ANNUAL ENVIRONMENTAL MANAGEMENT REPORT 2024

Whytes Gully Landfill Extension Project

For The NSW Department of Planning and Environment

Wollongong City Council
Waste Services

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Document Information

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Aerial Image: Wollongong Waste & Resource Recovery Park (WWARRP) 2024

Wollongong Waste and Resource Recovery Park (Whytes Gully)

Annual Environmental Management Report 2024

1 Introduction

1.1 Background

WOLLONGONG City Council (the Council) own and operate the Wollongong Waste and Resource Recovery Park (Whytes Gully) located at the base of the Illawarra Escarpment on Reddalls Road, Kembla Grange New South Wales (NSW) (Figure 1 and 2). The facility is licensed by the NSW Environmental Protection Agency (EPA) under the *Protection of the Environment Operations Act 1997 (*POEO Act), Environmental Protection License (EPL) number 5862 (EPL 5862).

In addition to this, as part of the proposed expansion of the facility which included the construction of new landfill cells and leachate ponds under *Section 75J* of the *Environmental Planning and Assessment Act 1979*, Project Approval (Approval No.11-0094) was granted by the Minister for Planning and Infrastructure on 3 April 2013. The approval was subject to conditions stipulated in Schedules 2-5, which, among other things, requires an Annual Environmental Management Review (AEMR) report to be prepared on an annual basis detailing the following:

(a) Operations that were carried out in the past calendar year;
(b) Monitoring results and complaint records of the project over the past year, which includes a comparison of these results against the:
    a. Relevant statutory requirements, limits or performance measures/criteria;
    b. Monitoring results of previous years; and
    c. Relevant predictions in the Environmental Assessment (EA)
(c) Details of any non-compliance over the last year, and description of what actions were (or are being) taken to ensure compliance;
(d) Trends in the monitoring data over the life of the project; and
(e) Actions proposed to be implemented over the following year to improve the environmental performance of the project (including a timeline for completion of each action).

In addition to the above, item (f) states that the Council is required to publish the report on the Council's website within two weeks of its completion.

Two modifications to Project Approval No.11_0094 were also submitted and approved for the new landfill cell, these include:

- Modification 1 (MP 11_0994 MOD1): Modification of operating hours. Approved on 11 April 2018; and
- Modification 2 (MP11_0094 MOD 2): Modification of eastern gully drainage channel alignment to be predominantly outside the landfill footprint. Approved on 29 May 2018.

Modification 3 (MP11_0094) has been submitted to the Department in this reporting period and is currently under review.

Figure 1 Locality Plan

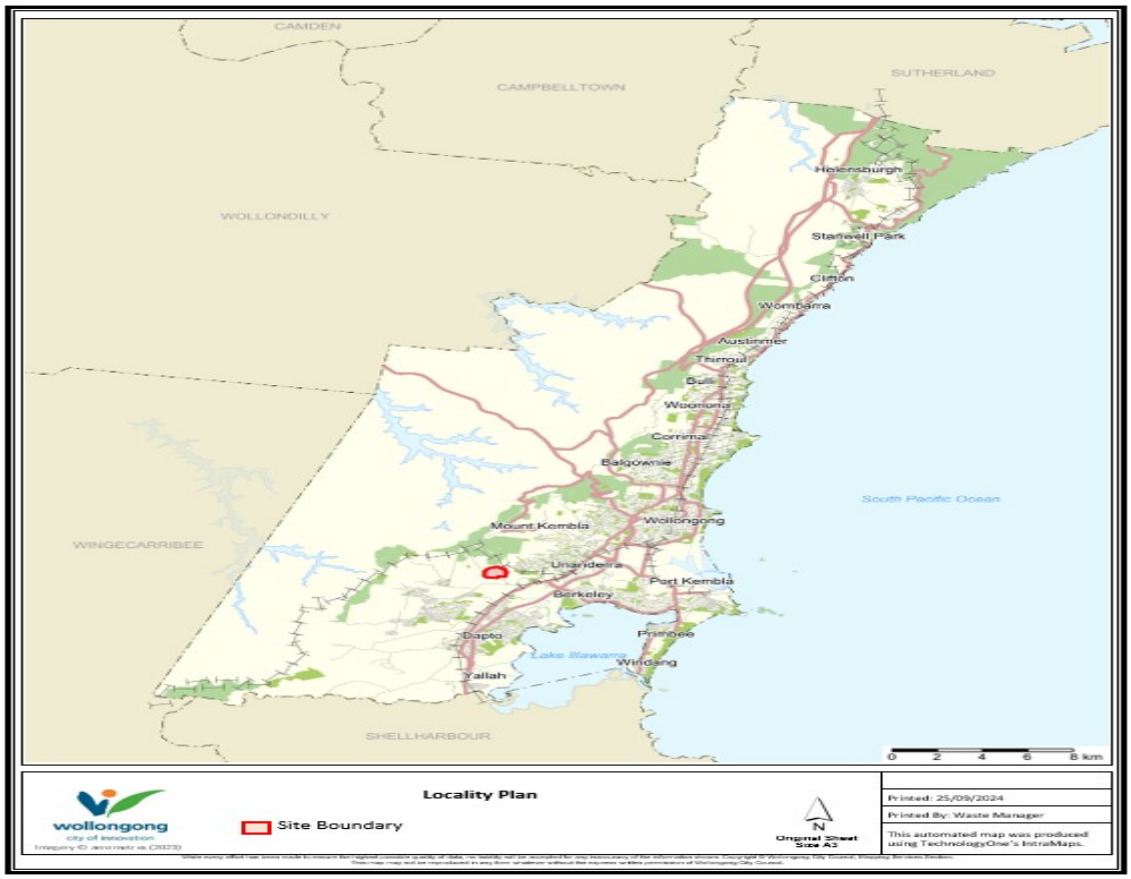
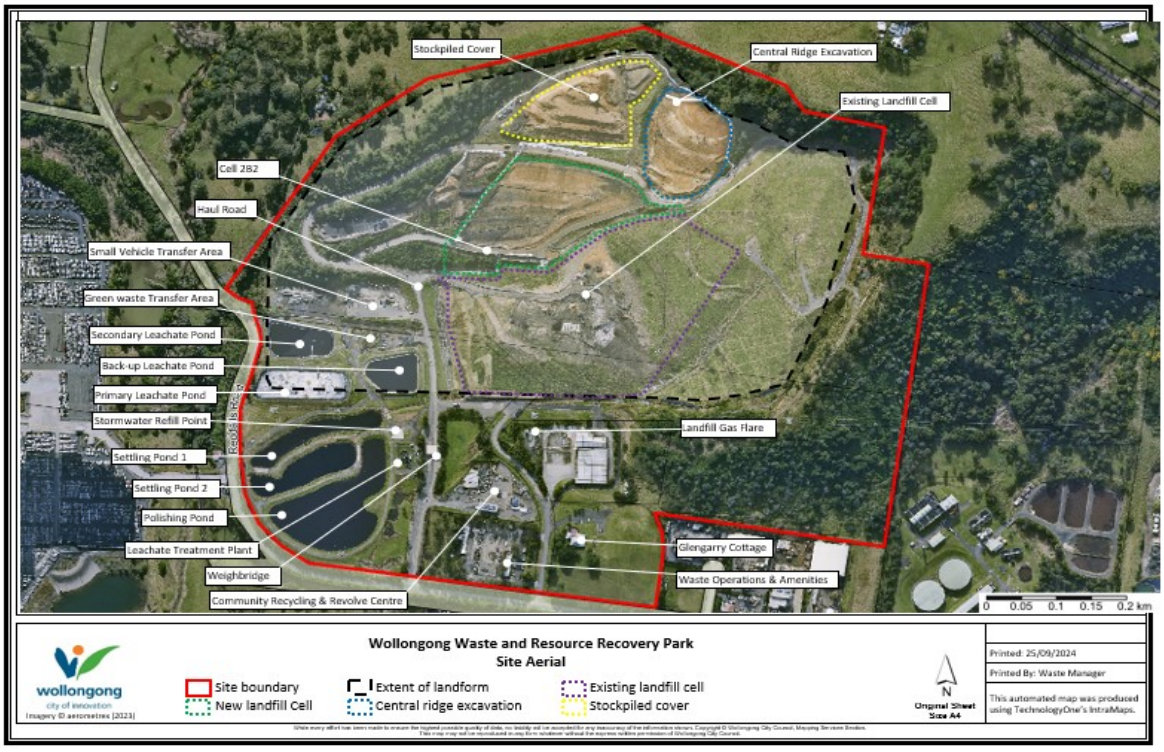


Figure 2 Site Aerial Photograph



1.2 Objectives

The objectives of this AEMR report are to satisfy the Council's Project approval obligations for the 2023/2024 annual reporting period, which will cover 2 March 2023 to 1 March 2024. The compiled monitoring data presented in this AEMR report addresses all aspects stipulated in Section 1.1 (items (a) through to (e)).

