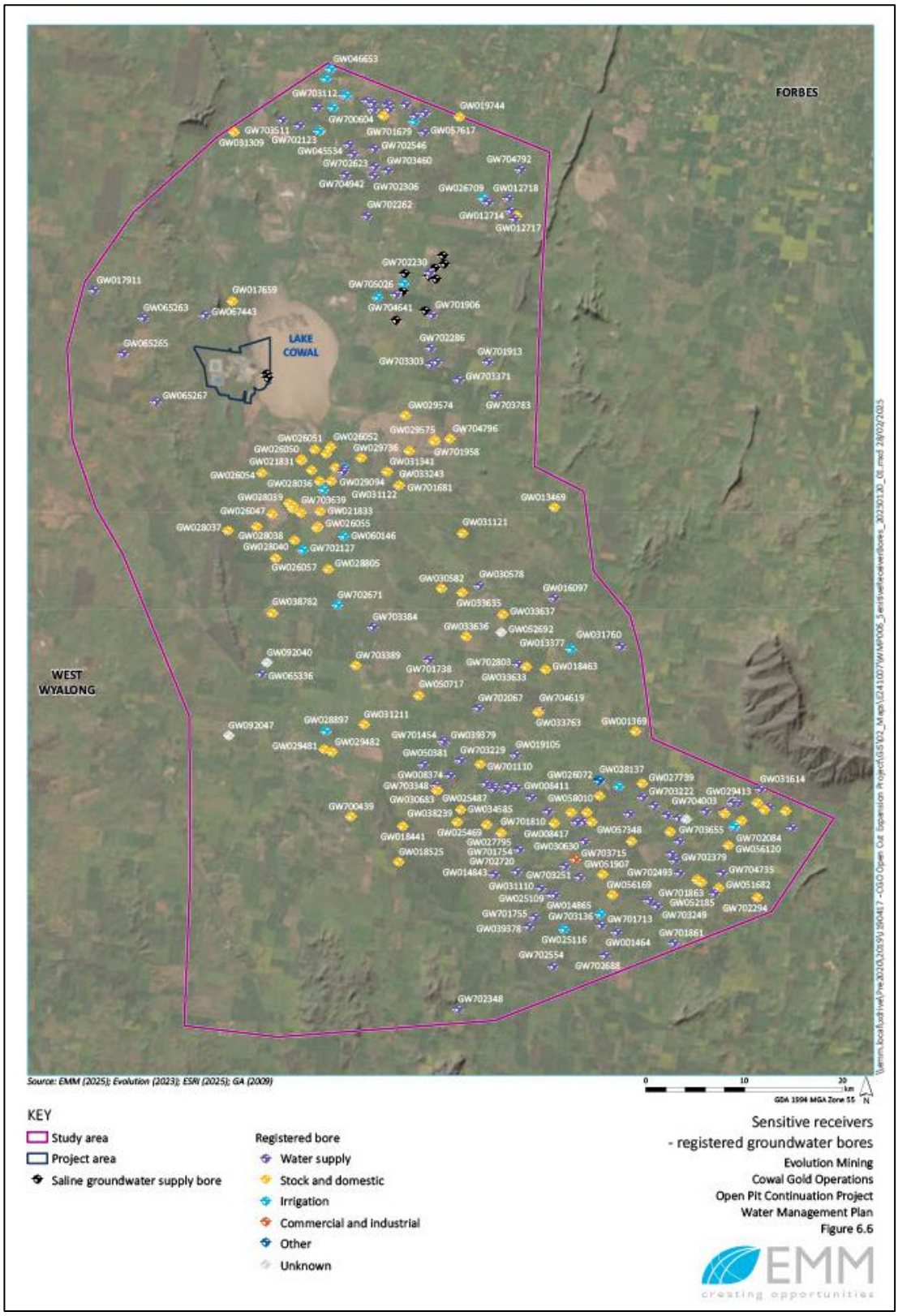
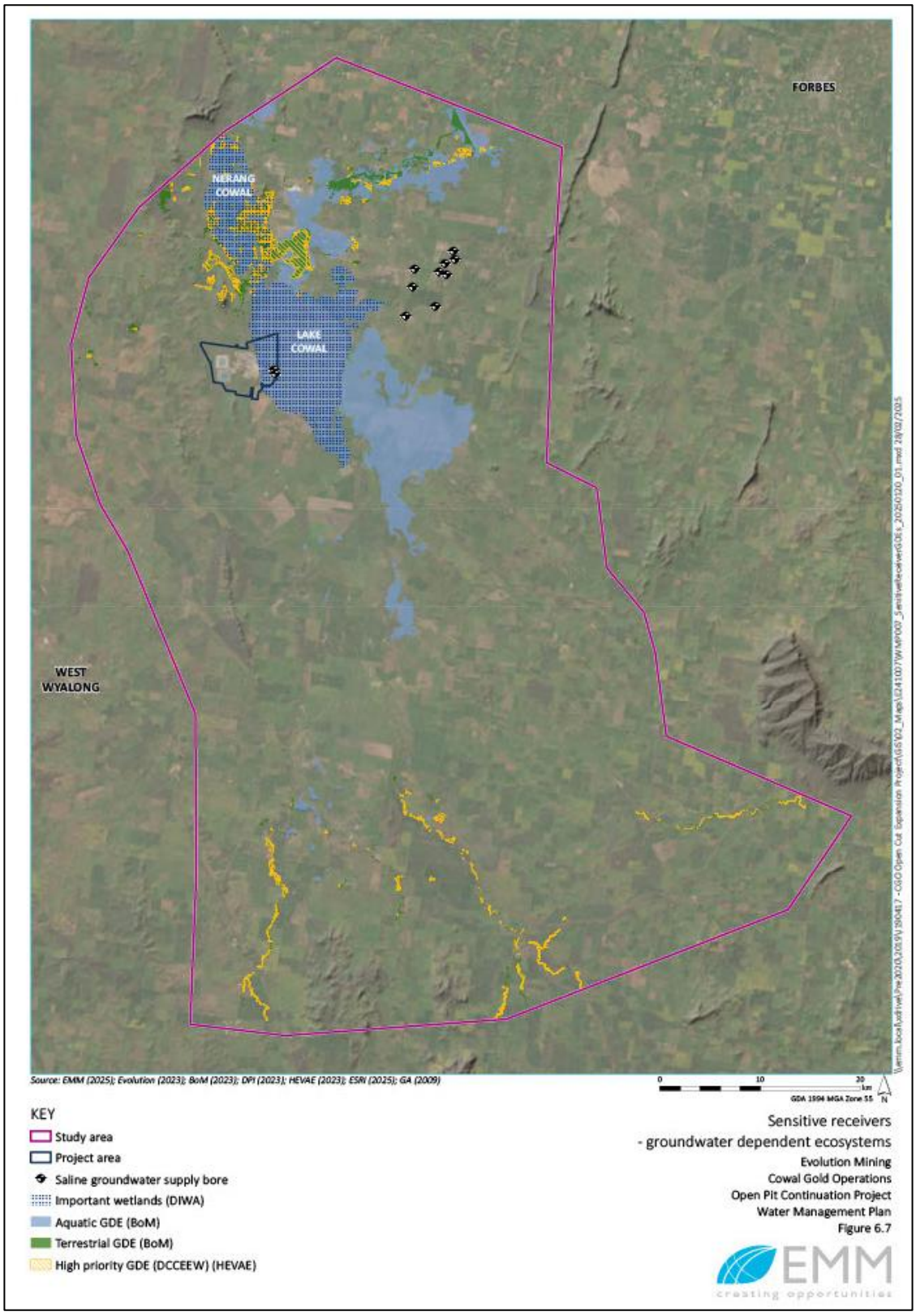


Figure 6.7: Sensitive receivers – groundwater dependent ecosystems



6.4 Site conceptual model

A conceptual model describes the key processes in the hydrological and hydrogeological environment. It is based on hypotheses and assumptions, some of which will be derived from data sourced from the water environment under investigation and others will be based on general hydrogeological or hydrological principles.

EMM (2023a) developed a hydrogeological conceptualisation of the mining area, as shown in ***Figure 6.8*** and ***Figure 6.9***. These figures include hydrostratigraphic units, groundwater stresses and groundwater flow direction. The conceptual models show the following main attributes:

- The mine is located on the western edge of the palaeochannel, with only the Lacustrine clay and the Upper Cowra Formation existing in the vicinity of the mine. It does not intersect the Lachlan Formation.
- The saline groundwater supply bores within the ML 1535 and the eastern saline borefield extract water from the Cowra Formation. The Bland Creek Palaeochannel Borefield extracts water from the Lachlan Formation.
- Irrigation and rainfall are the main recharge mechanisms. Locally, groundwater systems are recharged by the Lachlan River, irrigation channels, and intermittently from the Lachlan River floodway during flooding.
- The main flow direction is downwards from the palaeochannel sediments to the underlying fractured rock system. Groundwater then continues to flow west and discharges outside of the mine area.
- Evapotranspiration is the main discharge mechanism from the shallow groundwater system, especially during wetter periods when the lakes are full.
- Minor seepage occurs from these lakes; however, recharge is limited by the low hydraulic conductivity of the Lacustrine Clay, deposited directly beneath the lakes.
- Inflow of groundwater from the Upper Cowra, Lower Cowra and fractured rock groundwater system flows into theE42 pit, causing local drawdown.
- Tailings deposition and WREs induce local groundwater mounds beneath these facilities.

Figure 6.8: Conceptual hydrogeological section – east to west

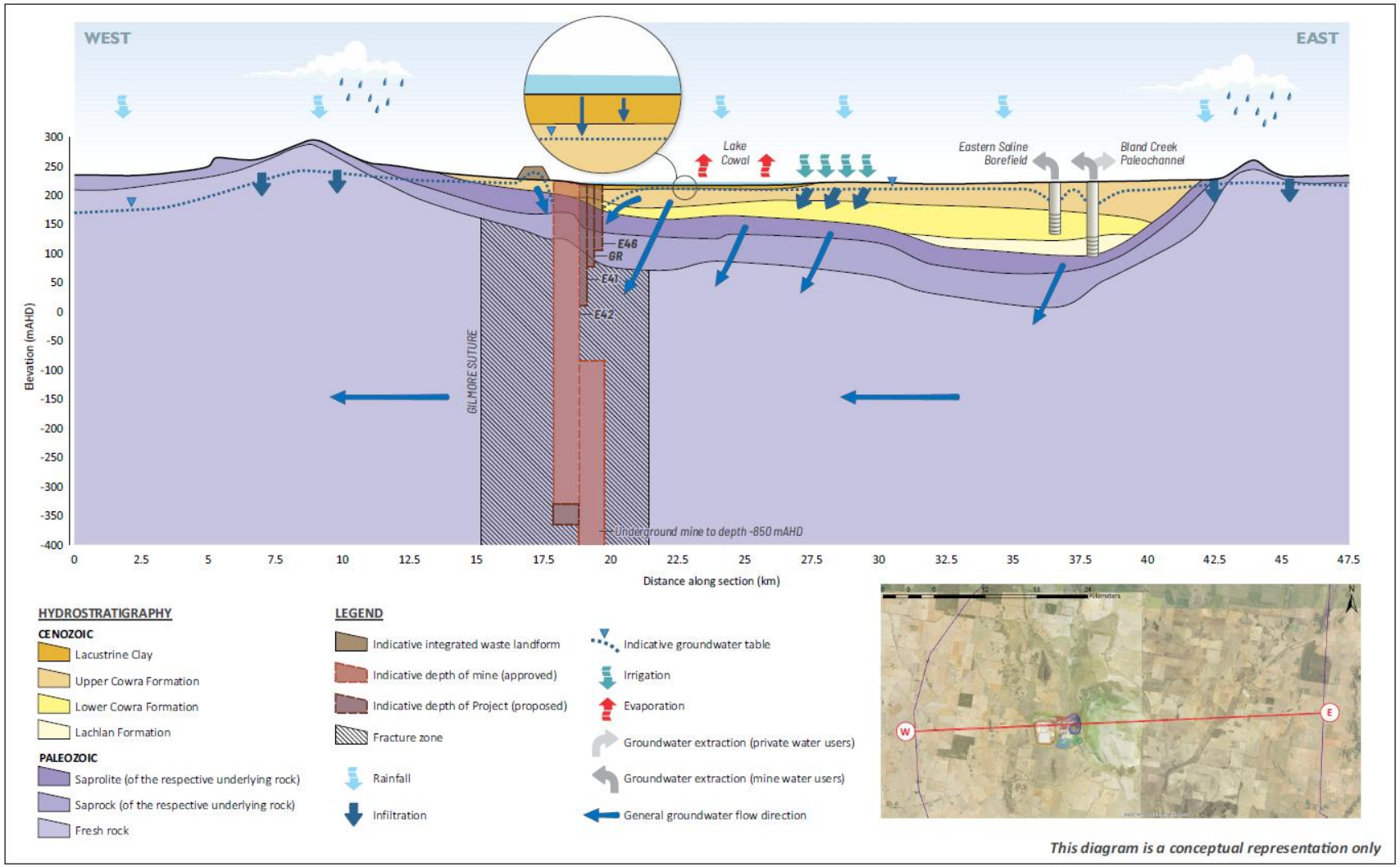
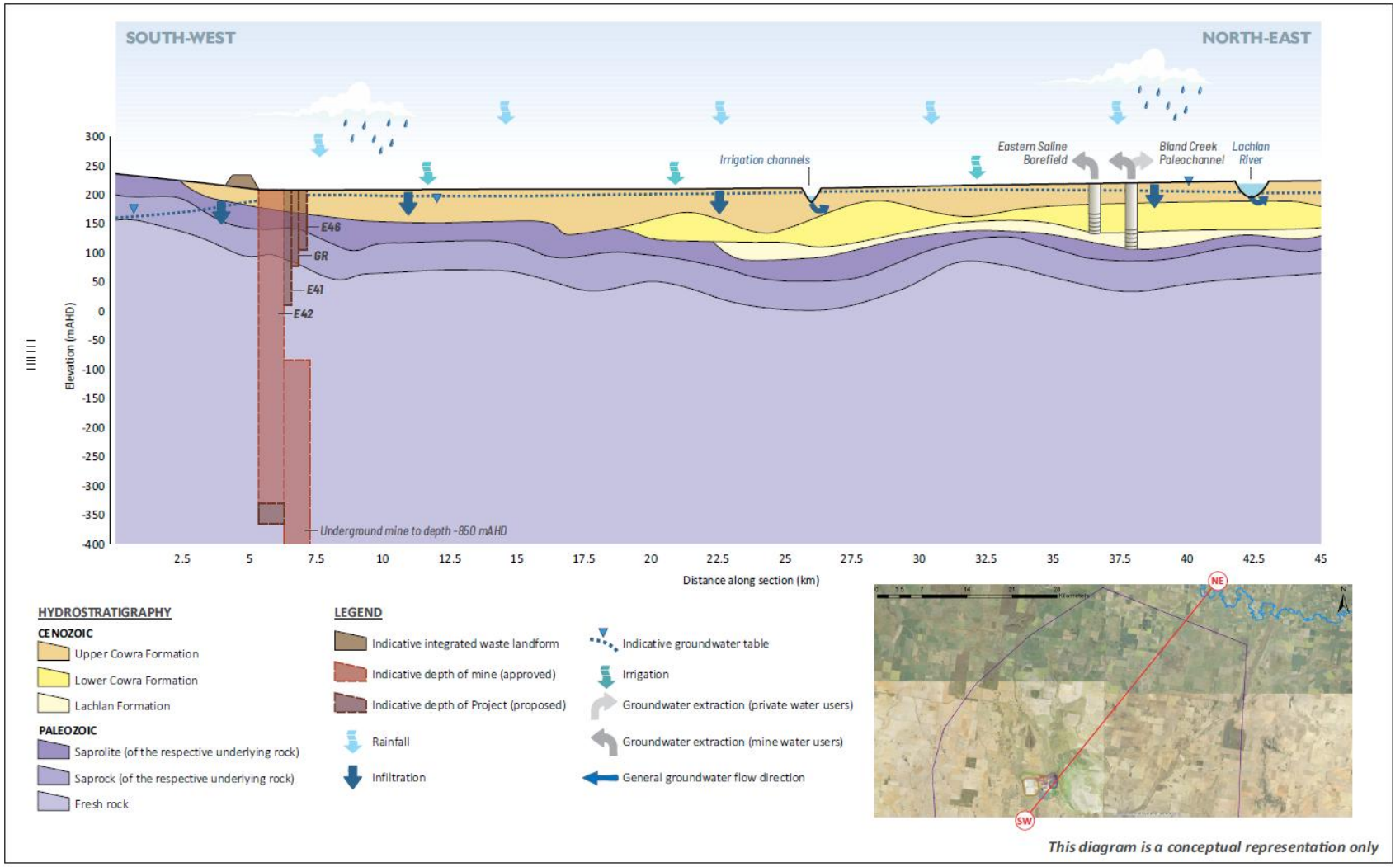


Figure 6.9: Conceptual hydrogeological section – southwest to northeast



7 Water management approach

7.1 Overview

The current CGO water management system is presented in ***Figure 7.1*** and ***Figure 7.2***. It is designed, constructed and operated with consideration of the following key objectives:

- minimise disturbance areas, with progressive stabilisation and revegetation of disturbed areas
- maximise the separation of clean and potentially contaminated water
- minimise the volume of potentially contaminated water generated
- provide sufficient on-site storage to contain potentially contaminated water to minimise the risk of releases water that could affect the quality of downstream water sources
- prioritise the recycling and reuse of potentially contaminated water where reasonable and feasible in preference to external water supply.

The CGO water management system has been designed to contain all potentially contaminated water generated within the operational area, while diverting all other water around the perimeter of the site. The water management system includes both permanent features that will continue to operate post-closure (e.g. diversions of surface water around the site, creation of new catchment divides and isolation of the lake from the open pit), and temporary structures (servicing the life of mine requirements only). The water management system will be progressively developed during the construction and operation of the mine as diversion and containment requirements change.

Surface water within and around the mine will continue to be managed through a number of water management structures. The UCDS, lake isolation system and ICDS are designed to minimise the volume of surface water within the mine site through the isolation of the mine site from Lake Cowal and the catchment upstream of the UCDS.

The lake isolation system comprises a temporary isolation bund and a permanent isolation bund (the LPB). The LPB comprises a large, engineered embankment that provides a permanent barrier between Lake Cowal and the open pit. Runoff from areas upslope of the ICDS (i.e. areas upstream that are undisturbed by mining) is diverted via the UCDS around the mine site to Lake Cowal.

The following changes to the water management system are required to facilitate the Project:

- expansion of the LPB, which would be developed in two stages, to maintain the mutual separation and protection between CGO and Lake Cowal
- expansion of the IWL to the north of the existing IWL (termed the “IWL North”), which will provide an additional 70 Mt tailings storage capacity
- realignment of the UCDS around the new site components to maintain clean water diversion around CGO
- changes to the ICDS to integrate the new Project components into the site’s internal water management system, including the construction of additional contained water storages.

The Project water management system is presented in ***Figure 7.3*** to ***Figure 7.7***.

Figure 7.1: Current (2025) site layout and catchments (ATCW 2023)

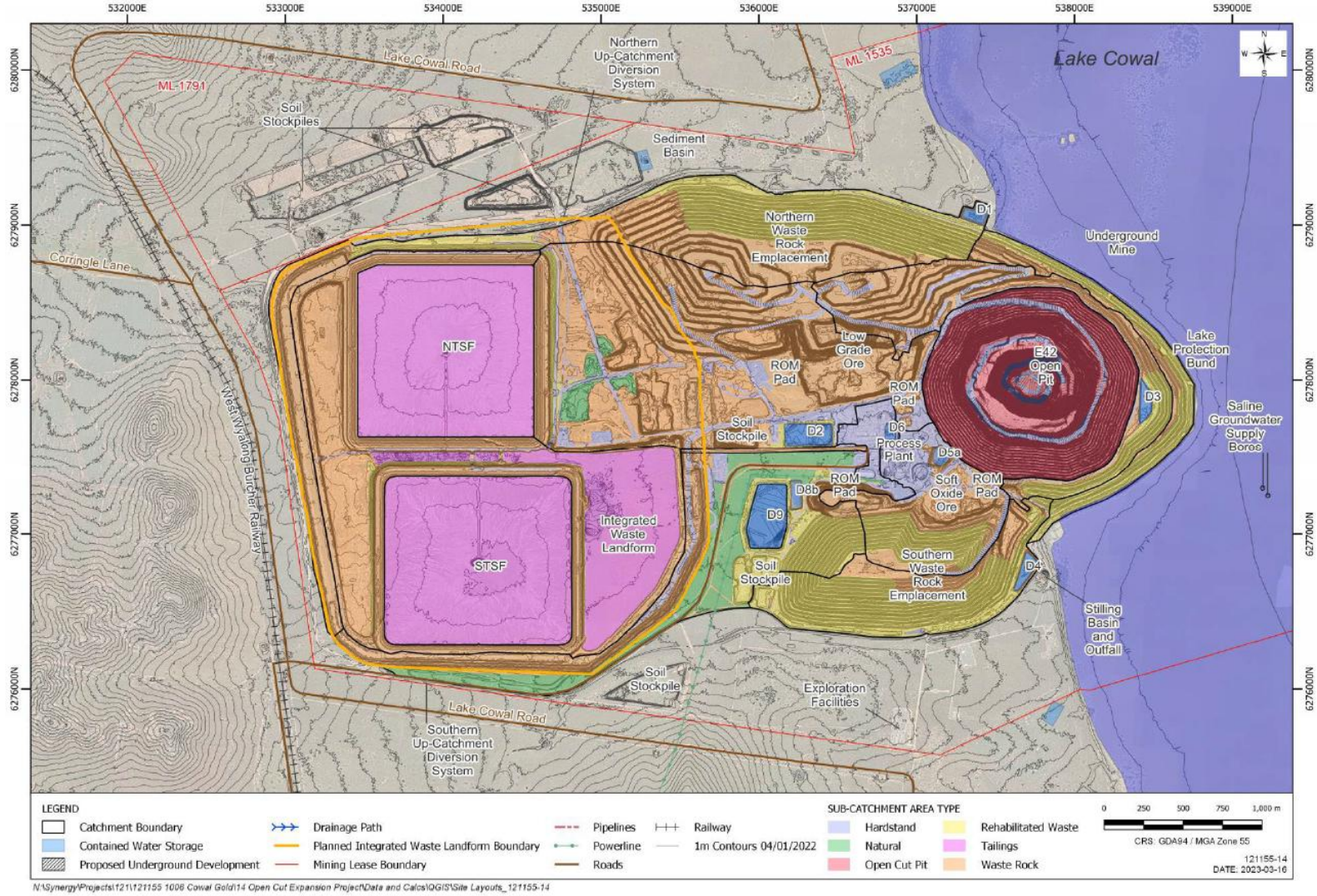


Figure 7.2: Current (2025) water management system schematic (ATCW 2023)

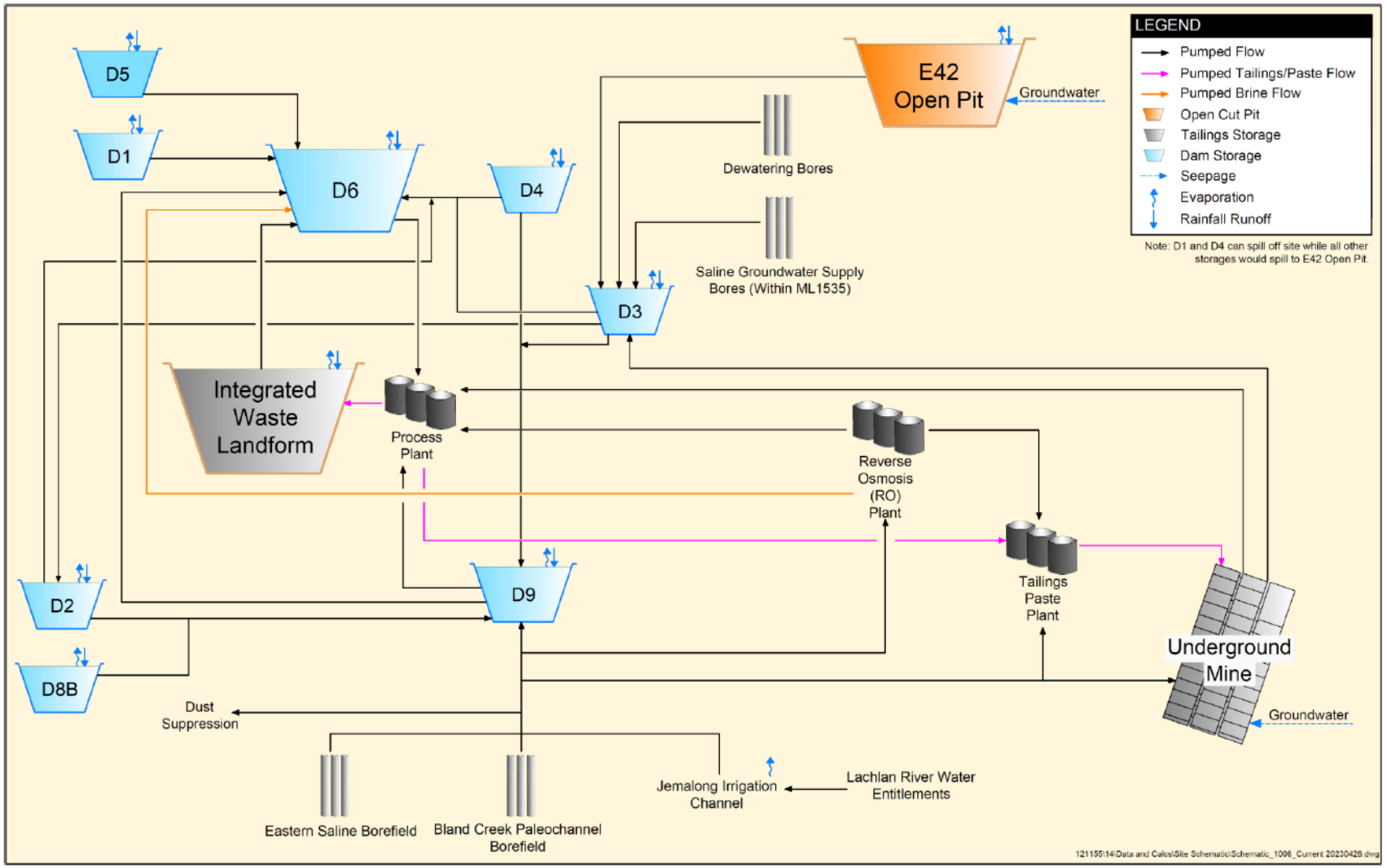


Figure 7.3: Conceptual site layout and catchments – Year 2 (ATCW 2023)

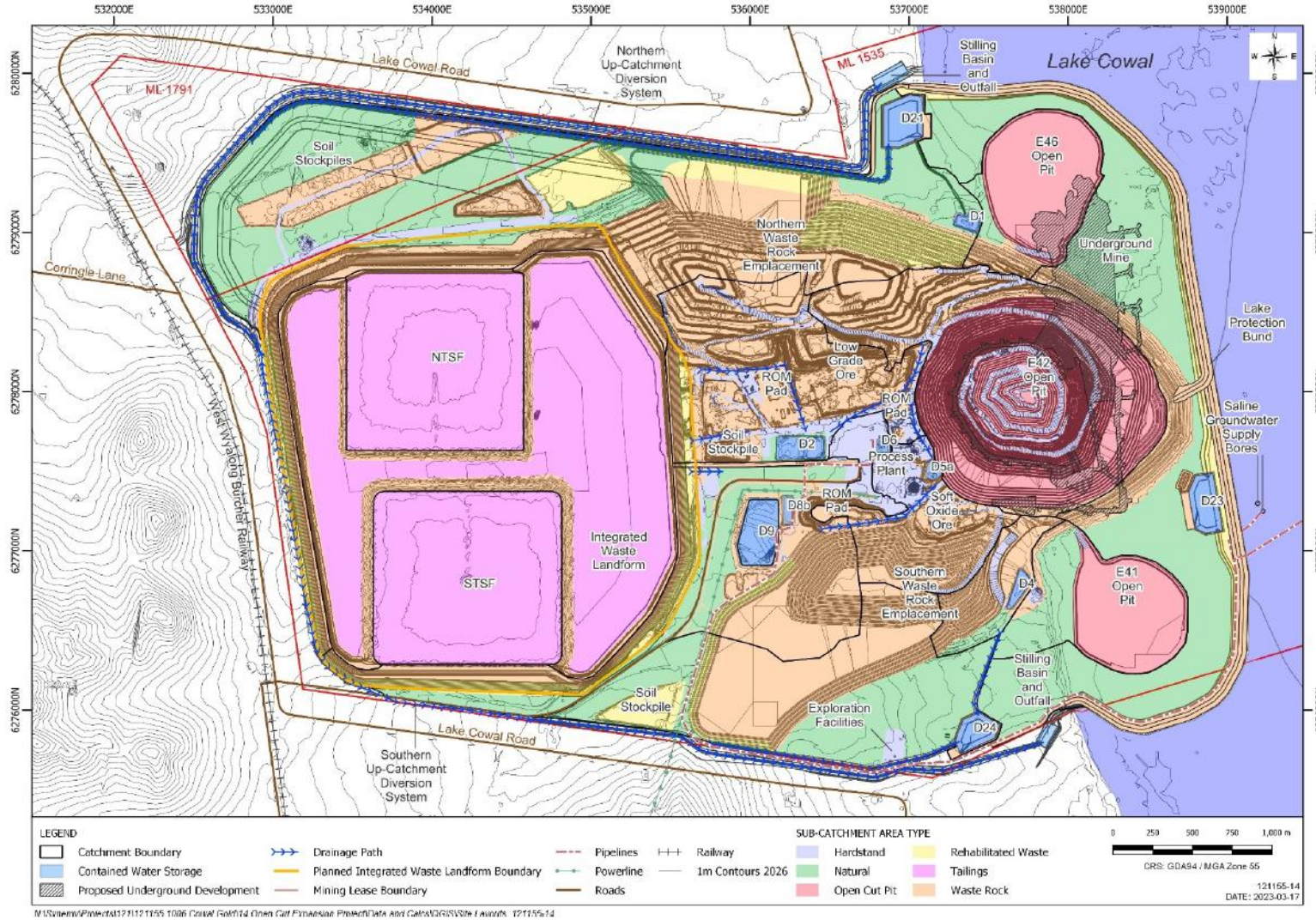


Figure 7.4: Conceptual site layout and catchments – Year 5 (ATCW 2023)

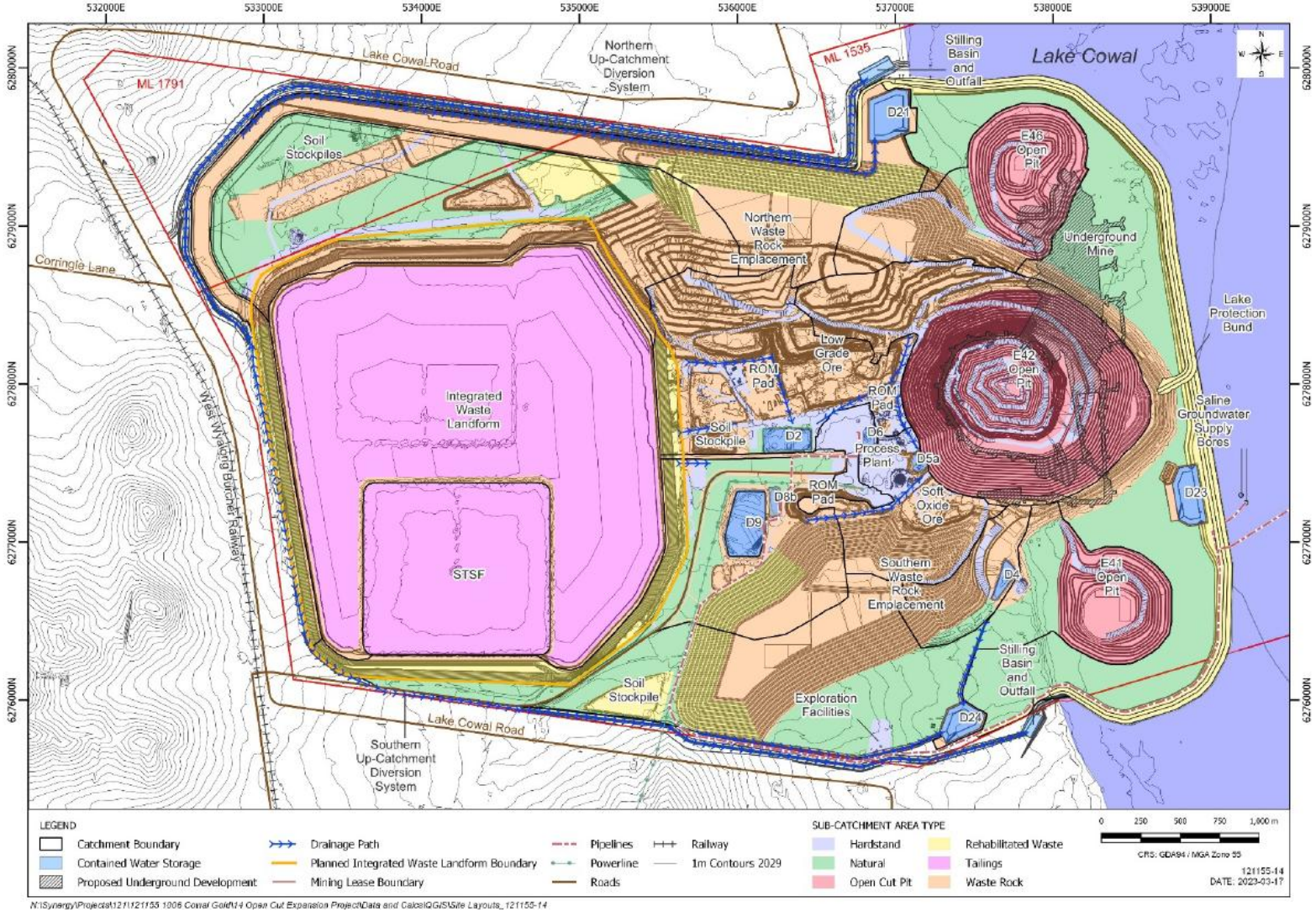


Figure 7.5: Conceptual site layout and catchments – Year 7 (ATCW 2023)

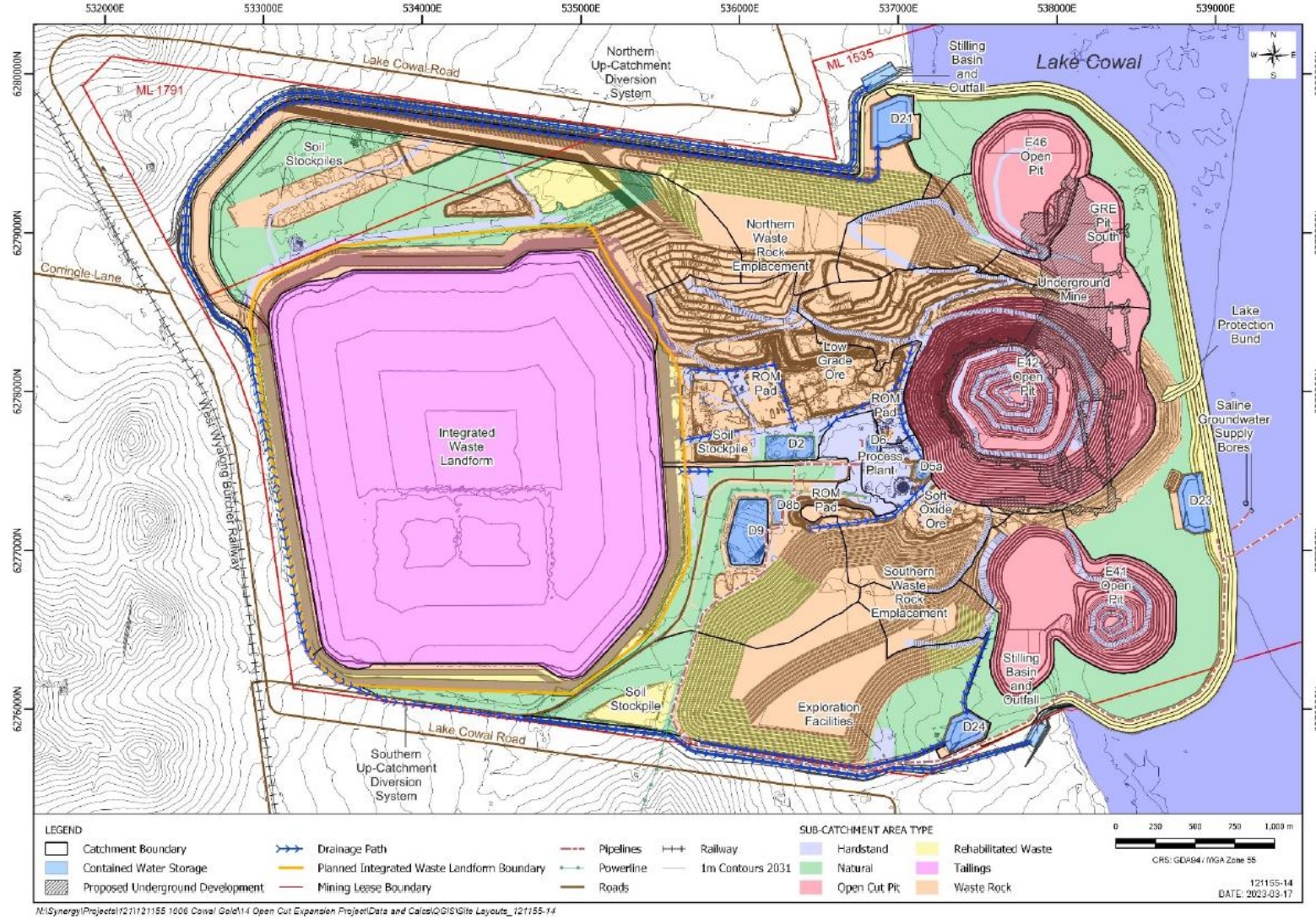


Figure 7.6: Conceptual site layout and catchments – Year 13 (ATCW 2023)

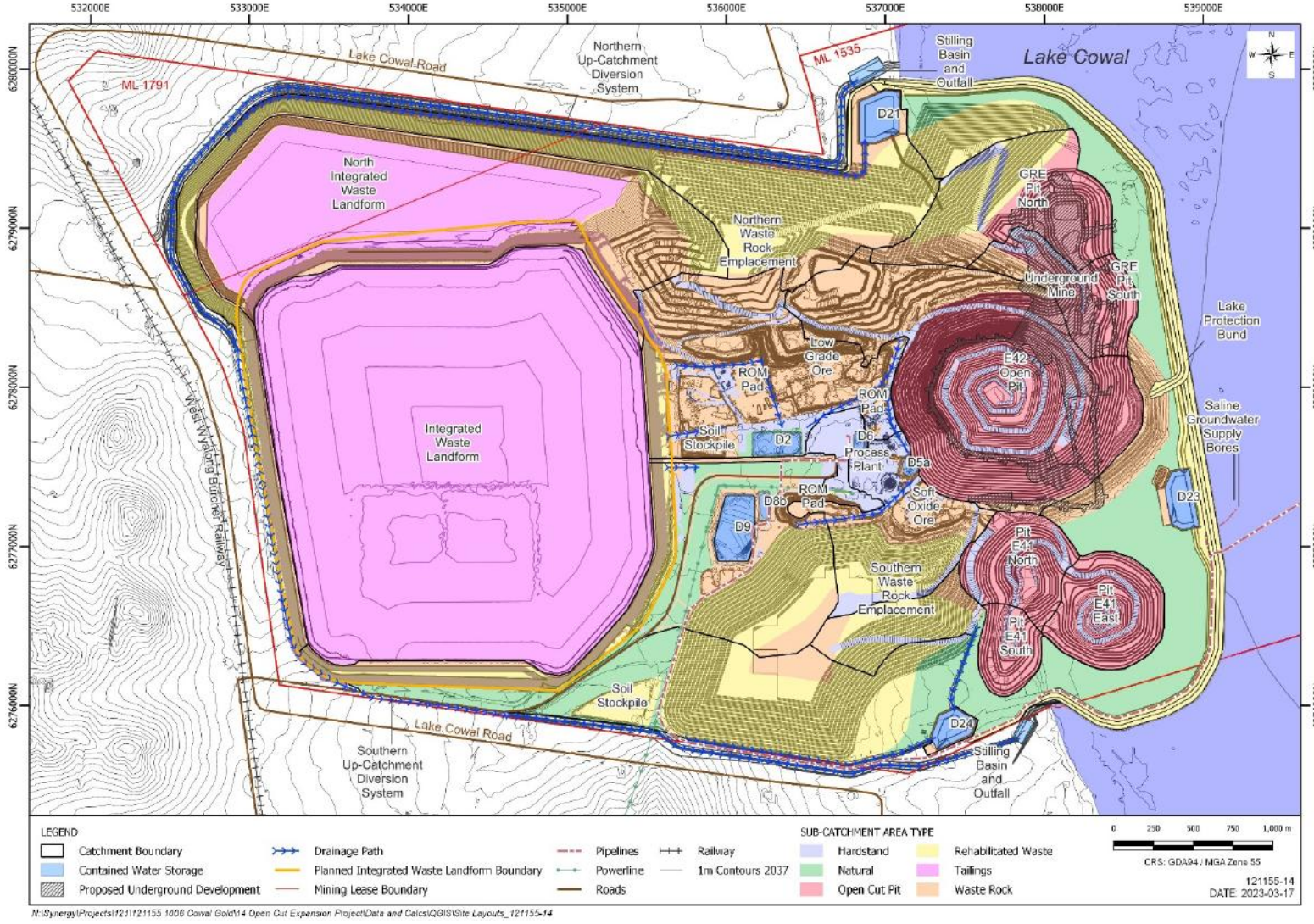
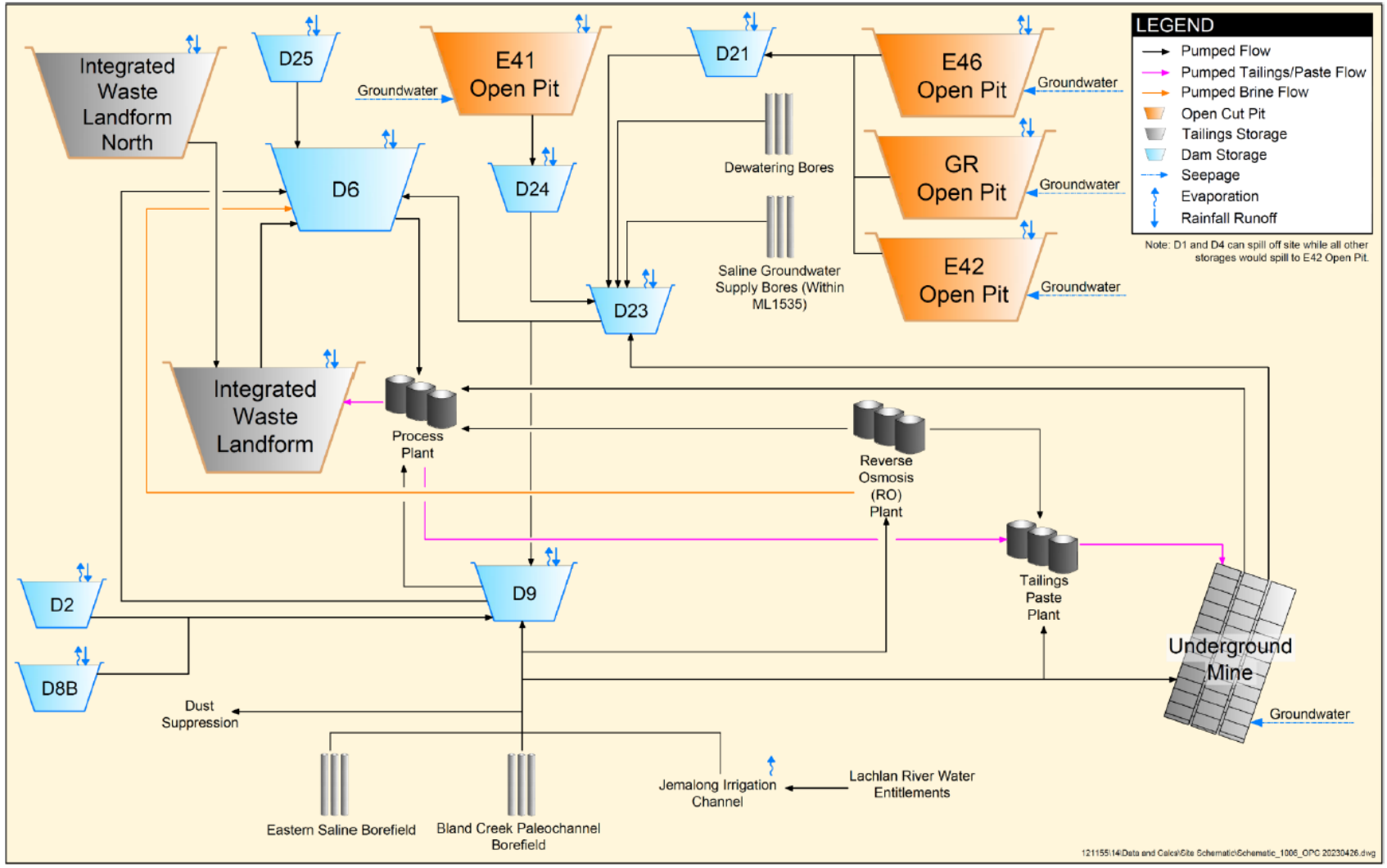


Figure 7.7: Project water management system schematic (ATCW 2023)



7.2 Lake isolation system

7.2.1 Existing lake isolation system

The lake isolation system has been designed to hydrologically separate the open pit and Lake Cowal during development, mining and post-closure of CGO. The lake isolation system provides for the management of the quantity of surface waters by preventing water inflow (during periods of high lake water level) from Lake Cowal into the open pit (limiting the volume of water requiring management within the ICDS) and isolating the mine site from its downslope catchment, preventing surface water runoff from disturbed areas from discharging to the lake.

The lake isolation system has been concurrently rehabilitated to re-establish the lake foreshore. Once the outer surface of the lake isolation system was stabilised and revegetated, the runoff from these surfaces has become comparable quality to that from undisturbed areas.

The temporary isolation bund was designed to control water inflow to the pit development area from Lake Cowal during construction of the LPB. It was constructed using inert rock material sourced during pre-stripping of the waste emplacement and open pit. Fill used for construction was tested for geochemical and geotechnical suitability prior to construction commencing. Suitable fill was sufficiently impermeable, with low dispersiveness, low salinity and non-acid forming (North Limited 1998). Rock armouring of the lake side outer batter slope of the bund minimises erosion from wave action.

The LPB is located approximately 10 m behind the temporary isolation bund (closer to the pit) with a maximum height of 4 m up to a level of 208.25 mAHD. Below 207.75 mAHD, the LPB is a two-zone, earth-filled embankment to meet specific engineering criteria to ensure that the required compaction densities are achieved.

The LPB was constructed from suitable low-salinity lake sediments sourced from within the open pit development area. Once the structure was constructed to its final height, topsoil (organic lakebed sediments previously stripped from the open pit development area) was applied to the surface to provide a suitable growth medium for reformation of the foreshore habitat and ecotone (North Limited 1998). The rehabilitation cover system for the outer batter of the LPB includes cross-ripping primary waste rock mulch with topsoil to provide long-term slope stability and reduce erosion potential.

7.2.2 Expanded lake protection bund

The expanded LPB comprises two areas, being the LPB North and LPB South, which may be constructed separately but eventually combined to establish the LPB. The conceptual design of the expanded LPB is similar to the existing lake isolation system but is more extensive and does not involve a perimeter WRE.

Appendix B provides the Lake Protection Bund Design and Verification Plan.

i. Construction methodology

The expanded LPB has two potential methods of construction, a dry build and wet build method, which will be determined by the location of Lake Cowal's shoreline at the time of construction:

- Dry build – This is built using a similar construction method to the original LPB, consisting of a compacted clay core with a rock shell to maintain integrity of the bund. This would involve excavating a key and then placing compacted silty clay sourced from the mining area until the final profile is achieved. Rip-rap would be applied to this to prevent erosion.

- Wet build – During construction, all areas where the LPB alignment is impacted by water, a wet build method will be adopted. It is anticipated that when construction of the LPB commences, the wet build method of construction will be required to be adopted. The wet build method is to build an initial rock groyne and insert sheet piling to form a low permeability barrier to enable dewatering of water captured behind the barrier

back to Lake Cowal. Dewatering will be undertaken in accordance with the relevant conditions of the EPL and POEO Act.

The LPB (comprising LPB North and LPB South) will be built in three stages as summarised below and illustrated on **Figure 7.8**:

- **STAGE 1**: Construction of a rock groin up to 206.5 mAHD. This will consist of a central finger of engineered rock so that sheet piles can be installed through the groin. The sheet piles will approximate 6 m in length and will create hydraulic separation between the new mining area and the lake water. This stage is a function of the wet build method that has been proposed and will be subject to change pending the lake levels at the time of construction. Changes during this stage will not impact the ultimate height of the LPB.

- **STAGE 2**: Construction of the engineered bund to 209.64 mAHD. This will consist of excavating a key into the existing lakebed to create a lock for the lake protection, then building the LPB to height using compacted clays to ensure a good seal with the surficial lake materials. The clay will be built up on the internal edge of the rock groin before the final profile of the LPB is raised to final design height. The sheet piles will be left in place and while they provide a barrier against the lake, the clay core of the LPB on its own will provide an impermeable barrier against rising lake waters. The engineered LPB structure will be rock armoured with rip-rap to ensure the integrity of the engineered structure is maintained against erosion and surface operations.

- **STAGE 3**: An optional haul road will be constructed on the inside edge of the LPB subject to the operational requirements. This will be constructed using run of mine oxide material with a rock cap to provide a suitable running surface for the road. This will be sheeted with appropriate geotextile and road base. Exposed bund surfaces will in time be sheeted with a soil rock matrix to promote rehabilitation of these surfaces.

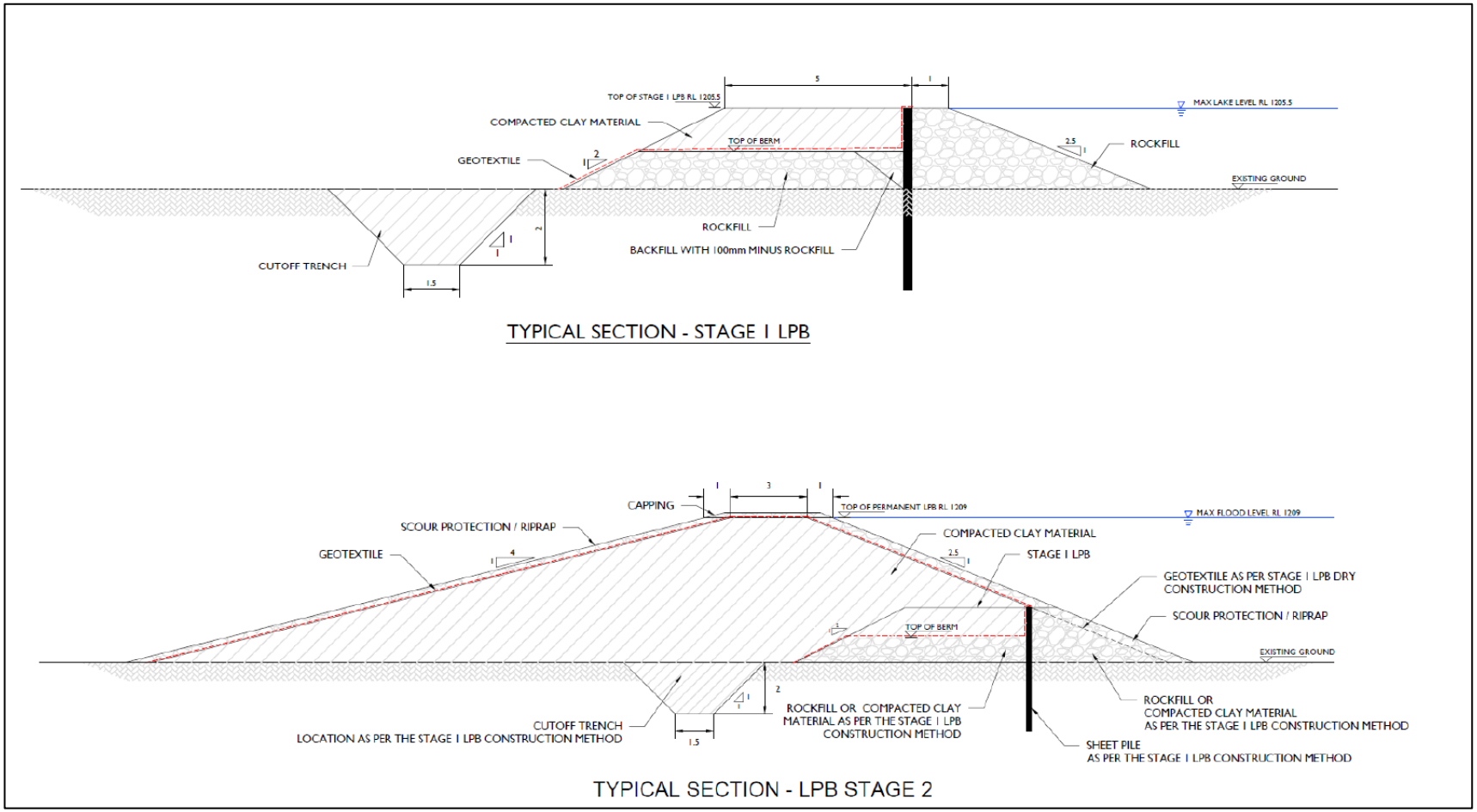
A key erosion control measure to be implemented during construction of the LPB will be the establishment of a continuous silt curtain which will be established around the construction zone of the LPB, both inside and outside the LPB. The silt curtain is to be installed prior to construction to trap fine sediment and minimise/prevent suspended material migrating into the main body of the lake. Silt curtains will not be installed in locations where discharge points are provided for dewatering (refer to the Dewatering Management Plan).

The expanded LPB will be constructed from benign waste rock material and/or borrow areas from within the CGO footprint. A geochemical testing program will be implemented to verify the material for emplacement within Lake Cowal for the construction of the LPB is suitable and will not result in impacts to the environment. This is further described in the Lake Protection Bund Design and Verification Plan provided in Appendix B.

ii. Lake protection bund design

During operations, the LPB will be designed to accommodate the 1 in 1,000 year AEP event flood level (209.27 mAHD) with a 0.35 m freeboard. At mine closure, the height of the LPB will be increased to provide protection to the mining area from the Lake Cowal probable maximum flood (PMF) level (210.54 mAHD) with a 0.35 m freeboard.

Figure 7.8: Lake protection bund construction stages



iii. Lake protection bund dewatering

In the event the LPB is constructed while Lake Cowal is inundated, any water captured behind the LPB will be pumped back into Lake Cowal. The rate of pumping will be determined by water licensing requirements (refer Section 9.5), however may be up to 800 L/s (approximately 70,000 kilolitres per day).

Dewatering activities will be required throughout the duration of the LPB construction period, with the timeframe for dewatering dependent on the level of inundation in Lake Cowal and the water licensing requirements to facilitate dewatering activities.

Discharge will occur via a series of pumps and pipelines to be established along the LPB, further detailed in the Dewatering Management Plan. Discharges will occur within eight identified discharge areas as illustrated in ***Figure 7.9***.

7.3 Up-Catchment Diversion System

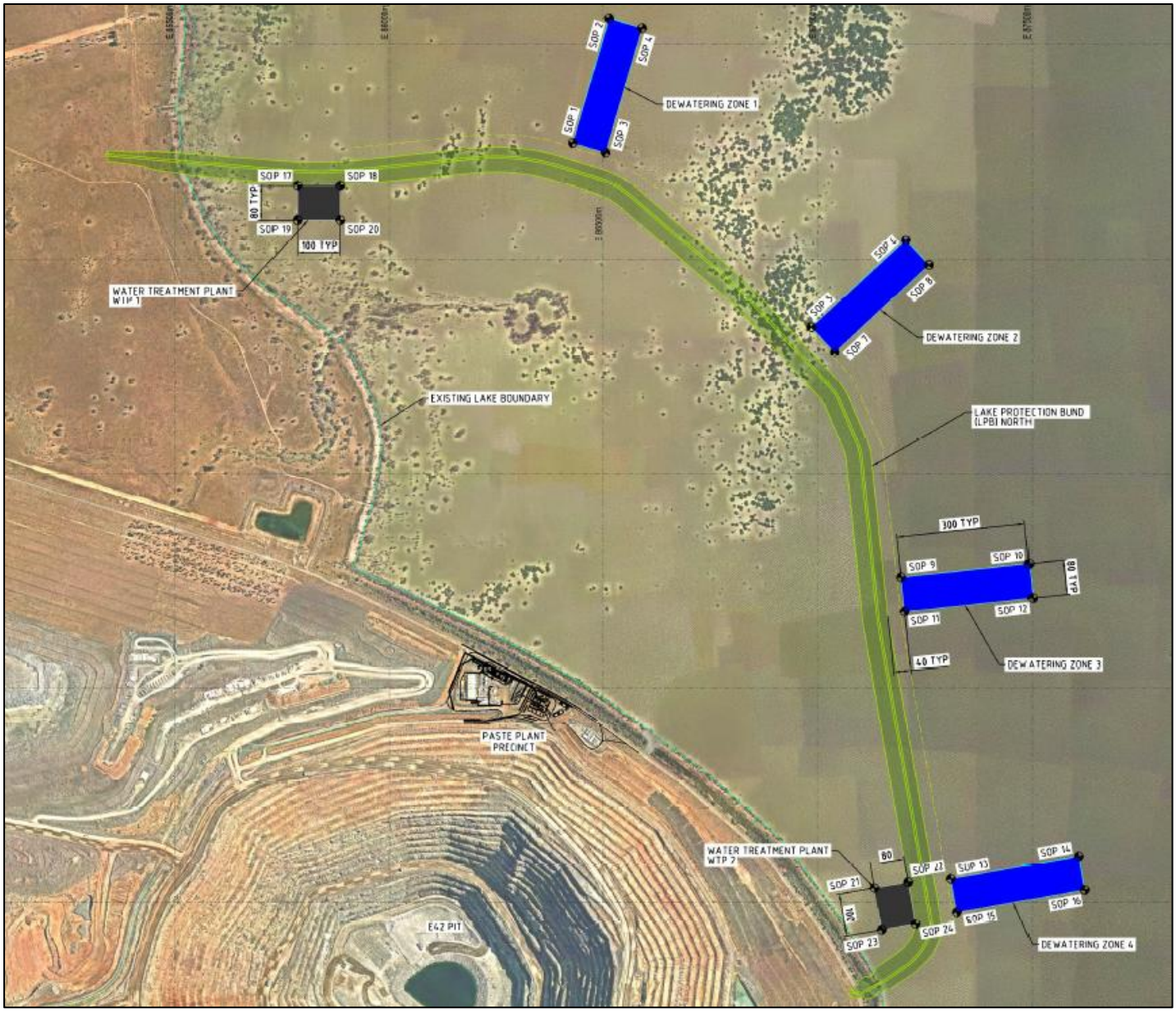
7.3.1 Existing system

The UCDS is a permanent feature that has been developed in stages to convey upstream catchment runoff around the mine and into Lake Cowal. The UCDS maintains natural flow paths in the immediate vicinity of the mine that would otherwise be intercepted by the mine.

The UCDS comprises a northern and southern limb. The northern UCDS is aligned around the northern perimeter of the IWL and northern WRE. The southern UCDS is aligned around the southern side of the IWL and southern WRE. Both limbs comprise an excavated channel and bund, with flow in the UCDS discharging to stilling basins prior to entering Lake Cowal. When the channel capacity is exceeded, water floods out over the adjacent countryside as sheet flow and into adjacent drainage lines, with the bund preventing flow from entering CGO. The UCDS has been designed to accommodate peak flow rates of up to the 1 in 1,000 year AEP event with a minimum freeboard of 0.3 m.

Development of the UCDS involved the reinstatement of natural stream features to enhance long-term stability of the system and compatibility with the existing hydrology of the area. These include features such as rock outfalls at confluences with existing natural drainage lines to minimise erosion, a low flow drainage path within a wider floodplain (approximately 65 m wide), meanders and pool/riffle sequences. Riparian vegetation species have also been incorporated into the diversion system.

Figure 7.9: Lake protection bund – discharge locations



7.3.2 Expanded systems

The UCDS will be expanded as part of the Project around the ultimate boundaries of the IWL, IWL North, Northern and Southern WREs to accommodate the expanded footprint of the CGO. The overall alignment of the expanded UCDS is shown in ***Figure 7.3***. Once reconstructed, the alignment of the UCDS will not change for the life of the operation. The expanded UCDS has the same design criteria as the existing UCDS to accommodate peak flow rates of up to the 1 in 1,000 year AEP event with a minimum freeboard of 0.3 m (ATCW 2023).

As well as earth fill bunds on the CGO side of the expanded UCDS (to prevent flow into CGO), additional bunds on the outside of the UCDS have been incorporated into the design in the upper reaches of both limbs of the UCDS, to prevent flow potentially impacting neighbouring properties. Near the downstream end of each limb of the UCDS, these outside bunds are absent, allowing flow to flood out over the adjacent countryside as sheet flow and in adjacent drainage lines, facilitating a reduction in design flow velocities (ATCW 2023).

Stilling basins have been designed at the downstream end of each limb of the UCDS. These will be constructed as excavated basins to dissipate the energy of incoming flow (i.e. to reduce the potential for scour and erosion) before allowing quiescent overflow to Lake Cowal from their eastern ends. These stilling basins will be instream features designed to manage scour and erosion potential to mitigate potential impacts, particularly on Lake Cowal. The stilling basins would also temporarily form sediment basins during the construction of the expanded UCDS and during vegetation establishment (ATCW 2023).

The northern limb of the expanded UCDS will extend significantly further northwards around the IWL North perimeter and will intersect an unnamed drainage line that captures the majority of the catchment to the west of the expanded CGO footprint. An inlet channel and transition into the northern limb of the UCDS has been designed to ensure a smooth transition and mitigate the risk of erosion. Areas such as channel inlets and stilling basin outfalls will include rockfill or other erosion protection, however modelling shows that revegetation will be suitable erosion protection for the majority of the UCDS (ATCW 2023).

7.4 Internal Catchment Drainage System

The ICDS comprises a series of seven internal drainage catchments (each served by a contained water storage for runoff collection) and a water supply storage D9, as shown in **Figure *7.1***. As part of the Project, a number of additional contained water storages will be constructed as required with the progression of mining, as shown in ***Figure 7.3*** to ***Figure 7.6***. Details of the catchment areas and the capacities of the contained water storages are summarised in ***Table 7.1***. Except for storages D1 and D4, all storages ultimately overflow to the open pit in the event of a spill. Storages D1 and D4 are equipped with dewatering pumps to empty the storages as required between rainfall events.

Contained water storages D1, D2, D3, D4, D5A and D8B are used to contain runoff from the WREs and general site area. Toe drains and contained water storages D1, D2, D4 and D8B have been constructed in stages around the WREs and ore stockpile areas and are designed to capture any potentially saline surface runoff or seepage emanating from the WRE areas.

Runoff from the outer batters of the Perimeter WRE ponds against the temporary isolation bund, which has the capacity to store runoff from at least the 48 hour, 1 in 100 year AEP rainfall event. Water that ponds in this area is pumped to D6 (via D1 or D4) as required between rainfall events. Any contained water generated on the top surface and internal batters of the Perimeter WRE will be directed to contained water storage D3, which is located adjacent to the eastern edge of the open pit.

Table 7.1: Summary of water storages

Storage	Catchment/function	Storage capacity (ML [2])	Catchment area (ha)
D1	Runoff from northern perimeter of the Northern WRE and northern and western batters of the IWL. Collected water is pumped to D6.	42.3	165
D2	Runoff/seepage from ROM pad, low-grade ore stockpile and from the southern perimeter of the Northern WRE. Collected water is pumped to D6 or D9.	328	256
D3	Runoff from perimeter catchment surrounding the open pit and the Perimeter WRE. Collected water is pumped to D6.	14.3	76
D4	Runoff from the southern perimeter of the Southern WRE. Collected water is pumped to D6 or D9.	62.2	75
D5A	Process plant area drainage collection. Water is pumped to D6.	63.6	65
D6	Process water supply storage. Main source of process plant make-up water requirements.	21.7	18
D8B	Runoff from Southern WRE and area between Southern TSF and D9. Water is pumped to D9.	24.0	130
D9	Process water supply storage and storage for raw water. Water is pumped to D6.	688	Incidental area
D21 [1]	Replacement for the existing D1. Runoff from the northern portion of the Northern WRE and IWL North. Collected water will be pumped to D6.	608	248
D23 [1]	Replacement for the existing D3. Runoff from perimeter catchment surrounding the expanded open pits. Collected water will be pumped to D6.	455	334
D24 [1]	Replacement for the existing D4. Runoff from the southern perimeter of the Southern WRE. Collected water will be pumped to D23.	336	156
D25 [1]	Replacement for the existing D5A. Process plant area drainage collection. Water will be pumped to D6.	62	62

1. To be constructed as required with the progression of mining.
2. ML = megalitres, volumes are indicative and are subject to minor amendments based on site conditions

7.5 Soil stockpiles

Upslope diversion drains and/or bunds and a sediment dam have been constructed to manage surface water runoff around the perimeter of the soil stockpiles located in the north of ML 1535 and in ML 1791 (outside the ICDS). Runoff is released into local drainage lines and ultimately reports to Lake Cowal following settling of sediment within the sediment dam, in accordance with *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004) and *Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries* (DECC 2008).

Similarly, for the southern soil stockpile (south-east of the IWL) upslope diversions and/or bunds have been constructed to manage surface water runoff. However, drainage on the eastern side of the southern soil stockpile is facilitated by the existing internal access road. Ultimately, surface water runoff from the southern soil stockpile collects within the UCDS, with settling of sediment within the stilling and outfall basin prior to reporting to Lake Cowal.

7.6 Infrastructure located outside the Up-Catchment Diversion System

The explosives compound and magazine are located to the south-east of the Southern WRE, outside of the UCDS. Upslope diversion drains and sediment traps have been constructed around the perimeter of the explosives compound and magazine to manage runoff and/or spills from these facilities. The explosives compound is also bunded. Any potentially contaminated water is pumped to contained water storage D9.

7.7 Open pit dewatering

Groundwater inflow into the open pit is managed by dewatering bores and in-pit sumps, which also collect incidental rainfall. Horizontal drains/bores in the pit wall accelerate depressurisation of the aquifer system by draining groundwater into the pit sumps. The open pit is dewatered to contained water storage D3. The open pit also acts as the final water containment point in the event of an overflow from any of the contained water storages (except D1 and D4, as discussed in Section 7.4) or an overflow from the IWL.

7.8 Underground mining

Underground mine water is pumped directly to the process plant or to contained water storage D23 when constructed.

As part of the underground mine operation, a portion of the process tailings is thickened to produce a tailings paste. This paste consists of fresh full stream tailings and a cementitious binder and is used to produce a backfill to support the excavated underground stopes. Following processing, the paste is reticulated to the stopes under gravity flow.

7.9 Process plant

Ore processing uses a conventional CIL cyanide leaching circuit to extract gold from the ore. Water is used as the transport median for the ore during the gold treatment process. Sodium cyanide and other reagents used during the gold recovery process are stored and mixed in dedicated storage facility and mixing tank. Other reagents include hydrated lime for pH control and activated carbon for gold capture.

Use of the cyanide leaching circuit is carried out in accordance with the CGO Cyanide Management Plan. Concentrations of cyanide in the tailings slurry stream at the process plant are monitored via an automated sampler and must not exceed 20 mg CNWAD/L (90th percentile) and 30 mg CNWAD/L (maximum) at any time.

A portion of the tailings stream is diverted from the process plant to produce cemented paste to backfill the underground stopes, with excess paste approved to be disposed of in the WREs.

Drains have been constructed around the perimeter of the process plant to collect and channel surface water to contained water storage D5A. Any rainfall, accidental spills of processing water or other potentially hazardous substances (including spilt process chemicals in the unlikely event of a tank rupture or other accidental spill) will report to this storage.

7.10 Waste rock emplacement

Mine waste rock from open cut and underground mining operations is placed in three WRE areas: the Northern, Southern and Perimeter WREs, as shown in ***Figure 7.1***. The WRE areas have been designed and constructed to facilitate drainage of seepage from saline generating components in the waste rock toward the open pit.

Runoff from the external face of the Northern WRE is captured by contained water storage D1, which is located below the external north-eastern toe of the Northern WRE area. Seepage from the Northern WRE emerges from the internal toe of the WRE area, where it reports to contained water storage D2.

Runoff from the external face of the Southern WRE is captured by contained water storage D4, which is located below the external south-eastern toe of the Southern WRE area. Seepage from the Southern WRE emerges from the internal toe of the WRE area, where it reports to contained water storage D8B.

The Perimeter WRE surrounds the open pit to the north, east and south. It provides a continuous elevated landform linking the Northern and Southern WRE areas. Runoff from the Perimeter WRE area ponds between the toe of the Perimeter WRE and the temporary isolation bund. Accumulated water is pumped to contained water storage D6 as required.

7.11 Integrated waste landform

7.11.1 Existing integrated waste landform

Process tailings material is deposited in the IWL, which has been formed around the two former TSFs, the Northern TSF and Southern TSF, as shown in ***Figure 7.1***. The IWL comprises a confining embankment raised above the surrounding natural surface and has been designed to maintain a minimum freeboard sufficient to store at least the 1 in 1,000 year AEP rainfall event at all times. Tailings are discharged as a slurry around the perimeter of the IWL, with settled tailings forming a sloping surface under sub-aerial conditions.

The areas of the Northern TSF and Southern TSF are estimated to be around 124 ha and 129 ha respectively. The area of the IWL, excluding the area of the TSFs, is estimated to be around 215 ha. It is expected that the Northern and Southern TSFs will be covered with tailings in approximately 2029 and 2031 respectively, after which time the IWL will comprise a single large tailings surface area.

The IWL perimeter embankment is progressively raised ahead of the rising tailings surface. In general, tailings are deposited through a 450 mm nominal diameter high density polyethylene pipeline which runs from the process plant to the IWL and along the perimeter embankment. There are spigots (smaller pipe sections) exiting from the deposition pipeline around the circumference of the IWL, which deposit tailings around the internal perimeter of the IWL. Within each spigot is a gate valve, which is used to alternate the deposition locations, allowing for intermittent drying times of the deposited tailings and for a consistent tailings beach height around the internal perimeter of the IWL.

The low permeability basement layer constructed for the Northern and Southern TSFs (e.g. targeted vertical permeability of no greater than 1 x 10^{-9} m/s) and other existing seepage control methods are replicated for the IWL.

Runoff and free water liberated during the settling of the tailings (termed ‘bleed’ water) accumulate in a central internal decant pond within the IWL located between the Northern and Southern TSFs. Water accumulated from rainfall within the former decant ponds of the two remnant TSFs and ponded against the outer side of the TSF embankments is pumped as required to the IWL decant pond. Water contained in the IWL decant pond is pumped to storage D6 for re-use within the process plant.

7.11.2 Expanded integrated waste landform

As part of the Project, the IWL North will provide an additional 70 Mt of tailings storage capacity. The IWL embankments will be constructed in stages and integrate with the northern embankment of the existing Northern TSF and the southern embankment of the Southern TSF, while the IWL North embankment will integrate with the existing IWL embankment and the northern embankment of the existing Northern TSF. A cut-off trench will be constructed beneath the IWL and IWL North embankments along their full perimeter to control seepage. A perimeter drain will be located at the toe of the IWL North outer embankment, directing drainage from the outer embankment to contained water storage D21.

Water management for the IWL North will be similar to the existing IWL, with a single central decant, comprising a pontoon mounted decant pump located within a circular (in plan) coarse rockfill decant structure. Water will be pumped to the existing IWL and then to contained water storage D6. During the initial operation of the IWL North, temporary pumping may be required from water which accumulates between the edge of the initially forming tailings beach and the central decant; or alternatively trenches and diversion drains may be excavated to facilitate drainage to the central decant prior to the tailings beach establishing from the perimeter embankment to the central decant (ATCW 2023).

7.12 Wastewater

A site sewage treatment plant is operational with treated sewage and sullage disposed of to the West Wyalong Sewage Treatment Plant to the satisfaction of Bland Shire Council and the EPA and in accordance with the requirements of the NSW Department of Health.

7.13 Design criteria

A summary of the hydrological design criteria for the CGO's water management system is provided in **Table 7.2**

Table 7.2: Water management system – hydrological design criteria

Component	Aspect	Design criteria	Consequence of design event exceedance
TSFs/IWL	Containment capacity	Max. net accumulation of water from a 1 in 1,000 year AEP event of three months duration	Controlled overflow to contained water storages or open pit
Process plant contained water storage D5A	Containment capacity	Runoff from a 1 in 1,000 year AEP event of 48 hours duration	Controlled overflow to contained water storage D3 or open pit
Temporary diversion bund/toe drains around WRE	Conveyance capacity	Peak discharge from the critical duration 1 in 100 year AEP event	Short duration or overflow to adjacent drainages/lake foreshore
Emplacement contained water storages (D1, D2, D3, D4, and D8B)	Storage capacity	Runoff from contributing catchment resulting from a 1 in 100 year AEP event of 48 hours duration	Overflow to adjacent drainage/lake foreshore
Temporary sediment dams	Storage capacity	Runoff from the 1 in 20 year AEP event of one hour duration	Controlled overflow to contained water storages or open pit
Northern Soil Stockpile Sediment Basin	Storage capacity	In accordance with Landcom (2004) *Managing Urban Stormwater – Soils and Construction Volume 1* and DECC (2008) *Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries* guidelines	Runoff to local drainages ultimately reporting to Lake Cowal following settling of sediment in accordance with Landcom (2004) and DECC (2008) guidelines

Component	Aspect	Design criteria	Consequence of design event exceedance
Process water storage D6	Containment capacity	1 in 1,000 year AEP event of 48 hours duration above normal operating level	Controlled overflow to contained water storages D5A, D3 or open pit
Process water storage D9	Containment capacity	1 in 1,000 year AEP event of 48 hours duration above normal operating level	Controlled overflow to contained water storages D8B, D2, D5A or open pit
Process water storage D10	Containment capacity	1 in 1,000 year AEP event of 48 hours duration above normal operating level	Controlled overflow to contained water storages D9 and open pit
UCDS	Conveyance capacity	1 in 1,000 year AEP event	Controlled overflow to contained water storages or open pit
LPB	Flood immunity Lake Cowal isolation	1 in 1,000 year AEP event plus 0.35 m freeboard	Lake Cowal floods into open pit

7.14 Water supply

7.14.1 Overview

The main water demand for CGO is to supply the process plant, which requires around 22 megalitres per day (ML/day) on average. Other water demands include for construction requirements and haul road dust suppression as well as minor potable and non-potable uses around the mine site. Most water used in processing operations is recycled within the process plant. Water losses from the system include water entrained in tailings and evaporative losses principally from the TSFs/IWL.

Water supply for CGO is sourced primarily on site, with make-up supply provided from external sources. Water supply sources in order of priority include:

- internal sources:
  - water returned from the TSFs/IWL
  - water from the open cut pit and underground mine sumps and pit dewatering borefield
  - runoff from mine WREs and other areas within the site which is collected as part of the ICDS and contained in on-site water storages
- external sources:
  - groundwater from the saline groundwater supply bores within ML 1535 (when water levels within Lake Cowal allow)
  - groundwater from the Eastern Saline Borefield
  - groundwater from the Bland Creek Palaeochannel Borefield
  - water accessed from the Lachlan River under licence, which is supplied via a pipeline from the Jemalong Irrigation Channel.

Some water from the external water supply sources is treated by a reverse osmosis plant prior to use in the process plant or to satisfy other operational requirements. Brine from the reverse osmosis plant is disposed of in the TSFs.

External water supply options are discussed further in the following sections. Water licensing of external water supply is addressed in Chapter 8.

7.14.2 Bland Creek Palaeochannel Borefield

The Bland Creek Palaeochannel Borefield is used where make-up water from all on-site sources is inadequate. Supply from this source will continue to be alternated with the Lachlan River source, to manage groundwater levels and provide flexibility with respect to extraction rates and supply sources.

CGO has maintained a community consultation programme in relation to groundwater use from the Bland Creek Palaeochannel and meets regularly with a community group representing both irrigators and stock/domestic groundwater users.

Four production bores have been developed within the Bland Creek Palaeochannel Borefield, located approximately 20 km east-northeast of CGO, as shown in ***Figure 7.10***. The borefield provides on average around 3.8 ML/day of brackish water within the Lachlan groundwater system, since commencing in 2004. The borefield reticulation system includes a break pressure/balancing storage after the final bore, a buried 600 mm diameter pipeline to the CGO site and power supply along existing road reserves. The bores and pipeline route are shown on ***Figure 7.10*** As described later in this section, the water supply pipeline has been duplicated up to Bore 4 of the Bland Creek Palaeochannel borefield.

i. Extraction limits

Extraction of groundwater from the Bland Creek Palaeochannel Borefield is licensed by WAL 31864 (discussed further in Chapter 8). The maximum daily volume of water approved to be extracted is subject to a TARP monitored by DCCEEW – Water Group in conjunction with a Bland Creek Palaeochannel users' group. All production bores from the Bland Creek Palaeochannel Borefield used for mine water supply are metered and the quantity of water extracted from each bore is recorded to ensure quantity of groundwater extracted does not trigger the response limits.

As set out in Section 11.1.2 and Section 11.2.2, CGO monitors levels at three regional groundwater monitoring bores and ceases pumping from the Bland Creek Palaeochannel Borefield when required.

ii. Water supply pipeline and pump station

The Bland Creek Palaeochannel Borefield reticulation system includes a break pressure/balancing storage after Bore 4, a buried 600 mm diameter pipeline to CGO and power supply along existing road reserves.

The water supply pipeline from the Bland Creek Palaeochannel Borefield, as shown in **Figure *7.10***, is buried within the bed of Lake Cowal so as to not interfere with the passage of fish or other animals, boats or vehicles or with flood behaviour. The pipeline route was designed so that it did not disturb bird breeding areas, important habitat or similar sensitive areas. The pipeline was duplicated in 2020 within the existing 40 m pipeline corridor, buried to a nominal depth of approximately 1 m. The existing pipeline was retained to provide additional contingency capacity.

The eastern pump station, located on the eastern side of Lake Cowal as shown in **Figure *7.10***, provides a booster pump to maintain the capacity of the water supply pipeline at around 14 ML/day. A diesel generator will be used to power the booster pump, with fuel stored in a 10,000 litre tank that is delivered by a licensed contractor. The eastern pump station and associated diesel generator and storage tank has been constructed on a gravel and concrete pad, which is raised above the surrounding cultivated paddock to avoid potential flooding impacts.

iii. Automatic shutdown in the event of pipe rupture

An automatic shutdown device was installed on both the existing and duplicate pipelines so that pumping ceases immediately in the event of a pipeline rupture and will not resume until the rupture is located and repaired. This system is intended to negate the risk of significant impact on Lake Cowal surface water quality.

Visual inspection of the above ground sections of the pipeline are also undertaken by staff or consultants as discussed in Section 10.3.

7.14.3 Eastern Saline Borefield

The Eastern Saline Borefield, located 10 km east of Lake Cowal's eastern shoreline and north-east of the Bland Creek Palaeochannel Borefield, consists of two bores as shown in ***Figure 7.10***. The bores have historically provided a total of around 0.5 ML/day of brackish to saline water from the Lower Cowra groundwater system. Groundwater from the Eastern Saline Borefield is pumped to CGO via the Bland Creek Palaeochannel Borefield water supply pipeline.

7.14.4 Saline groundwater supply borefield within ML 153

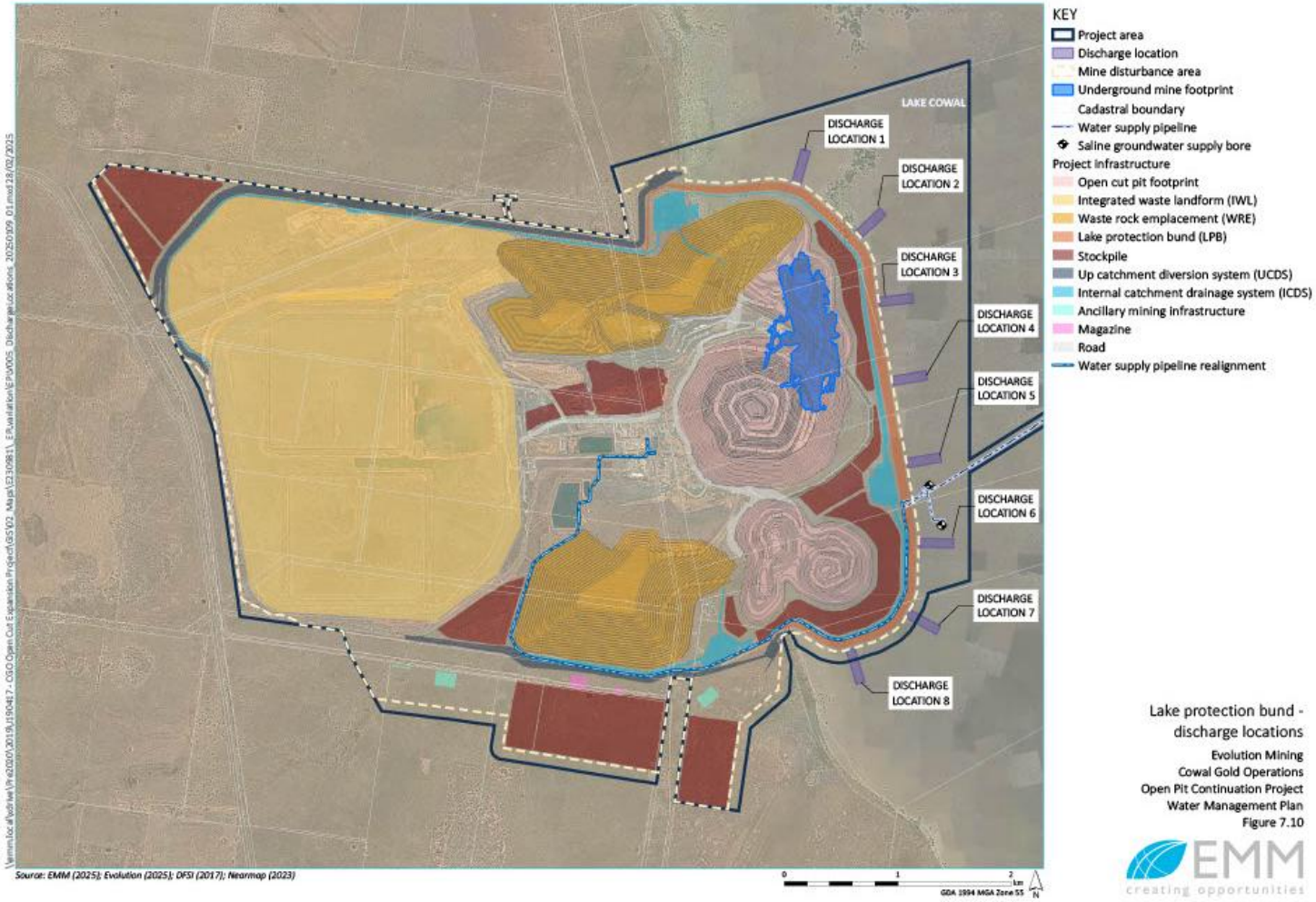
There are two saline groundwater supply bores extracting water from the Cowra Formation, which are located 1 km south-east of the open pit within Lake Cowal and are within ML 1535 as shown in ***Figure 7.10***. A water supply pipeline delivers the groundwater to CGO. When Lake Cowal is inundated, the saline groundwater supply bores are submerged and inaccessible. When the lake is dry, these bores have a total extraction limit of 0.7 ML/day and 366 megalitres per year (ML/year); however, the bores have historically provided less than 0.6 ML/day of saline water, for the short amount of time it was operational between 2008 and 2010.

Operation of the saline groundwater supply borefield within ML 1535 includes the following control and mitigation measures:

- shutdown and removal of pumps during periods when the borefield is inundated by Lake Cowal
- prominent signage at the well-heads to minimise the potential for accidental collision or damage when the lake is full
- a pipeline laid on the ground surface (i.e. above ground level) in a V-drain for potential spill containment and a generator to power the pumps
- leak detection mechanisms including automatic shut-down capability in the event of a pipeline rupture (i.e. a pressure-based shut down system).

In the unlikely event of pipeline failure and leakage of saline water, the spill will be controlled, contained and cleaned up in accordance with the spill response procedures described in the CGO Hazardous Materials Management Plan.

Figure 7.10: Water supply borefields and pipelines



7.14.5 Lachlan River

Water from the Lachlan River is accessed when other lower quality water sources (i.e. recycled water on site and saline groundwater supplied by borefields) are not available or to supplement water use on site if necessary. Water is supplied from the Lachlan River via a pipeline from the Jemalong Irrigation Channel (Bore 4 pump station). The Bore 4 pump station includes:

- an intake sump structure with two submersible pumps and a duty standby pump arrangement to inject water into the existing buried water supply pipeline from the Bland Creek Palaeochannel borefield
- two tanks (i.e. balancing storage) with a combined capacity of approximately 100 kilolitres
- a paddle wheel (or flow meter) at the canal in order to meter the pumping/transfer rate.

7.15 Site water balance

7.15.1 Annual water balance

A revised site water balance for the Project has been prepared by ATCW (2023). The model involved simulating the water management system considering average system inflows and outflows for 134 climatic modelled realisations over the Project life, simulated to extend from the start of 2025 to 30 June 2042.

A summary of the simulated water balance for the Project under 10th percentile (low rainfall), median and 90th percentile (high rainfall) conditions is shown in ***Table 7.3***. Results have been averaged over the project life. It is expected that the majority of total water requirements for the approved CGO will continue to be supplied from internal water sources, with the remainder supplied from external water sources.

The following provides a summary of the key findings for the median rainfall realisation:

- runoff accounts for 26% of the total annual inflow
- external water supply is predicted to make up 18% of the total inflows
- the biggest outflow is predicted to be the process plant supply
- more than half of the average process plant supply is predicted to be available as tailings water bleed/return.

Table 7.3: Simulated water balance for the life of the Project (ATCW 2023)

Expected water demand/supply	10th percentile rainfall realisation (dry)	Median rainfall realisation	90th percentile rainfall realisation (wet)
	(ML/year)		
Inflows (ML/year)			
Internal water sources			
Catchment runoff within ICDS	2,105	2,553	3,018
Tailings water bleed/return	4,460	4,460	4,460
Open pit and underground mine groundwater	1,066	1,066	1,066

Expected water demand/supply	10th percentile rainfall realisation (dry)	Median rainfall realisation	90th percentile rainfall realisation (wet)
	(ML/year)		
Subtotal – internal water sources	7,631	8,079	8,544
External water sources			
Saline groundwater supply borefield within ML 1535	6.9	4.7	1.8
Bland Creek Palaeochannel Borefield	870	782	627
Eastern Saline Borefield	298	299	300
Lachlan River extraction [1]	760	632	362
Subtotal – external water sources	1,935	1,718	1,291
Total inflows	**9,566**	**9,795**	**9,833**
Outflows (ML/year)			
Evaporation	1,644	1,731	1,758
Haul road dust suppression	279	278	276
Construction water	91	91	91
Process plant supply	7,475	7,475	7,475
Overflow	0	0	0
Underground mine vent loss	74	74	74
Total outflows	**9,564**	**9,649**	**9,674**

1. Modelled volume of water actually reaching CGO – excludes irrigation channel losses (ATCW 2023).

7.15.2 Water security

The total demand from external sources (the Bland Creek Palaeochannel Borefield, Eastern Saline Borefield, saline groundwater supply borefield within ML 1535 and extraction from the Lachlan River) in ***Table 7.3*** for the median rainfall realisation averages 1,718 ML/year.

The annual distribution of forecast water demand from the Bland Creek Palaeochannel Borefield and Lachlan River are shown in ***Figure 7.11*** and ***Figure 7.12*** respectively.

As shown in ***Figure 7.11***, the median annual demand from the Bland Creek Palaeochannel Borefield is predicted to be approximately 800 ML/year to 1,100 ML/year until 2033 (i.e. Year 9 of the Project) before declining with the commissioning of the IWL North, which is associated with an increase in total tailings area and a higher forecast tailings water recovery rate (after evaporation) from the IWL North. A reduction in forecast production and demand from 2041 (i.e. Year 17 of the Project) results in a reduction in demand towards the end of the forecast period.

The results presented in ***Figure 7.12*** indicate the median annual demand from the Lachlan River is forecast to increase up until 2032 (i.e. Year 8 of the Project). Thereafter the demand follows a similar pattern to the Bland Creek Palaeochannel Borefield demand. The 90th percentile predicted demand from the Lachlan River is approximately 1,965 ML/year.

No water supply shortfalls were predicted for any of the 134 water balance model simulations, subject to the supply being available from the borefields and the Lachlan River (ATCW 2023).

Figure 7.11: Predicted annual Bland Creek Palaeochannel Borefield demand (ATCW 2023)

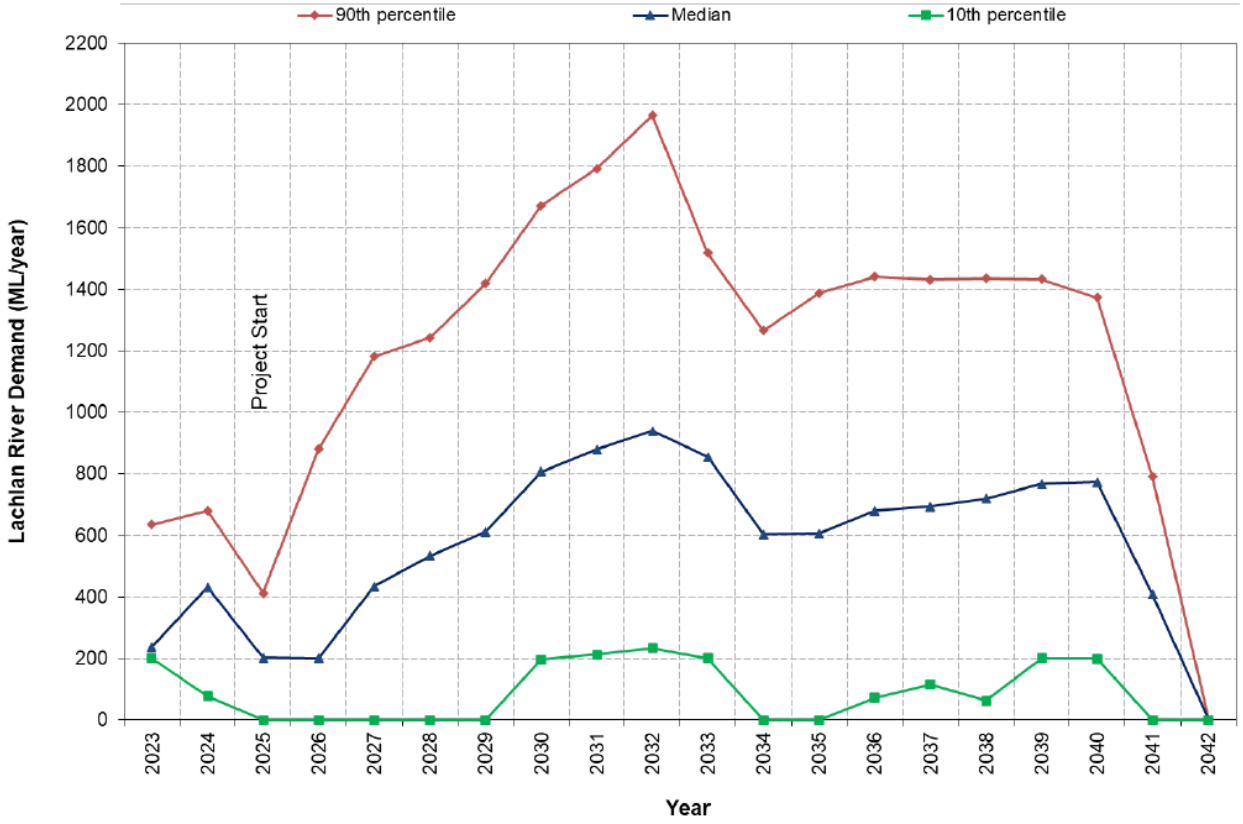


Figure 7.12: Predicted annual Lachlan River demand (ATCW 2023)

In addition to internal recycling and reuse of water and external water supplies, CGO uses a number of operational responses to address potential water supply shortfalls. One or more of these actions could be investigated and implemented in the event of extended drought:

- review of haul road dust suppression demand by use of dust suppression agents
- investigation of alternative water supplies, including:
  - development of additional bores or borefields in saline aquifers in the region
  - purchase of additional entitlement for the alluvial aquifer associated with the Lachlan River in an area disconnected from the Bland Creek Palaeochannel
  - purchase of additional high and/or general security entitlement for the Lachlan Regulated River Water Source
  - development of a surface water collection system to collect clean catchment runoff in accordance with CGO's harvestable rights
- reduction of site wide water demand by scaling back production.

Regarding alternative water supplies, saline groundwater sources would be preferred for development to reduce potential environmental impacts and competition with other water users. Further investigation and feasibility assessments would be undertaken for these options as required. Any relevant approvals will be obtained should these options be identified as feasible.

7.15.3 Off-site discharges

Contained water storages D1 and D4 are currently managed to dewater the storages between rainfall events to prevent discharge off-site. Upon expansion of the LPB, contained water storages D1 and D4 will be contained within CGO (i.e. by the end of Year 2 of the Project), as shown in ***Figure 7.3***, and will no longer be able to spill off-site.

No off-site discharges were predicted from contained water storages D1 and D4 prior to containment by the expanded LPB in any modelled realisations (ATCW 2023). Spills could occur from other existing or planned contained water storages, however these would be contained within the ICDS, ultimately reporting to the E42 open pit.

LPB dewatering and discharge, required during construction, will be undertaken in accordance with the Dewatering Management Plan. Discharge required for the LPB dewatering activities are also regulated under EPL 11912 up to a volume limit of 70 ML/day. The required discharge volumes will vary dependent on the scheduling of construction and water level present in Lake Cowal.