Rainfall in this reporting period finally reduced to produce 'normal' conditions with just under 1000 mm falling in a relatively even distribution; apart from November and December 2023 (where over 420 mm of rainfall was recorded in two months).

The previous 2 years produced catastrophic episodes resulting in three state natural disasters (severe weather and flooding) in the Wollongong region. This allowed Operations to resume basic routine site maintenance and put in place preparations for the next stages of cell construction as shown below.

1.3 Purpose of this Report

The purpose of this Annual Review is to provide the DPE with a report of the site's environmental performance over the last year, actions taken in relation to environmental control and compliance

with Development Consent Project Approval MP11_0094, and two modifications to this consent (MP11_0094 MOD 1 and MP11_0094 MOD 2). Condition 5 of Schedule 5 of the Project Approval outlines the requirement for WCC to prepare an annual report.

Table 1.1 outlines the content included in this report to address the requirements of Condition 5 of Schedule 5 of the Project Approval.

Table1.1 Condition 5 of Schedule 5 Requirements and Annual Review section.

Condition	Requirement	Annual Review Section/Response
5	One year after the commencement of operation, and annually thereafter, the Proponent shall review the environmental performance to the satisfaction of the Director-General. This review must:	This document has been prepared in response to the requirements of Schedule 5, Condition 5. The report covers the reporting period between the 2nd March 2023 to 1st March 2024.
(a)	Describe the operations that were carried out in the past year;	See Section 2
(b)	Analyse the monitoring results and complaints records over the past year, which includes a comparison of these results against the: • Relevant statutory requirements, limits or performance measures/criteria • Monitoring results of the previous years • Relevant predictions in the Environmental Assessment	See Section 3 for monitoring results, analysis and comparison against relevant criteria. See Section 4 for complaints results, analysis and comparison against relevant criteria.
(c)	Identify any non-compliance over the last year and describe what actions were (or are being) taken to ensure compliance;	See Section 5.
(d)	Identify any trends in the monitoring data over the life of the project;	See Section 3 for environmental components. See Section 4 for complaints.
(e)	Describe what actions will be implemented over the next year to improve the environmental performance of the project (including a timeline for completion of each action); and	See Section 5.
(f)	Be placed on Council's website within 2 weeks of completion.	This Report will be submitted to the Department of Planning and will be made available to the public via WCC's website.

1.4 Consideration of Compliance

1.4.1 Assessment of Compliance

Consideration of site compliance with the Project Approval and modifications is provided in this document. Consideration of site compliance with the Landfill and Construction Environmental Plans and associated subplans is also discussed in this document. Cumulative actions during this reporting period were measured against the last Independent Environmental Audit (November 2020) Results to measure progress. This Annual Environmental Management Review identifies the relevant environmental monitoring environment requirements as identified in the Approval, EPL licence,

Sydney Water Trade Waste Agreement and management programs and plans. A discussion of requirements and results is provided in Section 3.

The next Independent Environmental Audit is due in 2025 and preparations are currently underway.

The compliance status of each requirement or commitment was determined according to the definitions in the Compliance Reporting: *Post Approval Requirements (DPIE-May 2020).* A summary of non-compliances for the reviewed conditions are provided in Section 5.

1.4.2 Non-compliance

43 non-compliances were recorded during this reporting period. These were reported in accordance with DPE and EPA requirements. Six were related to non-compliant stormwater overflow parameters, 12 to surface gas emissions, 23 odour complaints and two incidents (a small fire at the SVTS) and leachate/stormwater overflow event. A summary of these is provided below.

Non-compliance	Relevant Condition	Corrective Actions
Methane surface gas readings non-compliant on 12 occasions	Schedule 4 Condition 29	Continual heavy rainfall resulted in damage to interim cover in certain sections of the old landfill. Additional cover will be added to these areas and a biocover trial is being established to manage fugitive gas emissions.
23 Odour complaints received via the EPA	Schedule 4 Condition 23	• New insitu deodoriser system installed at the tip face. • Small working tip face area • Daily cover • Regular odour surveys undertaken by operations staff • Monthly odour reporting to EPA It is important to note that the EPA sends odour complaint notifications to a number of businesses in the Kembla Grange Industrial Precinct.
One stormwater overflow event 6 November 2024	Schedule 4 Condition 18	70mm of rainfall fell in a 24 hour period resulting in an overflow incident. This incident links to the non-compliant stormwater discharge parameters below.
Stormwater discharge not within compliance limits for pH and/or Total Suspended Solids (TSS) on 6 occasions	Schedule 4 Condition 14	• Testing undertaken every 24 hours. • Water quality compliant on the 8th November 2023. • Discharge of water (when compliant) to ensure adequate freeboard during rainfall events. • Water recirculation installed into the stormwater system to manage water quality and quantity.

One fire at the small vehicle transfer station (SVTS)	Schedule 4 Condition 46	This fire was caused by a lithium battery in the waste brought in by the public. Additional screening and staff have been added to the transfer station.

The Pollution Incident Response Management Plan (PIRMP) was activated in a timely manner and mitigation measures were put in place in accordance with the approved management plans. These non-compliances will be discussed in the following sections.

2 General Facility Operations

During the reporting period 2023-2024, the facility operated as per '*normal',* in accordance with EPL 5862 and Project Approval No. 11_ 0094. The operating hours were Monday – Friday 0730 to 1630, and Saturday, Sunday and public holidays (0800 to 1600). Details pertaining to the waste streams and volumes received are provided in Section 6.

Weather conditions stabilised, allowing site clean up and repairs to be undertaken to the stormwater management system. Leachate generation slowly decreased; with 24/7 discharge to sewer continuing throughout the period to gain freeboard.

Construction of the new cell commenced on the 29th January 2024 with the expected completion date being the 11th June 2025.

The different areas of operations undertaken in this reporting period are outlined below:

- Weighbridge and gatehouse
- Community Recycling Centre
- Small Vehicle Transfer Station
- Continued Filling of cell 2B with waste
- Leachate and stormwater management and associated monitoring
- Monitoring Areas – landfill gas, groundwater, noise and air quality
- Green Waste Transfer Area
- Landfill gas flare
- Further Installation of landfill gas collection infrastructure
- Stockpiling areas
- Environmental controls
- Weed Control and Revegetation works
- Weather Monitoring (MHL)

During this reporting period, the filling of Cell 2B continued in parallel with preparation and construction of the new cell. Gas infrastructure was again expanded within the new fill areas and connected to the existing landfill gas flare system.

Upgrades to the leachate management system were undertaken (including installation of additional aeration capacity, leachate transfer pump system and update of process, control and dosing systems);

as well as Stage 2 Works for Stormwater Pond Desilting, tendering for construction of the Rapid Fill Water Station and a new weather station was installed in accordance EPL 5862.

Also, within this reporting period, Wollongong City Council continued rolling out their Food Organics Garden Organics (FOGO) Program in partnership with a local organics processing facility (Soilco). This has meant that 97% of residents now have access to the FOGO kerbside collection system, resulting in approximately 33 000 tonnes collected and diverted away from landfill.

Community support programs continued with the following activities undertaken within the reporting period:

- Household Chemical Collection
    - Two free events collected over 40 tonnes of chemical and problem wastes.
- Garden Waste Collection
    - Three free events collected approximately 17 tonnes of garden waste for diversion to compost.
- Cardboard Collection
    - Three free events collected 7.8 tonnes for recycling.

A wide range of educational activities have been conducted throughout the past twelve months. These have included:

- Wollongong Summer Cleansing (focus on coffee cups)
- Operation Nappy workshops
- Household Chemical Collection, Garden Waste and Cardboard Waste Collection Events promotion
- Educational Pop-ups at events and shopping centres and at Botanic Gardens
- CALD Talks – TAFE English classes
- Home Composting workshops
- School Education events at the Botanic Gardens
- Waste App - Waste App continues to be updated with information for our residents to use to assist with kerbside collection and other recycling activities.
- Continued update of websites and printed information.
- Regular social media posts including campaigns for FOGO and for Recycling Week

3 Water Monitoring – Surface Water

Surface water (stormwater) monitoring was completed in order satisfy Approval No.11_ 0094 Schedule 4, conditions pertaining to ‘Soil and Water’. The findings for the 2023-2024 reporting period are provided in the sections below.

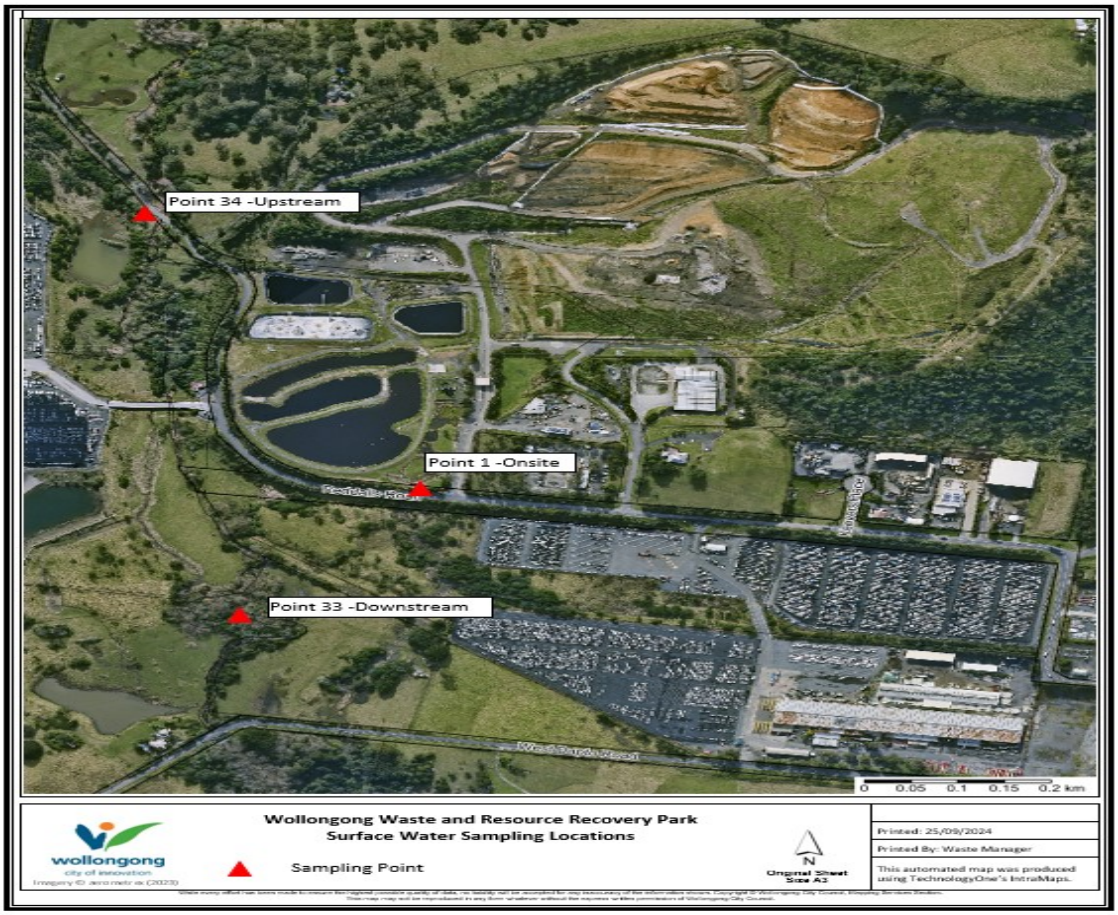
3.1 Overview

Surface water monitoring was undertaken by ALS Environmental (service contract renewed for 5 years), with the monitoring locations shown in Figure 3. A summary of the monitoring requirements are detailed in Table 3-1 below:

Table 3-1: Surface Water Monitoring

Activity	Description		
Purpose	Detect excess sediment loads in stormwater leaving the site and/or potential cross contamination of stormwater with landfill leachate.		
Frequency	**Surface Water Monitoring Points**: Quarterly or as required during breaches. **Polishing Pond**: During controlled release.		
Location	Sampling locations were those listed in EPL 5862, and included the following: • Monitoring Point 1 – outlet at Reddalls Road (onsite) • Monitoring Point 33 – Downstream monitoring point; and • Monitoring Point 34 – Upstream Monitoring point The final 'Polishing Pond' is also monitored by Council during any controlled release event or overflow.		
Methodology	Samples were collected using a 'scoop'; and Field parameters were recorded using a calibrated water quality meter. Table 3-2 : Surface Water Quality Parameters (Point 1, 33 and 34)		
	Annually		
Analytes/Field Parameters	Alkalinity	Calcium	Conductivity (EC)
	Filterable Iron	Magnesium	pH
	Sodium	Temperature	Total phenolics
	Ammonia	Chloride	Dissolved Oxygen
	Fluoride	Nitrate	Potassium
	Sulfate	Total Organic Carbon	Total Suspended Solids
	In addition, the 'Polishing Pond' was subject to analysis for pH and turbidity to ensure the water is suitable for release.		

Figure 3 Surface Water Sampling Locations



3.2 Performance Criteria

The performance criteria for surface water monitoring is detailed in the table below:

Table 3.2 Surface Water Performance Criteria

Description	Performance Criteria	Reference Document
Stormwater Discharge	No discharge of contaminated stormwater to water under dry weather conditions (*less than 10 mm of rainfall within a 24 hour period).*	EPL 5862
	No discharge of contaminated stormwater to water during a storm event of less than 1:10 year, 24 hour recurrence interval *(less than 297.4 mm of rain within 24 hours*).	
	pH: 6.5 – 8.5 Turbidity: 40 NTU	
Monitoring Point 1	pH: 6.5 to 8.5 TSS: 50 mg/L	Section 3 (I2) of EPL 5862

In addition to the above, Section 7.4 of the Draft LEMP (Golder 2020) states that all surface water results are to be assessed against the Australian and New Zealand and Australian State and Territory Governments (ANZAST) *Guidelines for Fresh & Marine Water Quality, 2018 (ANZAST 2018*).

Rainfall this period was half of last year's total at 1022 mm, allowing the site to dry out for the first time in over 20 months. This allowed for the implementation of the EPA Stormwater Improvement Plan Variation(U1), which states:

U1.3 By no later than 30th June 2023, the licensee must submit an independent assessment of the revised stormwater management system prepared by a suitably qualified and experienced independent person. The assessment must include recommendations for improvements to the management of the system to prevent overflow events and ensure compliance with relevant licence limits.

This was submitted during this reporting period.

3.3 Results - Monitoring Points 1, 33 and 34

Surface water was monitored throughout overflow events and annually during this period.

In total, there were 29 overflow events with 6 constituting non-compliances based on the license constraints for pH and TSS.

Significant rainfall events occurred in October and November 2023, with over 425 mm falling in these two months. This constitutes almost half the yearly rainfall in a period of six weeks.

The full set of tabulated surface water results are provided in Appendix A, with a summary of the key results presented in the sections below.

3.3.1 pH and Total Suspended Solids (TSS)

During this period, pH levels at Point 1 fluctuated between 7.5 and 9.5. There were 5 non-compliant pH results ranging between 8.6 (6th November 2023), 8.9 (9th January 2024), 9.0 (10th January 2024), 9.5 (11th January 2024) and 9.3 (12th January 2024), most likely influenced by the leachate overflows during the November rainfall event and capture of sediment from construction work preparation.