7.15.4 Key model assumptions and limitations

The site water balance consists of the following assumptions and limitations as defined by ATCW (2023):

- The predictions provided as part of the EIS consisted of an 18 year model period which included periods of high and low rainfall for all modelled realisations.
- The water balance model provided as part of the EIS was run commencing on 27 March 2023 and included storage volumes and operational conditions as they were correct at that date (based on data supplied by CGO).
- The water balance model simulated no limit on extraction from Lachlan River by licensing requirements. If borefield supplies are inadequate to meet the demands for water supply to CGO, water is sourced from the Lachlan River and in reality, is limited only by the pipeline capacity (i.e. 22 ML/day).

7.16 Post-closure water management system

Rehabilitation of final landforms and disturbed areas is undertaken progressively as soon as reasonably practicable following disturbance. The post-closure water management strategy aims to provide a stabilised surface water management system post-closure and will be refined and developed over the life of the CGO as part of the mine closure planning in consultation with DCCEEW – Water Group, EPA, NSW Resources Regulator and the Community Environmental Monitoring and Consultative Committee (CEMCC). The strategy is consistent with the exiting closure concepts presented in the ESCMP and Rehabilitation Management Plan.

A summary of the post-closure water management strategy is provided below, with the conceptual post-mining general arrangement layout shown in **Figure 7.13**.

7.16.1 Water management structures

The permanent water management structures for the CGO comprise:

- UCDS
- ICDS (including the permanent catchment divide structures)
- lake isolation system (LPB).

Rehabilitation monitoring of the permanent surface water diversion systems will continue to be undertaken post-closure to determine whether the relevant rehabilitation completion criteria have been met. Silt fences and flow retention structures will be maintained until surface stability is achieved, to minimise the potential for off-site migration of sediments. Rehabilitation monitoring will continue post-closure until stability of these systems can be demonstrated. Maintenance will be carried out as required during rehabilitation.

During closure, the contained water storages will be dewatered and liners removed (i.e. unless otherwise requested to be retained for local landholder use). Decommissioning of the water management infrastructure will be undertaken to the satisfaction of the Resources Regulator and EPA in consultation with DCCEEW – Water Group.

7.16.2 Mine water supply bores and pipeline

a. Bland Creek Palaeochannel Borefield

CGO will identify and discuss post-mining issues during the life of the mine, which will be specifically reviewed in consultation with the CEMCC five years prior to mine closure. The review process will identify opportunities for consultation with local and regional landholders and specifically the local water users' group regarding possible alternative uses for the Bland Creek Palaeochannel Borefield bores, associated pump stations (including the eastern pump station) and pipelines. Subject to the outcomes of consultation, the bores and associated pump stations may be transferred to regional landholders upon agreement by CGO and in consultation with DCCEEW – Water Group. Alternatively, the bores and associated pump stations may be dismantled and the bores plugged and capped. All works associated with bore decommissioning will be conducted in consultation with DCCEEW – Water Group and in accordance with the guideline *Minimum Construction Requirements for Water Bores in Australia* (NUDLC 2020).

b. Options for alternate uses of the water pipelines

If no alternative use for the pipelines can be agreed following consultation, the pipelines will be raised and dismantled for recycling. The sections of pipelines in the bed of Lake Cowal will be raised when the lake is dry, subject to strict environmental management procedures and in accordance with relevant DCCEEW – Water Group requirements.

For example, in undertaking the works associated with removal of the pipelines, CGO will seek to:

- minimise disturbance to soil and vegetation communities
- maintain the existing/natural hydraulic, hydrologic, geomorphic and ecological functions of Lake Cowal
- rehabilitate disturbed areas post pipeline removal as appropriate and in consideration of the revegetation principles within the suite of documents under the *Guidelines for Controlled Actions on Waterfront Land* (DPE 2022b).

If this is not possible due to successive high rainfall seasons, any decision to remove the pipelines will be discussed with DCCEEW – Water Group.

c. Eastern Saline Borefield and saline groundwater supply borefield within ML 1535

Given the water supply from the Eastern Saline Borefield and saline groundwater supply borefield within ML 1535 is highly saline, it is unlikely that these bores will be suitable and/or requested for ongoing future use by regional landholders post-closure of the CGO as the groundwater is unsuitable for agricultural or domestic use.

Notwithstanding, consultation will include discussions between CGO and local and regional landholders regarding potential transfer of the infrastructure for private use.

It is likely that the groundwater bores, piezometers/monitoring bores and associated pipelines will be dismantled and the bores plugged and capped following the cessation of mining operations at CGO in accordance with the guideline *Minimum Construction Requirements for Water Bores in Australia* (NUDLC 2020). Works associated with decommissioning of the groundwater bores and associated pipeline will be undertaken during dry conditions in consultation with DCCEEW – Water Group and will be subject to the same environmental management procedures as described above for the sections of the Bland Creek Palaeochannel pipelines located within Lake Cowal.

7.16.3 Final void

The specific rehabilitation objectives for the final voids are to create habitat opportunities for waterbirds at the approximate level at which void water will reach equilibrium, where feasible, and to leave the void surrounds safe (for humans and stray stock) (EMM 2023b).

The LPB will be constructed around the perimeter of the final voids which will be planted with an initial cover crop if necessary (to assist in stabilising the bund following construction) and will then be seeded with native and/or endemic eucalypt woodland species (EMM 2023b). The final voids will be screened from public views on surrounding local roads and privately owned land by the IWL, expanded LPB and WREs. The voids will be fenced and signposted warnings to the public will be placed along the fence.

CGO will conduct a final void water balance post-mine closure to assess long-term water levels in the final void and the potential impact on groundwater quality in the immediate vicinity of the pit void.

7.16.4 Lake protection bund

The post-mining landform objectives of the LPB will be to continue to provide mutual protection of CGO and Lake Cowal. The design and implementation of rehabilitation works for the LPB will be undertaken in a manner consistent with the NSW Wetlands Policy (DECCW 2010).

Following construction of the LPB and once water levels recede sufficiently, landscaping and reinstatement of the Lake Cowal foreshore will be carried out. The earthworks and landscaping, using primarily lakebed soils, will occur during the LPB construction if the lakebed is dry. Should be lakebed be wet/semi-inundated, then construction would be delayed until the conditions are suitable. From the toe of the LPB, the landscaping will extend approximately 30 m horizontally into the lake (EMM 2023b).

Reinstatement of the Lake Cowal foreshore around the extended LPB will include microvariations in slope and elevation to provide complex habitats for terrestrial and aquatic ecosystems. Following the contouring of the new lake foreshore, rehabilitation will involve both active and passive rehabilitation techniques with the existing seedbank in the lakebed soils anticipated to provide natural revegetation of disturbed areas. The works will include placement of rock material and appropriate biomaterial to create water retaining elements (EMM 2023b).

Rehabilitation monitoring of the LPB will continue post-closure until the lease relinquishment criteria as described in the Rehabilitation Management Plan have been satisfied (i.e. acceptably low risk of environmental harm to Lake Cowal). The Rehabilitation Management Plan includes rehabilitation concepts and measures which consider the revegetation concepts for waterfront land described in the Guidelines for Controlled Actions on Waterfront Land (DPE 2022b).

7.16.5 Waste rock emplacements

Top surfaces of the WREs will be managed via a series of small shallow basins (depressions), a rehabilitation cover system (including gypsum-treated subsoil and topsoil) that absorbs rainfall and comprises woodland vegetation. The use of depressions is aimed at maximising internal drainage without creating permanent ponding during normal and heavy rainfall events. Containment of runoff on the top of the WREs will also be maximised, via the use of perimeter bunds to ensure any runoff that ponds on the surface is away from the edges of the WRE where it could potentially cause tunnel erosion.

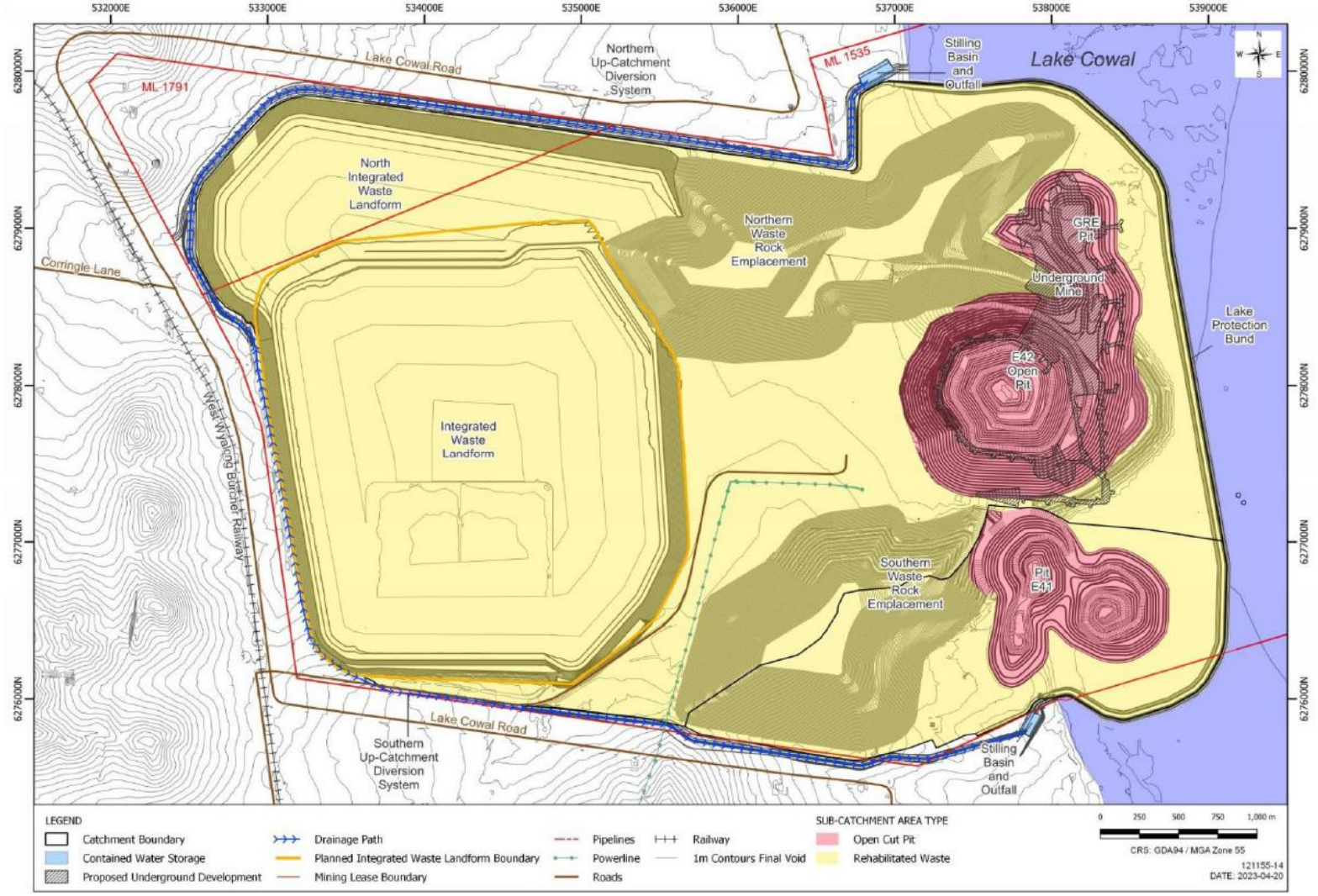
A layer of gypsum and then primary waste rock may be placed over oxide waste rock areas on the top surface to assist with stabilising the sodic and dispersive characteristics of the oxide waste rock. The cover material and thicknesses will be selected to be consistent with the overall objective of reducing runoff from the emplacement surface by encouraging rainfall infiltration and moisture retention in a relatively thick cover layer where it will be available for surface vegetation.

Deep rooting, high transpiration capacity vegetation species will be utilised as cover vegetation to take up and use the available moisture in the cover layer. The final surface of the WRE areas will be purposely left with a high degree of irregularity to provide surface retention of excess rainfall for longer term infiltration and take-up in the surface cover and plant system.

7.16.6 Integrated waste landform

Concept design for rehabilitation of the IWL and IWL North comprise a combined landform, with the IWL North will involve a similar approach as those developed for the outer batters of the WREs. The concepts developed for the top surface (i.e. tailings) include retention of the final inverted cone shape of the final beach surface which would, by virtue of the planned peripheral tailings discharge regime, slope downward from the embankment perimeters toward the central decant areas. The final surface will be covered with a relatively thick layer of low salinity sub-soil and topsoil to support a deep rooting plan cover. A capillary break layer of waste rock between the final tailing surface and the cover has also been identified as a requirement of the surface rehabilitation to prevent salt rise into the overlying soil cover layer. Planned surface irregularities, mounds and swale-like channels are also proposed for transient retention of surface runoff, to enhance moisture retention within the cover system and to provide a formal pathway for any net runoff under extreme conditions to be diverted to the final void.

Figure 7.13: Conceptual general arrangement post-closure (ATCW 2023)



8 Erosion and sediment control

8.1 Erosion and sediment control systems

Erosion and sediment controls have been developed in-line with best practice erosion and sediment control measures listed in *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004), *Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries* (DECC 2008) and the *Best Practice Erosion & Sediment Control Guidelines* (IECA 2008).

The objective of erosion and sediment controls is to minimise the adverse impacts of soil erosion at the CGO through the effective design and implementation of sediment control strategies throughout the life of the CGO. This includes:

- the protection of water quality in Lake Cowal (via the separation of flows into the ICDS and the UCDS)
- the prevention of sediment-laden runoff from the mine site.

8.1.1 Operational mining area

The CGO's initial construction phase included the establishment of major components of the CGO's water management system (i.e. construction of the lake isolation system, ICDS, UCDS and pit dewatering system), process plant and TSFs. The CGO has been operational since 2005, however parts of the site will be subject to new construction activities. Further developments of various scales and durations are expected to occur from time to time until the mine eventually closes.

i. Soil units and landscapes

The original suitability assessment of soil types at the CGO was included in the 1998 EIS (North Limited 1998). This assessment included descriptions of soil types, general characterisation of suitable stripping depths for revegetation/rehabilitation activities and formulation of soil stripping and soil stockpiling strategies.

The major soil types identified (CALM 1994) were:

- hard pedal red duplex soils
- grey, brown and red cracking clays
- hill soils
- lacustrine (lake) sediments.

More recent assessment works (Minesoils 2023) have been undertaken for an expanded project area which identified the following applicable soil landscapes summarised in ***Table 8.1*** and shown on ***Figure 8.1***.

Figure 8.1: Mapped soil units (Minesoils 2023)

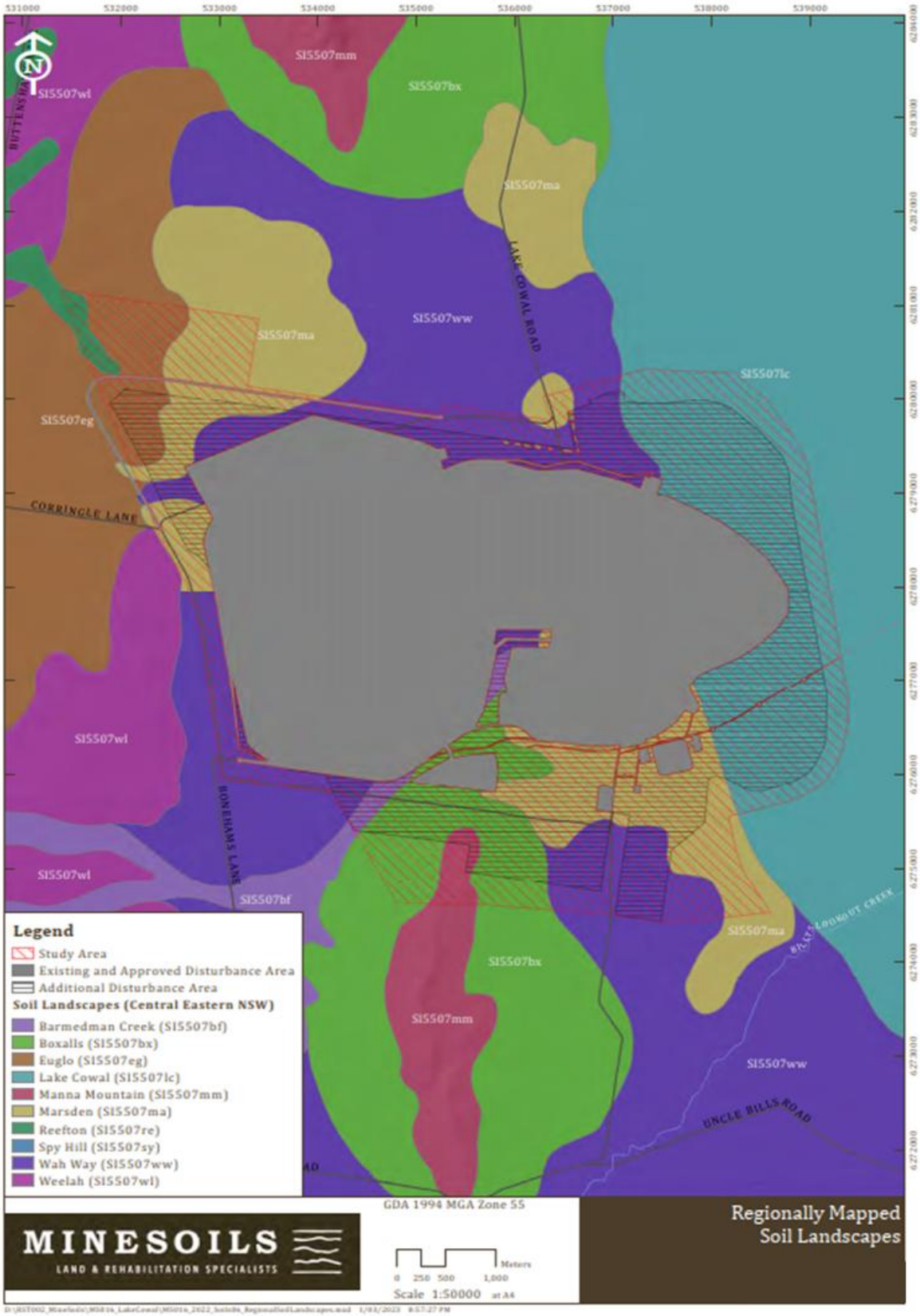


Table 8.1: Relevant soil landscapes and limitations

Soil landscape	Limitations
Lake Cowal Landscape	Very low permeability, salinity (localised) sodicity/dispersibility, soil structure decline hazard and high erodibility (localised).
Wah Wey Landscape	Flood hazard, water erosion hazard, foundation hazard, sodic/dispersible alkaline, highly plastic soils of low permeability and low fertility with high localised high shrink-swell, subsoil salinity, hardsetting surfaces, soil structure decline hazard and high erodibility.
Marsden Soil Landscape	Waterlogging, low wet bearing strength (localised within topsoils), foundation hazards, shrink-swell soils of low permeability and sodic, alkaline and occasionally saline subsoils.
Boxalls Soil Landscape	Soil limitations include high run-on, water erosion hazard, soils of low fertility with hardsetting surfaces (localised).
Barmedman Creek Soil Landscape	Flood hazard, seasonal waterlogging (localised), foundation hazard (localised), highly plastic soils with shrink-swell, low wet bearing strength, alkaline subsoils and low permeability (localised).

Soil management measures implemented at the CGO are summarised in Section 8.3.

ii. Relevant standards and design criteria

General design criteria for the erosion and sediment control structures used at the CGO are presented below and are largely derived from and are largely derived from *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004). Where there is any contradiction between other referred to guidelines and the Landcom guideline, the latter has taken precedence.

a. Erosion and sediment control design criteria

The design AEP used to size individual components of the erosion and sediment control systems are shown in ***Table 8.2***.

Designs should generally comply with the upper limit and the ranges specified within Table 8.2. In circumstances where the consequence of failure is considered low, lower design event capacity can be considered.

Table 8.2: Design criteria for erosion and sediment control measures

Control measure	Estimated design life	
	0–12 months	>12 months
Diversion bank	1 in 10 year AEP	Full design required
Level spreader	1 in 10 year AEP	
Sediment basin emergency outlet/overflow	1 in 50 year AEP	
Sediment trap	0.2 EY	
Outlet scour protection	1 in 20 year AEP	
Waterway diversion	0.5 EY	

Note: EY – exceedance per year.

Source: Information based on Volume 1 (Landcom 2004) and on standard receiving environment in Volume 2E (DECC 2008).

b. Design rainfall

Rainfall intensity for the sizing of components of the erosion and sediment control systems uses the method outlined in *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004) using Intensity-Frequency-Duration (IFD) data. Table 8.3 contains IFD data (BOM 2016) for CGO (latitude -33.6375, longitude 147.4023). The depth of rain generated by a rainfall event of a given AEP event is provided in Table 8.3. Refer to the *Australian Rainfall and Runoff* (AR&R) guidelines (Ball et al. 2019) for potential scaling factors for design rainfall to account for climate change effects when planning for construction activities.

c. Runoff

Estimation of runoff from any catchment can be made using a hydrology modelling software with the methodology listed with AR&R guidelines (Ball et al. 2019). For estimations on natural catchments generally less than 1,000 km^2 and not influenced directly by mining (such as numerous stockpiles or surface subsidence), a Regional Flood Frequency Estimate can be made.

Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom 2004) provide guidance on using statistical rational method for estimating runoff for erosion and sediment control applications. This method estimates time of concentration as a function of catchment size, and the coefficient of runoff is determined as a function of catchment size, locality and AEP. This method is used on “natural” or untreated catchments to estimate peak discharge.

d. Culverts

Temporary culverts during construction are to be designed and constructed in accordance with details provided in Chapter 5.3.5 of *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004).

Culvert crossing capacities are designed in accordance with the methods stated above. Permanent culverts under roads are to be designed and constructed in accordance with the Austroads (2021) *Guide to Road Design*.

Culvert design and construction takes into account a range of factors including purpose, location and materials available. The design storm event is selected based upon an assessment of catchment characteristics and consequence of failure. At a minimum, culverts are designed to convey the 1 in 10 year AEP, critical duration flow.

e. Sediment basins

Sediment basins are to be designed in accordance with procedures detailed in Section 6.3.3 of *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004) and *Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries* (DECC 2008). The volume required for each sediment basin will be determined from a combination of the runoff generated by the 75th percentile, 5 day rainfall event for Type F soils and the sediment capacity, determined from the maximum value of the revised universal soil loss equation, or 50% of the inflow runoff volume (DECC 2008).

The volumetric coefficient of runoff (C_V) used in the estimation of sediment basin volumes is provided in Table F2 in Landcom (2004).

Containment storages will continue to be sized specifically to capture specific rainfall events from 1 in 100 year AEP to a 1 in 1,000 year AEP event.

Table 8.3: Design rainfall

Duration	Exceedance per year (EY) and annual exceedance probability (AEP)						
	1 EY	0.5 EY	0.2 EY	1 in 10 year AEP	1 in 20 year AEP	1 in 50 year AEP	1 in 100 year AEP
5 min	63.5	80.7	105	124	145	174	196
10 min	48.4	61.4	79.4	93.9	110	133	151
20 min	33.7	42.8	55.4	65.5	76.9	92.8	106
30 min	26.4	33.5	43.5	51.5	60.5	72.8	82.7
45 min	20.3	25.8	33.6	39.8	46.7	56.1	63.6
1 hour	16.8	21.4	27.8	32.9	38.6	46.3	52.4
2 hour	10.5	13.4	17.4	20.5	24	28.7	32.4
3 hour	8	10.2	13.2	15.5	18.2	21.7	24.4
4.5 hour	6.09	7.75	10	11.8	13.7	16.4	18.4
9 hour	3.83	4.86	6.22	7.3	8.49	10.2	11.5
12 hour	3.15	3.99	5.1	5.98	6.95	8.33	9.42
24 hour	1.93	2.43	3.1	3.65	4.26	5.11	5.8
48 hour	1.13	1.42	1.82	2.15	2.53	3.04	3.44
72 hour	0.808	1.02	1.31	1.55	1.82	2.18	2.47
96 hour	0.632	0.798	1.03	1.21	1.43	1.7	1.92
120 hour	0.521	0.659	0.846	0.997	1.17	1.39	1.57
144 hour	0.446	0.563	0.722	0.848	0.988	1.18	1.32
168 hour	0.391	0.495	0.631	0.737	0.855	1.01	1.14

f. Diversion bank channels and grassed waterways

Diversion bank channels and grassed waterways are effective in the management of clean and dirty water flow paths. Further advice on the design and details of these structures is provided in Section 5.4.4 of *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004).

g. Sodicity and dispersibility

Investigations into the dispersivity and stability of the CGO soil types (Knight Piesold 1995) indicated moderate dispersion potential. Further tests conducted using lake water and saline groundwater indicated stability of all water containment structures (including tailings embankments and the existing constructed temporary isolation bund) would not be compromised by soil dispersion (North Limited 1998). Soil erodibility factors (K) range from 0.006 to 0.051 across soil map units A, B, and C based on work completed by CALM (1994).

North Limited (1998) estimated that potential soil loss after rehabilitation from permanent features such as the TSF, waste emplacements and perimeter bunds should not exceed 450 tonnes/year. Expressed as an average unit rate across the area of the features, it was estimated to be a rate of 0.7 tonnes/ha/year which is considered low.

General measures adopted to mitigate potential impacts on soils within the mining area include:

- minimising the area disturbed by the CGO and restricting access to non-disturbed areas
- ripping and rehabilitation of hardstand areas and roads no longer required for access
- avoidance of soil stripping operations during particularly wet or dry periods, minimising compaction during soil excavation and movement and the use of ameliorants where required (e.g. gypsum application to dispersive soils)
- use of silt fences and temporary sediment traps to minimise sediment movement
- use of diversion banks, channels and rip-rap structures to divert surface water around disturbed areas and control runoff velocity
- maintaining soil stockpile slopes at or below maximum acceptable angles to resist erosion
- constructing all access roads at an appropriate slope along the contour, where practicable
- the use of constructed surface water drainage features (i.e. table drains and culverts) to control and manage surface water runoff from access roads.

iii. Construction phase

The initial construction phase of the CGO has been completed and involved the development of major infrastructure components of the mine in preparation for operational phase mining of the orebody including (but not limited to):

- internal main access road
- boundary fences
- ore stockpile and process plant area
- soil stockpiles
- internal mine roads
- contractors' areas

- borrow pits
- earthworks associated with landscaping (earth mounds)
- UCDS
- ICDS
- existing lake isolation system.

The potential for erosion and sediment migration in site runoff is high during any construction phase. Given the CGO's proximity to Lake Cowal and the sensitive ecological status of the lake, prevention of sediment-laden runoff from the mine site discharging into the lake was, and continues to be, the primary objective of the erosion and sediment control system.

Specific sediment control protection works are put in place prior to initiation of any earthworks at the CGO. Immediately upon completion of earthworks, batter stabilisation and revegetation of disturbed areas commenced.

As the operations expand, future construction activities and disturbance areas for the CGO are required over an area of approximately 1,031 ha. Further detail of this expansion is outlined in Section 2.

The following sections cover temporary and permanent controls for the site when in operation.

a. Temporal erosion and sediment control systems

Typical temporary erosion and control measures implemented during construction are summarised below in ***Table 8.4*** along with additional references and Landcom (2004) standard drawings (SD) and details.

Table 8.4: Temporary erosion and sediment control measures

Measure	Description	References
Use of silt fences and sediment traps to minimise soil movement	• Temporary sediment traps and sediment filters are installed downslope of soil stockpiles where the potential for significant sediment migration is identified. • Straw bales are considered more appropriate where a degree of ponding/energy loss is required, while sediment fences are suited to low energy flows where filtration was the primary objective.	Sediment traps – SD 6-16, SD 6-17, SD 6-36, SD 6-38 Straw bales – SD 6-35
Use of diversion banks, channels and rip-rap structures to divert surface water around disturbed areas and control runoff velocity	• Temporary diversion banks are designed and constructed upslope of disturbance areas where the potential for significant runoff from the upslope undisturbed area to the disturbed area is expected so as to minimise runoff to soil stockpile areas. • Rip-rap structures are to be designed and constructed to stabilise concentrated water flow paths where the potential for erosion of flow paths by high energy flows is identified. Rip-rap structures are typically used to dissipate energy where flow paths traversed relatively steep slopes and/or as waters exit constructed channels and enter natural drainage lines.	Diversion Banks – SD 5-25, SD 5-26 Energy dissipation – refer to Chapter 5.4.5 of Landcom (2004) SD 5-34
Soil stockpiles	• Long-term topsoil stockpiles are constructed up to 3 m in height with slopes at a maximum acceptable angle to resist erosion. Subsoil stockpiles vary in height as determined by storage volumes and available space within the footprint of approved disturbance areas. Soil stockpile batters are generally revegetated.	Stockpiles – refer to Chapter 4.3.2 of Landcom (2004) SD 4-5

Measure	Description	References
Constructing access roads at an appropriate slope along the contour, where practicable	• Internal mine roads are to be constructed at an appropriate slope along the contour (with the exception of roads within the pit limits) in order to avoid steep grades where practicable. The length of unavoidable steep grades must be minimised.	Temporary access roads – refer to Chapter 3, 4 and 6 of OEH (2012) Refer to Ausroads (2021)
Constructed surface water drainage features (i.e. table drains and culverts) to control surface runoff from access roads	• Runoff from the road surface is to be managed via road side table drains. Where the internal mine roads traverse natural drainage lines, culverts should be designed and constructed where the potential for significant upslope runoff exists.	Table drain – refer to Chapter 5.4.3 and 5.4.4 of Landcom (2004) Culverts – refer to Chapter 5.3.5 of Landcom (2004) SD 5-25, SD 5-26
Ripping and rehabilitation of roads no longer required for access	• Decommissioning of the roads no longer required for access involved the ripping, topsoiling and revegetation of the disturbed areas with a cover crop. Rehabilitation is undertaken progressively.	Rehabilitation – refer to Chapter 7 of Landcom (2004) SD 4-2

Measures to control wind-borne dust are presented in the CGO Air Quality Management Plan.

b. Permanent Erosion and sediment control systems

The permanent erosion and sediment controls include those systems that will provide ongoing water management for the site which include the:

- UCDS
- ICDS
- existing lake isolation system and the expanded LPB.

These water management systems will continue to operate post-closure, modified as required. The specific erosion and sediment controls for the construction of each of the above systems is further outlined in ***Table 8.5***.

Table 8.5: Erosion and sediment controls specific to the construction of the water management system

Feature	Specific control details during construction	References
Up-catchment diversion system	• Sediment controls to be in place prior to disturbance works. Controls include silt fences, straw bale weirs and temporary sediment traps. • Where dispersive soils are known to occur (Gilgai areas) are to be removed and replaced where possible, or ameliorated. • Soil stripping is to be undertaken in accordance with the requirements of the Soil Stripping Management Plan. • Stilling basins required in operation of the UCDS will be used during construction as temporary sediment basins to protect sediment migration to Lake Cowal. • Following construction, disturbance areas are to be rehabilitated including batter stabilisation and revegetation to the current applicable standards.	Revegetation – Refer to Section 3.4 of Mid-Lachlan Regional Vegetation Committee (2001) Rehabilitation – refer to Chapter 7 in Landcom (2004) and Rehabilitation Management Plan
Internal catchment drainage system	• Construction and stabilisation of open channels. • Construction of containment storages that capture sediment-laden and potentially contaminated water.	Refer to Section 7.4Refer to Section 7.4
Expanded lake protection bund	• Construction of a temporary isolation bund using placed rock and sheet piles. • Construction of a low permeability embankment on either side of the temporary isolation bund using silt curtains to keep suspended sediment in close proximity to the construction areas. • The two embankments will be integrated to a design height of approximately 209 mAHD. • The expanded LPB will be constructed using a combination of inert waste rock material and/or engineered fill material adjacent construction activities. • The final bund will be capped with a compacted clay layer. Once the design height and capping is completed, the sheet piles will be extracted. • Erosion protection of the lake side of the bund wall will be with placed rock/rip-rap won from site or imported. This will depend on the lake conditions at time of construction. In the event that Lake Cowal is flooded, then a wet construction of the LPB will be required which will require the internal side of the bund to be protected with rip-rap and only the top section of the bund on the lake side protected. • The road cross fall will be directed towards the mine side of the LPB. • Dewatering of water captured behind the bund will be treated and discharged to Lake Cowal. This may also include other sources needing to be treated and disposed of such as sediment laden water from any temporary sediment basins required on the mine side in association with laydown areas, access roads or other construction related disturbance. • Construction activities of the LPB will be subject to a specific progressive erosion and sediment control plan.	Lake Protection Bund Design and Verification Plan (Appendix B) Lake Protection Bund Dewatering Management Plan

iv. Operational phase

The operational phase of CGO requires less erosion and sediment controls then when in construction, however operational mining activities still have the potential to cause erosion and generate sources of sediment. The following sections cover temporary and permanent controls for the site when in operation.

a. Temporary erosion and sediment control systems

Several soil stockpiles will be constructed outside of the UCDS. Prior to placement of soil, upslope runoff would be directed around the stockpile area via a system of diversion bunds/banks. Runoff from the soil stockpile will be directed to a sediment basin, via a series of toe drains constructed directly downslope. Where the stockpile is suitably stabilised and the runoff is clean, the toe drains can be directed to the UCDS.

The diversions and sediment basins required are to be constructed in accordance with *Managing Urban Stormwater – Soils and Construction Volume 1* (Landcom 2004) and *Managing Urban Stormwater – Soils and Construction Volume 2E Mines and Quarries* (DECC 2008). In addition, the construction and management of the soil stockpiles will be undertaken in accordance with the measures detailed within the Soil Stripping Management Plan.

b. Permanent erosion and sediment control system

Details of the permanent erosion and sediment control systems during the operational phase are outlined in Table 8.6.

Table 8.6: Erosion and sediment controls specific to the operation of the water management system

Feature	Specific details during operational phase
Up-catchment diversion system	• Rehabilitation of unstable areas will be undertaken as required. • Realignment of the system can be undertaken as long as the system capacity is maintained against the required design criteria. • Rehabilitation of the system will be undertaken progressively. • System subject to ongoing monitoring and maintenance.
Internal catchment drainage system	• Open channels convey both potentially contaminated and sediment laden water, within the disturbance area of CGO, to a containment storage for reuse. • At closure, the system will be decommissioned with all internal drainage directed to the remaining open pit void. • At closure containment storages will be decommissioned, with liners removed.
Open pit	• The existing lake isolation system and expanded LPB provides a permanent barrier around the open pit area and prevents erosion and sediment flow towards the lake. • The open pit design includes water management structures (face seepage collection drains) and in-pit sumps in the floor of the pit. The in-pit sumps will be sized to store runoff from a medium sized rainfall event. • Sediment fluxes to Lake Cowal are expected to reduce as a result of CGO activities. Whilst the soil loss rate is likely to be higher from the disturbance areas than under pre-mining conditions, the final void will intercept a large proportion of runoff, preventing a large proportion of suspended sediment from entering the lake.

Feature	Specific details during operational phase
Tailings storage/IWL	• An interception system directs runoff or seepage back to the process water system via open channels. • Erosion control of the TSF/IWL during operations is designed so that the outer batters are constructed with surface roughness (through addition of cover such as rock mulch or pasture cover) and with reverse grading berms which longitudinally "drain" to low depressions within the berms. Coupled with a deep cover (of subsoil and topsoil) on the top surfaces, the IWL landform will eventually act to absorb and store rainfall. • Refer to the CGO Tailings Management Plan for further detail.
Northern and southern waste rock emplacements	• The northern and southern WREs have been designed to meet the long-term goal of containing potentially saline seepage generated from WRE areas during operation and post-closure. • Drainage on the top surfaces of the WREs are managed via a series of small shallow basins (depressions) and include a rehabilitation cover system that absorbs rainfall and comprises woodland vegetation. The use of depressions is aimed at maximising internal drainage without creating permanent ponding during normal and heavy rainfall events. A bund around the perimeter of the top surfaces of the WREs provides a contained catchment and minimises surface water runoff from the top surface down the batters.
Existing lake isolation system and expanded lake protection bund	• The LPB has been designed to hydrologically isolate and provide permanent mutual protection between the open pit and Lake Cowal during CGO development, mining and post-closure. • The LPB is to be stabilised and revegetated to prevent erosion and contain sediment.

8.1.2 Borefield pipelines

The pipelines from the Bland Creek Palaeochannel Borefield, Eastern Saline Borefield and saline groundwater supply borefield to the site were constructed in such a way to not impede the passage of fish or other animals, interfere with flood behaviour or the passage of boats and vehicles.

As the pipelines are buried, the erosion and sediment control systems are limited to ongoing monitoring and maintenance which is provided in Section 8.5.

8.2 Salinity management

Many saline areas in NSW (e.g. inland salt pans, brackish streams, coastal salt marshes and naturally saline soils) are the result of entirely natural processes. Most newly salinised areas, however, are often the result of particular land use practices, such as over-clearing, river regulation, irrigation or the cultivation of crops (DLWC 2003).

Salinity is often divided into several different categories including:

- dryland salinity
- irrigation salinity
- urban salinity
- river salinity
- industrial salinity.

Irrigation salinity (i.e. due to over-irrigation of farmland, inefficient water usage and poor drainage) and urban salinity (i.e. due to dryland salinity processes and over-watering of towns and urban areas) are not relevant to CGO.

The three different types of salinity relevant to CGO (i.e. dryland, river and industrial salinity) are described in the following subsections and include details of salinity management measures, where relevant. These measures are provided to meet the objectives relating to salinity management of the relevant local and regional management plans.

8.2.1 Dryland salinity

Dryland salinity is the build-up of salt in the soil, usually as a result of a rising water table. Evaporation of saline water at the soil surface tends to concentrate salts to the point where they affect the environment (DLWC 2003).

In rural areas, dryland salinity associated with rising water tables is often caused by the loss of deep-rooted perennial trees, shrubs and grasses. The loss of vegetation is often caused by factors such as clearing, soil acidity, overgrazing or erosion (DLWC 2003).

The Lake Cowal Foundation (2013) states that Lake Cowal is under threat by dryland salinity induced by poor catchment management practices. The lake (outside of ML 1535) is subject to grazing and cropping below the lake full storage line when the lake recedes in dryer times (Lake Cowal Foundation 2013). No grazing of areas occurs within ML 1535 and ML 1791.

Measures that have been adopted by the CGO to manage dryland salinity are summarised in ***Table 8.7***.

Table 8.7: Measures adopted to manage dryland salinity

Measures	Description
Minimising the areas disturbed by CGO components and restricting access to non-disturbed areas	• Clearing of areas for CGO components during the construction and operational phases will be limited and clearly delineated, where appropriate, with barrier mesh (upslope) and sediment fencing (downslope) or similar materials in accordance with details provided in Landcom (2004). • Unrestricted vehicular plant access to undisturbed areas will not be permitted. Vegetation near works areas will be demarcated with flagging tape (or similar) so as to prevent disturbance. All employees undertaking the site induction/training programme will be made aware of the importance of remaining within the defined works areas.
Identification of saline soils (infill testing) and selective soil resource management	• As described in the Soil Stripping Management Plan, infill testing of soil profiles will be undertaken to confirm the precise depths of soil and any requirements for amelioration at the time of soil stripping. Where possible, the more saline and dispersive soil horizons are left in-situ beneath mine landforms. • Topsoil and subsoil resources are stripped and stored in separate stockpiles comprising topsoil; low salinity subsoil; gypsum treated subsoil; and native seed topsoil. Stripped non-saline soils are stored in dedicated stockpile areas for re-use during construction and progressive rehabilitation works. • Low salinity topsoils/soils are selectively placed on the outer face of the WRE. Stripped soils not suitable for construction or rehabilitation are placed in the WREs or ameliorated as described within the Soil Stripping Management Plan.
Identification of low salinity construction material (construction fill testing) and selective resource management	• Fill used for construction is tested for geochemical and geotechnical suitability prior to construction commencing. Suitable fill will be sufficiently impermeable, low dispersion, low salinity and not acid forming. Where possible, the more saline and dispersive soil horizons are left in situ beneath mine landforms.
Fencing ML 1535 and ML 1791 to restrict stock and prevent overgrazing and erosion	• A fence has been constructed around the perimeter of ML 1535 and ML 1791 (except for the portion of the shared boundary). • The fence is currently inspected on a weekly basis.

Measures	Description
Implementation of appropriate erosion and sediment control systems and ongoing monitoring and maintenance	• Erosion and sediment control systems will be implemented to minimise erosion and the loss of vegetation and hence minimise salinity. The monitoring and maintenance activities for erosion and sediment controls will be undertaken during the life of CGO to manage salinity related issues. • Water quality monitoring of water contained in sediment control structures will occur following overflow events. • Generally, water quality monitoring is undertaken monthly in these storages and drains.

8.2.2 River salinity

Surface water runoff from areas of dryland, irrigation and urban salinity may flow into creeks and rivers, raising their salinity. According to the Murray-Darling Basin Commission Salinity Audit, salinity is likely to rise to high levels in future in the Bogan, Castlereagh, Lachlan, and Macquarie and Namoi Rivers (DLWC 2003).

Measures that have been adopted by CGO to manage river salinity are summarised in ***Table 8.8***.

Table 8.8: Measures adopted to manage river salinity

Measures	Description
Containment and management of saline surface water runoff	• Soil and waste rock characterisation programmes have identified materials to be disturbed during the construction and development of CGO that have the potential to generate salinity. • The CGO water management strategy incorporates design elements to contain surface runoff or seepage likely to contain increased salt concentrations. The interception drains (toe drains) and collection storages (temporary sediment basins and contained water storages) around all stockpile areas, WREs, tailings emplacements and structures containing saline materials is captured for reuse within the process water supply. • Contained water storages D1 and D4 are fitted with pumps capable of transferring the first flush of initial captured runoff waters (typically saline and containing sediment) from the outer batters of the northern and southern WREs and IWL to the designated process water contained water storages.
Open pit/final void salinity sink	• During CGO operations, water will accumulate within the open pit as a result of controlled drainage of surface water runoff during wet weather and groundwater inflows which is managed through pit dewatering. • A large proportion of runoff is directed to the final void will intercept, preventing sediment from entering Lake Cowal. As a result, salt loads entering the lake from CGO are expected to marginally decrease post-mining as salt will also be trapped by the void. • A strategy for the long-term management of the final void has been developed and includes long-term monitoring of the water quality in the final void and the stability of the void walls (refer to the CGO Final Void Management Plan).

8.2.3 Industrial salinity

Industrial salinity is often related to industrial processes, whereby salt is concentrated in the water used over time. Mine workings often need to manage saline water from groundwater seepage and from rainwater coming into contact with saline mined materials. Abandoned mines are also a major source of salinity in some areas (DLWC 2003).

Measures that have been adopted by CGO to manage industrial salinity are summarised in ***Table 8.9***.

Table 8.9: Measures adopted to manage industrial salinity

Measures	Description
Isolation of saline groundwaters by the open pit	• Waters that accumulate within the open pit will be managed in accordance with a pit dewatering programme. The effect of the open pit will be to locally depress the groundwater table (potentiometric surface) such that all groundwater movement in the surrounding area will be towards the void. • This effect will also reduce salinity associated with the rising groundwaters which is the greatest long-term threat to the values of the lake and the surrounding area.
Containment of potentially saline seepage generated from WRE and IWL areas	• The northern and southern WREs have been designed to meet the long-term goal of containing potentially saline seepage generated from WRE areas during operation and post-closure. • The existing topography of the footprint has been altered by stripping topsoil and subsoil from the WRE footprints. In addition, oxide waste rock has been placed and compacted (using haul truck movements) across the footprints. The resulting basement for the emplacements slopes towards the open pit to provide drainage control. Any waters permeating through the emplacement are expected to be intercepted by this layer and preferentially flow towards the open pit. • Similar to the existing TSF/IWL, the IWL North will be constructed with a low permeability basement layer to control seepage. There are a series of interceptor drains and fingers under the rock embankment designed to capture stormwater that permeate through the rock embankment. This water is directed to an external sump and sent back to the process water system for reuse.
Containment and management of saline surface water runoff	• CGO's water management strategy incorporates interception drains (toe drains) and collection storages (temporary sediment basins and contained water storages) around all stockpile areas, WREs and IWL to contain saline materials.
Final void management and monitoring	• A strategy for the long-term management of the final void has been developed and will include long-term monitoring of the water quality in the final void.

8.3 Soil management

The principal strategy in soil resource management at CGO is to strip suitable soil resources from all proposed disturbance areas and directly replace on rehabilitation areas or store in dedicated stockpiles for re-use during progressive rehabilitation works.

The strategies and objectives for management of CGO soil resources include:

- characterisation of the suitability of the material for rehabilitation purposes prior to stripping
- soil resources are stripped, stored selectively and managed according to their suitability for rehabilitation purposes
- sufficient subsoil and stable topsoil are available for rehabilitation purposes

- progressive rehabilitation of final landforms is conducted as soon as practicable after completion of the landforms or when areas are no longer required
- soil resources are stripped and stored in such a manner that their long-term viability is maintained.

8.3.1 Stripping method

Disturbance areas are stripped progressively, to reduce potential erosion and sediment generation, and to minimise the extent of topsoil stockpiles and the period of soil storage.

Prior to soil stripping, testing of soil profiles is undertaken to confirm the precise depths of suitable soil and any requirements for amelioration at the time of soil stockpiling. Stakes may be used to delineate soil boundaries and to identify suitable stripping depths for equipment operators.

A range of pre-stripping activities must be completed before stripping can occur. This may include due diligence exercises on cultural heritage and ecology. Following completion of these surveys and studies, the completion of the ground disturbance permit is required.

The removal of trees and other vegetation from the mine site is restricted to the approved disturbance areas only. Once cleared of woody vegetation, soils are typically stripped using a grader, scraper or bulldozer. Scrapers may be used to strip soils where areas become too large for effective dozer or grader stripping.

Soil is stripped by firstly removing grasses. This is followed by the separate removal of topsoil and subsoil, where required. Stripped soils will be either directly replaced on rehabilitation areas or stored in separate topsoil and subsoil stockpiles where practicable. Where rehandling is necessary, this will typically be undertaken using excavators and dump trucks.

For further detailed information refer to the Soil Stripping Management Plan.

8.3.2 Soil stockpile management

The protocol for the management of soil stockpiles is focused on the retention of soil characteristics (i.e. nutrients and micro-organisms) favourable to plant growth. The protocol includes the following steps:

- leave the surface of the completed soil stockpiles in a “rough” condition to help promote water infiltration and minimise erosion prior to vegetation establishment
- deep-rip soil stockpiles and seed (if necessary) to maintain soil organic matter levels, soil structure and microbial activity
- treat soil stockpiles with gypsum to reduce dispersiveness during stockpiling
- install signposts for all soil stockpiles with the date of construction and type of soil
- record details of all soil stockpiles on a site database which includes the location and volume of each stockpile and the stockpile maintenance records (e.g. ameliorative treatment, weed control, seeding).

Where practicable, soil is stripped from one area and immediately transferred to an active rehabilitation area for direct placement. This reduces the size of soil stockpiles and optimise soil fertility for rehabilitation.

Following construction, and if adequate unassisted revegetation has not occurred, soil stockpiles are sown with suitable annual or select grass and legume species to maintain soil condition for future revegetation/rehabilitation works to minimise erosion and wind-blown dust and discourage opportunistic weed growth. Soil treatment/amelioration methods undertaken as necessary prior to the use of soil for rehabilitation.

8.4 Rehabilitation

The rehabilitation programme will be undertaken in accordance with the Rehabilitation Management Plan with the following general principles:

- the rehabilitation of landforms is to be progressive (where possible) and conducted in accordance with approved, verified plans
- final landforms are to be stable in the long-term and include native and/or endemic vegetation characteristic of remnant vegetation within the surrounding landscape
- native and/or endemic groundcover, understorey, and tree species are to be cultivated and used in the rehabilitation programme
- rehabilitation concepts are to be flexible to allow for adjustments, based on investigations, to improve the rehabilitation programme.

Rehabilitation works are undertaken in accordance with the CGO Rehabilitation Management Plan.

8.5 Monitoring and maintenance

8.5.1 Operational mining area

Weekly inspections are conducted to confirm that erosion and sediment controls have been installed and performing effectively (i.e. preventing erosion and containing sediment) to minimise erosion and sediment migration. Site inspections will be undertaken by systematically walking around the site to relevant works areas and recording the following observations:

- condition of the erosion and sediment control structures
- maintenance requirements (if necessary) including instructive actions
- volume of sediment removed (e.g. from sediment basins to retain capacity requirements)
- sediment disposal locations.

Stockpile areas will be inspected and where there is potential for excessive sediment migration or dust generation identified, remedial or response measures be enacted in accordance with Landcom (2004) or the Soil Stripping Management Plan.

Additional wet weather inspections of sediment controls and structures, are triggered following rainfall events of 20 mm or more in a 24 hour period (to be commenced within 48 hours of the event). Inspection of sediment controls and structures include confirmation of capture capacities (i.e. sediment build-up which has reduced capacity), structural integrity (i.e. stability) and effectiveness (i.e. sediment containment).

Ameliorative responses and maintenance activities typically include:

- cleaning out of containment structures, diversion drains, etc. where sediment/sand/soil/vegetation builds up
- repairing of areas of erosion (e.g. lining with a suitable material which may include use of grasses, plastic, geotextile, rock, concrete)
- further application of seed/fertiliser in areas of minor soil erosion and/or inadequate vegetative establishment
- installation of additional erosion and sediment control structures.

Water quality monitoring of sediment control structures is required following overflow events (i.e. rainfall events greater than the prescribed design criteria). Water quality parameters to be captured during these monitoring rounds will include total suspended solids, turbidity, pH and EC.

8.5.2 Saline Borefield

The pipelines from the saline groundwater supply borefield was constructed with an automatic shut-down device in the event of a pipe rupture. This device effectively stops the operation of the pumps. The water supply from the borefield is not to be restarted until the rupture is located and repaired.

The pipeline is only operated when Lake Cowal is dry and therefore negates the risk of any potential impacts on water quality.

Maintenance of the pipeline alignment is undertaken in accordance with Chapter 8 of *Managing Urban Stormwater – Soils and Construction* (Landcom 2004) and is focused on the areas of revegetated lake bed. This is inspected periodically as part the CGO general rehabilitation programme.

8.5.3 Borefield and pipeline

Inspections and maintenance activities on the pipeline corridor are completed following the same approach for outlined for the operational mine. However, the frequency of inspections is less frequent and due to the corridor now being stabilised. The corridor is inspected periodically as part the CGO general rehabilitation programme.

8.5.4 General rehabilitation

Maintenance of soil conservation works and revegetated areas is undertaken periodically as part of the rehabilitation programme. Monitoring of previously stabilised and revegetated areas associated with the lake isolation system is part of the rehabilitation programme. Ameliorative responses and maintenance activities as detailed above are carried out when problems are identified.

9 Water licensing requirements

9.1 Existing licences and approvals

A summary of the WALs held for operations at CGO and the associated approvals is provided in Table 9.1.

9.2 Water storages

Dams that are solely for the capture, containment or recirculation of drainage, consistent with best management practice to prevent the contamination of a water source, that are located on a minor stream (as defined by the hydrolines provided by the WM Regulation data published by DCCEEW (2025)) are considered to be excluded works under Schedule 1, item 3 of the WM Regulation (often referred to as dirty water or contaminated water excluded works dams). The use of water from excluded works dams is exempt from requiring a licence under Schedule 4, item 12 of the WM Regulation.

All contained water storages within the water management system at the mine capture dirty water runoff or potentially contaminated surface water and are considered to fulfil the requirements of the excluded works exemption and therefore do not require licensing to account for water take.

9.3 Groundwater inflows

Incidental groundwater inflows into underground mine workings and open pits requires water licensing. The maximum volume of groundwater inflow predicted by numerical hydrogeological modelling (EMM 2023a) is:

- 1,664 ML/year of groundwater from the fractured rock aquifer, regulated under the Lachlan Fold Belt MDB Groundwater Source (Lachlan Fold Belt MDB (Other) Management Zone)

- 121 ML/year of groundwater from the overlying sediments, regulated under the Upper Lachlan Alluvial Groundwater Source (Upper Lachlan Alluvial Zone 7 Management Zone).

9.4 External water supply

9.4.1 Lachlan River

Water extracted from the Lachlan River supplied via a pipeline from the Jemalong Irrigation Channel is accounted for with licences in the Lachlan Regulated River Water Source. ATCW (2023) predicted a demand for water from the Lachlan River of 940 ML/year (median), up to 1,965 ML/year (90th percentile).

Temporary allocation assignment water is purchased by CGO on the open market within the Lachlan Regulated River to account for any water required that is in excess of the current entitlement held by CGO. The volume of water purchased varies annually depending on the availability of water for reuse from the contained water storages, the performance of the Bland Creek Palaeochannel Borefield and the availability of water within the Lachlan River.

DCCEEW – Water Group allocation assignment trading data show that volumes between 4,000 ML and 274,000 ML has been traded annually since records began in the 2004/05 water year to the 2023/24 water year (WaterNSW 2025). Throughout the operating history of the CGO, the Lachlan River regulated source has proven to be a reliable supply of temporary water (ATCW 2023).

Table 9.1: Summary of water access licences and approvals

Licence number	Category	Entitlement	Water sharing plan	Water source	Management zone	Nominated approval	Description
WAL 36569	Aquifer	300 units	Lachlan Alluvial Groundwater Sources 2020	Upper Lachlan Alluvial Groundwater Source	Upper Lachlan Alluvial Zone 7 Management Zone	70WA614933	Eastern Saline Borefield
WAL 31864	Aquifer	3,350 units	Lachlan Alluvial Groundwater Sources 2020	Upper Lachlan Alluvial Groundwater Source	Upper Lachlan Alluvial Zone 7 Management Zone	70WA614076	Bland Creek Palaeochannel Borefield
WAL 36615	Aquifer	366 units	Lachlan Alluvial Groundwater Sources 2020	Upper Lachlan Alluvial Groundwater Source	Upper Lachlan Alluvial Zone 7 Management Zone	70WA614090	Saline groundwater supply borefield within ML 1535 Pit and underground mine dewatering
WAL 36617	Aquifer	3,294 units	NSW Murray Darling Basin Fractured Rock Groundwater Sources 2020	Lachlan Fold Belt MDB Groundwater Source	Lachlan Fold Belt MDB (Other) Management Zone	70WA614090	Pit and underground mine dewatering
WAL 13749	Regulated river (high security)	0 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Upstream of Lake Cargelligo Weir	70CA601244	Lachlan River additional water supply
WAL 14981	Regulated river (high security)	80 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Downstream of Lake Cargelligo Weir	70WA603145	Lachlan River additional water supply

Licence number	Category	Entitlement	Water sharing plan	Water source	Management zone	Nominated approval	Description
WAL 13748	Regulated river (general security)	30 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Upstream of Lake Cargelligo Weir	70CA601244	Lachlan River additional water supply
WAL 1990	Regulated river (general security)	123 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Upstream of Lake Cargelligo Weir		Lachlan River additional water supply
WAL 42993	Regulated river (general security)	1,400 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Downstream of Lake Cargelligo Weir		Lachlan River water supply
WAL 40424	Regulated river (general security)	100 units	Lachlan Regulated River Water Source 2016	Lachlan Regulated River Water Source	That Part of the Water Source Upstream of Lake Cargelligo Weir		Lachlan River additional water supply
WAL 31568	Unregulated river	729 units	Lachlan Unregulated River Water Sources 2012	Bogandillon and Manna Creeks Water Source		70MW604511	LPB dewatering

9.4.2 Groundwater supply

Groundwater supplied by the Bland Creek Palaeochannel Borefield, Eastern Saline Borefield and saline groundwater supply borefield within ML 1535 accounted for with licences in the Upper Lachlan Alluvial Groundwater Source (Upper Lachlan Alluvial Zone 7 Management Zone). The predicted volume of groundwater supply required for the Project is presented in ***Table 9.2***, based on the water balance modelling results presented by ATCW (2023).

Table 9.2: Predicted groundwater supply demands

Source	Median volume	90th percentile volume [1]
Bland Creek Palaeochannel Borefield	1,100 ML/year	1,460 ML/year
Eastern Saline Borefield	300 ML/year	300 ML/year
Saline groundwater supply borefield within ML 1535	0 ML/year	30 ML/year
Total	**1,400 ML/year**	**1,790 ML/year**

1. Based on 90th percentile demand predictions from ATCW (2023). They should be considered an upper estimate from a range of values.

9.5 Lake protection bund dewatering

Dewatering of any water trapped behind the expanded LPB during construction will be pumped back into Lake Cowal at a maximum rate of 800 L/s under licensing. CGO currently holds WAL 31568 with a total entitlement of 729 unit shares within the Bogandillon and Manna Creeks Water Source to account for the LPB dewatering.

The following water accounting rules as specified by the WSP for the Bogandillon and Manna Creeks Water Source:

- carryover – a maximum of 1 ML per unit share (i.e. 729 ML) of unused allocation is carried over from one water year to the next
- three-year average – water taken must not exceed a maximum of 3 ML per unit share (i.e. 2,187 ML) of allocation over a period of any three consecutive water years.

Dewatering of the LPB will be restricted by the licensing entitlement and water accounting rules associated with WAL 31568 to a maximum of 1,458 ML in any one water year (assuming licensed entitlement is not used in the year prior to dewatering) and 2,187 ML on average over three consecutive water years.

9.6 Summary of water licensing requirements

A summary of the predicted water licensing requirements and current entitlement held for CGO is provided in ***Table 9.3***. Sufficient entitlement is held for the predicted water take from groundwater sources and no additional entitlement is expected to be required for the Project. Water in excess of current entitlements and annual allocations may be required from the Lachlan River Regulated River Water Source from time to time to meet peak demand.

Table 9.3: Summary of water licensing requirements

Water source	Project aspect	Entitlement held	Licensing requirement
Lachlan Fold Belt MDB Groundwater Source	Pit and underground mine dewatering	3,294 ML	1,664 ML
Upper Lachlan Alluvial Groundwater Source	Pit and underground mine dewatering External water supply from Bland Creek Palaeochannel Borefield, Eastern Saline Borefield and saline groundwater supply borefield within ML 1535	4,016 ML	1,911 ML
Lachlan Regulated River Water Source	External water supply from Lachlan River	80 ML (high security) 1,653 ML (general security)	1,965 ML
Bogandillon and Manna Creeks Water Source	Dewatering of LPB	729 ML	729 ML + carryover

10 Monitoring program

The objective of the water monitoring program is to collect data to:

- fulfill the relevant regulatory requirements of and assess compliance with SSD-42917792, EPL 11912 and other relevant requirements
- assess the effectiveness of the water management system and other environmental impact mitigation measures
- identify and quantify water quality and quantity impacts to receiving environment
- calibrate and validate models of CGO (e.g. site water balance and groundwater models).

The water monitoring program includes monitoring of the following elements of the water management system and surrounding environment:

- meteorological conditions
- surface water quality and level of Lake Cowal
- groundwater quality and level of the alluvial and fractured bedrock aquifers
- water management system.

10.1 Monitoring methods

All water monitoring at CGO is undertaken in accordance with relevant Australian Standards, legislation, EPA and DCCEEW – Water Group approved methods for sampling, including:

- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (EPA 2022)
- AS/NZS 5667.1:1998 *Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*

All data will be validated to ensure that it has been obtained in accordance with the requirements of this plan, but not limited to:

- samples being taken by a suitably qualified and experienced staff or consultants to the satisfaction of DCCEEW – Water Group and EPA
- samples handled and transported, correct sampling equipment and container used in accordance with AS/NZS 5667.1:1998 *Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*
- samples have been analysed by a National Association of Testing Authorities (NATA) accredited laboratory.

Where a comparison with baseline monitoring data is required, data validation will also involve a review of the relevant baseline data to detect any anomalous results.

Validated data from each of the monitoring programs is entered into the CGO monitoring database to assist reporting and enable trends to be easily identified. Data collected from monitoring is used to validate the predicted performance of the site water management system and/or to determine the need for any augmentation of the system.

Table 10.1 summarises the analytes and analysis methods for water quality monitoring. Physical and chemical stressors (with the exception of TSS) are monitored in the field with a calibrated hand-held water quality meter. All other parameters are analysed at a laboratory accredited by NATA.

Table 10.1: Water quality monitoring analytes and methods

Category	Parameters	Analysis method
Physico-chemical parameters	Dissolved oxygen, EC, pH, temperature, total dissolved solids (TDS), turbidity	In the field with a calibrated hand-held water quality meter
	TSS	Analysis undertaken at NATA accredited laboratory
Major ions	Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate	Analysis undertaken at NATA accredited laboratory
Nutrients	Ammonia, nitrate, nitrite, nitrate + nitrite, reactive phosphorus, total phosphorus	Analysis undertaken at NATA accredited laboratory
Metals	Antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc	Analysis undertaken at NATA accredited laboratory
Other	Oil and grease, total hardness, WAD and total cyanide	Analysis undertaken at NATA accredited laboratory

10.2 Meteorological monitoring

Meteorological monitoring is undertaken to:

- determining sampling frequencies of contained water storages and erosion and sediment control structures
- provide input to the site water balance and groundwater models
- inform site water management decision making and improvement of water management system
- inform the interpretation and analysis of surface water and groundwater monitoring data.

Meteorological conditions at CGO are monitored by an automatic weather station located on the southern perimeter of the site, as shown in ***Figure 10.1***. The weather station records rainfall, temperature, relative humidity, wind direction, wind velocity, barometric pressure and solar radiation at 10-minute intervals.

Data collection is automated and imported to an electronic database via telemetry. Monitoring equipment is maintained and calibrated quarterly.

10.3 Surface water monitoring

10.3.1 Lake Cowal and water management system

Table 10.2 summarises the location, frequency and parameters for surface water monitoring of the CGO surface water management system and Lake Cowal. The location of surface water monitoring points is shown in ***Figure 10.1***.

Monitoring is conducted at the monitoring locations when the water level in Lake Cowal is at or above 204.5 mAHD.

Inspections of key water management infrastructure, such as pumps, pipelines, bunds, drains and dams, is undertaken to ensure they are working effectively, and the water management system is operating as intended. The inspections are conducted monthly and following rainfall greater than 20 mm in a 24 hour period. Any issues will be documented and maintenance carried out as required.

10.3.2 Lake protection bund construction and dewatering

Table 10.3 summarises the location, frequency and parameters for surface water monitoring during construction and dewatering of the expanded LPB. This monitoring program will be implemented post-construction until it can be established that the water quality at sites close to CGO (i.e. P1, P2 and P3) do not exceed the concurrent water quality at sites on the opposite side of the lake (i.e. C1, C2 and C3) for three consecutive months.

i. Final void

Monitoring of the water quality (salinity and other dissolved analytes) and water level in the final void will be undertaken to confirm the final void modelling predictions. The surface water quality monitoring program during mine closure (including monitoring of water quality in the final void) will be developed in consultation with DCCEEW – Water Group, EPA, Fisheries NSW and to the satisfaction of the DPHI.

ii. Stability of the final voids walls

The geotechnical stability of the final void will be reviewed by an appropriately qualified and experienced person in consultation with the Resources Regulator as part of the mine closure process. The stability of the final void will continue to be surveyed from the cessation of mining until lease relinquishment (i.e. until the final void walls can be demonstrated to be geotechnically stable and present an acceptably low risk of environmental harm).

iii. Stability of the lake protection bund

Survey assessments will be undertaken annually to determine and quantify any movement of the lake protection bund until permanent stability is demonstrated (i.e. until the lake protection bund can be demonstrated to be geotechnically stable and presents an acceptably low risk of environmental harm).

Table 10.2: Summary of surface water monitoring program

Aspect	Location	Monitoring frequency	Parameters
UCDS	Up-catchment diversions north and south	Monthly and following rainfall events of 20 mm or greater in a 24 hour period	EC, pH, TSS
ICDS	Contained water storages D1 (EPL point 12), D4 (EPL point 13) and D21 and D24 (once constructed)	Monthly and following rainfall events of 20 mm or greater in a 24 hour period	EC, pH, TSS
	Contained water storages D1 (EPL point 12), D2, D3, D4 (EPL point 13), D5A, D6, D8B, D9 and D21, D23, D24 and D25 (once constructed)	Quarterly	Oil and grease, EC, pH, dissolved oxygen Total hardness, TSS, TDS Calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved antimony, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, zinc
	Sediment control structures (inside and outside the ICDS)	Quarterly and following rainfall events of 20 mm or greater in a 24 hour period	Structural integrity, TSS
		Overflow event	EC, pH, TSS
Pit void water	Pit sumps	Monthly	EC, pH, TSS
TSF/IWL	Decant, Northern TSF, Southern TSF, IWL, IWL North (once constructed)	Monthly	EC, pH
WRE areas	Northern WRE (EPL point 41), Southern WRE (EPL point 42) and Perimeter WRE (EPL point 43)	Monthly	EC, pH
		Quarterly	TDS, total hardness Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc

Aspect	Location	Monitoring frequency	Parameters
Lake Cowal	Lake Cowal gauge board	Monthly (when lake water is present)	Lake water level
	P1 (EPL point 14), P3 (EPL point 16)	Weekly and following rainfall events of 20 mm or greater in a 24 hour period (when lake water level is at or above 204.5 mAHD)	EC, pH, TSS
	L1, C1	Fortnightly and following rainfall events of 20 mm or greater in a 24 hour period (when lake water level is at or above 204.5 mAHD)	EC, pH, TSS
	Lachlan floodway transect – L1, L2, L5, L8, L9, L11 and L13 Irrigation channel transect – I1, I3 and I4 East shore transect – E1, E3 and E5 Bland Creek transect – B1 (EPL point 17), B2, B4 and B6 (EPL point 18) Impact transect – P1 (EPL point 14), P2 (EPL site 15) and P3 (EPL point 16) Control transect – C1, C2 and C3	Monthly (when lake water level is or above 204.5 mAHD)	EC, dissolved oxygen, pH, temperature, turbidity
		Quarterly (when lake water level is at or above 204.5 mAHD)	TSS Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate Ammonia, nitrate, nitrite, nitrate + nitrite, reactive phosphorus, total phosphorus Total and dissolved antimony, arsenic, cadmium, copper, iron, lead, mercury, molybdenum, nickel, selenium, zinc
Lake Cowal inflow sites	Lachlan floodway, Irrigation Channel, Bland Creek and Sandy Creek inflow sites	Monthly (when lake water level is at or above 204.5 mAHD)	EC, pH, turbidity, dissolved oxygen, temperature
		Quarterly (when lake water level is at or above 204.5 mAHD)	TSS Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate Ammonia, nitrate, nitrite, nitrate + nitrite, reactive phosphorus, total phosphorus Total and dissolved antimony, arsenic, cadmium, copper, iron, lead, mercury, molybdenum, nickel, selenium, zinc

Figure 10.1: Surface water monitoring locations

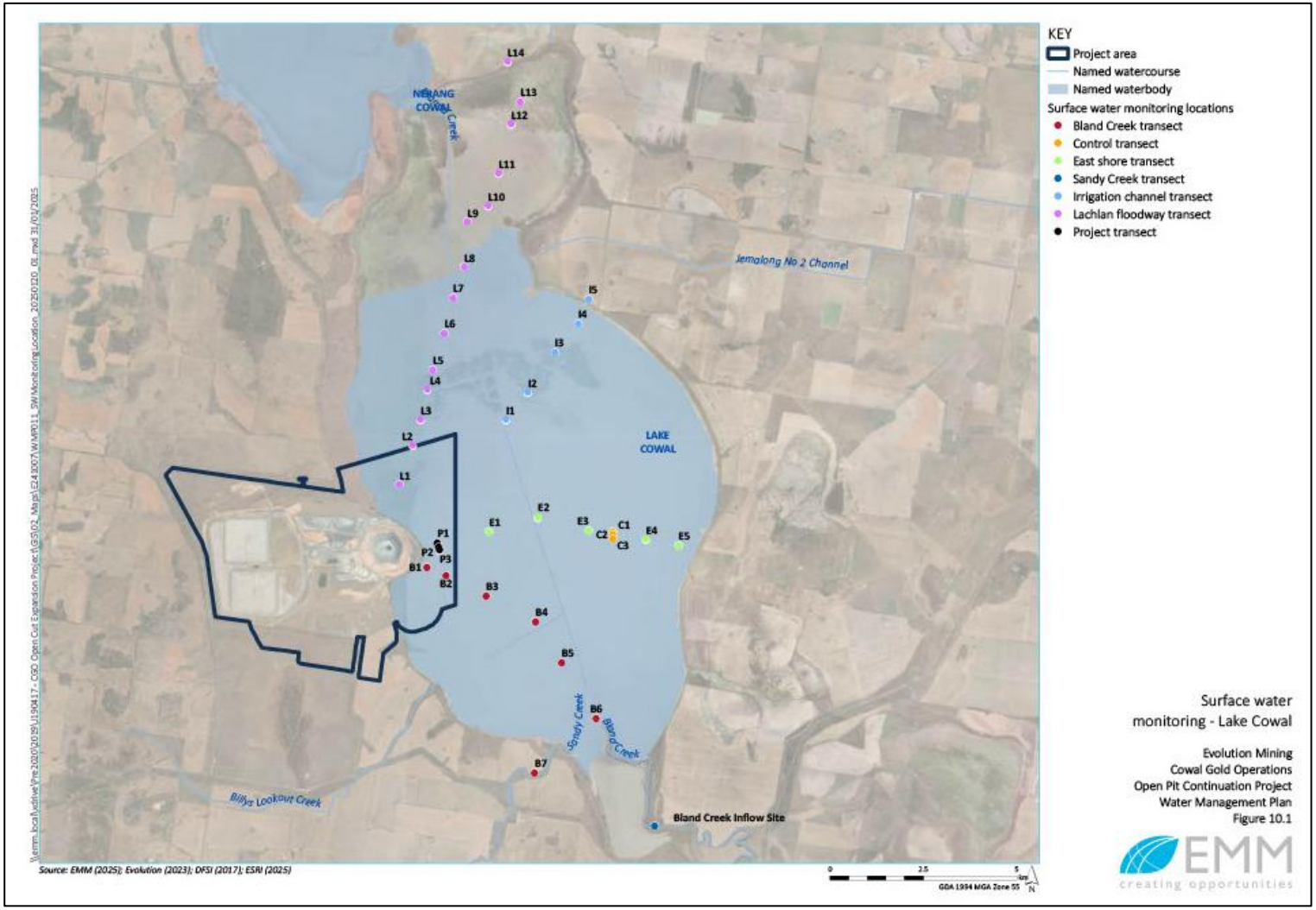


Table 10.3: Expanded lake protection bund surface water monitoring

Aspect	Location	Monitoring frequency	Parameters
Lake Cowal	Lachlan floodway transect – L1, L2, L5, L8, L9, L11 and L13 Irrigation channel transect – I1, I3 and I4 East shore transect – E1, E3 and E5 Bland Creek transect – B1 (EPL point 17), B2, B4 and B6 (EPL point 18) Impact transect – P1 (EPL point 14), P2 (EPL site 15) and P3 (EPL point 16) Control transect – C1, C2 and C3	Weekly (when lake water level is or above 204.5 mAHD)	EC, dissolved oxygen, pH, temperature, turbidity
		Monthly (when lake water level is at or above 204.5 mAHD)	TSS Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate Ammonia, nitrate, nitrite, nitrate + nitrite, reactive phosphorus, total phosphorus Total and dissolved antimony, arsenic, cadmium, chromium, copper, iron, lead, mercury, molybdenum, nickel, selenium, zinc
LPB dewatering	Discharge points 1 to 8	Continuous	EC, dissolved oxygen, pH, turbidity
		Weekly	TSS Alkalinity, calcium, chloride, magnesium, potassium, sodium, sulfate Ammonia, nitrate and nitrite, reactive phosphate, total phosphate Total iron
		Monthly	Dissolved and total antimony, arsenic, cadmium, chromium, copper, lead, molybdenum, mercury, nickel, selenium, silver, zinc

10.4 Groundwater monitoring

10.4.1 Groundwater levels and quality

Groundwater monitoring will continue to be undertaken at monitoring sites used during the baseline monitoring program (where those sites are still operational) and at additional monitoring sites specifically related to CGO potential groundwater impacts. Additional groundwater monitoring bores have also been established to replace those displaced by construction of the IWL.

The groundwater monitoring program has been developed to monitor aquifers beneath the ML area and more regionally within the alluvial aquifer. Groundwater monitoring will continue to be used to validate predictive modelling, particularly in the vicinity of the open pit, IWL and water supply borefields (when in use). Continued monitoring of groundwater salinity will be undertaken in the vicinity of the Bland Creek Paleochannel Borefield to assess potential saline migration.

The monitoring locations, frequency of monitoring and groundwater parameters for the operations phase is provided in ***Table 10.4***. The groundwater monitoring locations within ML 1535 are shown on ***Figure 10.2***, with the regional groundwater monitoring locations are shown on ***Figure 10.3***.

10.4.2 Open pit dewatering

Bores which intercept the aquifers surrounding the open pit will be used for monitoring groundwater depth (i.e. groundwater table or piezometric level). The monitoring frequency and parameters are provided in ***Table 10.4***.

Daily/monthly meter reading will be taken for water pumped out of the underground mine. Data collected from the meter reading will be assessed during the annual review each year to monitor and evaluate groundwater inflows into the mining operations.

The water extracted during pit dewatering is highly saline and is stored in temporary storage areas located within the open pit area, prior to being pumped to contained water storage D6. The quantity and water quality of water pumped to contained water storage D6 is recorded.

10.4.3 Post-closures

A post-closure groundwater monitoring program will be constructed once post-closure requirements are known.

Table 10.4: Groundwater monitoring program

CGO component	Site	Monitoring frequency	Parameters
Mining area	Open pit area	Monthly	Standing water level (SWL), EC, pH
	PDB1A and PDB1B, PBD3A and PDB3B, and PDB5A and PDB5B	Quarterly	Total hardness, alkalinity, TDS
			Calcium, chloride, magnesium, potassium, sodium, sulfate
			Dissolved antimony, arsenic, cadmium, copper, iron, lead, manganese, molybdenum, nickel, selenium, zinc
	Process plant area	Monthly	SWL, EC, pH
	PP01, PP02, PP03, PP04 and PP06 Northern and Southern TSFs/IWL IWL01 A and B, IWL02 A and B, IWL03 A and B, IWL04 A and B, IWL05 A and B, IWL06 A and B, P417 A and B, P418 A and B, P516 A and B, P555A-R, P558A-R, MON02A and MON02B	Quarterly	Total hardness, alkalinity, TDS WAD and total cyanide Calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved antimony, arsenic, cadmium, copper, iron, lead, manganese, molybdenum, nickel, selenium, zinc
	Private registered bores in the Lachlan Fold Belt* GW017659, GW065265, GW065267	Quarterly (as provided by private groundwater users)	SWL
	Private registered bores – AIP potentially impacted private users* GW028040, GW702262, GW704641 (alluvium) and GW065263 (fractured rock)	Quarterly (as provided by private groundwater users)	SWL

CGO component	Site	Monitoring frequency	Parameters
Bland Creek Palaeochannel Borefield	BLPR1, BLPR2, BLPR3, BLPR4, BLPR5, BLPR6 and BLPR7	Monthly	SWL, EC, pH
		Quarterly	Total hardness, alkalinity, TDS Calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved iron and manganese
	DCCEEW – Water Group piezometers GW036551, GW036552, GW036553, GW036523, GW036524, GW036528, GW036594, GW036594, GW036595, GW036596, GW036597, GW036609, GW036610, GW036611, GW036613, GW036700 and GW090093	Monthly or daily as per publicly available download from the WaterNSW online monitoring database	SWL
Saline groundwater supply borefields	WB12 (saline borefield within ML 1535) PZ09, PZ10 and PZ11 (Eastern Saline Borefield)	Monthly	SWL, EC, pH
		Quarterly	Total hardness, alkalinity, TDS Calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved iron and manganese
Underground lake area	CGOMB03A, CGOMB03B, CGOMB04A, CGOMB04B, CGOMB05A, CGOMB05B, E46MB01, E46MB02, E41MB01, E41MB02	Monthly	SWL, EC, pH
		Quarterly	Total hardness, alkalinity, TDS Calcium, chloride, magnesium, potassium, sodium, sulfate Dissolved antimony, arsenic, cadmium, copper, iron, lead, manganese, molybdenum, nickel, selenium, zinc

* These bores are new to the groundwater monitoring network and are private third-party bores. Discussions will be conducted with the owners of these to obtain land access.

Figure 10.2: CGO monitoring bore network (mining lease/ borefields)

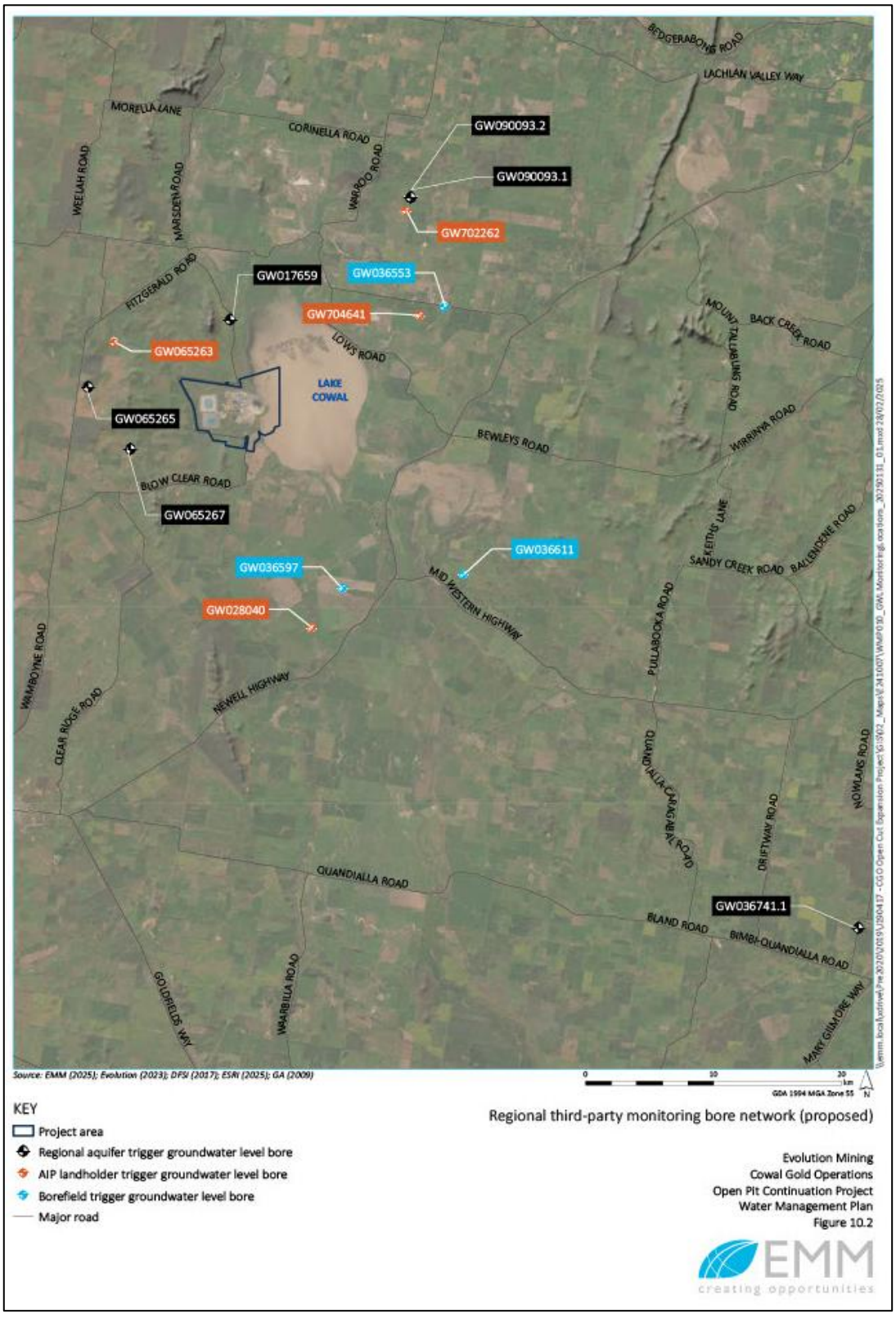
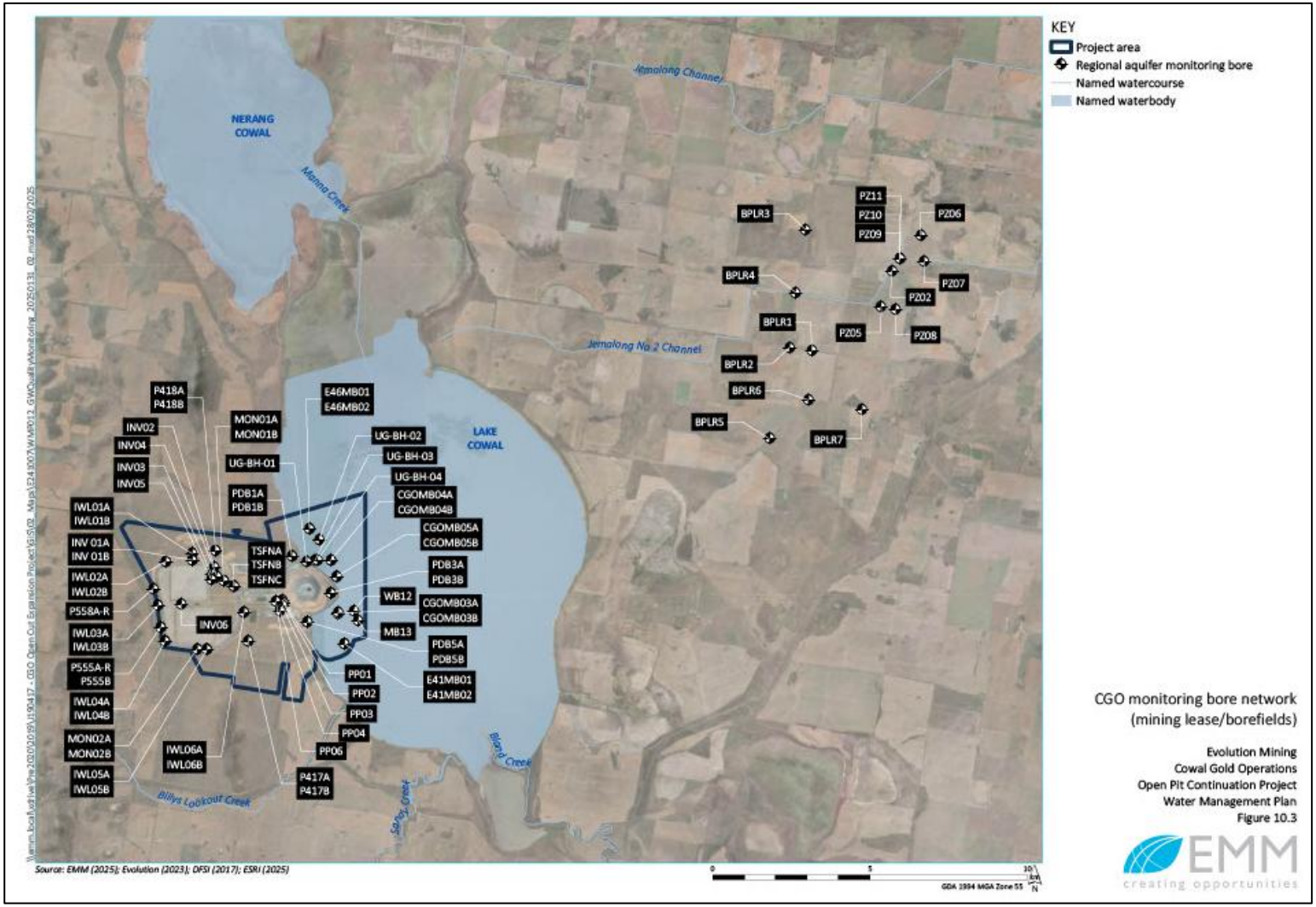


Figure 10.3: Regional third-party monitoring bore network (proposed)



11 Performance management

11.1 Potential impacts

11.1.1 Surface water

i. Upper catchment diversion system

Construction of the expanded UCDS has the potential to generate sediment during and directly following construction that could migrate to Lake Cowal. The diversion system will be staged and include the use of proposed discharge stilling basins as sediment basins during construction. The construction of the UCDS system will be managed as discussed in Chapter 8.

The expanded UCDS will be stabilised where necessary with rock mulch and vegetation as is the existing arrangements. New sections of the UCDS would be designed and profiled to convey the peak flow velocity and bed shear stresses generated by the 1 in 1,000 AEP design event.

In the event that there is an overtopping of the UCDS, water quality issues during construction or an instability, then the general water management TARP (refer to Appendix E) will be implemented.

ii. Internal water management

As part of the EIS for the Project, the augmented water management system was assessed as part of the site water balance model by ATCW (2023). The water storages D1 and D4 are the only storages within the water management system with potential overflows that are into Lake Cowal. Pumping systems on these water storages are managed to control catchment inflow and dewatering in between rainfall events. Changes to the water management system over the life of the Project will mean that overflows to Lake Cowal from the water management system will cease at the end of Year 2.

Up to Year 2 of the Project, the water storages D1 and D4 are not predicted to result in overflows to Lake Cowal.

ATCW (2023) indicate that spills could occur from other existing or planned contained water storages, however these would be contained within the ICDS, ultimately reporting to the E42 open pit and reused by process water demands.

In the event that there is an overtopping of water storages D1 or D4, or an instability occurs in the ICDS, then the general water management TARP (refer to Appendix E) will be implemented.

iii. Water Supply and demand

The water supply and demand for the Project has been assessed within the site water balance model by ATCW (2023). The model predicted that the overall operational reliance on external raw water sources is likely to decrease as a result of the Project (compared to previous approvals), due an increased reuse of water on-site. No shortfalls in supply were predicted from the model however this outcome is subject to demand and water licence allocation being available from the borefields and the Lachlan River.

As part of the annual water balance modelling update, the predicted inflows and outflows of the water management system will be compared to observed pumping records and water storage levels. If there is a significant difference between the predicted and observed site water balance (e.g. if there is additional water stored on site or predicted pit inflows are significantly lower than recorded pit pumping records), the water supply TARP (refer to Appendix E) will be implemented.

iv. Lake Cowal water quality

Based on the assessment provided by ATCW (2023) it is unlikely that the Project will result in degradation to the water quality within Lake Cowal. As surface water influenced by mining operations are effectively managed by the ICDS, the risk is minimal to water quality in Lake Cowal being impacted. ATCW (2023) indicate that only

D1 and D4 storages have the potential to overflow into the lake however they are fitted with pump back systems. CGO has indicated that overflows from these storages have not occurred to date. Water quality monitoring is undertaken within the lake cover both near-field and far-field potential.

Water quality criteria to be used for performance management is provided in Section 11.2.1.

v. Lake protection bund construction

Water that is captured behind the expansion of the LPB during construction of the temporary isolation bund is planned to be returned to Lake Cowal by pumping. The intercepted lake water has the potential to be affected by direct contact or runoff from materials used in the construction process. In order to limit the risk to Lake Cowal water quality, a dewatering management plan has been prepared including treatment and monitoring requirements. This dewatering process is also regulated by EPL 11912.

During construction of the temporary isolation bund (a component of the LPB), placement of inert waste rock directly into Lake Cowal will have the potential to influence lake water quality. Placement of inert waste rock onto the floor of the lake is likely to generate locally increased turbidity and suspended material. Placement of a continuous silt curtain around the perimeter of the temporary isolation bund will trap fine sediment and control the migration of suspended material into the lake.

A TARP for the dewatering activities of the LPB is provided in the Dewatering Management Plan.

vi. Lake Cowal water cycle and flooding

The Project, through the construction of the LPB and expansion of the UCDS, is expected to result in a small reduction in the catchment area reporting to Lake Cowal and a small reduction in the lake storage volume. ATCW (2023) developed a water balance model as part of the EIS to assess the changes to Lake Cowal.

The modelling completed for the Project predicted negligible changes to the water balance of Lake Cowal given:

- predicted reduction in catchment runoff to the lake is predicted to amount to 0.5%
- spills from the lake are predicted to increase by approximately 0.9%.

Flood modelling was undertaken by ATCW (2023) as part of the EIS. The modelling considered three events including the 1 in 100 year AEP, 1 in 1000 year AEP and PMF event. The flood modelling undertaken for the EIS specifically focused on assessing the impact of an expanded LPB to determine any potential landowner impact and inform the appropriate placement of the UCDS and stilling basins.

The flood modelling considered the entire catchment of Lake Cowal (10,293 km^2), routing flood waters from the southern end of Lake Cowal downstream to the outflow point north of Nerang Cowal, into Bogandillon Creek.

The results from the flood model predictions have been used to inform performance criteria and triggers outlined in Section 11.2.1.

vii. Downstream users

There were no impacts predicted to downstream users of Lake Cowal as a result of the Project (ATCW 2023). In the event that complaints are made specific to surface water management and Lake Cowal, these will be investigated and addressed as part of the complaints process detailed in Section 12.6.

viii. Cyanide management

Ore processing uses a conventional CIL cyanide leaching circuit to extract gold from the ore. Use of the cyanide leaching circuit is carried out in accordance with the CGO Cyanide Management Plan. Concentrations of cyanide in the tailings slurry stream at the processing facility must not exceed the following parameters:

- 20 mg/L CN_{WAD} (90th percentile)
- 30 mg/L CN_{WAD} (100th percentile)

For further details, reference should be made to the CGO Cyanide Management Plan for contingency strategies related to the use of the CIL cyanide leaching circuit on site.

11.1.2 Groundwater

i. Regional and local aquifers – water levels

Based on numerical modelling undertaken (EMM 2023a), cumulative groundwater level drawdown in both the alluvial and fractured rock aquifers is predicted for the Project. The GIA (EMM 2023a) that supported the approval for this Project included the following observations of the predictions:

- For the Upper Cowra groundwater system, which predominantly hosts the water table:

  - There are two drawdown zones, one emanating around the mine and the second in the north-east associated with borefield pumping. Drawdown from mining will reach maximums of approximately 25 m, and from borefield pumping approximately 10 m. Drawdown from mining will propagate outside the mining lease boundary.
  - There are small locations of groundwater mounding, where the maximum modelled rise in groundwater level is 5 m, at the end of mining and for the 20 years post mining fast recovery case. Areas of mounding underlie the existing and future IWL areas.
  - The maximum extent of drawdown is experienced at the end of mining, drawdown does not continue to propagate during the recovery phase (i.e. remaining 100 years).
  - By year 100, the maximum drawdown around the CGO pit for the most conservative post-closure scenario is 25 m.

- For the top of the Lachlan Fold Belt hard rock unit:

  - The maximum drawdown centres under the proposed and approved mining areas. The localised pockets of drawdown in the remainder of the study area are artefacts of where the model layer is present, and vertical propagation of drawdown from other layers.
  - By year 100, the maximum drawdown around the pit for the most conservative post-closure scenario is 100 m.
  - The most conservative post-closure scenario shows drawdown expanding laterally during recovery (i.e. expanding between years 20 and 100).

- For the continuous Lachlan Fold Belt hard rock unit:

  - There are two drawdown zones, one emanating around the mine and the second in the north-east associated with borefield pumping. Drawdown from mining will reach over 100 m, and from borefield pumping over 25 m. Drawdown from mining will propagate outside the mining lease boundary.
  - By year 100, the maximum drawdown around the pit for the most conservative post-closure scenario is 100 m.
  - The most conservative post-closure scenario shows drawdown expanding laterally to the west during recovery (i.e. expanding between years 20 and 100) but contracting to the south.

ii. Regional and local aquifers – groundwater quality

a. Mining

EMM (2023a) completed a contaminant transport tracking model as part of the GIA. Particle tracking modelling occurred over a period of 200 years post closure. It tracked particles of generic contaminants that were not constrained by attenuation factors and represented the most conservative cases of contaminant transport. As part of the most conservative closure scenario (fast recovery) particles to the east of the TSF/IWL and those in the vicinity of the void travelled towards the void. Particles to the west of the TSF/IWL initially travelled away from site before reversing after approximately 60 to 80 years and travelling back towards the pit.

The modelling indicated that contaminant transport will generally be limited to within the site footprint, with minor occurrences of movement away from site. There were no sensitive receivers (landholder bores and high priority GDEs) located in the modelled particle tracking extent.

Since particle movement was based on conservative parameters such as sulfate, the implications of the model results are that contaminant movement from seepage from the WRE areas and the TSF/IWL is likely to remain localised. This indicates that potential impacts from acid and metalliferous drainage and/or saline drainage (of which sulfate is an indicator) are likely to be limited.

The quality of the groundwater collected by the dewatering system, comprising groundwater both pumped from vertical dewatering bores and seeping into the open pits, is expected to be similar to existing groundwater quality and would be used as a water supply for the process plant (Coffey 2020a).

b. Groundwater borefield

Pumping of the Lower Cowra and Lachlan Formations can draw vertical leakage from overlying groundwater sources. In this instance, the Upper Cowra Formation has a higher salinity and this could potentially increase the salinity of the target formations. Coffey (2020b) undertook an assessment of the potential vertical mixing using numerical species transport simulation. Modelling predicted TDS, a measurement of salinity, in the Lachlan Formation will increase from approximately 1,260 mg/L to 1,490 mg/L by 2032, an increase of around 20% from pre-mining conditions due to groundwater abstraction.

There is no proposed change to the borefield pumping rate, rather the duration of pumping will slightly increase. Extrapolating groundwater quality predictions to 2042, suggests a further possible 20% increase in salinity whereby groundwater TDS could be around 1,700 mg/L, which is still considered brackish and therefore the groundwater quality beneficial use category of this water source is not predicted to change (EMM 2023a).

iii. Groundwater inflows

The CGO open pit has been in operation since 2005 and represents a significant groundwater sink. Groundwater is drawn toward the open pit, mainly from the fractured rock aquifer in which most of the open pit is excavated (Coffey 2021).

Based on numerical modelling undertaken (EMM 2023a), combined groundwater inflows into the open cut pits (new and existing) and underground mine have been predicted to increase from less than 1 ML/day in 2004 to a peak of 4.74 ML/day in 2027. Most of the inflows are predicted to occur in the E42 pit. These modelled inflows represent the total groundwater removed from the groundwater source (i.e. to achieve dry voids in the pits and underground). It includes entrained water in material excavated to surface as well as groundwater removed via evaporation and the ventilation system, and thus represents a greater volumetric flux than that is expected to be managed by the site.