On 2 occasions at Point 1, TSS values were recorded at or over 50 mg/L. Values ranged between < 5 – 62 mg/L and remained stable throughout this period, particularly compared to the previous two periods.

Upstream and downstream results showed similar consistent readings during this time, remaining compliant. pH upstream and downstream also remained compliant during this reporting period.

Table 3.3 Surface Water Quality Monitoring Results

Site Name			(Point 1)	(Point 33)	(Point 34)
Sample Date	Chemical	Units			
06/11/2023	pH	pH	8.6	7.4	7.5
07/11/2023	pH	pH	7.6	7.4	7.7
08/11/2023	pH	pH	8.2	7.3	7.8
09/11/2023	pH	pH	8.3	7.4	7.8
10/11/2023	pH	pH	7.8	7.4	7.6
11/11/2023	pH	pH	8.2	7.2	7.7
12/11/2023	pH	pH	8.0	7.3	7.6
13/11/2023	pH	pH	7.8	7.5	7.6
14/11/2023	pH	pH	7.5	7.3	7.6
15/11/2023	pH	pH	8.0	7.2	7.4
16/11/2023	pH	pH	8.0	7.5	7.7
17/11/2023	pH	pH	7.6	7.4	7.8
29/11/2023	pH	pH	7.5	7.0	7.3
30/11/2023	pH	pH	7.8	7.6	7.9
01/12/2023	pH	pH	7.9	7.6	7.7
02/12/2023	pH	pH	7.9	7.3	7.7
03/12/2023	pH	pH	7.9	7.3	7.6
04/12/2023	pH	pH	8.0	7.6	7.7
05/12/2023	pH	pH	7.9	7.3	7.7
06/12/2023	pH	pH	8.0	7.3	7.5
20/12/2023	pH	pH	8.2	7.8	7.6
21/12/2023	pH	pH	8.0	7.5	7.7
22/12/2023	pH	pH	7.9	7.4	7.7
09/01/2024	pH	pH	8.9	7.5	7.6
10/01/2024	pH	pH	9.0	7.6	7.4
11/01/2024	pH	pH	9.5	7.6	7.6
12/01/2024	pH	pH	9.3	7.5	7.5
05/02/2024	pH	pH	8.2	7.5	7.6
07/02/2024	pH	pH	7.7	7.4	8.0
13/02/2024	pH	pH	8.1	7.3	7.4

Site Name			(Point 1)	(Point 33)	(Point 34)
Sample Date	Chemical Name	Units			
06/11/2023	Total suspended solids	mg/L	62	8	8
07/11/2023	Total suspended solids	mg/L	50	<5	<5
08/11/2023	Total suspended solids	mg/L	21	6	<5
09/11/2023	Total suspended solids	mg/L	31	9	6
10/11/2023	Total suspended solids	mg/L	25	<5	<5
11/11/2023	Total suspended solids	mg/L	8	24	9
12/11/2023	Total suspended solids	mg/L	9	8	<5
13/11/2023	Total suspended solids	mg/L	6	7	10
14/11/2023	Total suspended solids	mg/L	6	<5	<5
15/11/2023	Total suspended solids	mg/L	<5	<5	<5
16/11/2023	Total suspended solids	mg/L	<5	11	<5
17/11/2023	Total suspended solids	mg/L	10	<5	<5
29/11/2023	Total suspended solids	mg/L	18	27	16
30/11/2023	Total suspended solids	mg/L	48	14	5
01/12/2023	Total suspended solids	mg/L	13	<5	<5
02/12/2023	Total suspended solids	mg/L	<5	<5	<5
03/12/2023	Total suspended solids	mg/L	<5	<5	<5
04/12/2023	Total suspended solids	mg/L	8	<5	<5
05/12/2023	Total suspended solids	mg/L	<5	<5	<5
06/12/2023	Total suspended solids	mg/L	<5	<5	<5
20/12/2023	Total suspended solids	mg/L	<5	10	14
21/12/2023	Total suspended solids	mg/L	<5	<5	<5
22/12/2023	Total suspended solids	mg/L	<5	<5	<5
09/01/2024	Total suspended solids	mg/L	6	<5	<5
10/01/2024	Total suspended solids	mg/L	<5	<5	<5
11/01/2024	Total suspended solids	mg/L	19	<5	<5
12/01/2024	Total suspended solids	mg/L	23	<5	<5
05/02/2024	Total suspended solids	mg/L	6	<5	<5
07/02/2024	Total suspended solids	mg/L	6	5	<5
13/02/2024	Total suspended solids	mg/L	14	<5	<5

Rainfall during this period was moderate compared to the previous two reporting periods, allowing the site to dry and waterflow return to return to normal with the exception of November and December 2023 (which recorded almost half of the total rainfall across the two months).

Month	Rainfall over the Reporting Period
March 2023	119.4 mm
April 2023	84 mm
May 2023	21.6 mm
June 2023	11.6 mm
July 2023	8.4 mm
August 2023	67.6 mm
September 2023	53.4 mm
October 2023	22.4 mm
November 2023	216.2 mm
December 2023	207.4 mm
January 2024	57.4 mm
February 2024	71.8 mm
TOTAL	**941.24 mm**

3.3.2 All Other Parameters

3.3.2.1 Nutrients and Total Organic Carbon (TOC)

No trigger value in ANZAST (2018) guidelines are specified for these compounds in fresh waters. The previous 2000 threshold level for nitrate (0.7 mg/L) is erroneous according to Australian and New Zealand Water Quality Guidelines and no current updated value is available for comparison.

Generally, increased nitrate concentrations correlated with the significant rainfall events at all Points (1, 33, 34). Point 1 had nitrate levels peaking at 1.58 mg/L on the 21st December 2023, and 1.17 mg/L on 9th and 11th November 2024 with levels generally remaining below 1.00 mg/L for the rest of the reporting period. Point 33 (downstream) remained under 1.00 mg/L on all sampling occasions, with Point 34 nitrate levels recording 1.11 mg/L on 6th November 2023 as the highest level in this reporting period for upstream.

During most of the reporting period, nitrate levels remained below 0.5 mg/L. Upstream and downstream results were generally lower, however followed the similar peaking rates after rain events travelled through the upper and lower catchment.

Ammonia, which is a compound commonly associated with leachate, was not reported at non-compliant concentrations (>0.9 mg/L) during this reporting period, with the highest level recorded at 0.56 mg/L. Upstream (Point 34) and downstream (Point 33) ammonia levels remained compliant during this time.

TOC, which can be used as a general water quality indicator reported higher concentrations at Discharge Monitoring Point 1, with lower concentrations reported at both the Upstream and Downstream Monitoring Points (33 and 34). It appears that higher concentrations were reported at the discharge point during the stormwater overflow events compared to the annual sampling event. This suggests a slight increase in discharge during the storm event, which is to be expected.

The highest level of TOC recorded at Point 1 was 18 mg/L on 6th November 2024. At Point 33 (downstream) 10 mg/L was the highest level recorded on the 16th, 17th and 29th November 2023 and

the highest level recorded at Point 34 (upstream) was 8 mg/L on the 20th December 2023. These peak values and general trends follow the occurrence of heavy rainfall events.

In general, TOC and nutrient concentrations were lowest at the upstream sampling point (Monitoring Point 34). Concentrations increase at the discharge sampling point (Monitoring Point 1), then slightly decrease at the downstream sampling point (Monitoring Point 33), to concentrations similar to the upstream monitoring location.

3.3.2.2 Major Anions and Cations

No trigger values are specified in the ANZAST (2018) for anions and cations, but their inclusion allows for an understanding of water characteristics and whether these characteristics are changing between monitoring points.

Overall, concentrations of some anions and cations at Discharge Monitoring Point 1 were elevated after rainfall events throughout the reporting period. Chloride, fluoride, sodium, sulphate and alkalinity levels were all higher than at Point 33 (downstream) and Point 34 (upstream). However, calcium, magnesium and potassium remained at similar levels at all three sampling points.

3.3.2.3 Electrical Conductivity (EC)

No trigger values are specified in ANZAST (2018), though its inclusion allows for an understanding of water quality and possible impacts to this quality.