Following mine closure, groundwater inflows to the pits are expected to reduce from approximately 3.62 ML/day in 2040 to less than 0.01 ML/day by the start of 2043.

iv. Sensitive receivers

a. Groundwater supply for other water users

Under the AIP-specific cumulative impact evaluation (i.e. incorporating the approved operations, the local private bore operations, the CGO borefields plus the Project), the maximum cumulative drawdown is predicted to exceed the AIP minimal impact considerations (2 m drawdown) at four bores. Management measures for these bores include groundwater level monitoring, model validation to confirm predictions and make good arrangements if these bores do become impacted (in accordance with the AIP).

Table 11.1: Details of landholder bores – predicted cumulative drawdown exceeds AIP 2 m drawdown criteria

Bore ID	Purpose	Groundwater source	Bore depth (m)	Status	Salinity description	Yield (L/s)
GW028040	Stock and domestic	Upper Lachlan Alluvial Groundwater Source (Lower Cowra Formation)	43.6	Use	7,001–10,000 ppm	
GW702262	Stock and domestic	Upper Lachlan Alluvial Groundwater Source (Lachlan Formation)	126	Use	1,000 mg/L	2.5
GW704641	Irrigation	Upper Lachlan Alluvial Groundwater Source (Lachlan Formation)	108	Use	Good	15
GW065263	Stock and domestic	Lachlan Fold Belt MDB Groundwater Source	83	Unknown		0.13–0.19

Note: ppm = parts per million.

b. Blank Creek Paleochannel Borefiled trigger monitoring bores

The potential cumulative drawdown effects associated with the continued use of the Bland Creek Palaeochannel Borefield and Eastern Saline Borefield for the approved CGO and continued extraction of groundwater by other users is managed by trigger levels at three regional groundwater monitoring trigger bores.

Modelled groundwater levels at the three regional groundwater monitoring trigger bores were simulated for the GIA (EMM 2023a). They indicate the following potential impacts:

- Groundwater levels remain above the investigation and mitigation threshold at GW036553 (located in the immediate vicinity of the borefields). The only exception was the 10th percentile around 2010 (during history matching), representing a less than 10% chance of drawdown exceeding the trigger level. The measured data shows that this exceedance did not occur in reality. **This bore governs the operation of the Bland Creek Palaeochannel Borefield** (Coffey 2020b).

- Groundwater levels remain above the investigation threshold at GW036597 (located to the south of the borefields) for the 90th percentile and base case. The 10th percentile (considered 'very unlikely') exceeds the trigger level during the operation of the Project (2023–2041), but then recovers. **This bore does not govern the operation of the Bland Creek Palaeochannel Borefield** (Coffey 2020b).

- Base case groundwater levels at GW036611 (located to the south of the borefields) are predicted to just exceed the investigation threshold during the later stages of operation of the Project (from approximately 2035–2040) but will then recover quickly above the trigger level. Post 2040, the 10th percentile is expected to marginally breach the trigger, however this is based on a 'very unlikely' probability of occurrence. **This bore does not govern the operation of the Bland Creek Palaeochannel Borefield** (Coffey 2020b).

c. Groundwater dependent ecosystems

Groundwater modelling undertaken as part of the EIS (EMM 2023a) identified a likelihood of groundwater drawdown greater than natural water table fluctuations (0.5 m) in areas with mapped high priority GDEs. A desktop assessment indicated that potential high priority GDEs included Red River Gum and Black Gum plant community types.

EMM completed a subsequent GDE assessment (EMM 2024) to assess the likelihood of these potential GDEs being impacted by dewatering. This involved detailed field-based investigations and ecohydrological conceptualisations to identify characteristics of potential GDEs and their reliance on groundwater.

The key findings of the assessment are as follows:

- Most trees fringing Lake Cowal and within the predicted groundwater drawdown impact zone are in good health, and the field-based investigations suggest reliable and shallow water sources are accessible.

- Potential for health stress by water logging was identified for River Red Gum closest to the Project, where a perched groundwater system was supported by recent high lake levels.

- River Red Gum communities (and Black Gum where measured) appear to draw moisture from soil water within the shallow vadose zone, predominantly between depths from surface to 1.5 m below ground level.

- Measured leaf water potential suggest that these trees have no reliance on the permanent groundwater source hosted in the Upper Cowra Formation.

- Salinity measurements of the groundwater within the unconfined Upper Cowra Formation are also inhospitable for River Red Gum and Black Gum (i.e. salinity measures were up to 43,

- 700 µS/cm), which provides additional evidence that these trees do not use this groundwater source.

- Groundwater drawdown associated with the Project is not expected to impact River Red Gum communities since they appear to be dependent on water within the vadose zone or shallow perched system only. That is, as these vegetation communities are not accessing groundwater within the Upper Cowal Formation, any drawdown of groundwater associated with that formation is not expected to impact these potential GDEs.

- Further, although excavation has the potential to affect the shallow systems supporting the perched aquifer under Lake Cowal, these perched systems seem to be associated with local lake sediments and are not at risk of excavation due to the mining activities, unless located within or immediately adjacent to the open cut mining operations.

In conclusion, aquifer drawdown associated with the development of the Project is not expected to impact River Red Gum communities due to the absence of pathways between groundwater sources, being either the vadose zone or the shallow perched system, and the water effecting activities at the mine site.

Based on a lack of expected impacts of groundwater drawdown on River Red Gum communities by the Project, it is not considered necessary to implement adaptive management measures (i.e. ongoing monitoring and associated trigger, action response plans).

v. Potential impacts to Lake Cowal

A study of groundwater level trends and a comparison of water quality was undertaken to understand whether there is a difference between the hydro-chemical signatures within the Lake Cowal surface water system and groundwater systems in the study area. Groundwater level trends indicated that all hydrostratigraphic units are influenced by rainfall, and no bores were influenced by lake levels or CGO borefield pumping. The review of water quality show clear differences between Lake Cowal, Cowra, Lachlan Formation and weathered bedrock. This suggests that there is no definitive evidence of a hydraulic connection between the lake, bores around the E42 pit and the underground. As well as no evidence of a hydraulic connection between the paleochannel, lake, E42 pit or the underground.

It is hypothesised that the separation of surface water and groundwater systems is due to the very low hydraulic conductivity properties of a Lacustrine Clay layer overlying the alluvial groundwater system. A review of inferred groundwater depths indicates slight groundwater mounding under Lake Cowal. This suggests that the lake is a losing and disconnected system, with groundwater receiving gradual long-term seepage from the lake when full, which is restricted by the Lacustrine Clay layer. CGO has installed nested monitoring bores within Lake Cowal to monitor for a potential hydraulic connection between an inundated Lake Cowal and the underground works.

Existing monitoring data indicates that groundwater inflow to the CGO open pit has not changed significantly during lake-fill conditions due to the hydraulic separation of the open pit and Lake Cowal.

Development of the approved CGO will not affect the impermeable clay layers that act to isolate Lake Cowal from the underlying aquifers. Coffey (2020a) concludes that the total impact to Lake Cowal associated with open pit dewatering at the approved CGO will be negligible.

vi. Seepage from the IWL

The IWL design height for the Project is higher than what is currently operated at site, which is approximately 248 mAHD at 2022 compared to a final maximum height of 251 mAHD. The Project also includes a northern expansion to accommodate tailings from processing ore from the new open pits. Due to this change, modelled seepage rates from IWL increase from around 1 ML/day at 2022 to between 2 ML/day and 2.7 ML/day during the prediction period up to 2040 (EMM 2023a). However as noted above in Section 11.1.2iia contaminant movement via seepage from the IWL (and WREs) is likely to remain localised with potential impacts from acid and metalliferous drainage and/or saline drainage expected to be limited. Furthermore, there are no groundwater users predicted to be impacted.

11.2 Performance criteria

Performance criteria have been developed from baseline information and the water management performance measures specified by Table 5 of SSD-42917792 (refer ***Table 3.2***). The performance criteria have been developed to ensure that impacts because of mining operations are not greater than those predicted by the EIS for the Project. The triggers have been developed to prompt specific actions and responses, identified in TARPs (refer to Appendix E), to prevent exceedance of the performance criteria.

11.2.1 Surface water trigger levels

i. Lake Cowal water quality

Water quality criteria for managing the potential influence that mining operations have on Lake Cowal is outlined in ***Table 11.2***. The defined water quality criteria and triggers considers both the applicable DGVs and the most recent historical baseline data range for Lake Cowal.

Table 11.2: Lake Cowal water quality criteria for management

Parameter (unit)	Default guideline value	Lake Cowal transect monitoring [6]	Inflow sites monitoring [6]
		Aug 2021–Nov 2024	July 2022–Nov 2024
Total nitrogen (mg/L)	0.35 [2]	–	–
Total phosphorus (mg/L)	0.01 [2]	0.01–3.95 (average 0.32)	0.09–0.8 (average 0.35)
pH (pH units)	6.5–8.0 [2]	6.49–9.24 (average 7.97)	7.25–8.41 (average 7.80)
TSS (mg/L)	–	3–448 (average 71)	13–801 (average 158)
Turbidity (NTU [1])	1–20 [3]	4.6–497 (average 150)	41–840 (average 196)
EC (µS/cm)	20–30 [3]	41–912 (average 353)	28–940 (average 455)
Arsenic (mg/L)	0.013 [1]	0.001–0.007 (average 0.003)	<0.001–0.005 (average 0.003)
Cadmium (mg/L)	0.0002 [1]	All samples below LOR of 0.0001	All samples below LOR of 0.0001
Copper (mg/L)	0.0014 [1]	<0.001–0.015 (average 0.005)	<0.001–0.014 (average 0.006)
Iron (mg/L)	0.3 [2]	0.07–25.3 (average 5.9)	0.74–20.1 (average 6.7)
Lead (mg/L)	0.0034 [1]	<0.001–0.011 (average 0.003)	<0.001–0.014 (average 0.004)
Manganese (mg/L)	1.9 [1]	–	–
Mercury (inorganic) (mg/L)	0.00006 [3]	All samples below LOR of 0.0001	All samples below LOR of 0.0001
Nickel (mg/L)	0.011 [1]	0.002–0.02 (average 0.007)	0.002–0.015 (average 0.007)
Zinc (mg/L)	0.008 [1]	<0.005–0.039 (average 0.012)	<0.005–0.044 (average 0.016)

NTU – nephelometric turbidity units.

DGV for south-east Australia for slightly disturbed ecosystems (freshwater lakes and reservoirs) recommended by ANZECC (2000; Table 3.3.2).

DGV for south-east Australia for slightly disturbed ecosystems (lakes and reservoirs) recommended by ANZECC (2000; Table 3.3.3).

Reported in Cowal Gold Project EIS (North Limited 1998).

Reported in Project Surface Water Impact Assessment (ATCW 2023).

Derived from monitoring data summarised in Appendix C.

During construction of the LPB, dewatering of water trapped behind the temporary isolation bund will be discharged via nominated points defined by EPL 11912. Up to 70,000 kilolitres per day of water discharge would occur via a series of pumps and pipelines to be established along the LPB. Dewatering will be subject to the water quality limits defined within the EPL which are provided in ***Table 11.3***. Dewatering will be undertaken in accordance with the relevant provisions of the POEO Act, notably Section 120 prohibition of pollution to waters.

Table 11.3: EPL Conditions L2.4 and L3.1

Pollutant	Unit of measure	100 percentile concentration limits
pH	pH	6.5 – 8.5
EC	µS/cm	±10% of 24-hour criteria
Turbidity	nephelometric turbidity units	±10% of 24-hour criteria
Point	**Unit of measure**	**Volume/Mass Limit**
69, 70, 71, 72, 73, 74, 75, 76	Kilolitres per day	70,000

ii. Lake Cowal flooding

Changes in flood depth and velocity are expected to be as a result of construction of the LPB. The EIS predicted changes in flood depth are presented in ***Table 11.4*** and shown in a typical cross section of the lake in ***Figure 11.1***. This flood depth also corresponded to a minor localised changes in flood velocity around the LPB.

Table 11.4: Predicted changes in flooding

Event	Average level change (m)
1 in 100 year AEP	0.013
1 in 1,000 year AEP	0.014
PMF	0.010

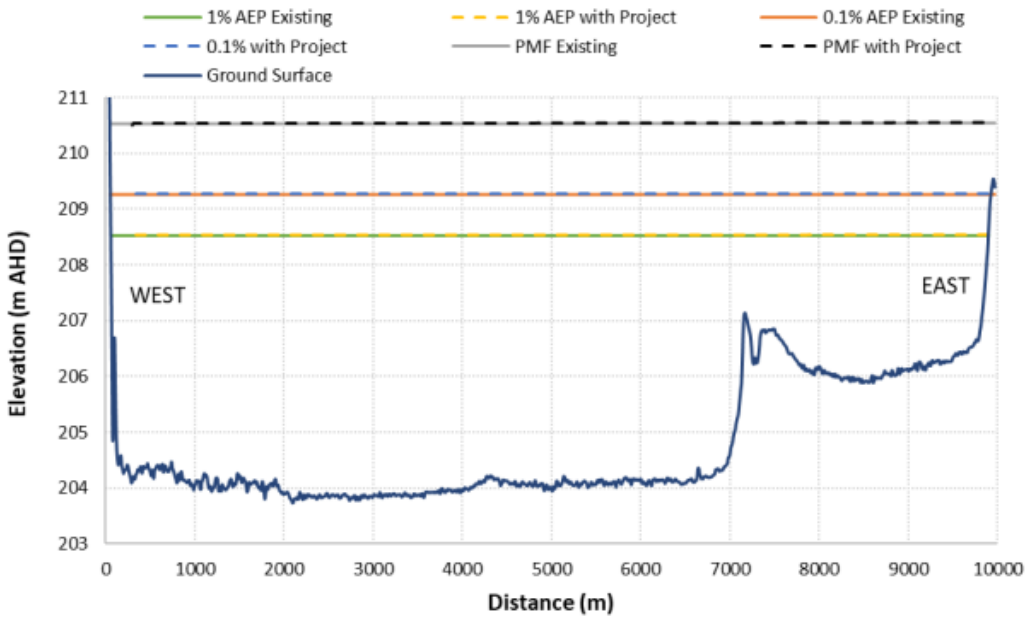


Figure 11.1: Existing and predicted Lake Cowal peak flood levels (ATCW 2023)

Lands within Nerang Cowal that may be affected by the changed flood regime will be limited to those below the level at which Nerang Cowal overflows to Manna Creek. The level at which Nerang Cowal overflows to Manna Creek represents the full storage level of Nerang Cowal, consequently any land above this level will not be affected by the changed flood regime.

If there is significant difference between the predicted and observed flooding in an event, a failure of the LPB or a complaint from a landowner, the TARP for flooding (refer to Appendix E) will be initiated.

iii. Management and disposal of waters captured behind the temporary isolation bund

The Dewatering Management Plan has been prepared to specifically as part of the construction of the LPB and outlines the proposed on-site management, transfer and treatment (if required) of waters captured behind the temporary isolation bund. The plan includes a TARP.

11.2.2 Groundwater trigger levels

i. Regional and local aquifers – groundwater levels

a. Borefield triggers and flow contingency strategy

Groundwater levels in the Lachlan Alluvium around the Bland Creek Paleochannel Borefield are managed through the monitoring of groundwater levels and the implementation of response measures should groundwater levels reach certain trigger levels.

Currently three government monitoring bores have trigger levels assigned to assess the performance of the operating CGO borefields. These triggers have been agreed previously between CGO and DCCEEW – Water Group and are shown below in Table 11.5 and in Figure 10.3.

Table 11.5: Groundwater level trigger values – borefields

Bore	Area	Trigger A (mAHD)	Trigger B (mAHD)
GW036553	Bland Creek Palaeochannel Borefield area	137.5	134
GW036597	Billabong area	143.5	N/A
GW036611	Maslin area	145.7	N/A

Groundwater levels at GW036553 are monitored on a continuous basis by DCCEEW – Water Group. Trigger A is an investigation trigger level where if the groundwater level falls below this level, CGO will proceed with a management contingency plan including investigation. Should the groundwater level fall below the Trigger B, CGO is to alter the pumping regime or maintain a water supply to impacted stock and domestic bores. Each contingency is described in the TARP in Appendix E.

b. Mine pit triggers

Groundwater levels in the alluvium downloaded from the WaterNSW online monitoring database (see ***Table 10.4***). An annual assessment will be undertaken as part of the annual review and will include departures from predicted trends from the groundwater model for the bores outlined in ***Table 11.6***. If departures greater than the approved groundwater model predictions are identified this will initiate further actions, as outlined in the TARP (Appendix E).

Currently, it is proposed that the regional fractured rock aquifer (Lachlan Fold Belt MDB) will be monitored in the three private bores in ***Table 11.6*** (GW017659, GW065265, and GW065267) on a quarterly basis. CGO will engage the applicable landowners and seek permission to complete a bore census to understand bore suitability and understand ongoing land access permissions. Monitoring in this aquifer will be reviewed after this consultation.

Table 11.6: Groundwater level trigger values – mine pit

Bore ID	Bore Type	Groundwater source	Predicted base case drawdown (m)	Trigger A description	Trigger B description
GW017659 (Provisional)	Private	Lachlan Fold Belt MDB Groundwater Source	0	>0 m drawdown	>2 m drawdown
GW065265 (Provisional)	Private	Lachlan Fold Belt MDB Groundwater Source	0	>0 m drawdown	>2 m drawdown
GW065267 (Provisional)	Private	Lachlan Fold Belt MDB Groundwater Source	0	>0 m drawdown	>2 m drawdown
E41MB01	CGO monitoring	Lower Cowra Formation	TBC	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
E46MB01	CGO monitoring	Lower Cowra Formation	TBC	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)

Bore ID	Bore Type	Groundwater source	Predicted base case drawdown (m)	Trigger A description	Trigger B description
CGOMB03A	CGO monitoring	Lower Cowra Formation	TBC	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
CGOMB04A	CGO monitoring	Lower Cowra Formation	TBC	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
CGOMB05A	CGO monitoring	Lower Cowra Formation	TBC	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
GW090093.1	DCCEEW – Water Group monitoring	Upper Cowra Formation	~2	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
GW090093.2	DCCEEW – Water Group monitoring	Lower Cowra Formation	~10	>base case drawdown predicted by EMM (2023a)	>90th percentile drawdown predicted by EMM (2023a)
GW036741.1	DCCEEW monitoring	Upper Cowra Formation	0	>0 m drawdown	>2 m drawdown

ii. Regional and local aquifer – groundwater take

The monitoring and reporting of groundwater inflows into the CGO has been established for some years. This will continue for the life of the mine and, in accordance with condition B39(f)(iii) of SSD-42917792, the review and correlation of groundwater modelling with monitoring data will be undertaken every three years. Where the model does not have an acceptable correlation with actual values, the model will be revised, as discussed in Section 12.11.

TARPs for groundwater take are provided in Appendix E.

iii. Interception of unexpected groundwater volumes

Repeated groundwater investigations by Coffey (2018; 2020a) have examined the potential for interception of large volumes of groundwater in previously unknown aquifers, most likely associated with faults or potentially through connection with a flooded Lake Cowal. Of the contingency measures proposed below, it should be noted that where incidents occur (in keeping with the definition provided by SSD-42917792), CGO will only implement that response as may be agreed with relevant government agencies.

Contingences for connection with a flooded Lake Cowal:

- installation and monitoring of nested groundwater bores
- monitoring of groundwater seepage volumes from the underground
- depending on the nature of the connection, geotechnical solutions may include:
  - grouting the water pathway

- sealing off and abandoning the affected stope/drive
- for small, stable flows of water, installation of additional pumping infrastructure to return the water to the lake.

Contingencies for the interception of unexpectedly large or unknown aquifers:

- monitoring of groundwater seepage volumes from the underground
- depending on the nature of the connection, geotechnical solutions may include:
  - grouting the water pathway
  - sealing off and abandoning the affected stope/drive
  - for small, stable flows of water, installation of additional pumping infrastructure to capture the water for use in the process water system.

iv. Regional and local aquifers – groundwater quality

Groundwater quality impact is anticipated to be localised to the CGO mine site (see Section 11.1.2ii) and in proximity of the Bland Creek Palaeochannel Borefield (increase in salinity only). Therefore, the groundwater quality criteria focus on monitoring at local bores on the ML and the bores at the Bland Creek Palaeochannel Borefield only. To assess the performance measures listed above the following trigger levels and performance criteria have been derived for groundwater quality. The locations of these are shown in Figure 10.3.

Water quality trigger levels have been calculated based on the best practice methodology outlined in the Using monitoring data to assess groundwater quality and potential environmental impacts (DES 2021).

a. Major ions

Field parameters and major ion (sodium and sulfate) trigger levels are based on 95th percentile (and 5th percentile for pH) of all bores in that area that are listed in ***Table 11.7***. Three consecutive exceedances in any of the bores is considered a Level 1 non-compliance. TARPs for groundwater quality are further detailed in Appendix E.

Table 11.7: Field parameters and major ion trigger levels by CGO activity area

CGO area – groundwater system	Bores	Electrical conductivity (µS/cm)	pH lower (pH units)	pH upper (pH units)	Sodium (mg/L)	Sulfate (mg/L)
Bland Creek Palaeochannel Borefield – Lachlan Formation aquifer	BLPR1, BLPR2, BLPR3, BLPR4, BLPR5, BLPR6 and BLPR7	5,157	6.28	7.30	940	152
Pit area – Transported aquifer	PDB1B	53,900	5.84	6.54	10,900	6,070
Pit area – Saprolite aquifer	PDB1A, PDB3A, PDB5A	55,546	6.11	6.98	11,400	4,763
Process plant	PP03, PP04	49,652	6.35	7.71	10,665	3,792
IWL South upgradient – Saprolite aquifer	P555A-R, IWL03A, IWL04A	32,911	6.56	6.95	7,454	2,828
IWL South downgradient – Transported aquifer	P417B, IWL05B, IWL06B	44,404	6.40	6.92	8,803	3,430
IWL South downgradient – Saprolite aquifer	P417A, IWL05A, IWL06A	47,285	6.40	6.81	9,787	3,696
IWL North upgradient – Transported aquifer	IWL01B	38,316	6.23	6.79	8,080	3,173
IWL North upgradient – Saprolite aquifer	IWL01A, IWL02A	48,337	6.63	7.01	10,300	5,087
IWL North downgradient – Transported aquifer	P418B	46,797	6.30	6.73	10,645	5,245
IWL North downgradient – Saprolite aquifer	P418A	49,799	6.38	6.84	11,380	5,102
Underground lake area – Lower Cowra Formation and Saprolite aquifer*	E41MB01, E46MB01, CGOMB03A. CGOMB04A, CGOMB05A, E41MB02, E46MB02, CGOMB03B. CGOMB04B, CGOMB05B	55,546	5.84	6.98	11,400	6,070

*Interim triggers have been set for the bores in the underground lake area as not enough data currently exists for the underground lake area bores (which commenced monitoring in late 2023) to form site-specific triggers. Interim triggers are based on the highest trigger seen in the 'Pit Area', which is the closest area to the underground lake monitoring bores. It is recommended that these are reassigned a site-specific trigger after two full years of quarterly monitoring data.

b. Metal ions

For metal ions at CGO, trigger levels have been assigned to a 'compliance bore' in each area at the site. Each compliance bore has been chosen to represent the changes in water chemistry surrounding the site. Each compliance bore has been selected based on either the longer record of monitoring data or general stability of metal concentrations.

Metal ion trigger levels are based on 95th percentile for that compliance bore and are shown in ***Table 11.8***. Three consecutive exceedances in the compliance bore are considered a Level 1 non-compliance. A trend analysis on all bores, including supplementary bores, will be undertaken in each annual review to aid in the detection of any gradual changes in water quality.

Table 11.8: Metal ions trigger levels by CGO activity area

CGO area	Compliance bore	Supplementary bores	Geological aquifer	Metal ion trigger (mg/L)							
				Arsenic	Cadmium	Cyanide (Total and WAD) [3]	Manganese	Molybdenum	Nickel	Selenium	Zinc
Pit area 1	PDB3B	PDB1B, PDB5B	Transported	0.0016	0.0009	N/A	0.13	0.0012	0.015	0.02	0.033
Pit area 2	PDB1A	PDB3A. PDB5A	Saprolite	0.0012	0.005	N/A	3.9	0.002	0.07	0.004	0.047
Processing plant	PP04	PP03	Mix – show similar	0.0008	0.0002	0.004	0.026	0.0015	0.01	0.011	0.047
IWL South upgradient	P555A-R	IWL03A, IWL04A	Saprolite/Sap rock	0.0007	0.0007	0.004	0.38	0.0032	0.034	0.004	0.014
IWL South downgradient 1	P417B	IWL05B, IWL06B	Transported	0.00063	0.0011	0.004	0.049	0.0004	0.0043	0.011	0.053
IWL South downgradient 2	P417A	IWL05A, IWL06A	Saprolite	0.00062	0.0011	0.004	0.077	0.0064	0.073	0.01	0.017
IWL North upgradient 1	IWL01B	IWL02B	Transported	0.0005	0.0003	0.004	0.039	0.0018	0.058	0.003	0.015
IWL North upgradient 2	IWL01A	IWL02A	Saprolite	0.0008	0.00073	0.004	0.084	0.0026	0.13	0.04	0.012
IWL North downgradient 1	P418B	N/A	Transported	0.0015	0.0002	0.004	0.052	0.013	0.38	0.006	0.008 [1]
IWL North downgradient 2	P418A	N/A	Saprolite	0.00066	0.0002	0.004	0.48	0.0068	0.04	0.0056	0.016

CGO area	Compliance bore	Supplementary bores	Geological aquifer	Metal ion trigger (mg/L)							
				Arsenic	Cadmium	Cyanide (Total and WAD) [3]	Manganese	Molybdenum	Nickel	Selenium	Zinc
Underground lake area [2]	TBC	TBC	All	0.0012	0.005	0.004	3.9	0.002	0.07	0.02	0.047

1. Based on ANZG (2018) guidelines where insufficient site data (< 8 measurements above the LOR) exists for a particular area/water quality parameter. It is recommended these are updated as further data is acquired.
2. Not enough data exists for the underground lake area bores (which commenced monitoring in late 2023) to form site-specific triggers. It is recommended that these are assigned a site-specific trigger after two full years of quarterly monitoring data. Interim triggers are based on the highest trigger seen in the 'Pit Area', which is the closest area to the underground lake monitoring bores.
3. The cyanide trigger (both total and WAD) is based on the LOR as more than 95% of all measurements are below this threshold.

c. Seepage/leachate management

In the event that seepage is identified from a component of the water management system (i.e. water storages, the TSF/IWL, WREs, infrastructure and processing areas, or the final voids), and that seepage is likely to either leave the site or impact a sensitive receiver, CGO will conduct further monitoring to determine the requirement for any necessary actions. Monitoring may include:

- monitoring of dams and nearby water sources to assess water quality and the potential for connectivity
- soil and sediment sampling
- monitoring of nearby groundwater bores for connectivity, or
- installation of additional shallow monitoring wells where no other data is available.

Seepage from water management system components to groundwater will be estimated as part of the calculation of the detailed site water balance. The CGO site water balance is described in detail in the Section 7.15.

During the mine operations phase, groundwater monitoring up-gradient (i.e. west of the IWL in the unconsolidated sediments, bores P555A-R and IWL 03A and B) and down-gradient of the TSFs (i.e. between the IWL and open pits – within the unconsolidated sediments, bores P417A and B and IWL06 A and B) is carried out at sites shown on ***Figure 10.3***. The monitoring frequency and parameters are provided in ***Table 10.4***. It is noted that a steady increase in groundwater levels has been observed in the vicinity of the IWL locations. Recent work by SLR (2023), has attributed the observed groundwater level rise to compression of aquifer materials below the tailings dams and not the result of tailings seepage. Aquifer compression is due to the high clay content and low hydraulic conductivities of the strata underlying the IWL's.

Consideration for seepage/leachate management will be considered as part of mine closure planning, final landform and drainage design. Ongoing monitoring will continue post-closure of the CGO to confirm that solutes associated with seepage from the IWL are flowing towards, and ultimately terminate within, the final pit voids.

v. Private bores

As stated in Section 11.1.2iva, the EIS for the Project predicted that the maximum cumulative drawdown may exceed the AIP minimal impact considerations (2 m drawdown) at four private water supply bores (EMM 2023a). Currently, it is proposed that the four AIP impacted bores are monitored on a quarterly basis. CGO will engage the applicable landowners and seek permission to complete a bore census to understand if the bore is still being used as a water supply as well as request ongoing land access permissions for regular monitoring purposes.

The acquired data will be validated and assessed against predicted (modelled) groundwater levels. If monitoring data exhibits drawdown greater than 2 m, such departures will initiate further actions, as outlined in ***Table 11.9*** and the TARP in Appendix E. Locations of these bores are shown in ***Figure 10.3***.

Table 11.9: Monitored AIP bores (provisional)

Bore ID	Reason for inclusion	Groundwater source	Trigger A description
GW028040	AIP potentially impacted private users	Upper Lachlan Alluvial Groundwater Source (Lower Cowra Formation)	2 m drawdown from modelled 2012 levels[1]
GW702262	AIP potentially impacted private users	Upper Lachlan Alluvial Groundwater Source (Lachlan Formation)	2 m drawdown from modelled 2012 levels[1]
GW704641	AIP potentially impacted private users	Upper Lachlan Alluvial Groundwater Source (Lachlan Formation)	2 m drawdown from modelled 2012 levels[1]
GW065263	AIP potentially impacted private users	Lachlan Fold Belt MDB Groundwater Source	2 m drawdown from modelled 2012 levels[1]

1. In accordance with the AIP requirement that assessment of cumulative impacts occur from the commencement of a WSP, which was 2012 for the *Water Sharing Plan for the Lachlan Alluvial Groundwater Sources 2020*.

vi. Groundwater dependent ecosystems

As stated in Section 6.3.5(ii), aquifer drawdown associated with the development of the Project is not expected to impact River Red Gum communities. This is due to the absence of pathways between groundwater sources, being either the vadose zone or the shallow perched system, and the water effecting activities at the mine site. As such, performance (impact assessment) criteria are not proposed for GDEs. Notwithstanding, CGO will monitor River Red Gum communities in accordance with the CGO Biodiversity Management Plan.

11.3 Trigger action response plans

TARPs are provided in Appendix E for:

- general water management performance
- water supply and demand
- surface water quality (receiving environment)
- Lake Cowal flood management
- borefield groundwater level performance
- mine pit groundwater level performance
- groundwater take performance
- groundwater quality performance.

11.3.1 Contingency measures

Contingency measures will be developed in consultation with the relevant authorities based on the results of investigations. Additional monitoring programs will also be implemented to measure the effectiveness of the contingency measures.

Investigations will subsequently be triggered where necessary and mitigation measures (measures to control/reduce/remove impacts) implemented where necessary. The type and detail of the investigation will be determined on a case-by-case basis in consultation with the CEMCC and relevant regulators.

In addition to the above, all data obtained from the surface water and groundwater monitoring programs is progressively reviewed and a trend analysis undertaken to aid in the detection of any gradual changes in water quality. The results of these analyses are reported in the annual review (Section 12.1).

11.3.2 Compensatory water supply

In accordance with Condition B34 of the Consent, should CGO directly and adversely impact any person's basic landholder water rights through its operations (as defined in the WM Act), a compensatory water supply will be provided. The compensatory water source should provide a long-term water source equivalent to the loss attributable to the CGO. Equivalent water supply will be provided (at least on an interim basis) as soon as loss is identified, unless otherwise agreed with the landholder.

Within 3 months of receiving a written complaint claiming direct and adverse impacts from the development, CGO will investigate the claim in consultation with DCCEEW Water and provide an investigation report to the landowner and Planning Secretary. The compensatory water supply will be agreed to with the affected landholder in consultation with DCCEEW Water, DPHI and approved by the Planning Secretary.

Should CGO and the landholder not reach an agreement regarding the compensatory measures to be implemented, or there is a dispute about the implementation of the measures, either party may then refer the matter to the Planning Secretary for resolution.

12 Reviewing and reporting

12.1 Annual review

Condition D11 of SSD-42917792 requires an annual review to be prepared that reviews the performance of operations against the requirements of the WMP, provides an overview of environmental management actions taken and summarises the monitoring results over the 12-month reporting period. The annual review typically includes the following elements specific to water management:

- any amendments to licensing or statutory approvals
- a summary of complaints or incidents relating to the performance of the water management system over the reporting period
- a summary of the monitoring results collected over the reporting period and assessment against any relevant performance measures/criteria
- an evaluation of any trends in the monitoring results occurring over the life of the operation
- annual update of site water balance
- a summary of water extracted from the site (direct and indirect), including water taken under each WAL
- any non-compliance recorded during the reporting period and the actions taken to ensure compliance
- identification of any discrepancies between the predicted and actual impacts of operations and an analysis of the potential cause of any significant discrepancies
- a summary of management actions to be implemented over the next year to improve the environmental performance of the site.

Annual reviews are required to be submitted to the DPHI by the end of March each year and are publicly available on Evolution's website (www.evolutionmining.com.au).

12.2 Annual return

Condition R1 of EPL 11912 requires an Annual Return to be prepared that details compliance with the requirements of the licence, including a summary of environmental monitoring and any complaints. The Annual Return must be in an approved form and provided to the EPA within 60 days of the end of the reporting period.

12.3 Monitoring reporting

All surface water and groundwater data collected in accordance with EPL 11912 monitoring requirements will be publicly available on Evolution's website (www.evolutionmining.com.au) in accordance with the POEO Act and condition D15(vii) of SSD-42917792. Information in this management plan will be kept up to date to the satisfaction of the Planning Secretary.

12.4 Incident reporting

Condition D8 of SSD-42917792 requires the DPHI to be notified within 24 hours of becoming aware of an incident via the NSW planning portal (Major Projects). An incident is defined by SSD-42917792 as "an occurrence or set of circumstances that causes or threatens to cause material harm to the environment, and which may or may not be or cause a non-compliance". The notification must address details of the incident including:

- date, time and location
- description of what occurred and why it has been classified as an incident
- description of immediate steps taken in relation to the incident
- identify a contact person for further communication.

Within seven days of the incident notification (or as otherwise agreed by the Planning Secretary), a subsequent incident report is required by SSD-42917792 to be submitted via the NSW planning portal (Major Projects) that:

- identifies how the incident was detected
- identifies when CGO became aware of the incident
- identifies any actual or potential non-compliance with the conditions of SSD-42917792
- identifies further action(s) that will be taken in relation to the incident
- a summary of the incident
- outcomes of an incident investigation, including identification of the cause of the incident
- details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence, including the period for implementing any corrective and/or preventative actions
- details of any communication with other stakeholders regarding the incident.

In accordance with the requirements of EPL 11912 and the POEO Act, any employee or contractor must notify the EPA and any relevant agencies of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident. Notifications must be made by telephoning the Environmental Line service on 131 555. Written details of the notification to the EPA must be provided within seven days of the incident.

12.5 Non-compliance reporting

Condition D10 of SSD-42917792 requires the DPHI to be notified within seven days of becoming aware of a non-compliance. A non-compliance is defined by SSD-42917792 as an occurrence, set of circumstances or development that is in breach of the consent conditions. The notification must address details of the non-compliance including:

- identify the development (including the development application number and name)
- set out the condition of SSD-42917792 that the development is non-compliant with and why it does not comply
- the reasons for the non-compliance (if known)
- what actions have been undertaken, or will be undertaken, and when, to address the non-compliance.

All non-compliance notifications must be submitted via the NSW planning portal (Major Projects). A non-compliance that has been notified as an incident does not need to also be notified as a non-compliance.

12.6 Complaints

In accordance with the condition M5 of EPL 11912, a record of all complaints made to CGO or any employee or agent of CGO in relation to pollution arising from any activity to which EPL 11912 applies must be kept. The record must include details of the following:

- the date and time of the complaint
- the method by which the complaint was made
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a not to that effect\
- the nature of the complaint
- the action taken in relation to the complaint, including any follow-up contact with the complainant
- if no action was taken, the reasons why no action was taken.

The record of a complaint must be kept for at least four years after the complaint was made. The record must be produced to any authorised officer of the EPA who asks to see them.

12.7 Community consultation

A CEMCC is established, and CGO will continue to provide opportunities for members of the community to attend CEMCC meetings to discuss specific issues relevant to them. This will be achieved by landholders making a request to the CEMCC regarding a particular issue, or by the landowner registering a complaint in the complaints register. Landowners who register complaints may be invited to join discussion of the issue at the next CEMCC meeting. Items of discussion at these meetings will include mine progress, reporting on environmental monitoring, complaints, rehabilitation activities and any environmental assessments undertaken.

If dispute resolution is necessary, the resolution process will be one of informed discussion involving the complainant and CGO. CGO may also refer the dispute (with the complainant's agreement) to CGO's CEMCC for mediation. If the complainant is still dissatisfied, the matter may be referred to the DPHI for consideration of further measures. Every effort will be made to ensure that concerns are addressed in a manner that results in a mutually acceptable outcome.

12.8 Independent environmental audit

Every three years, an independent environmental audit of CGO is undertaken in accordance with condition D12 of SSD-42917792 and the requirements of the Independent Audit Post Approval Requirements (DPIE 2020b). The audit includes assessment of the environmental performance of CGO, including compliance with the regulatory requirements details in Chapter 3 and will provide recommendations for any measures or actions to improve the environmental performance of the mine. Within two months of completion, the final audit report is submitted to the DPHI.

12.9 Water Management Plan review

In accordance with Condition D6 of SSD-42917792, the WMP will be reviewed, and if necessary revised, within three months of:

- the annual review of the environmental risk assessment under condition D1 of SSD-42917792
- the submission of an incident report under condition D8 of SSD-42917792 (refer Section 12.4)
- the submission of an annual review under condition D11 of SSD-42917792 (refer Section 12.1)
- the submission of an independent environmental audit under condition D12 of SSD-42917792 (refer Section 12.8)
- the approval of any modification of the condition of SSD-42917792 (unless the conditions require otherwise), or
- notification of a change in development phase under Condition A10 of SSD-42917792.

Review of the WMP is also required to either improve the environmental performance of the development, cater for a modification to SSD-42917792 or comply with a direction as per Condition D7 of SSD-42917792. Where this review leads to revisions of the WMP, then within six weeks of the review the revised document will be submitted to the Planning Secretary for approval. Updated versions of the approved WMP are made publicly available on Evolution's website (www.evolutionmining.com.au) once approved by the Planning Secretary.

12.10 Site water balance review

The site water balance will be reviewed annually and updated as appropriate and/or when additional or revised information becomes available with the progression of mining operations. Results of the site water balance will be reported in the annual review.

12.11 Groundwater model validation

If there are no significant changes to the mining operations and/or there are no significant variance from groundwater predictions identified through the groundwater monitoring program (Section 10.4), the groundwater model will be validated at minimum every three years and independently peer reviewed, in accordance with condition B39(f)(iii) of SSD-42917792.

Where the annual review process identifies significant variances between monitored and predicted mine groundwater inflows (as described in the TARPs in Appendix E, Table E2.3) or that the hydrogeological model is underestimating drawdown in groundwater level (as detailed in Appendix E, Table E2.2), further investigation will be undertaken as set out in the TARPs. This may include early validation of the groundwater model.

A recalibration process may be required to be undertaken in consultation with an independent reviewer, dependent on the results of the validation process. Upon recalibration, updated model predictions of mining and post-mining drawdown will be done to determine whether any impacts on water supply works would require compensatory water to be provided for predicted future impacts following mine closure.

13 Document control

Quality control information, including WMP document version and authors, is summarised in Table 13.1.

Table 13.1: Document control information

Draft Version	Date	Authors	Comment
1	31 January 2025	T Davies, E Watts, K Bond, J Wearne, L Hammersley	Preliminary draft
2	3 March 2025	T Davies, E Watts, L Hammersley	
3	7 March 2025	T Davies, E Watts, L Hammersley	Final document provided for consultation
4	7 April 2025	T Davies, E Watts, L Hammersley	Updated following consultation with DCCEEW – Water Group
5	16 June 2025	T Davies, E Watts, L Hammersley	Updated following consultation with DPHI
Final Version	**Date**	**Authors**	**Comment**
1	16 June 2025	T Davies, E Watts, L Hammersley	n/a

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Abbreviations

Abbreviation	Definition
AEP	annual exceedance probability
AIP	Aquifer Interference Policy
ANC	acid neutralisation capacity
BOM	Bureau of Meteorology
CEMCC	Community Environmental Monitoring and Consultative Committee
CGO	Cowal Gold Operations
CIL	carbon-in-leach
CN_{WAD}	weak acid dissociable cyanide
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DGV	default guideline value
DPHI	NSW Department of Planning, Housing and Infrastructure
EC	electrical conductivity
EIS	environmental impact statement
EMM	EMM Consulting Pty Ltd
EMS	Environmental Management Strategy
EPL	environment protection licence
Evolution	Evolution Mining (Cowal) Pty Limited
EY	exceedance per year
FTE	full-time equivalent
GDE	groundwater-dependent ecosystem
GIA	Groundwater Impact Assessment
ha	hectare
HEVAE	high ecological values aquatic ecosystems
ICDS	internal catchment drainage system
IFD	Intensity-Frequency-Duration
IWL	integrated waste landform
km	kilometre
km^2	square kilometre
L/s	litre per second

Abbreviation	Definition
LGO	low grade ore
LOR	limit of reporting
LPB	lake protection bund
m	metre
m/s	metre per second
mAHD	metres Australian Height Datum
mg CN_{WAD}/L	milligrams weak acid dissociable cyanide per litre
mg/L	milligram per litre
ML/day	megalitre per day
ML/year	megalitre per year
mm	millimetre
mm/month	millimetre per month
Mt	million tonnes
Mtpa	million tonnes per annum
NAF	non-acid forming
NATA	National Association of Testing Authorities
NSW	New South Wales
NTU	nephelometric turbidity units
PAF	potentially acid forming
PMF	probable maximum flood
POEO Act	NSW *Protection of the Environment Operations Act 1997*
ppm	parts per million
SD	standard drawings
SILO	Scientific Information for Landowners
SSD	State significant development
TDS	total dissolved solids
the Project	Cowal Gold Operations Open Pit Continuation Project
TSF	tailings storage facility
TSS	total suspended solids
UCDS	up-catchment diversion system
WAD	weak acid dissociable

Abbreviation	Definition
WAL	water access licence
WM Act	NSW *Water Management Act 2000*
WM Regulation	Water Management (General) Regulation 2018
WMP	water management plan
WRE	waste rock emplacement
WSP	water sharing plan
µS/cm	microSiemens per centimetre

Appendix A: Consultation on Water Management Plan

A.1 EPA consultation

DOC25/302359
11 April 2025

Environment Superintendent
Evolution Mining (Cowal) Pty Ltd
PO Box 210
WEST WYALONG NSW 2671

Via Major Projects Portal

EPA Advice - Water Management Plan – Cowal Gold Operations Open Pit Continuation – SSD-42917792

Dear Mr Thomas,

Thank you for consulting with the Environment Protection Authority (EPA) in regard to your request to review the Water Management Plan (WMP) for the Cowal Gold Operations Open Pit Continuation (SSD-42917792).

The EPA encourage the development of such plans to ensure that proponents and licensees have determined how they will meet their statutory obligations and environmental objectives. The EPA no longer approves or endorses these plans however, as our role is to set environmental objectives for environmental management, not to be involved in developing strategies such as this plan to achieve those objectives. As such, we have no specific comments on the plan.

It is recommended that you contact us directly should you identify any necessary changes to the premises' Environment Protection Licence (EPL) that may result from the proposed management plan updates.

If you have any questions, please contact Briohny Seaman directly by telephoning 131 555 or by electronic mail at info@epa.nsw.gov.au

Yours sincerely,

BRIOHNY SEAMAN
Unit Head – Operations
NSW Environment Protection Authority

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A.2 DCCEEW Consultation

NSW Department of Climate Change, Energy, the Environment and Water

Our ref: OUT25/3737

Mick Thomas
Evolution Mining
Email: mick.thomas@evolutionmining.com

3 April 2025

Subject: Cowal Gold Operations Open Pit Continuation (SSD-42917792) Water Management Plan

Dear Mick Thomas,

I refer to your request for advice sent on 10 March 2025 to the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group about the above matter.

NSW DCCEEW Water Group has reviewed the Water Management Plan and has recommendations regarding water supply, take and licensing, and water quality criteria. Please see **Attachment A** for more detail.

Should you have any further queries in relation to this submission please do not hesitate to contact the Water Assessments team at water.assessments@dpie.nsw.gov.au.

Yours sincerely,

Tim Baker
Senior Project Officer, Assessments, Knowledge Division
NSW Department of Climate Change, Energy, the Environment and Water

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150
Locked Bag 5022, Parramatta NSW 2124
https://www.nsw.gov.au/departments-and-agencies/dcceew

Attachment A

Detailed advice regarding the Cowal Gold Operations Open Pit Continuation (SSD-42917792) Water Management Plan

1.0 Water supply, take and licensing

1.1 Recommendation – pre-approval

The proponent should clarify the catchment runoff identified in the site water balance.

Explanation

The site water balance identifies a volume of catchment runoff but it is unclear where this is occurring. The proponent must consider this in terms of licensing requirements unless an exemption can be identified.

1.2 Recommendation – pre-approval

The proponent should confirm the maximum annual volume of groundwater take associated with the project due to inflows into the underground and open cut voids.

Explanation

The site water balance quantifies groundwater inflows into the open cut and underground mines as 1,066ML/year but section 9.3 quantifies inflows as 1,664ML/year in the Lachlan Fold Belt MDB Groundwater source with an additional 121ML/year in the Lachlan Alluvial Groundwater Source. Clarification is requested to ensure that sufficient entitlement is held in each impacted groundwater source to account for the maximum potential water take.

1.3 Recommendation – post approval

The proponent should review held Water Access Licences (WALs) to ensure all management zones, extraction limits and WALs are linked to relevant extraction points. Additionally, the proponent must ensure that relevant nomination of work dealing applications for WALs proposed to account for water take by the project have been completed prior to the water take occurring.

Explanation

Table 9.1 summarises all held WALs associated with the project, however it includes some inconsistencies with department records, including:

- WAL:14981 and WAL:42993 are incorrectly listed as being a part of the upstream of Lake Cargelligo Weir Management Zone; however, the NSW Water Register indicates these WALs are in the Management Zone "That part of the water source downstream of Lake Cargelligo Weir".
- WAL:1990, WAL:42993 and WAL:40424 are not currently linked to a nominated work or extraction point, until this occurs water take should not be occurring.
- WAL:31568 does not appear to nominate an extraction point represented by 70MW604511. A dealing to nominate this work should occur prior to water take occurring.

Table 9.2 notes that the Eastern Creek Saline Borefield will take a 90th percentile volume of 1,460ML/year, however, Table 9.1 indicates that the WAL associated with this bore field (WAL:36569) has only 300-unit shares. This should be reviewed to ensure sufficient entitlement is linked to each extraction point to account for maximum take from that extraction point.

The proponent should note that annual bore extraction limits applying to bores in the Eastern Saline Borefield (authorised by approval 70WA614933) may have operational impacts.

2.0 Water quality trigger criteria

2.1 Recommendation – pre-determination

Where data is insufficient at this stage to set site specific water quality trigger criteria, the proponent should set an interim water quality criteria based on a broad regional dataset and/or to the ANZG (2018) water quality guidelines.

Explanation

The proponent has indicated some site specific (e.g. Underground lake area) water quality trigger criteria need refining in the future when there is sufficient data to define these triggers:

- "Based on ANZG (2018) guidelines where insufficient site data (< 8 measurements above the LOR) exists for a particular area/water quality parameter. It is recommended these are updated as further data is acquired.
- Not enough data exists for the underground lake area bores (which commenced monitoring in late 2023) to form site-specific triggers. It is recommended that these are assigned a site-specific trigger after two full years of quarterly monitoring data."

Whilst this approach is reasonable and good practice in the interim it would better aid the project to set trigger criteria based on broad regional data and or the ANZG (2018) water quality guidelines to enable better assessment of any potential impacts.

End Attachment A

Appendix B: Lake Protection Bund Design and Verification Plan

OPEN PIT CONTINUATION WATER MANAGEMENT PLAN

LPB Design and Verification Plan

Author: Nathan Bourne | 31 January 2025

DOCUMENT CONTROL

Version	Date	Prepared by	Approved by (Name)	Approved by (Role)
Rev 0	31/01/2025	Nathan Bourne	Ian McConnell	Principal Geotechnical Engineer (OP)
Rev 1	2/06/2025	Study Execution Team	Jesse Mann	OPC Project Manager

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1. INTRODUCTION AND PURPOSE

The following plan has been prepared to satisfy the Cowal Golder Operations (CGO) Open Pit Continuation Development Consent (SSD-42917792) - Condition B39 (v).

The Condition states that a design and verification plan is required for the Lake Protection Bund (LPB).

The LPB is a mutually beneficial piece of civil infrastructure that will provide separation between Lake Cowal and operations at CGO.

Specifically, the condition of consent states that the plan must include:

- additional geochemical and geotechnical testing to verify the suitability of the clay and other materials to be used for construction of the LPB and other components of the lake isolation system;
- details of a quality assurance program to demonstrate that the LPB is constructed to meet its design specifications; and
- details of measures that would be implemented to minimise impacts on fish and other aquatic fauna species.

The purpose of this plan is to outline the design and verification processes that will be undertaken to finalise the design, verify the conformance of the design and construction is in accordance with the intent and function of the LPB. The focus is on robust and feasible activities/processes to ensure compliant, efficient and effective activities are undertaken.

2. DESIGN BACKGROUND

To accommodate continuation of open pit mining at CGO, including the establishment of new new pits E41, E46 and GRE and the cutback of the existing pit E42, a new LPB alignment, outside of the existing LPB alignment is required.

The function of the LPB is to:

- provide flood protection for the operational mine site:
- provide isolation of mining activities and surface water from within the disturbance footprint from Lake Cowal.

The LPB is shown in the **Figure 1** below and demonstrates the isolation of CGO from Lake Cowal.

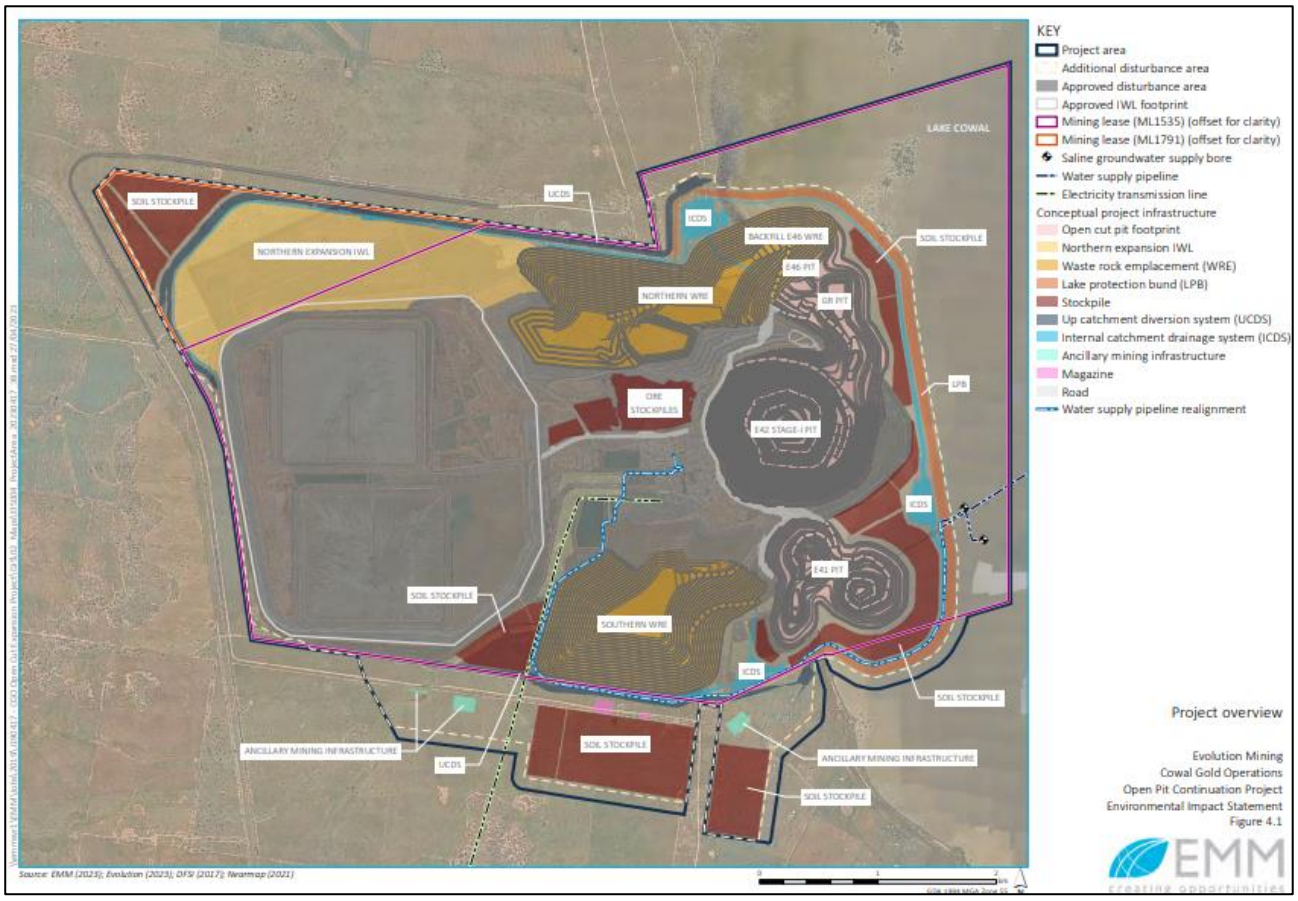


Figure 1 – OPC EIS Extract – Project Overview Figure

Lake Cowal is an ephemeral Lake and as documented in historical records has a regular pattern of receding to a point when the Lake is completely dry. The EIS documented these historical records and ideally, as documented within the EIS there is a preference to construct the Lake during the receding cycle but this is unpredictable and not a sustainable approach to maintaining operations and employment so contingencies for wet weather construction were documented throughout the EIS and subsequently approved within the Development Consent.

At the time the EIS was submitted the design was at a schematic level of detail of definition. The design was developed by SLR and subsequently refined by EDG during the EIS and approval period of the project.

Refer to Appendix 1 for a summary of the designs developed during the EIS and approval phase of the project.

3. DEVELOPMENT CONSENT – DESIGN HEIGHT

The OPC was approved in December 2024 and since then the team have been putting together the compliance documentation to enable execution of the OPC.

Part of the execution readiness program is to appoint a Contractor and Consultant to finalise the design for the Lake Protection Bund within approval parameters stated within the Development Consent that are summarised in the table below.

The LPB will be built over three (3) stages as summarised below:

- **Stage 1 – Construction of the temporary isolation bund** (Refer to Appendix 2 for a section of the current design)
- **Stage 2 – Construction to the Operational Heights** (Refer to Appendix 2 for a section of the current design and Table below for heights)
- **Stage 3 – Construction to the PMF Commitment** (Refer to Table below for PMF height)

The heights of Stages 2 & 3 were documented in RFI 6, 7 & 8 to DPHI. For ease of reference, we have included the extracts in the figures below

2. LPB Height - what height (mAHD) is required to achieve (inclusive of any freeboard):
    a. 0.1% AEP initially, and then
    b. PMF for final landform

Simulated peak water levels in Lake Cowal, as outlined in the ATC Williams Report (ATCW 2024) were provided as Appendix L to the Submissions Report (EMM 2024), and are presented in **Table 1** below.

Table 1 - Simulated peak water levels in Lake Cowal

Event	Simulated peak water level (mAHD)
1% Annual Exceedance Probability (AEP) flood level	208.53
0.1% AEP flood level	209.27
Probable Maximum Flood (PMF) level	210.54

The recommendation for the Lake Protection Bund (LPB) height in the ATC Williams Surface Water Assessment (ATCW 2023) provided as Appendix G to the EIS, is to consider a 1% AEP flood Level with a 0.5m provision for freeboard.

CGO is proposing to go beyond the ATC recommendation and have designed the LPB to eventually accommodate the PMF flood level with a 0.3 m consideration for freeboard.

For the purposes of the Project, and based on the above, the proposed initial operational LBP design criteria and final mine closure landform LPB design parameters are detailed in **Table 2** and **Table 3** respectively.

Table 2 – Initial operational LPB design parameters

Aspect	Design criteria
0.1% AEP flood level	209.27 mAHD
Freeboard provision	350 mm
Total proposed height	209.64 mAHD

Table 3 – Final landform LPB design parameters

Aspect	Design criteria
Probable Maximum Flood (PMF) level	210.54 mAHD
Freeboard provision	350 mm
Total proposed height	210.90 mAHD

Figure 2 – Development Consent RFI 6,7 & 8 - Evolution Response – LPB Heights

4. DESIGN & GEOTECH VERIFCATION

The LPB detailed design is currently being updated to incorporate the outcomes of additional geotechnical investigations and revised hydrological modelling. This process ensures that the final design reflects the most up-to-date understanding of site conditions and flood risk, and is aligned with current best practice and regulatory expectations.

A comprehensive Basis of Design is being developed to guide and validate the final design. This includes flood level assessments, slope stability criteria, seismic loading analysis, and embankment failure risk evaluation. The design is being benchmarked against key national and state guidelines including the ANCOLD Guidelines, NSW Dam Safety Act and Regulations, Australian Rainfall and Runoff (2024), and site-specific water management plans.

A core component of the design approach is the staged acquisition of geotechnical data.

As Lake Cowal naturally recedes and access to the lakebed becomes available, a full geotechnical investigation program will be undertaken by a qualified geotechnical engineering team. This will include targeted test pitting, in-situ testing, and laboratory analysis to confirm subgrade conditions, material properties, and embankment performance parameters.

This work is fundamental to underpinning the final design with a high level of geotechnical confidence.

The geotechnical results will directly inform final design elements including:

- Embankment cross-sections and construction methodology
- Stability modelling and settlement predictions
- Erosion and drainage controls
- Foundation preparation and treatment

Should the results of this geotechnical program identify conditions or parameters that deviate materially from the current design assumptions, the design will be revised accordingly. This may include updates to the bund alignment, construction materials, crest levels, or slope protection measures to ensure long-term structural integrity and compliance with safety and performance requirements.

This staged approach provides assurance to regulators that the final design will be:

- Based on verified, site-specific conditions, not assumptions
- Reviewed and certified by appropriately qualified engineers
- Updated iteratively to reflect progressive risk resolution

The final LPB design will be formally certified by a suitably qualified and experienced engineer, in accordance with relevant engineering codes and regulatory expectations. This certified design package will incorporate all outcomes of the updated flood modelling, geotechnical investigations, safety assessments, and engineering analyses undertaken throughout the design development process.

The certified design will include:

- Detailed design drawings and specifications
- Verified basis of design documentation
- Geotechnical design summary and stability assessments
- Safety in Design (SiD) register and risk treatments
- Construction methodology and quality assurance requirements
- Operations, monitoring and contingency response protocols

The certification process will ensure that the LPB meets structural and functional performance requirements under both normal and extreme conditions, including flood events

5. MATERIALS TESTING AND SAMPLING

Two key aspects of materials test work underpin the suitability of construction materials for the LPB: **geochemical stability** and **engineering properties**, particularly for clay materials. The geochemical testing focuses on confirming that rock materials used in construction are non-acid forming and meet environmental management criteria, while the clay material assessment is directed at verifying the geotechnical performance characteristics required to meet the design intent.

Geochem:

A detailed geochemical testing program was developed and included in the LPB construction rock management strategy, as documented in the Environmental Impact Statement (EIS) and prepared by EMM (2023). This strategy is provided in **Appendix C.**

This testing regime has already been applied to the stockpiled rock material intended for use in construction. The findings of this assessment are presented in **Appendix D**. The results confirm that the stockpiled material meets the criteria established in the rock management strategy and has been classified as Non-Acid Forming (NAF).

Clay Materials:

For clay materials, it is proposed that these will be sourced from natural deposits within the lakebed, shoreline zone, or along the alignment of the UCDS. As such, the potential for leaching and erosion of these clays is considered to reflect the existing natural processes associated with seasonal wetting and drying cycles of the lake environment. Ongoing water quality monitoring, as required by development consent conditions and site management plans, will provide early identification and response to any potential water quality impacts from the placed materials.

With respect to engineering properties, Table 4.a outlines the target material parameters and associated sampling frequencies. These parameters—along with any additional requirements such as maximum particle size, Emerson Class (dispersity), and Atterberg Limits (plastic and liquid limits)—will be finalised and confirmed by the appointed design engineer during the final design phase. Material acceptance criteria will be clearly specified and verified through construction quality assurance testing to ensure compliance with design assumptions.

Table 5.a: Material property requirements and testing frequencies

Material	Description of material	Property and requirement	Testing frequency
Clay material	Low Permeability material	Permeability K<10^{-9}m/s	1 per 10,000m3
		Moisture condition +2% to -3% of OMC	Per placement lot
Rip Rap	Use graded durable rip-rap of igneous origin. Rip-rap should not be Single sized, but should be a well-graded mixture designed to ensure that all gaps between large rocks are filled with rock of progressively smaller size so that no significant voids occur in the Rip-rap blanket. Grading requirements are provided in table 1 below.	Grading – D_{50} 400mm	1 per 10,000m3
		Point load strength of 25MPa	1 per 10,000m3
		Dimension – length less than 2 times the breadth/thickness	1 per 10,000m3
Rock platform	Well graded hard rock with a low void ratio, low fines content.	Visual	Ongoing.
Geofabric		Per requirements for Strength Class D	1 Per 100,000m2

All material conformance will be managed on a lot based verification and release process. Material will be stockpiled, tested/result received then released for incorporation into the works.

6. CONSTRUCTION VERIFICATION

A quality management plan will be developed to ensure compliance with the design and specifications. It will include details of the inspection and testing process. The QMP will be developed in accordance with ASNZS ISO9001 – Quality Management Systems.

Some of the key requirements in the QMP include:

- Controlled stockpiles with a stockpile/zone release process.
- NATA certification of testing including sampling, grading, permeability, compaction, moisture condition and any other requirements. AS standard testing will apply. An onsite annex lab may be implemented on site to expedite testing result turn around.
- Engaging of an independent CPEng Geotechnical Engineer to verify that the materials, processes and as constructed works comply with the design.

Construction related testing to be carried out on a lot by lot basis utilising TfNSW QMS Q6 requirements in terms of lots and sampling/testing frequency. Foundations (including the base of the cut off key) will be inspected by a CPEng Geotechnical Engineer (engineer of record) to confirm the stripped/cut surface is adequate per the design. The CPEng Geotechnical Engineer will also undertake all onsite verification of material compliance, geotechnical conditions and ensure construction meets the requirements of the design.

CGO has extensive experience working with site won materials in the Integrated Waste Landform (IWL) lift process. The quality management plan for the IWL will be the basis for the LPB quality management plan. We have achieved the required permeability using site won materials moisture conditioned and compacted to similar specifications.

7. PROTECTION OF AQUATIC FAUNA

Three primary construction activities associated with the LPB have the potential to impact fish and other aquatic fauna:

- Placement of rock material into the lake to construct the sheet piling platform, along with installation of sheet piles
- Dewatering of water trapped behind the sheet piling during bund construction

The placement of rock will occur in areas where water depth may exceed safe working limits for personnel, necessitating placement from the bank or from floating plant. The physical disturbance and water displacement associated with this activity are expected to cause localised turbidity and noise, which will likely result in aquatic fauna temporarily vacating the immediate area.

These impacts are anticipated to be short-term and localised in nature and have been discussed at length throughout the EIS process with NSW fisheries.

The following are the key activities that will be undertaken to minimise the impact on fish and aquatic fauna.

- Pre works aquatic ecology inspection.
- Any located fauna to be relocated where possible and practical to an environment of similar nature (e.g. North or South of the works zone).
- Any fauna encountered to be removed from the works zone by a suitably qualified and experienced person (ecologist or trained person) when safe access and water depth is achieved (<1.2m). This will be a progressive task completed during the dewatering phase.
- Indigenous aquatic species will be relocated and exotic species will be euthanised.
- Dewatering operations will utilise inlet screens buried in a permeable media to minimise the potential for harm from pumping operations. This will be a method with a <3mm aperture size.
- Training of work crews in the process if fauna is encountered.
- Closure requirements include a geomorphology/fauna habitat creation per the rehabilitation management plan.

- Reporting of all activities will be undertaken including techniques used, details of the capture/release activities, documenting the type and number of fauna relocated.

There is potential for algal blooms due to increased temperatures and reduction of waterflows. If these are encountered an advanced fauna relocation program will be undertaken. A detailed Dewatering Management plan will be developed that will expand on the above mentioned.

8. REFERENCES

EMM 2023, *CGO Open Cut Expansion Project: Lake Protection Bund Construction Rock Management Strategy*.

EMM 2024, *CGO Open Cut Expansion Project: Lake Protection Bund Construction Rock Management* - geochemistry update memo.

Evolution Mining 2024, *Cowal Gold Operations Rehabilitation Management Plan*.

Evolution
MINING

Appendix C: Surface water data

C.1 Bland Creek inflow site, Sandy Creek inflow site, control transect, impact transect

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
Physicochemical parameters									
Electrical conductivity (µS/cm)	Count	7	8	149	27	27	184	30	182
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	201	28	66	67	61	61	64	68
	Median	694	374	385	254	257	374	266	375
	Maximum	940	505	867	821	819	888	836	871
pH	Count	7	7	136	14	14	170	17	169
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	7.39	7.25	7.0	7.1	7.13	6.49	7.07	6.65
	Median	8.02	7.69	8.1	7.8	7.825	7.975	7.73	8.07
	Maximum	8.41	8.01	8.9	8.5	8.49	9.15	8.56	9.24
Total suspended solids (mg/L)	Count	7	7	136	14	14	171	17	169
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	13	55	5	13	14	5	15	4
	Median	126	101	64	65	59	63	61	67
	Maximum	129	801	289	171	218	448	182	254

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
Turbidity (NTU)	Count	7	7	14	14	14	14	16	15
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	41	59	27	26	28	58	57	53
	Median	150	102	177	177	178	181	174	177
	Maximum	234	840	479	466	461	435	436	432
Nutrients									
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	61	38	74	69	73	86	45	67
	Median	179	107	123	124	124	124	121	125
	Maximum	206	131	206	206	212	212	212	212
Carbonate alkalinity as $CaCO_3$ (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	86%	100%	85%	92%	92%	85%	85%	85%
	Minimum	<1	<1	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1	<1	<1
	Maximum	8	<1	8	9	8	12	12	8
	Count	7	7	13	13	13	13	13	13

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1	<1	<1
	Maximum	<1	<1	<1	<1	<1	<1	<1	<1
Total alkalinity as $CaCO_3$ (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	61	38	74	69	73	86	45	67
	Median	179	107	123	124	124	124	121	125
	Maximum	214	131	214	213	212	220	219	219
Calcium (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	100%	0%	0%	0%	100%	0%	0%	0%
	Minimum	<0.0001	4	11	11	<0.0001	12	11	11
	Median	<0.0001	18	20	21	<0.0001	21	22	22
	Maximum	<0.0001	26	36	36	<0.0001	34	35	33
Chloride (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	21	14	29	29	29	28	29	28

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Median	106	57	50	46	45	39	38	39
	Maximum	193	71	144	147	152	136	136	139
Magnesium (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	5	3	7	7	7	7	7	7
	Median	20	9	10	10	10	10	10	11
	Maximum	37	14	23	24	24	23	24	23
Potassium (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	10	10	7	7	7	10	9	9
	Median	14	13	14	14	13	14	15	15
	Maximum	25	17	25	25	25	25	26	25
Sodium (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	16	13	21	21	21	23	22	21
	Median	68	38	35	36	35	33	32	33
	Maximum	99	59	95	95	97	99	99	99
Sulfate (mg/L)	Count	7	7	19	19	19	19	21	19

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Samples < LOR	0%	14%	11%	11%	11%	0%	0%	11%
	Minimum	3	<1	<1	<1	<1	3	4	<1
	Median	12	7	7	8	7	8	9	8
	Maximum	25	14	14	15	15	13	18	14
Nutrients									
Ammonia (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	0%	0%	8%	8%	8%	7%	7%
	Minimum	0.02	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.09	0.02	0.03	0.04	0.03	0.05	0.03	0.05
	Maximum	0.4	0.32	0.15	0.15	0.16	0.29	0.67	0.23
Nitrate (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	57%	8%	8%	8%	8%	13%	7%
	Minimum	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.18	<0.01	0.31	0.32	0.31	0.46	0.49	0.48
	Maximum	1.01	0.78	1.75	8.64	1.40	8.70	3.97	1.36
Nitrite (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	43%	86%	77%	69%	77%	85%	77%	77%

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Minimum	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.02	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	0.05	0.01	0.11	0.11	0.11	0.02	0.02	0.02
Nitrate + nitrite (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	57%	8%	8%	8%	8%	13%	7%
	Minimum	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.18	<0.01	0.31	0.32	0.31	0.46	0.49	0.48
	Maximum	1.06	0.78	1.77	8.66	1.42	8.70	3.97	1.36
Reactive phosphorus (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	14%	71%	15%	15%	15%	8%	14%	14%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.06	<0.01	0.06	0.07	0.06	0.09	0.09	0.09
	Maximum	0.09	0.05	0.22	0.23	0.23	0.16	0.16	0.16
Total phosphorus (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.09	0.15	0.09	0.05	0.12	0.12	0.13	0.16
	Median	0.28	0.24	0.28	0.29	0.29	0.32	0.30	0.32
	Maximum	0.71	0.80	0.47	0.46	0.54	1.05	0.85	1.12

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
Metals									
Antimony dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony total (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	0%	71%	8%	8%	8%	0%	8%	0%
	Minimum	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001
	Median	0.002	<0.001	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.002	0.004	0.004	0.004	0.003	0.003	0.007
Arsenic total (mg/L)	Count	7	7	13	13	13	13	13	14

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.001	0.002	0.002	0.002	0.002	0.001	0.002
	Median	0.003	0.004	0.003	0.003	0.003	0.004	0.003	0.004
	Maximum	0.004	0.005	0.006	0.006	0.006	0.006	0.006	0.006
Cadmium dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium total (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	0%	57%	38%	31%	23%	23%	23%	23%
	Minimum	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Median	0.002	<0.001	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.004	0.003	0.003	0.003	0.003	0.004	0.004	0.004
Copper total (mg/L)	Count	7	7	13	13	13	13	14	13
	Samples < LOR	0%	14%	8%	8%	8%	8%	14%	8%
	Minimum	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.004	0.005	0.004	0.006	0.006	0.006	0.0055	0.004
	Maximum	0.01	0.014	0.012	0.012	0.012	0.012	0.01	0.012
Iron dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	86%	71%	85%	85%	85%	85%	77%	85%
	Minimum	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05
	Median	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05
	Maximum	0.43	2.09	0.14	0.13	0.13	0.1	0.09	0.11
Iron total (mg/L)	Count	7	7	13	13	13	13	15	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	1.05	0.74	0.19	0.71	0.43	0.59	0.41	0.77
	Median	3.56	6	3.52	7.17	6.57	5	7	5
	Maximum	13.3	20.1	19.9	18.7	19.4	20.8	14	19.8
Lead dissolved (mg/L)	Count	7	7	13	13	13	13	13	13

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001
Lead total (mg/L)	Count	7	7	13	13	13	13	13	14
	Samples < LOR	14%	14%	15%	15%	15%	15%	15%	21%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.003	0.002	0.003	0.003	0.002	0.003	0.0025
	Maximum	0.004	0.014	0.010	0.009	0.01	0.01	0.008	0.009
Mercury dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury total (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	57%	86%	69%	69%	69%	62%	62%	77%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.001	0.005	0.003	0.002	0.003	0.002	0.002
Molybdenum total (mg/L)	Count	7	7	13	13	13	13	13	14
	Samples < LOR	43%	100%	69%	62%	62%	62%	69%	57%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	<0.001	0.002	0.002	0.002	0.002	0.002	0.002
Nickel dissolved (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.001	0.002	0.002	0.002	0.001	0.002	0.001
	Median	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.002	0.003	0.004	0.004	0.003	0.003	0.004
Nickel total (mg/L)	Count	7	7	13	13	13	13	13	14

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.003	0.002	0.002	0.003	0.003	0.003	0.002	0.003
	Median	0.006	0.008	0.005	0.008	0.008	0.006	0.006	0.0065
	Maximum	0.011	0.015	0.016	0.014	0.015	0.015	0.012	0.015
Selenium dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium total (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc dissolved (mg/L)	Count	7	7	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	92%	92%	92%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Analyte	Parameter	Bland Creek inflow site	Sandy Creek inflow site	Control transects			Impact transects		
				C1	C2	C3	P1	P2	P3
	Median	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Maximum	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.005	0.006
Zinc total (mg/L)	Count	7	7	13	13	13	13	14	14
	Samples < LOR	29%	43%	46%	38%	46%	23%	36%	36%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	0.006	0.021	0.007	0.019	0.012	0.012	0.012	0.0105
	Maximum	0.026	0.044	0.028	0.028	0.028	0.031	0.024	0.029

C.2 Bland Creek transect

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
Physicochemical parameters							
Electrical conductivity (µS/cm)	Count	27	27	27	27	27	28
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	45	58	66	59	60	43
	Median	251	244	241	243	242	231
	Maximum	826	829	819	818	821	859
pH	Count	14	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Minimum	7.07	7.05	7.2	7.17	7.17	7.01
	Median	7.78	7.745	7.745	7.78	7.81	7.595
	Maximum	8.49	8.57	8.57	8.39	8.4	8.36
Total suspended solids (mg/L)	Count	14	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	18	14	35	15	16	13
	Median	55	58	67	75	68	56
	Maximum	143	171	122	146	126	210
Turbidity (NTU)	Count	14	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	42	38	74	71	29	17
	Median	178	172	182	166	146	158
	Maximum	420	416	435	438	430	283
Major ions							
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	66	65	67	63	69	59
	Median	126	119	118	123	126	126
	Maximum	218	218	216	211	210	208
	Count	13	13	13	13	13	13

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
Carbonate alkalinity as $CaCO_3$ (mg/L)	Samples < LOR	92%	0%	92%	85%	85%	92%
	Minimum	<1	1	<1	<1	<1	<1
	Median	<1	1	<1	<1	<1	<1
	Maximum	9	12	10	6	6	7
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	0%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1
	Maximum	<1	<1	<1	<1	<1	<1
Total alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	66	65	67	63	69	59
	Median	126	119	118	123	126	126
	Maximum	218	218	216	215	214	215
Calcium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chloride (mg/L)	Count	13	13	13	13	13	13

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	28	28	29	30	27	22
	Median	40	39	41	46	50	76
	Maximum	138	137	136	135	136	148
Magnesium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	7	7	6	7	7	6
	Median	11	10	10	11	13	16
	Maximum	24	21	25	22	22	25
Potassium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	9	8	8	8	8	8
	Median	14	14	15	14	14	14
	Maximum	25	25	24	25	26	26
Sodium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	21	20	24	24	20	18
	Median	34	32	34	37	38	44
	Maximum	104	95	96	96	97	103
Sulfate (mg/L)	Count	18	19	19	19	19	19

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Samples < LOR	11%	11%	0%	0%	11%	11%
	Minimum	<1	<1	3	3	<1	<1
	Median	8	7	8	8	8	10
	Maximum	13	13	13	13	13	16
Nutrients							
Ammonia (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	23%	0%	8%	8%
	Minimum	0.01	0.02	<0.01	0.01	<0.01	<0.01
	Median	0.04	0.03	0.04	0.03	0.03	0.05
	Maximum	0.21	0.18	0.22	0.13	0.23	0.5
Nitrate (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	23%	15%	15%	8%	8%	8%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.46	0.45	0.30	0.38	0.52	0.28
	Maximum	1.32	12.10	4.17	1.22	3.32	2.41
Nitrite (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	85%	77%	62%	77%	77%	69%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	0.02	0.02	0.03	0.08	0.10	0.04

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
Nitrate + nitrite (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	23%	8%	8%	8%	8%	8%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.46	0.45	0.30	0.38	0.52	0.28
	Maximum	1.32	12.10	4.18	1.23	3.32	2.45
Reactive phosphorus (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	15%	8%	8%	15%	8%	8%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.09	0.08	0.08	0.08	0.07	0.06
	Maximum	0.16	0.15	0.17	0.18	0.21	0.14
Total phosphorus (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.12	0.15	0.11	0.06	0.10	0.09
	Median	0.30	0.33	0.28	0.30	0.30	0.27
	Maximum	0.52	0.51	0.44	0.45	0.48	0.44
Metals							
Antimony dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	8%	0%	8%	0%
	Minimum	0.001	0.001	0.001	0.001	<0.001	0.001
	Median	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.004	0.004	0.006	0.004	0.004	0.005
Arsenic total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.002	0.001
	Median	0.003	0.004	0.003	0.003	0.003	0.003
	Maximum	0.005	0.005	0.006	0.006	0.005	0.005
Cadmium dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	92%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001
Cadmium total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	31%	31%	31%	15%	31%	31%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.004	0.003	0.003	0.006	0.003	0.004
Copper total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	8%	0%	8%	8%
	Minimum	0.001	0.001	<0.001	0.001	<0.001	<0.001
	Median	0.004	0.005	0.006	0.005	0.004	0.005
	Maximum	0.008	0.009	0.011	0.012	0.01	0.014
Iron dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	85%	85%	0%	77%	85%	69%
	Minimum	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Median	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	0.11	0.12	0.13	0.17	0.16	0.46
Iron total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.72	0.12	0.29	0.39	0.42	0.63
	Median	1.99	4.01	7.85	4.94	3.07	5.25
	Maximum	12.5	14.6	18	20.5	16.6	11.7
Lead dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	8%	8%	8%	0%	15%	15%
	Minimum	<0.001	<0.001	0.001	0.001	<0.001	<0.001
	Median	0.003	0.003	0.004	0.003	0.002	0.003
	Maximum	0.006	0.008	0.009	0.009	0.008	0.004
Mercury dissolved (mg/L)	Count	12	12	12	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	62%	69%	69%	54%	69%	69%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.004	0.01	0.003	0.003	0.003	0.003
Molybdenum total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	54%	54%	69%	54%	54%	54%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	0.002	0.002	0.002	0.002
Nickel dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	8%	0%	0%	0%	0%
	Minimum	0.002	<0.001	0.002	0.002	0.001	0.002
	Median	0.002	0.002	0.002	0.002	0.002	0.002

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	0.003	0.003	0.005	0.003	0.003	0.003
Nickel total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.003	0.002	0.003	0.003	0.002	0.003
	Median	0.005	0.006	0.008	0.006	0.006	0.006
	Maximum	0.01	0.012	0.014	0.016	0.013	0.01
Selenium dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Analyte	Parameter	Bland Creek transects					
		B1	B2	B3	B4	B5	B6
	Maximum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	46%	38%	38%	38%	46%	31%
	Minimum	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
	Median	0.008	0.007	0.014	0.01	0.008	0.009
	Maximum	0.016	0.024	0.032	0.03	0.023	0.018

C.3 East shore transect

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
Physicochemical parameters						
Electrical conductivity (µS/cm)	Count	27	27	27	26	27
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	68	61	51	66	54
	Median	244	254	259	241	237
	Maximum	836	818	813	815	818
pH	Count	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	7.16	7.19	6.73	7.24	7.38

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	7.855	7.86	7.805	7.81	7.81
	Maximum	8.7	8.55	8.46	8.49	8.46
Total suspended solids (mg/L)	Count	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	12	18	15	18	16
	Median	72	73	71	71	56
	Maximum	205	140	170	153	227
Turbidity (NTU)	Count	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	63	51	34	8	25
	Median	203	199	188	157	155
	Maximum	436	444	362	448	469
Major ions						
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	60	60	70	72	67
	Median	123	124	121	124	127
	Maximum	212	209	206	204	204
Carbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13
	Samples < LOR	85%	85%	85%	85%	85%

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Minimum	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1
	Maximum	16	10	8	9	8
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1
	Maximum	<1	<1	<1	<1	<1

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
Total alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	60	60	70	72	67
	Median	123	124	121	124	127
	Maximum	218	215	213	211	212
Calcium (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	0%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	11
	Median	<0.0001	<0.0001	<0.0001	<0.0001	21
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	33
Chloride (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	29	31	30	26	28
	Median	41	40	42	47	46
	Maximum	150	151	147	145	142
Magnesium (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	7	7	7	7	7
	Median	10	11	10	10	12
	Maximum	24	24	22	22	23

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
Potassium (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	8	8	8	8	8
	Median	14	14	14	15	15
	Maximum	25	25	25	25	26
Sodium (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	24	24	23	18	20
	Median	34	34	35	38	37
	Maximum	97	95	96	96	98
Sulfate (mg/L)	Count	19	19	19	19	19
	Samples < LOR	0%	0%	0%	11%	11%
	Minimum	4	4	2	<1	<1
	Median	8	8	8	8	7
	Maximum	14	14	14	15	14
Nutrients						
Ammonia (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	8%	15%	0%	8%
	Minimum	<0.01	<0.01	<0.01	0.01	<0.01
	Median	0.03	0.03	0.04	0.06	0.04

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Maximum	0.21	0.12	0.12	0.33	0.2
Nitrate (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	8%	8%	8%	8%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.41	0.40	0.30	0.24	0.23
	Maximum	1.02	4.40	3.28	1.72	3.73
Nitrite (mg/L)	Count	13	13	13	13	13
	Samples < LOR	62%	69%	85%	69%	69%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	0.02	0.05	0.12	0.09	0.08
Nitrate + nitrite (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	8%	8%	8%	8%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.42	0.41	0.30	0.26	0.25
	Maximum	1.04	4.41	3.28	1.75	3.76
Reactive phosphorus (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	8%	23%	15%	15%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.08	0.08	0.07	0.06	0.06

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Maximum	0.19	0.2	0.2	0.21	0.22
Total phosphorus (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	0.08	0.04	0.06	0.12	0.08
	Median	0.29	0.30	0.29	0.29	0.32
	Maximum	0.50	0.50	0.55	0.46	0.50
Metals						
Antimony dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	92%	100%	92%	92%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	0.002	<0.001	0.002	0.001
Antimony total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	92%	92%	85%	92%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	0.002	0.001	0.002	0.001
Arsenic dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	8%	8%	8%	8%
	Minimum	0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.004	0.004	0.004	0.004
Arsenic total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.002
	Median	0.003	0.003	0.003	0.003	0.003
	Maximum	0.005	0.006	0.006	0.006	0.005
Cadmium dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	31%	31%	38%	38%	38%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	0.002	0.002	0.002	0.002	0.002
	Maximum	0.004	0.003	0.006	0.007	0.004
Copper total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	8%	0%	8%	15%
	Minimum	<0.001	<0.001	0.001	<0.001	<0.001
	Median	0.006	0.004	0.004	0.004	0.005
	Maximum	0.012	0.013	0.012	0.011	0.012
Iron dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	92%	92%	85%	85%	85%
	Minimum	<0.05	<0.05	<0.05	<0.05	<0.05
	Median	<0.05	<0.05	<0.05	<0.05	<0.05
	Maximum	0.17	0.12	0.13	0.16	0.19
Iron total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	0.6	0.33	0.42	0.18	0.33
	Median	7.94	6.24	3.44	3	6
	Maximum	20.6	23.4	20.4	17.4	19
Lead dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	0.001	<0.001
Lead total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	8%	15%	15%	15%	23%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.003	0.003	0.002	0.003	0.003
	Maximum	0.009	0.01	0.009	0.009	0.009
Mercury dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	62%	69%	69%	62%	62%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	0.002	0.003	0.003
Molybdenum total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	46%	54%	62%	62%	54%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	0.002	0.002	0.002
Nickel dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.001	0.002	0.001
	Median	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.003	0.003	0.004	0.004
Nickel total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%
	Minimum	0.003	0.003	0.003	0.002	0.003
	Median	0.008	0.008	0.005	0.005	0.007
	Maximum	0.016	0.016	0.015	0.014	0.017
Selenium dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01

Analyte	Parameter	East shore transect				
		E1	E2	E3	E4	E5
	Median	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc dissolved (mg/L)	Count	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	<0.005	<0.005	<0.005	<0.005
	Maximum	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc total (mg/L)	Count	13	13	13	13	13
	Samples < LOR	31%	31%	46%	38%	31%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	0.015	0.011	0.005	0.007	0.012
	Maximum	0.033	0.032	0.028	0.026	0.027

C.4 Irrigation channel transect

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
Physicochemical parameters					
Electrical conductivity (µS/cm)	Count	26	26	0	26
	Samples < LOR	0%	0%	4800%	0%
	Minimum	62	58	60	58
	Median	224	167	389	222
	Maximum	845	844	0	841
pH	Count	13	13	0	13
	Samples < LOR	0%	0%	698%	0%
	Minimum	7.42	6.98	7.584	7.16
	Median	7.87	7.83	8.118	7.78
	Maximum	8.54	8.23	0	8.73
Total suspended solids (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	1100%	0%
	Minimum	20	8	44	13
	Median	60	51	98	101
	Maximum	324	115	0	166
Turbidity (NTU)	Count	13	13	0	13
	Samples < LOR	0%	0%	3290%	0%

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Minimum	31	24	61	40
	Median	178	137	254	164
	Maximum	497	408	0	479
Major ions					
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	7200%	0%
	Minimum	68	73	120	67
	Median	133	127	166	132
	Maximum	223	223	0	209
Carbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	12	13
	Samples < LOR	92%	100%	<1	85%
	Minimum	<1	<1	<1	<1
	Median	<1	<1	<1	<1
	Maximum	10	<1	0	17
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<1	100%
	Minimum	<1	<1	<1	<1
	Median	<1	<1	<1	<1
	Maximum	<1	<1	0	<1
Total alkalinity as $CaCO_3$ (mg/L)	Count	13	13	0	13

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Samples < LOR	0%	0%	7200%	0%
	Minimum	68	73	120	67
	Median	133	127	170	132
	Maximum	223	223	0	222
Calcium (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	1200%	0%
	Minimum	10	11	20	12
	Median	22	22	30	22
	Maximum	33	38	0	35
Chloride (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	2800%	0%
	Minimum	28	18	34	29
	Median	43	44	98	52
	Maximum	146	151	0	160
Magnesium (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	700%	0%
	Minimum	7	6	9	7
	Median	11	11	20	11
	Maximum	23	25	0	24
Potassium (mg/L)	Count	13	13	0	13

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Samples < LOR	0%	0%	1000%	0%
	Minimum	9	10	13	10
	Median	14	14	19	15
	Maximum	26	26	0	26
Sodium (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	2400%	0%
	Minimum	24	17	30	24
	Median	33	34	71	35
	Maximum	99	100	0	102
Sulfate (mg/L)	Count	19	18	0	19
	Samples < LOR	0%	0%	300%	0%
	Minimum	6	3	6	3
	Median	8	8	9	9
	Maximum	14	14	0	21
Nutrients					
Ammonia (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	1%	0%
	Minimum	**0.01**	**0.01**	**0.02**	**0.02**
	Median	**0.03**	**0.04**	**0.08**	**0.04**
	Maximum	**0.16**	**0.09**	**0**	**0.09**

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
Nitrate (mg/L)	Count	**13**	**13**	**2**	**13**
	Samples < LOR	**15%**	**8%**	**<0.01**	**15%**
	Minimum	<0.01	<0.01	0.03	<0.01
	Median	0.44	0.15	0.42	0.15
	Maximum	2.19	0.70	0.00	1.20
Nitrite (mg/L)	Count	13	13	10	13
	Samples < LOR	85%	85%	<0.01	69%
	Minimum	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	0.01	<0.01
	Maximum	0.01	0.02	0	0.02
Nitrate + nitrite (mg/L)	Count	13	13	2	13
	Samples < LOR	15%	8%	<0.01	15%
	Minimum	<0.01	<0.01	0.03	<0.01
	Median	0.44	0.15	0.43	0.15
	Maximum	2.19	0.72	0.00	1.22
Reactive phosphorus (mg/L)	Count	13	13	2	13
	Samples < LOR	15%	15%	<0.01	23%
	Minimum	<0.01	<0.01	0.04	<0.01
	Median	0.08	0.06	0.12	0.07
	Maximum	0.18	0.22	0	0.14

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
Total phosphorus (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	7%	0%
	Minimum	0.03	0.03	0.16	0.03
	Median	0.30	0.25	0.35	0.32
	Maximum	0.54	1.19	0.00	1.66
Metals					
Antimony dissolved (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.001	100%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	0	<0.001
Antimony total (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.001	100%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	**<0.001**	**<0.001**	**<0.001**	**<0.001**
	Maximum	<0.001	<0.001	0	<0.001
Arsenic dissolved (mg/L)	Count	**13**	**13**	**0**	**13**
	Samples < LOR	**8%**	**0%**	**0%**	**0%**
	Minimum	**<0.001**	**0.001**	**0.002**	**0.001**
	Median	**0.002**	**0.002**	**0.003**	**0.002**

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Maximum	0.004	0.003	0	0.004
Arsenic total (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002
	Median	0.003	0.003	0.0046	0.003
	Maximum	0.007	0.005	0	0.006
Cadmium dissolved (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.0001	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	0	<0.0001
Cadmium total (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.0001	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	0	<0.0001
Copper dissolved (mg/L)	Count	13	13	4	13
	Samples < LOR	23%	38%	<0.001	31%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.002	0.002	0.002

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Maximum	0.004	0.004	0	0.004
Copper total (mg/L)	Count	13	13	1	13
	Samples < LOR	8%	8%	<0.001	8%
	Minimum	<0.001	<0.001	0.002	<0.001
	Median	0.005	0.003	0.0076	0.004
	Maximum	0.015	0.008	0	0.012
Iron dissolved (mg/L)	Count	13	13	12	13
	Samples < LOR	92%	92%	<0.05	92%
	Minimum	<0.05	<0.05	<0.05	<0.05
	Median	<0.05	<0.05	<0.05	<0.05
	Maximum	0.12	0.12	0	0.13
Iron total (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	38%	0%
	Minimum	0.07	0.34	1.05	0.29
	Median	5	3	9	1
	Maximum	25.3	12.5	0	20.8
Lead dissolved (mg/L)	Count	**13**	**13**	**13**	**13**
	Samples < LOR	100%	100%	<0.001	100%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Maximum	<0.001	<0.001	0	<0.001
Lead total (mg/L)	Count	13	13	2	13
	Samples < LOR	8%	23%	<0.001	23%
	Minimum	<0.001	<0.001	0.001	<0.001
	Median	0.003	0.002	0.0042	0.002
	Maximum	0.011	0.007	0	0.01
Mercury dissolved (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.0001	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	0	<0.0001
Mercury total (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.0001	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	0	<0.0001
Molybdenum dissolved (mg/L)	Count	13	13	9	13
	Samples < LOR	62%	46%	<0.001	62%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	0.001	0.0016	<0.001

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Maximum	0.002	0.002	0	0.002
Molybdenum total (mg/L)	Count	13	13	7	13
	Samples < LOR	54%	54%	<0.001	54%
	Minimum	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	0.0016	<0.001
	Maximum	0.002	0.002	0	0.002
Nickel dissolved (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002
	Median	0.002	0.002	0.0026	0.002
	Maximum	0.003	0.003	0	0.008
Nickel total (mg/L)	Count	13	13	0	13
	Samples < LOR	0%	0%	0%	0%
	Minimum	0.002	0.002	0.003	0.002
	Median	0.007	0.004	0.0108	0.004
	Maximum	0.02	0.01	0	0.017
Selenium dissolved (mg/L)	Count	**13**	**13**	**13**	**13**
	Samples < LOR	**100%**	**100%**	**<0.01**	**100%**
	Minimum	**<0.01**	**<0.01**	**<0.01**	**<0.01**
	Median	<0.01	<0.01	<0.01	<0.01

Analyte	Parameter	Irrigation channel transect sites			
		I1	I2	I3	I4
	Maximum	<0.01	<0.01	0	<0.01
Selenium total (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.01	100%
	Minimum	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	0	<0.01
Zinc dissolved (mg/L)	Count	13	13	13	13
	Samples < LOR	100%	100%	<0.005	100%
	Minimum	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	<0.005	<0.005	<0.005
	Maximum	<0.005	<0.005	0	<0.005
Zinc total (mg/L)	Count	13	13	6	13
	Samples < LOR	38%	46%	<0.005	38%
	Minimum	<0.005	<0.005	<0.005	<0.005
	Median	0.012	0.011	0.0166	0.007
	Maximum	0.037	0.02	0	0.031

C.5 Lachlan floodway transect

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
Physicochemical parameters							
Electrical conductivity (µS/cm)	Count	181	27	27	27	27	27
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	41	45	47	58	56	49
	Median	378	257	257	255	258	256
	Maximum	912	843	850	863	858	870
pH	Count	168	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	7.07	7.15	7.07	7.06	7.12	7.18
	Median	8.04	7.83	7.805	7.775	7.815	7.84
	Maximum	9.1	8.5	8.24	8.42	8.2	8.71
Total suspended solids (mg/L)	Count	169	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	3	11	6	6	7	5
	Median	48	72	50	50	60	60
	Maximum	251	174	114	132	121	116
Turbidity (NTU)	Count	14	14	14	14	14	14
	Samples < LOR	0%	0%	0%	0%	0%	0%

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Minimum	33	32	31	19	23	11
	Median	134	156	126	128	146	149
	Maximum	410	409	399	381	385	382
Major ions							
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	70	74	73	70	73	72
	Median	125	131	138	129	123	130
	Maximum	213	222	220	227	219	221
Carbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	85%	92%	100%	92%	100%	85%
	Minimum	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1
	Maximum	12	10	<1	7	<1	15
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1
	Maximum	<1	<1	<1	<1	<1	<1
Total alkalinity as $CaCO_3$ (mg/L)	Count	13	13	13	13	13	13

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	70	74	73	70	73	72
	Median	125	131	138	129	123	130
	Maximum	219	222	220	227	219	227
Calcium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	12	12	12	12	13	12
	Median	22	22	23	23	21	22
	Maximum	37	35	34	34	34	32
Chloride (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	26	26	26	26	27	25
	Median	39	42	42	42	42	42
	Maximum	148	147	144	159	158	159
Magnesium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	7	8	7	7	8	7
	Median	10	11	11	11	11	11
	Maximum	24	23	23	24	24	23
Potassium (mg/L)	Count	13	13	13	13	13	13

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	10	10	10	10	10	10
	Median	14	15	14	14	14	14
	Maximum	26	25	25	25	26	26
Sodium (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	24	24	24	23	24	24
	Median	32	32	32	32	32	33
	Maximum	99	98	100	100	102	102
Sulfate (mg/L)	Count	19	19	19	19	19	19
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	4	4	3	4	3	4
	Median	8	8	8	7	8	7
	Maximum	14	14	17	14	15	15
Nutrients							
Ammonia (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	8%	0%	8%
	Minimum	0.02	0.02	0.01	<0.01	0.02	<0.01
	Median	0.04	0.04	0.04	0.04	0.03	0.03
	Maximum	0.18	0.13	0.12	0.13	0.11	0.09