The measured EC varied across the three locations with increased spikes after rain events. The highest level was 969 µS/L at Point 1 which occurred on the 6th November 2023 in the midst of a rain event. Point 33 (downstream) peaked at 584 µS/L on the 17th November 2023 and 591 µS/L was the highest recording at Point 34 (upstream) on the 7th February 2023.

3.3.2.4 Filterable Iron

No trigger values are specified in the ANZAST (2018) for filterable iron.

At Point 1, the highest level of filterable iron detected was 0.07 mg/l on the 11th November 2023 and 0.08 mg/L on the 16th November 2023 after a rain event. All other readings were below 0.05 mg/L at the discharge point, and low detectable concentrations were also recorded both upstream and downstream (under 0.05 mg/L) throughout the reporting period.

3.3.2.5 Dissolved Oxygen (DO) and Temperature

Reported DO concentrations ranged between 5.2 mg/L (7th November 2023) and 10.4 mg/L (11th January 2024) at Point 1. Ideally, DO levels should not drop below 3 mg/L to ensure a healthy water column (ANZAST (2018)). Values at Point 1 were above this level throughout the reporting period, indicating a healthier water column compared to the past two reporting periods.

Upstream and downstream waterways remained at healthy DO levels throughout the reporting period with temperatures fluctuating across all three monitoring points (18.3^0C – 29.0^0C).

3.3.2.6 Total Phenolics

Total phenolics (phenols) were reported below the laboratory practical quantification limits (PQLs) at all Monitoring points (1, 33 and 34) during all sampling events. No graph is provided for these parameters for this reason.

3.4 Results – Polishing Pond

The Polishing Pond is subjected to testing for pH and turbidity prior to, and during all controlled release events. Controlled release is undertaken to allow the stormwater management system to be maintained to increase storage of stormwater during rainfall events.

The polishing pond parameters (pH and turbidity) were measured only on two occasions for controlled release. Results were compliant & release was undertaken on the 16th June 2023 and 30th January 2024.

3.5 Non-Conformances

In reference to surface water monitoring, the facility had 6 non-conformances during the 2023/24 reporting period as described in Section 3.3.

3.6 Monitoring Trends

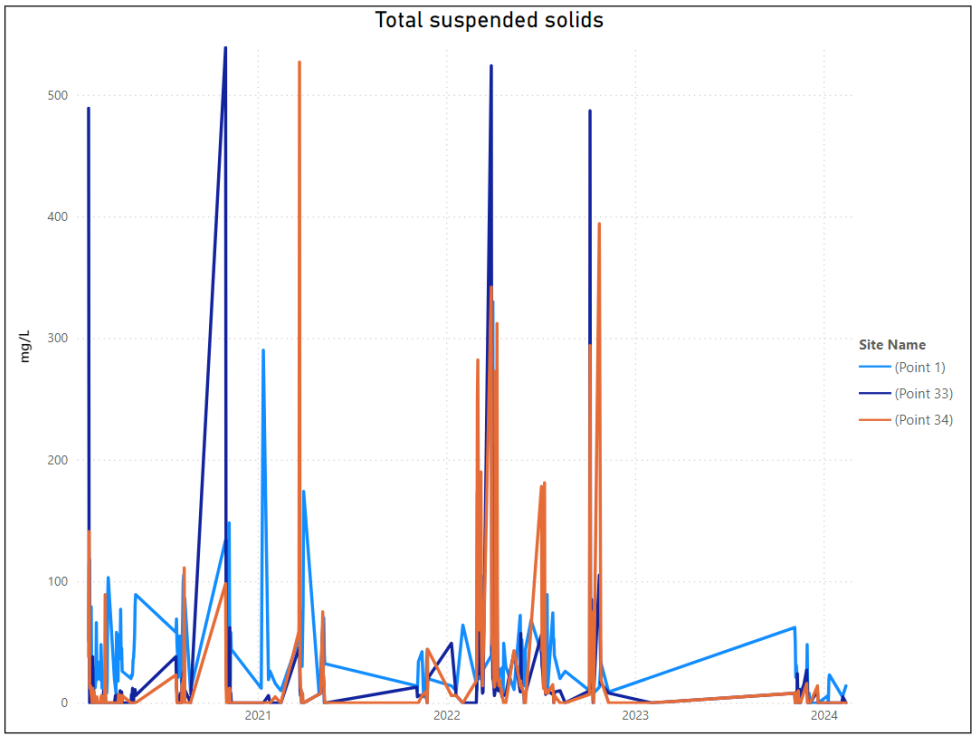
The graphed TSS and pH values for the last 5 years (2019-2024) are provided below, while the other analytes subject to monitoring during the same period are provided in Appendix A. A summary of the observable trends is provided below.

3.6.1 TSS Trends

As shown in the graph below, TSS concentrations stabilised during this reporting period. Water quality fluctuated greatly in the previous two reporting periods. This coincided with the La Nina weather event in the Southern Hemisphere; and as the weather improved, sediment loads decreased within acceptable limits. This allowed controlled discharge to be undertaken so that freeboard would be available for future rainfall events.

Two breaches over 50 mg/L (attributable to unexpected rainfall at the start of construction of the new cell and associated clearing works) occurred during this reporting period.

Graph 1: TSS Trends - Total Suspended Solids

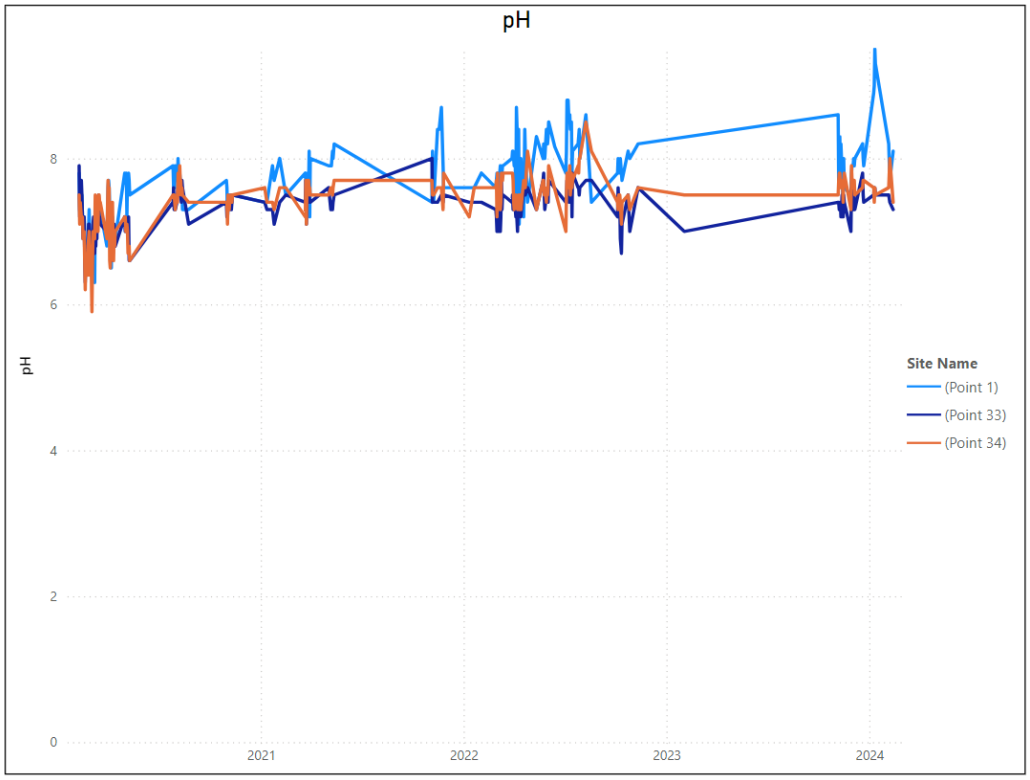


3.6.2 pH Trends

As shown in the graph below, pH has been relatively stable and within range (6.5-8.5) for the life of the project. This trend was disrupted during the Natural Disasters over the previous two reporting periods, however stabilisation has resumed over this period.

Four breaches over 8.5 (attributable to unexpected rainfall at the start of construction of the new cell and associated clearing works) occurred during this reporting period.