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
Nitrate (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	15%	15%	15%	8%	23%	15%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.45	0.36	0.27	0.11	0.14	0.13
	Maximum	1.92	2.04	4.84	1.19	0.70	0.63
Nitrite (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	77%	85%	69%	69%	77%	69%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	0.02	0.02	0.02	0.02	0.02	0.03
Nitrate + nitrite (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	15%	15%	15%	8%	23%	15%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.45	0.36	0.27	0.11	0.14	0.13
	Maximum	1.92	2.04	4.86	1.21	0.71	0.64
Reactive phosphorus (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	8%	15%	15%	15%	15%	15%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.07	0.07	0.06	0.05	0.06	0.04
	Maximum	0.19	0.18	0.2	0.24	0.25	0.24

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
Total phosphorus (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.08	0.14	0.1	0.04	0.03	0.08
	Median	0.32	0.34	0.32	0.26	0.25	0.24
	Maximum	2.13	3.95	1.84	0.47	0.48	0.48
Metals							
Antimony dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	92%	100%	100%	92%	92%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	0.001	<0.001	<0.001	0.002	0.001
Antimony total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	85%	92%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	0.002	0.001
Arsenic dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.001	0.001	0.001	0.001	0.001	0.001
	Median	0.002	0.002	0.002	0.002	0.002	0.002

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Maximum	0.003	0.005	0.004	0.004	0.003	0.003
Arsenic total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.002	0.002
	Median	0.003	0.003	0.003	0.003	0.003	0.003
	Maximum	0.005	0.005	0.006	0.005	0.005	0.005
Cadmium dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	31%	31%	31%	38%	38%	46%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.002	0.002	0.001	0.002	0.002

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Maximum	0.004	0.004	0.004	0.004	0.003	0.004
Copper total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	15%	8%	15%	8%	15%	8%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.006	0.004	0.004	0.003	0.004	0.005
	Maximum	0.014	0.011	0.015	0.01	0.011	0.011
Iron dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	92%	92%	92%	92%	92%	92%
	Minimum	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Median	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Maximum	0.08	0.07	0.08	0.09	0.07	0.1
Iron total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.52	0.46	0.51	0.54	0.48	0.37
	Median	4	5	3	2	3	3
	Maximum	18.8	20.3	21	18	20.6	21.1
Lead dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lead total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	15%	8%	15%	15%	23%	15%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.008	0.008	0.008	0.008	0.008	0.008
Mercury dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	69%	62%	62%	62%	69%	54%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Maximum	0.002	0.002	0.002	0.002	0.003	0.002
Molybdenum total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	54%	54%	54%	62%	54%	54%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	0.002	0.002	0.002	0.002
Nickel dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.001	0.002	0.001	0.002	0.002	0.002
	Median	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.003	0.003	0.003	0.003	0.003
Nickel total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.003	0.002	0.003	0.002	0.002
	Median	0.006	0.005	0.005	0.004	0.005	0.005
	Maximum	0.013	0.016	0.02	0.014	0.014	0.017
Selenium dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Analyte	Parameter	Lachlan floodway transect					
		L1	L2	L3	L4	L5	L6
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc dissolved (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	92%	92%	100%	100%	100%	100%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Maximum	0.006	0.005	<0.005	<0.005	<0.005	<0.005
Zinc total (mg/L)	Count	13	13	13	13	13	13
	Samples < LOR	46%	23%	38%	69%	38%	46%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	0.009	0.007	0.006	<0.005	0.008	0.007
	Maximum	0.025	0.029	0.039	0.033	0.028	0.034

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Physicochemical parameters								
Electrical conductivity (µS/cm)	Count	27	26	19	12	10	10	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	45	49	50	51	45	45	282
	Median	258	213	270	209	210	175	282
	Maximum	858	758	499	411	419	470	282
pH	Count	14	13	10	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	7.1	7.16	6.97	6.94	7.63	7.59	7.54
	Median	7.88	7.89	7.82	7.745	7.75	7.94	7.54
	Maximum	8.8	8.74	8.15	7.98	8.06	8	7.54
Total suspended solids (mg/L)	Count	14	13	10	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	3	7	9	18	14	18	12
	Median	79	90	86	67	79	75	12
	Maximum	151	181	279	149	281	264	12
Turbidity (NTU)	Count	14	13	10	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	5	7	7	19	23	19	18

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
	Median	155	175	200	107	107	113	18
	Maximum	347	323	396	288	327	306	18
Major ions								
Bicarbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	69	69	76	76	89	82	72
	Median	134	133	123	116	117	123	72
	Maximum	213	203	149	143	144	145	72
Carbonate alkalinity as $CaCO_3$ (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	85%	92%	100%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1	<1
	Maximum	20	17	<1	<1	<1	<1	<1
Hydroxide alkalinity as $CaCO_3$ (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<1	<1	<1	<1	<1	<1	<1
	Median	<1	<1	<1	<1	<1	<1	<1
	Maximum	<1	<1	<1	<1	<1	<1	<1
Total alkalinity as $CaCO_3$ (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
	Minimum	69	69	76	76	89	82	72
	Median	134	133	123	116	117	123	72
	Maximum	225	203	149	143	144	145	72
Calcium (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	11	12	12	16	17	16	16
	Median	22	23	22	19	20	21	16
	Maximum	33	32	30	26	26	26	16
Chloride (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	28	28	28	29	28	29	34
	Median	45	42	38	38	41	37	34
	Maximum	157	113	52	50	50	50	34
Magnesium (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	7	7	8	9	8	8	10
	Median	12	12	10	11	12	11	10
	Maximum	23	23	14	13	13	13	10
Potassium (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
	Minimum	10	9	9	7	4	4	4
	Median	14	14	13	13	13	13	4
	Maximum	26	24	17	17	17	17	4
Sodium (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	24	24	24	26	25	25	23
	Median	34	35	33	28	29	30	23
	Maximum	102	75	44	35	35	35	23
Sulfate (mg/L)	Count	19	18	15	12	10	10	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	3	6	3	5	3	3	11
	Median	8	8	8	9	8	8	11
	Maximum	14	10	12	13	14	12	11
Nutrients								
Ammonia (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	33%	17%	20%	0%	0%
	Minimum	0.02	0.02	<0.01	<0.01	<0.01	0.01	0.01
	Median	0.04	0.03	0.02	0.02	0.02	0.02	0.01
	Maximum	0.18	0.19	0.06	0.08	0.05	0.12	0.01
Nitrate (mg/L)	Count	13	12	9	6	5	5	1

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
	Samples < LOR	23%	33%	56%	67%	80%	60%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.06	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	10.90	0.64	0.48	0.48	0.46	0.37	<0.01
Nitrite (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	92%	92%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Nitrate + nitrite (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	23%	33%	56%	67%	80%	60%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	0.07	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	10.90	0.64	0.48	0.48	0.46	0.37	<0.01
Reactive phosphorus (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	31%	42%	22%	33%	60%	60%	0%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
	Median	0.04	0.04	0.05	0.03	<0.01	<0.01	0.03
	Maximum	0.13	0.1	0.07	0.08	0.06	0.05	0.03
Total phosphorus (mg/L)	Count	13	12	9	6	5	5	1

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.04	0.01	0.07	0.1	0.03	0.1	0.25
	Median	0.24	0.31	0.33	0.24	0.26	0.22	0.25
	Maximum	0.45	0.54	0.78	0.37	0.34	1.44	0.25
Metals								
Antimony dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	108%	100%	100%	83%	80%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	0.002	0.001	<0.001	<0.001
Antimony total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	83%	80%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	0.003	0.001	<0.001	<0.001
Arsenic dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	8%	0%	0%	17%	20%	20%	100%
	Minimum	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.0025	0.002	0.002	0.002	0.002	0.002	<0.001
	Maximum	0.004	0.004	0.003	0.004	0.003	0.004	<0.001

Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Arsenic total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.001	0.002	0.002
	Median	0.003	0.003	0.003	0.0035	0.003	0.004	0.002
	Maximum	0.005	0.005	0.006	0.005	0.005	0.005	0.002
Cadmium dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	108%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Copper dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	50%	50%	44%	50%	40%	40%	0%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003
	Median	<0.001	<0.001	0.002	<0.001	0.002	0.002	0.003
	Maximum	0.004	0.003	0.003	0.002	0.002	0.002	0.003

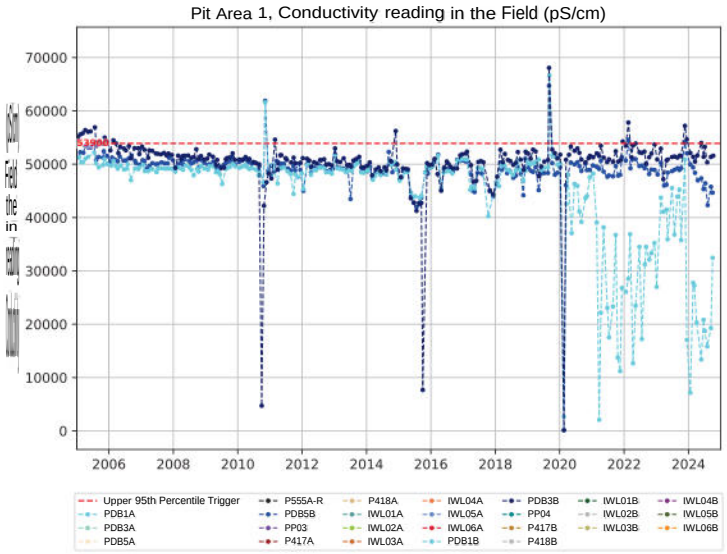
Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Copper total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	15%	0%	11%	0%	0%	0%	0%
	Minimum	<0.001	0.001	<0.001	0.001	0.001	0.001	0.003
	Median	0.003	0.006	0.004	0.0025	0.002	0.002	0.003
	Maximum	0.01	0.009	0.011	0.008	0.009	0.009	0.003
Iron dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	100%	92%	89%	83%	80%	80%	0%
	Minimum	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.25
	Median	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.25
	Maximum	0.09	0.06	0.07	0.07	0.13	0.21	0.25
Iron total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.44	0.45	0.36	0.42	0.48	0.58	1
	Median	2	6	1	3	1	1	1
	Maximum	14.3	11.7	20.1	9.89	9.23	10.2	1
Lead dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	108%	100%	100%	100%	100%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

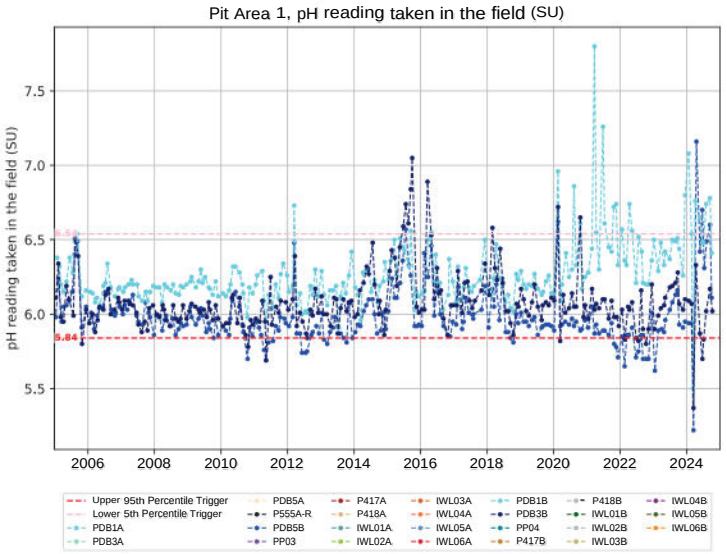
Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Lead total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	23%	17%	22%	33%	40%	40%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	0.002	0.0025	0.003	0.001	0.001	0.001	<0.001
	Maximum	0.007	0.006	0.008	0.006	0.006	0.006	<0.001
Mercury dissolved (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mercury total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Median	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Maximum	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	67%	75%	100%	83%	80%	100%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	<0.001	0.002	0.001	<0.001	<0.001

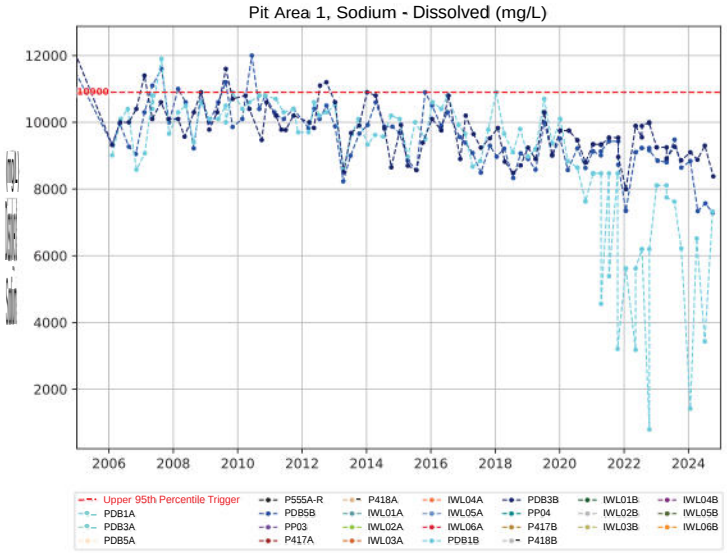
Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Molybdenum total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	54%	67%	89%	83%	80%	80%	100%
	Minimum	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Median	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Maximum	0.002	0.002	0.001	0.001	0.001	0.001	<0.001
Nickel dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	Median	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	Maximum	0.003	0.003	0.003	0.003	0.003	0.002	0.002
Nickel total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	0%	0%	0%	0%	0%	0%	0%
	Minimum	0.002	0.002	0.002	0.002	0.002	0.002	0.003
	Median	0.004	0.007	0.004	0.003	0.003	0.003	0.003
	Maximum	0.012	0.012	0.016	0.011	0.011	0.012	0.003
Selenium dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

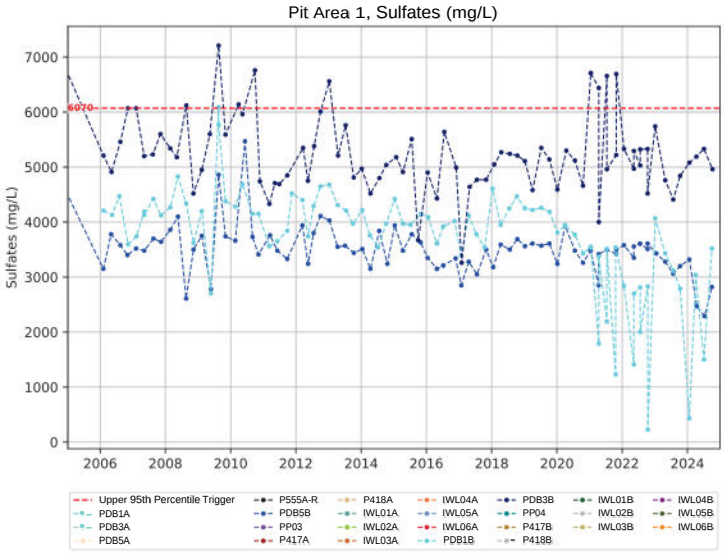
Analyte	Parameter	Lachlan floodway transect						
		L7	L8	L9	L10	L11	L12	L13
Selenium total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Median	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Maximum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc dissolved (mg/L)	Count	12	12	9	6	5	5	1
	Samples < LOR	100%	100%	100%	100%	100%	100%	100%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Maximum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc total (mg/L)	Count	13	12	9	6	5	5	1
	Samples < LOR	62%	42%	44%	67%	40%	60%	100%
	Minimum	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Median	<0.005	0.0105	0.006	<0.005	0.006	<0.005	<0.005
	Maximum	0.021	0.02	0.028	0.019	0.019	0.021	<0.005

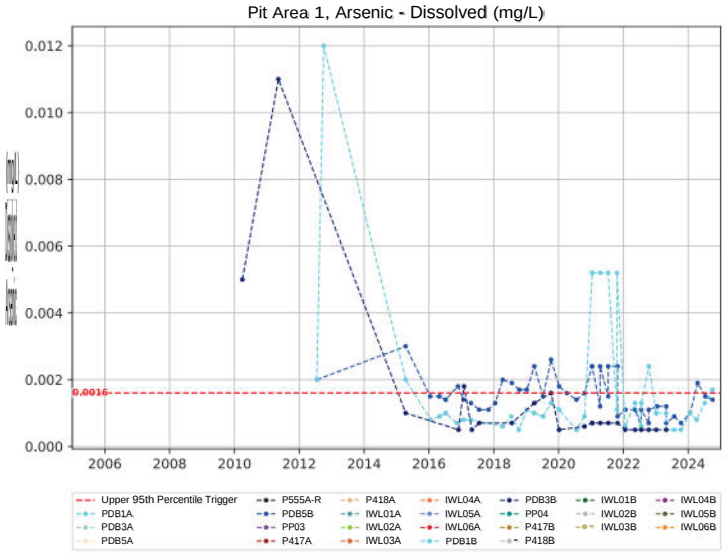
Appendix D: Groundwater data

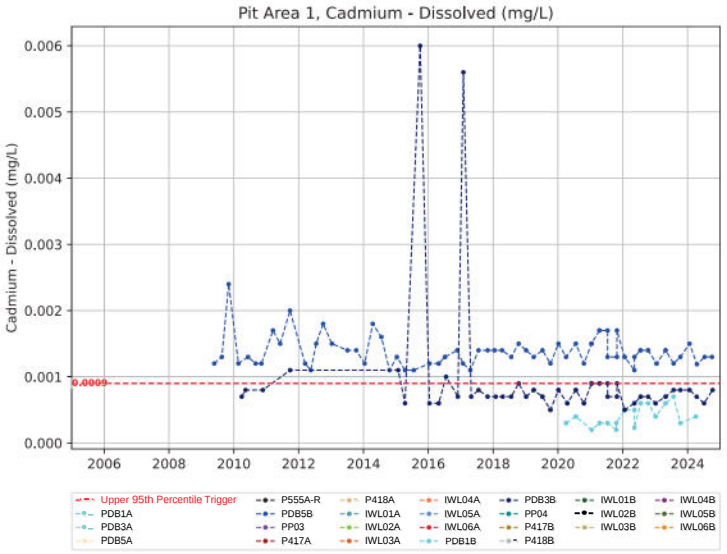

Pit Area 1, Conductivity reading in the Field (pS/cm)
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

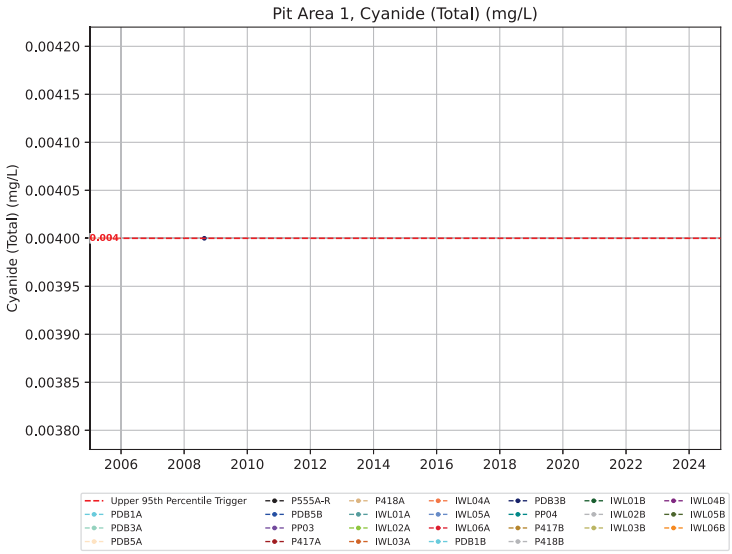

Pit Area 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

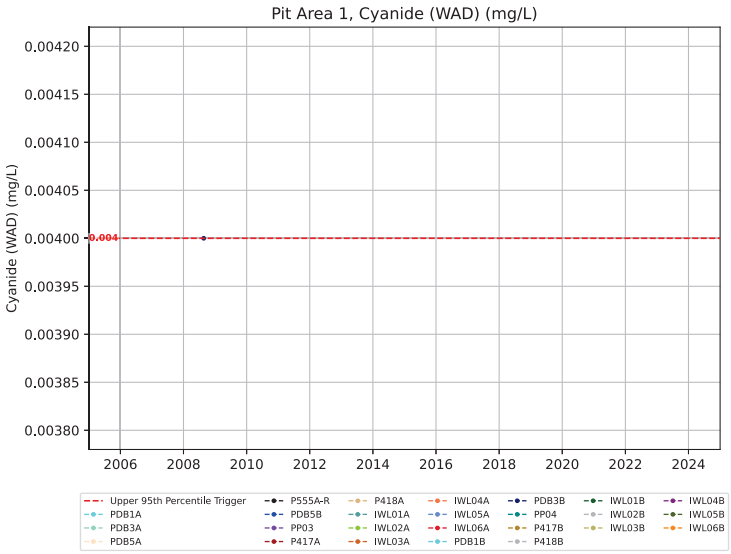

Pit Area 1, Sodium - Dissolved (mg/L)
10000
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

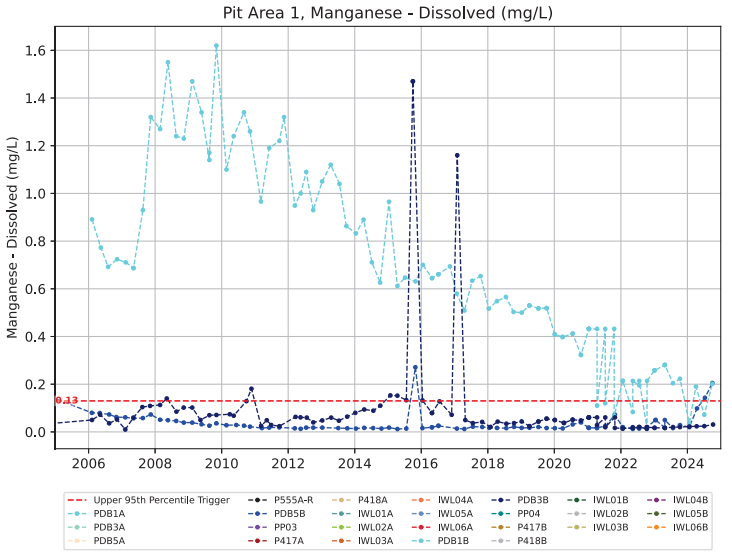

Pit Area 1, Sulfates (mg/L)
Sulfates (mg/L)
6070
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

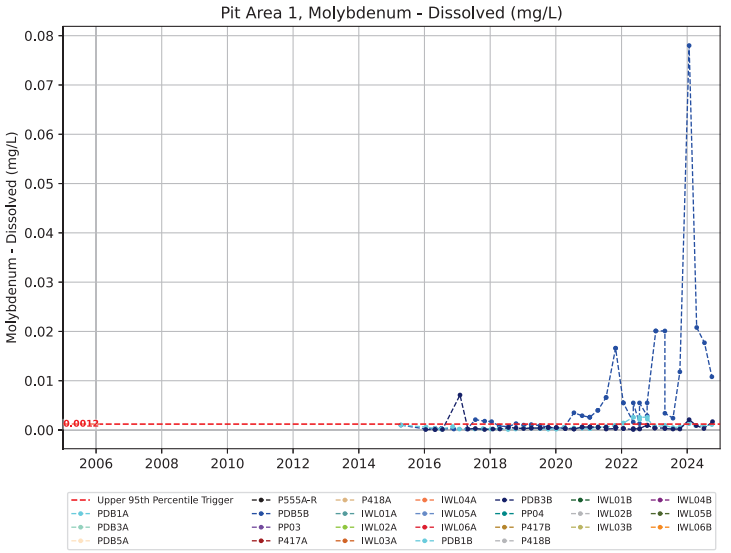

Pit Area 1, Arsenic - Dissolved (mg/L)
0.0016
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

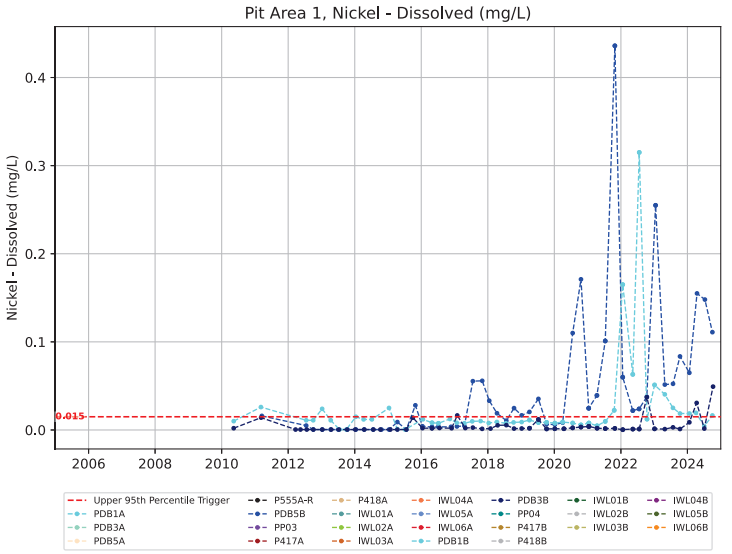

Pit Area 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0009
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

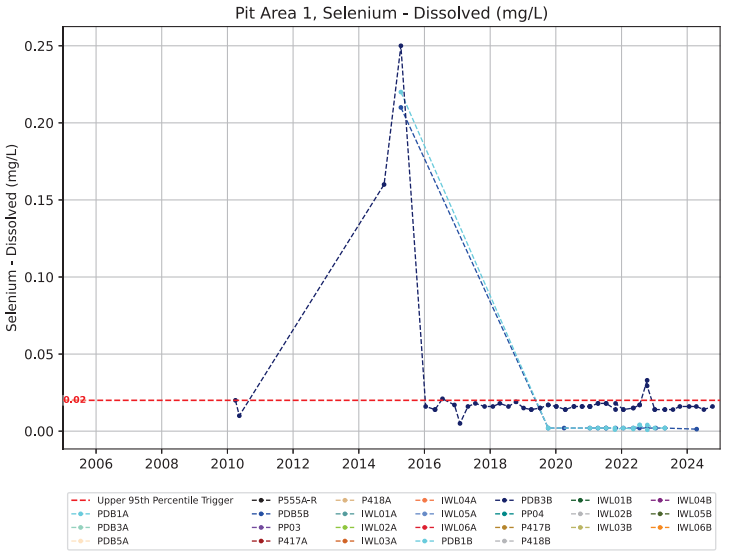

Pit Area 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

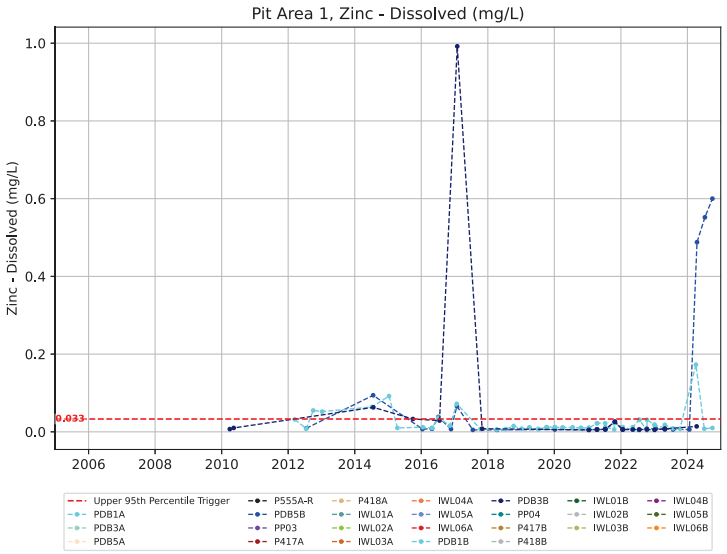

Pit Area 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

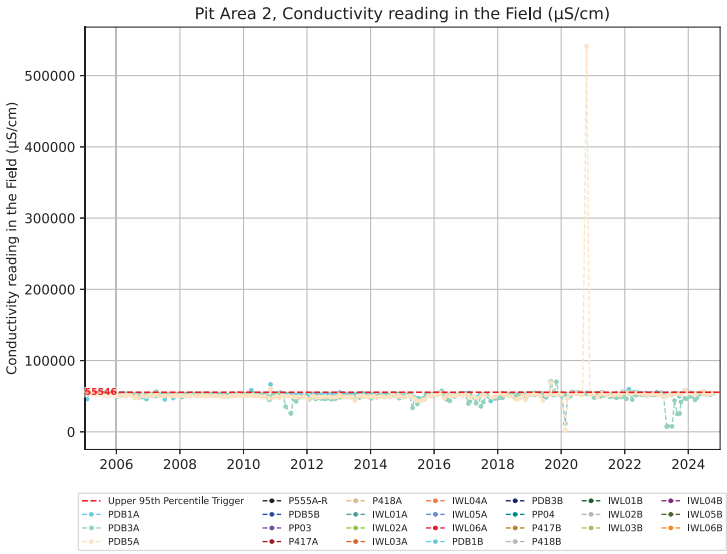

Pit Area 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.13
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

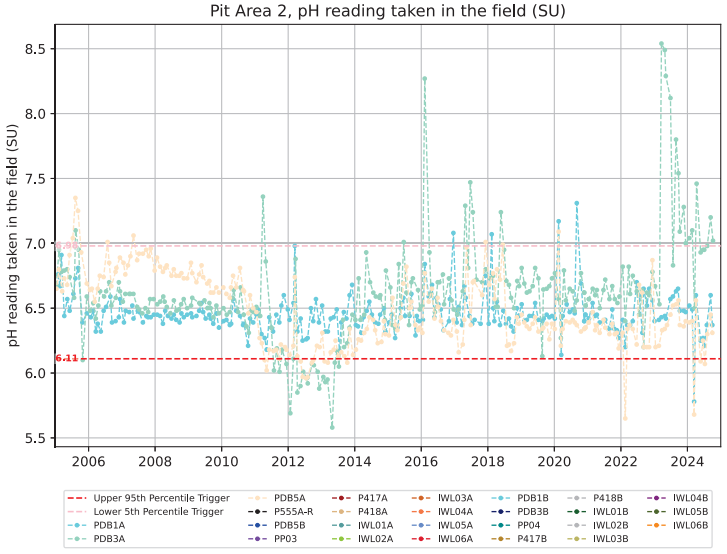

Pit Area 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

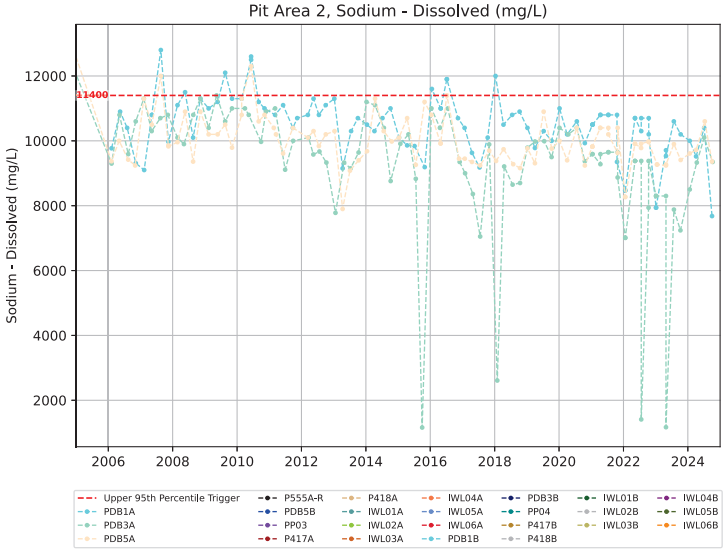

Pit Area 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

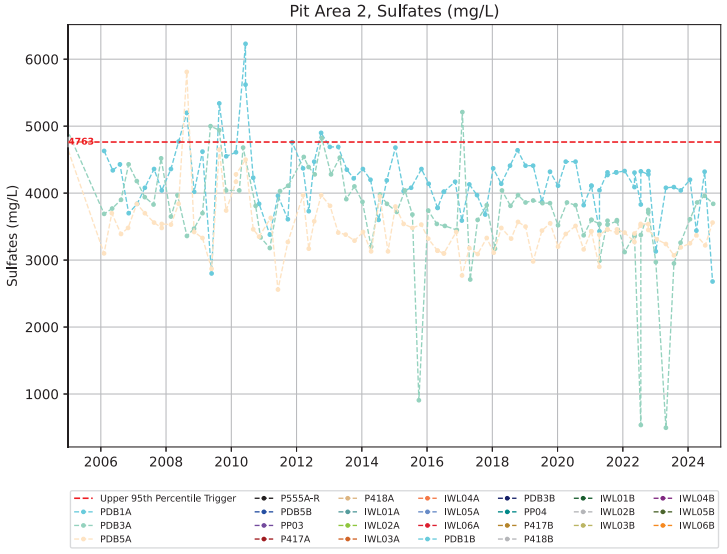

Pit Area 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.02
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

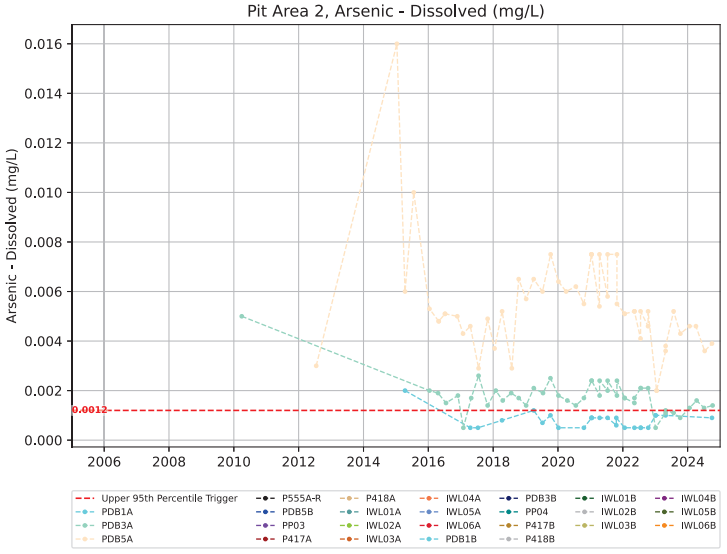

Pit Area 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.033
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

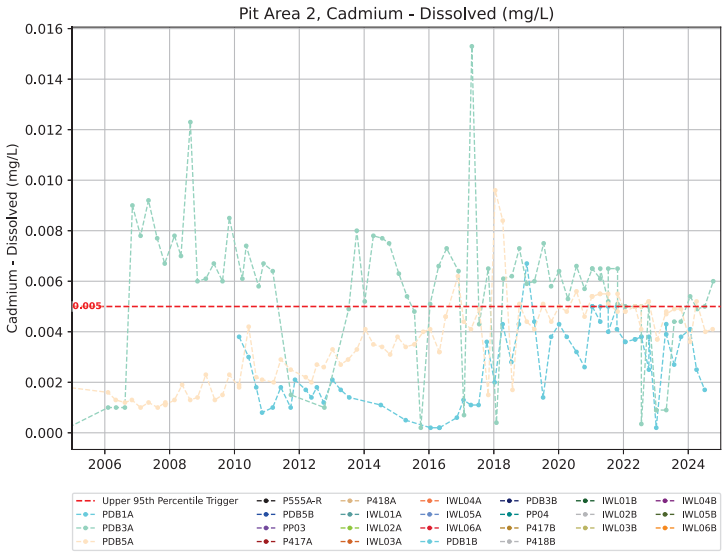

Pit Area 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
55546
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

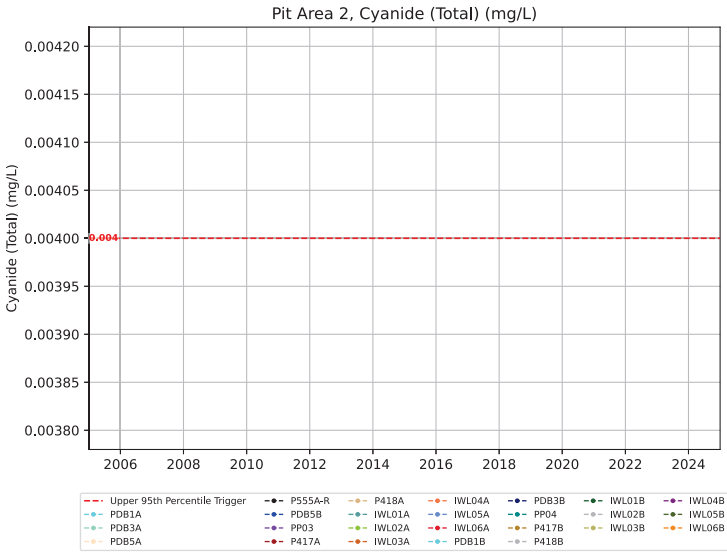

Pit Area 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.00
6.11
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11400
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Sulfates (mg/L)
Sulfates (mg/L)
4763
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.005
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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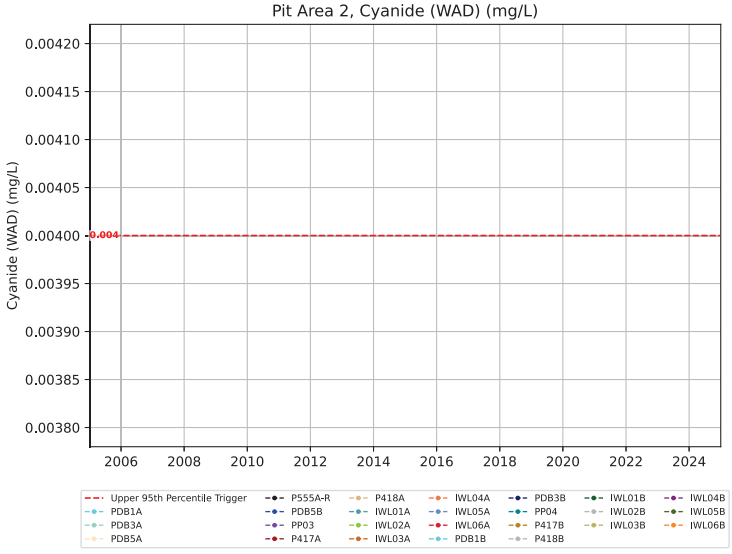
IWL04B
IWL05B
IWL06B


Pit Area 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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P418B
IWL01B
IWL02B
IWL03B
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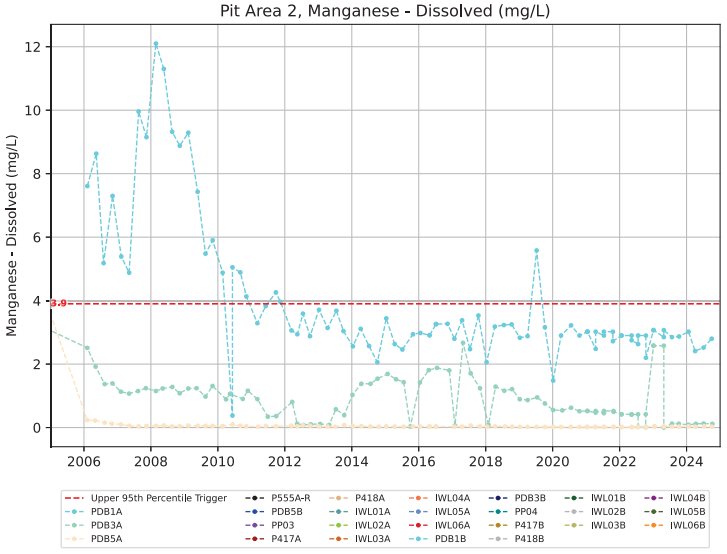
IWL05B
IWL06B


Pit Area 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
3.9
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
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IWL01B
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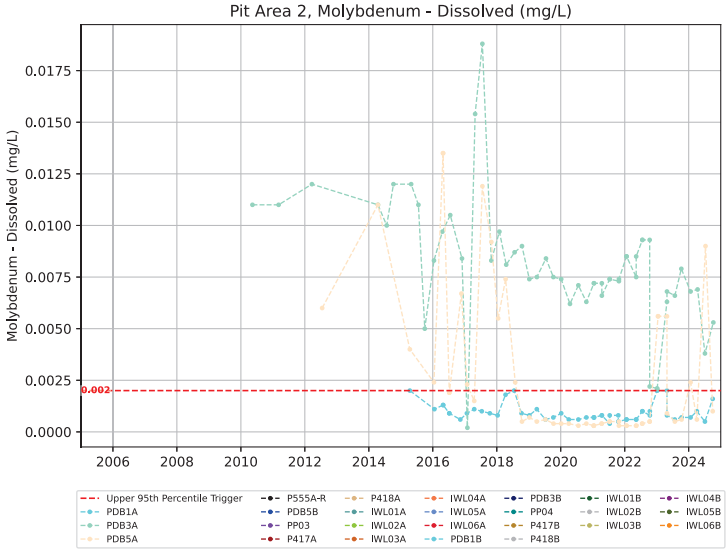
IWL05B
IWL06B


Pit Area 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
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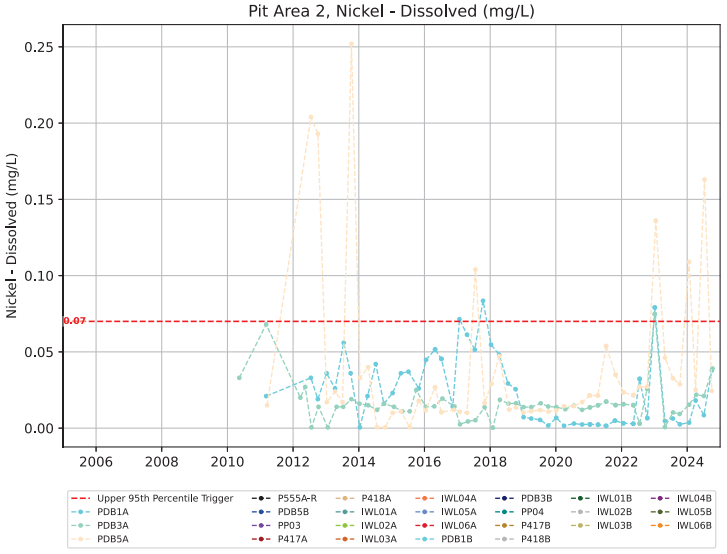
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.07
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
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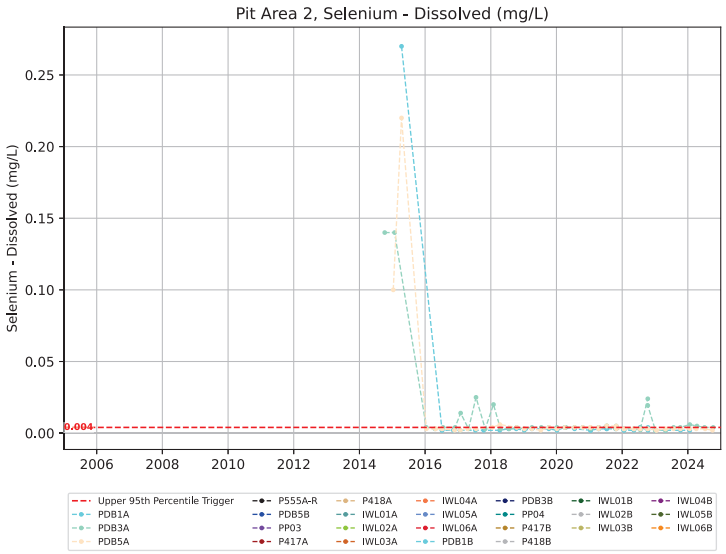
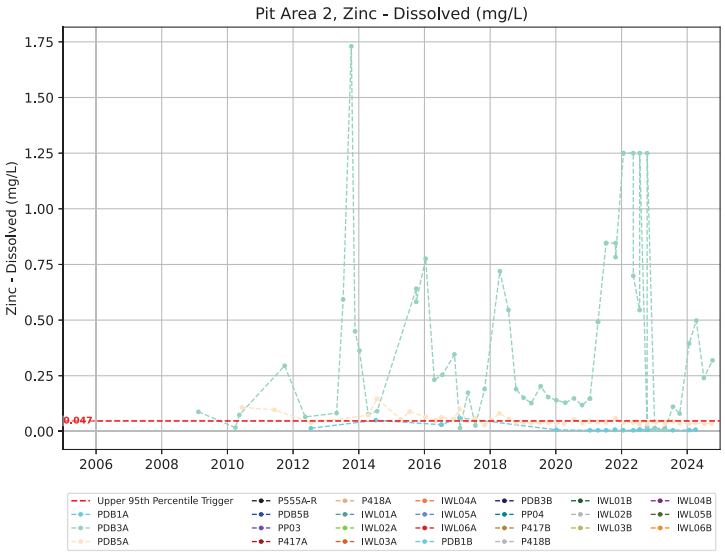
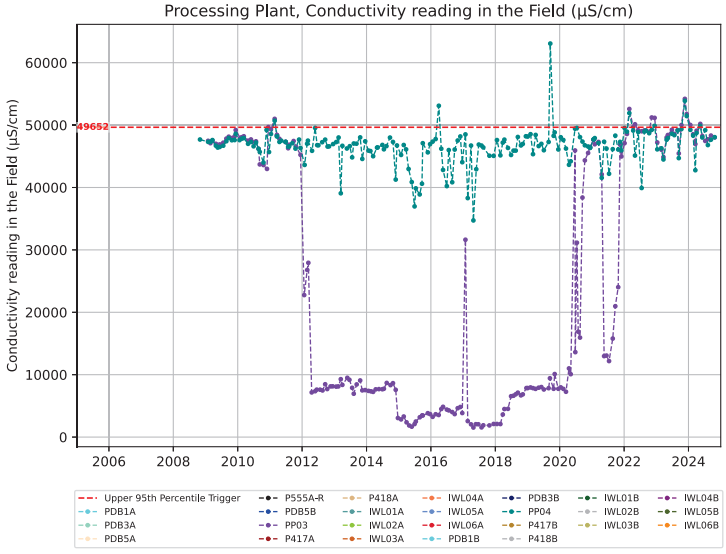
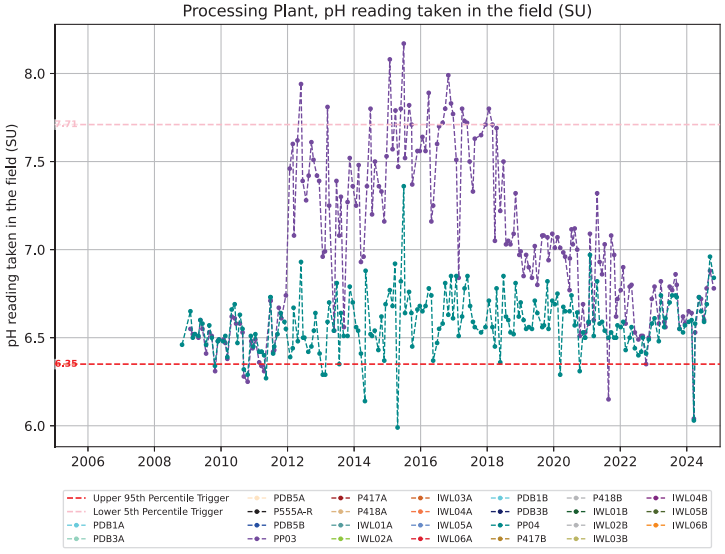
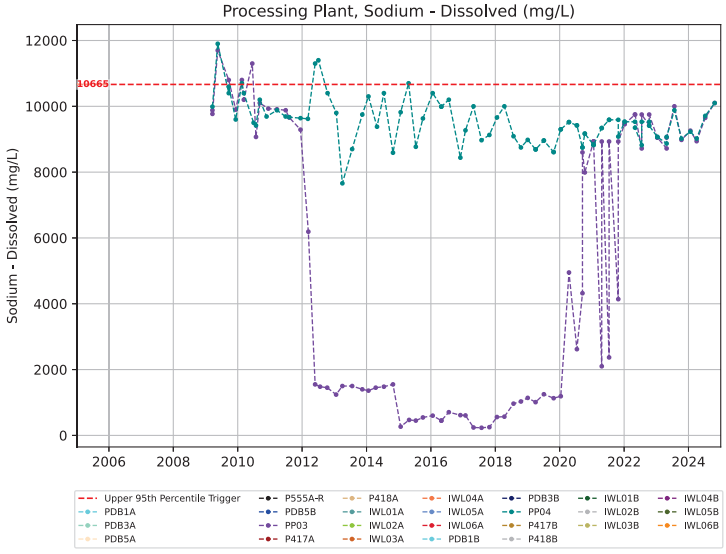
IWL05B
IWL06B

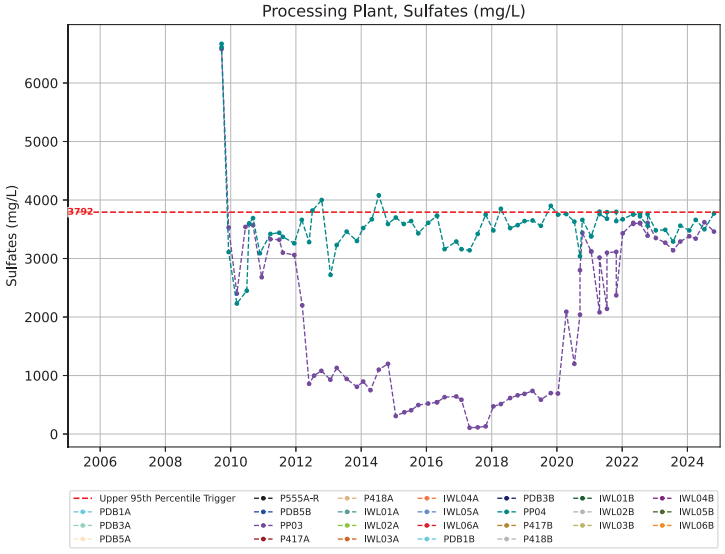

Pit Area 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.047
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
49652
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.71
6.35
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10665
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Sulfates (mg/L)
Sulfates (mg/L)
3792
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
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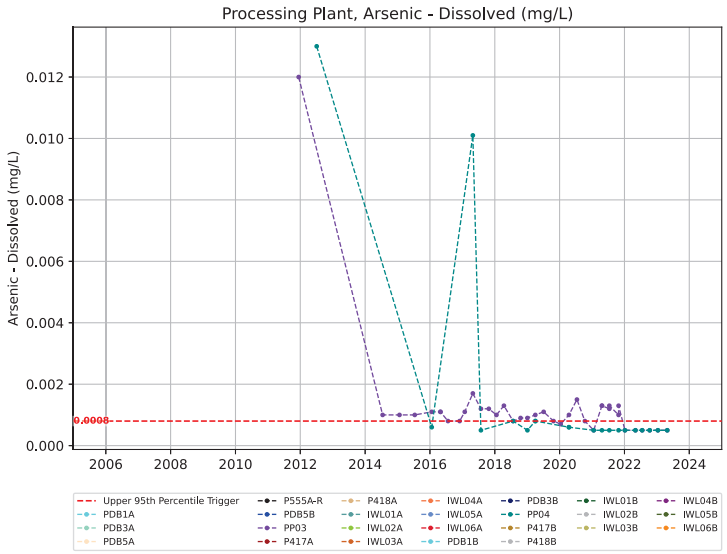
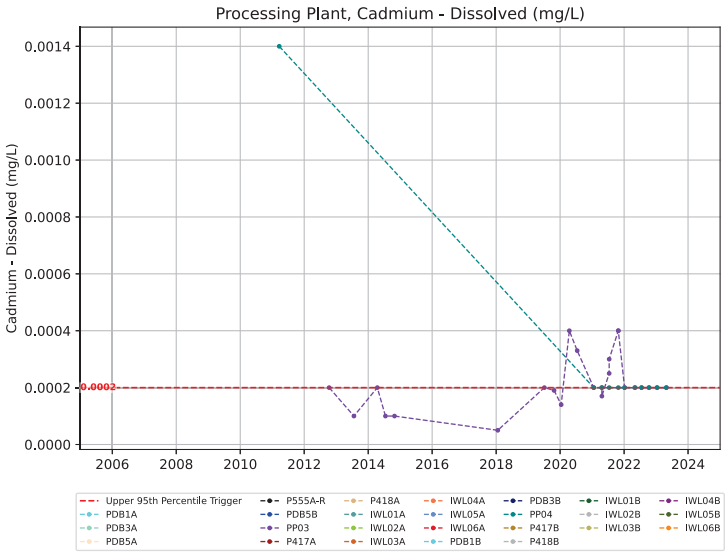
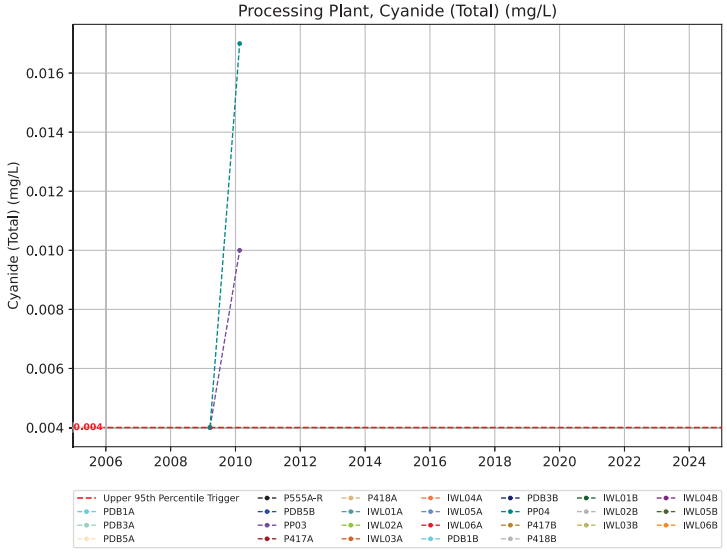
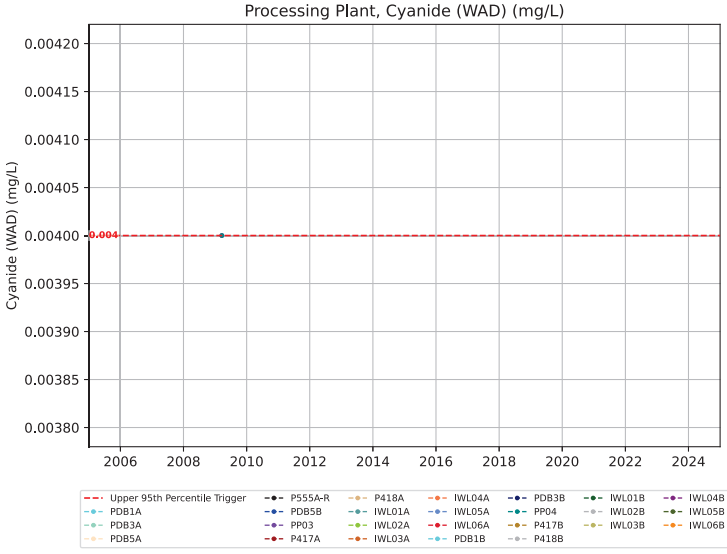
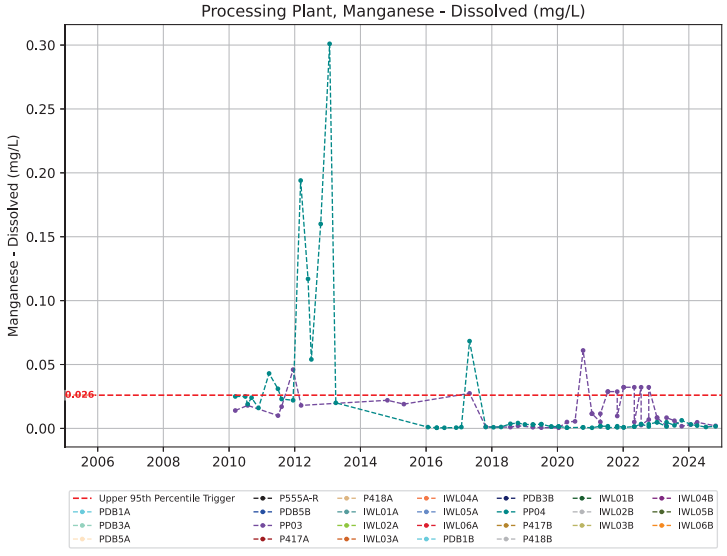
IWL05B
IWL06B

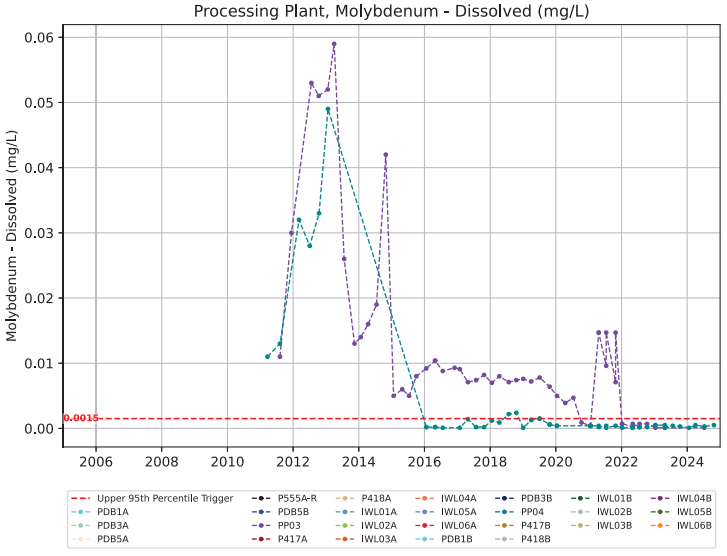

Processing Plant, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

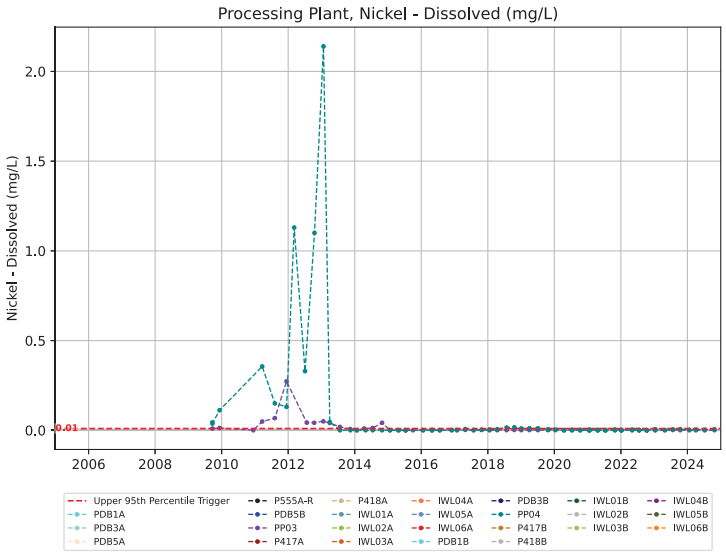

Processing Plant, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

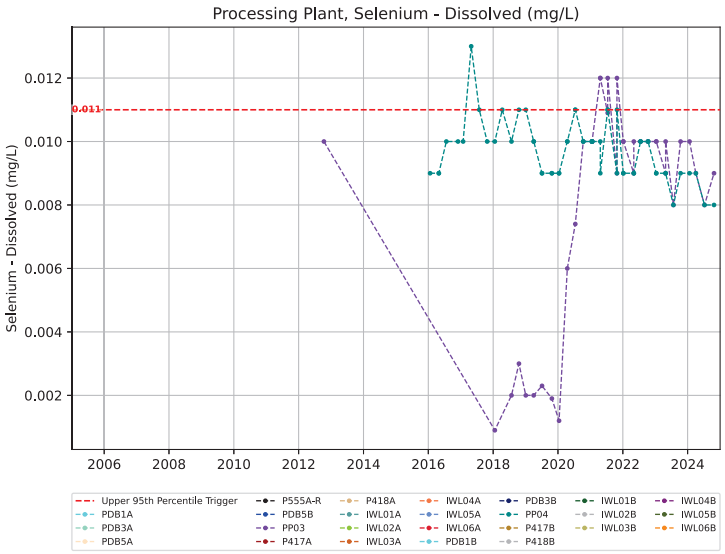

Processing Plant, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

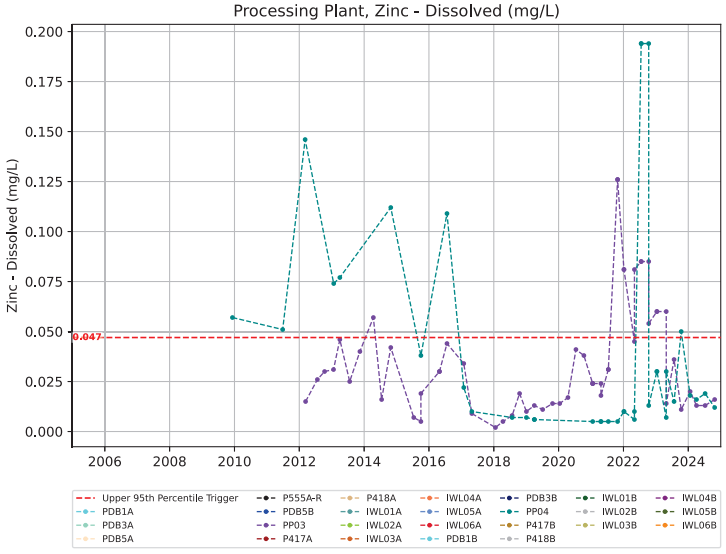

Processing Plant, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

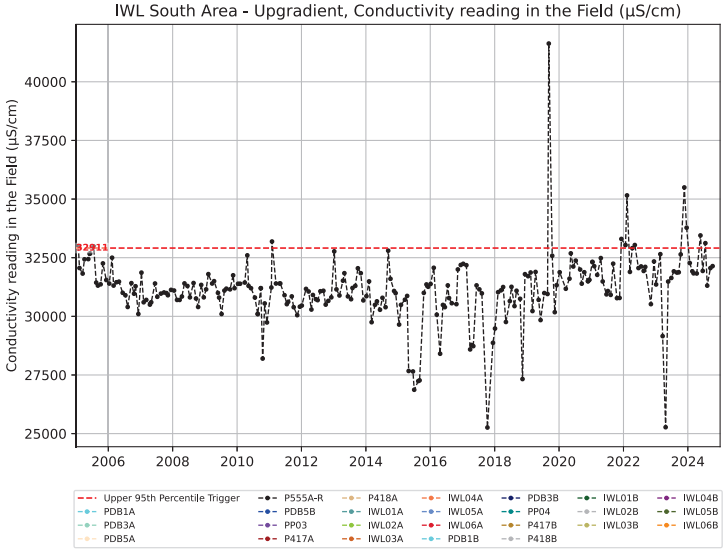

Processing Plant, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.026
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

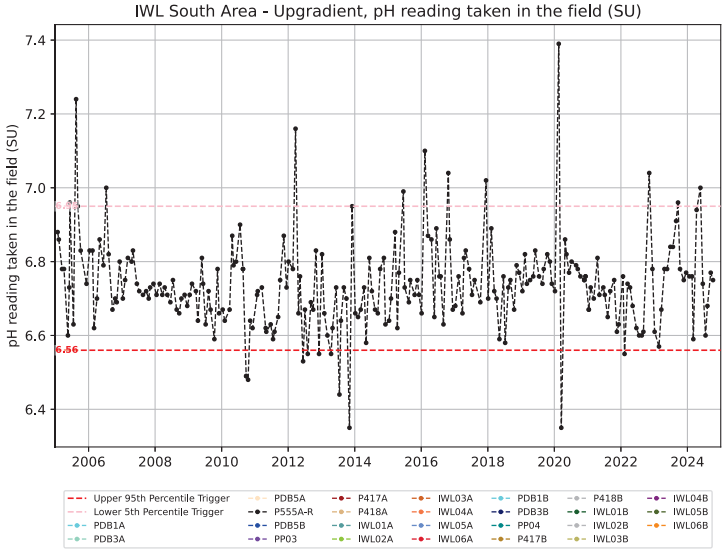

Processing Plant, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.01
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.047
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
32811
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.95
6.56
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
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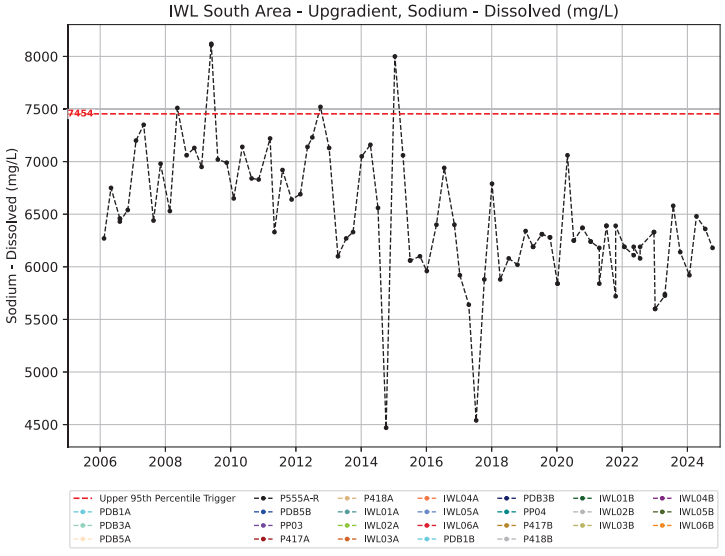
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
7454
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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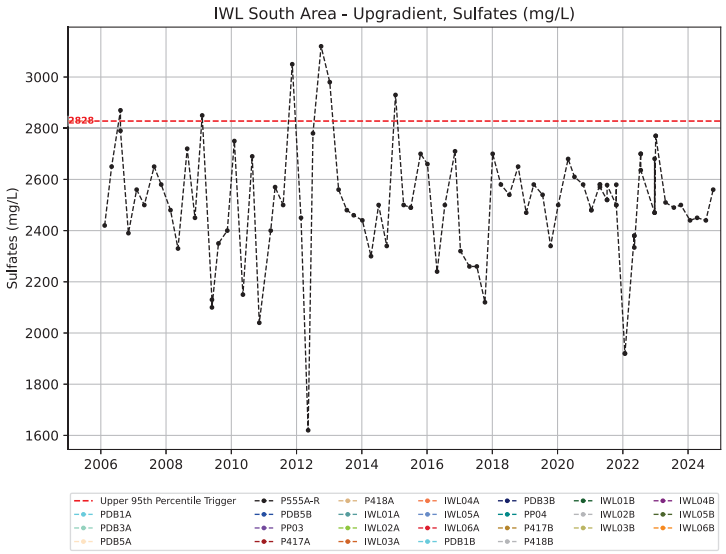
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Sulfates (mg/L)
Sulfates (mg/L)
2828
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
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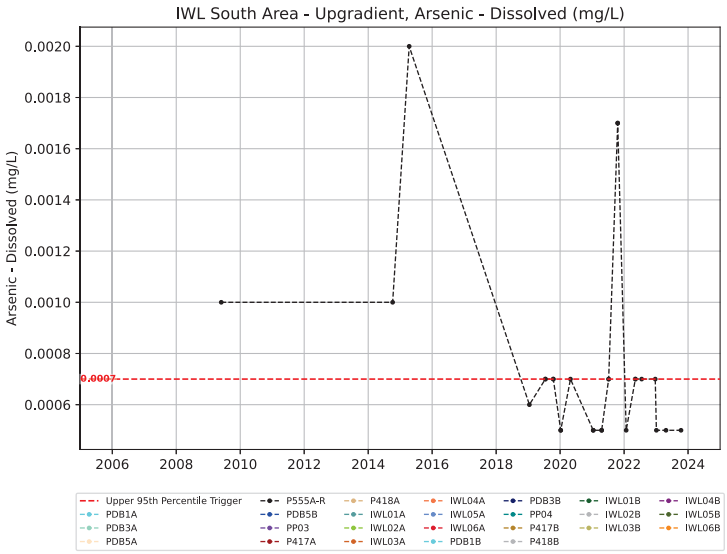
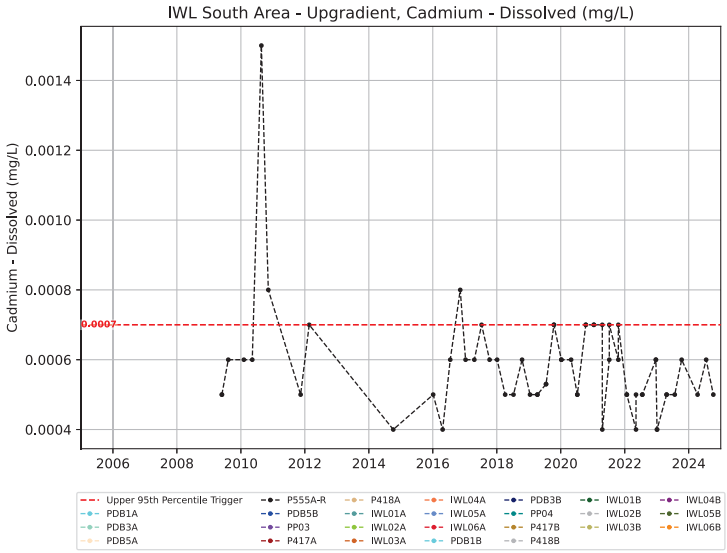
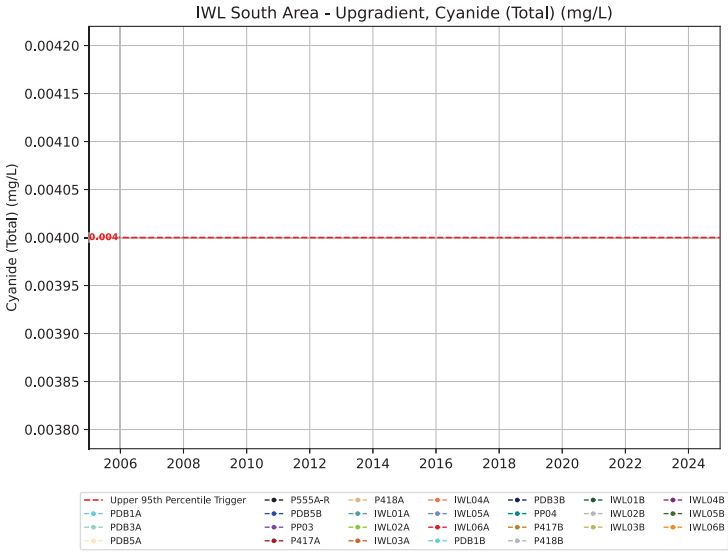
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0007
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0007
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
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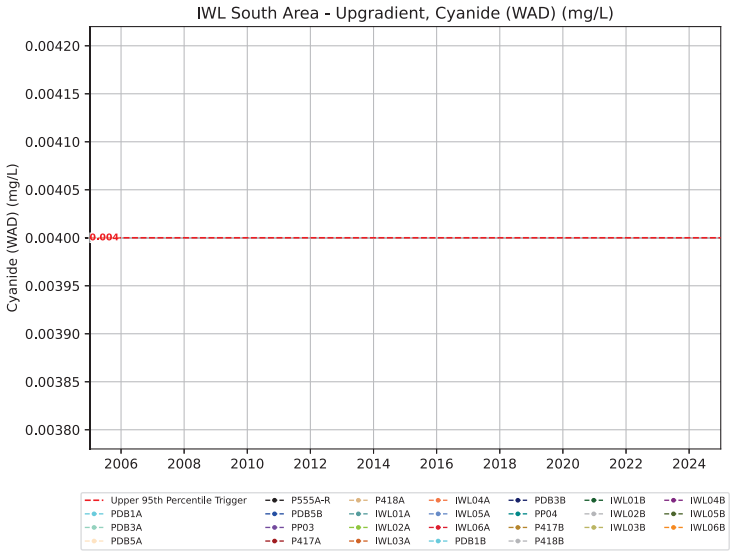
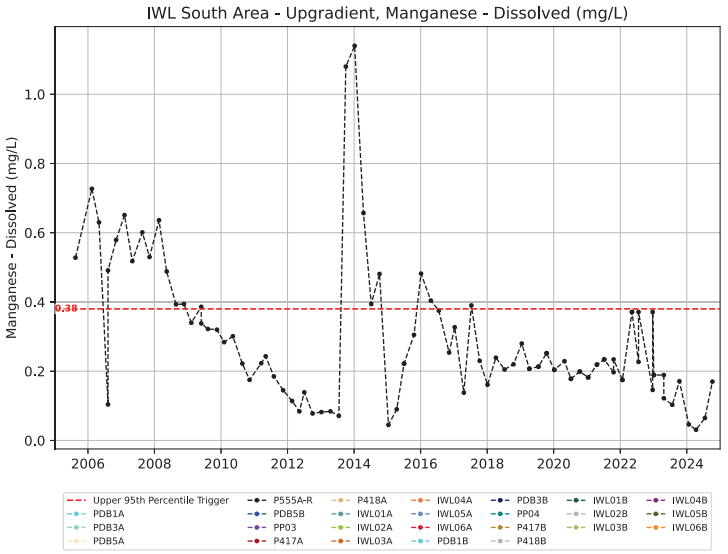
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.38
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
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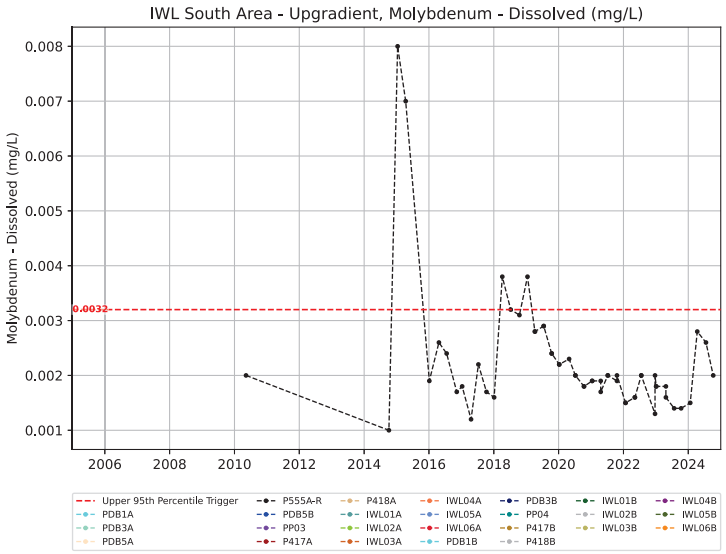
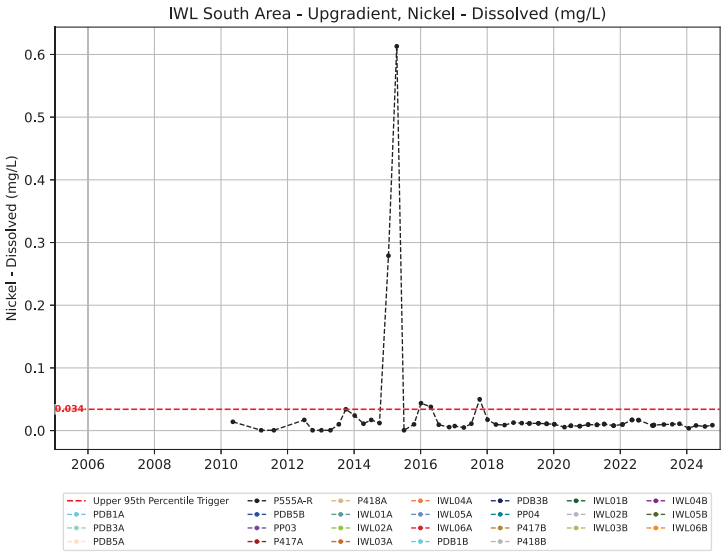
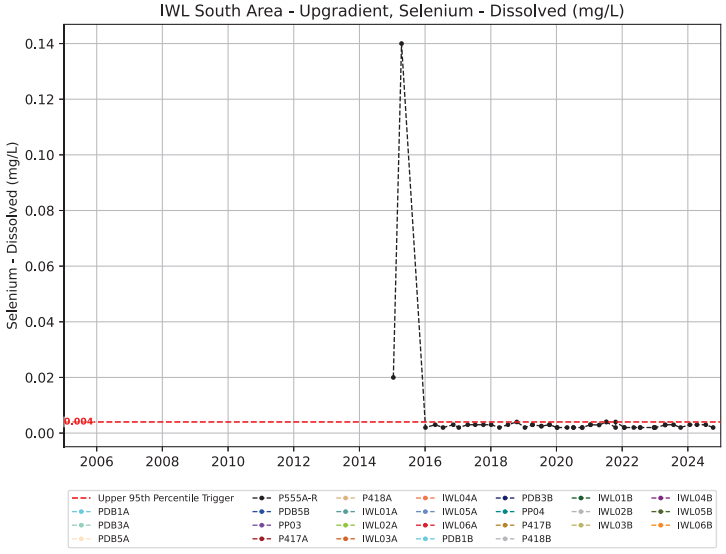
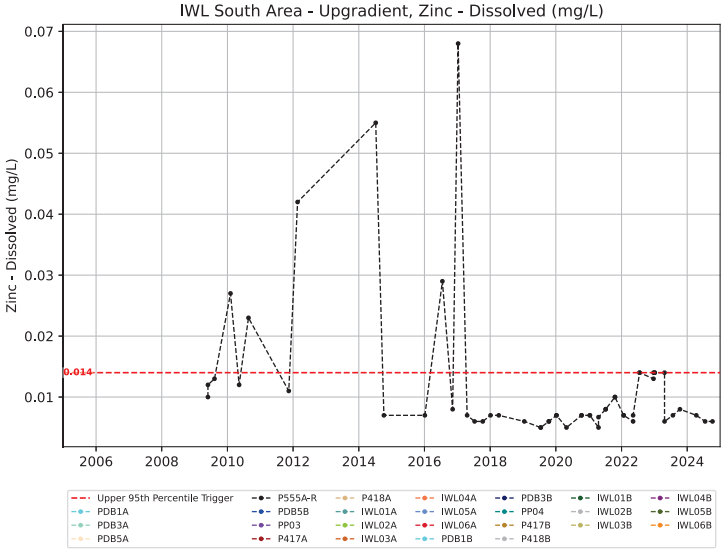
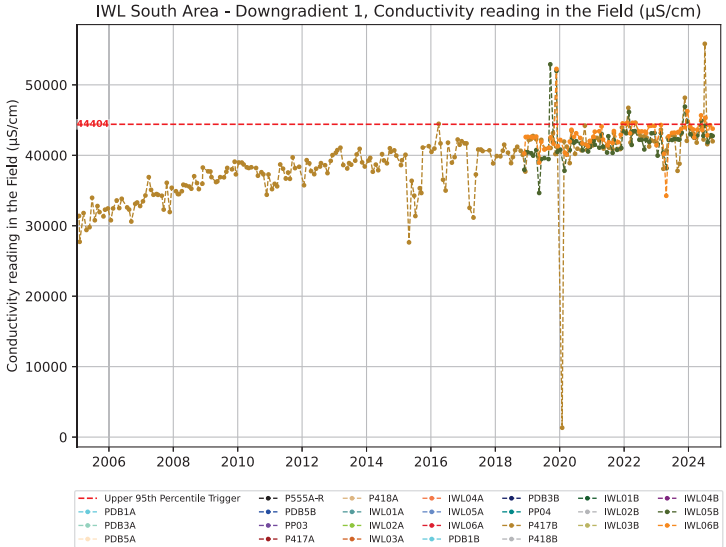
IWL03A
PDB1B
P418B

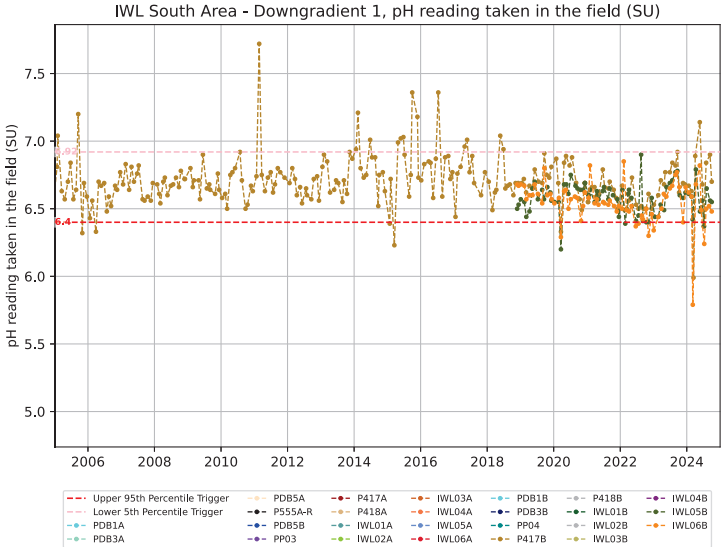

IWL South Area - Upgradient, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0032
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

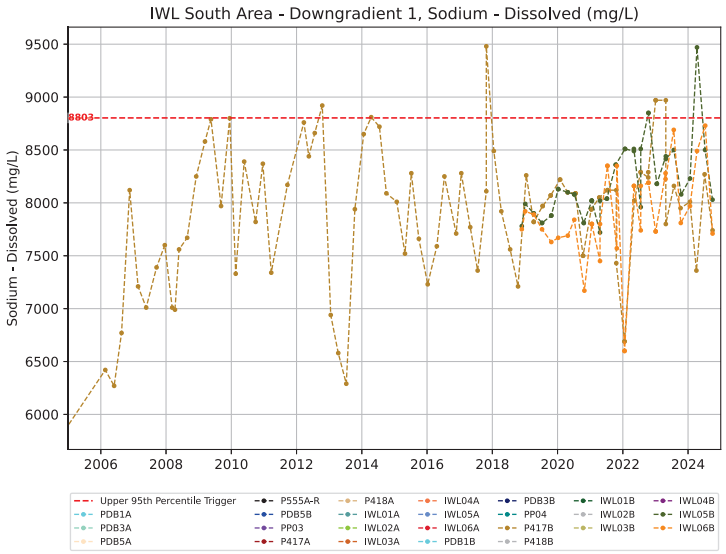

IWL South Area - Upgradient, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.034
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

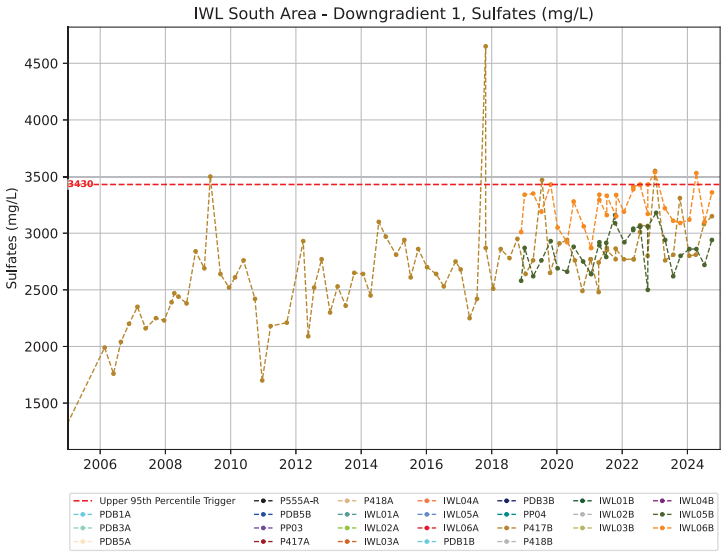

IWL South Area - Upgradient, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

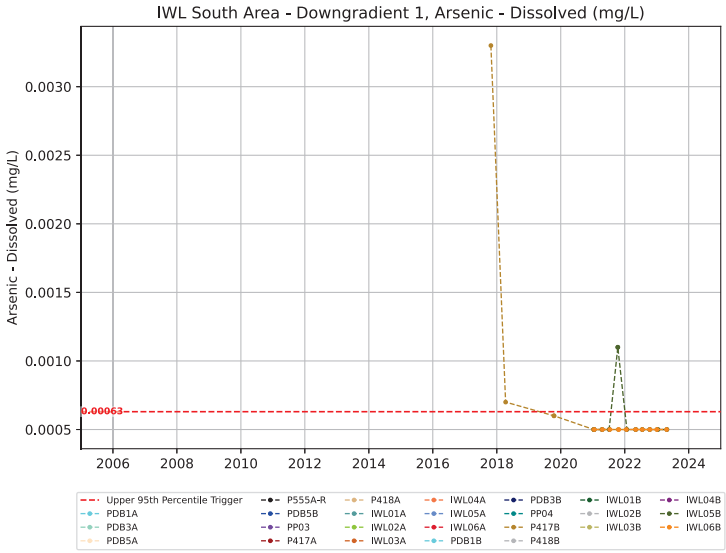

IWL South Area - Upgradient, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.014
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

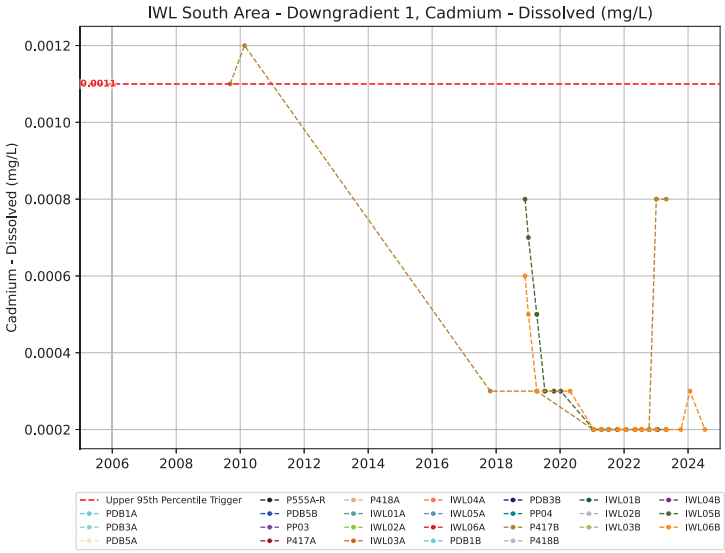

IWL South Area - Downgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
44404
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

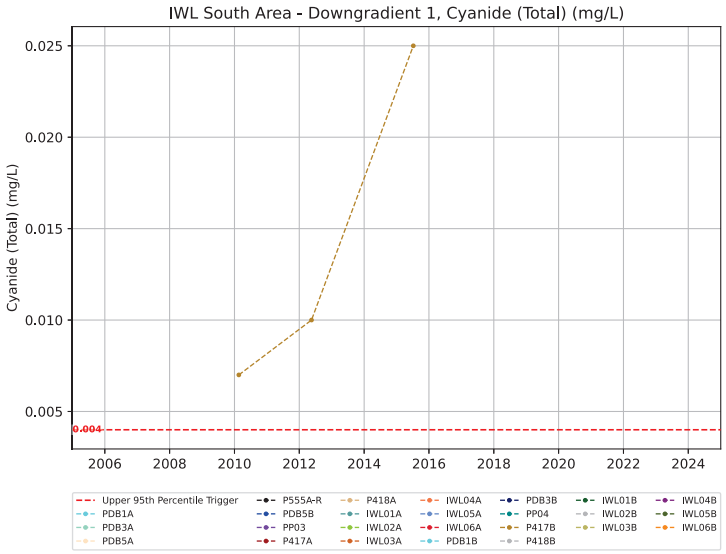

IWL South Area - Downgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.4
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

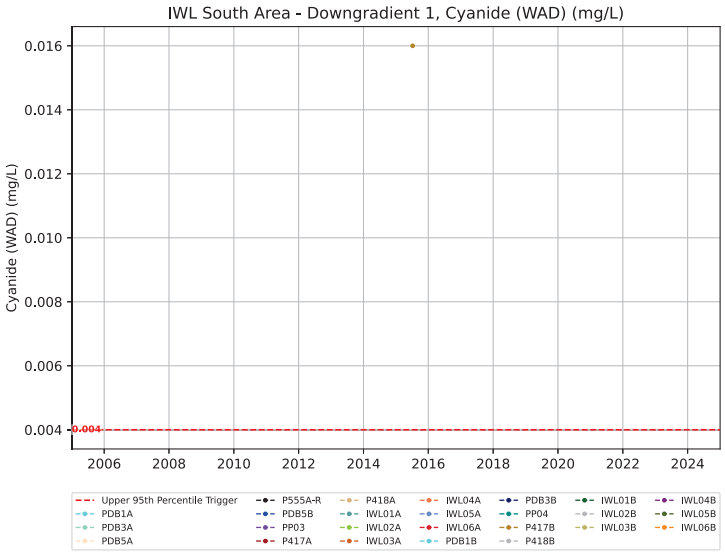

IWL South Area - Downgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
8803
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

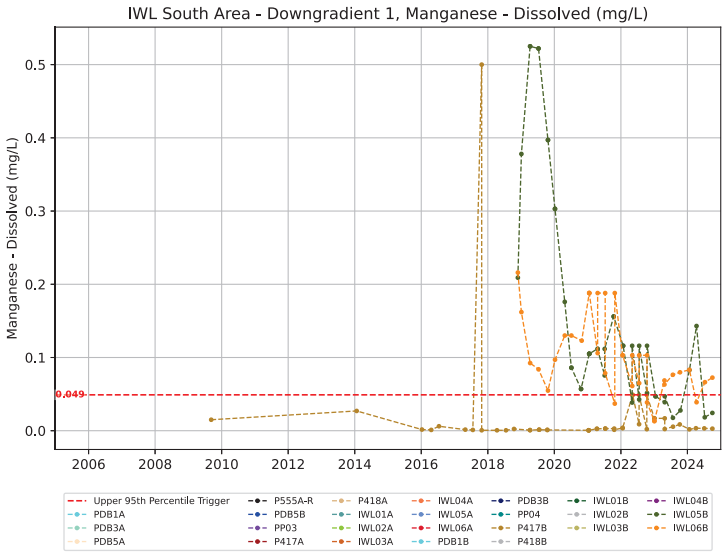

IWL South Area - Downgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
3430
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

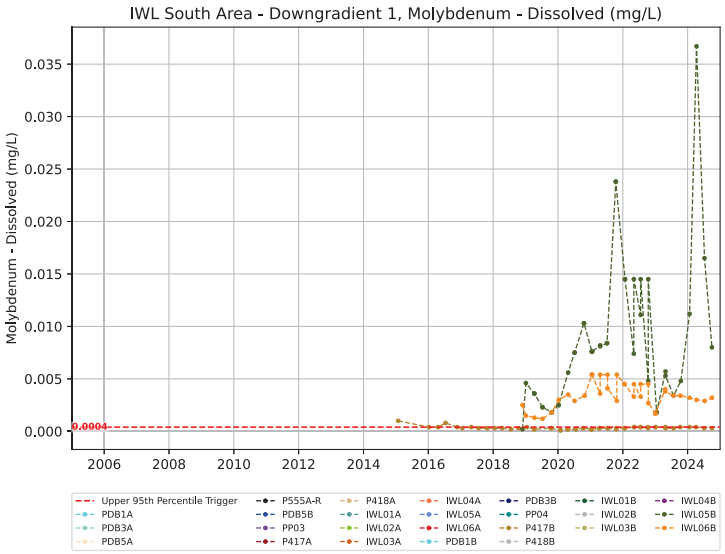

IWL South Area - Downgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00063
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