Graph 2: pH Trends



3.6.3 All Other Parameters

In relation to other parameters monitored, trend graphs are provided in Appendix A. Monitoring results stabilised during this time as weather patterns settled.

Continual fluctuations of water quality is most likely due to the large volume of water passing through the catchment over the last few years, mobilising contaminants and flushing them through the water column downstream.

Of interest, is the changing nature of the catchment. Until the last five years, the surrounding land use was predominantly rural residential land use. Whilst upstream remains relatively stable with limited to no development, adjacent land use has become predominantly light industrial (e.g. vehicle storage, bitumen plants, commercial composting) and now, increasingly residential. This will undoubtably impact surrounding water quality.

3.7 EA Predictions

The EA did not provide predictions relating to surface water. However, Condition 5(d) of MP 11_0094 MOD2 instrument requires that this soil, water and leachate management plan is updated to incorporate the final detailed design specifications for stormwater management and collection at the site, including the stormwater upgrade drainage works. Also, within Schedule 3 of the Planning

Approval, Council is required to prepare and implement a Soil, Water and Leachate Management Plan. This was submitted to DPE in November 2021 and was subsequently approved on the 29/06/2022.

The table below summarises the s75W Instrument of Modification Conditions (MOD2). The report approved is in accordance with Condition 3 in Schedule 5.

Table 3-5 Instrument of Modification (s75W)

Requirement	Condition Actions	Relevant Section
Site Water Balance	Identifies the source of water collected or stored on site, including rainfall, stormwater and groundwater. Includes details of all water use on site and any discharges. Describes the measures that will be implemented to minimize water use on site.	Whytes Gully Landfill Site Water Balance (GHD 2021). This will be updated in the 2024/25 reporting period in accordance with EPA requirements.
Erosion and Sediment Control Plan	Is consistent with the requirements in the latest version of the Blue Book. Identifies the activities on site that could cause soil erosion and generate sediment. Describes the measures that will be implemented to minimise soil erosion and transport of sediment and stockpiles are managed.	Stockpile Management Plan (August 2021)
Leachate Management Plan	Includes final details of leachate management and collection on site. Includes a remedial action plan.	Whytes Gully Landfill - Leachate Management Systems Update (JPG Engineering 2024)
Stormwater Management Plan	Is consistent with the Wollongong DCP. Includes detailed design for the stormwater management and collection system. Demonstrates how the requirements of Condition 15 of the schedule has been addressed. Is updated to the satisfaction of the Secretary prior to the construction of works.	Whytes Gully: Soil, Water and Leachate Management Plan (2022)
An Ongoing Monitoring Program	Includes baseline data. A combined surface and groundwater monitoring program. Includes surface and groundwater impact assessment criteria.	Whytes Gully: Soil, Water and Leachate Management Plan (2022)

4 Water Monitoring- Groundwater

Groundwater monitoring was completed in order to satisfy Approval No. 11_0094 Schedule 4, conditions pertaining to 'Soil and Water'. The findings for the 2023 -2024 annual reporting period are provided in the sections below.

4.1 Overview

Groundwater monitoring was undertaken by ALS Environmental, with monitoring locations shown in Figure 4. A summary of the monitoring requirements are detailed below:

Table 4-1: Groundwater Monitoring

<table>
<tr><th>Activity</th><th colspan="2">Description</th></tr>
<tr><td>Purpose</td><td colspan="2">Detect if groundwater is impacted by leachate.</td></tr>
<tr><td>Frequency</td><td colspan="2">Quarterly in accordance with EPL 5862. Monitoring was completed in:
May 2023
August 2023
November 2023
February 2024</td></tr>
<tr><td>Locations</td><td colspan="2">Sampling locations were in accordance with EPL 5862, and included the following monitoring points: 5,9,10,11,12,13,14,15,16,17,18,19 and 20.</td></tr>
<tr><td>Methodology</td><td colspan="2">Prior to sampling, the sampling the standing water levels (SWLs) were measured using a water level meter;
Groundwater samples were collected using a bailer;
Field parameters were recorded using a calibrated water quality meter prior to sampling.</td></tr>
<tr><td rowspan="10">Analytes/Field Parameters</td><td colspan="2">The analysis schedule was in accordance with M2.3 of EPL 5862 and included:

Table 4-2: Groundwater Parameters</td></tr>
<tr><td>Annually</td><td>Quarterly</td></tr>
<tr><td>Metals: aluminium, arsenic, barium, cadmium, chromium (hexavalent and total), cobalt, copper, lead, manganese, mercury, zinc</td><td>Alkalinity</td></tr>
<tr><td>Benzene, toluene, ethylbenzene, xylene (BTEX)</td><td>Major anions and cations:
Calcium, magnesium, potassium, sodium, chloride, sulfate</td></tr>
<tr><td>Fluoride</td><td>pH and EC</td></tr>
<tr><td>Nitrate and nitrite</td><td>SWLs</td></tr>
<tr><td>Organochlorine and organophosphate (OC and OP pesticides)</td><td>Total dissolved solids (TDS)</td></tr>
<tr><td>Polycyclic aromatic hydrocarbons (PAH)</td><td>TOC</td></tr>
<tr><td>Total Petroleum Hydrocarbons (TRH)</td><td>Nitrogen – (ammonia)</td></tr>
<tr><td>Total phenolics</td><td></td></tr>
</table>

Figure 4: Groundwater sampling locations

4.2 Performance Criteria

Consistent with the surface water monitoring performance criteria, Section 7.4 of the LEMP (Draft Golder 2020) states that all groundwater results are to be assessed against the relevant ANZAST,

2018 Fresh Water (95%) guidelines and or other relevant trigger values specified in the document will be adopted during future monitoring events.

4.3 Results

4.3.1 Depth to Water Table

Groundwater flows in a south westerly direction through the site. The minimum and maximum recorded SWLs (metres below top of casing (m b ToC) were as follows:

Table 4-3: Standing Water Levels

Monitoring Event	Minimum Depth (m bToC)	Maximum Depth (m bToC)
16/05/2023	1.73 (Point 15)	6.9 (Point 10)
15/08/2023	2.3 (Point 20)	10.8 (Point 12)
15/11/2023	2.46 (Point 20)	11.21 (Point 12)
06/02/2024	2.11 (Point 25)	10.53 (Point 12)

4.3.1.1 pH and EC

Groundwater pH was reported to be relatively neutral averaging between 6.0 to 7.5 for the reporting period.

Electrical Conductivity varied greatly across the site with the lowest value recorded being 200 µS/L at Point 12 (GMW105) on the 05/02/2024 and the highest value recorded being 5530 µS/L at Point 5 (GABHO2) also on 05/02/2024.

All bores being remained active across the site during this reporting period. However, Point 5 was offline for the first two reporting quarters as it was damaged. Repairs were undertaken on the 21st August 2024.

4.3.1 Laboratory Analysis Results

Tabulated analysis results for the 2023/24 annual reporting period are provided in Appendix B, with a summary of the results presented in the following sections.

4.3.1.1 Metals

Metals were detected in groundwater at all sampling locations, with concentrations of arsenic, barium, cadmium, chromium, lead, mercury and zinc below the ANZAST (2018) criteria for freshwater. However, the following metal exceedances were reported:

Table 4-4 Metals Exceedances

Metals	Monitoring Point	Exceedance (mg/L)	Assessment Criteria ANZAST (2018)
Aluminium	5 9 10 11 12 14 15 16 17 18 19 20	8.8 (5/02/2024) 4.96 (5/02/2024) 4.97 (5/02/2024) 11.2 (5/02/2024) 8.31 (5/02/2024) 3.64 (5/02/2024) 9.18(5/02/2024) 9.46 (5/02/2024) 0.76(5/02/2024) 7.77 (5/02/2024) 0.38 (5/02/2024) 1.05 (5/02/2024)	0.055
Cobalt	10 11 12 14 15 16 18 19 20	0.017 (5/02/2024) 0.006 (5/02/2024) 0.007 (5/02/2024) 0.004(5/02/2024) 0.010(5/02/2024) 0.051 (5/02/2024) 0.009 (5/02/2024) 0.003 (5/02/2024) 0.016 (5/02/2024)	0.0014
Manganese	16 20	5.98 (5/02/2024) 2.59 (5/02/2024)	1.9

4.3.1.2 Hydrocarbons

Concentrations of BTEX, TRH, PAH and total phenolics were reported below the laboratory PQLs and below the adopted assessment criteria. Graphs of these values have not been included and the Results Table in Appendix B has shown them as a 0 value.