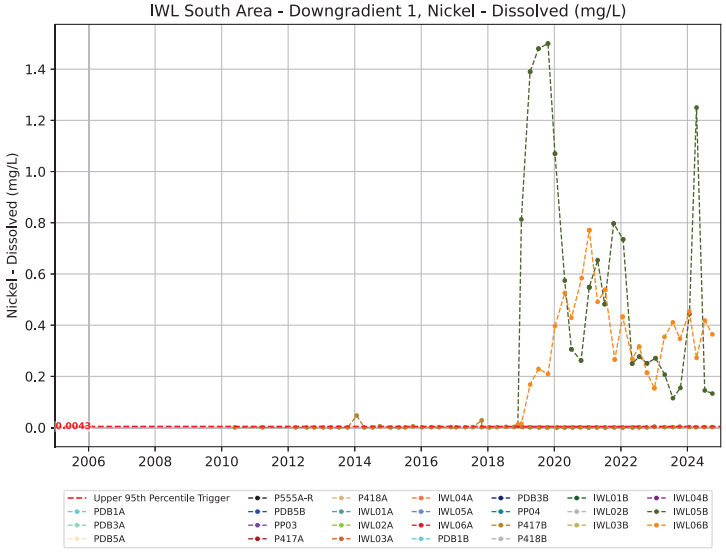

IWL South Area - Downgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0011
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Downgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Downgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Downgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.049
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.0043
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
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PDB3B
PP04
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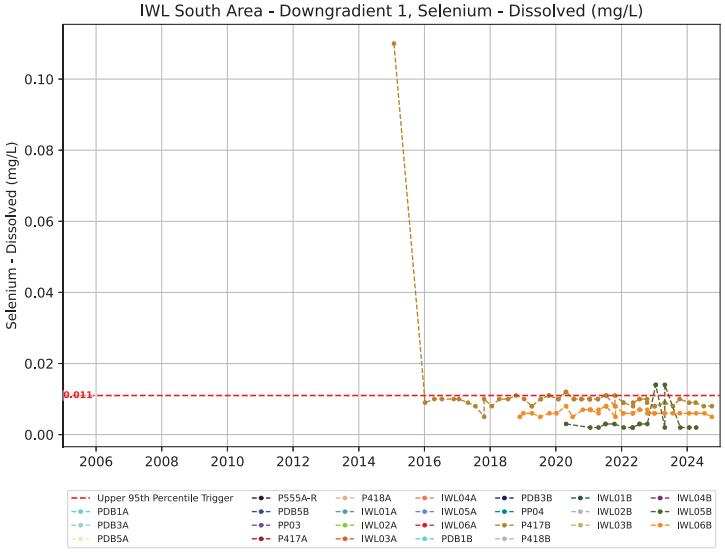
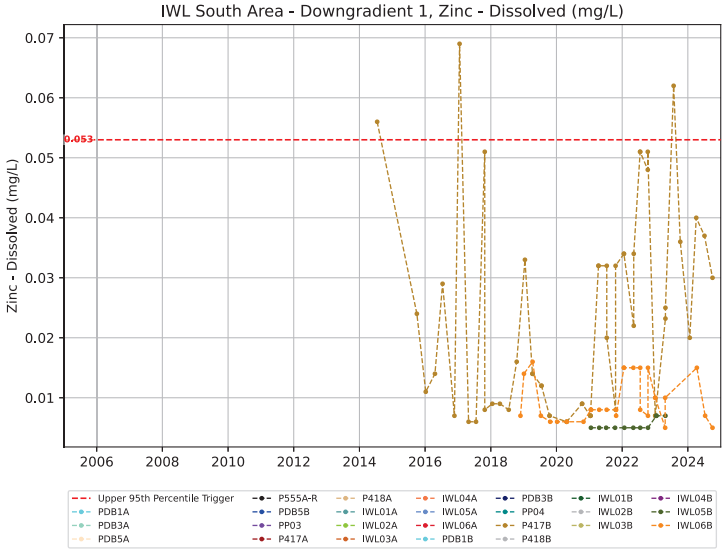
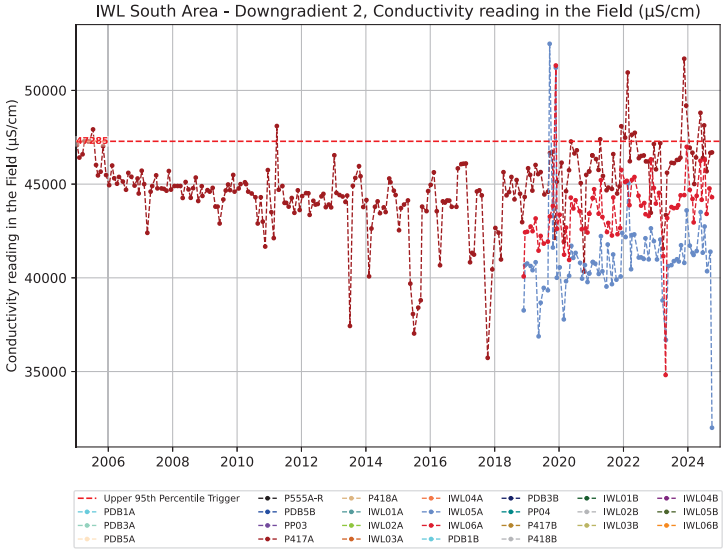
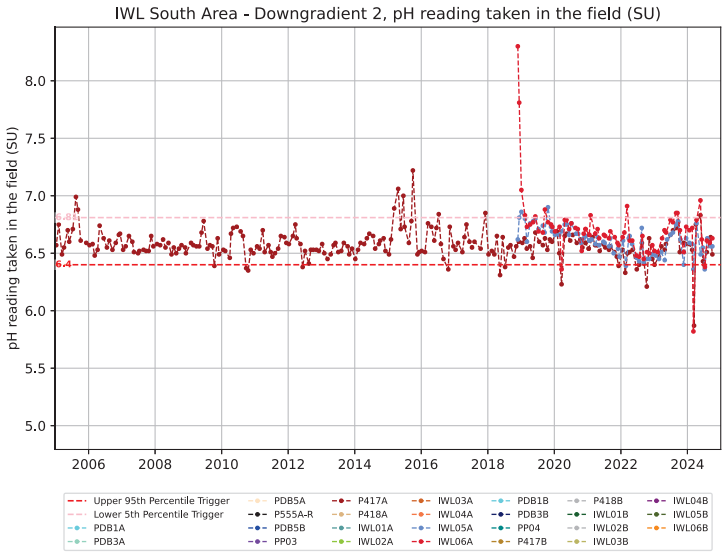
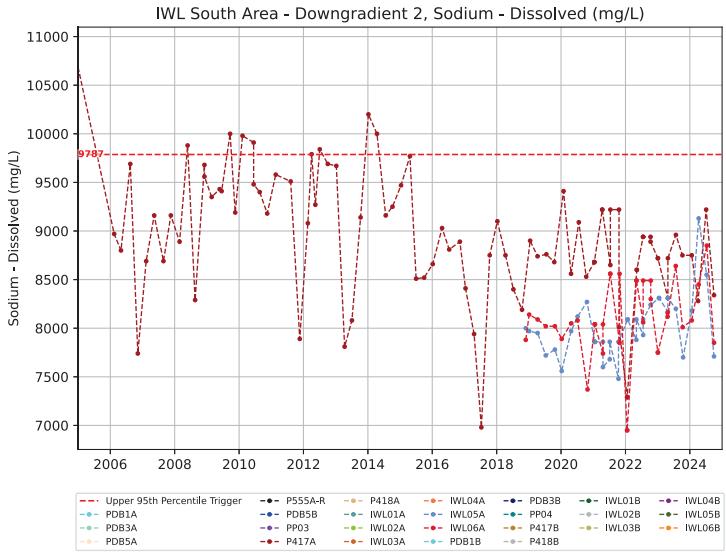
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.053
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
47285
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.4
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
9787
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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P418B
IWL01B
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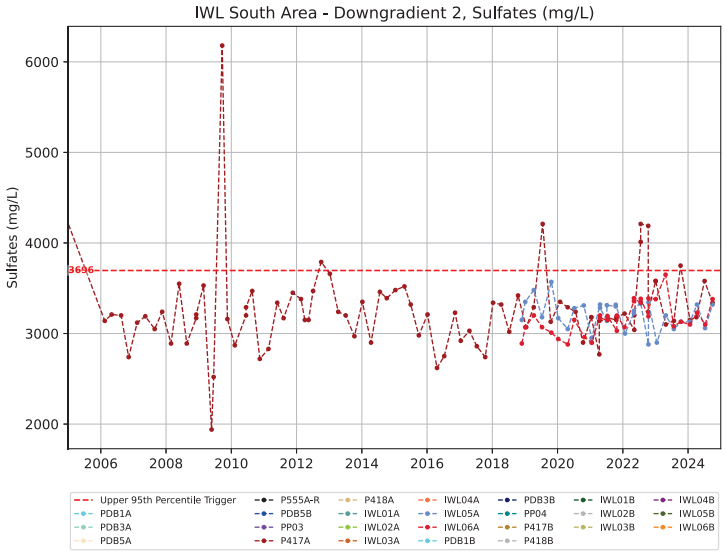
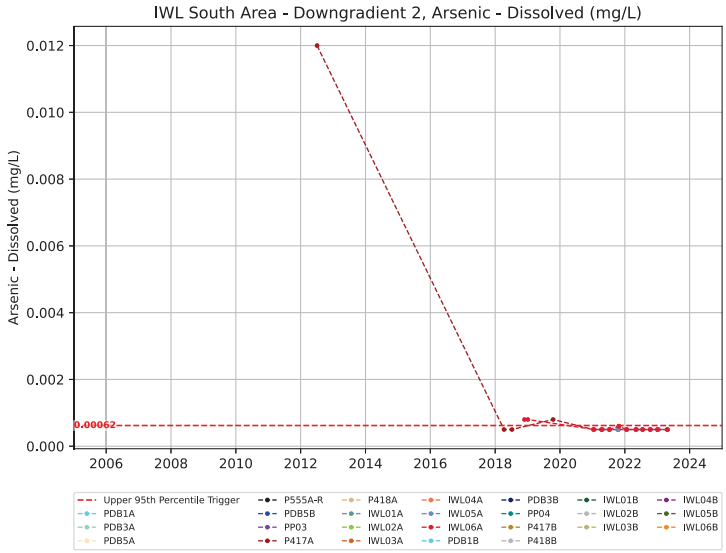
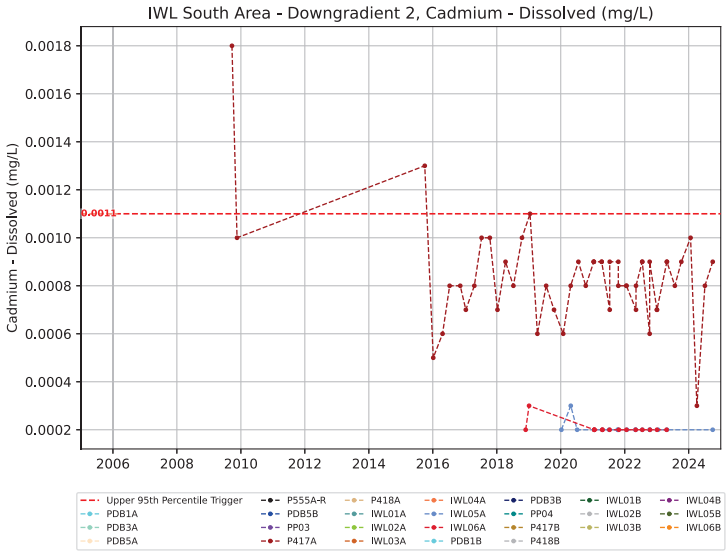
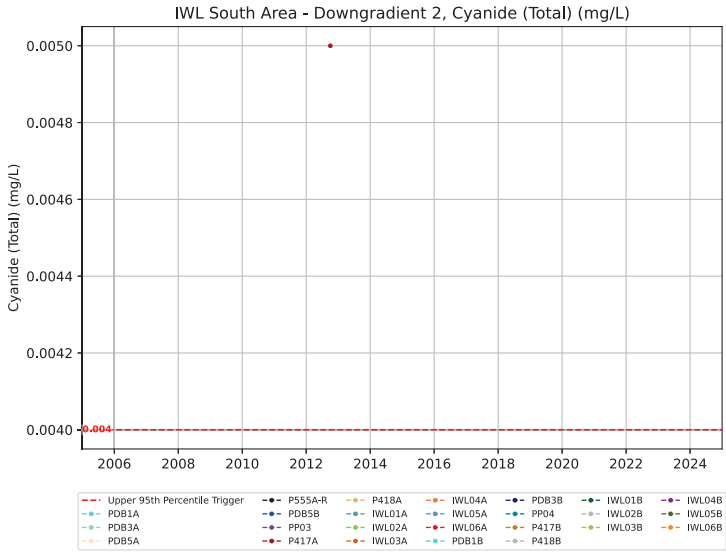
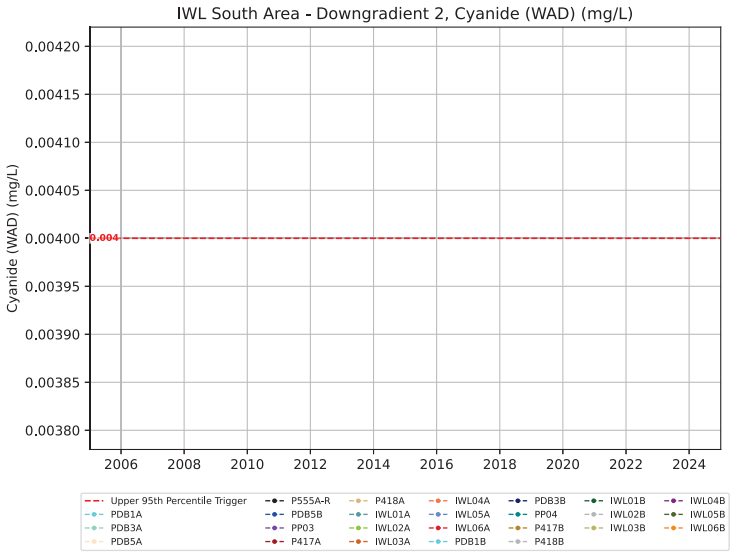
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
3696
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00062
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.00420
0.00415
0.00410
0.00405
0.00400
0.00395
0.00390
0.00385
0.00380
0.004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
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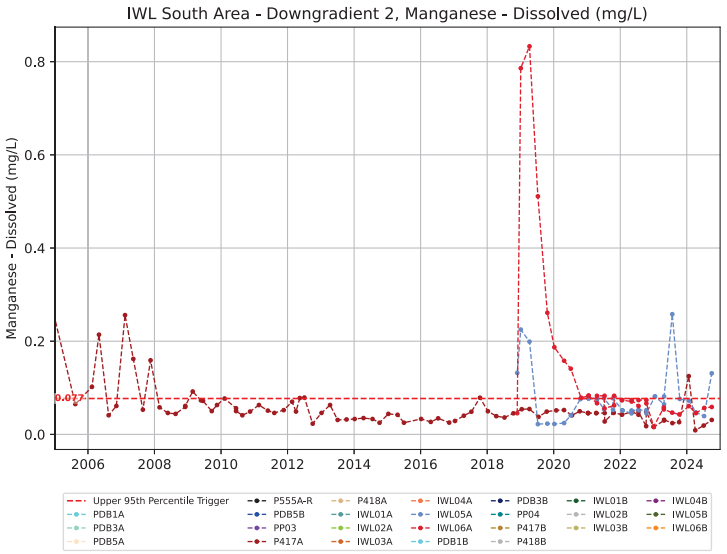
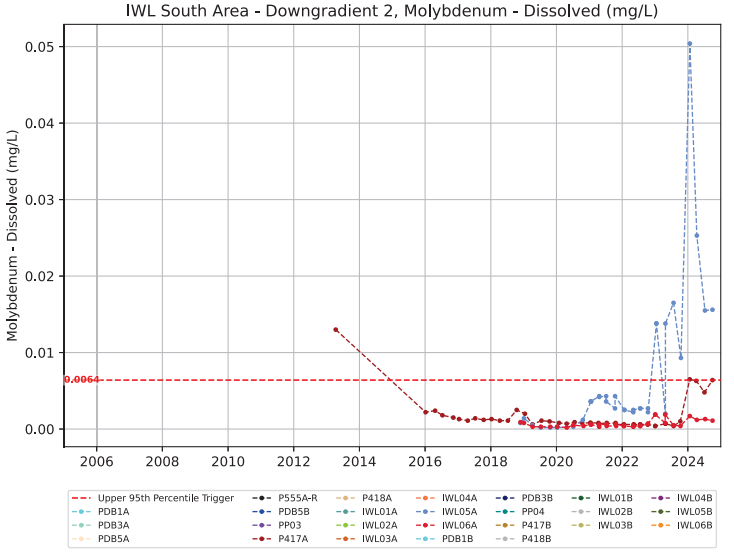
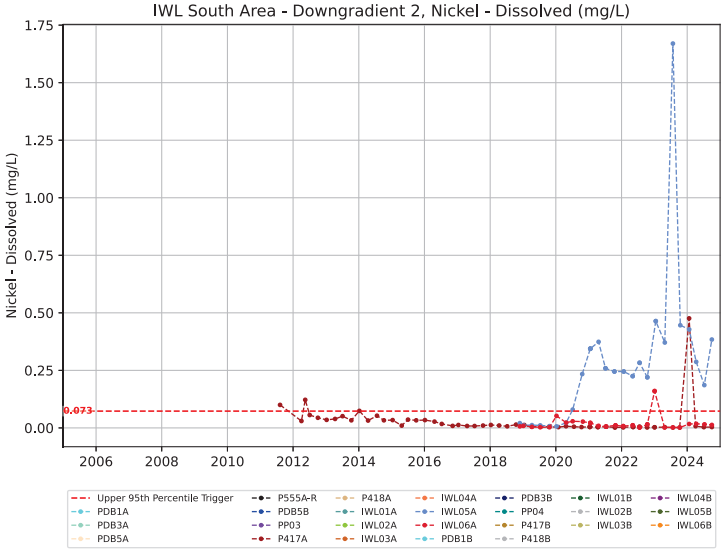
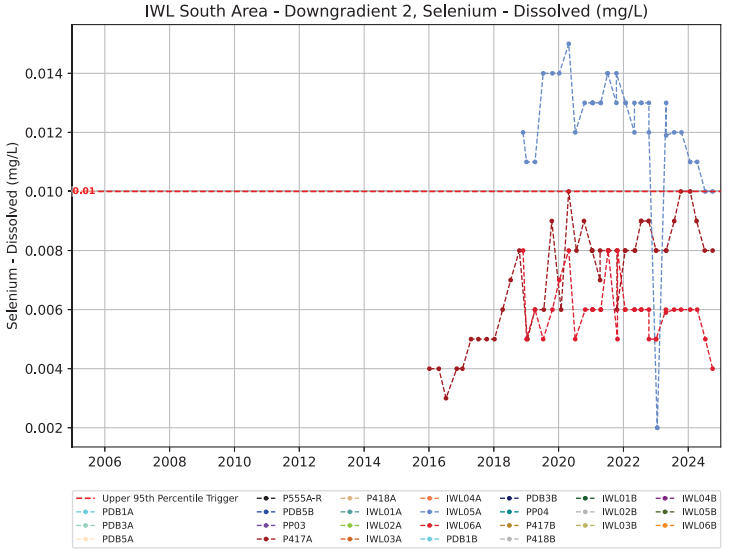
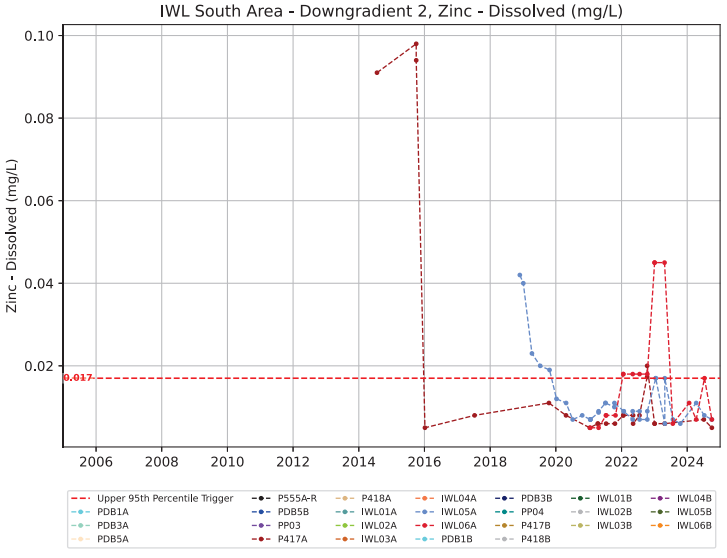
IWL04B
IWL05B
IWL06B

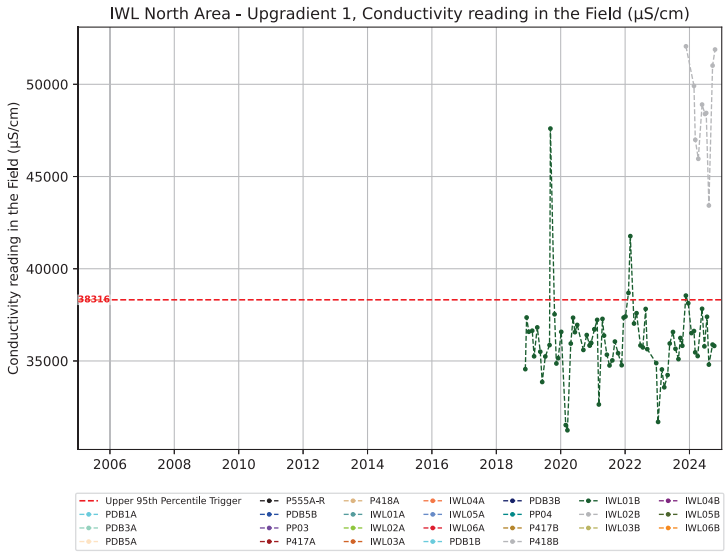

IWL South Area - Downgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.8
0.6
0.4
0.2
0.0
0.077
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

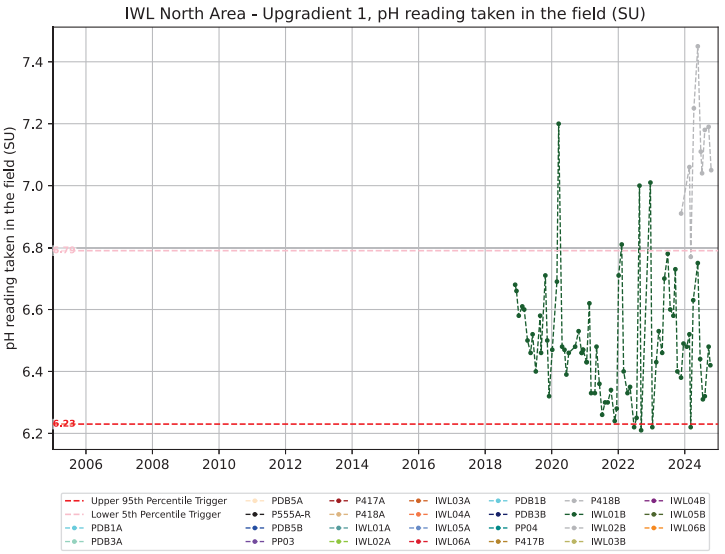

IWL South Area - Downgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
0.0064
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

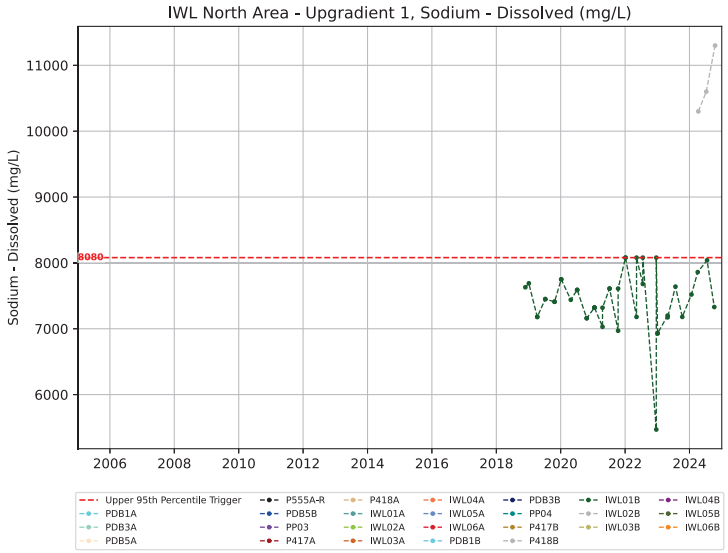

IWL South Area - Downgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.073
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

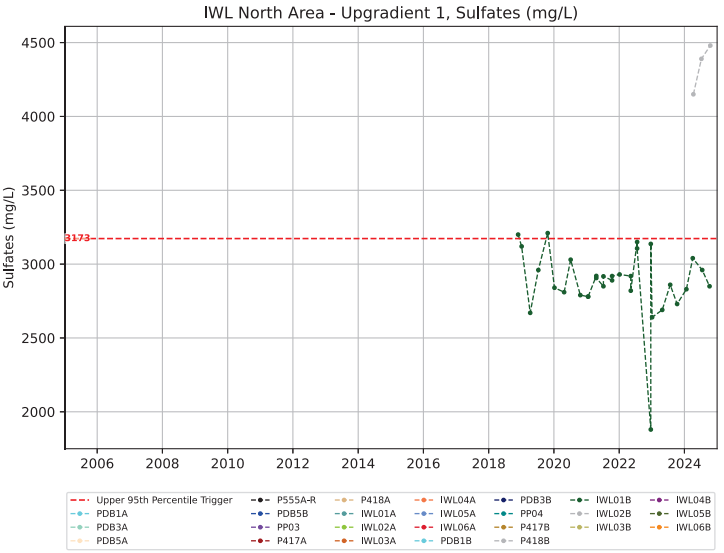

IWL South Area - Downgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

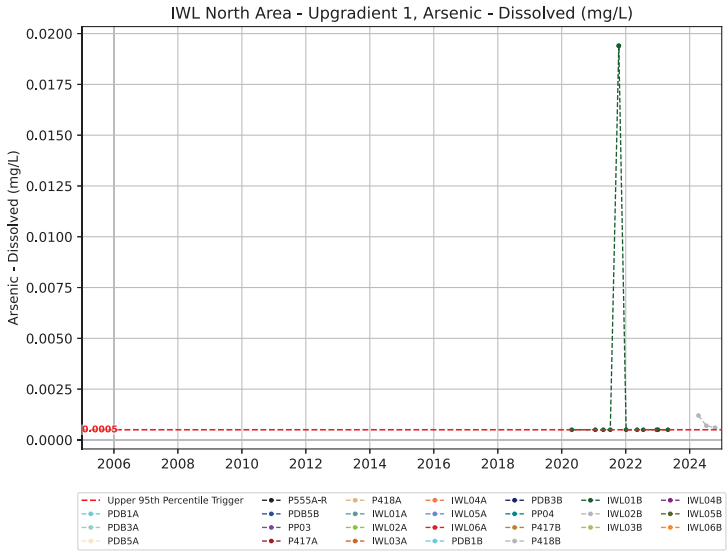

IWL South Area - Downgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.10
0.08
0.06
0.04
0.02
0.017
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

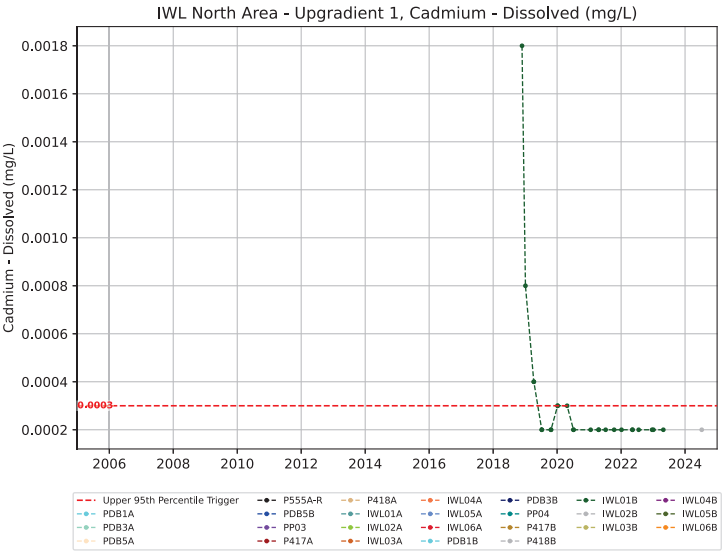

IWL North Area - Upgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
50000
45000
40000
35000
38316
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

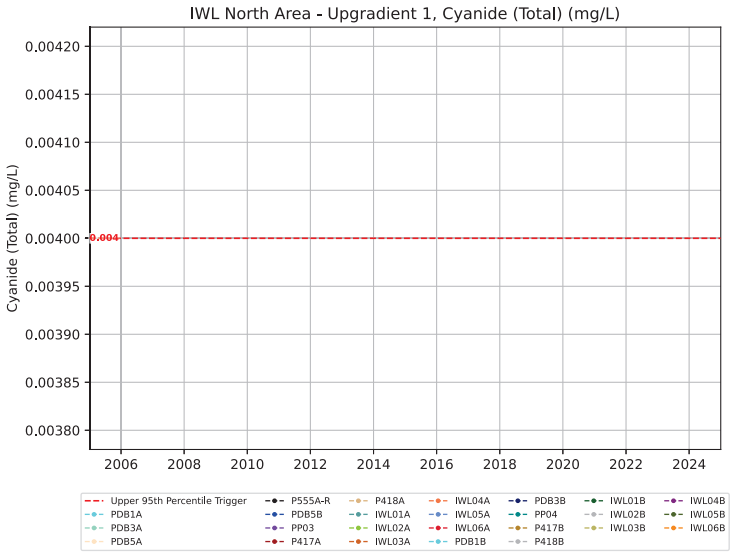

IWL North Area - Upgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.79
6.23
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

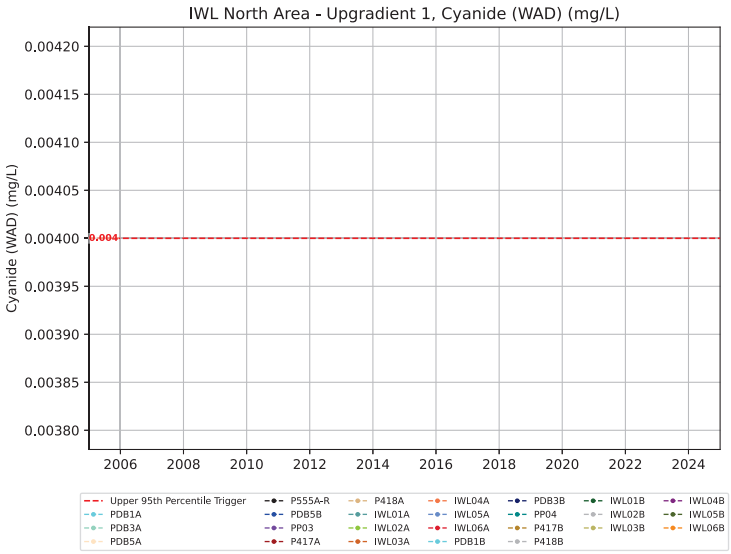

IWL North Area - Upgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11000
10000
9000
8000
7000
6000
8080
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

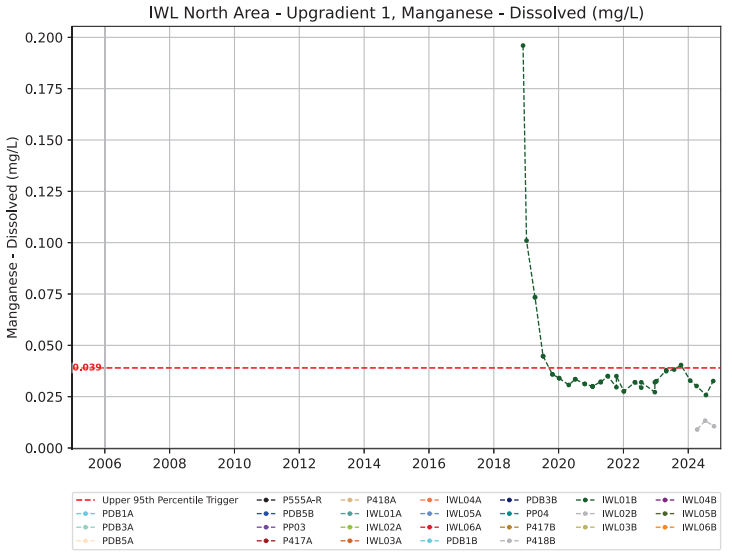

IWL North Area - Upgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
4500
4000
3500
3000
2500
2000
3173
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

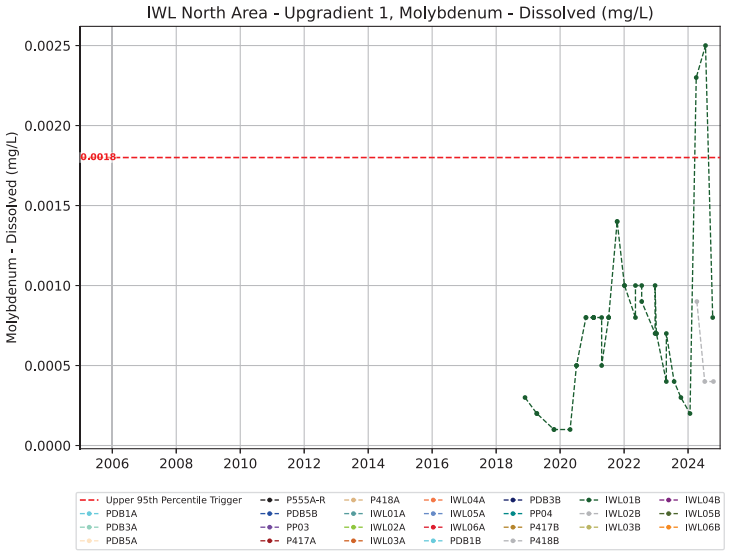

IWL North Area - Upgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.0005
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

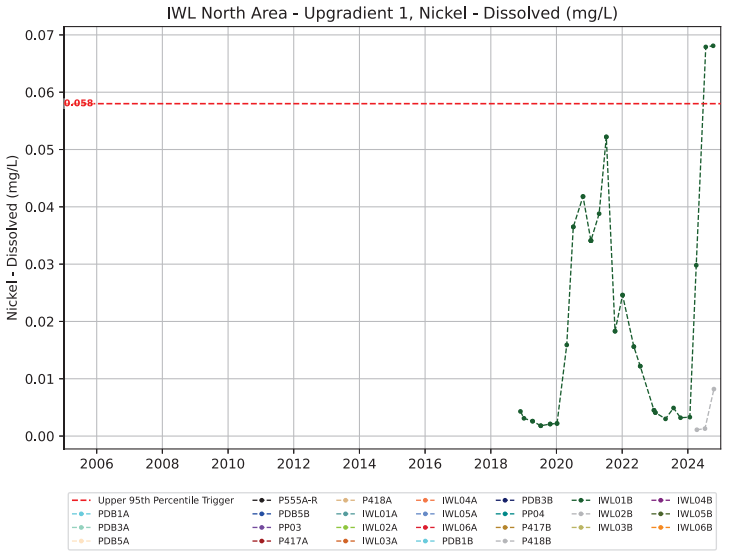

IWL North Area - Upgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0003
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

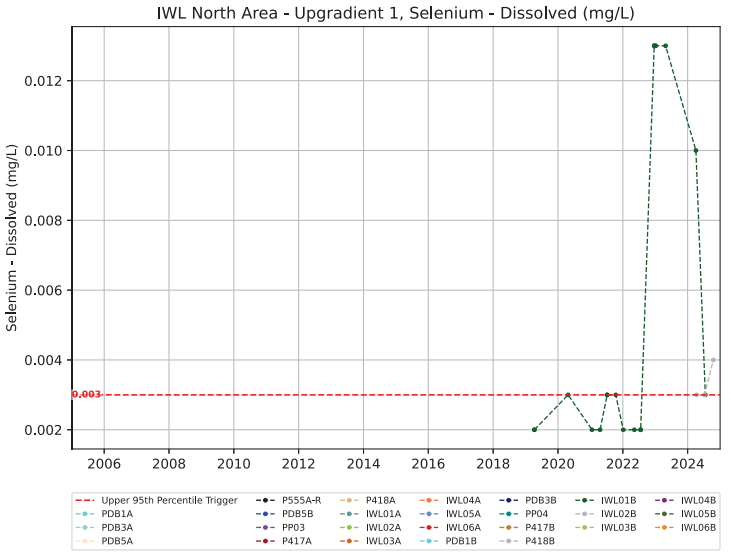

IWL North Area - Upgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

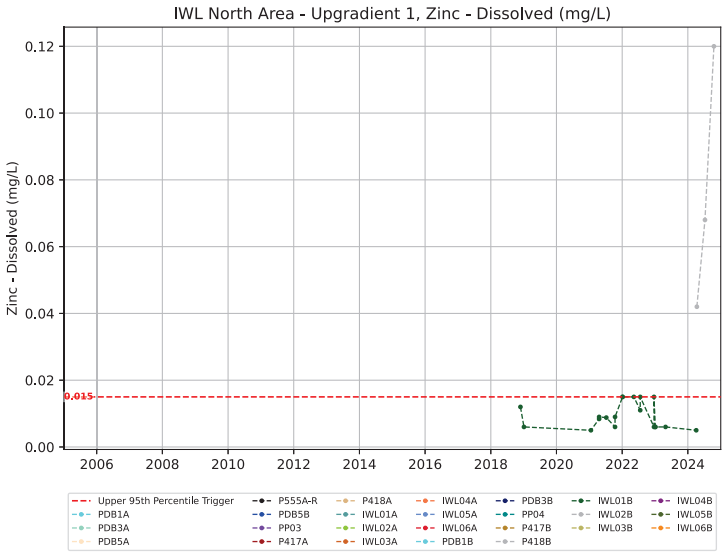

IWL North Area - Upgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

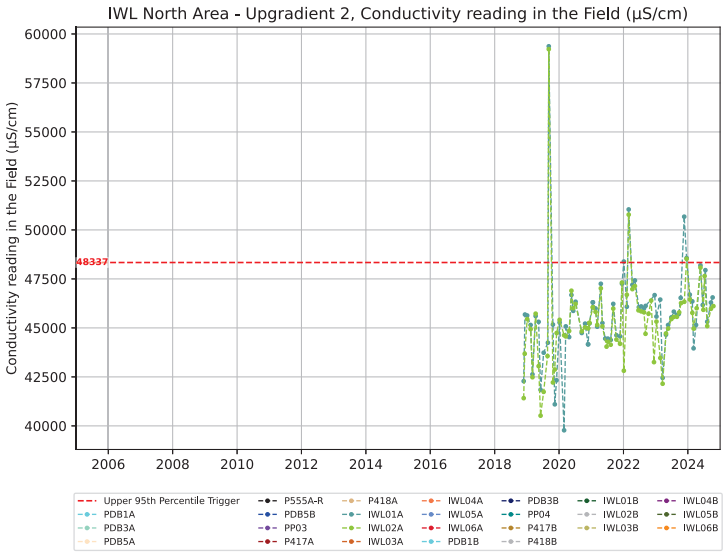

IWL North Area - Upgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.039
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

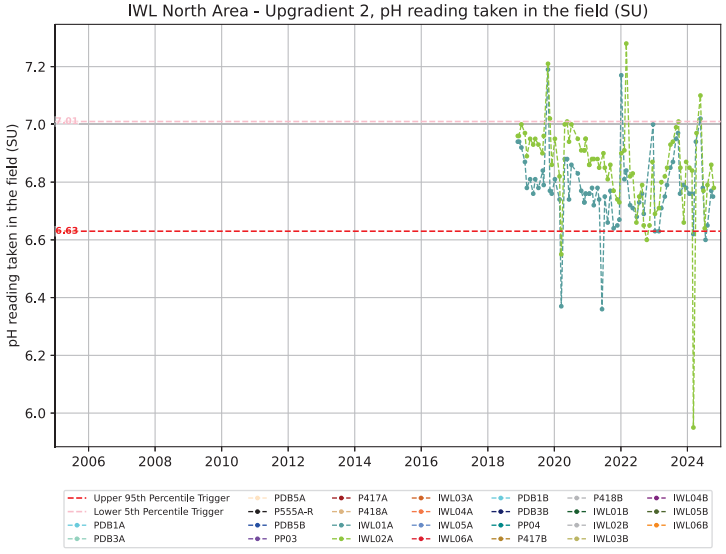

IWL North Area - Upgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0018
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

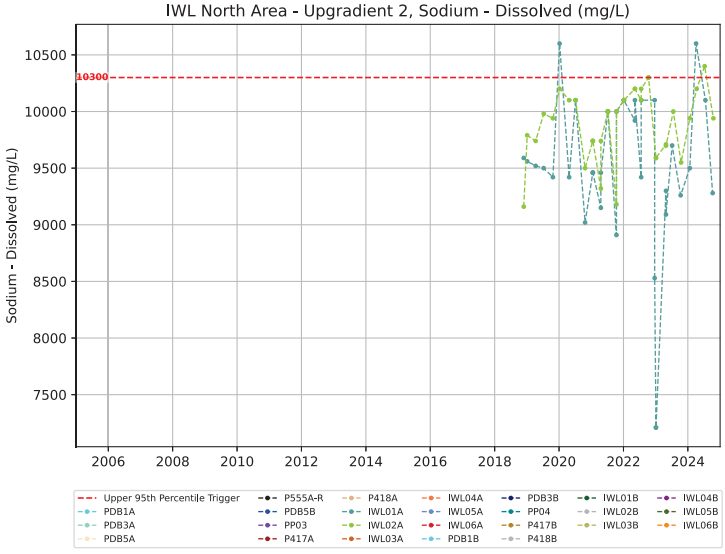

IWL North Area - Upgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.058
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

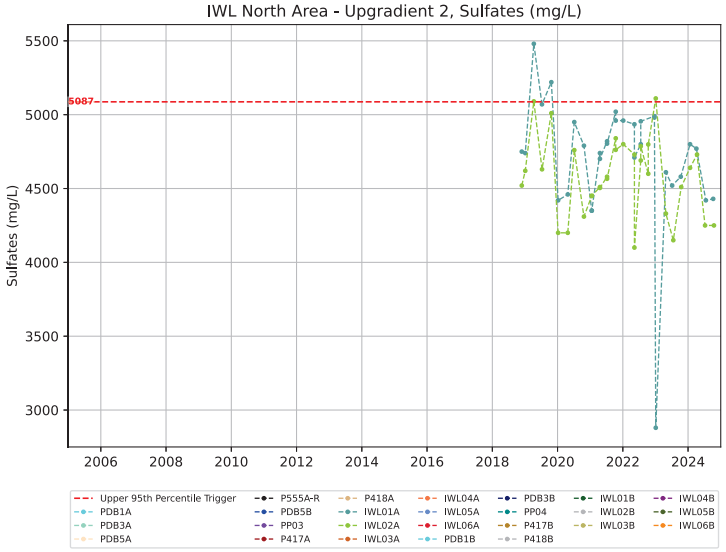

IWL North Area - Upgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.003
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL North Area - Upgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Upgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
48337
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Upgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.01
6.63
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Upgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10300
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Upgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
5087
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
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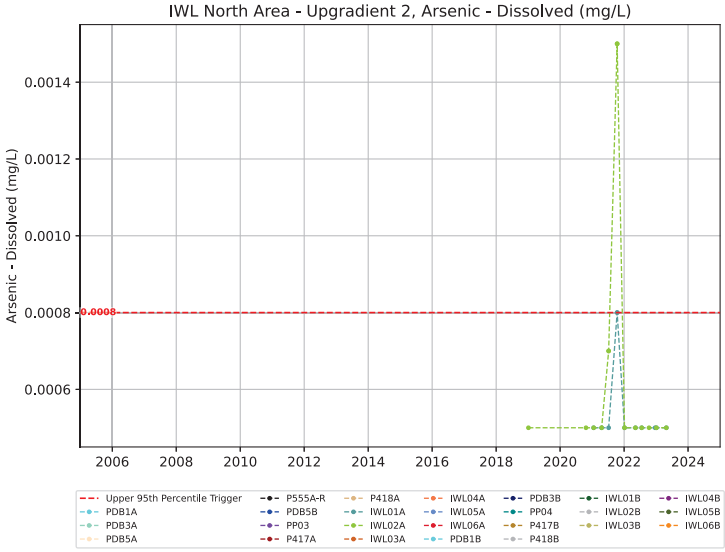
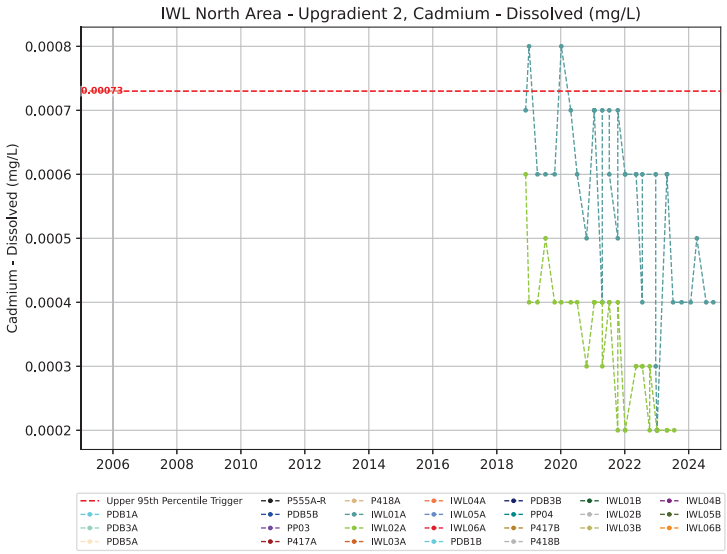
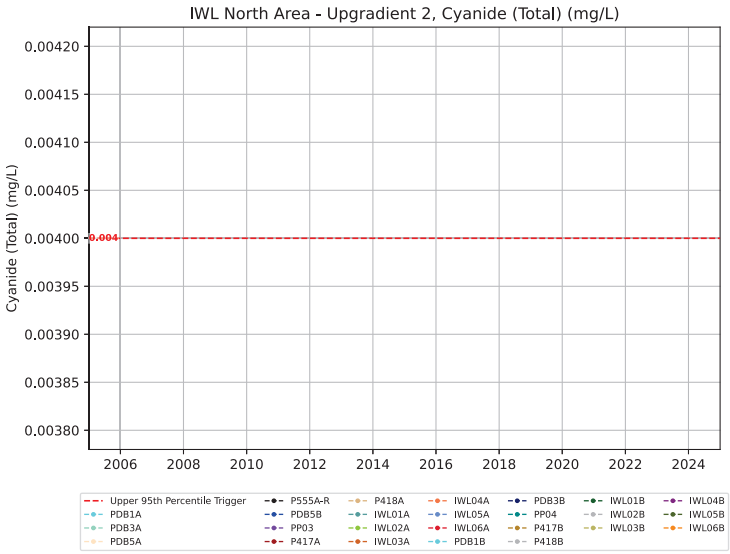
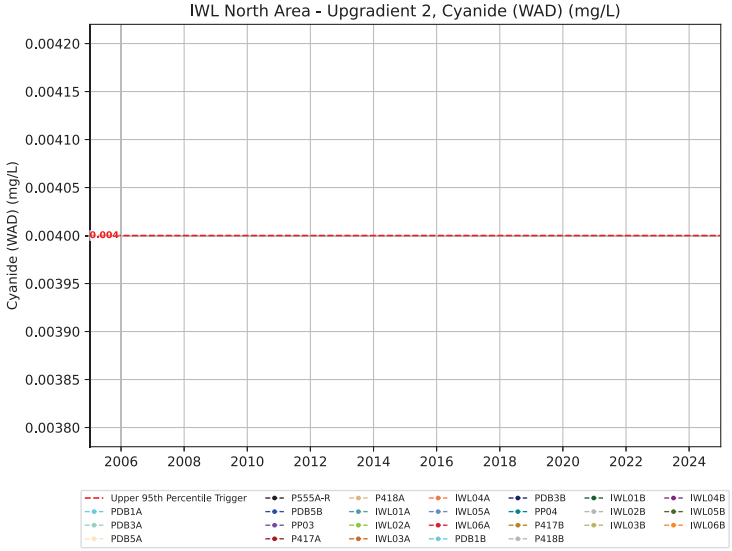
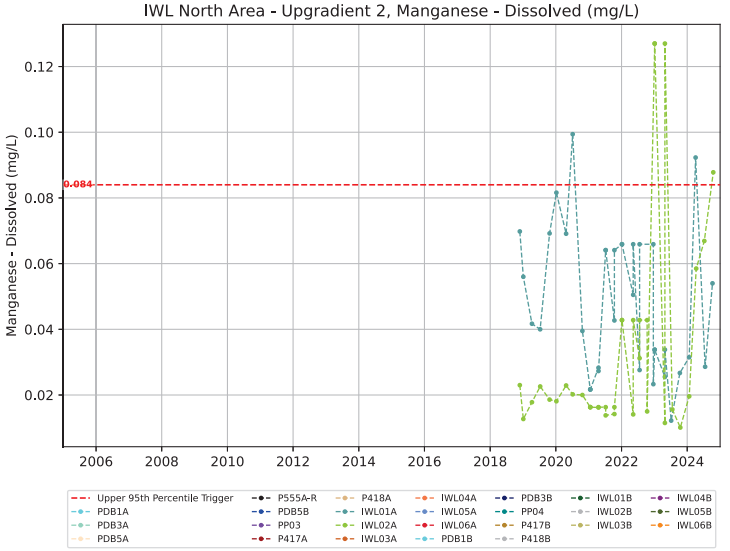
IWL05B
IWL06B

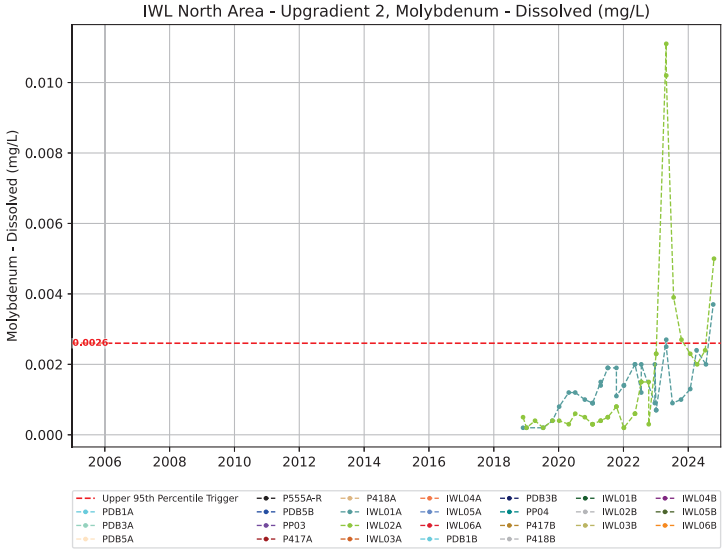

IWL North Area - Upgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

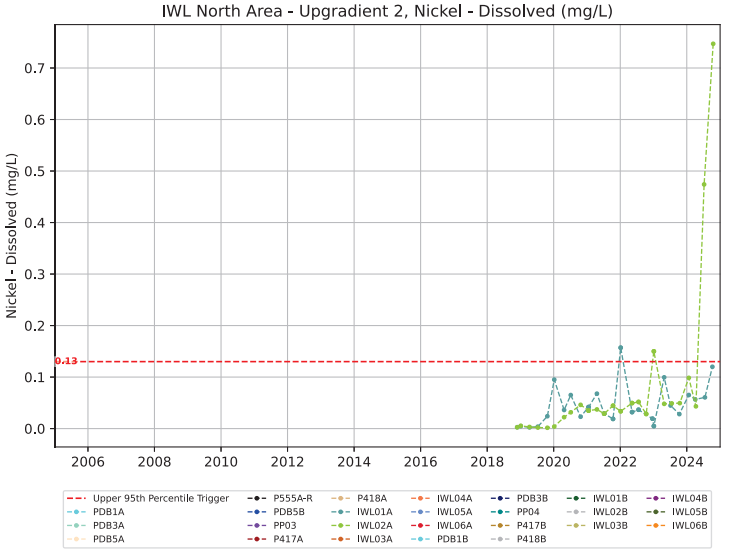

IWL North Area - Upgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.00073
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

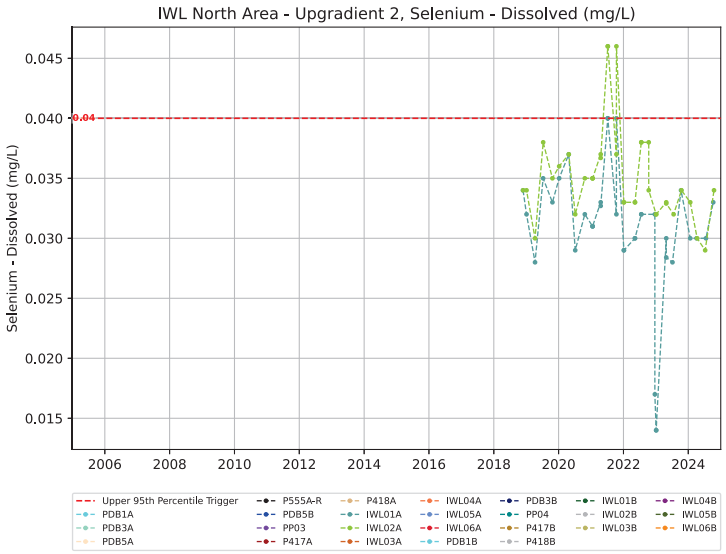

IWL North Area - Upgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

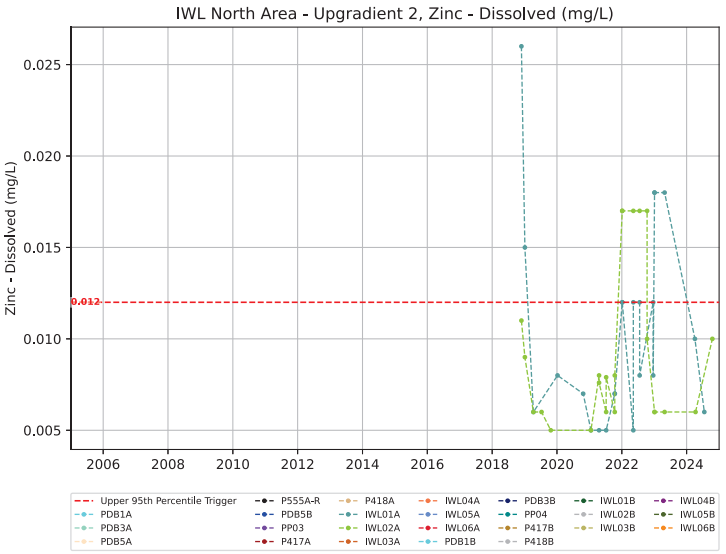

IWL North Area - Upgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

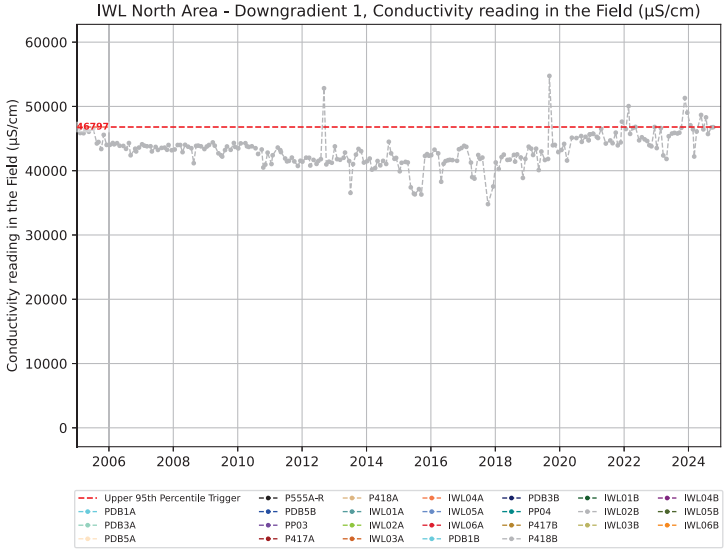

IWL North Area - Upgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.084
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

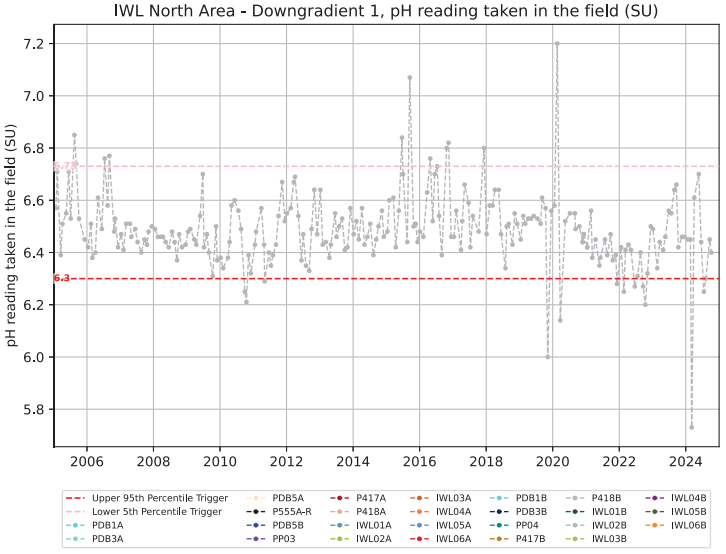

IWL North Area - Upgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0026
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

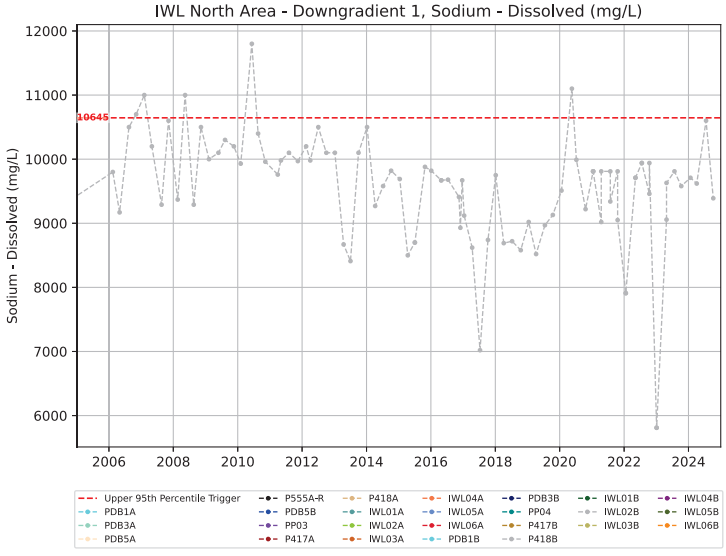

IWL North Area - Upgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.13
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

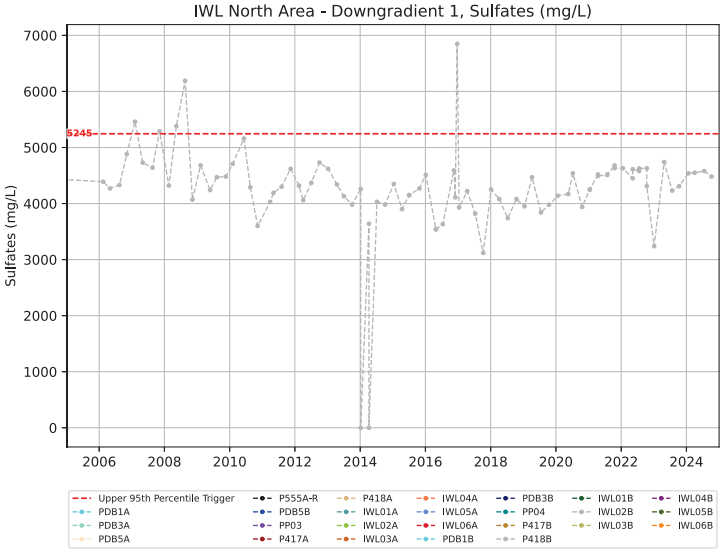

IWL North Area - Upgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.04
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

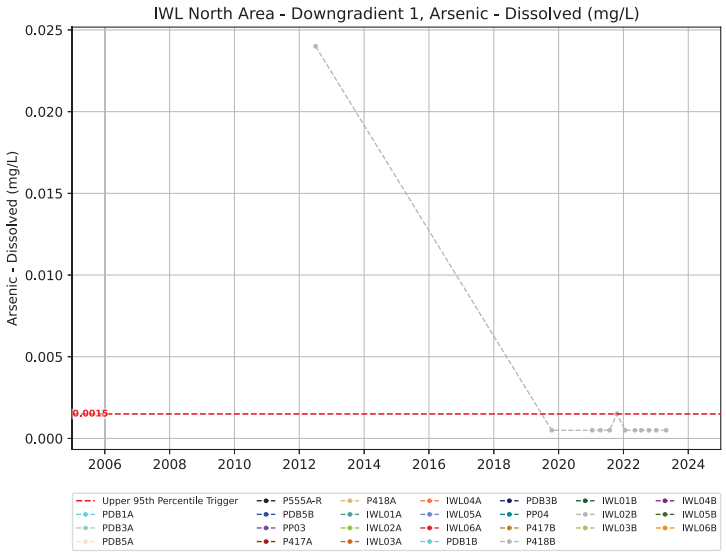

IWL North Area - Upgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

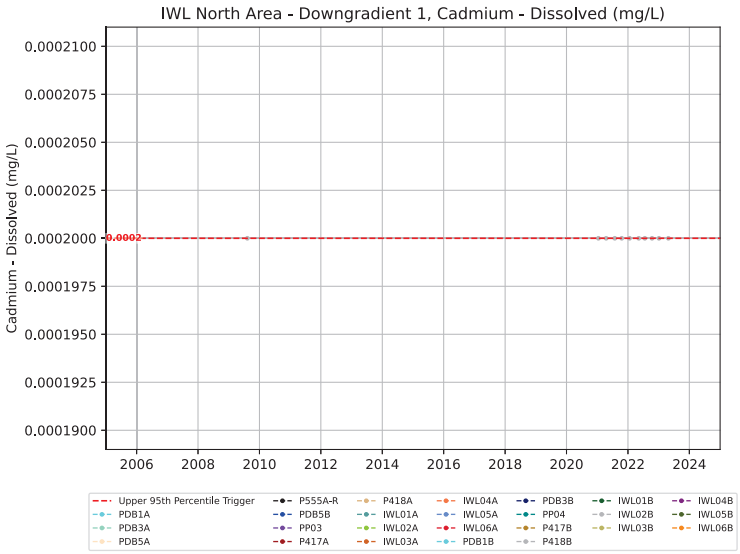

IWL North Area - Downgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
46797
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

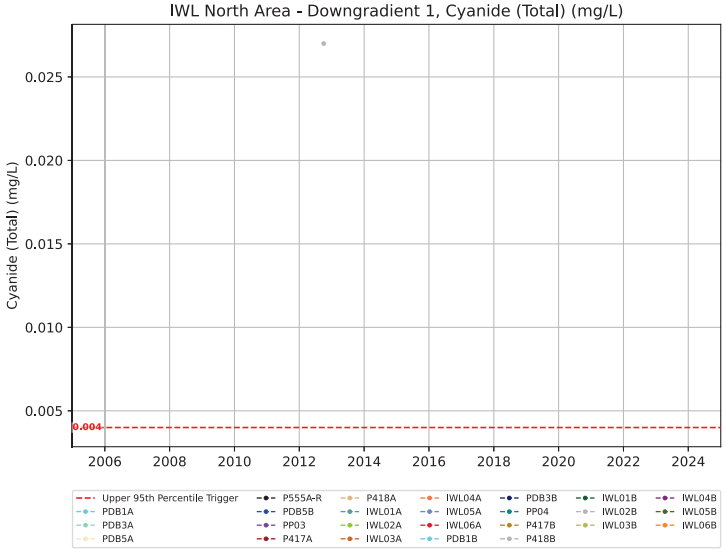

IWL North Area - Downgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.73
6.3
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

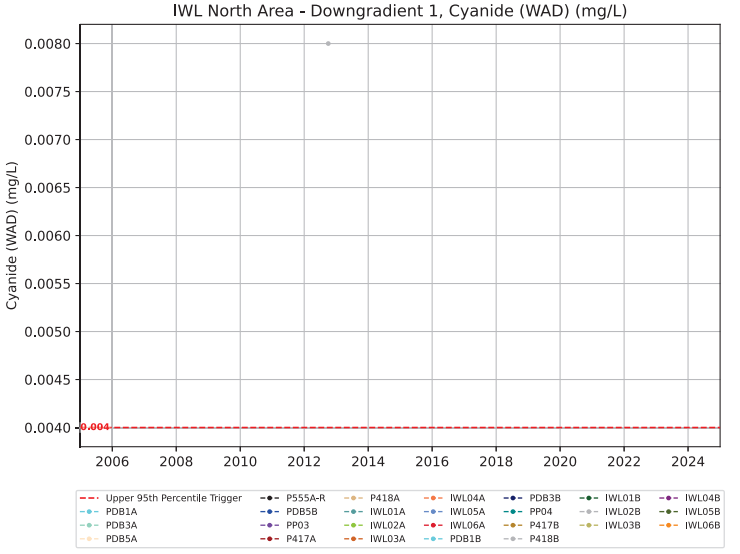

IWL North Area - Downgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10645
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

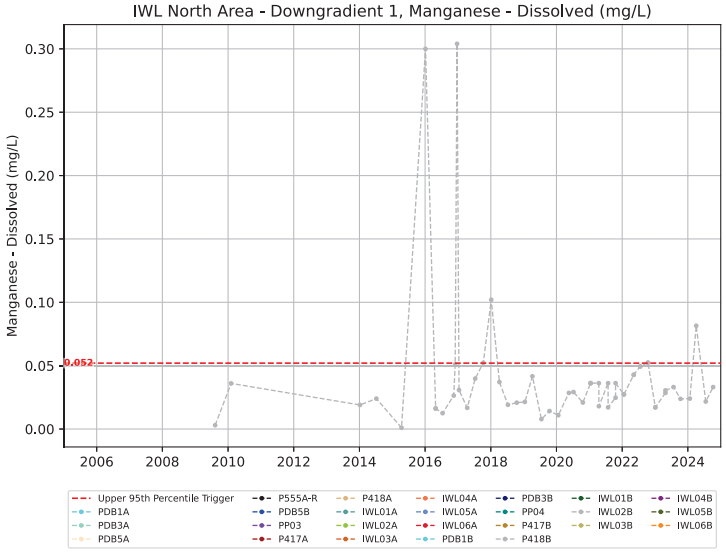

IWL North Area - Downgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
5245
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

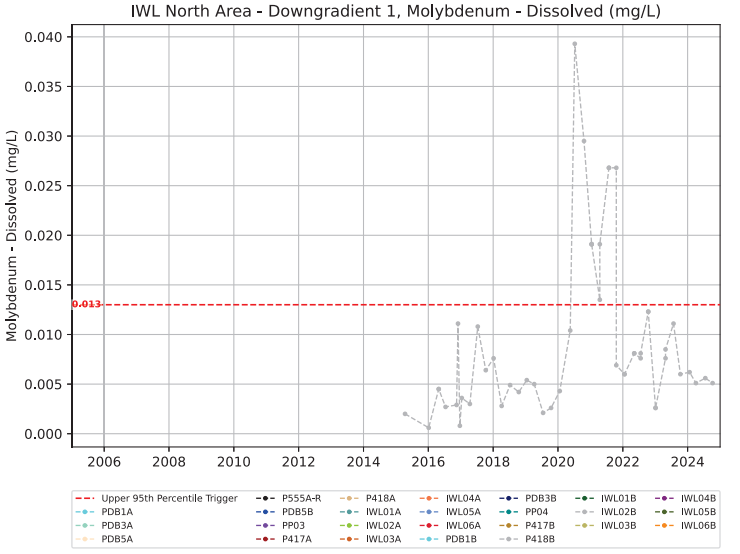

IWL North Area - Downgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

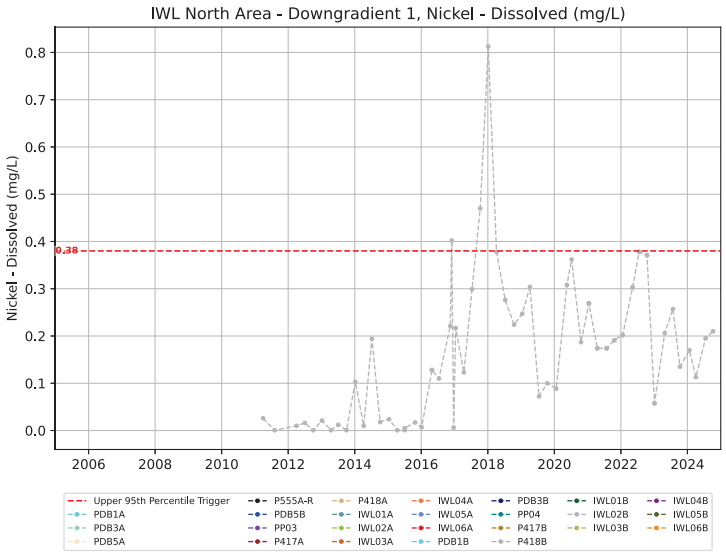

IWL North Area - Downgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

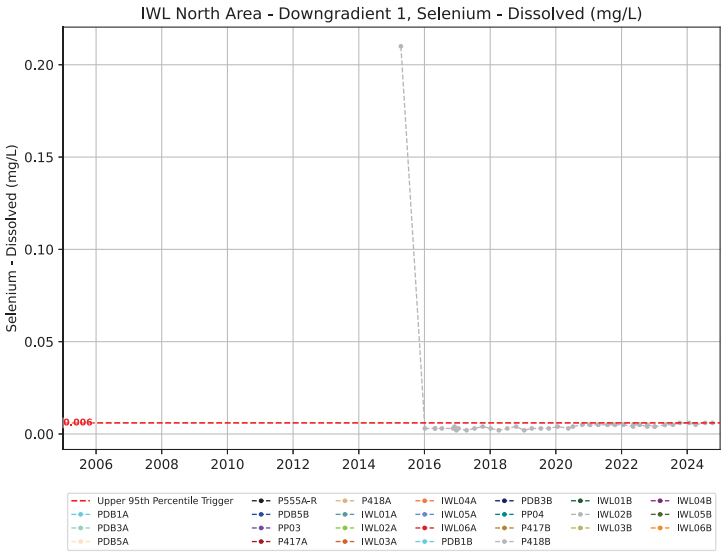

IWL North Area - Downgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

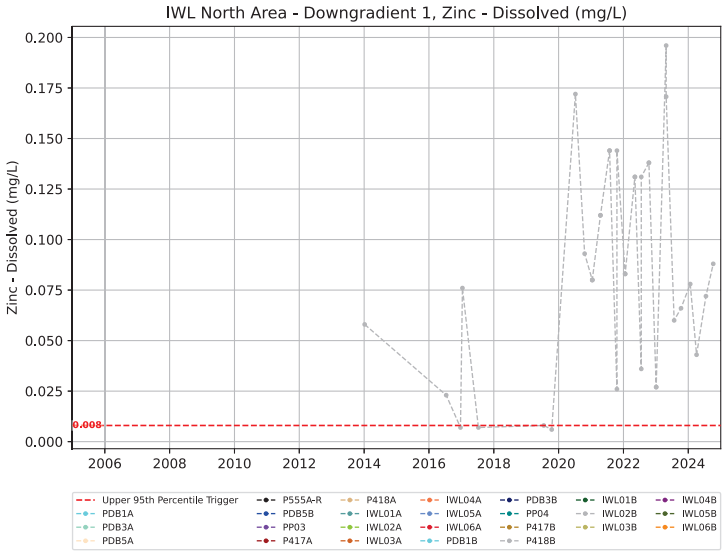

IWL North Area - Downgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

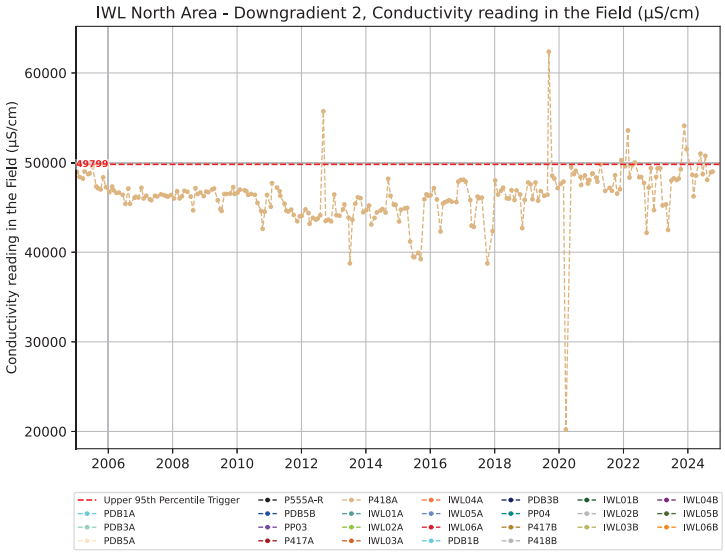

IWL North Area - Downgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.052
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

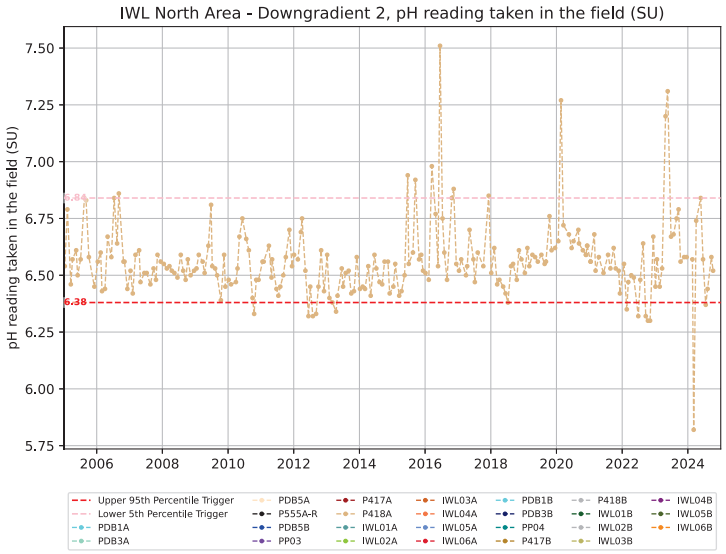

IWL North Area - Downgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.013
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.38
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.006
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
49799
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.84
6.38
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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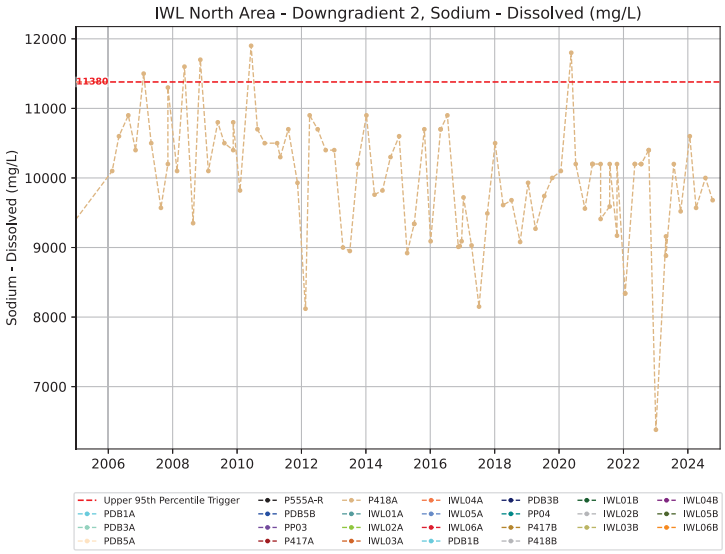
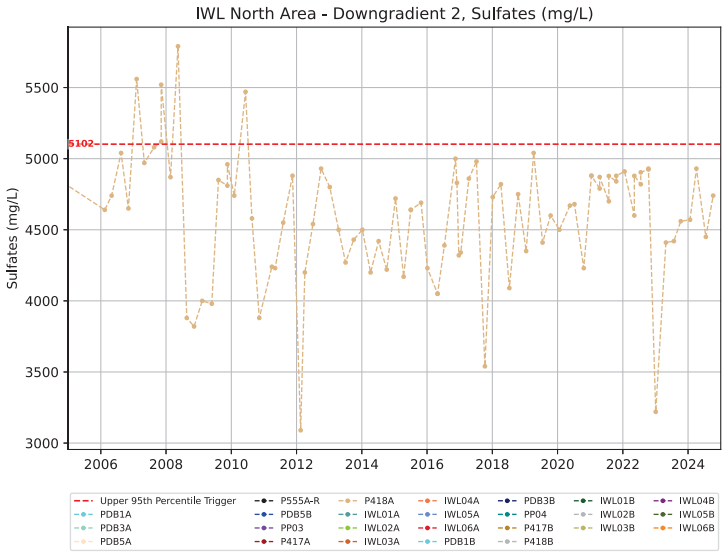
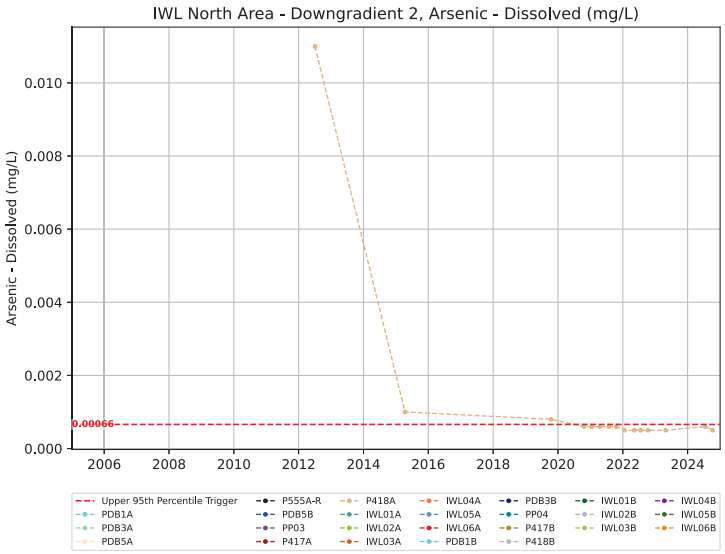
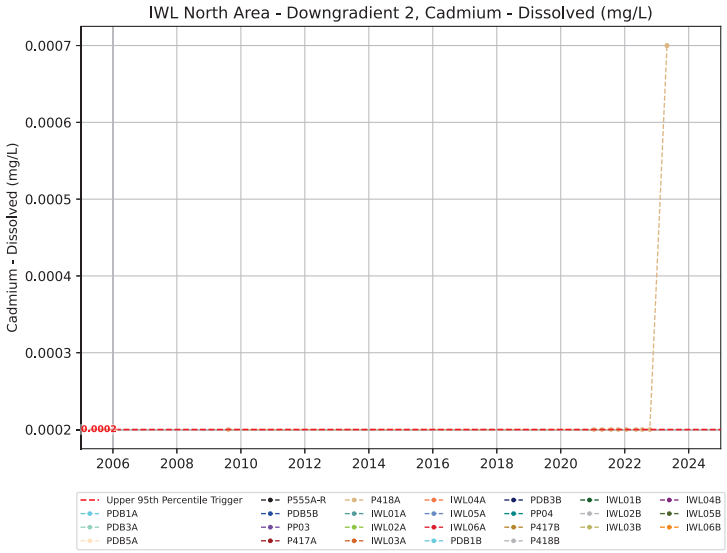
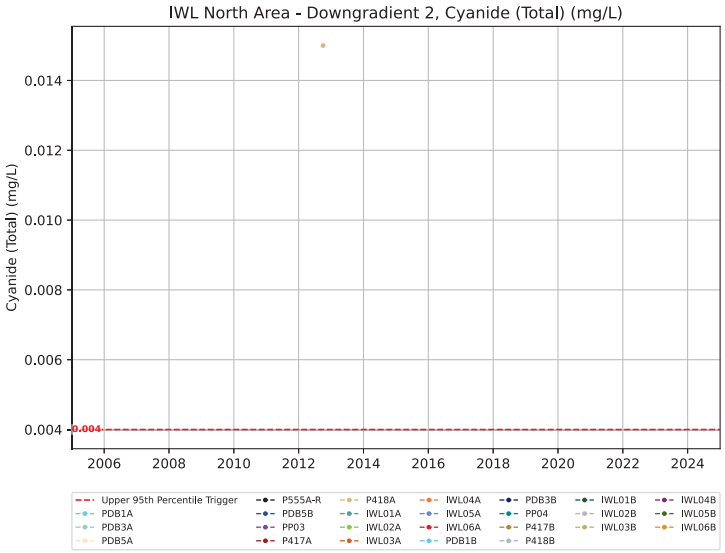
IWL04B
IWL05B
IWL06B

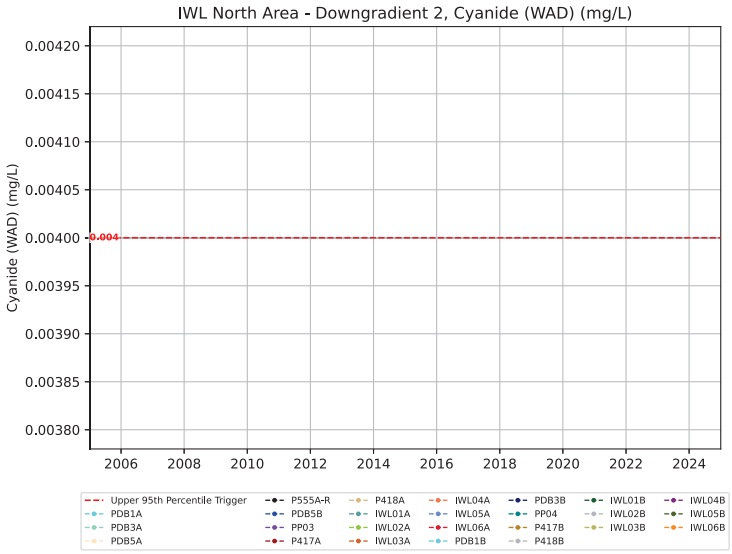

IWL North Area - Downgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11380
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

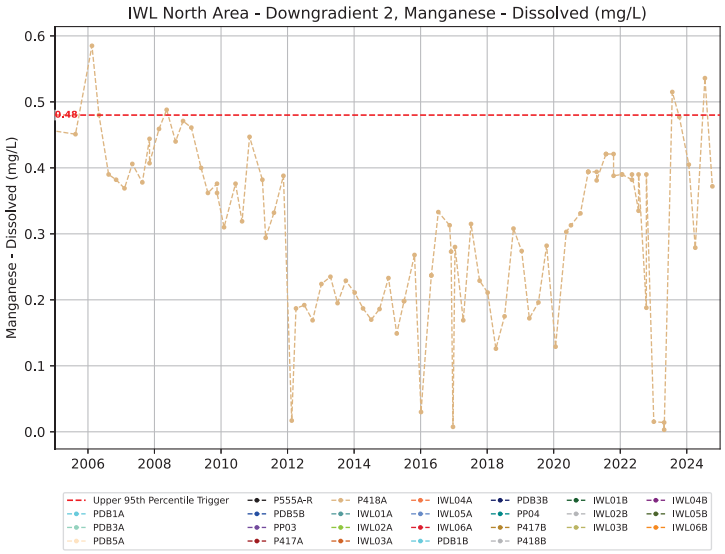

IWL North Area - Downgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
5102
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

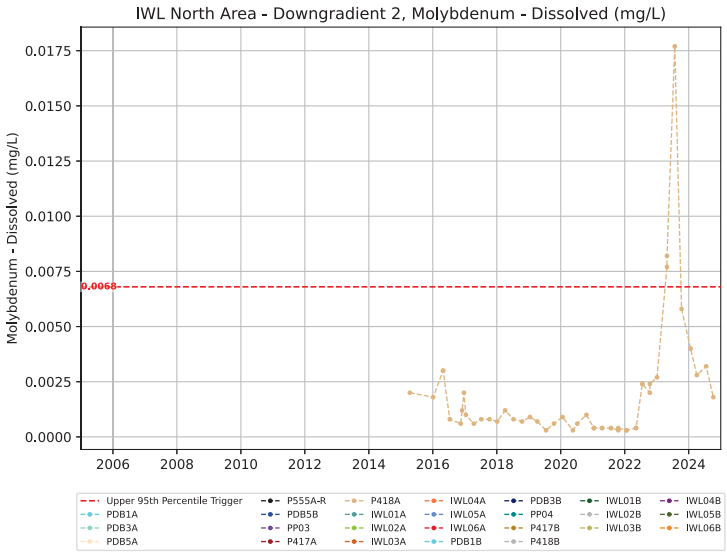

IWL North Area - Downgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00066
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

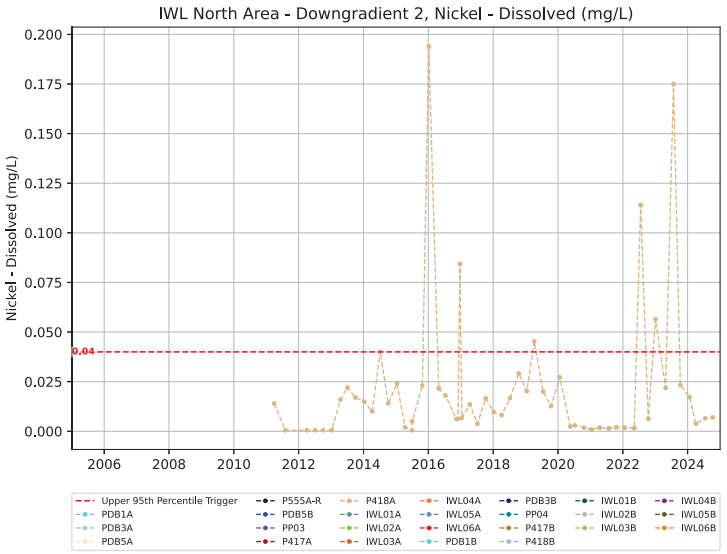

IWL North Area - Downgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

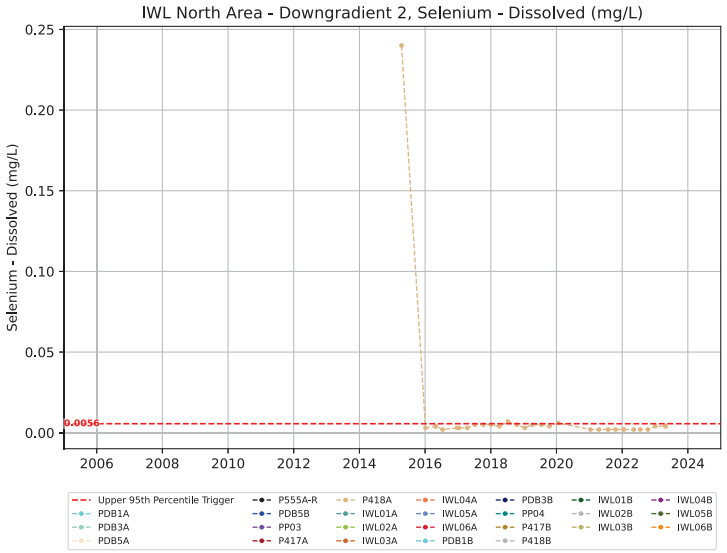

IWL North Area - Downgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

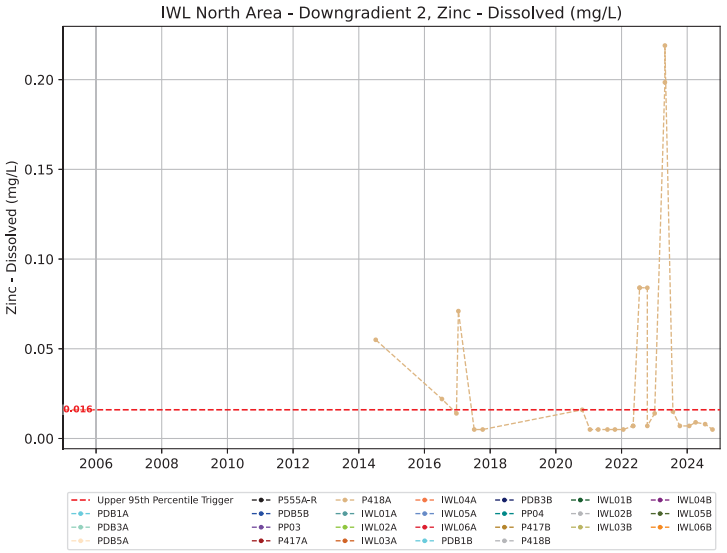

IWL North Area - Downgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

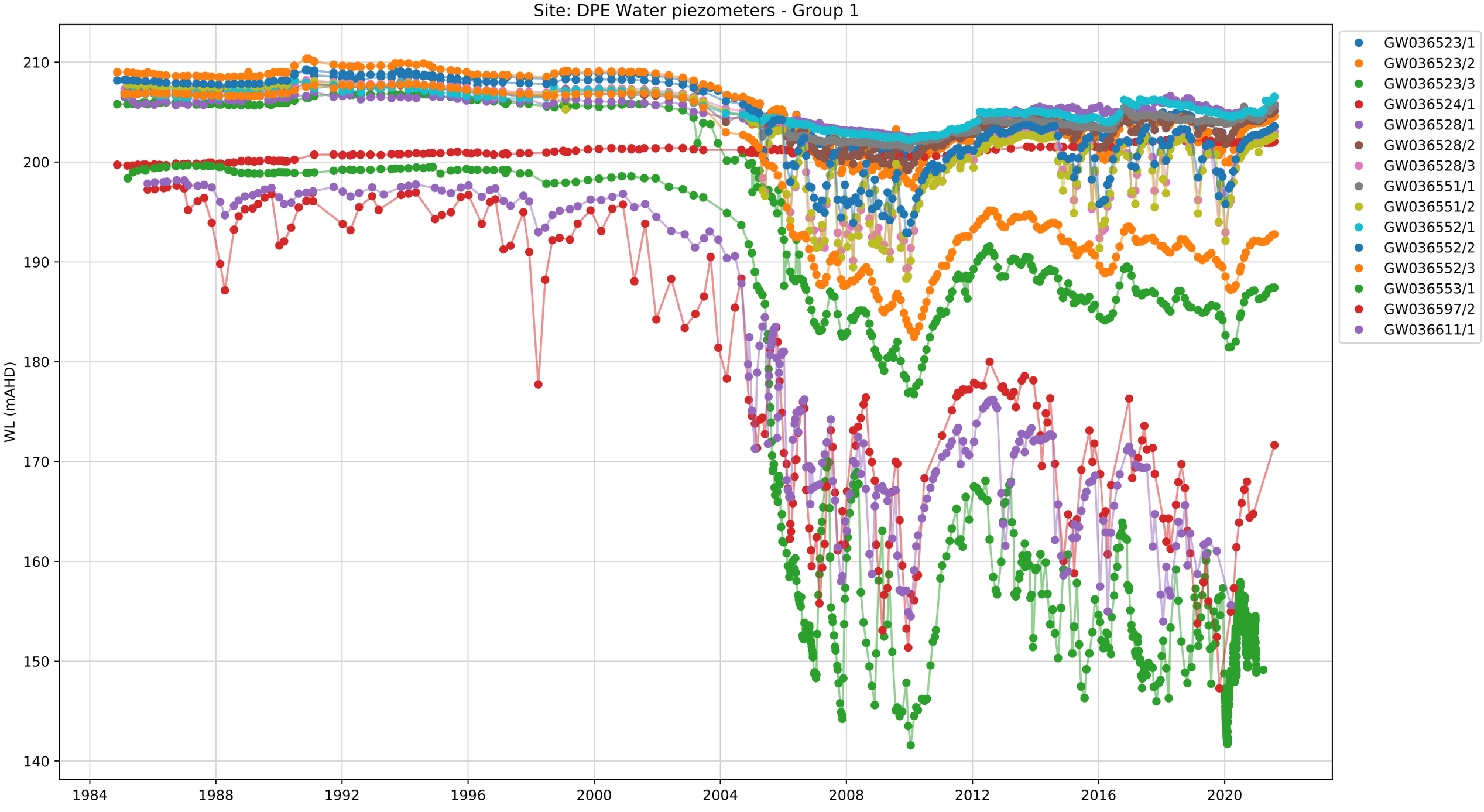

IWL North Area - Downgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.48
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

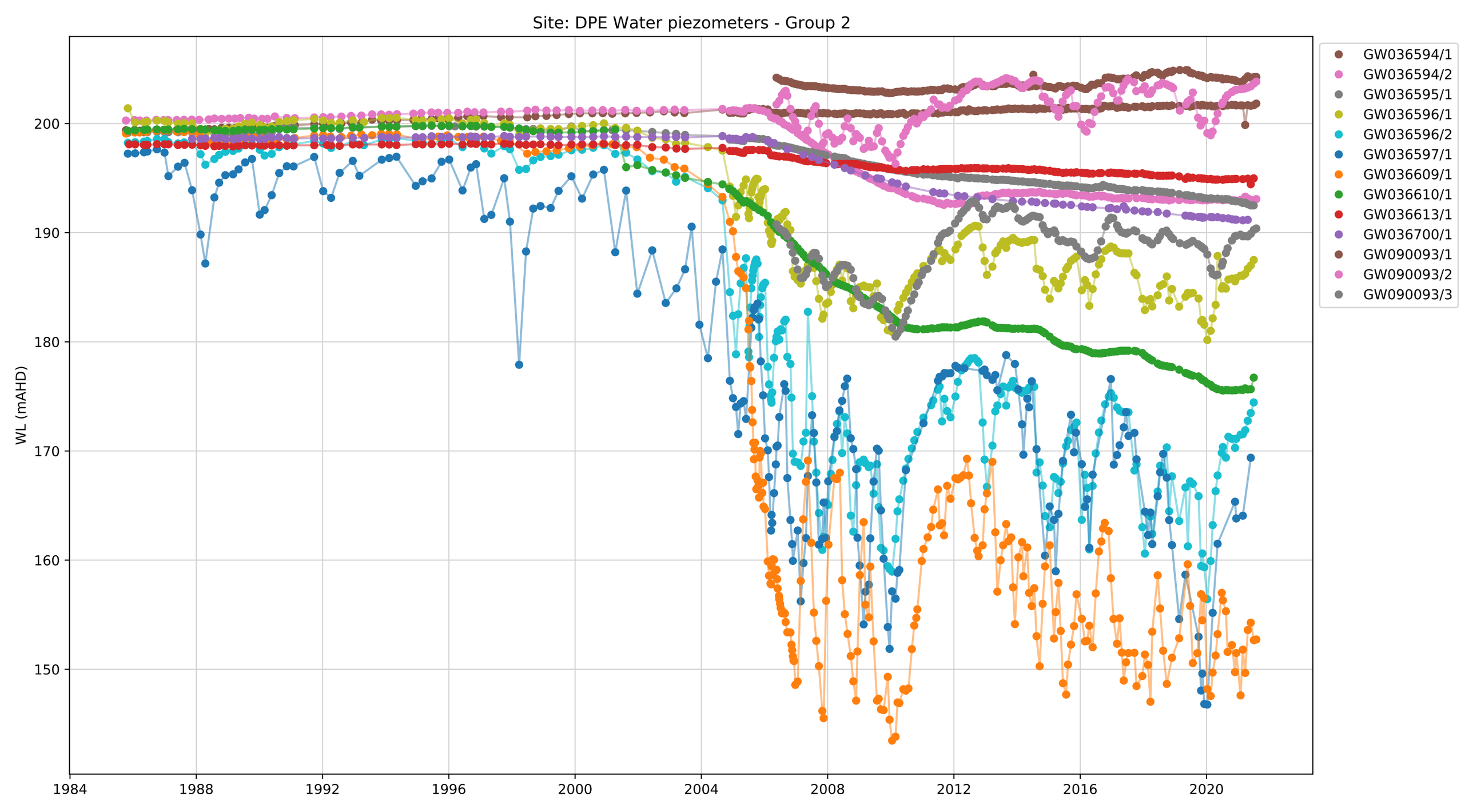

IWL North Area - Downgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.0068
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

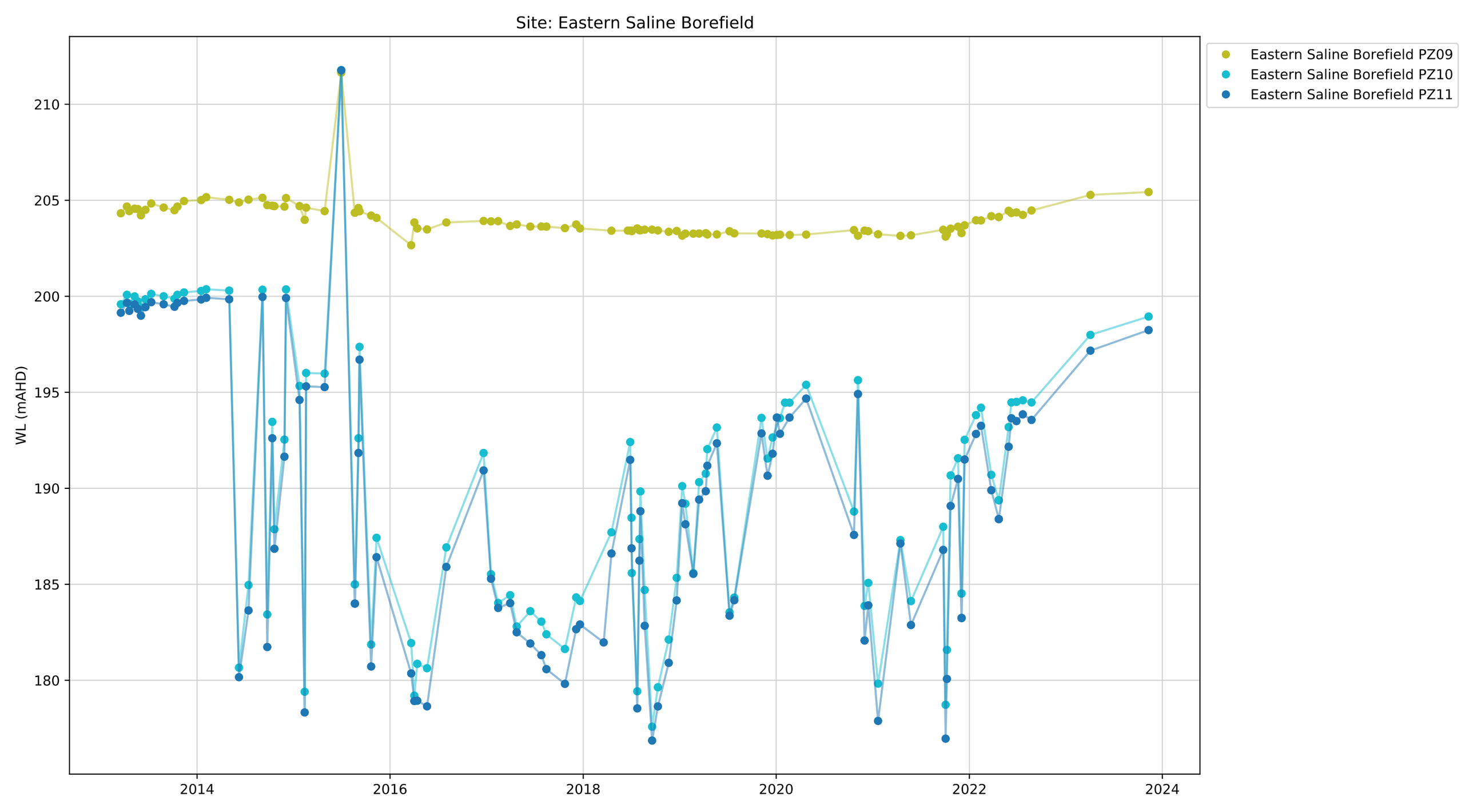

IWL North Area - Downgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.04
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

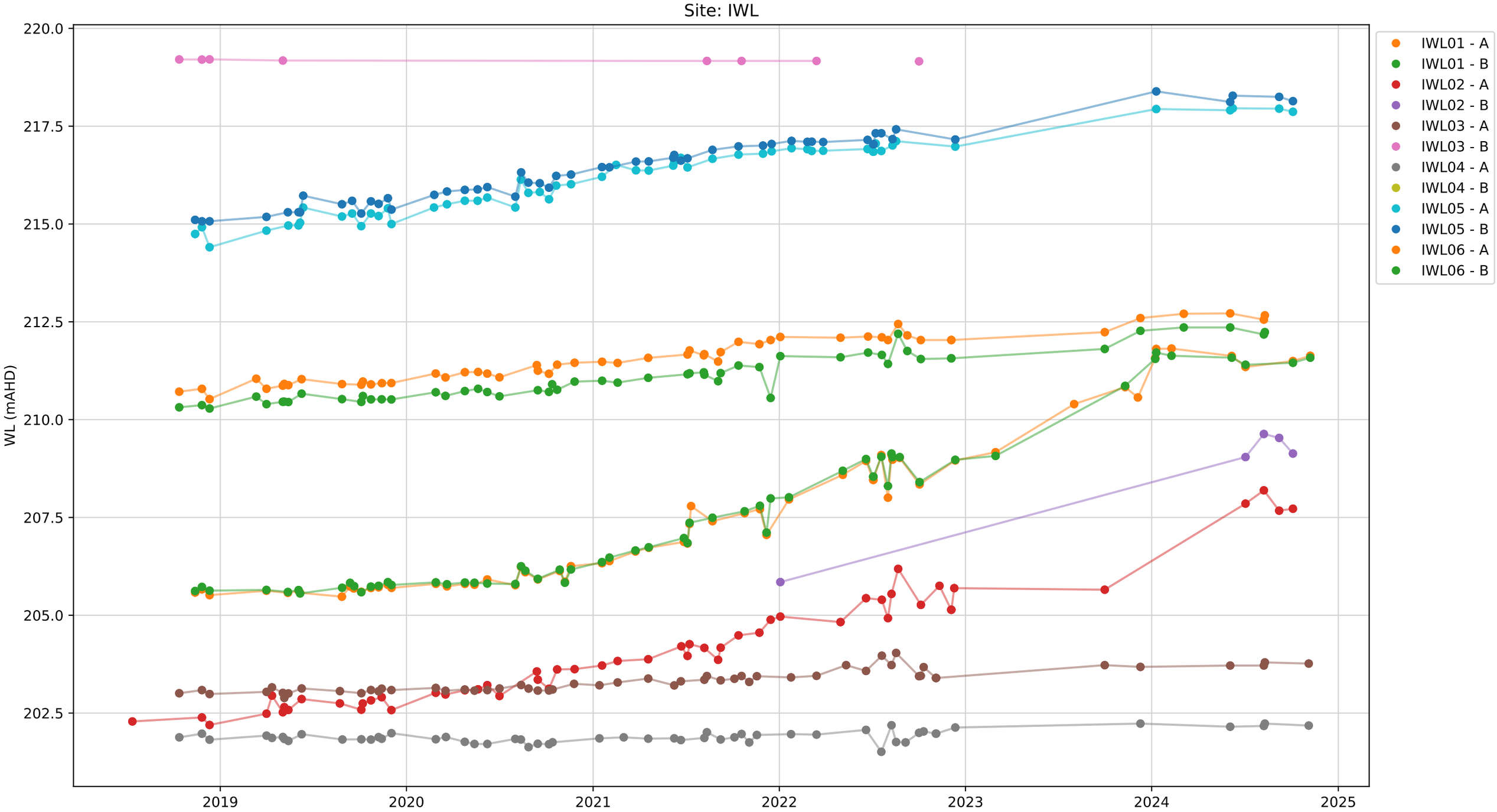

IWL North Area - Downgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
0.0056
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

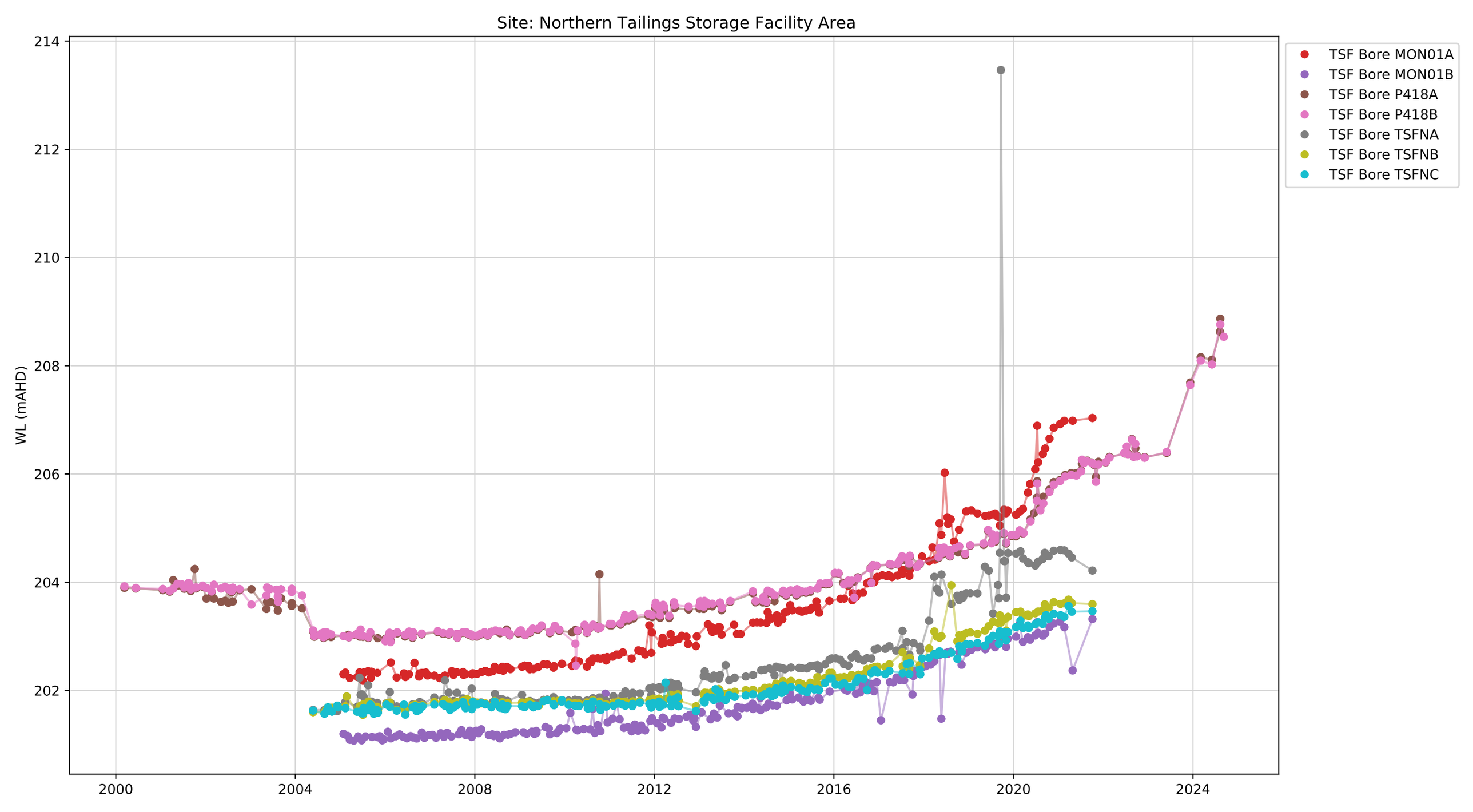

IWL North Area - Downgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.20
0.15
0.10
0.05
0.00
0.016
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

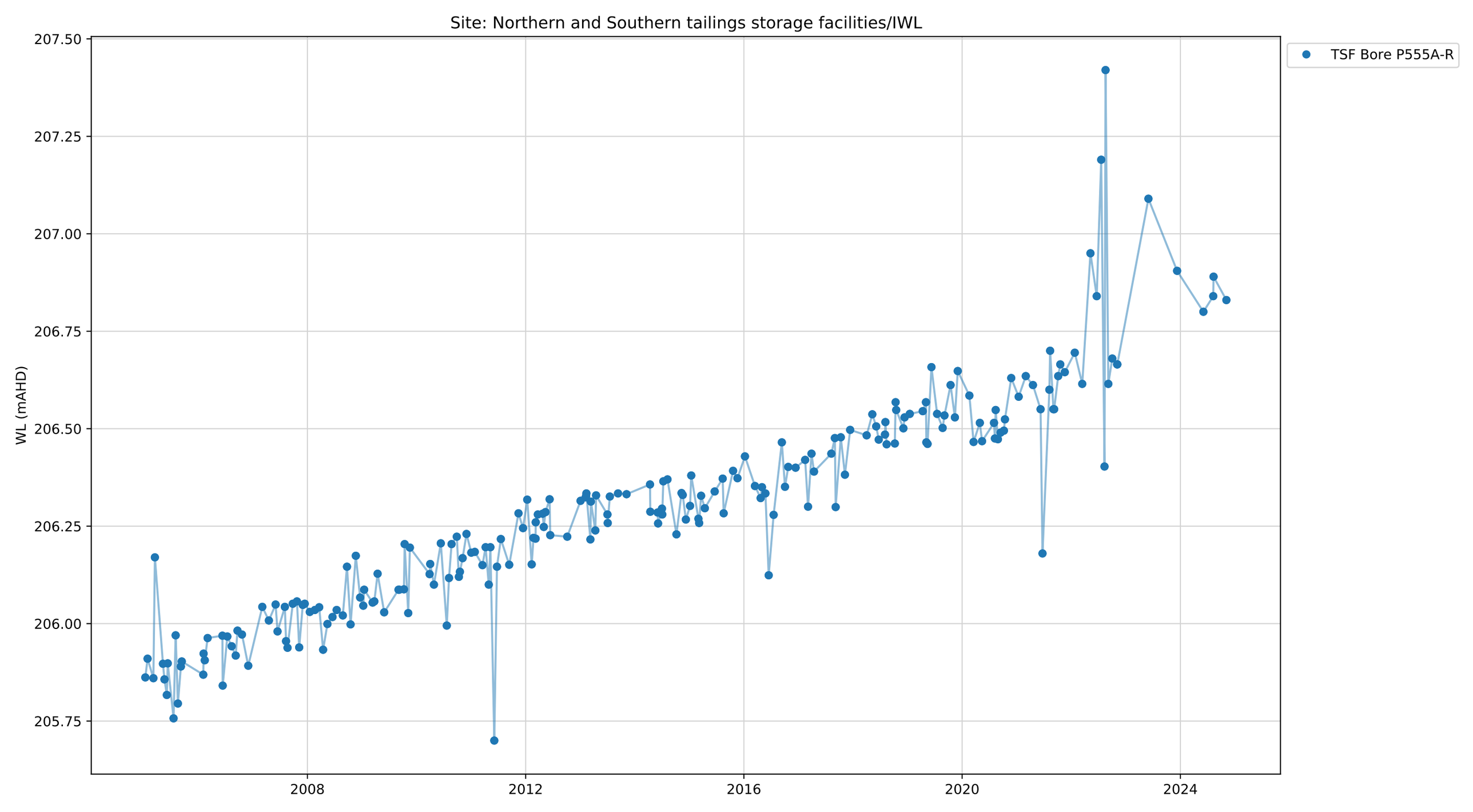

Site: DPE Water piezometers - Group 1
WL (mAHD)
210
200
190
180
170
160
150
140
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
GW036523/1
GW036523/2
GW036523/3
GW036524/1
GW036528/1
GW036528/2
GW036528/3
GW036551/1
GW036551/2
GW036552/1
GW036552/2
GW036552/3
GW036553/1
GW036597/2
GW036611/1

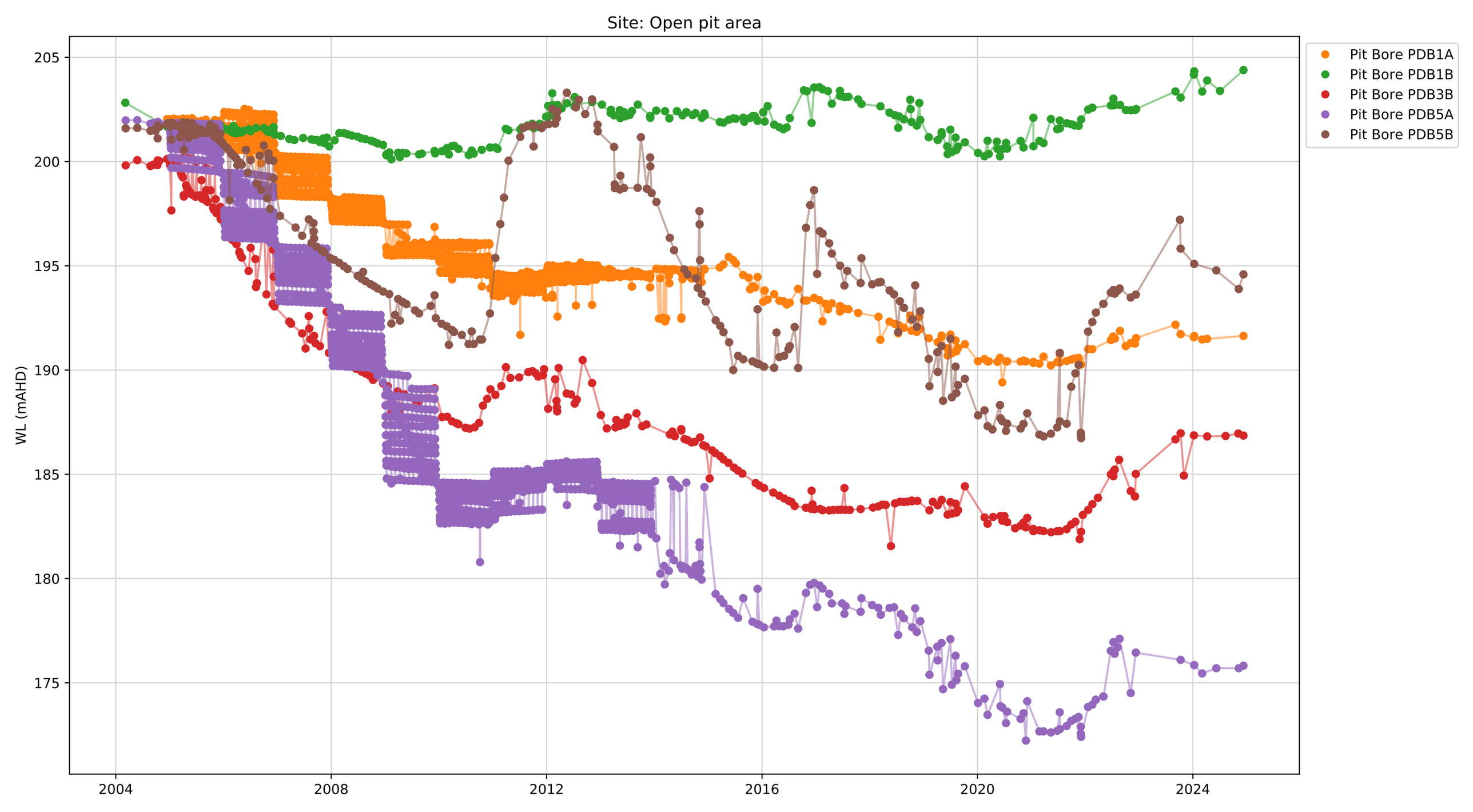

Site: DPE Water piezometers - Group 2
WL (mAHD)
200
190
180
170
160
150
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
GW036594/1
GW036594/2
GW036595/1
GW036596/1
GW036596/2
GW036597/1
GW036609/1
GW036610/1
GW036613/1
GW036700/1
GW090093/1
GW090093/2
GW090093/3

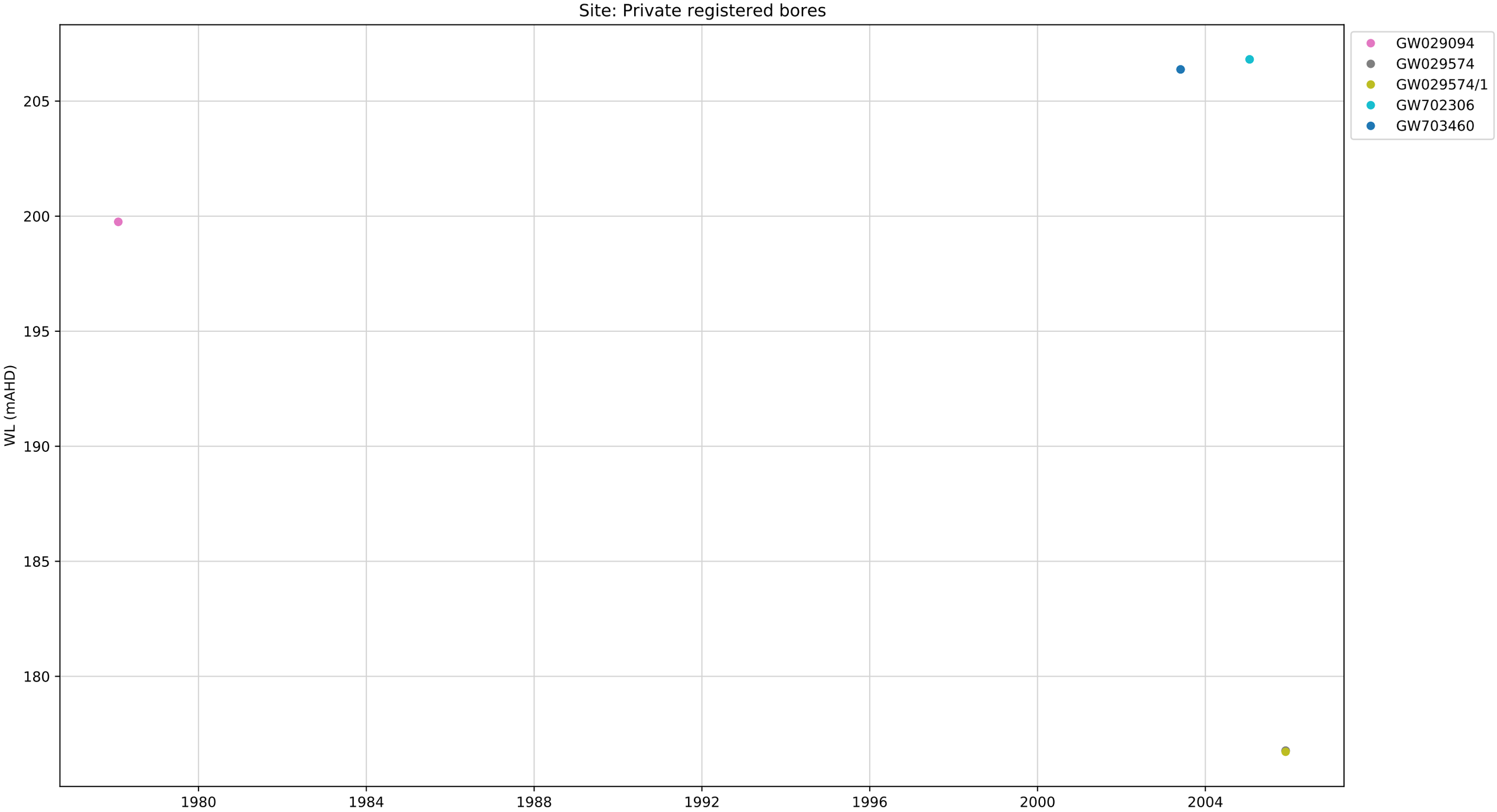

Site: Eastern Saline Borefield
Eastern Saline Borefield PZ09
Eastern Saline Borefield PZ10
Eastern Saline Borefield PZ11
WL (mAHD)
210
205
200
195
190
185
180
2014
2016
2018
2020
2022
2024


Site: IWL
WL (mAHD)
220.0
217.5
215.0
212.5
210.0
207.5
205.0
202.5
2019
2020
2021
2022
2023
2024
2025
IWL01 - A
IWL01 - B
IWL02 - A
IWL02 - B
IWL03 - A
IWL03 - B
IWL04 - A
IWL04 - B
IWL05 - A
IWL05 - B
IWL06 - A
IWL06 - B

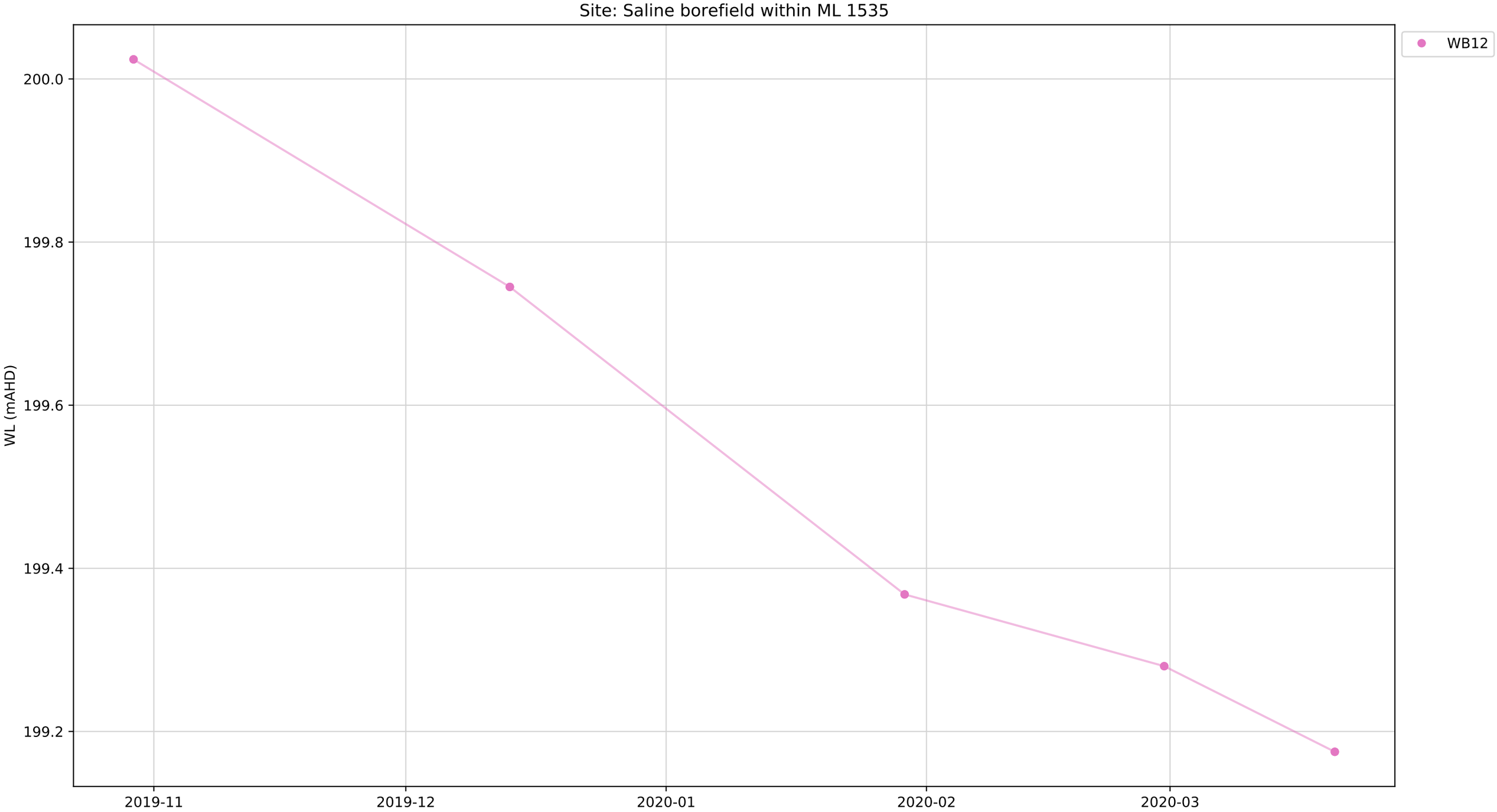

Site: Northern Tailings Storage Facility Area
WL (mAHD)
214
212
210
208
206
204
202
2000
2004
2008
2012
2016
2020
2024
TSF Bore MON01A
TSF Bore MON01B
TSF Bore P418A
TSF Bore P418B
TSF Bore TSFNA
TSF Bore TSFNB
TSF Bore TSFNC

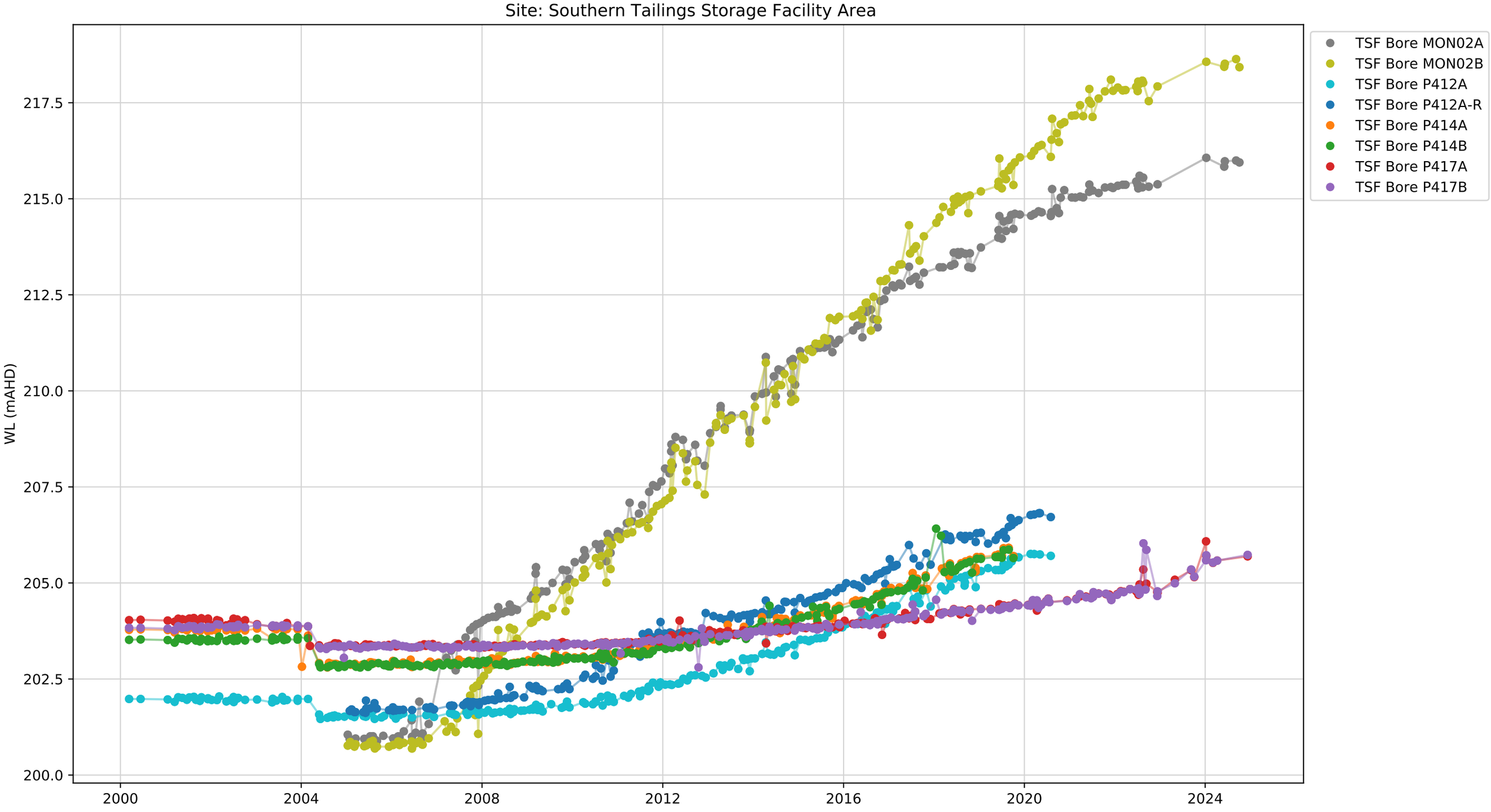

Site: Northern and Southern tailings storage facilities/IWL
TSF Bore P555A-R
WL (mAHD)
207.50
207.25
207.00
206.75
206.50
206.25
206.00
205.75
2008
2012
2016
2020
2024

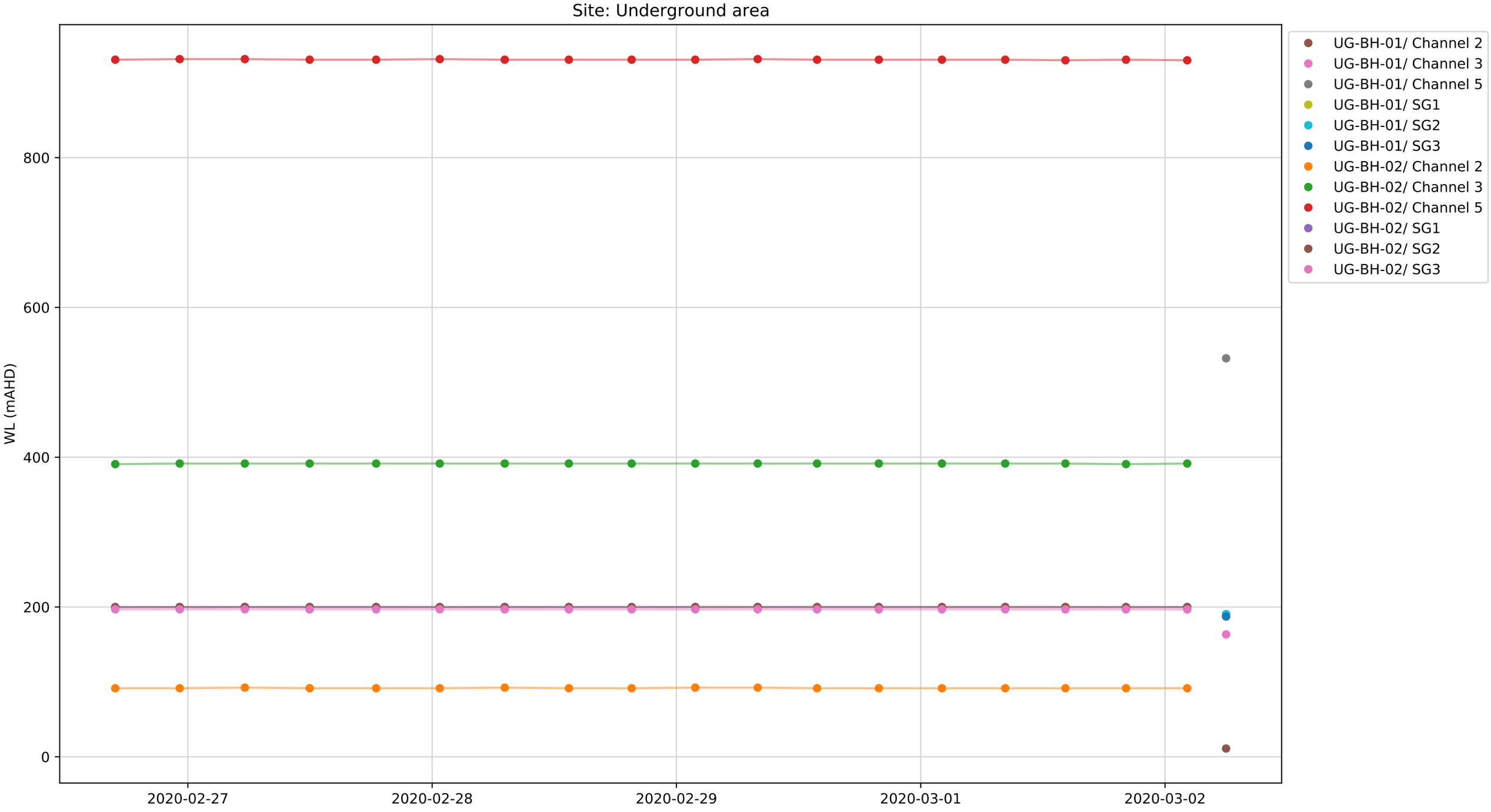

Site: Open pit area
WL (mAHD)
205
200
195
190
185
180
175
2004
2008
2012
2016
2020
2024
Pit Bore PDB1A
Pit Bore PDB1B
Pit Bore PDB3B
Pit Bore PDB5A
Pit Bore PDB5B

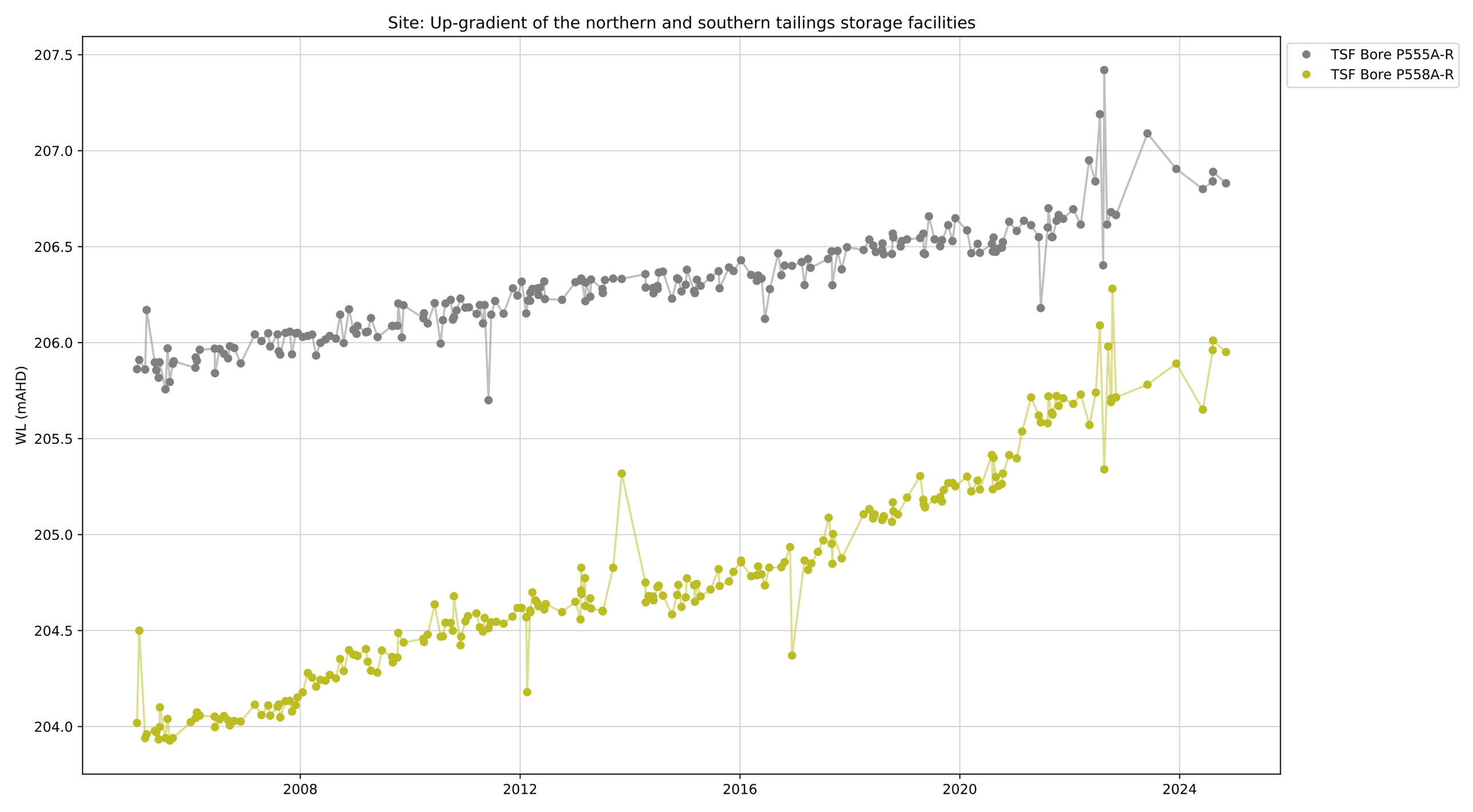

Site: Private registered bores
WL (mAHD)
205
200
195
190
185
180
1980
1984
1988
1992
1996
2000
2004
GW029094
GW029574
GW029574/1
GW702306
GW703460

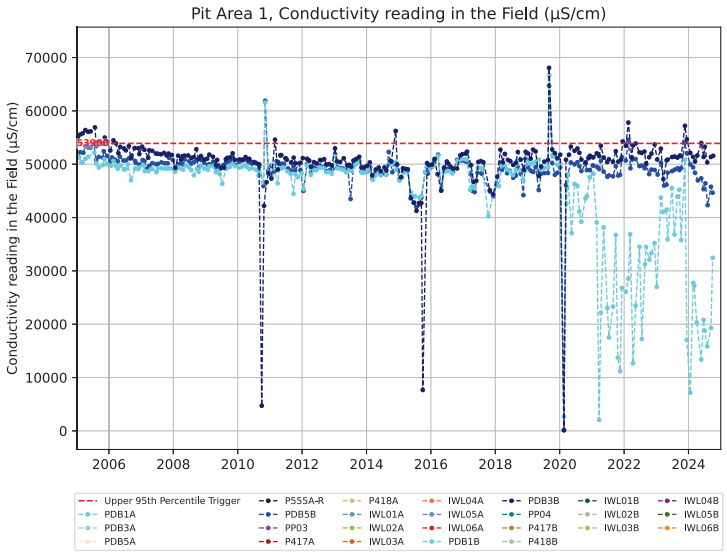
Site: Processing plant area
Processing Plant Bore 1
Processing Plant Bore 2
Processing Plant Bore 3
Processing Plant Bore 4
Processing Plant Bore 6
WL (mAHD)
200
198
196
194
2008
2010
2012
2014
2016
2018
2020
2022
2024

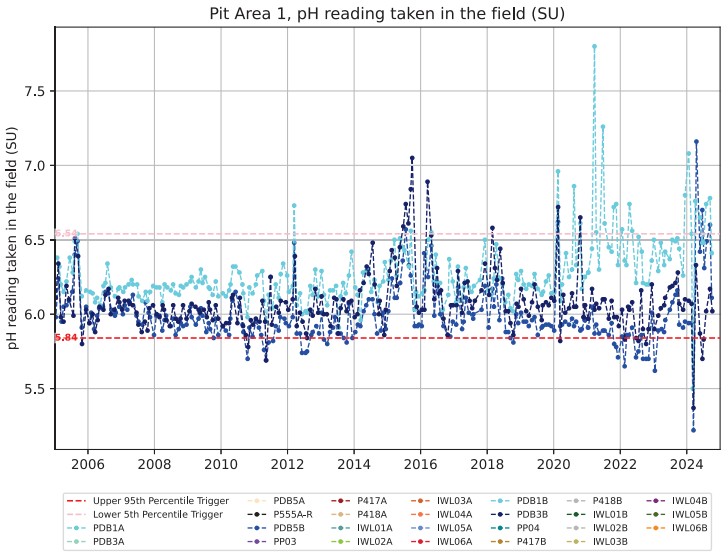

Site: Saline borefield within ML 1535
WB12
WL (mAHD)
200.0
199.8
199.6
199.4
199.2
2019-11
2019-12
2020-01
2020-02
2020-03

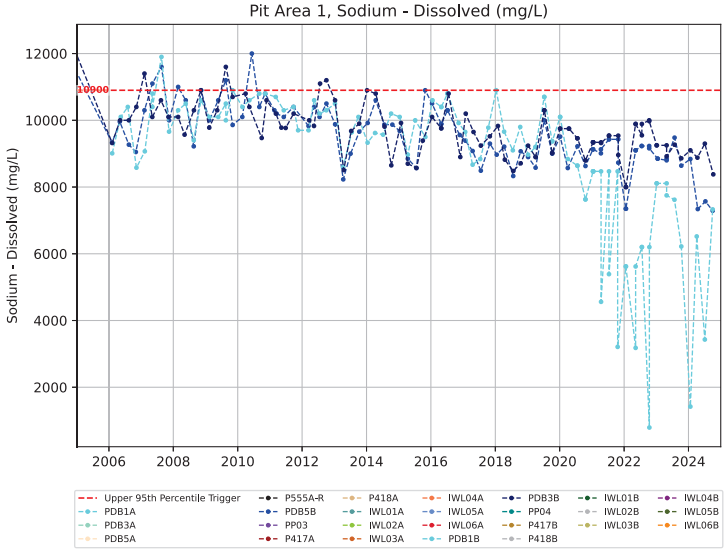

Site: Southern Tailings Storage Facility Area
WL (mAHD)
217.5
215.0
212.5
210.0
207.5
205.0
202.5
200.0
2000
2004
2008
2012
2016
2020
2024
TSF Bore MON02A
TSF Bore MON02B
TSF Bore P412A
TSF Bore P412A-R
TSF Bore P414A
TSF Bore P414B
TSF Bore P417A
TSF Bore P417B

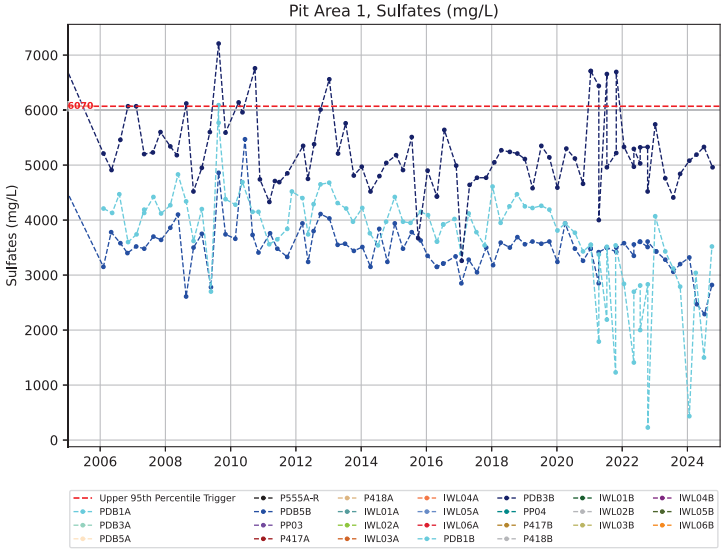

Site: Underground area
WL (mAHD)
0
200
400
600
800
2020-02-27
2020-02-28
2020-02-29
2020-03-01
2020-03-02
UG-BH-01/ Channel 2
UG-BH-01/ Channel 3
UG-BH-01/ Channel 5
UG-BH-01/ SG1
UG-BH-01/ SG2
UG-BH-01/ SG3
UG-BH-02/ Channel 2
UG-BH-02/ Channel 3
UG-BH-02/ Channel 5
UG-BH-02/ SG1
UG-BH-02/ SG2
UG-BH-02/ SG3

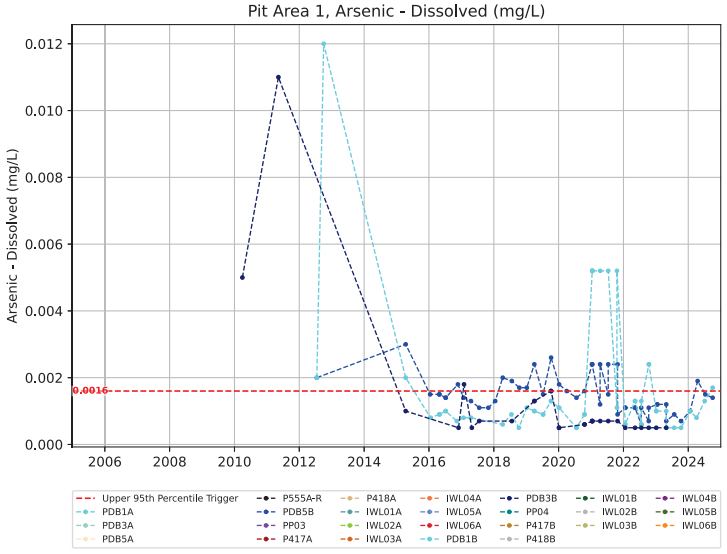

Site: Up-gradient of the northern and southern tailings storage facilities
TSF Bore P555A-R
TSF Bore P558A-R
WL (mAHD)
207.5
207.0
206.5
206.0
205.5
205.0
204.5
204.0
2008
2012
2016
2020
2024

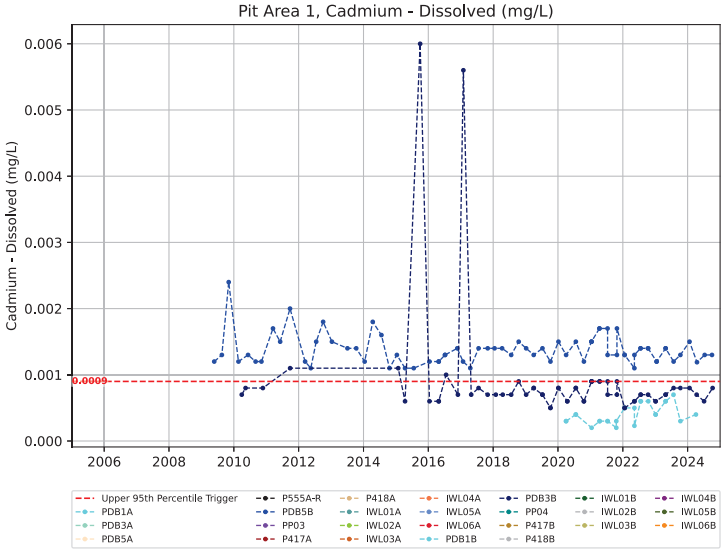

Pit Area 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
53900
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
P418B
PDB3B
PP04
P417B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

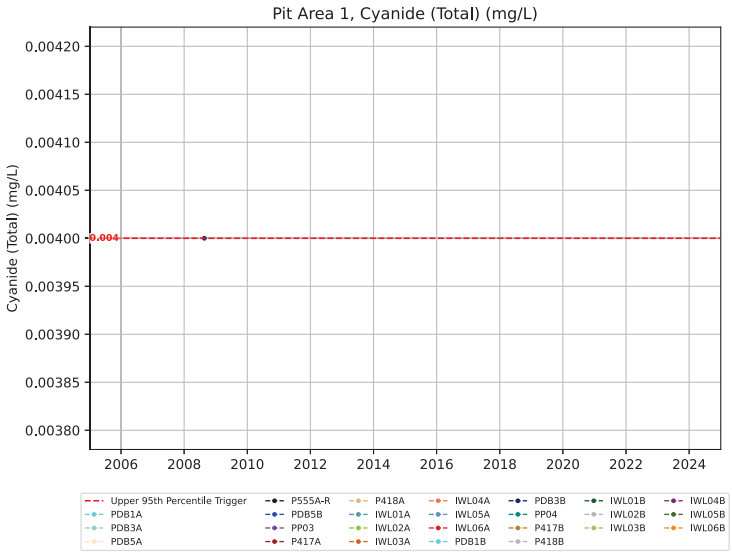

Pit Area 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.84
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PP04
P417B
P418B
PDB3B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

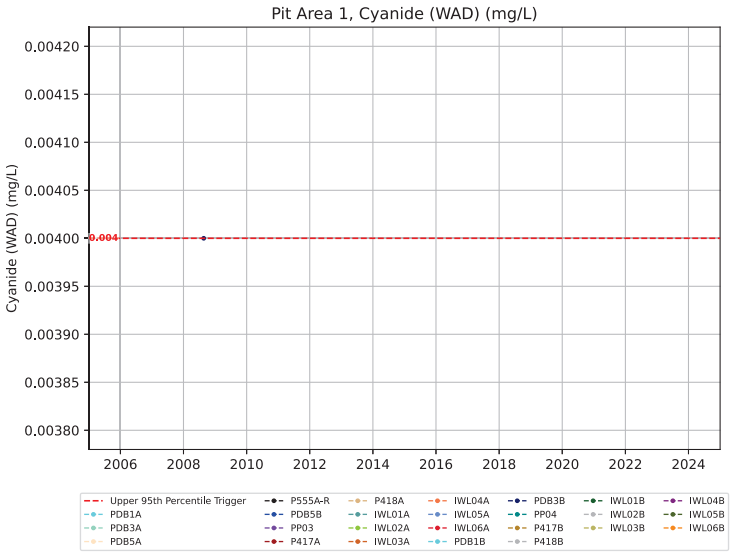

Pit Area 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10000
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PP04
P417B
P418B
PDB3B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

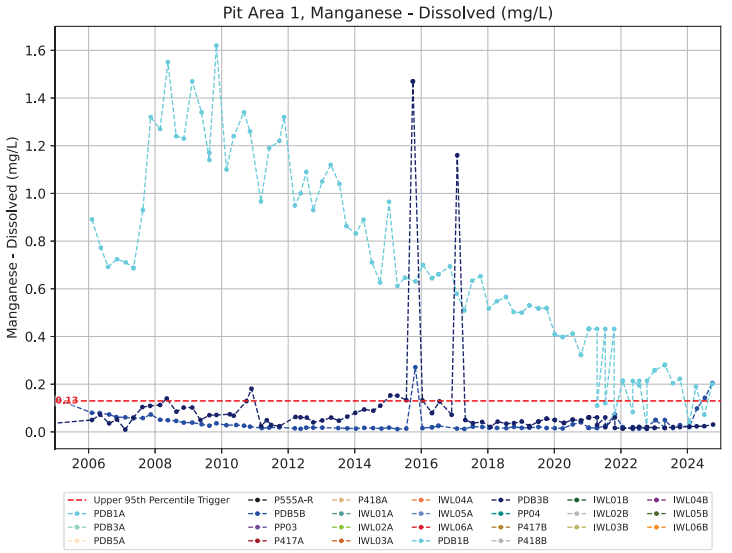

Pit Area 1, Sulfates (mg/L)
Sulfates (mg/L)
6070
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PP04
P417B
P418B
PDB3B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

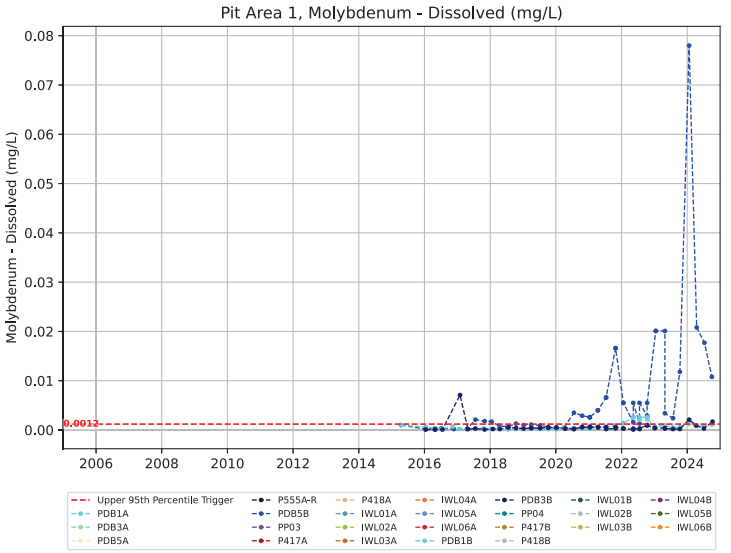

Pit Area 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0016
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PP04
P417B
P418B
PDB3B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0009
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PP04
P417B
P418B
PDB3B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.13
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
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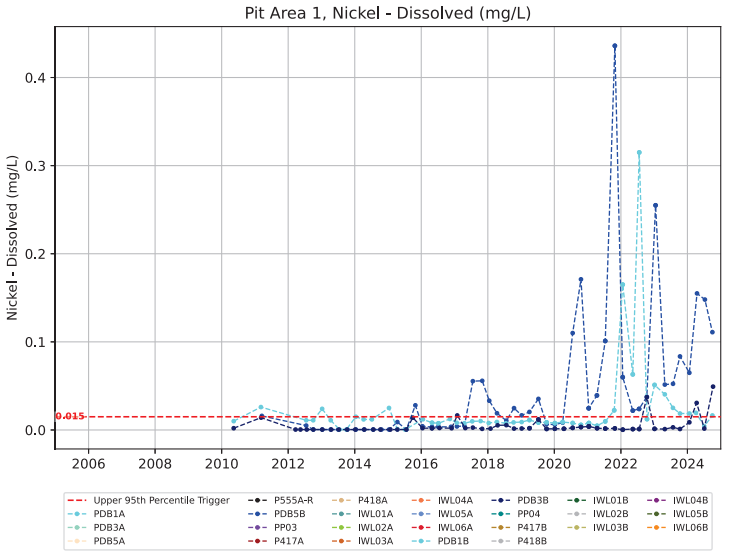
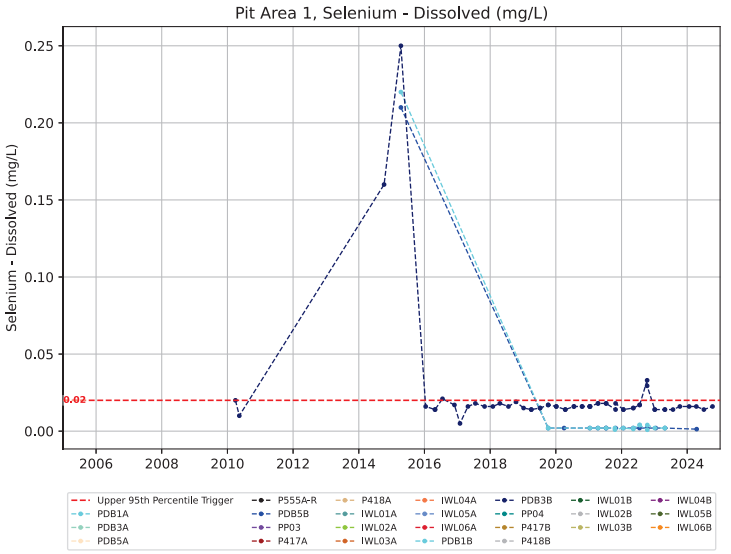
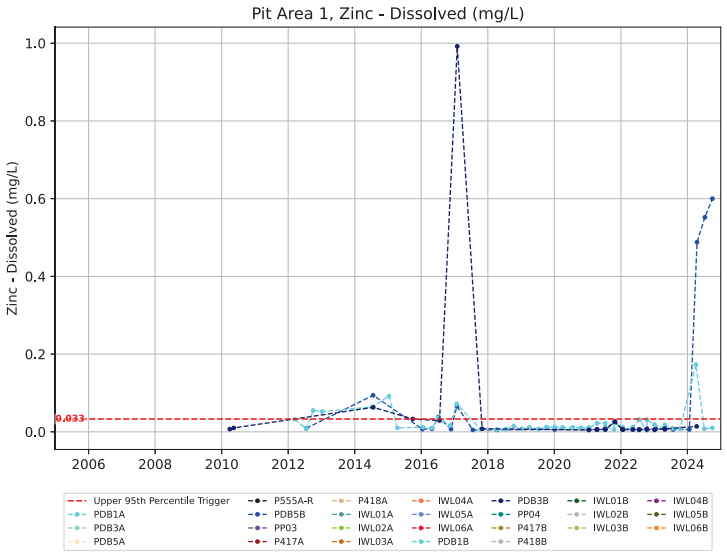
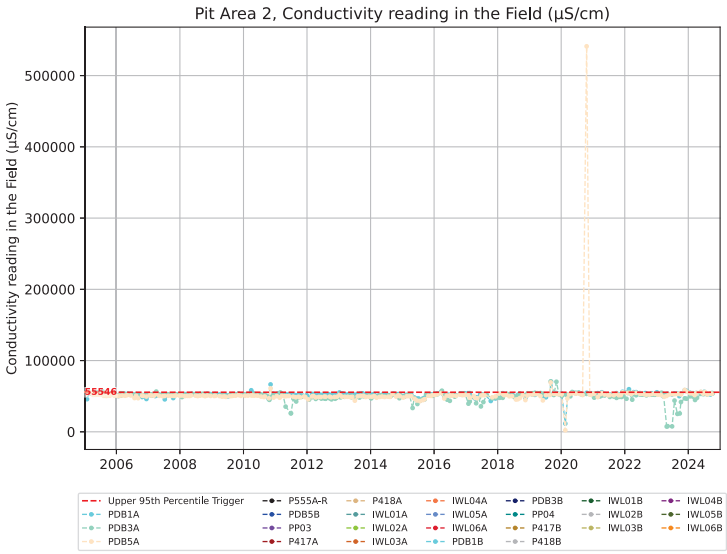
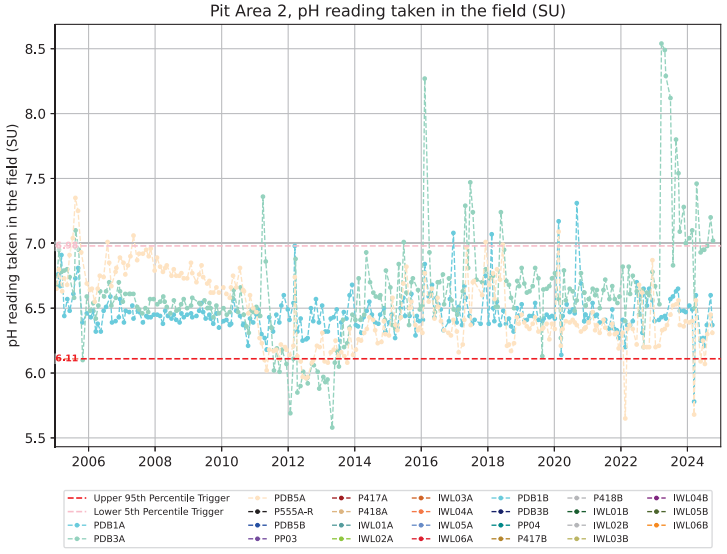
IWL05B
IWL06B


Pit Area 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.02
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.033
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
55546
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.00
6.11
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
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P417B
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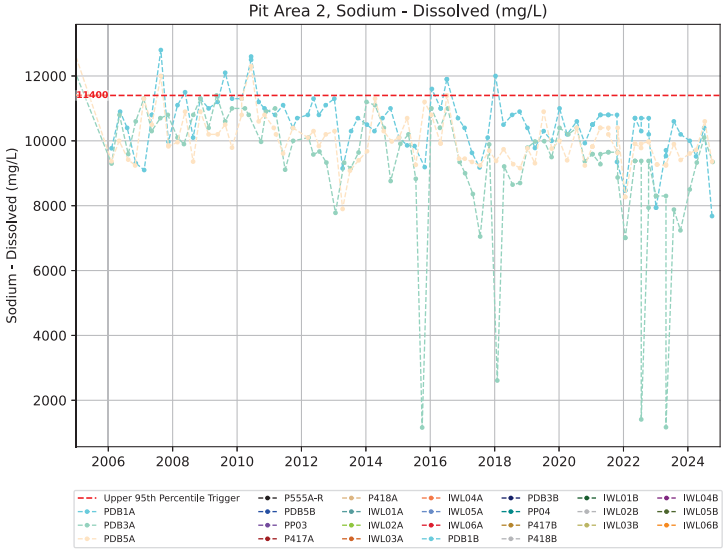
IWL04B
IWL05B
IWL06B


Pit Area 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11400
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
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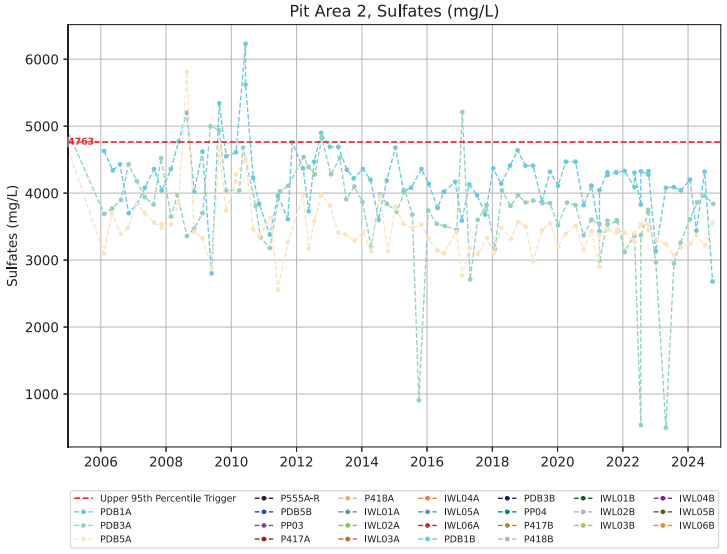
IWL05B
IWL06B


Pit Area 2, Sulfates (mg/L)
Sulfates (mg/L)
4763
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
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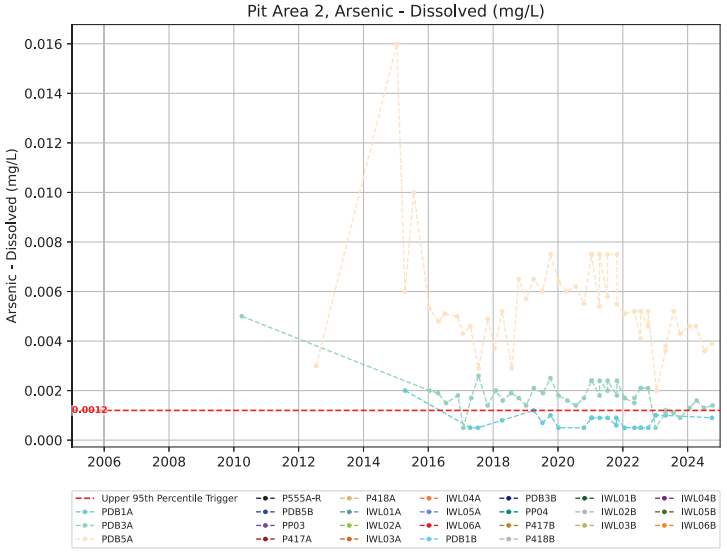
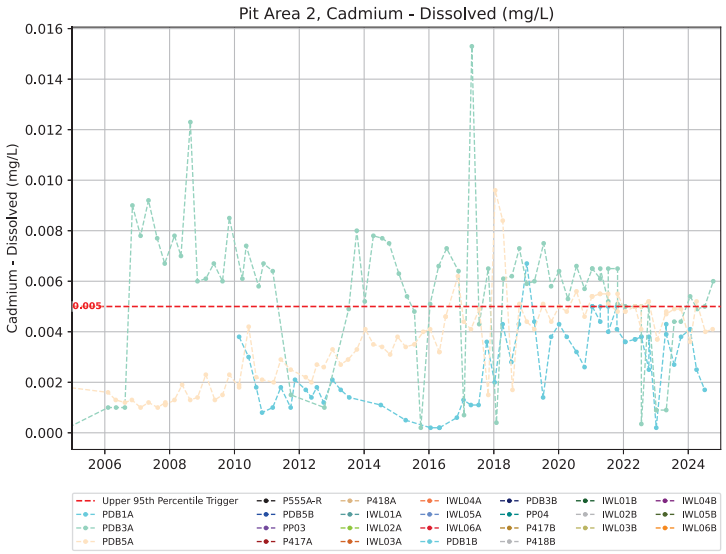
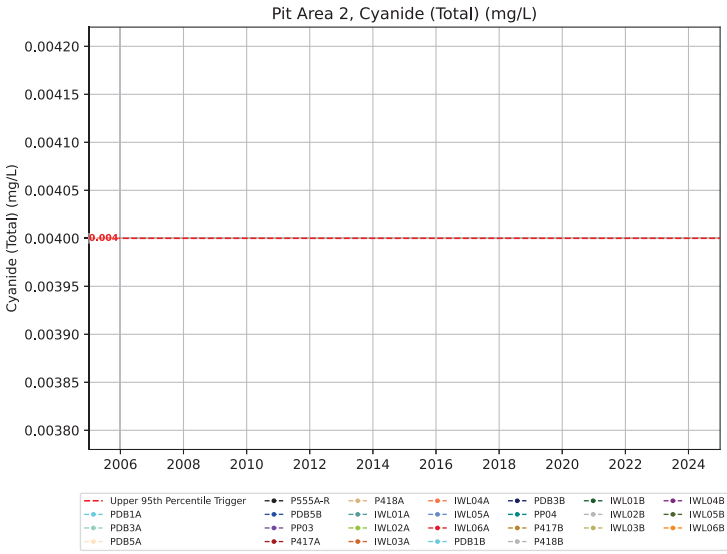
IWL05B
IWL06B


Pit Area 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.005
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
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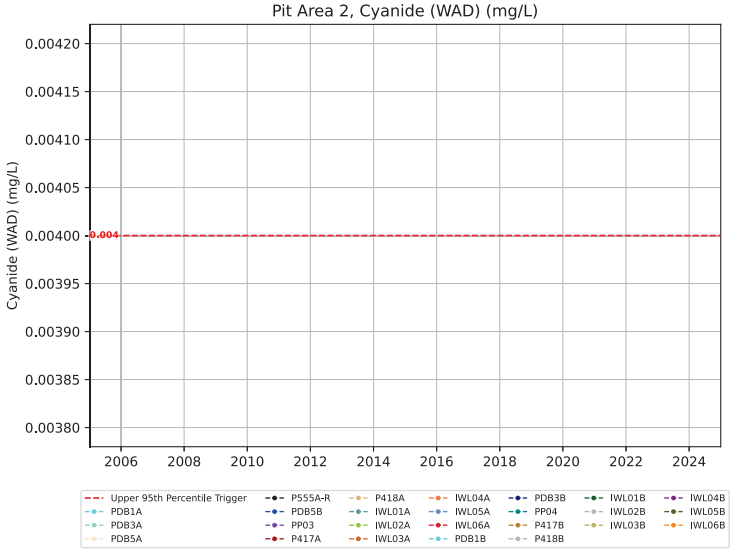
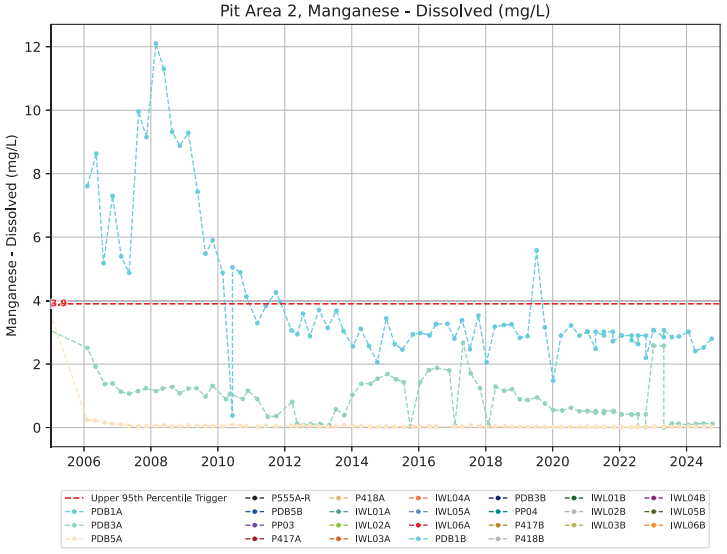
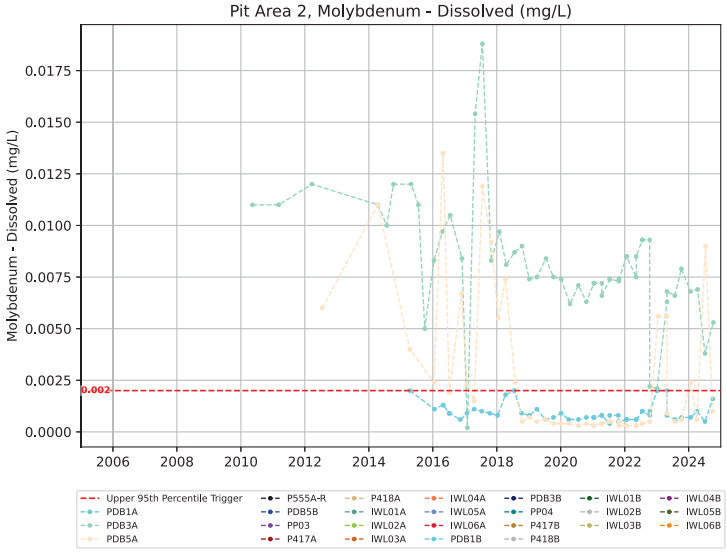
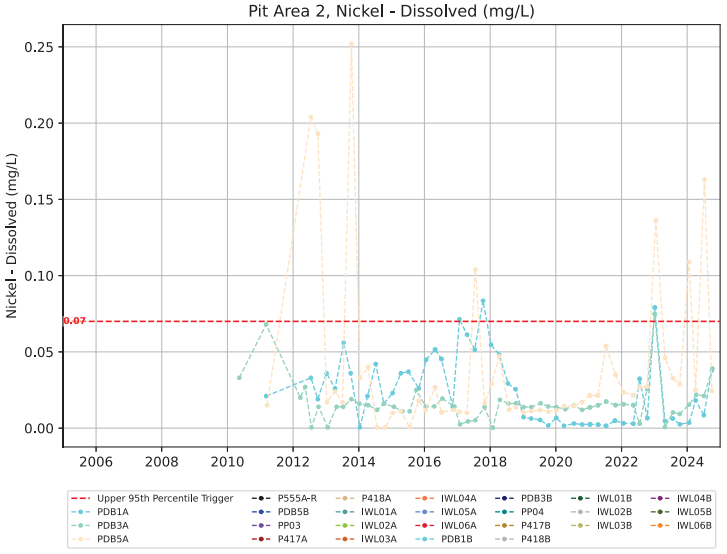
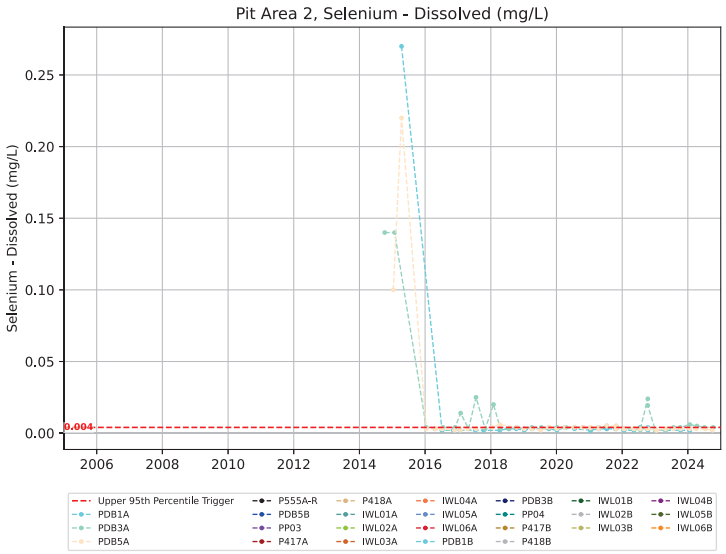
IWL03B
IWL04B
IWL05B
IWL06B

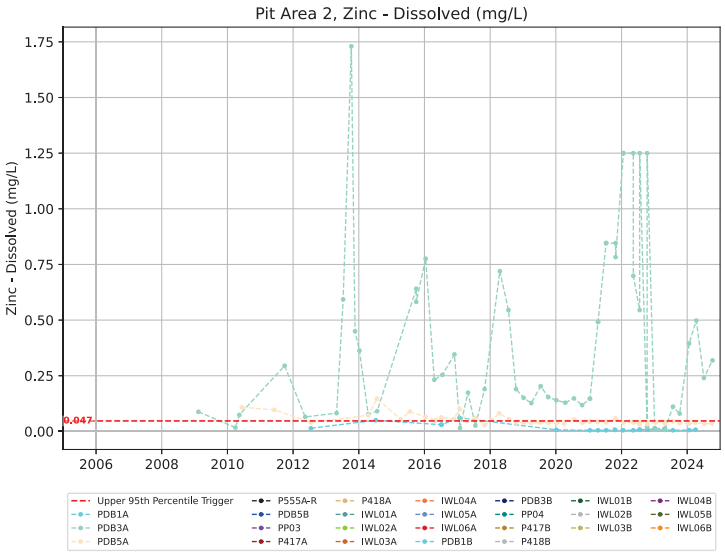

Pit Area 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

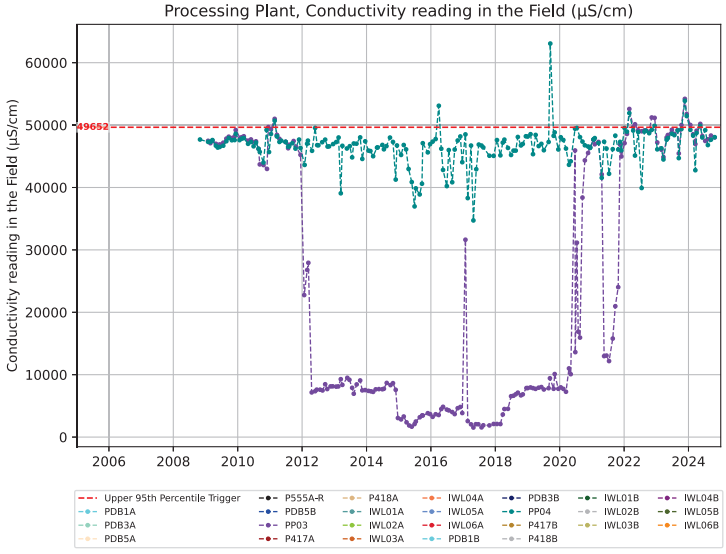

Pit Area 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
3.9
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

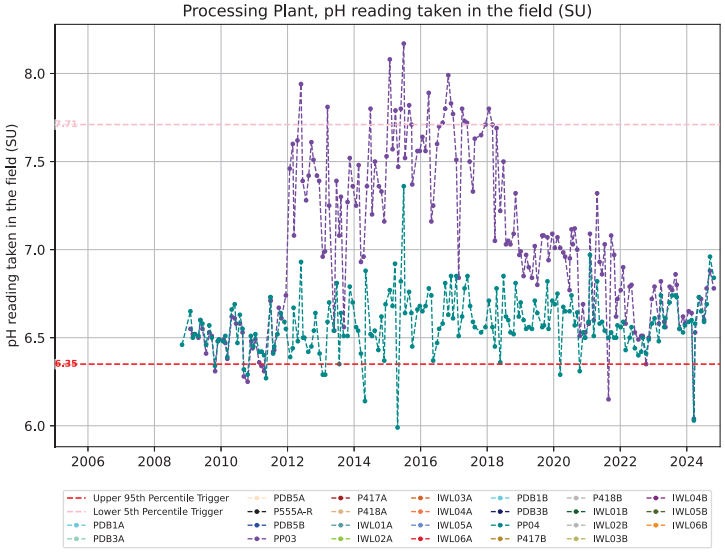

Pit Area 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.07
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Pit Area 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.047
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
49652
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.71
6.35
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
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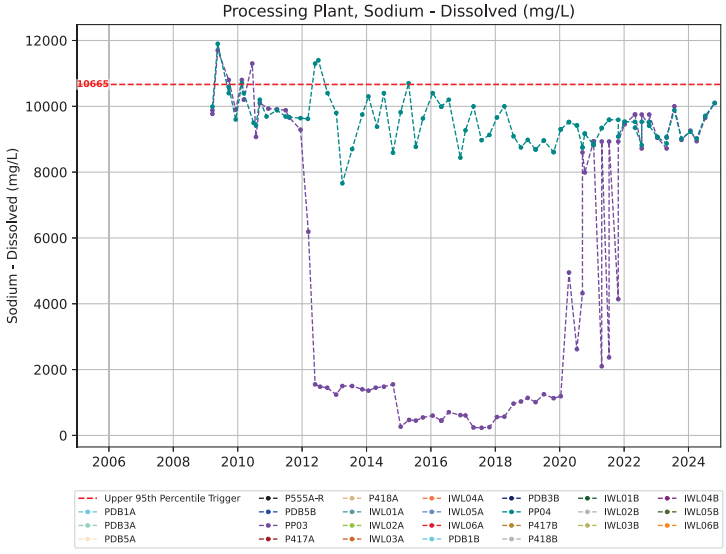
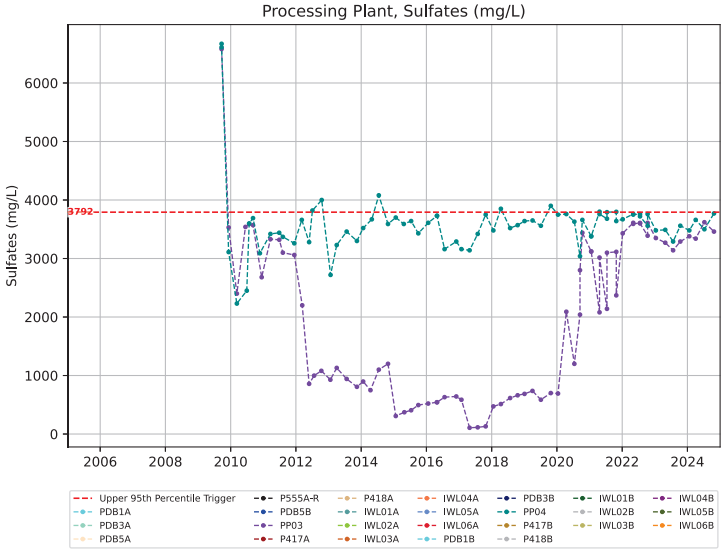
IWL04B
IWL05B
IWL06B


Processing Plant, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10665
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Sulfates (mg/L)
Sulfates (mg/L)
3792
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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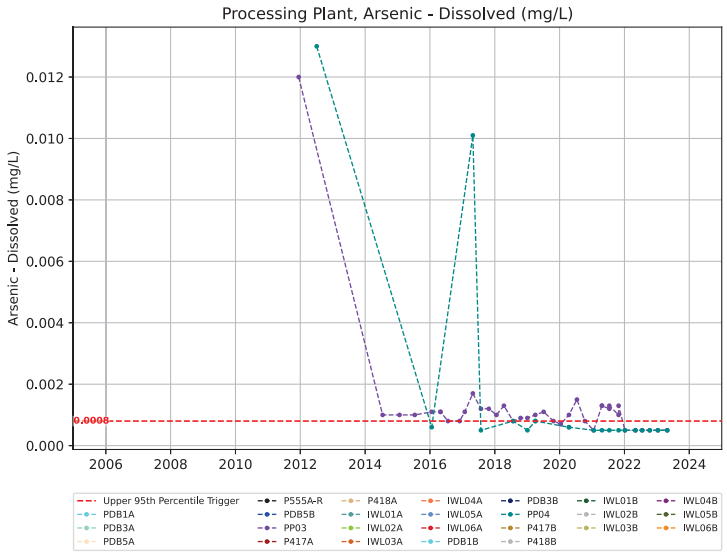
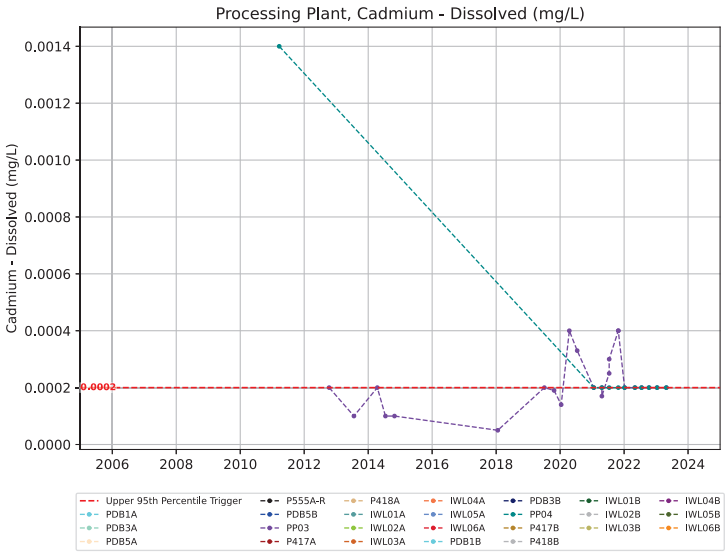
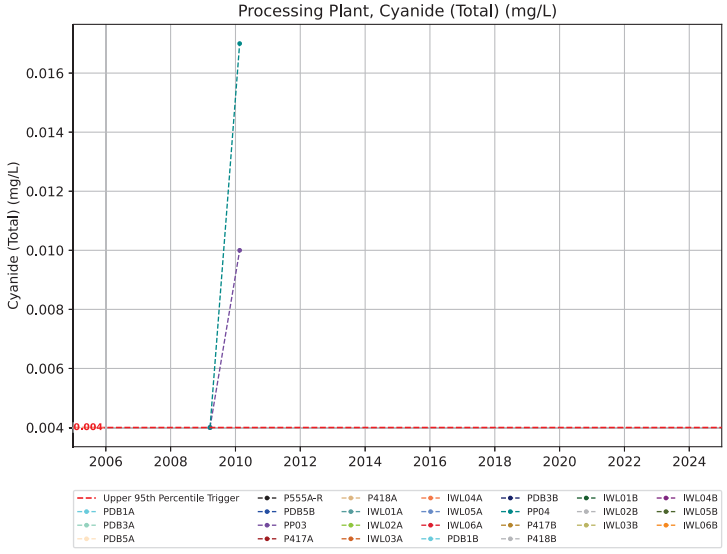
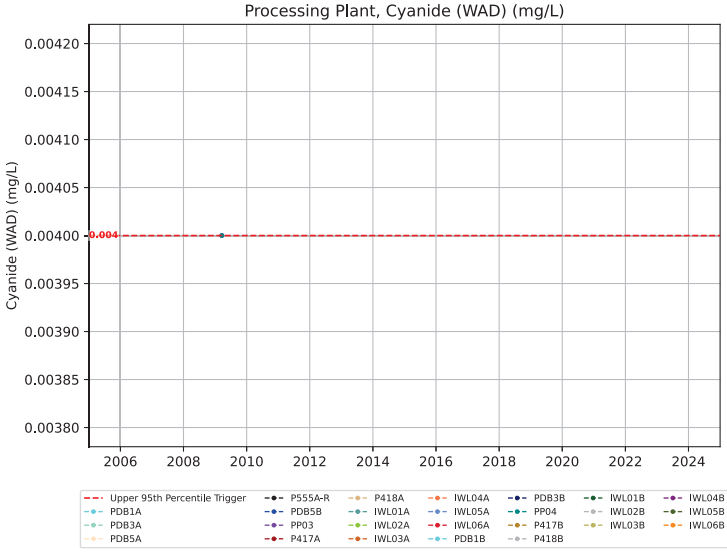
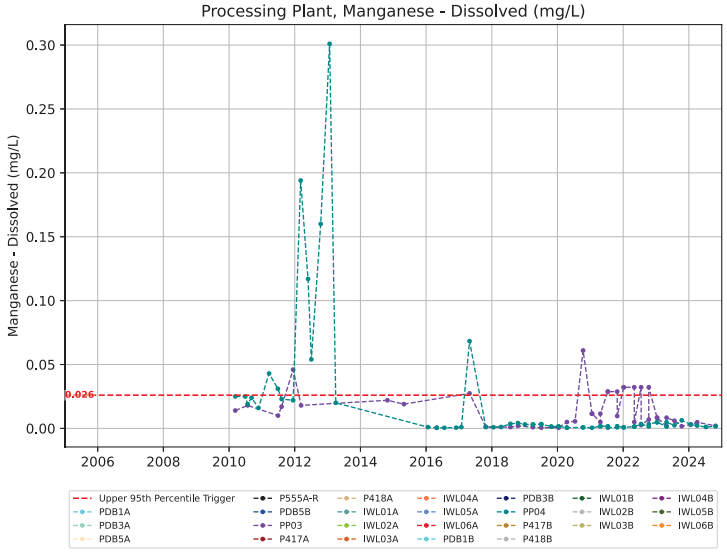
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

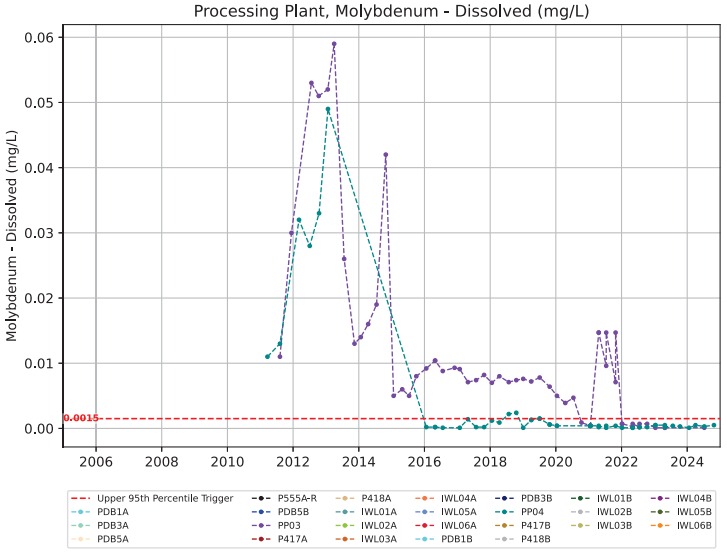

Processing Plant, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

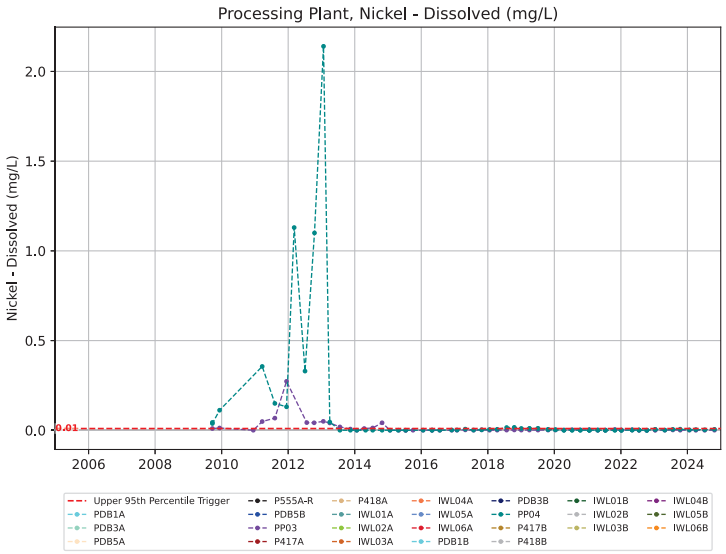

Processing Plant, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

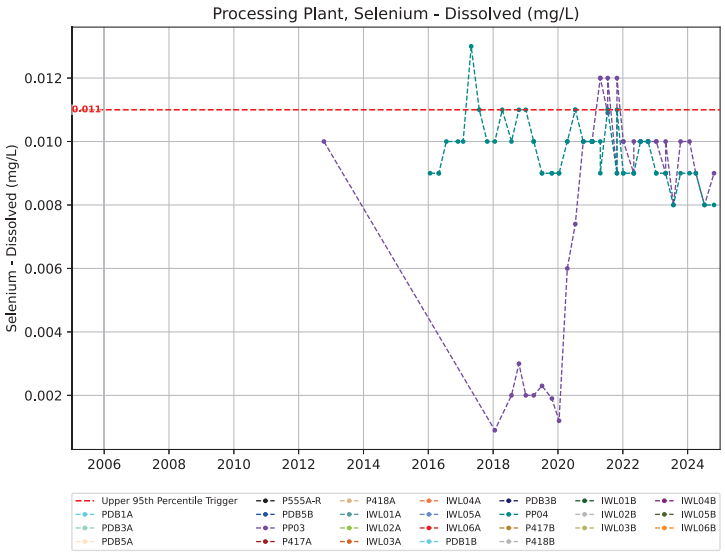

Processing Plant, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

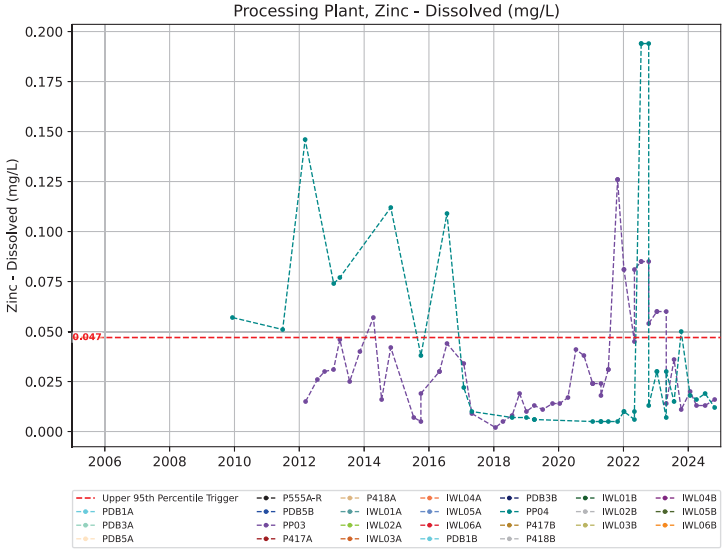

Processing Plant, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

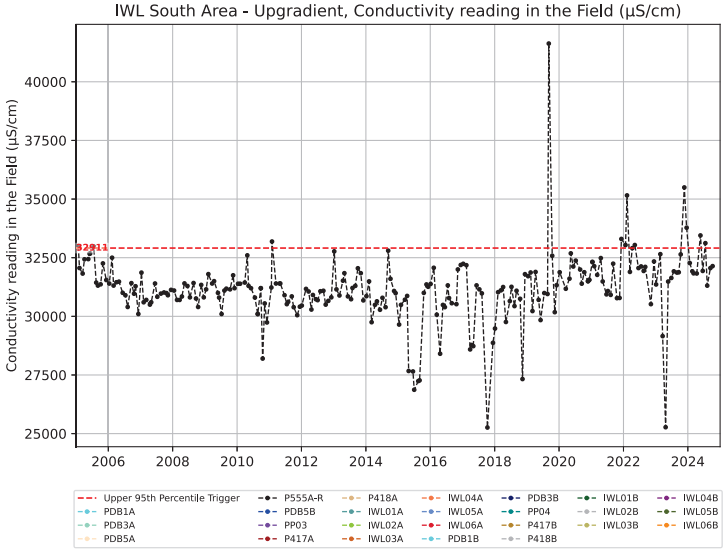

Processing Plant, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.026
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

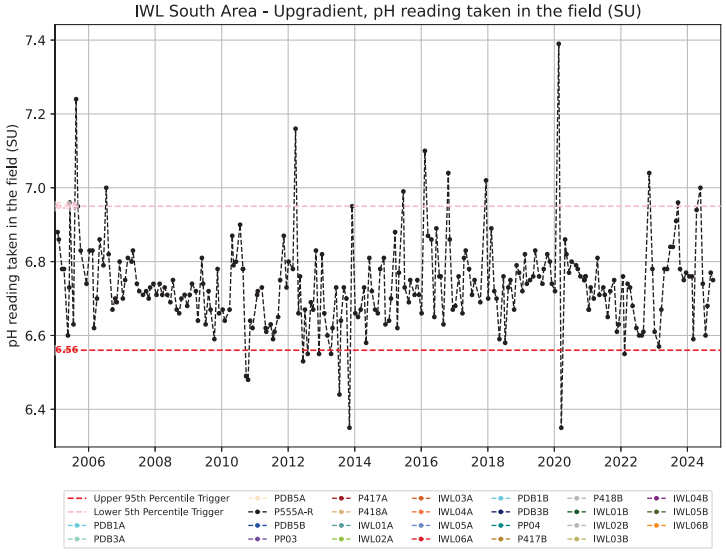

Processing Plant, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.01
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


Processing Plant, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.047
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
32811
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.95
6.56
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
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IWL03B
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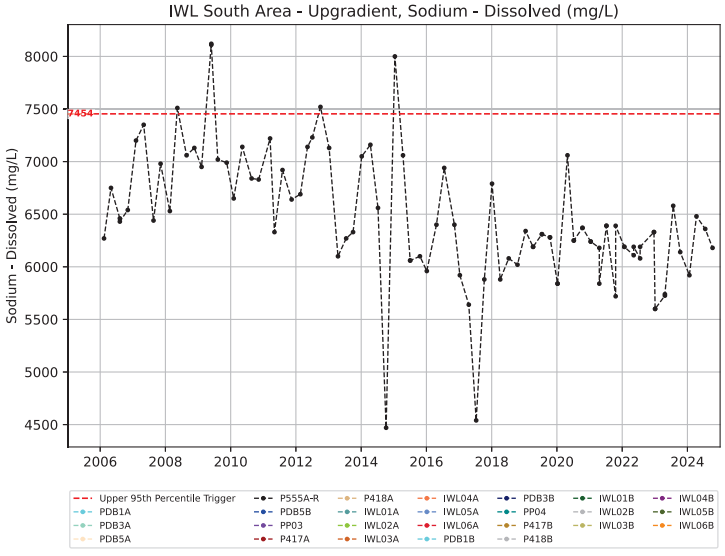
IWL05B
IWL06B