4.3.1.3 Major Anions and Cations

Concentrations of calcium, magnesium, potassium, chloride, fluoride, sulfate and sodium varied across the groundwater network. It does appear that groundwater is dominated by calcium, sodium and chloride ions, with all groundwater wells exhibiting higher concentrations of these ions compared to others.

Groundwater within the site is generally described as very hard to extremely hard. Monitoring Point 5 recorded the highest $CaCO_3$ concentrations during the reporting period, with levels peaking at 958 mg/L (5/02/2024).

Monitoring Point 12 had the lowest concentrations ranging between 39 mg/L (15/11/20232) and 43 mg/L (5/02/2024).

4.3.1.4 Total Dissolved Solids (TDS)

Groundwater across the site was reported to be 'fresh' to 'brackish', with TDS concentrations ranging between 185 mg/L at Point 12 (5/02/2024) and 3480 mg/L at Monitoring Point 5 (5/02/2024). Concentrations fluctuated significantly throughout the site and appear to be linked to the rainfall events during the reporting period. TDS levels were overall lower than the last reporting period, most likely due to dilution factors from the sheer volume of rainfall received at the site in the previous 18 months.

4.3.1.5 Total Organic Carbon (TOC)

No trigger values were adopted for TOC as none were available in the ANZAST (2018) guidelines. Concentrations across the site range from below the laboratory PQL (<1 mg/L) at bores 5,10,17,18 and 19 sampled on the 5/02/2024 through to 17 mg/L (Point 20) on 16/05/2023.

4.3.1.6 OC and OP Pesticides

OC and OP pesticides were reported below the laboratory PQLs during the reporting period. It is noted however, that several PQLs were higher than the ANZAST (2018) guideline values, and as such some exceedances may be masked.

4.3.1.7 Nutrients

Nutrient concentrations including nitrate, nitrite and ammonia-N concentrations were reported below the adopted assessment criteria in almost all groundwater bores. However, there was an elevated level of 6.08 mg/L Nitrate at Monitoring Point 17on the 5/02/2024.

Ammonia and nitrite levels remained low and fluctuated slightly during the reporting period.

4.4 Conformances

In relation to groundwater, the monitoring schedule was in conformance with during the 2022/23 reporting period, apart from some quarterly data not collected from Point 5 due to bore damage. The bore was replaced on the 21st August 2023 and sampling resumed in accordance with EPA compliance requirements.

In relation to concentrations of contaminants of potential concern (COPs) in groundwater, the following non-conformances were noted:

- Raised OC/OP PQLs which may potentially mask exceedances in the adopted criteria.

- Continued metal exceedance (aluminium, cobalt and manganese) at several locations. However, based on previous monitoring data, it is noted that aluminium and cobalt appear to be regionally elevated.

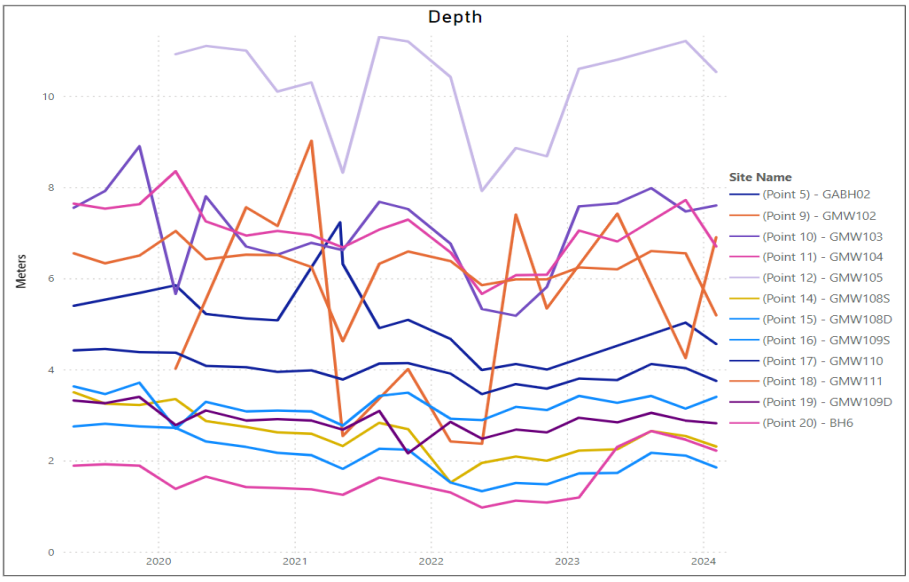
4.5 Monitoring Trends

The graphed monitoring trends for groundwater depth, TOC, ammonia-N and metals including aluminium, arsenic, copper, cadmium and zinc for the period 2019-2024 are provided below. The full suite of graphed trends is provided in Appendix B, with a summary of observable trends provided below.

4.5.1 Depth to Water Table

Water table levels remained elevated from the previous years of continual heavy rainfall. All bores continued to flow and were able to be measured.

Graph 3- Depth to Water Table

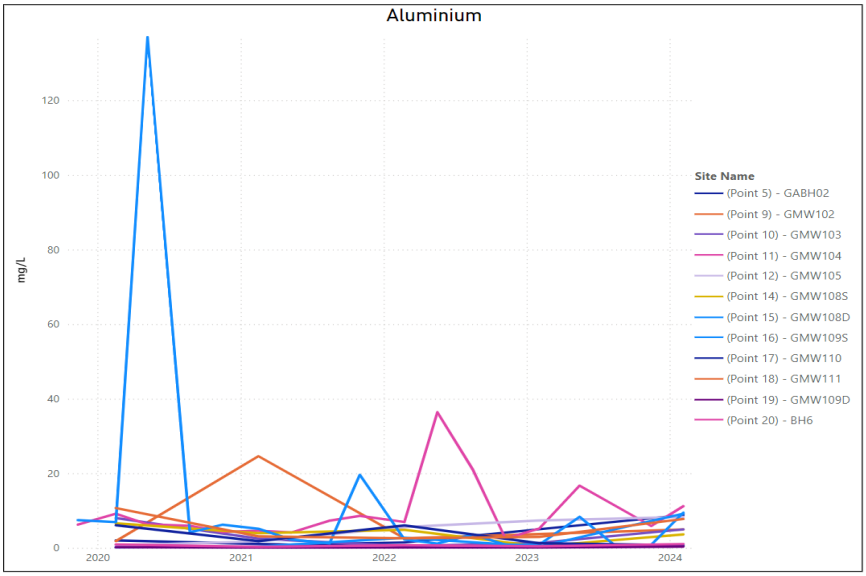


4.5.2 Metals

Aluminium

As shown in the graph below, aluminium concentrations continued to remain stable after peaking in 2020 (after a heavy rainfall event broke drought conditions). The previous ongoing heavy rainfall events mobilised metals in the groundwater system, however concentrations of aluminium in the water column dropped but still exceeded the adopted assessment criteria (0.055 mg/L).