IWL South Area - Upgradient, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
7454
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
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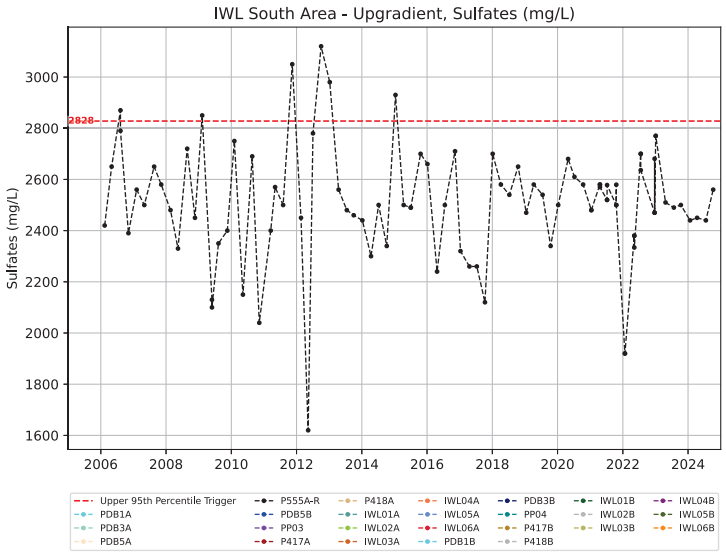
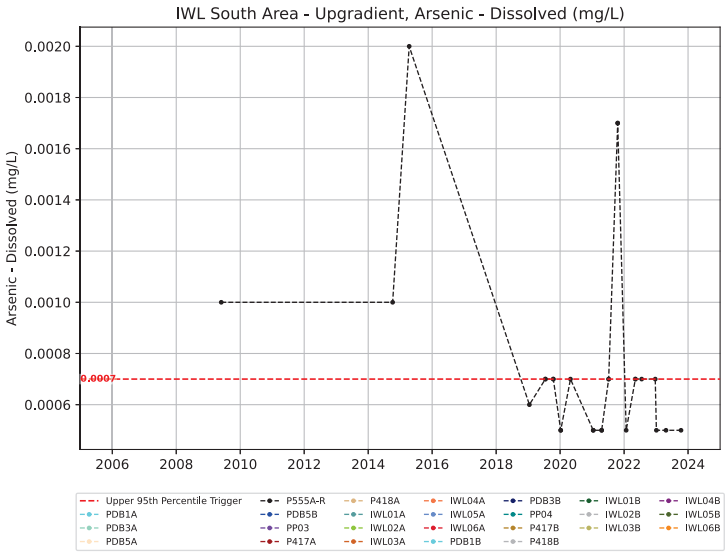
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Sulfates (mg/L)
Sulfates (mg/L)
2828
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0007
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
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P417B
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IWL06B
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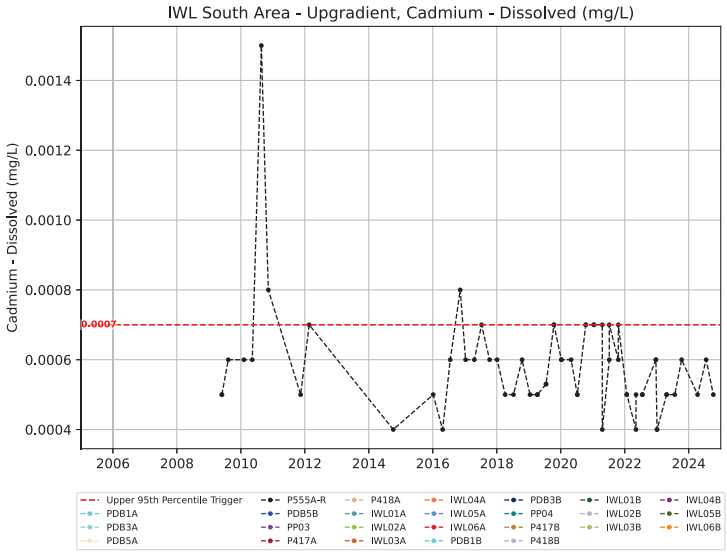
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0007
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
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IWL06B
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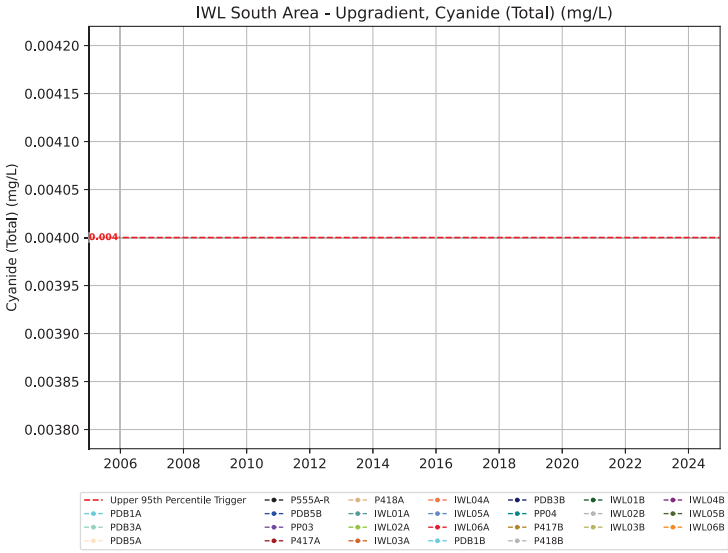
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
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IWL06B
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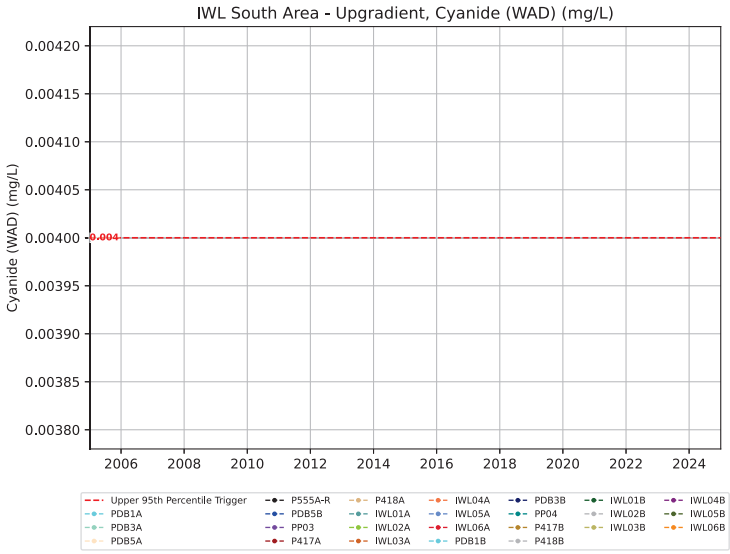
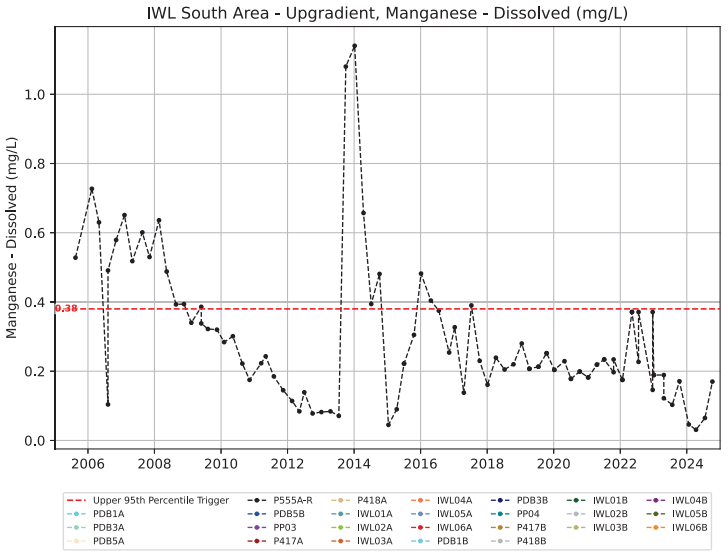
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.38
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
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P417B
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IWL06B
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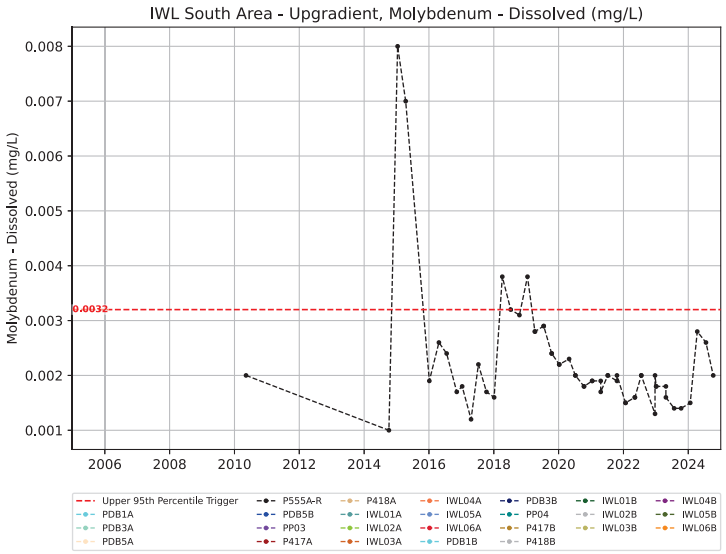
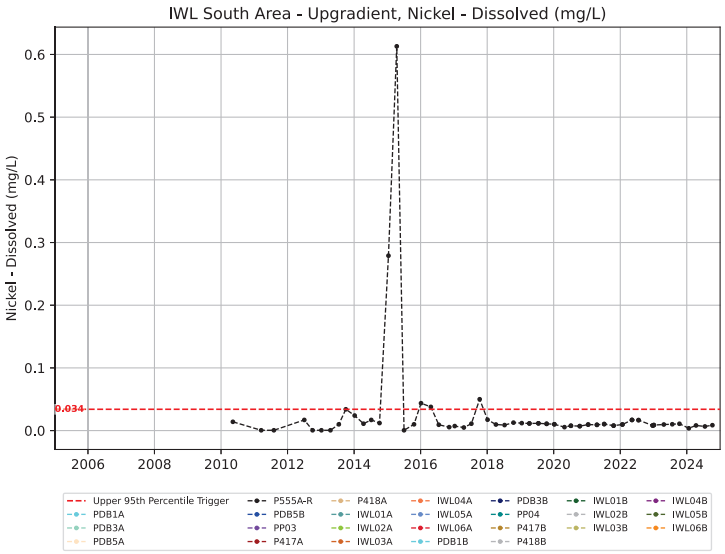
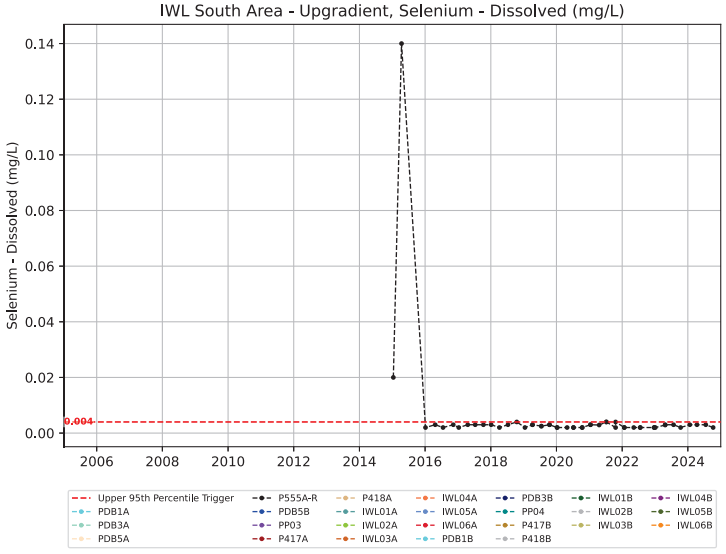
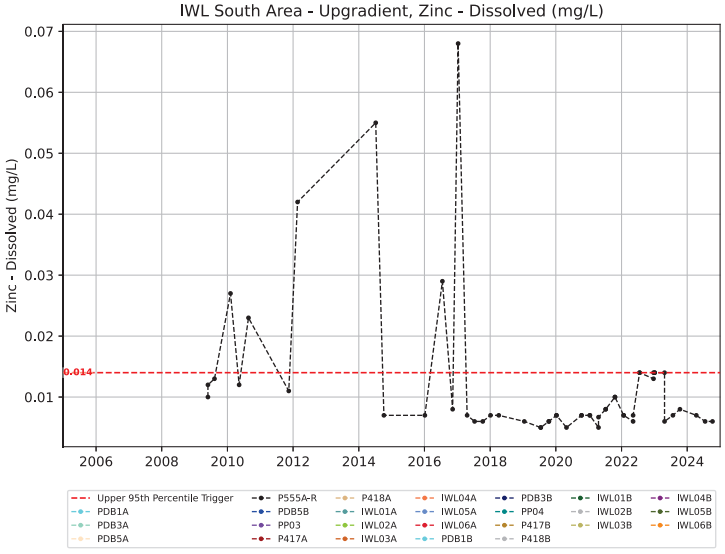
P417A
IWL03A
PDB1B
P418B


IWL South Area - Upgradient, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0032
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.034
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Upgradient, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.014
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
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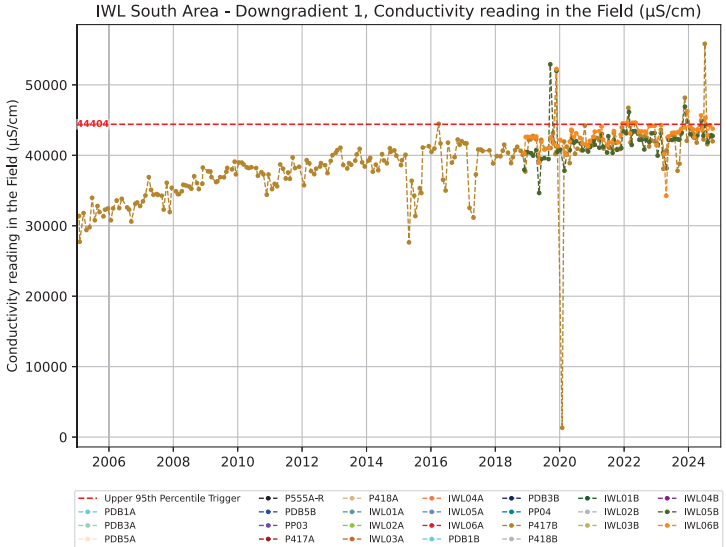
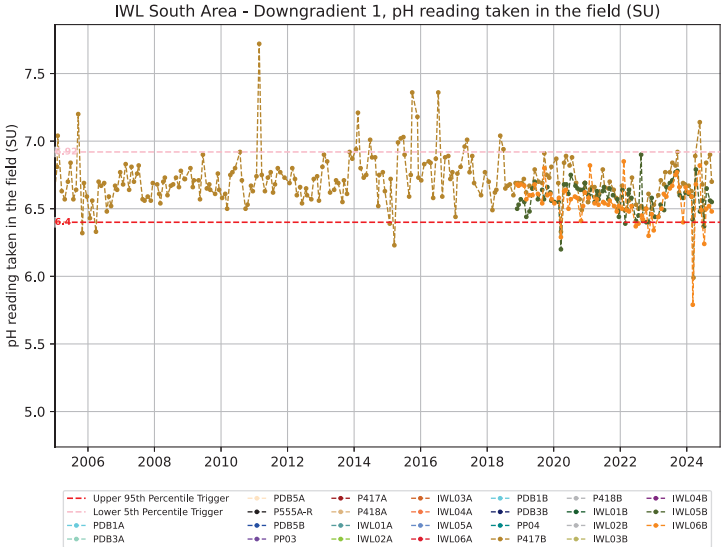
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
44404
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL South Area - Downgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.4
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
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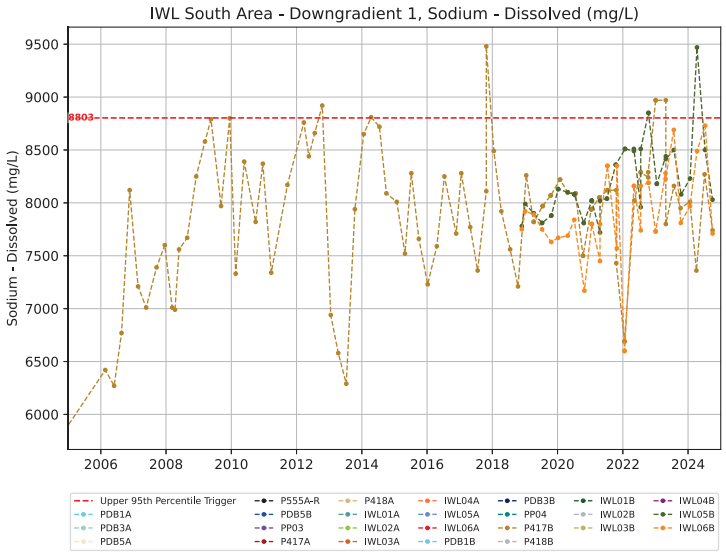
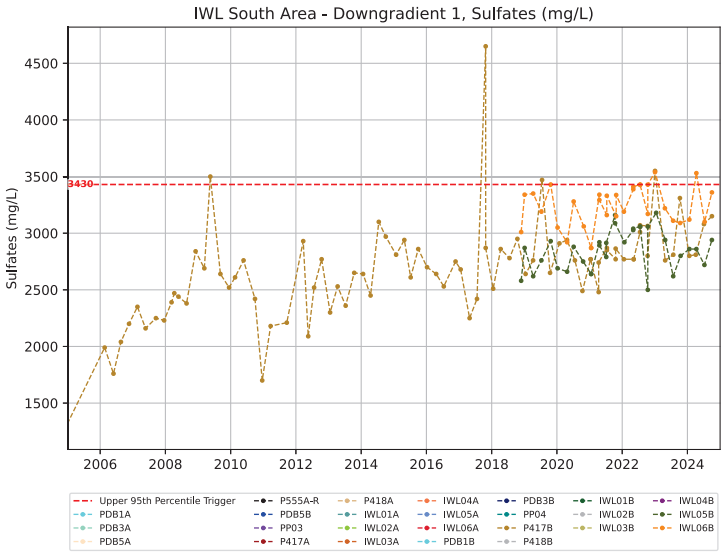
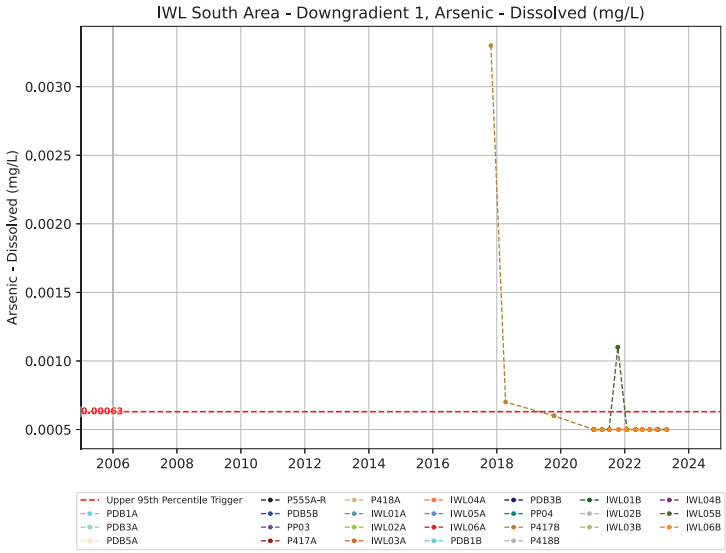
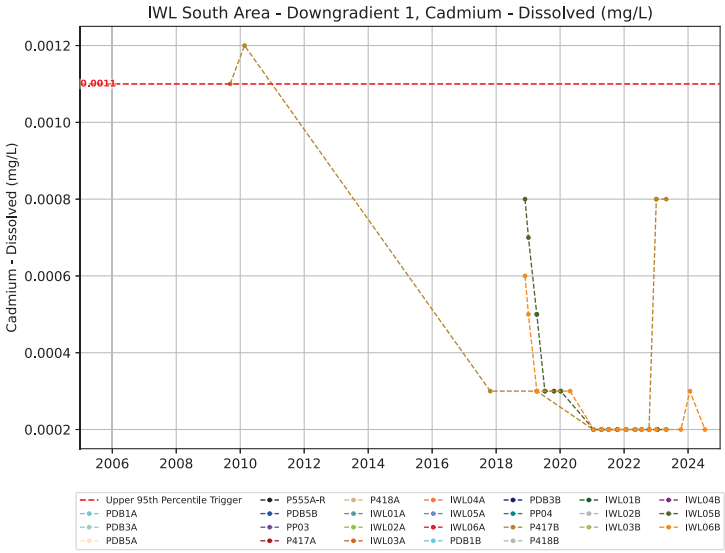
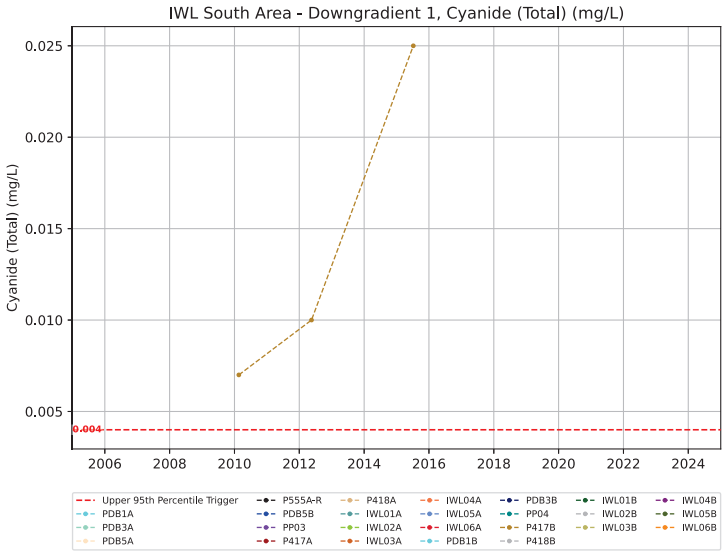
IWL04B
IWL05B
IWL06B

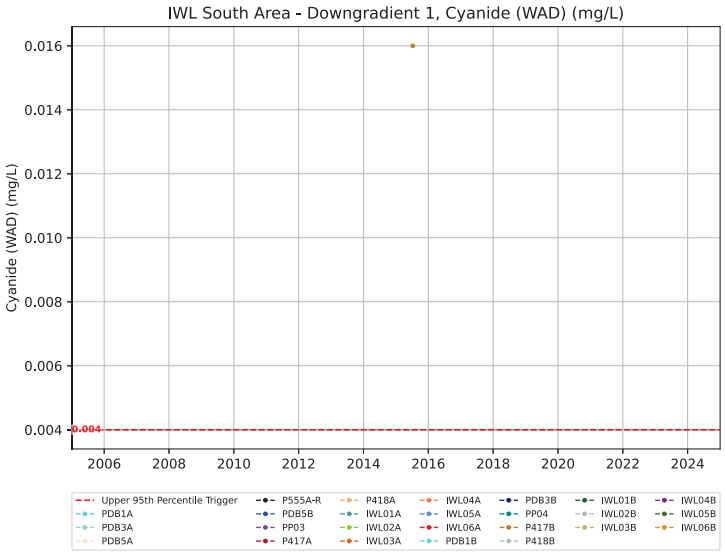

IWL South Area - Downgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
8803
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

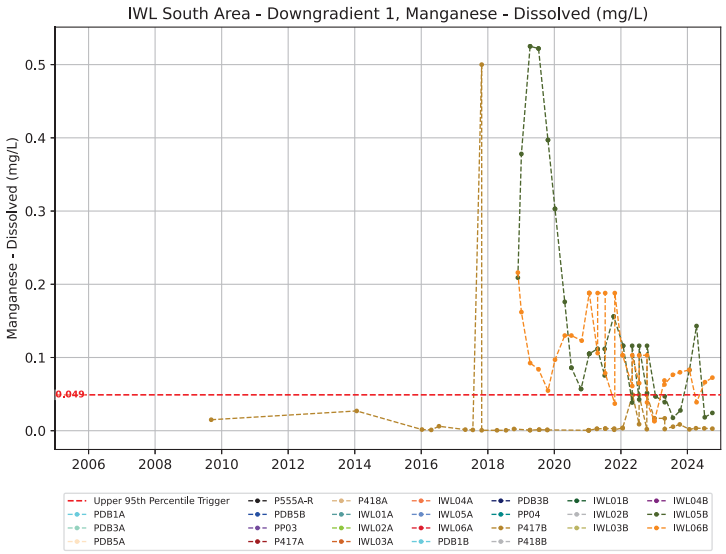

IWL South Area - Downgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
3430
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

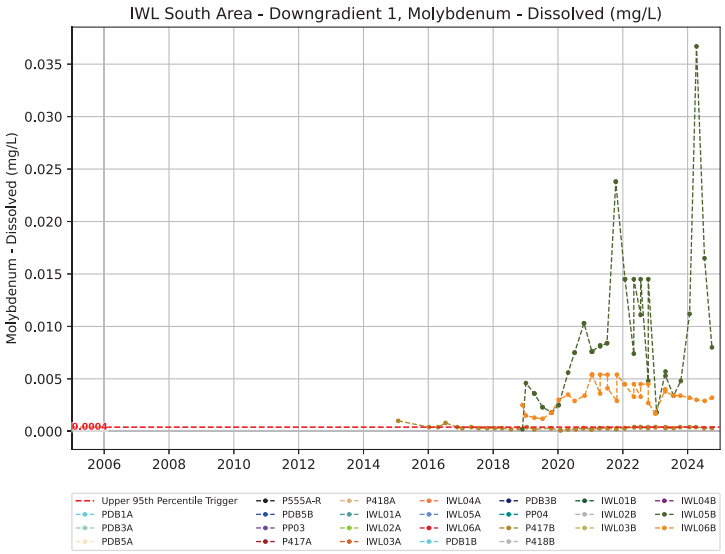

IWL South Area - Downgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00063
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

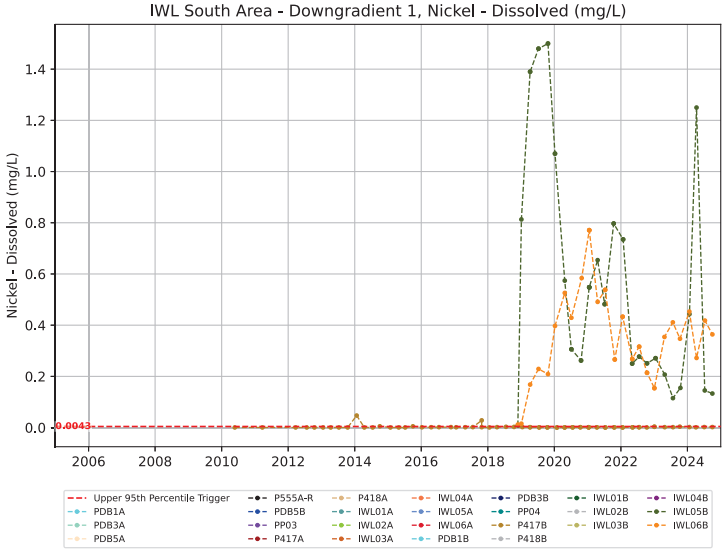

IWL South Area - Downgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0011
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

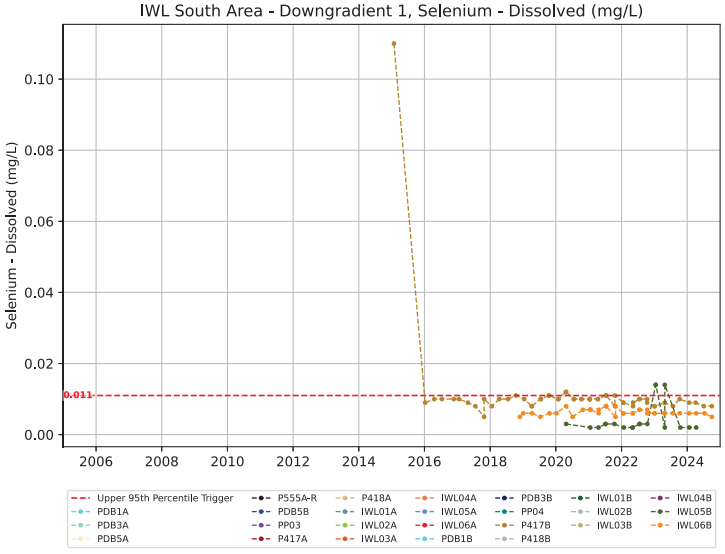

IWL South Area - Downgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

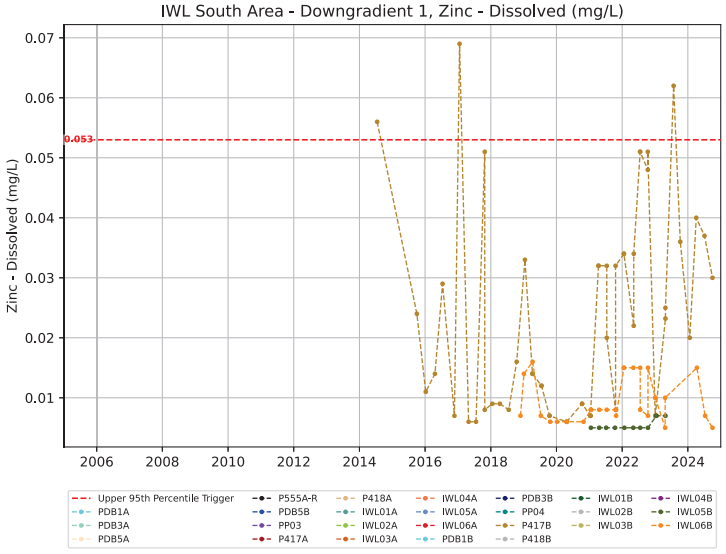

IWL South Area - Downgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

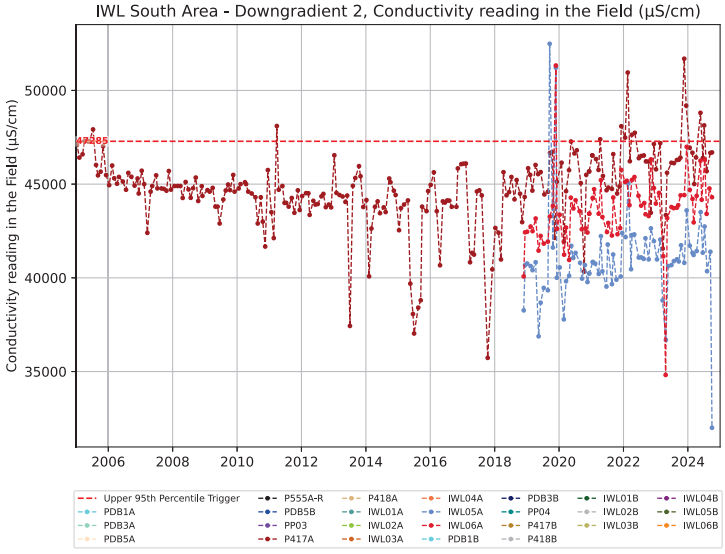

IWL South Area - Downgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.049
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

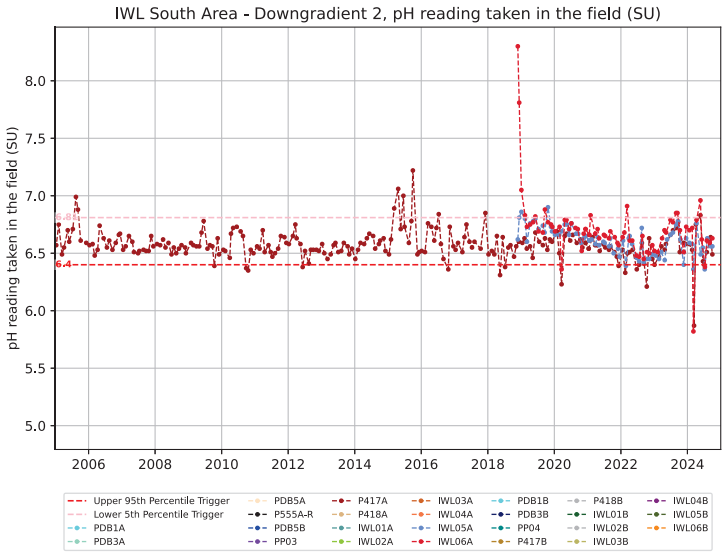

IWL South Area - Downgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

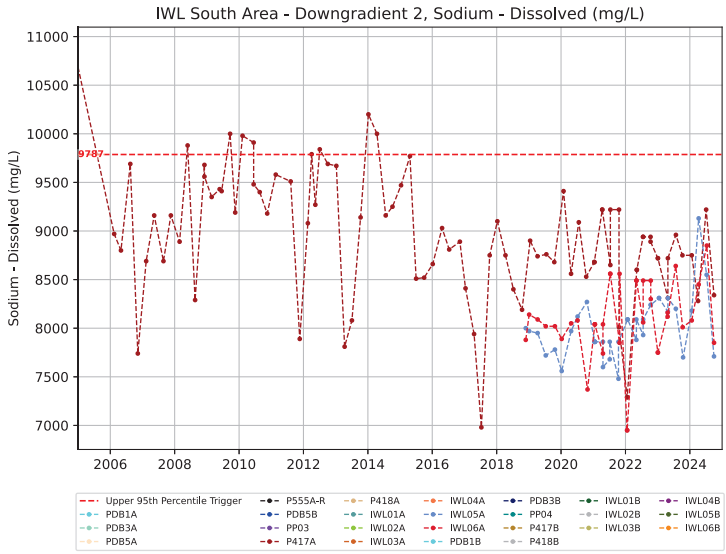

IWL South Area - Downgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.0043
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

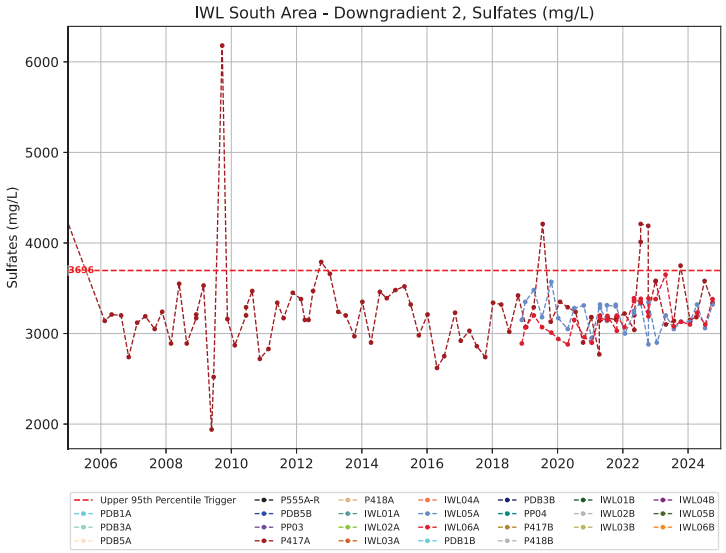

IWL South Area - Downgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

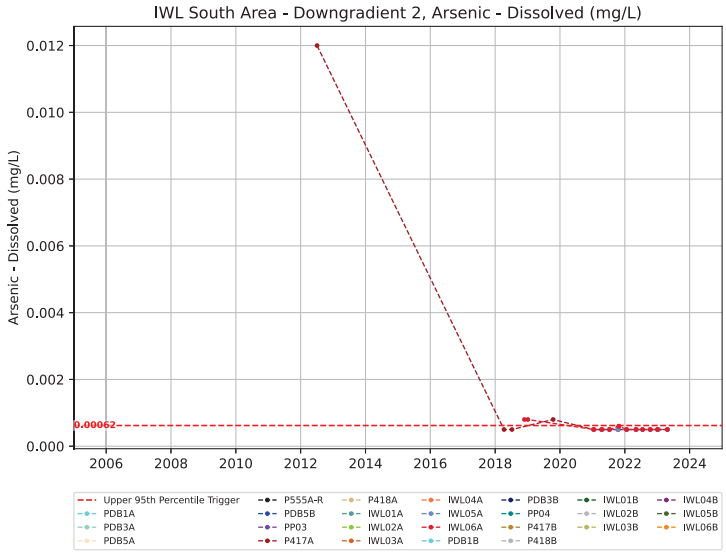

IWL South Area - Downgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.053
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

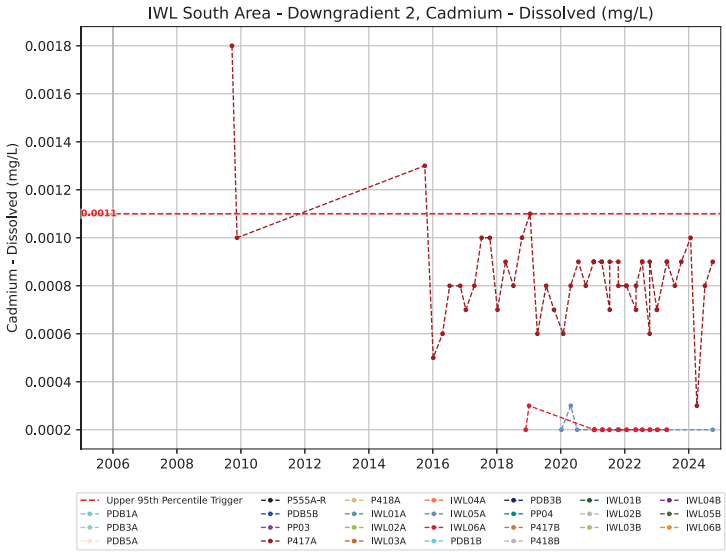

IWL South Area - Downgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
47285
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

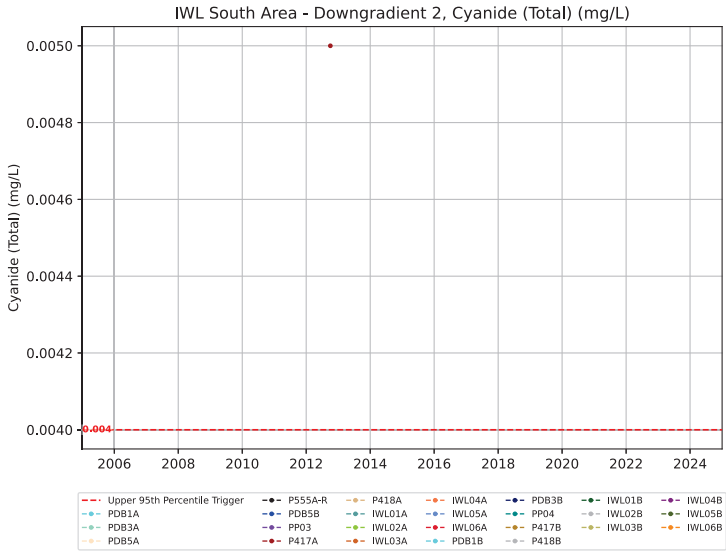

IWL South Area - Downgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.4
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

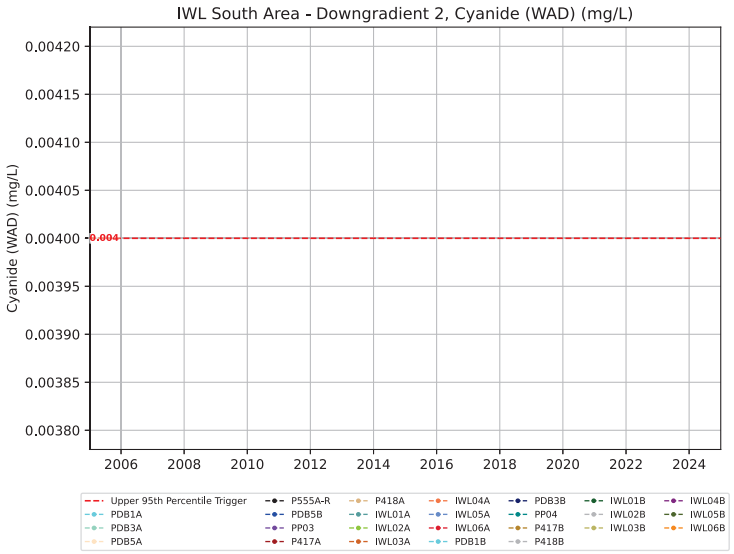

IWL South Area - Downgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
9787
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

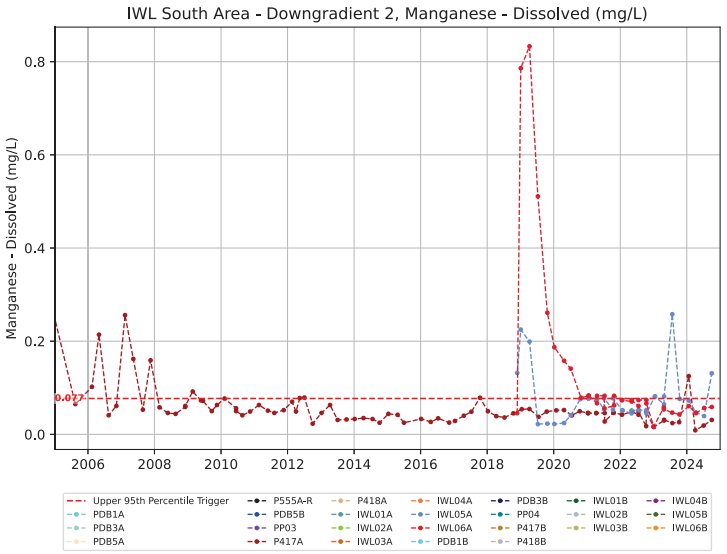

IWL South Area - Downgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
3696
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

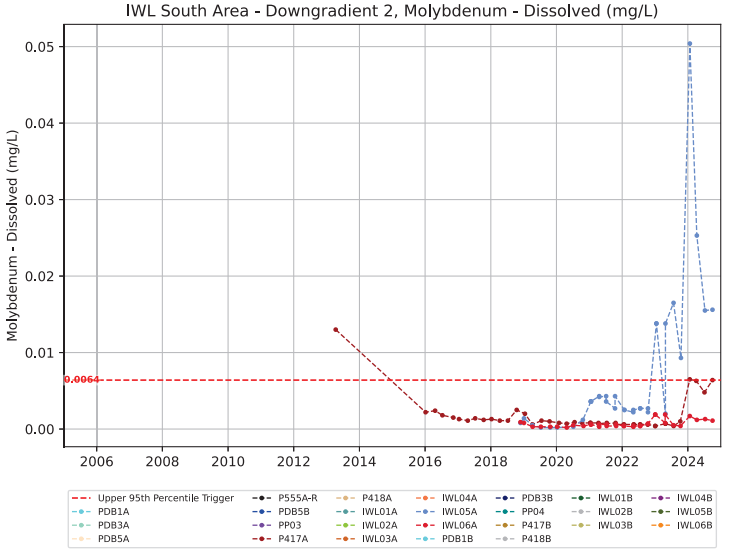

IWL South Area - Downgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00062
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

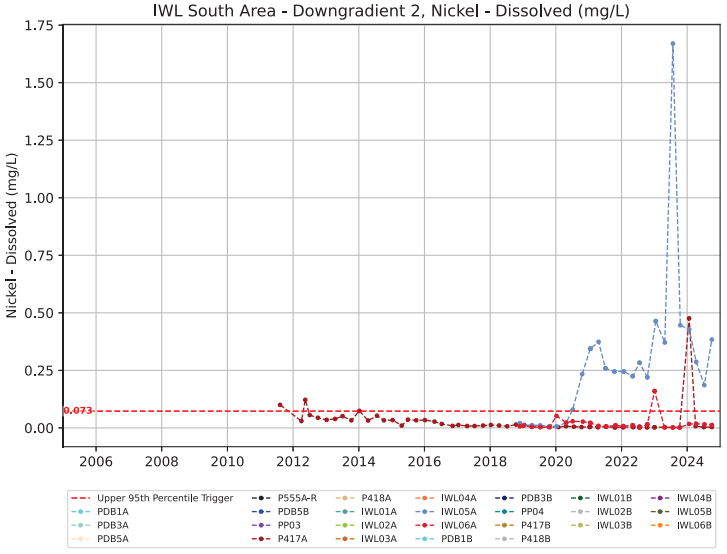

IWL South Area - Downgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0011
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

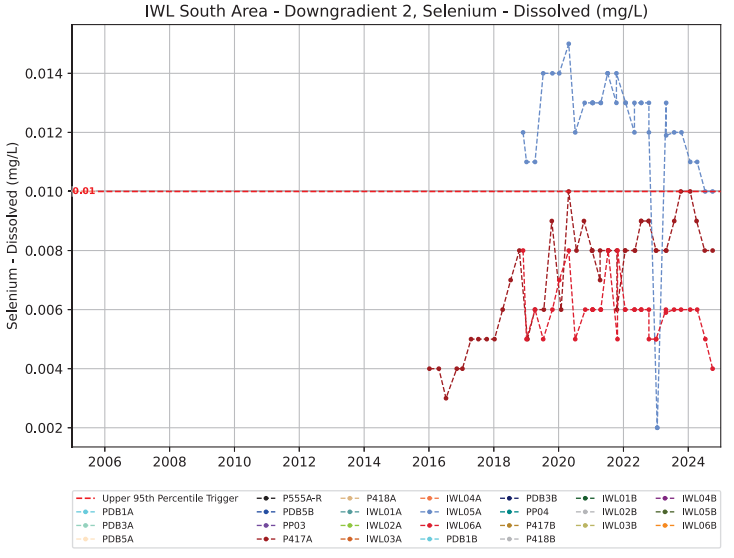

IWL South Area - Downgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

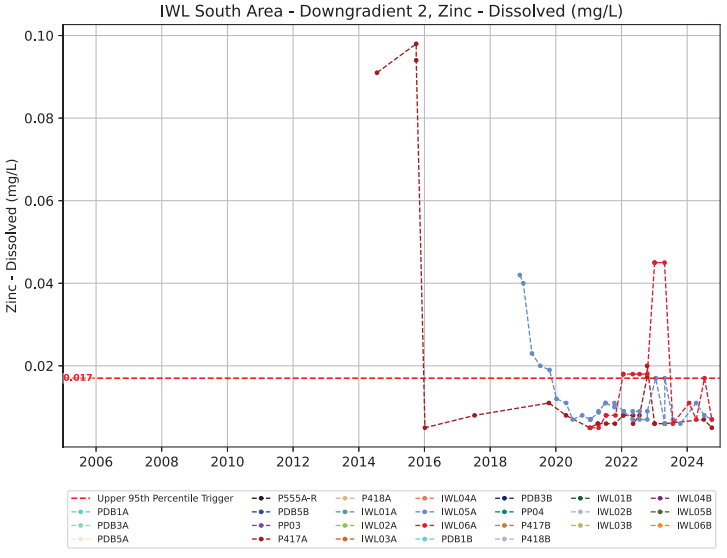

IWL South Area - Downgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.00420
0.00415
0.00410
0.00405
0.00400
0.00395
0.00390
0.00385
0.00380
0.004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

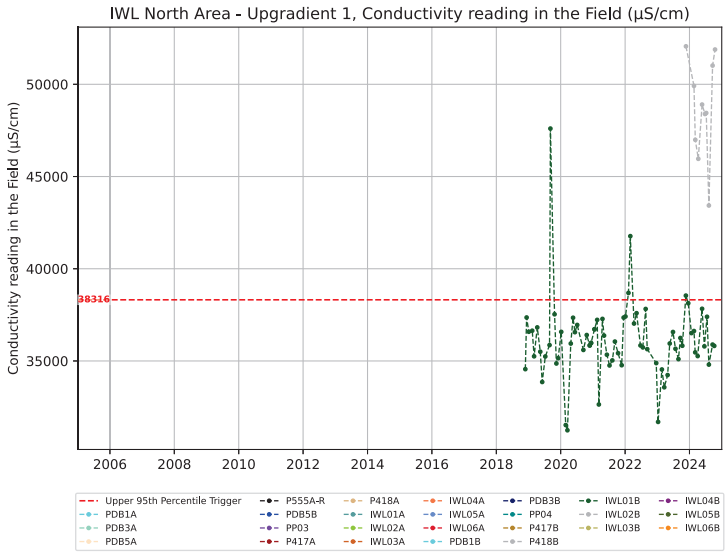

IWL South Area - Downgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.8
0.6
0.4
0.2
0.0
0.077
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

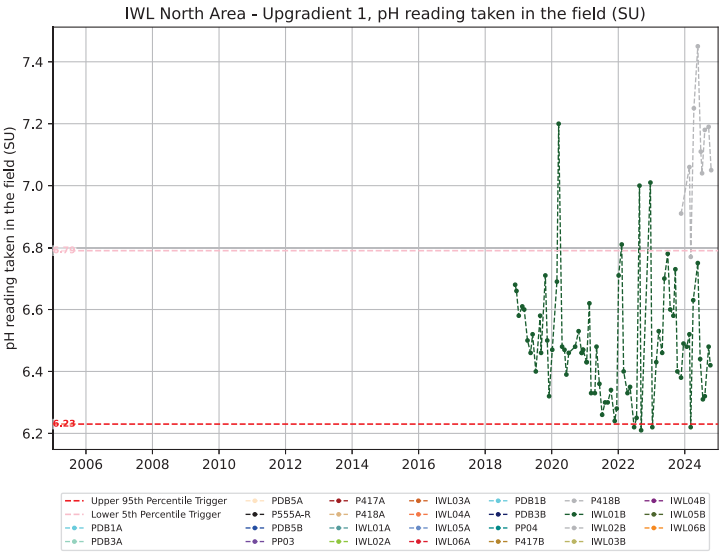

IWL South Area - Downgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.05
0.04
0.03
0.02
0.01
0.00
0.0064
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

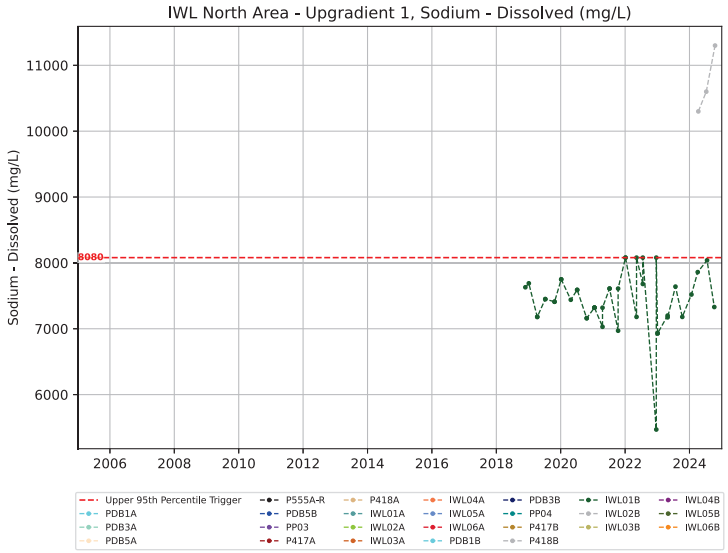

IWL South Area - Downgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.073
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

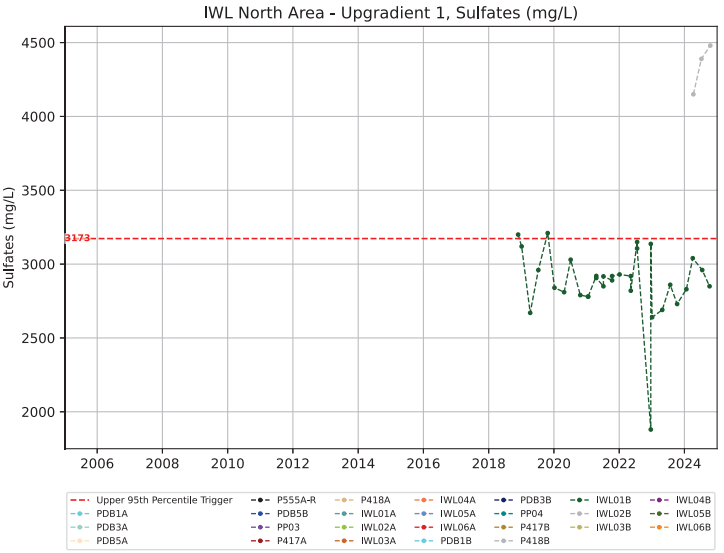

IWL South Area - Downgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.01
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

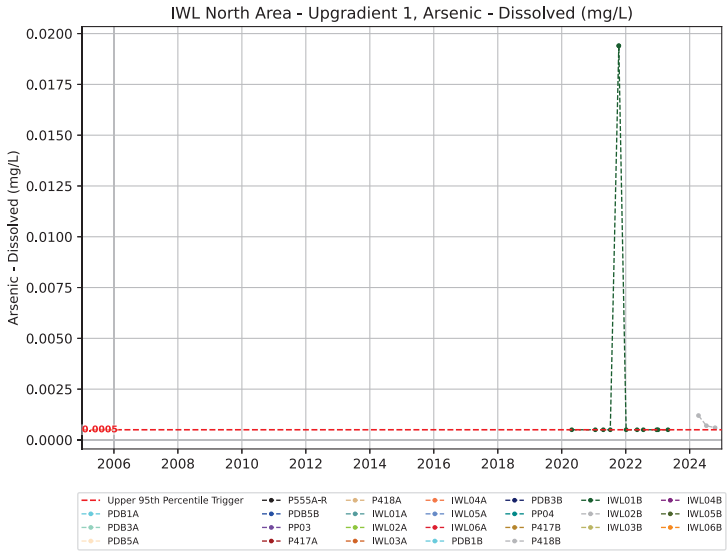

IWL South Area - Downgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.10
0.08
0.06
0.04
0.02
0.017
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

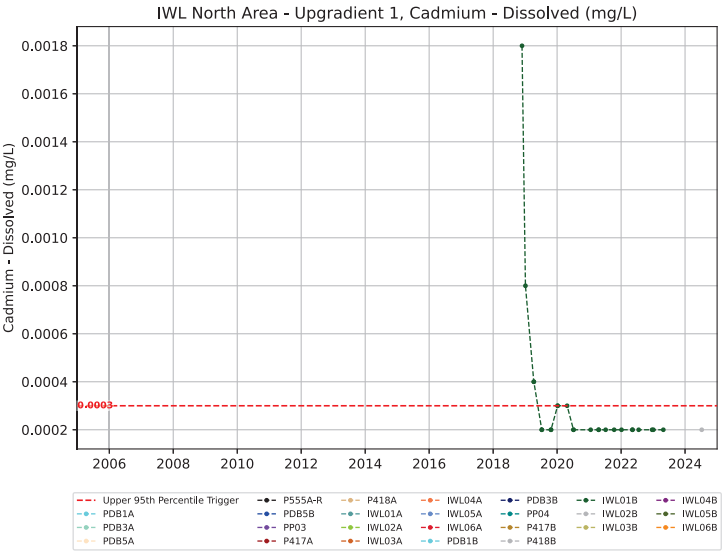

IWL North Area - Upgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
50000
45000
40000
35000
38316
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

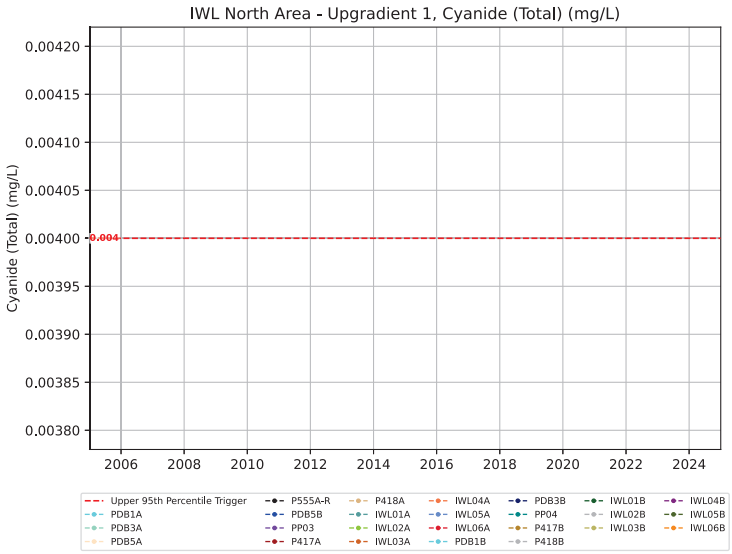

IWL North Area - Upgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.79
6.23
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

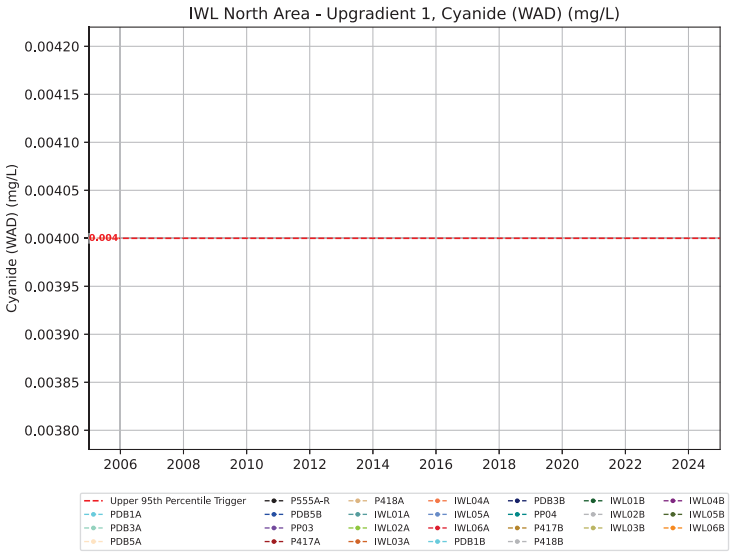

IWL North Area - Upgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11000
10000
9000
8000
7000
6000
8080
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

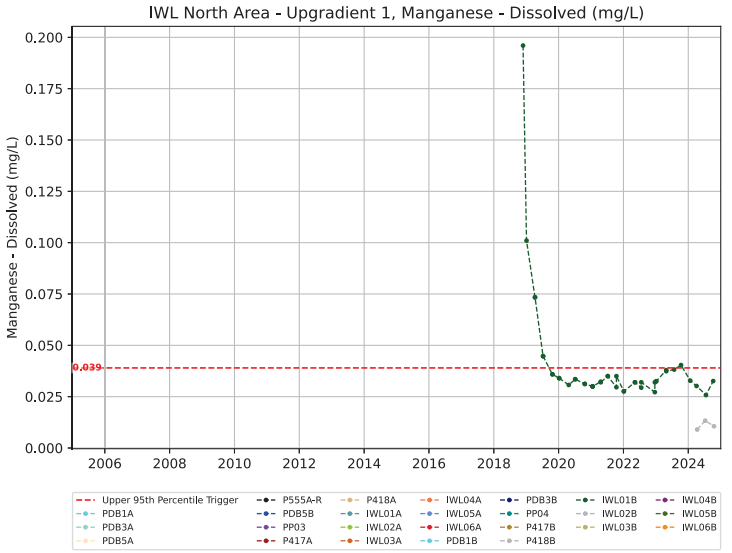

IWL North Area - Upgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
4500
4000
3500
3000
2500
2000
3173
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

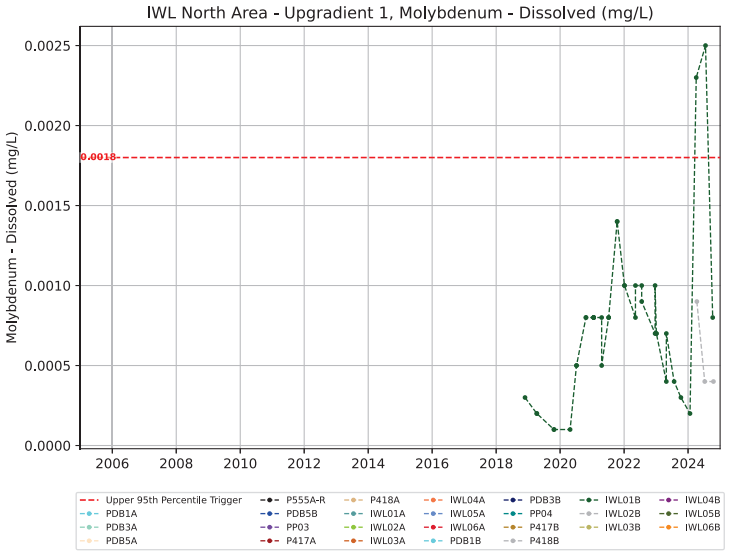

IWL North Area - Upgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0200
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.0005
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

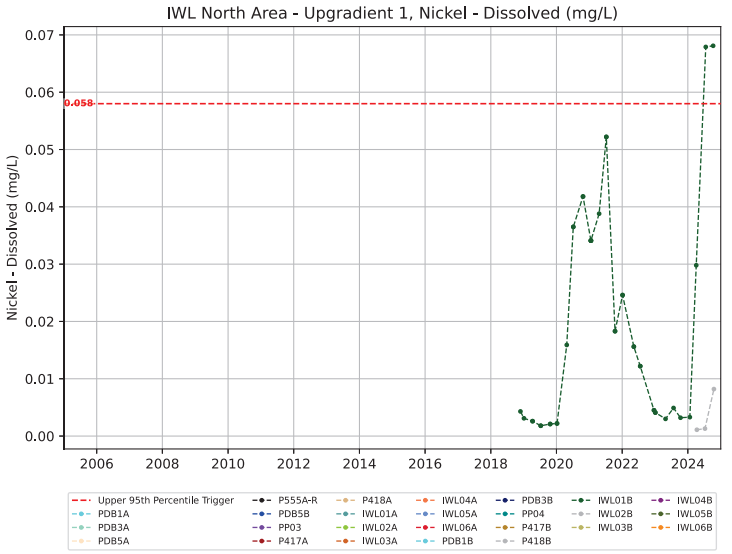

IWL North Area - Upgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0003
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

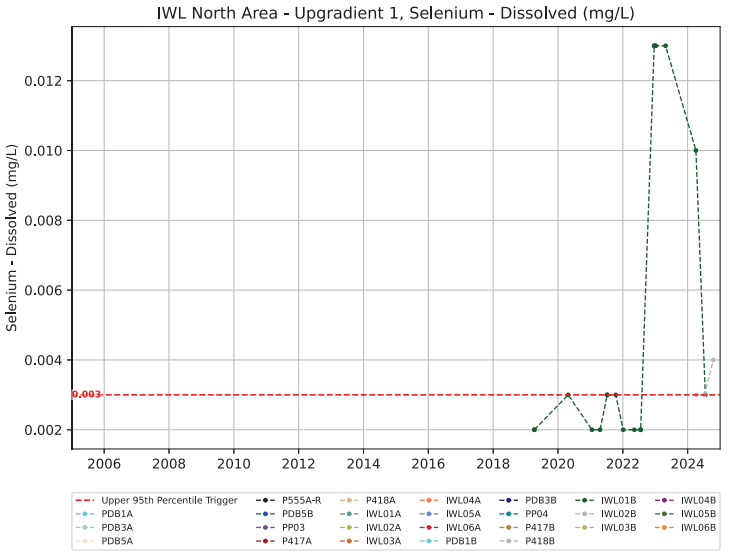

IWL North Area - Upgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

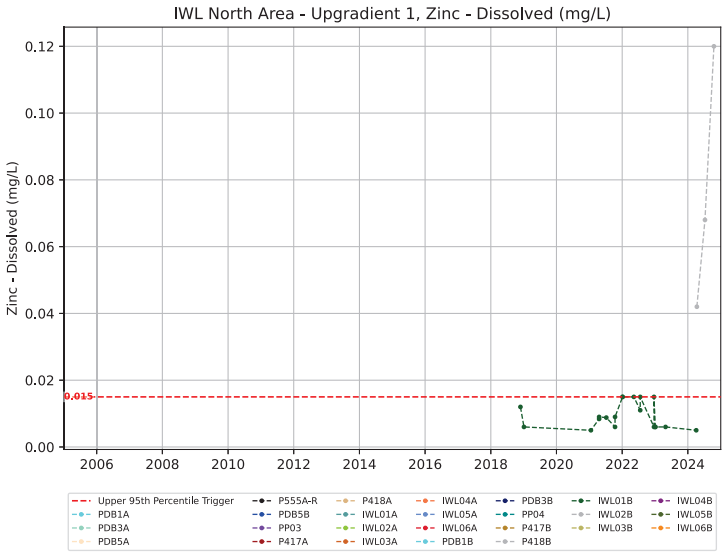

IWL North Area - Upgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

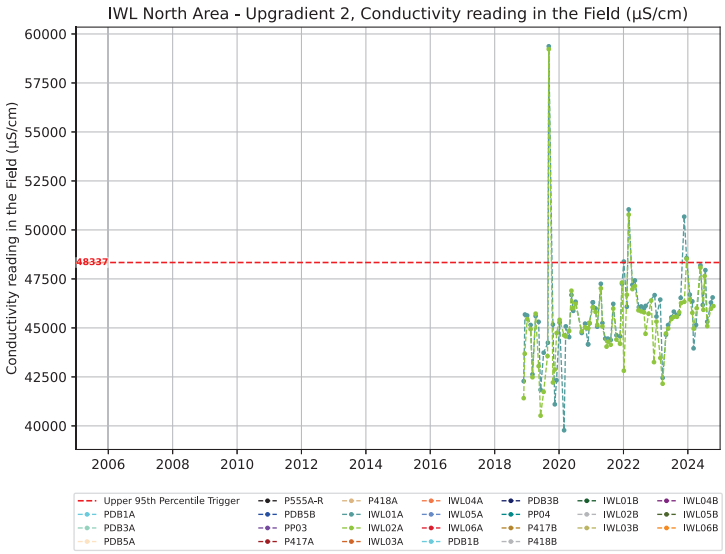

IWL North Area - Upgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.039
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

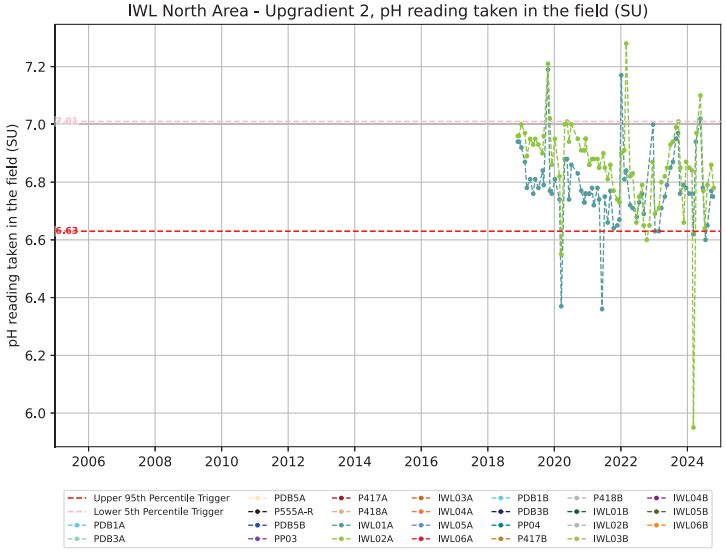

IWL North Area - Upgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0018
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

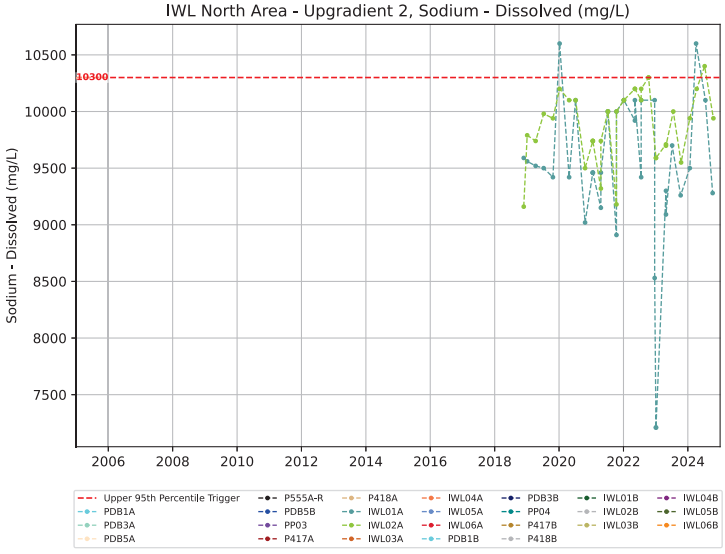

IWL North Area - Upgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.058
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

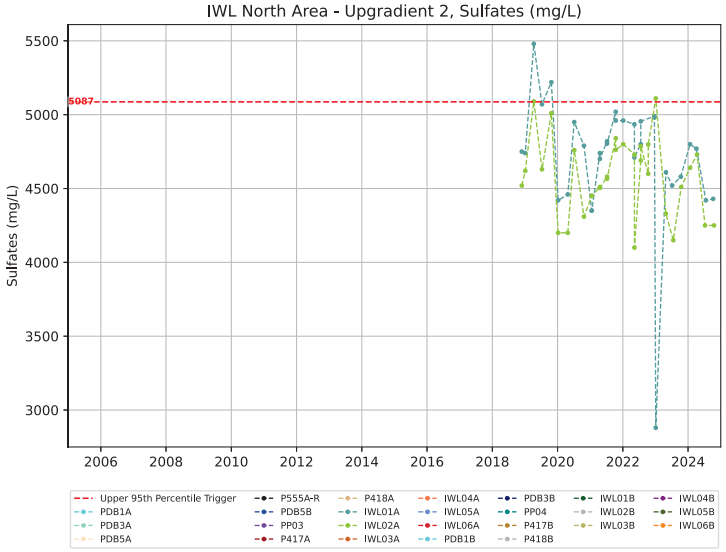

IWL North Area - Upgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.003
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

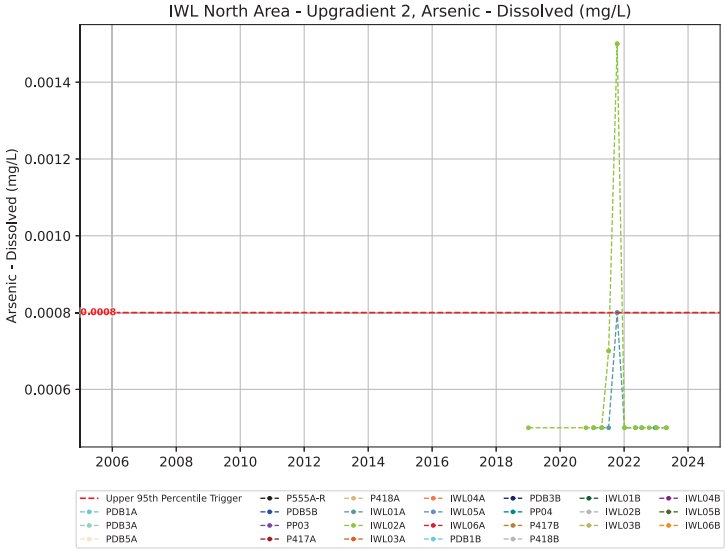

IWL North Area - Upgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

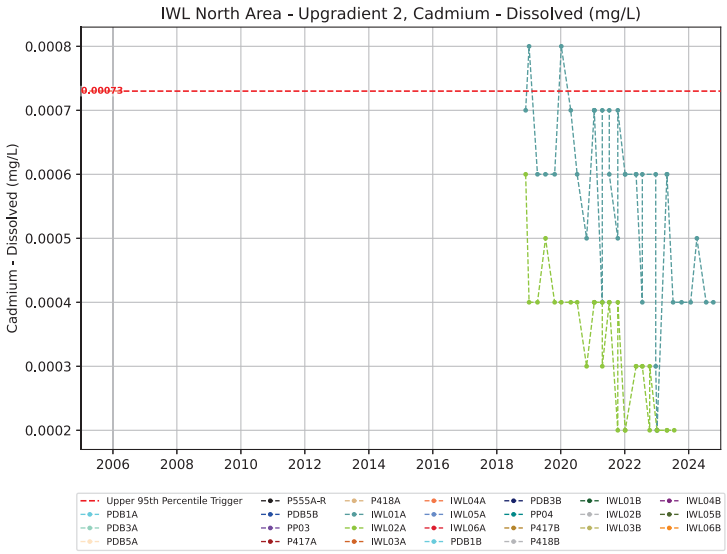

IWL North Area - Upgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
48337
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

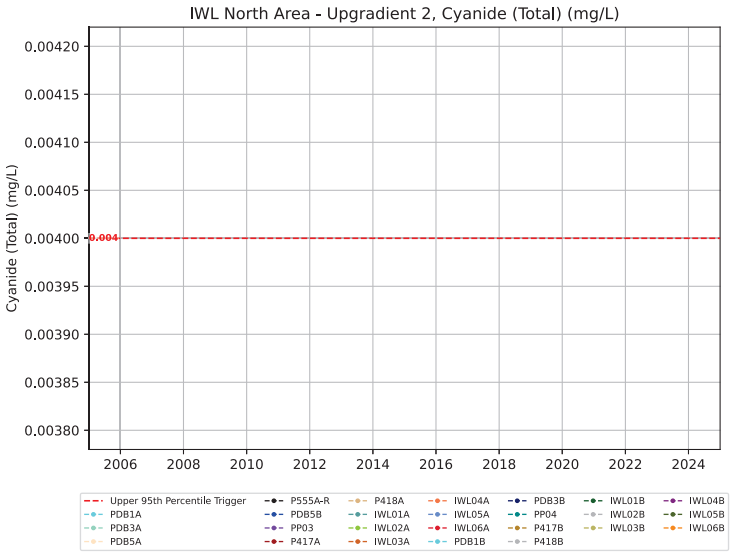

IWL North Area - Upgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
7.01
6.63
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

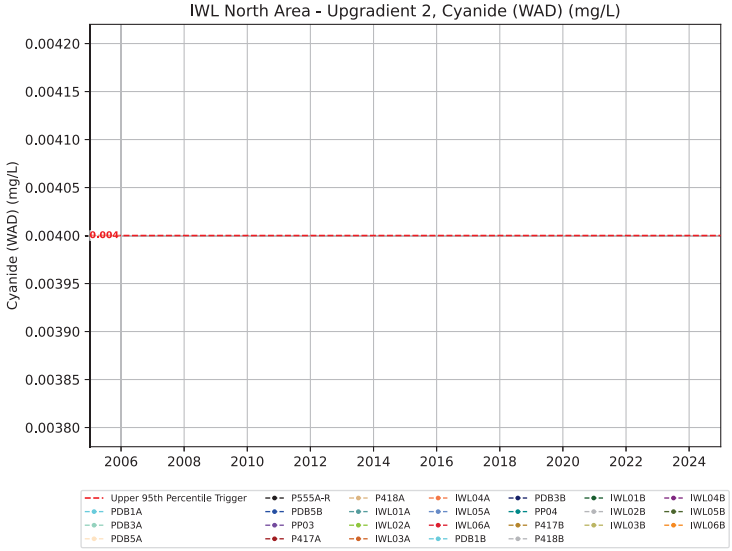

IWL North Area - Upgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10300
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

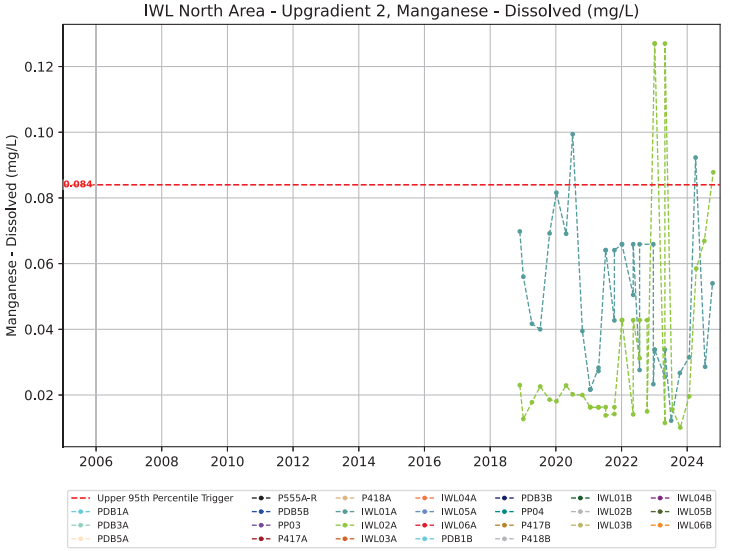

IWL North Area - Upgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
5087
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

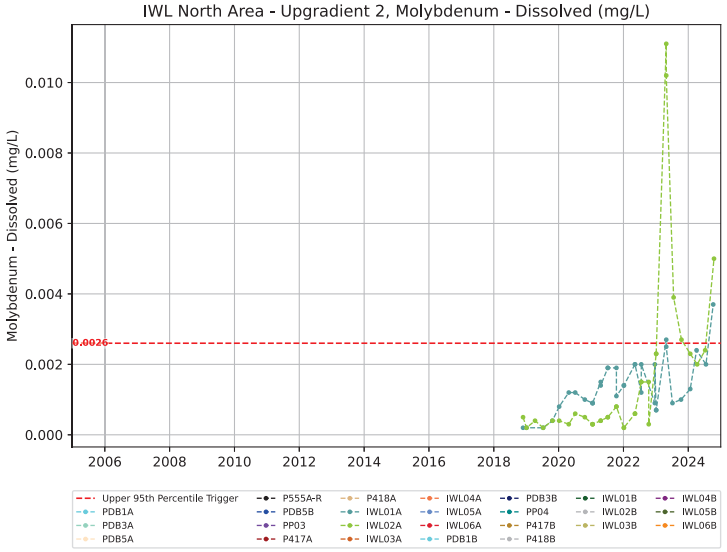

IWL North Area - Upgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

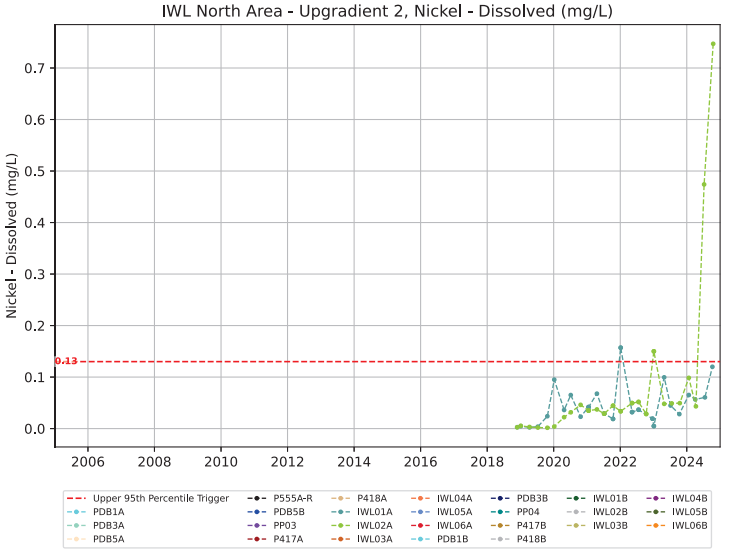

IWL North Area - Upgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.00073
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

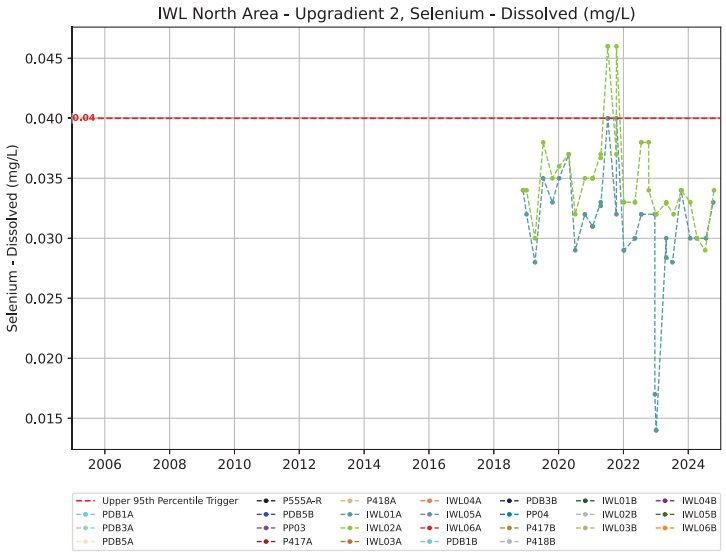

IWL North Area - Upgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

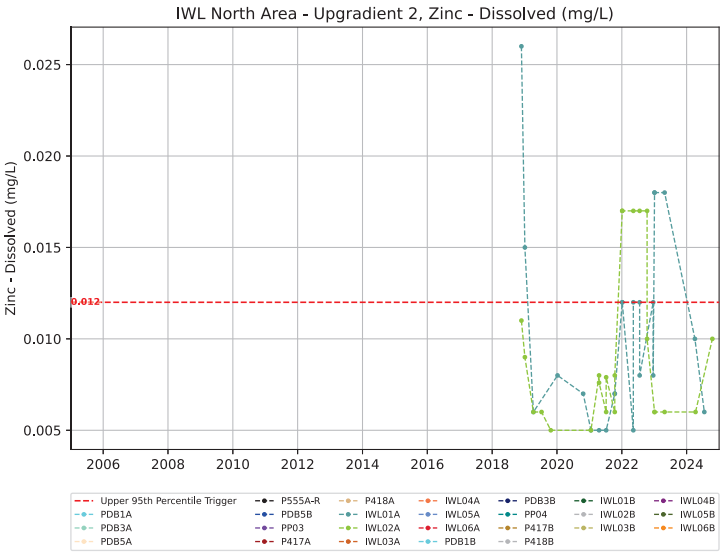

IWL North Area - Upgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

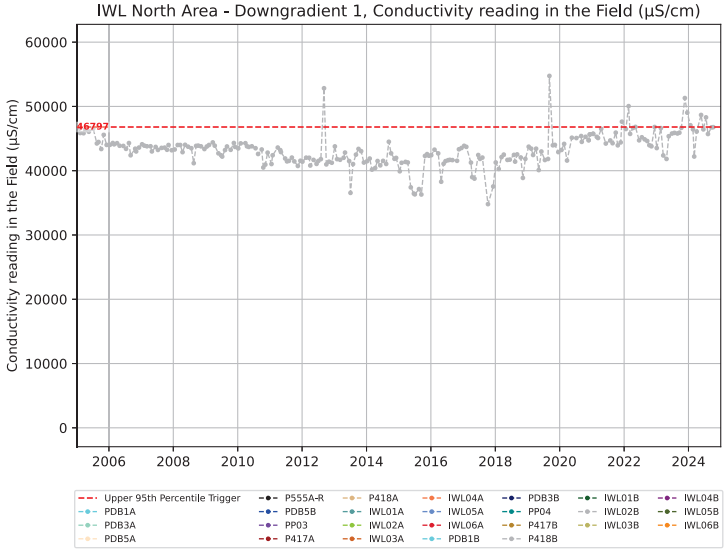

IWL North Area - Upgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.084
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

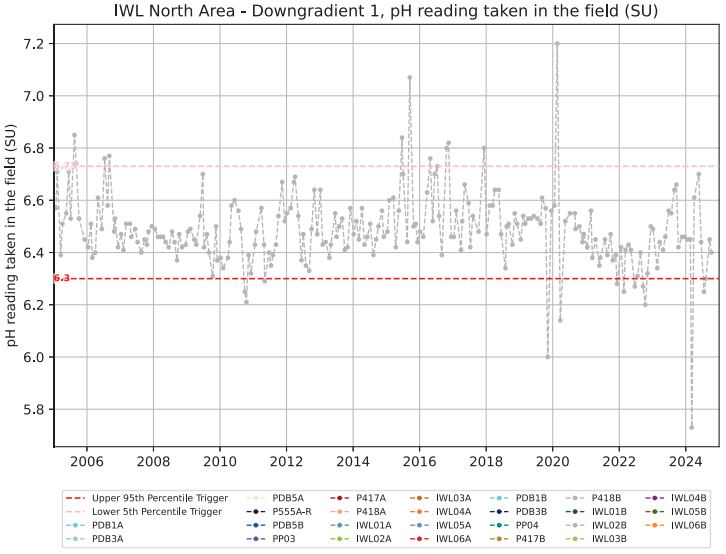

IWL North Area - Upgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0026
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

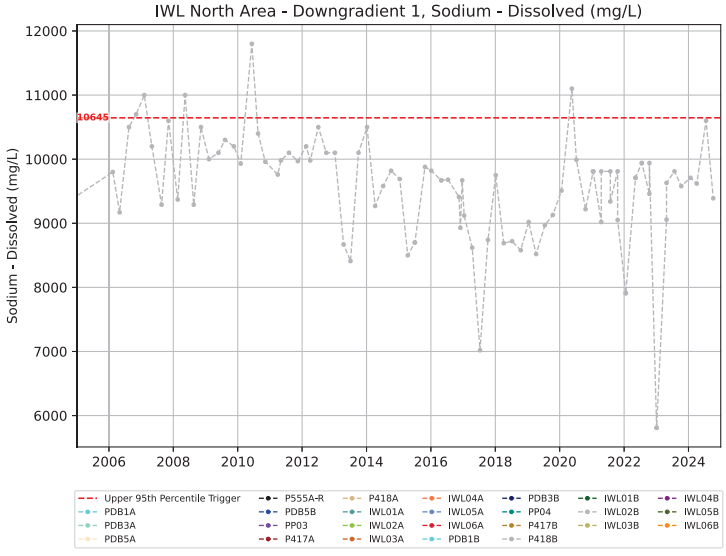

IWL North Area - Upgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.13
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

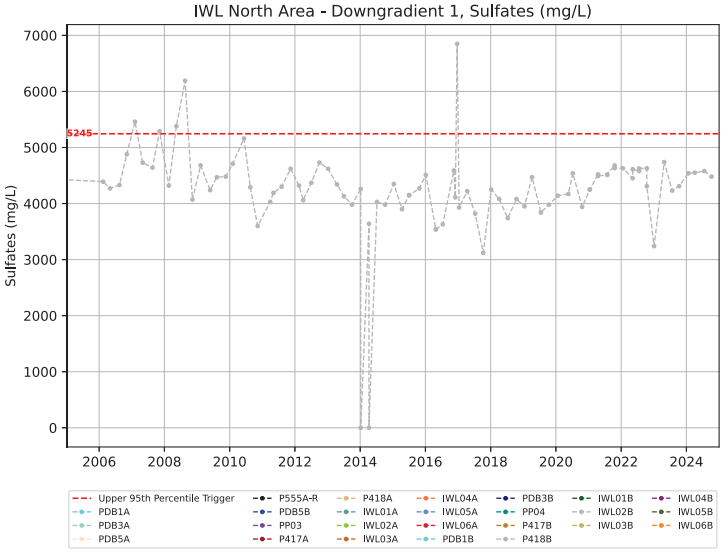

IWL North Area - Upgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.04
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

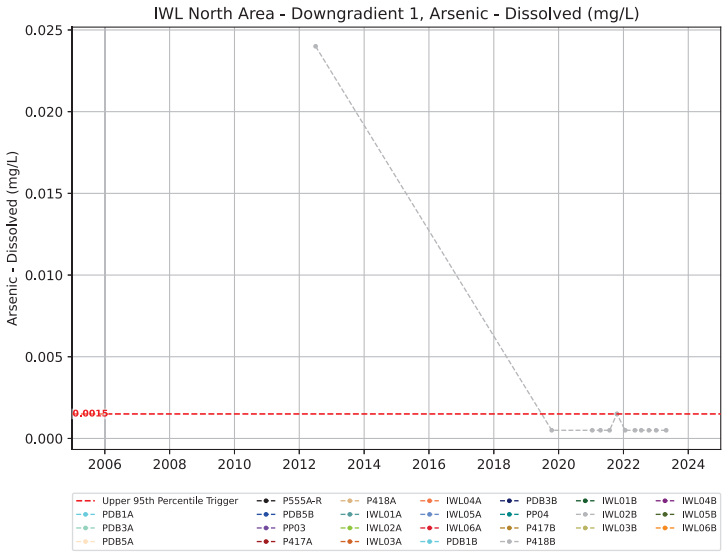

IWL North Area - Upgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.012
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

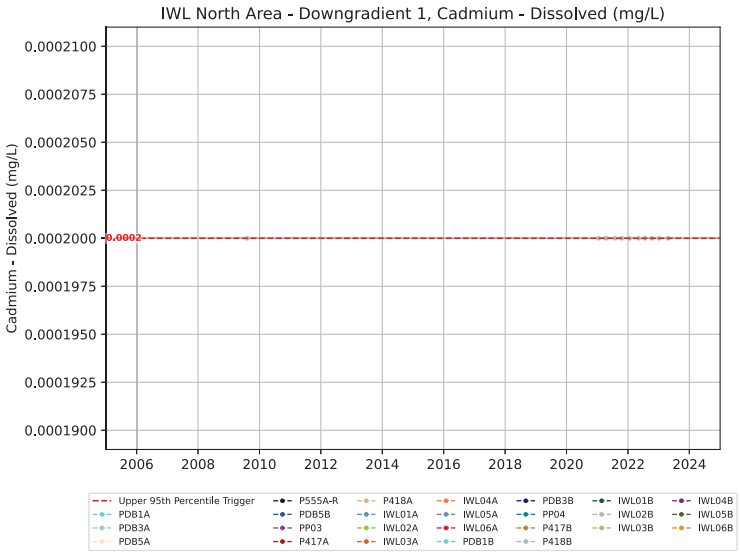

IWL North Area - Downgradient 1, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
46797
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

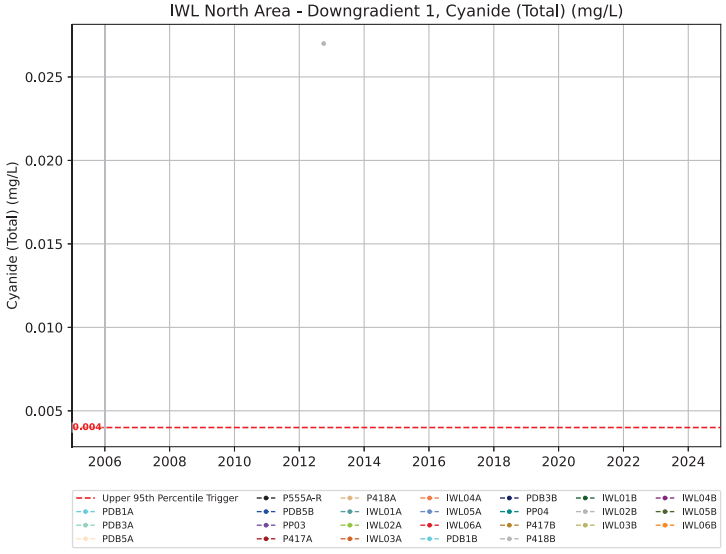

IWL North Area - Downgradient 1, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.73
6.3
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

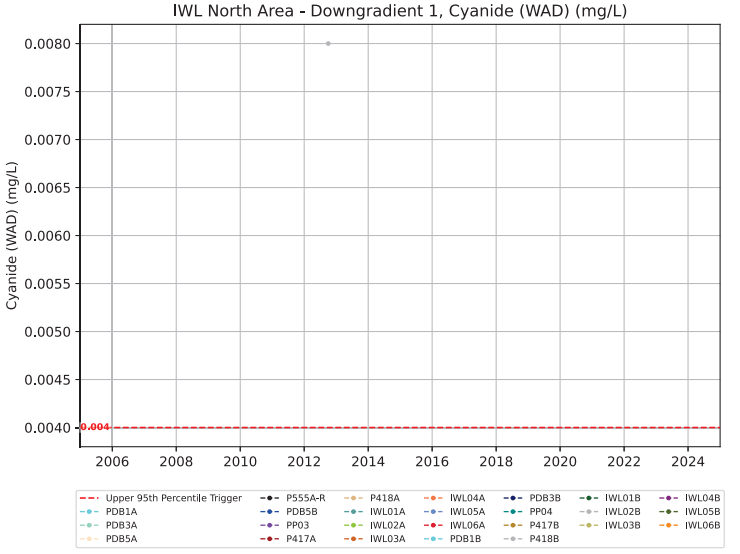

IWL North Area - Downgradient 1, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
10645
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Sulfates (mg/L)
Sulfates (mg/L)
5245
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.0015
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B


IWL North Area - Downgradient 1, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
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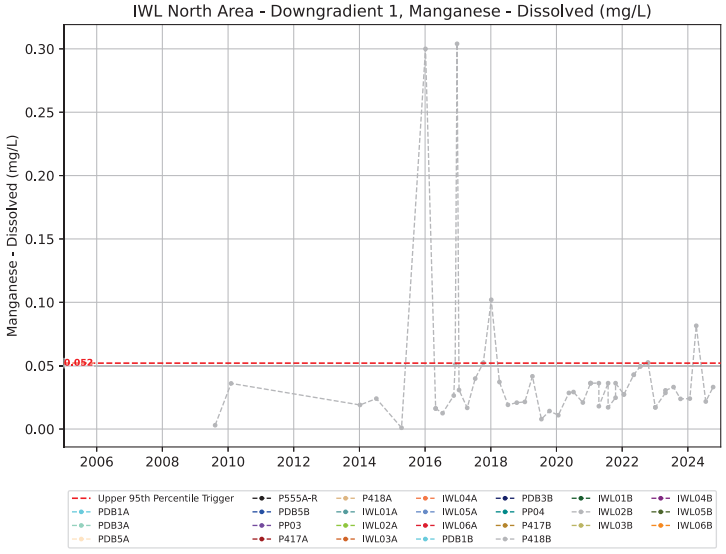
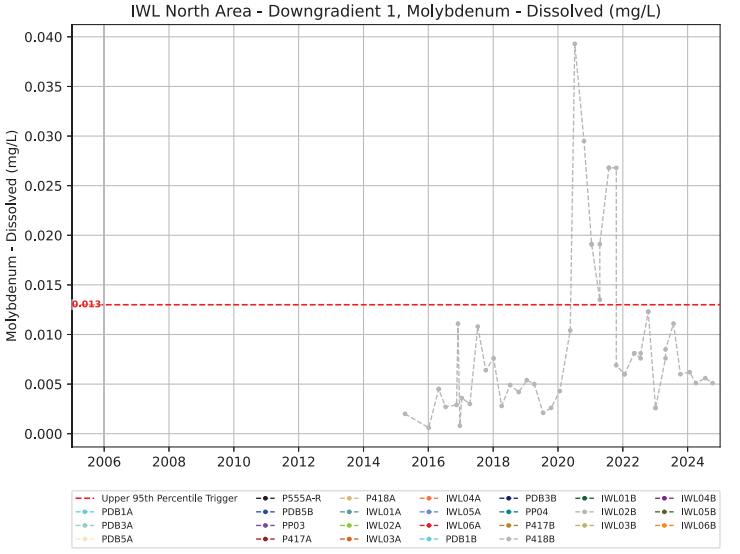
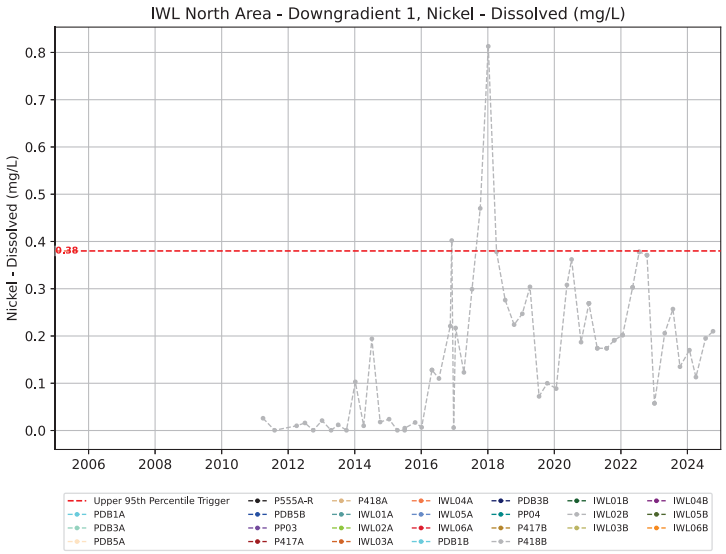
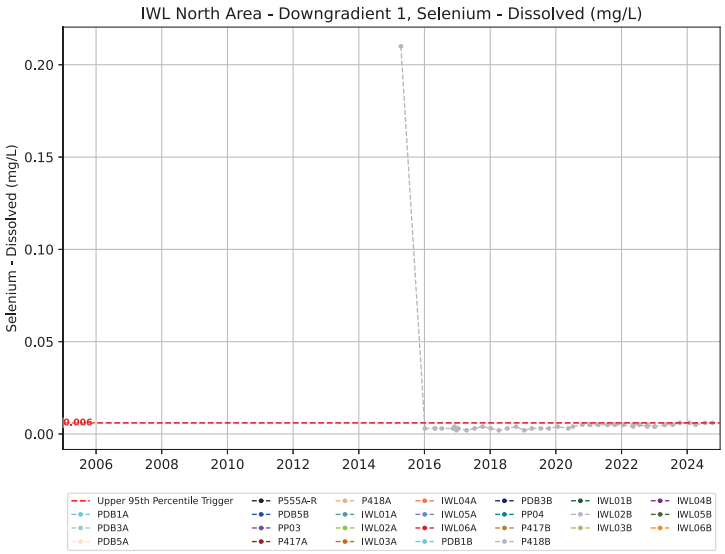
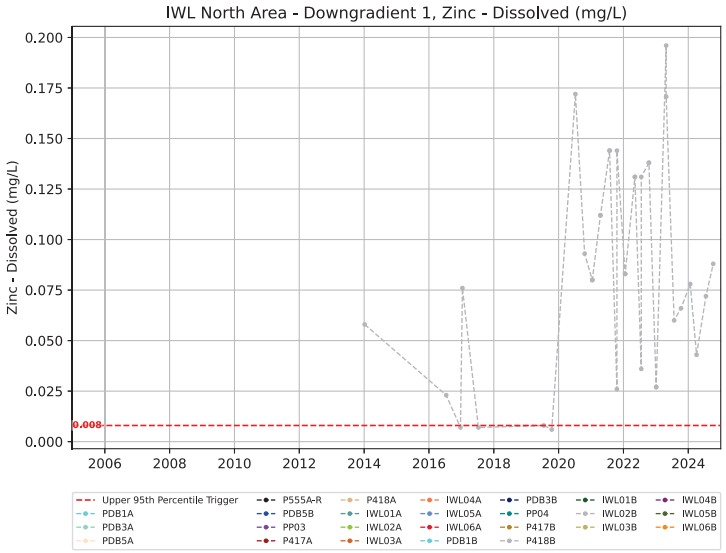
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

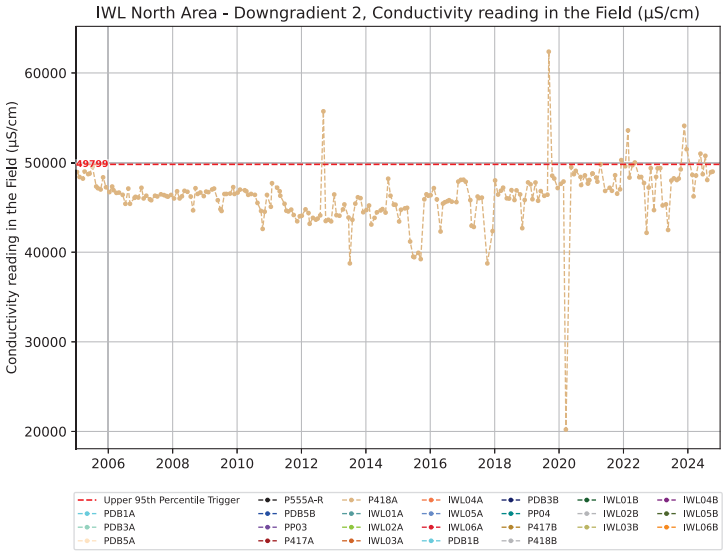

IWL North Area - Downgradient 1, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.052
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

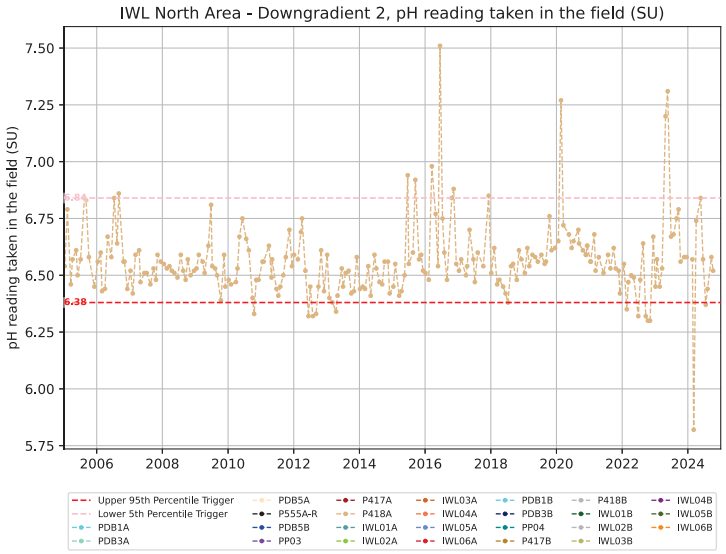

IWL North Area - Downgradient 1, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.013
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

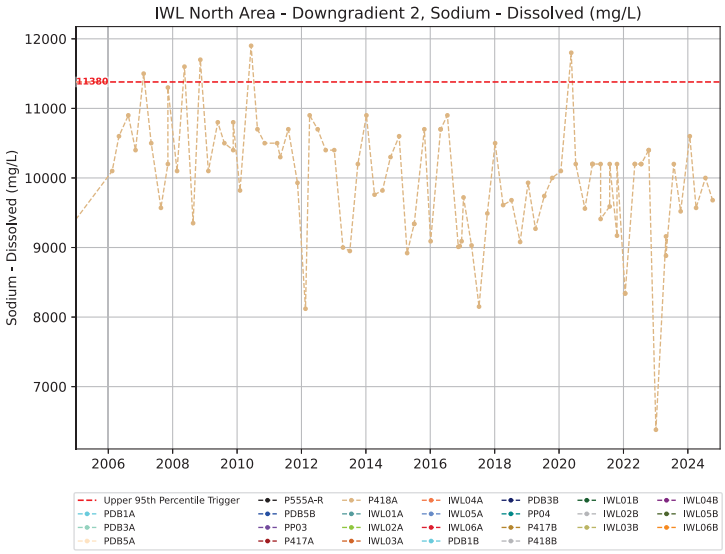

IWL North Area - Downgradient 1, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.38
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

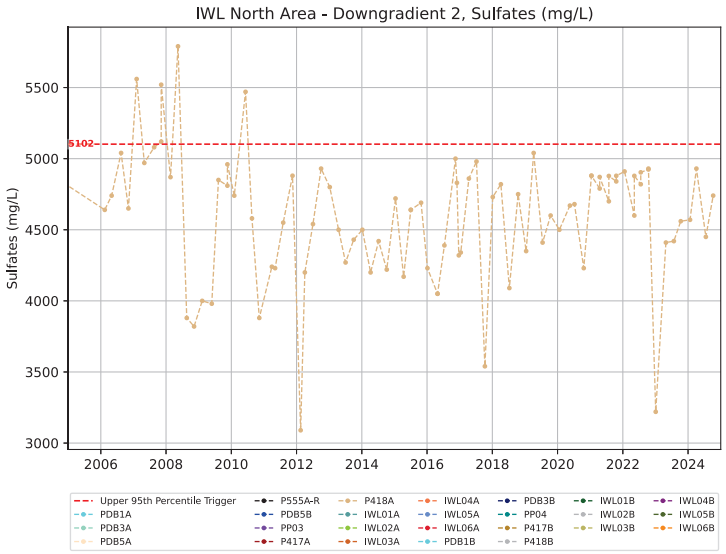

IWL North Area - Downgradient 1, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.006
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

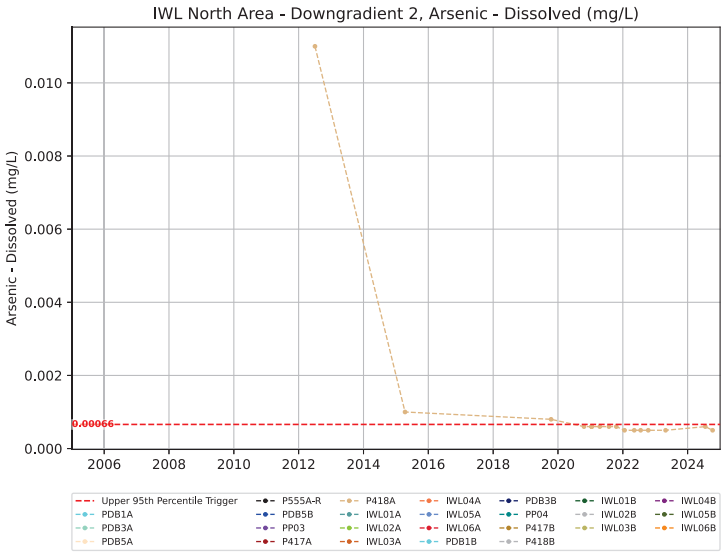

IWL North Area - Downgradient 1, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.008
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

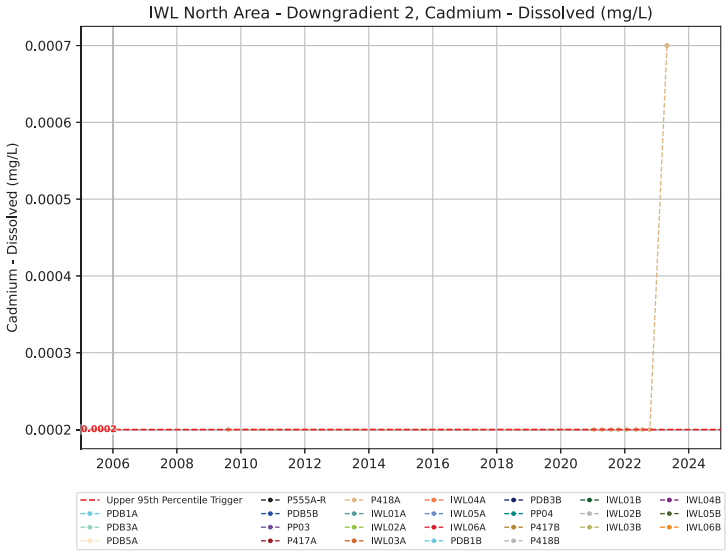

IWL North Area - Downgradient 2, Conductivity reading in the Field (µS/cm)
Conductivity reading in the Field (µS/cm)
49799
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

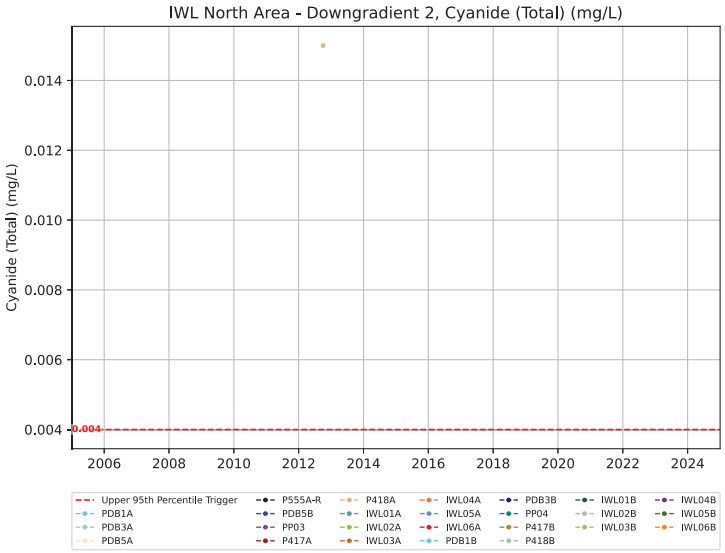

IWL North Area - Downgradient 2, pH reading taken in the field (SU)
pH reading taken in the field (SU)
6.84
6.38
Upper 95th Percentile Trigger
Lower 5th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

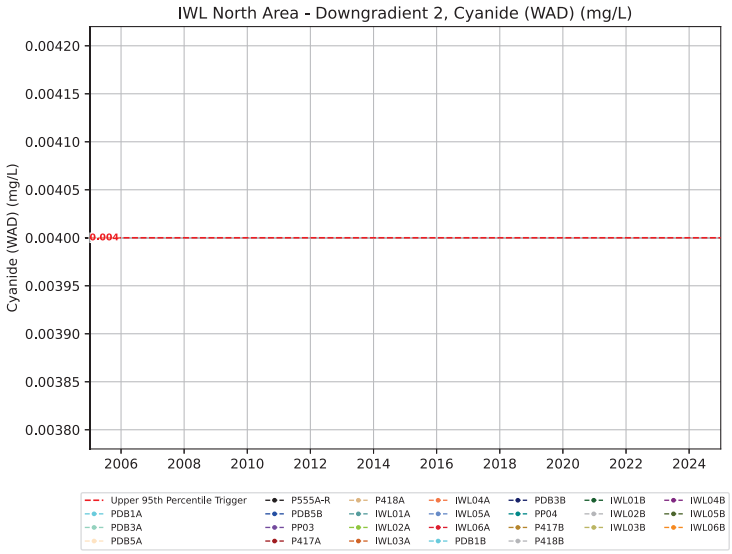

IWL North Area - Downgradient 2, Sodium - Dissolved (mg/L)
Sodium - Dissolved (mg/L)
11380
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

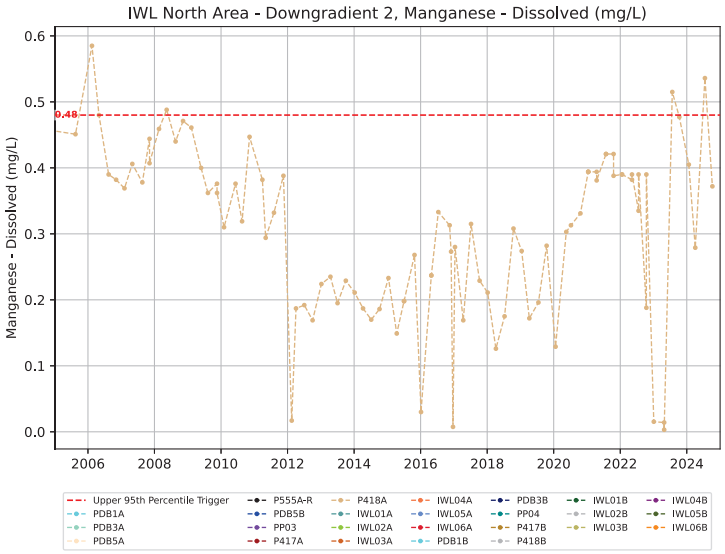

IWL North Area - Downgradient 2, Sulfates (mg/L)
Sulfates (mg/L)
5102
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

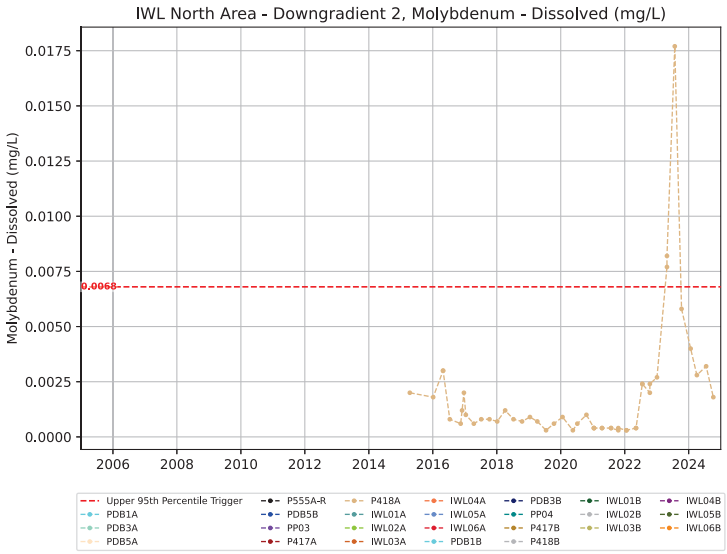

IWL North Area - Downgradient 2, Arsenic - Dissolved (mg/L)
Arsenic - Dissolved (mg/L)
0.00066
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

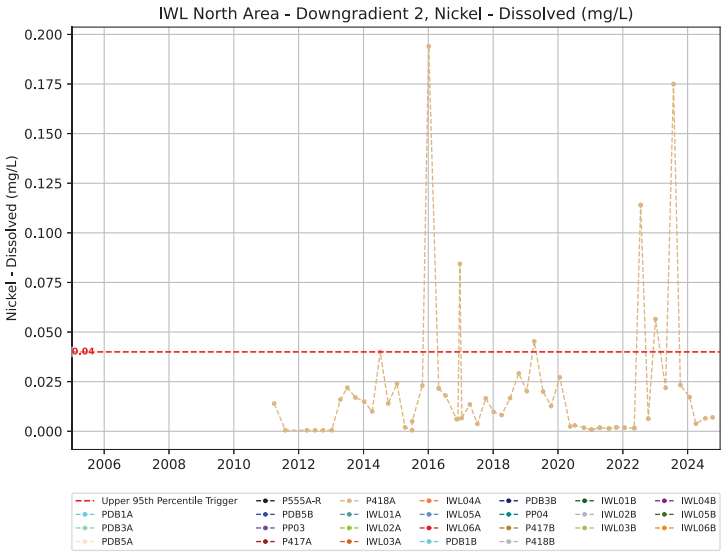

IWL North Area - Downgradient 2, Cadmium - Dissolved (mg/L)
Cadmium - Dissolved (mg/L)
0.0002
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

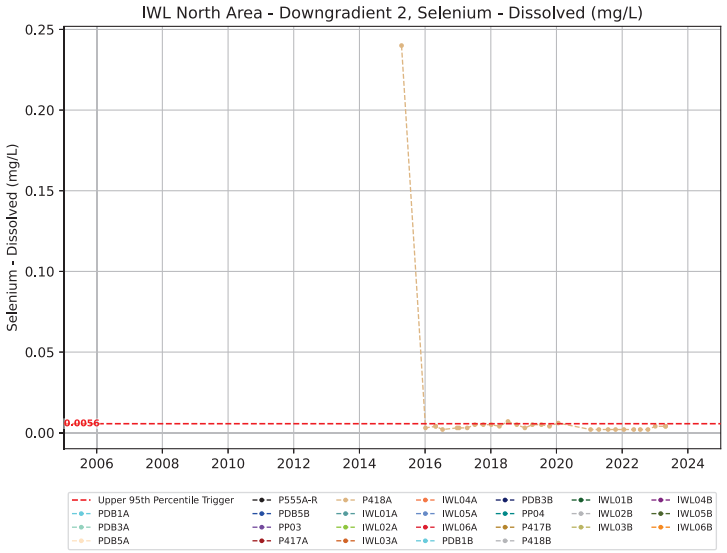

IWL North Area - Downgradient 2, Cyanide (Total) (mg/L)
Cyanide (Total) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

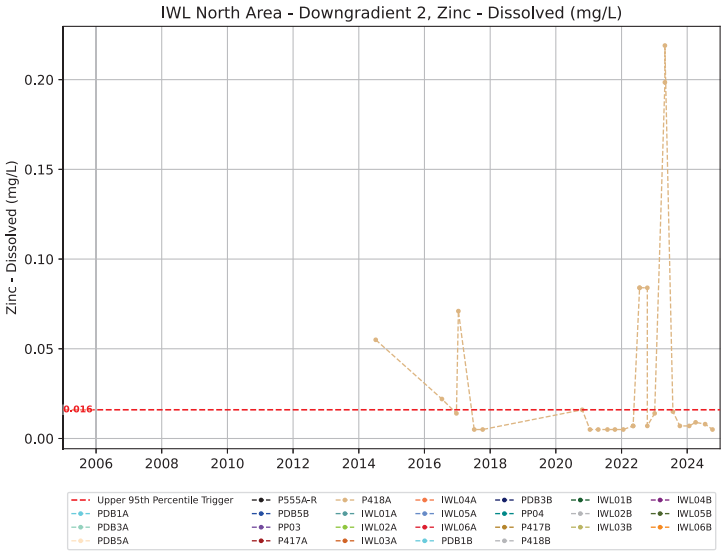

IWL North Area - Downgradient 2, Cyanide (WAD) (mg/L)
Cyanide (WAD) (mg/L)
0.004
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

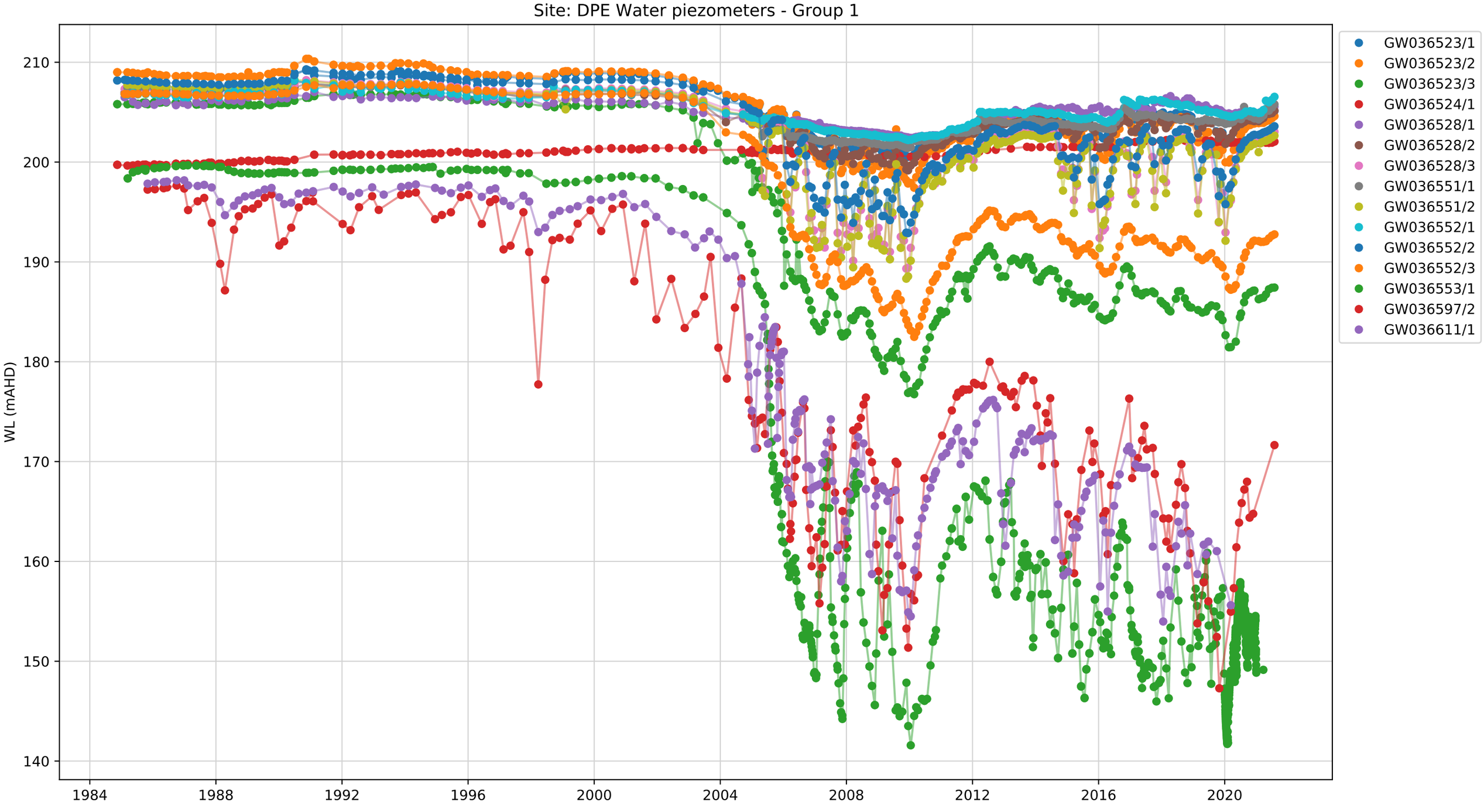

IWL North Area - Downgradient 2, Manganese - Dissolved (mg/L)
Manganese - Dissolved (mg/L)
0.48
Upper 95th Percentile Trigger
P555A-R
P418A
IWL04A
PDB3B
IWL01B
IWL04B
PDB1A
PDB5B
IWL01A
IWL05A
PP04
IWL02B
IWL05B
PDB3A
PP03
IWL02A
IWL06A
P417B
IWL03B
IWL06B
PDB5A
P417A
IWL03A
PDB1B
P418B

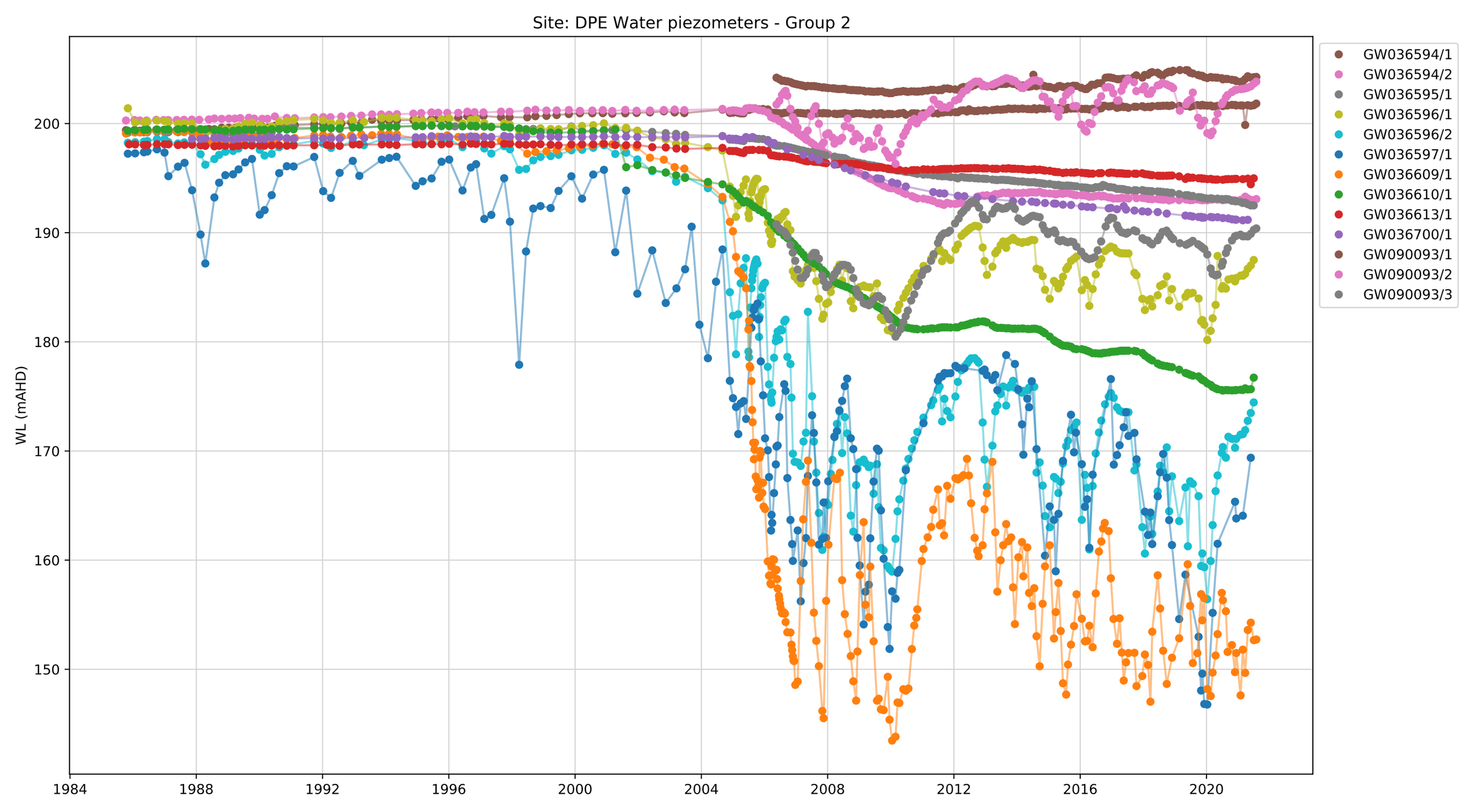

IWL North Area - Downgradient 2, Molybdenum - Dissolved (mg/L)
Molybdenum - Dissolved (mg/L)
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
0.0068
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

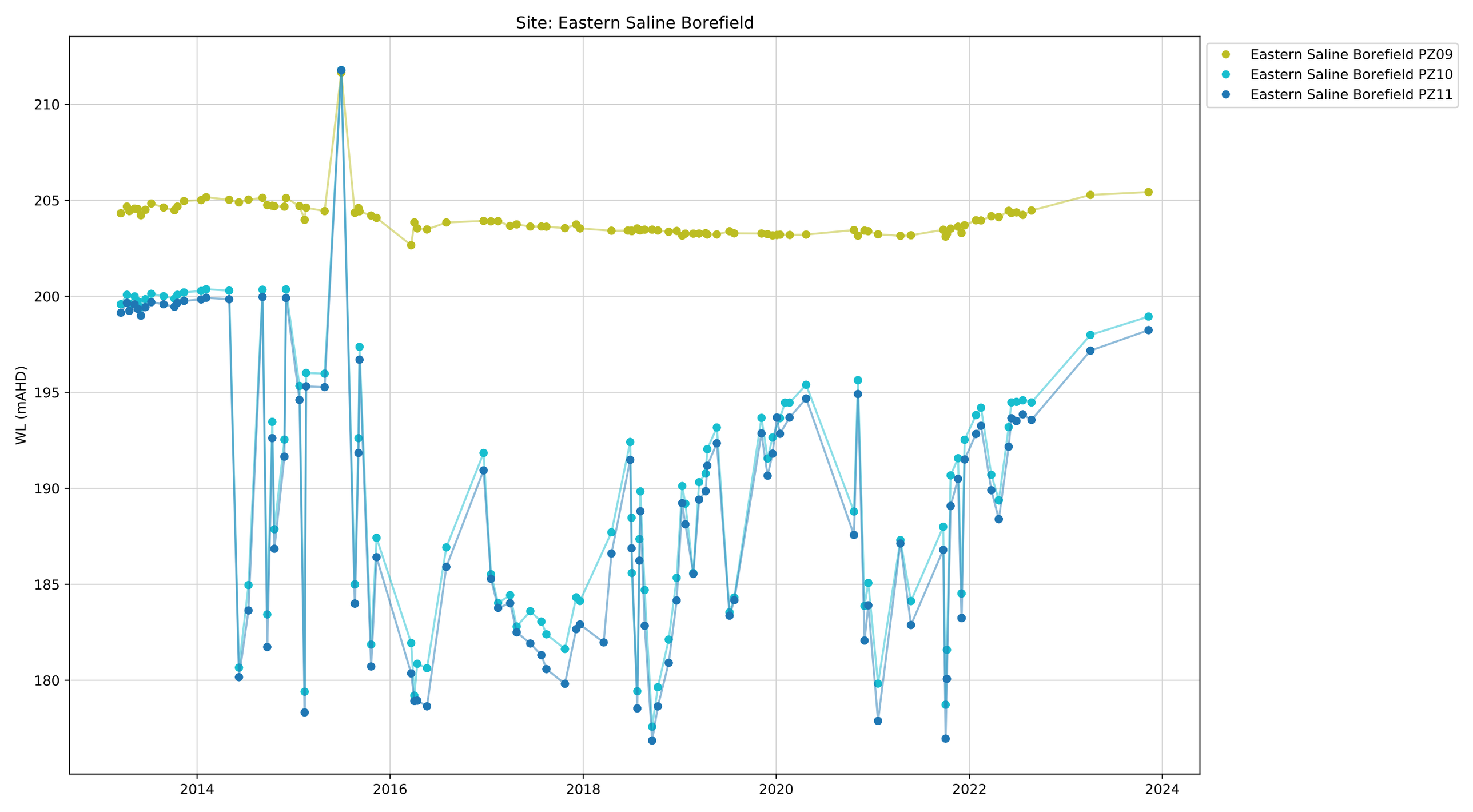

IWL North Area - Downgradient 2, Nickel - Dissolved (mg/L)
Nickel - Dissolved (mg/L)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0.04
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

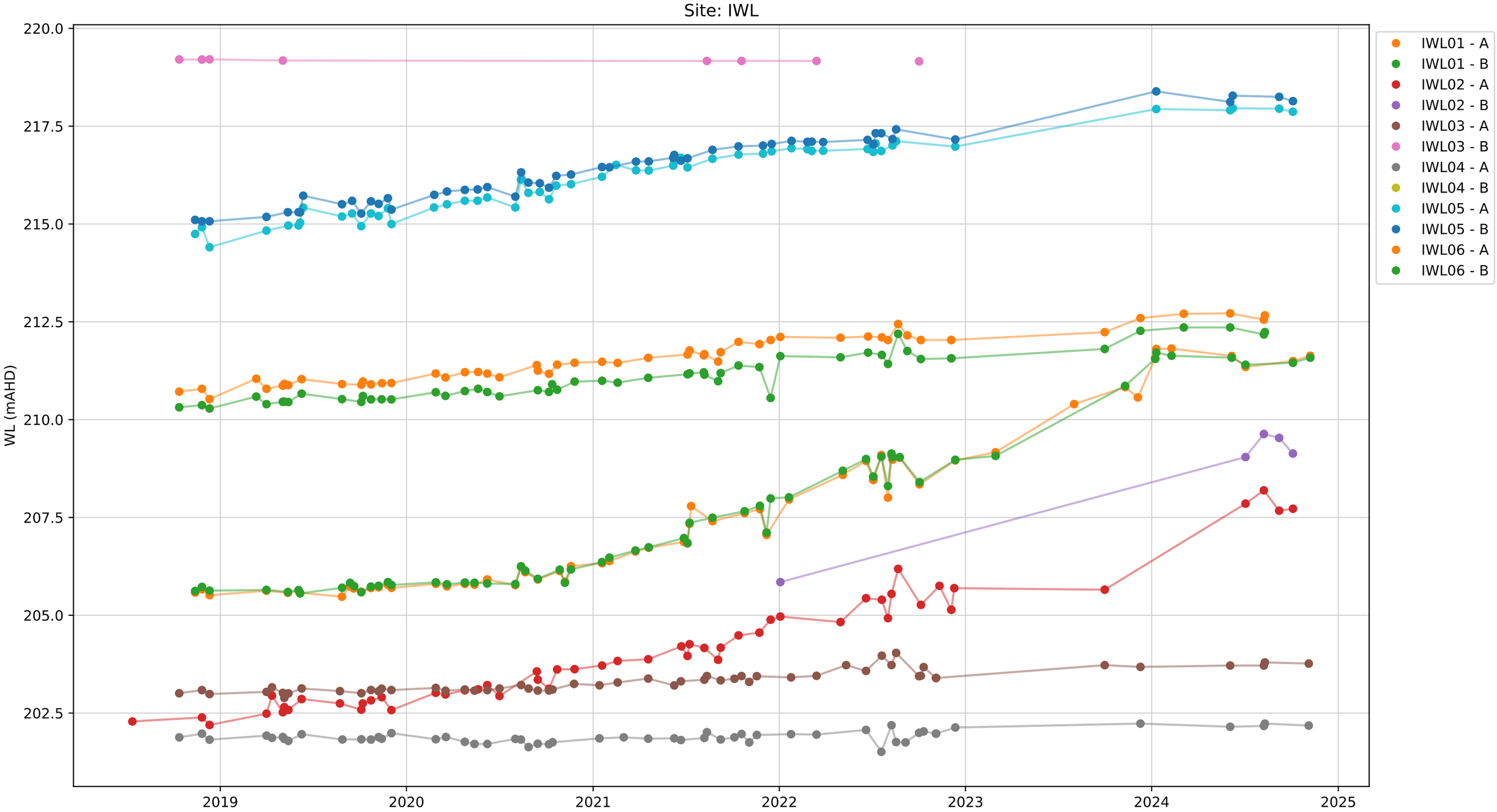

IWL North Area - Downgradient 2, Selenium - Dissolved (mg/L)
Selenium - Dissolved (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
0.0056
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

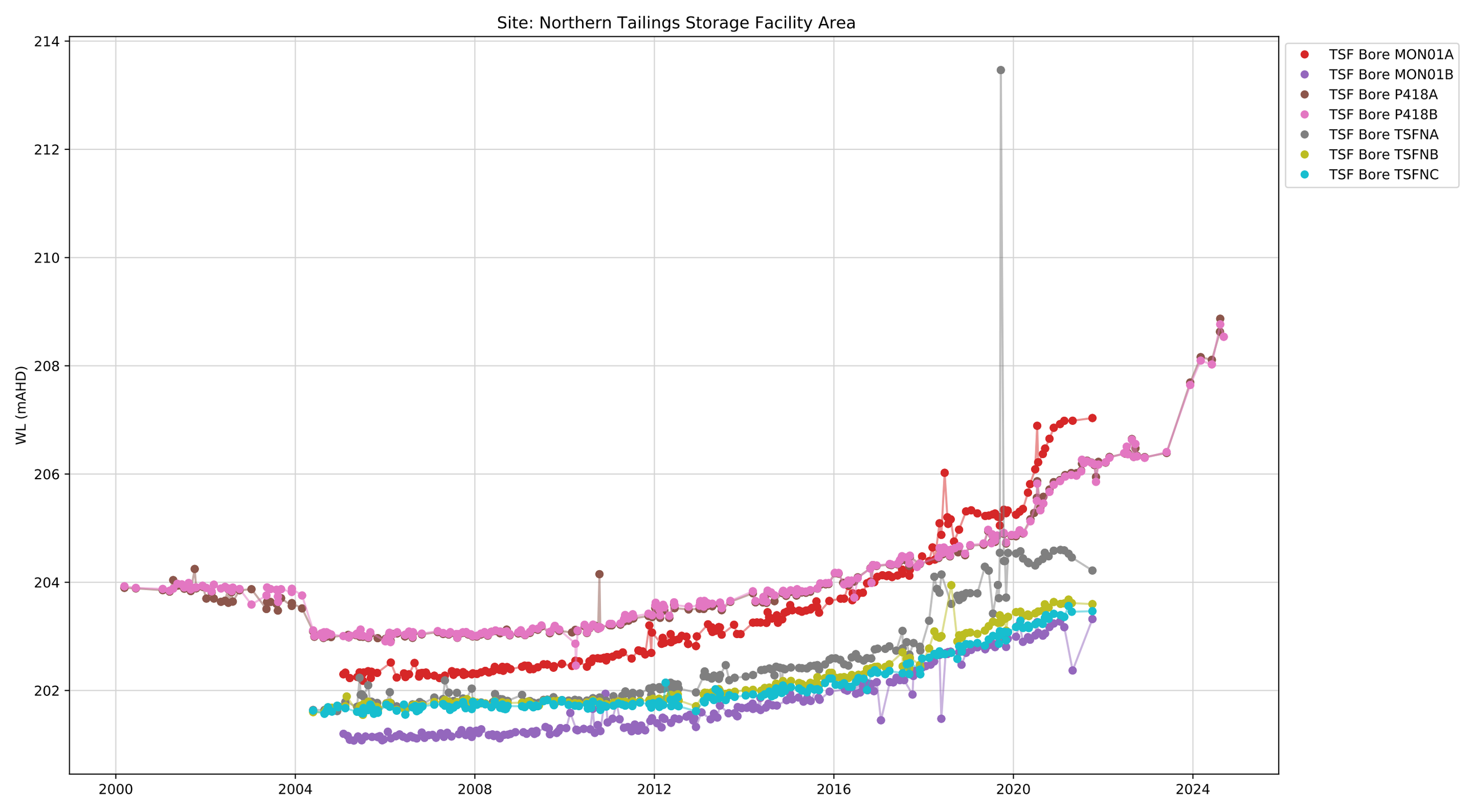

IWL North Area - Downgradient 2, Zinc - Dissolved (mg/L)
Zinc - Dissolved (mg/L)
0.20
0.15
0.10
0.05
0.00
0.016
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
Upper 95th Percentile Trigger
PDB1A
PDB3A
PDB5A
P555A-R
PDB5B
PP03
P417A
P418A
IWL01A
IWL02A
IWL03A
IWL04A
IWL05A
IWL06A
PDB1B
PDB3B
PP04
P417B
P418B
IWL01B
IWL02B
IWL03B
IWL04B
IWL05B
IWL06B

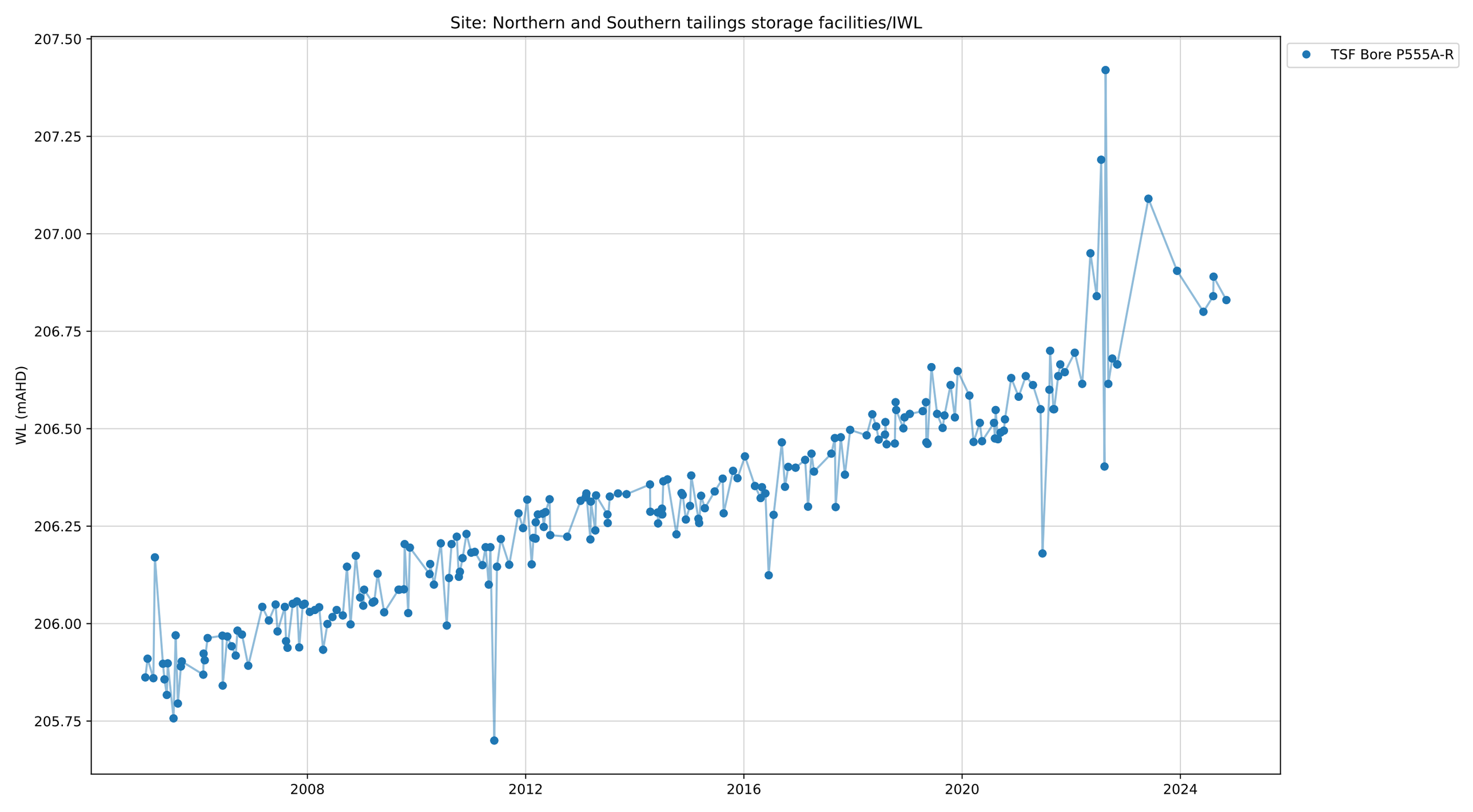

Site: DPE Water piezometers - Group 1
WL (mAHD)
210
200
190
180
170
160
150
140
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
GW036523/1
GW036523/2
GW036523/3
GW036524/1
GW036528/1
GW036528/2
GW036528/3
GW036551/1
GW036551/2
GW036552/1
GW036552/2
GW036552/3
GW036553/1
GW036597/2
GW036611/1

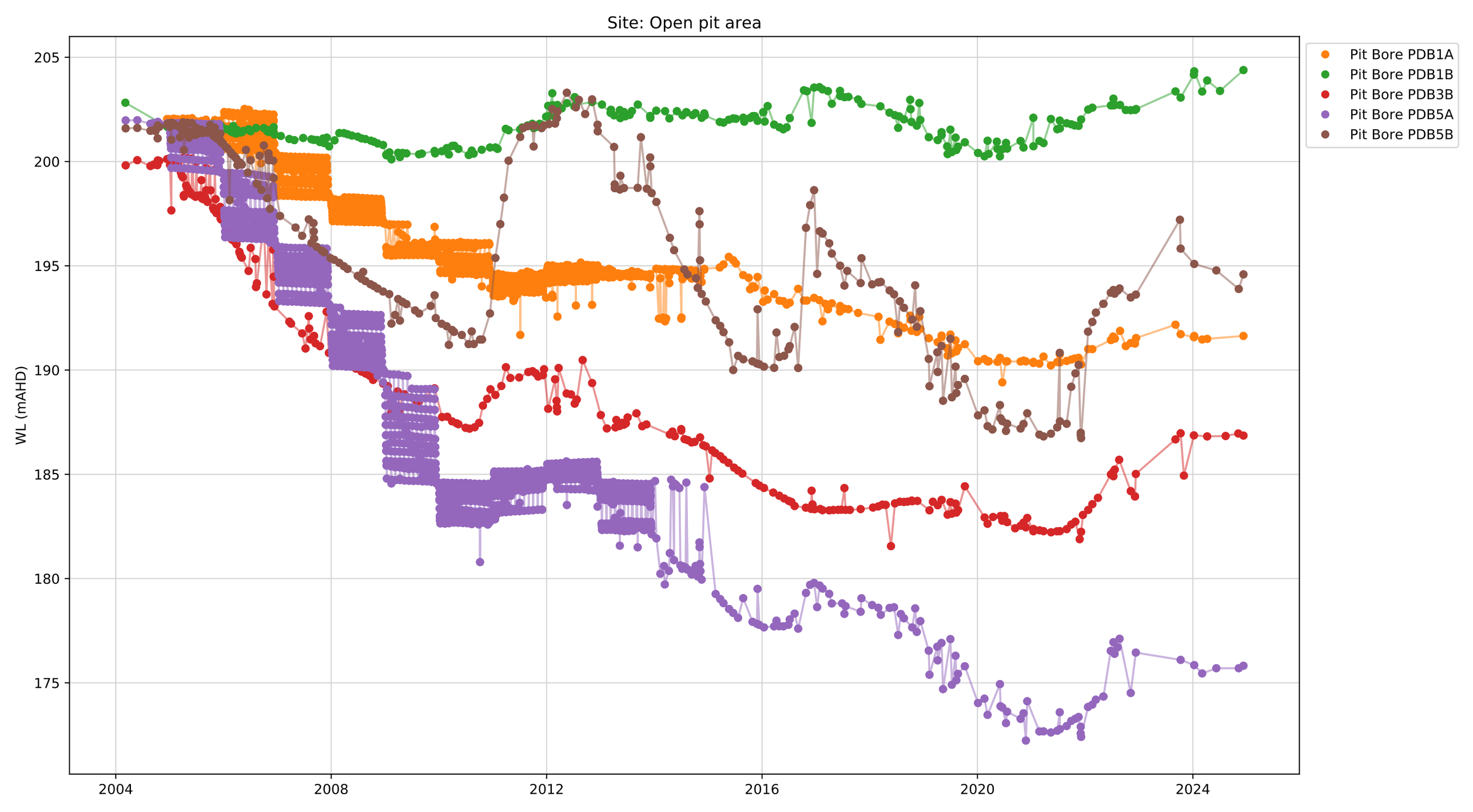

Site: DPE Water piezometers - Group 2
WL (mAHD)
200
190
180
170
160
150
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
GW036594/1
GW036594/2
GW036595/1
GW036596/1
GW036596/2
GW036597/1
GW036609/1
GW036610/1
GW036613/1
GW036700/1
GW090093/1
GW090093/2
GW090093/3

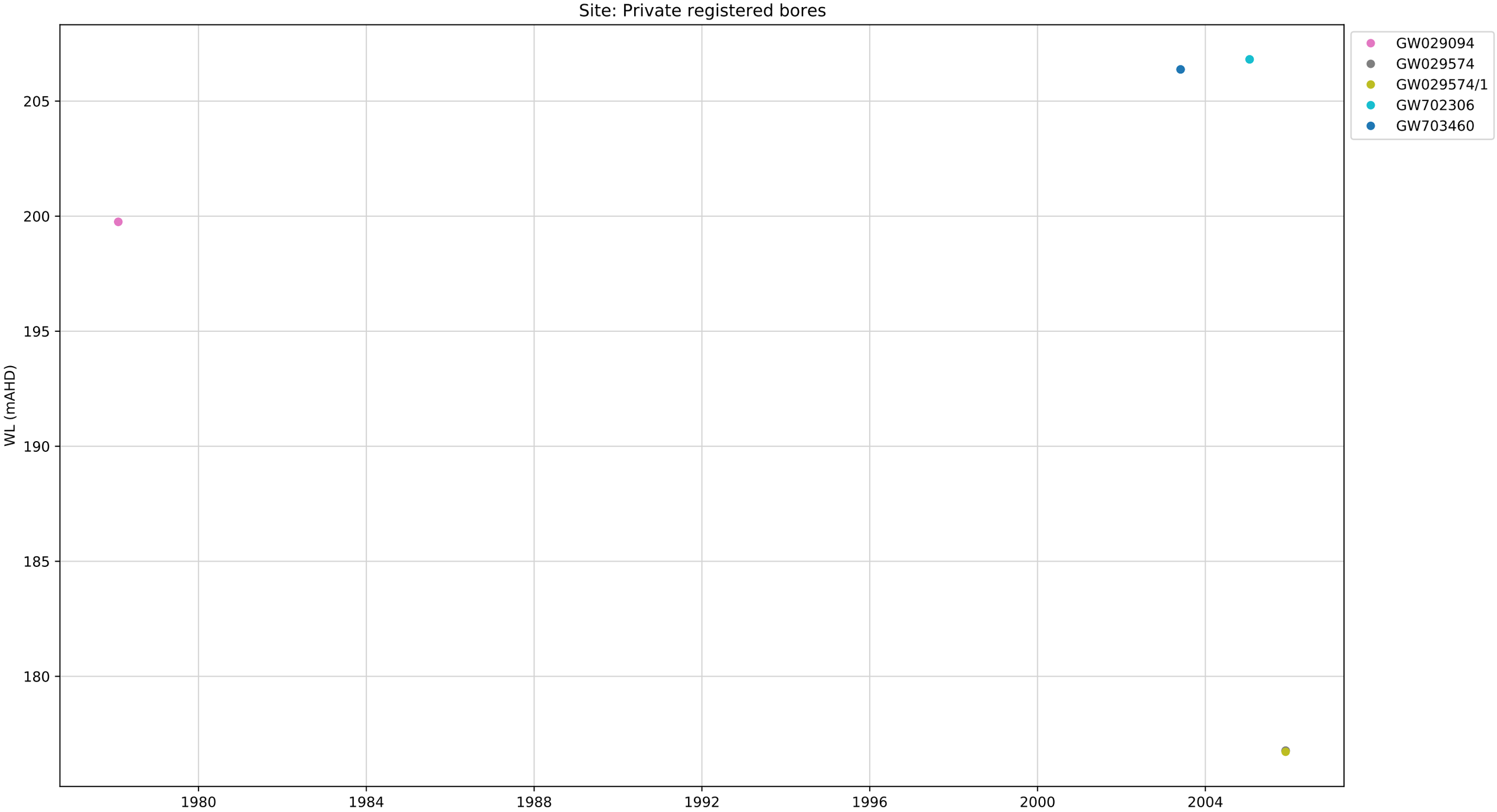

Site: Eastern Saline Borefield
Eastern Saline Borefield PZ09
Eastern Saline Borefield PZ10
Eastern Saline Borefield PZ11
WL (mAHD)
210
205
200
195
190
185
180
2014
2016
2018
2020
2022
2024


Site: IWL
WL (mAHD)
220.0
217.5
215.0
212.5
210.0
207.5
205.0
202.5
2019
2020
2021
2022
2023
2024
2025
IWL01 - A
IWL01 - B
IWL02 - A
IWL02 - B
IWL03 - A
IWL03 - B
IWL04 - A
IWL04 - B
IWL05 - A
IWL05 - B
IWL06 - A
IWL06 - B

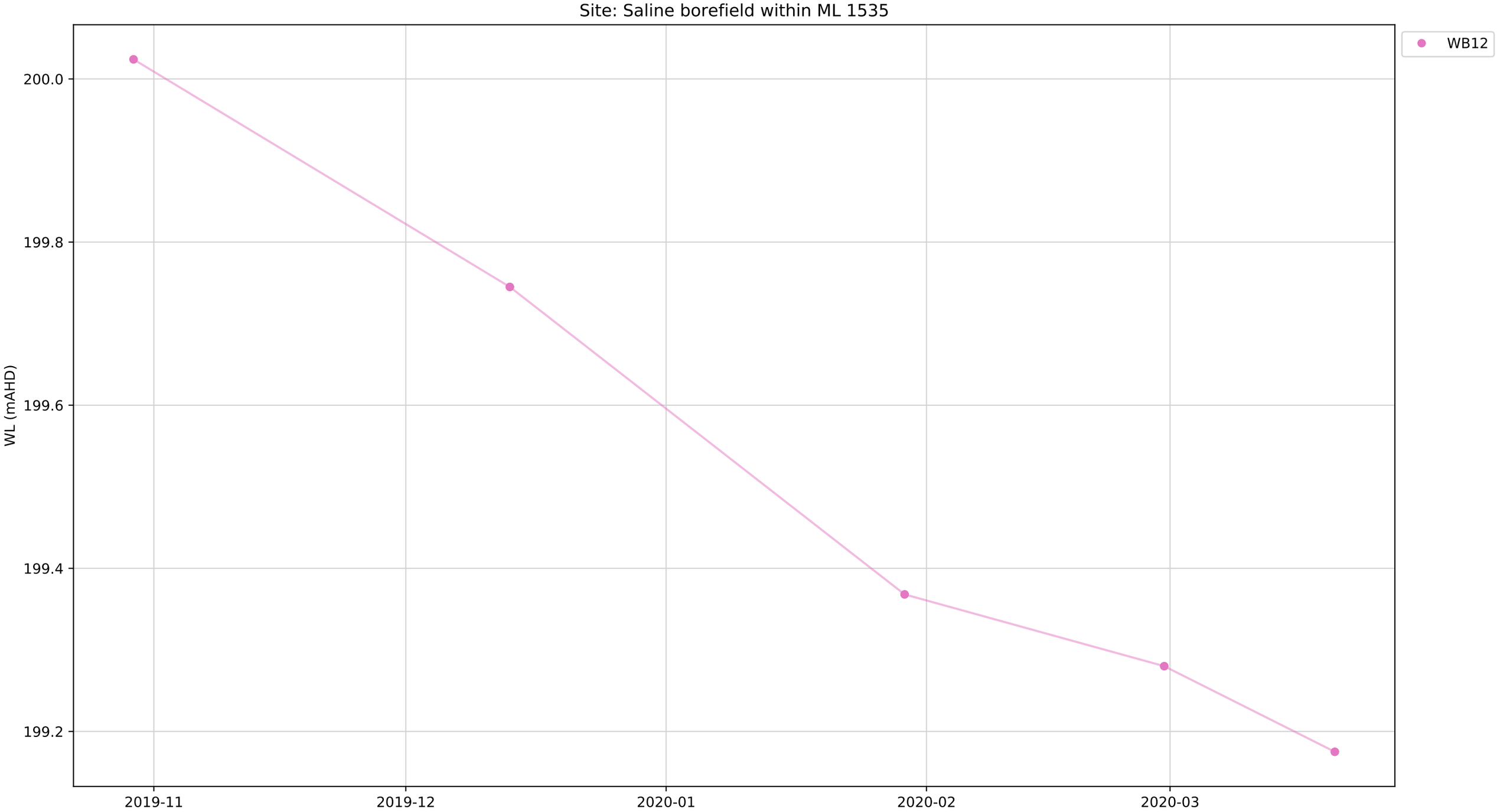

Site: Northern Tailings Storage Facility Area
WL (mAHD)
214
212
210
208
206
204
202
2000
2004
2008
2012
2016
2020
2024
TSF Bore MON01A
TSF Bore MON01B
TSF Bore P418A
TSF Bore P418B
TSF Bore TSFNA
TSF Bore TSFNB
TSF Bore TSFNC

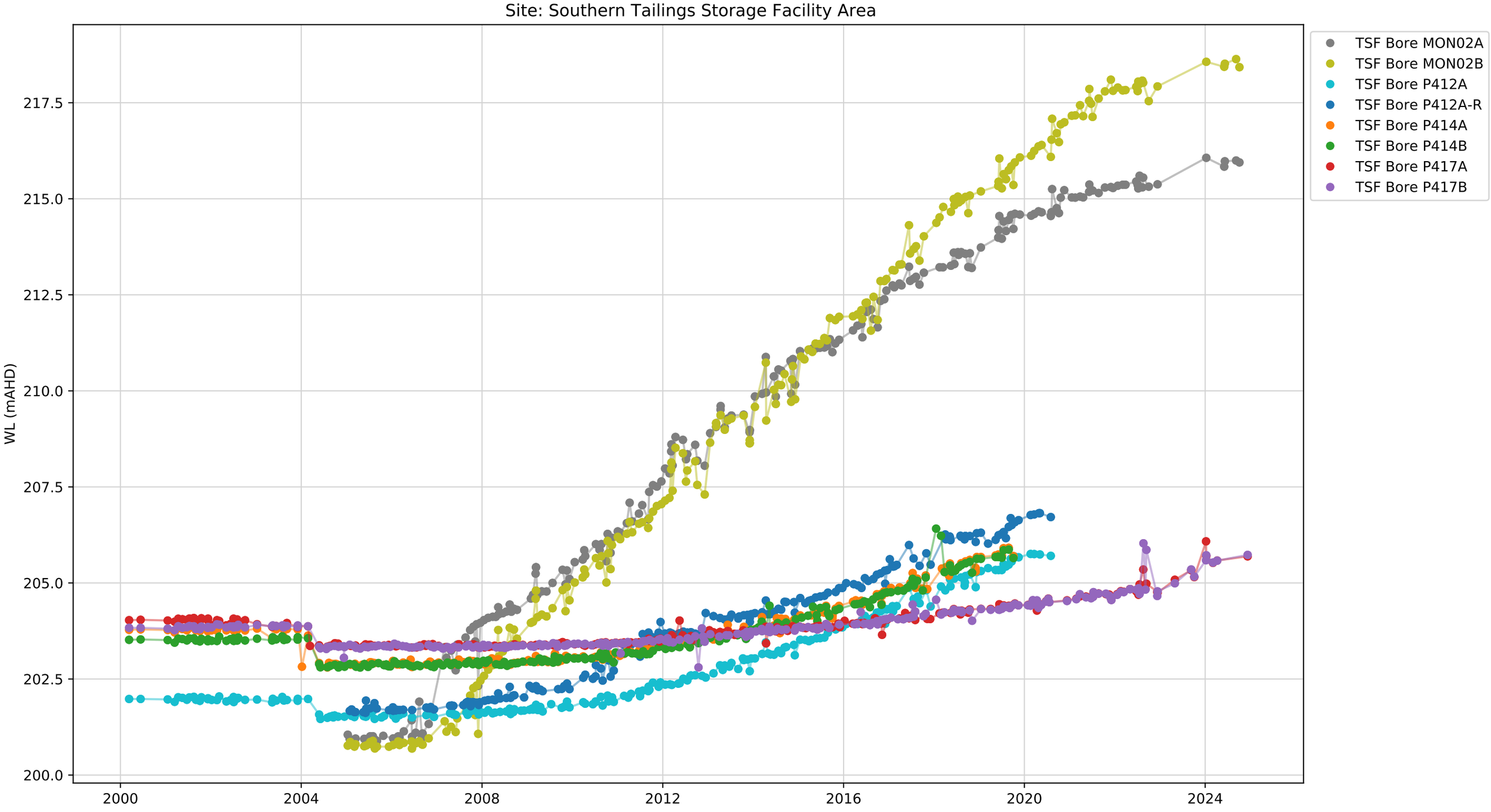

Site: Northern and Southern tailings storage facilities/IWL
TSF Bore P555A-R
WL (mAHD)
207.50
207.25
207.00
206.75
206.50
206.25
206.00
205.75
2008
2012
2016
2020
2024

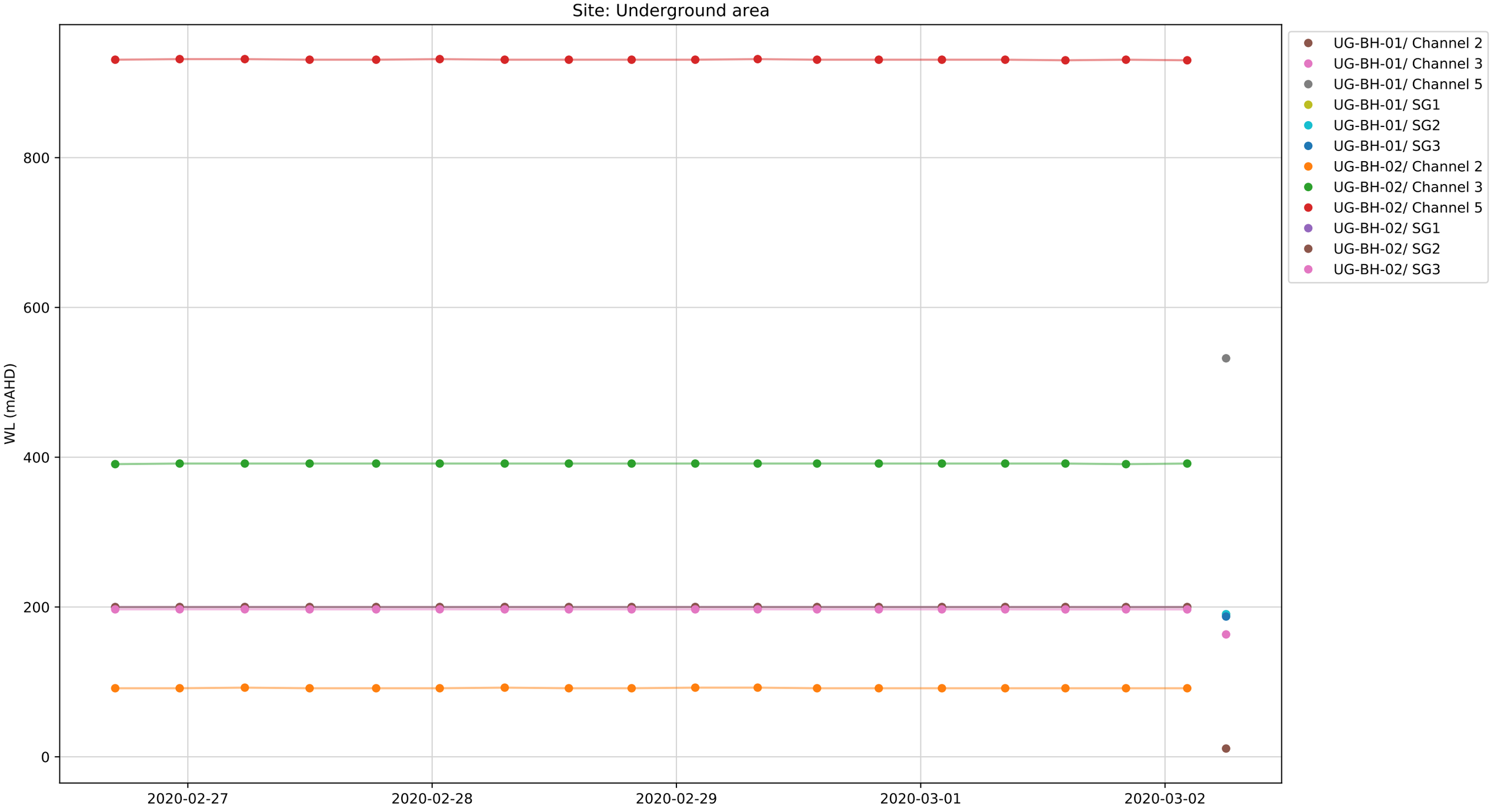

Site: Open pit area
WL (mAHD)
205
200
195
190
185
180
175
2004
2008
2012
2016
2020
2024
Pit Bore PDB1A
Pit Bore PDB1B
Pit Bore PDB3B
Pit Bore PDB5A
Pit Bore PDB5B

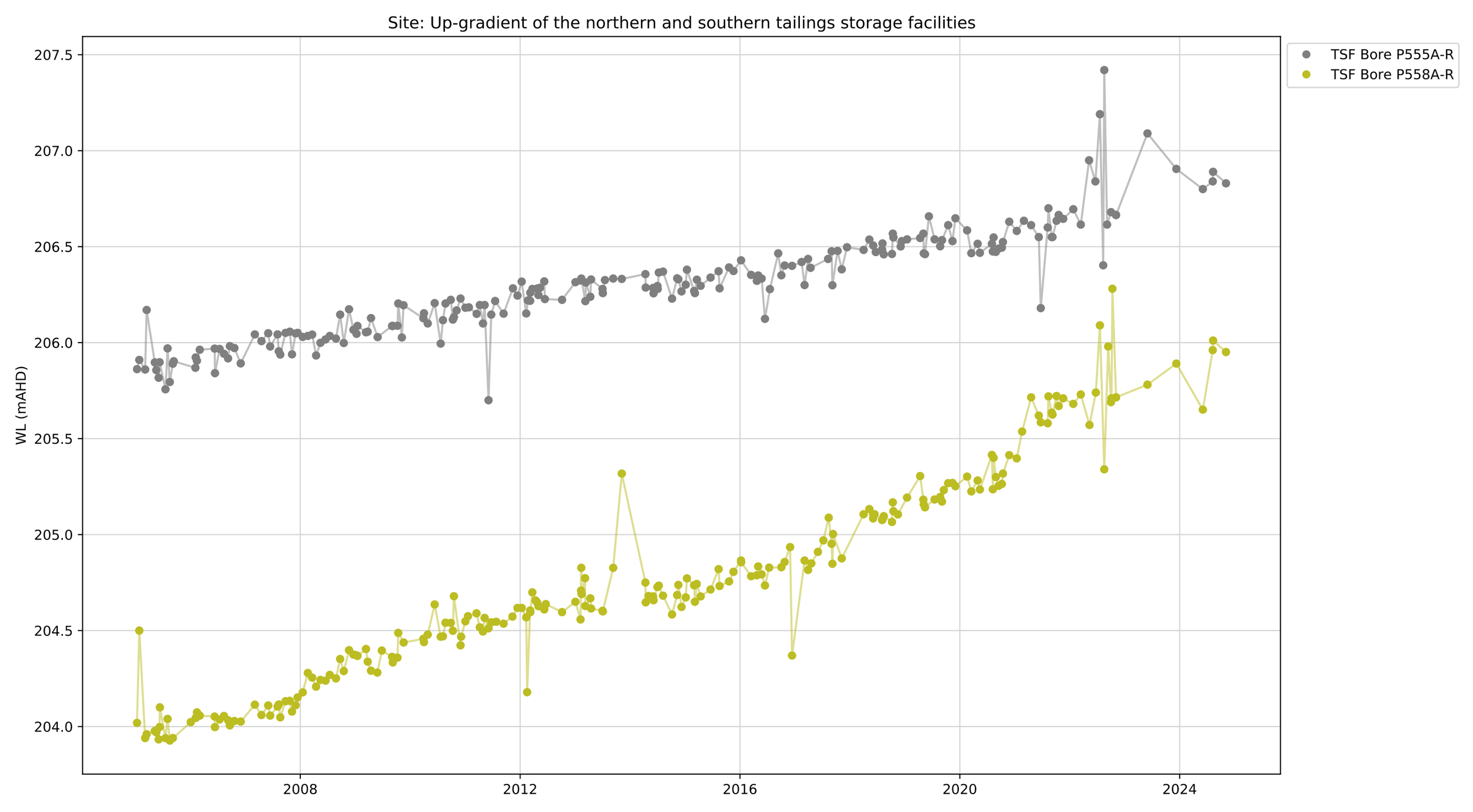

Site: Private registered bores
WL (mAHD)
205
200
195
190
185
180
1980
1984
1988
1992
1996
2000
2004
GW029094
GW029574
GW029574/1
GW702306
GW703460

Site: Processing plant area
Processing Plant Bore 1
Processing Plant Bore 2
Processing Plant Bore 3
Processing Plant Bore 4
Processing Plant Bore 6
WL (mAHD)
200
198
196
194
2008
2010
2012
2014
2016
2018
2020
2022
2024


Site: Saline borefield within ML 1535
WB12
WL (mAHD)
200.0
199.8
199.6
199.4
199.2
2019-11
2019-12
2020-01
2020-02
2020-03


Site: Southern Tailings Storage Facility Area
WL (mAHD)
217.5
215.0
212.5
210.0
207.5
205.0
202.5
200.0
2000
2004
2008
2012
2016
2020
2024
TSF Bore MON02A
TSF Bore MON02B
TSF Bore P412A
TSF Bore P412A-R
TSF Bore P414A
TSF Bore P414B
TSF Bore P417A
TSF Bore P417B


Site: Underground area
WL (mAHD)
0
200
400
600
800
2020-02-27
2020-02-28
2020-02-29
2020-03-01
2020-03-02
UG-BH-01/ Channel 2
UG-BH-01/ Channel 3
UG-BH-01/ Channel 5
UG-BH-01/ SG1
UG-BH-01/ SG2
UG-BH-01/ SG3
UG-BH-02/ Channel 2
UG-BH-02/ Channel 3
UG-BH-02/ Channel 5
UG-BH-02/ SG1
UG-BH-02/ SG2
UG-BH-02/ SG3


Site: Up-gradient of the northern and southern tailings storage facilities
TSF Bore P555A-R
TSF Bore P558A-R
WL (mAHD)
207.5
207.0
206.5
206.0
205.5
205.0
204.5
204.0
2008
2012
2016
2020
2024

Appendix E: Trigger action response plans

Table E1-1: TARP for general water management performance

Performance measure, assessment criteria and references	Monitoring program	Management		
		Trigger	Action	Response
Performance measure • Maintain separation between clean, dirty (i.e. sediment-laden) and mine water management systems • Design, install, operate and maintain water management systems in a proper and efficient manner **Assessment criteria** • Water quality within Lake Cowal • Instability within open channels • Overtopping of UCDS or ICDS channel capacity in events less than design capacity **Reference** • CGO-ENV-FRM-0054 – UCDS Inspection Field Sheet Form • CGO-ENV-PRO-0053 – Lake Water Monitoring Procedure • CGO-OHS-PLN-0149 – Inclement Weather Management Plan • CGO-MIN-TARP-0001 – TARP Inclement Weather – Open Pit and Underground	**Locations** Key infrastructure, drains, pumps, pipes, bunds and dams **Monitoring frequency** **During mining** Visual inspections Monitoring within Lake Cowal (refer to Table 10.2)	**Normal condition**		
		• Rainfall less than <20 mm in 24 hrs over 48 hrs	• Continue visual inspections on monthly basis	• No response required
		Level 1		
		• Inspections indicate in channel instability/erosion in one location only • Elevated turbidity (>460 NTU) within Lake Cowal in monitoring points closest to operations for at least one round of sampling	• *Actions as stated in normal condition* • Repeat water quality sampling • Where reasonable and feasible, undertake stabilisation works to channel. This may require input from a geomorphologist • Inspect relevant water management infrastructure and erosion and sediment controls • Undertake additional monitoring as required (e.g. surface water quality monitoring or additional visual inspections of sites upstream and downstream of areas of impact) • Determine if an incident and/or non-compliance has occurred and the likely causes	• Notify the Environment and Community Coordinator/Mine Manager. • Include outcomes from the works in annual review
		Level 2		

		• Inspections indicate in channel instability/erosion in multiple locations
		• Elevated turbidity within Lake Cowal in more than one round
		• Overtopping of ICDS or UCDS open channel in events less than:
		  ○ ICDS – 48 hr, 1 in 100 year AEP
		  ○ UCDS – 1 in 1,000 year AEP
			• *Actions as stated in Level 1*
			• Undertake a detailed further investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining)
				• *Responses as stated in Level 1*
				• Enact PIRMP if incident resulted in or had the potential to result in material harm to the environment
				• Notify DCCEEW Water Group, EPA and DPHI after becoming aware of any incident in accordance with Section 11.4
				• Develop practical contingency and remediation measures based on the results of the investigation in consultation with regulators
				• Communicate results of investigation into the incident and/or non-compliance and any actions taken to the regulators within seven days and CEMCC as required

Table E1-2: TARP for water supply and demand

Performance measure, assessment criteria and references	Monitoring program	Management		
		Trigger	Action	Response
Performance measure • Maximise water recycling, reuse and sharing opportunities • Minimise the use of make-up water from external sources **Assessment criteria** • Water supply within range of predictions of EIS • Water demand within range of predictions of EIS **Reference** • TARP for groundwater take performance • CGO-PRO-TARP-0009 – Water Reserve Escalation and Notification TARP	**Location** Water management system flow meters, and pumps **Monitoring frequency** **During mining** Annual review Annual water returns	**Normal condition**		
		• Review of annual water volumes indicate that supply and demand is within predicted range from modelling	• Continue to record site water transfers via SCADA system	• No response required
		Level 1		
		• Reduction in supply potential from external water sources • Change in site water demands due to change in mining schedule or other data	• *Actions as stated in normal condition* • Undertake review of data from SCADA system • Revise model predictions based on agreed scenarios • Undertake review of water licensing market to understand trading or purchase opportunities • Refer to *CGO-PRO-TARP-0009 – Water Reserve Escalation and Notification TARP* • Determine if an incident and/or non-compliance has occurred and the likely causes	• Notify the Environment and Community Coordinator/Mine Manager • Include outcomes from the works in annual review
		Level 2		
		• Borefield water source becomes unavailable	• *Actions as stated in Level 1* • Develop alternative water supply strategy • Adjust the scale of the development to match its available water supply	• *Responses as stated in Level 1* • Notify DCCEEW Water Group, EPA and DPHI after becoming aware of any incident in accordance with Section 12.4 • Develop practical contingency and remediation measures based on the results of the investigation in consultation with regulators • Communicate results of investigation into the incident and/or non-compliance and any actions taken to the regulators within seven days and CEMCC as required

Table E1-3: TARP for surface water quality (receiving environment)

Performance measure, assessment criteria and references	Monitoring program	Management		
		Trigger	**Action**	**Response**
Performance measure • Negligible impacts to Lake Cowal and other surface water resources caused by the development beyond those predicted in the EIS **Assessment criteria** Mining operations do not influence water quality of Lake Cowal compared to water quality DGVs and historical range (refer to Section 11.2.1) Construction of the LPB does not result in water quality impacts to Lake Cowal (regulated by EPL 11912) **Reference** • CGO-ENV-PRO-0053 – Lake Water Monitoring Procedure • Dewatering Management Plan • Lake Protection Bund Design Verification Plan (refer to Appendix B)	**Locations** Lake Cowal, downstream and surrounding area, drains **Monitoring frequency** **During mining** Monitoring within Lake Cowal (refer to Table 9.2) Monitoring during construction of the LPB (refer to Dewatering Management Plan)	**Normal condition**		
		• Water levels in Lake Cowal below 204.5 mAHD	• No action required	• No response required
		Level 1		
		• Water quality results for three consecutive rounds has exceeded historical range for at least one parameter AND • Water quality also exceeds the water quality DGVs for Lake Cowal	• *Actions as stated in normal condition* • Implement review procedure including validation of data, management of data, analysis and investigation and potentially repeating water quality sampling • Undertake inspection and review of water management system components interacting with Lake Cowal (e.g. UCDS) • Determine if an incident and/or non-compliance has occurred and the likely causes	• Include outcomes from the investigation in annual review
		Level 2		

		• Discharges required during construction of the LPB result in an exceedance of EPL discharge water quality limits
		• Indications are that water quality degradation within Lake Cowal has occurred due to mining operations with at least three parameters indicating exceedances of the water quality criteria over three consecutive sampling rounds
			• *Actions as stated in Level 1*
			• Undertake a detailed further investigation including:
			  ○ Review of site activities being undertaken at the time
			  ○ Water quality results in nearby locations (including lake inflow sites)
			  ○ the prevailing and preceding meteorological conditions and changes to the land use/activities being undertaken in the contributing catchment. The investigation will also involve consideration of baseline data and monitoring results collected to date.
			• The scope and timeframe of the investigation will be developed in consultation with the relevant authorities
			• Ameliorative measures will be developed in consultation with the relevant authorities based on the results of the review and investigative process
				• *Responses as stated in Level 1*
				• Enact PIRMP if incident resulted in or had the potential to result in material harm to the environment
				• Notify DCCEEW Water Group, EPA and DPHI after becoming aware of any incident in accordance with Section 12.4
				• Develop practical contingency and remediation measures based on the results of the investigation in consultation with regulators
				• Communicate results of investigation into the incident and/or non-compliance and any actions taken to the regulators within seven days and affected landowners and CEMCC as required as required

Table E1-4: TARP for Lake Cowal flood management

Performance measure, assessment criteria and references	Monitoring program	Management		
		Trigger	**Action**	**Response**
Performance measure • Negligible changes to offsite flood regimes caused by the development beyond those predicted in the EIS **Assessment criteria** • Changes in flood depth beyond predictions • Changes in flood velocity beyond predictions for 1 in 100 year AEP; 1 in 1,000 year AEP; and PMF events **Reference** • CGO-ENV-PRO-0053 – Lake Water Monitoring Procedure	**Locations** Lake Cowal, downstream and surrounding area **Monitoring frequency** **During mining** Monitoring within Lake Cowal (refer to Table 10.2)	**Normal condition**		
		• Water levels in Lake Cowal below 204.5 mAHD • Flood event consistent with or less than predictions in level and velocity for the respective event	• No action required	• No response required
		Level 1		
		• Complaint or infrastructure failure as a result of event up to including its design criteria	• *Actions as stated in normal condition* • Evacuate site if danger exists • Review conditions prior to flood event including climate, volume stored in water management structures, operational activities and other monitoring data • Inspect relevant water management infrastructure and erosion and sediment controls • Determine if an incident and/or non-compliance has occurred and the likely cause, (escalate if incident has occurred) • Undertake a review of the flood model and update as necessary • If complaint, follow procedure outlined in Section 12.6 • Determine if an incident and/or non-compliance has occurred and the likely causes	• Notify the Environment and Community Coordinator/Mine Manager • Include outcomes from the works in annual review
		Level 2		
		• Water level exceeds LPB or other incident has occurred due to flooding	• *Actions as stated in Level 1* • Assess if environmental harm has occurred and take all reasonable and feasible measures to further prevent/minimise environmental harm • Undertake investigation and develop remediation strategy, review documents and monitoring in consultation with regulators • Details of exceedances must be provided to affected landowners, tenants and the CEMCC	• *Responses as stated in Level 1* • Enact PIRMP if incident resulted in or had the potential to result in material harm to the environment • Notify DCCEEW Water Group, EPA and DPHI after becoming aware of any incident in accordance with Section 12.4 • Develop practical contingency and remediation measures based on the results of the investigation in consultation with regulators • Communicate results of investigation into the incident and/or non-compliance and any actions taken to the regulators within seven days, and affected landowners and CEMCC as required

Table E2-1: TARP for borefield groundwater level performance

<table>
<tr><th rowspan="2">Performance Measure and Indicator, TARP Objective and Assessment Criteria</th><th rowspan="2">Monitoring Program</th><th colspan="3">Management</th></tr>
<tr><th>Trigger</th><th>Action</th><th>Response</th></tr>
<tr><td rowspan="4"><u>Performance Measure</u>
Negligible groundwater level impact from borefield pumping on the Lachlan alluvial aquifer and associated private landowner bores beyond what was approved previously by DCCEEW.

<u>TARP Objective</u>
This TARP defines levels of deviation in groundwater level in the Lachlan alluvial aquifer from that approved and the actions to be implemented in response to each deviation.

<u>Assessment Criteria</u>
Bore specific trigger values are based on the triggers agreed by CGO and DCCEEW as part of their Groundwater Contingency Strategy. Trigger levels are outlined in Table 11.5 of the WMP.</td><td rowspan="4"><u>Locations</u>
DCCEEW monitoring bores (data download from online database only)
As outlined in Table 10.4 of the WMP.

<u>Monitoring Frequency</u>
During mining
DCCEEW monitoring bores: Continuous daily or monthly measurements (subject to government availability)
Non-monitored Private Bores: on receipt of complaint only

Post-mining
TBC</td><td>Normal Condition</td><td></td><td></td></tr>
<tr><td>• Groundwater level remains above the respective Trigger A limits (detailed in Table 11.5 of the WMP) for each individual groundwater bore.</td><td>• Continue monitoring and review of data as per monitoring program.</td><td>• No response required.</td></tr>
<tr><td>Level 1</td><td></td><td></td></tr>
<tr><td>For DCCEEW Monitoring Bores:
• Groundwater level in a groundwater bore exceeds the respective Trigger A limit on at least one occasion.
For Private Bores:
• Complaint received by landowners of private bores regarding groundwater level declines.</td><td>• Actions as stated in Normal Condition
• A suitably qualified person will undertake a preliminary hydrogeological investigation as efficiently as practicable to check and validate the data and assess cause of trigger exceedances to determine if mining related.
For exceedances at DCCEEW monitoring bore GW036553:
• Investigate the groundwater level in the Trigalana bore (GW702286) or any other neighbouring impacted private stock and domestic bores. This will include the following:
○ Determine the pump setting in relevant private bores.
○ Determine the drawdown rate in GW702286 and other impacted private bores.
• Undertake an investigation to demonstrate if the decline will impact the long-term viability of the affected private works.
For Private Bores:
• Undertake investigation to demonstrate if the decline will impact the long-term viability of the affected private bores.
• If bore not already monitored, commence level monitoring of said private bore in quarterly monitoring rounds, subject to negotiation and land access restrictions.</td><td>• Notify the Environment and Community Coordinator/Mine Manager.
• Notify DCCEEW and key stakeholders. Provide the investigation report to relevant agencies within a reasonable timeframe of identifying the non-compliance.
• Provide response back to complainant.
• Include outcomes from the preliminary investigation report in Annual Review.
For exceedances at DCCEEW monitoring bore GW036553:
• Develop an impact mitigation plan for impacted stock and domestic bores, if necessary.
• Set up an alternative water supply for the owner of GW702286 and other owners of stock and domestic bores, if necessary.</td></tr>
<tr><td>Level 2</td><td></td><td></td></tr>
<tr><td>For DCCEEW monitoring bore GW036553:
• Groundwater level exceeds its Trigger B limit on at least one occasion (detailed in Table 10.5 of the WMP).
For all other bores:
• The reduction in water level is determined in the Level 1 preliminary investigation not to be controlled by climatic, natural, or external anthropogenic factors.</td><td>• Actions as stated in Level 1.
• Undertake a detailed further investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining).
• Review groundwater model.</td><td>• Responses as stated in Level 1.
• Communicate results of investigation into the non-compliance and any actions taken to DCCEEW, DCCEEW-Water and EPA within seven days.
• Implement additional monitoring (where applicable) to monitor the effectiveness of the preventative/remedial measures if appropriate. The timeframe associated with the additional monitoring will be determined in consultation with DCCEEW and DCCEEW-Water.
For exceedances at GW036553, one or both of the following contingency measures will be implemented in consultation with DCCEEW-Water Group:
• Alter the CGO’s pumping regime to maintain the water level in the impacted stock and domestic bores; or
• Maintain a water supply to the owner/s of impacted stock and domestic bores.
For exceedances at other bores:
• Develop an impact mitigation plan for impacted stock and domestic bores, if necessary.
• Set up an alternative water supply for owners of stock and domestic bores, if necessary.</td></tr>
</table>

Table E2-2: TARP for mine pit groundwater level performance

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
Performance Measure Negligible groundwater level impact from mining activities on the Cowra and Lachlan alluvial aquifers and associated surface waterbodies, aquatic GDEs, and private landowner bores, outside that predicted by the approved groundwater assessment (EMM 2023). Negligible groundwater level impact from mining activities on the Lachlan Fold Belt bedrock aquifer and associated private landowner bores, outside that predicted by the approved groundwater assessment (EMM 2023). **TARP Objective** This TARP defines levels of deviation in groundwater level in aquifers from that approved (EMM 2023) and the actions to be implemented in response to each deviation. **Assessment Criteria** Assessed against predicted impacts from the EMM (2023) numerical groundwater model.	**Locations** DCCEEW monitoring bores (data download from online database only) and CGO network bores As outlined in Table 11.6 of the WMP. Monitored Private Bores As outlined in Tables 11.6 and 11.9 of the WMP. Non-monitored Private Bores (on receipt of complaint only) **Monitoring Frequency** **During mining** DCCEEW monitoring bores: Continuous daily measurements (subject to government availability) CGO monitoring network bores: as detailed in Table 10.4 of the WMP. Monitored private bores: Quarterly Non-monitored private bores: on receipt of complaint only **Post-mining** TBC	**Normal Condition**		
		• Groundwater level remains above the respective Trigger A limits (detailed in Tables 11.6 and 11.9 of the WMP) for each individual groundwater bore.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Groundwater level in a groundwater bore exceeds the respective Trigger A limit on five consecutive occasions. OR • Complaint received by landowners of private bores regarding groundwater level declines.	• *Actions as stated in Normal Condition* • A suitably qualified person will undertake a preliminary hydrogeological investigation as efficiently as practicable to check and validate the data and assess cause of trigger exceedances to determine if mining related. For Private Bores: • Undertake investigation to demonstrate if the decline will impact the long-term viability of the affected private bores. • If bore not already monitored, commence level monitoring of said private bore in quarterly monitoring rounds, subject to negotiation and land access restrictions.	• Notify Environment and Community Coordinator/Mine Manager. • Notify DCCEEW and key stakeholders. Provide the investigation report to relevant agencies within a reasonable timeframe of identifying the non-compliance. • Provide response back to complainant. • Include outcomes from the preliminary investigation report in Annual Review.
		Level 2		
		• The reduction in water level is determined in the Level 1 preliminary investigation not to be controlled by climatic or external anthropogenic factors. AND/OR • Groundwater level exceeds its Trigger B limit on at least three occasions (detailed in Table 11.6 of the WMP).	• *Actions as stated in Level 1.* • Undertake a detailed further investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining). • Review groundwater model.	• *Responses as stated in Level 1.* • Develop an impact mitigation plan for impacted water supply/stock and domestic bores, if necessary. • Set up an alternative water supply for owners of water supply/stock and domestic bores, if necessary. • Communicate results of investigation into the non-compliance and any actions taken to DCCEEW, DCCEEW-Water and EPA within seven days. • Implement additional monitoring (where applicable) to monitor the effectiveness of the preventative/remedial measures if appropriate. The timeframe associated with the additional monitoring will be determined in consultation with DCCEEW and DCCEEW-Water.

Table E2-3: TARP for groundwater take performance

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	Action	Response
Performance Measure Licensed take from the borefields and pit dewatering associated with CGO will be consistent with that predicted by the latest groundwater assessment (EMM 2023). **TARP Objective** This TARP defines levels of deviation in groundwater take from the approved conditions and the actions to be implemented in response to each deviation. **Assessment Criteria** Inflows are based on that predicted from the EMM (2023) numerical groundwater model. Review of actual take from borefield and pit dewatering will be compared to modelled outputs and compared with applicable groundwater licenses amounts.	**Locations** As outlined in the water access licence conditions **Monitoring Frequency** As outlined in the water access licence conditions **Post-mining** TBC	**Normal Condition**		
		• Monthly groundwater inflows consistent with, or below, modelled predictions.	• Continue monitoring and review of data as per monitoring program.	• No response required.
		Level 1		
		• Monthly groundwater inflow volume exceeds predicted rates by more than 10% over a six-month duration.	• Review monitoring/inflow estimation methodology and validate inflow data. Identify any potential contributing factors. • Investigate the source for the change in groundwater inflows and whether it is source from aquifers or a contribution from onsite seepage.	• Notify Environment and Community Coordinator/Mine Manager. • Additional groundwater WALs will be obtained if necessary. • Include outcomes from the preliminary investigation report in Annual Review.
		Level 2		
		• Monthly groundwater inflow volumes exceed predicted rates by more than 20% over a six-month duration.	• *Actions as stated in Level 1.* • Undertake review of hydrogeological model predictions for groundwater inflows into the mine. The hydrogeological model and site water balance model will be updated if necessary. • Update the site water management to accommodate the change in groundwater inflow. • Review available water licence allocation	• *Responses as stated in Level 1.* • Communicate results of investigation into the incident and/or non-compliance and any actions taken to DCCEEW, DCCEEW-Water and EPA within seven days. • Implement additional monitoring (where applicable) to monitor the effectiveness of the preventative/remedial measures if appropriate. The timeframe associated with the additional monitoring will be determined in consultation with DCCEEW and DCCEEW-Water.

Table E2-4: TARP for groundwater quality performance

Performance Measure and Indicator, TARP Objective and Assessment Criteria	Monitoring Program	Management		
		Trigger	**Action**	**Response**
Performance Measure Negligible quality impact on the Cowra/Lachlan alluvial aquifers as well as their associated surface waterbodies, aquatic GDEs, and private landholder bores, outside that predicted by the approved groundwater assessment (EMM 2023). Negligible quality impact on the Lachlan Fold Belt bedrock aquifer and associated private landowner bores, outside that predicted by the approved groundwater assessment (EMM 2023). **TARP Objective** Note the groundwater assessment predicted minimal impact to the wider aquifer with limited interaction locally. Therefore, this TARP defines levels of deviation in groundwater quality from baseline conditions (up to 2024) and the actions to be implemented in response to each water quality deviation. **Assessment Criteria** Quality in each monitoring bore remains below the 95th percentile (or within the 5th and 95th percentile for pH) of the baseline conditions. These percentiles are set out in Table 11.7 and Table 11.8 of the WMP for the following parameters: • Electrical Conductivity; • pH; • Sodium; • Sulfate; • Arsenic; • Cadmium; • Cyanide (Total and WAD); • Manganese; • Nickel; • Selenium; and • Zinc	**Locations** **Open standpipes** All open standpipe monitoring locations as set out in Tables 11.7 and 11.8 of the WMP. **Monitoring Frequency** **Prior to/during mining** As set out in Table 10.4 of the WMP. **Post-mining** TBC	**Normal Condition**		
		• Groundwater pH remains within the baseline 5th and 95th percentile range, as specified in the WMP (Table 11.7). • Other groundwater quality parameters remain below the baseline 95th percentile, as specified in the WMP (Tables 11.7 and 11.8).	• Continue monitoring as per monitoring program and prepare annual review of data as per usual.	• No response required.
		Level 1		
		• Three consecutive quality exceedances outside of the specified baseline range (pH) or above 95th percentile baseline (other quality parameters). OR • Complaint received by landowners of private bores regarding groundwater quality declines.	• Continue monitoring as per monitoring program. For Open Standpipe Monitoring Bores: • A qualified personnel member will undertake a preliminary hydrogeological investigation to assess cause of quality exceedances and determine if mining related. For Private Bores: • A qualified personnel member will undertake a preliminary hydrogeological investigation to assess cause of quality exceedances and determine if mining related and if quality will impact the long-term viability of the affected water supply works. • Increase quality monitoring to at least monthly measurements for sites where Level 1 has been reached, subject to land access. The investigation/s will commence and be completed as efficiently as practicable.	• Notify the Environment and Community Coordinator/Mine Manager. • Notify DCCEEW and key stakeholders. Provide the investigation report to relevant agencies within a reasonable timeframe of identifying the non-compliance. • Provide response back to complainant. • Include outcomes from the preliminary investigation report in Annual Review.
		Level 2		
		• The water quality changes are determined from Level 1 preliminary investigation to not be controlled by climatic, local land uses, or other external anthropogenic factors. OR • Groundwater quality continues to decline over a consecutive one-year period with 12 consecutive monthly or four quarterly quality exceedances outside of the specified baseline range (pH) or above 95th percentile baseline (other quality parameters).	• *Actions as stated in Level 1.* • Undertake a detailed investigation to assess if the change in behaviour is related to mining effects (e.g., catchment changes, another effect unrelated to mining). For Private Bores: • Propose corrective management actions (CMAs)/ make good provisions/ other additional reasonable and feasible options, considering findings from detailed investigations completed.	• *Responses as stated in Level 1.* • Communicate results of investigation into the non-compliance and any actions taken to DCCEEW, DCCEEW-Water and EPA within seven days. • Implement additional monitoring (where applicable) to monitor the effectiveness of the preventative/remedial measures if appropriate. The timeframe associated with the additional monitoring will be determined in consultation with DCCEEW and DCCEEW-Water. For Private Bores, if the changes have been confirmed to be related to mining effects: • Initiate negotiations with impacts landowners as soon as practicable. Consider all reasonable and feasible options for remediation as relevant (e.g., isolation, remediation, etc.). • Provide DCCEEW and key stakeholders with proposed corrective management actions (CMAs) for consultation (e.g., extending the depth of the bore, establishment of additional bores, compensation to affected landowners). • Implement CMAs, subject to land access (finalise negotiations and implement the agreed “make-good” arrangements). • Monitor and report on success of CMAs in Annual Review.