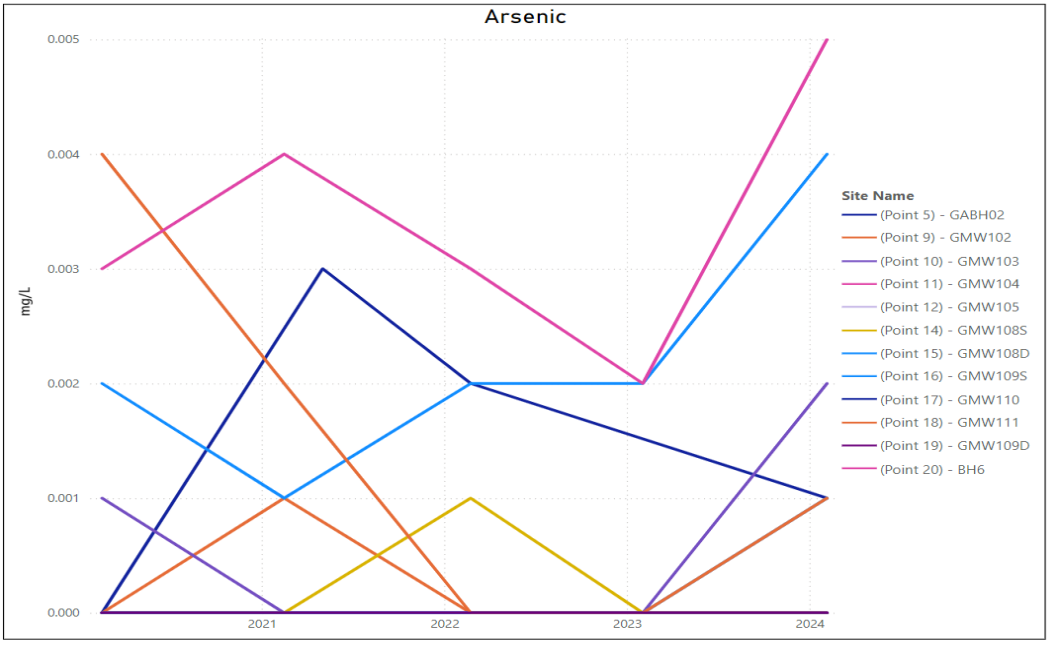
Graph 4 – Aluminium Trends



Arsenic

As shown in the following graph, arsenic concentrations have fluctuated over the period of the project but have generally stayed below the adopted guideline value of 0.013 mg/L. Even with increased levels peaking at Monitoring Points 5, 15 and 20, arsenic mobility in groundwater was below the guideline value.

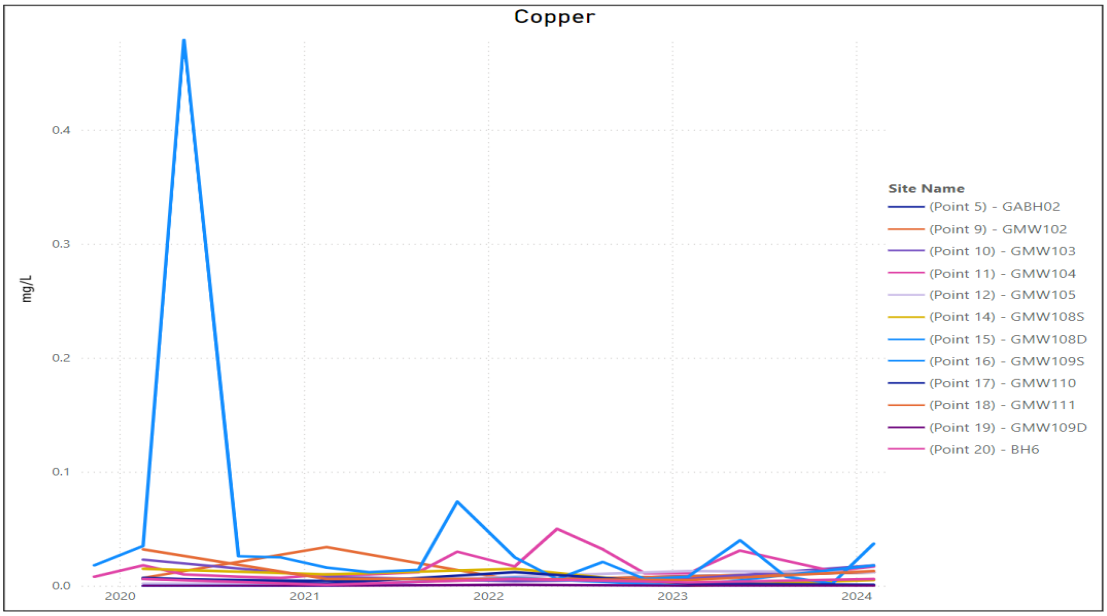
Graph 5: Arsenic Trends



Copper

As shown in the graph below, copper concentrations were below the adopted assessment criteria of 0.0014 mg/L this reporting period.

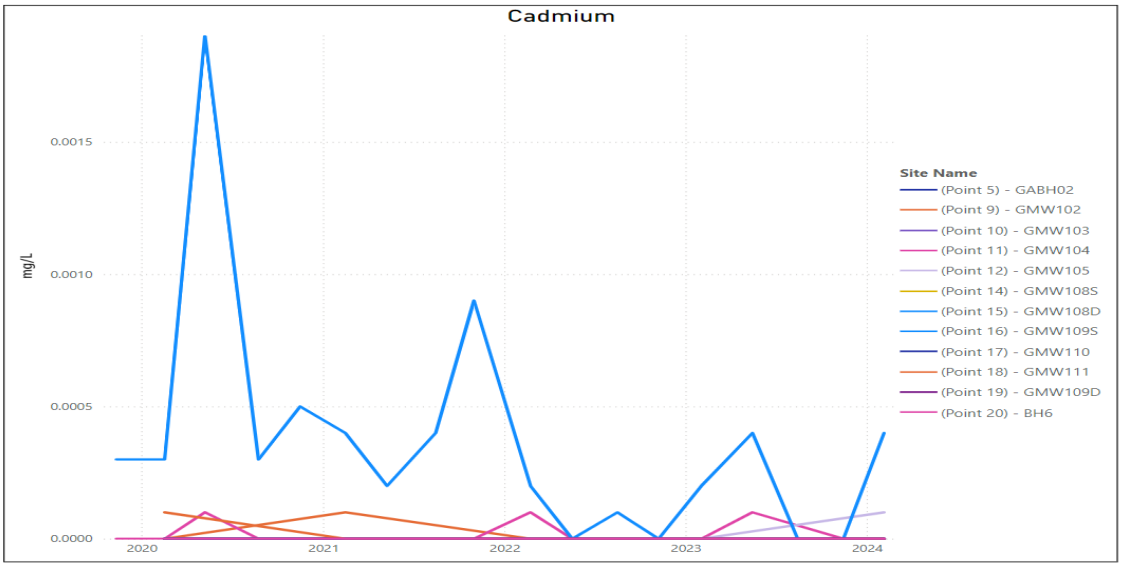
Graph 6: Copper Trends



Cadmium

The guideline values for cadmium were corrected to account for water hardness. As shown in the graph below, cadmium concentrations have been stable and below 0.005 mg/L this reporting period.

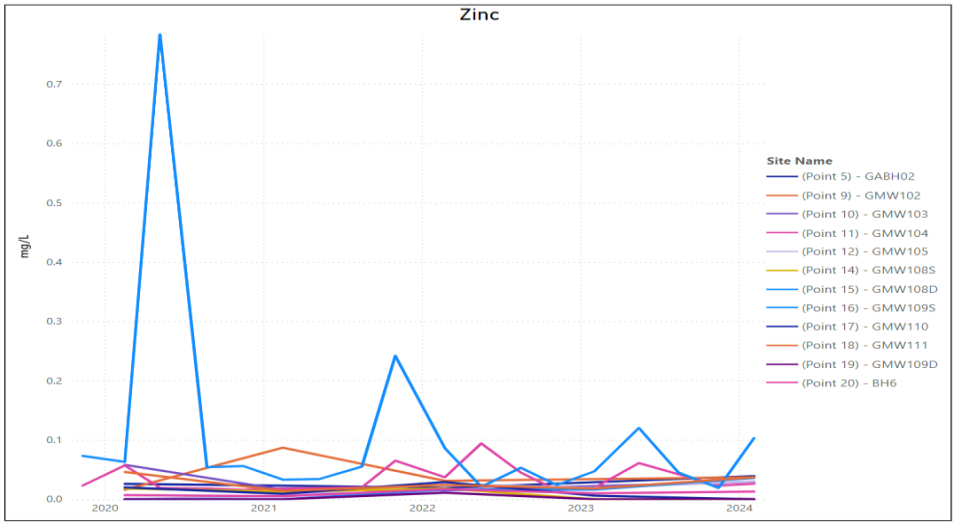
Graph 7 Cadmium Trends



Zinc

The monitoring values were corrected for hardness, with most results under the threshold value 0.0416 mg/L. The exceptions was Monitoring Points 15, which exceeded the guideline value on 2 occasions.

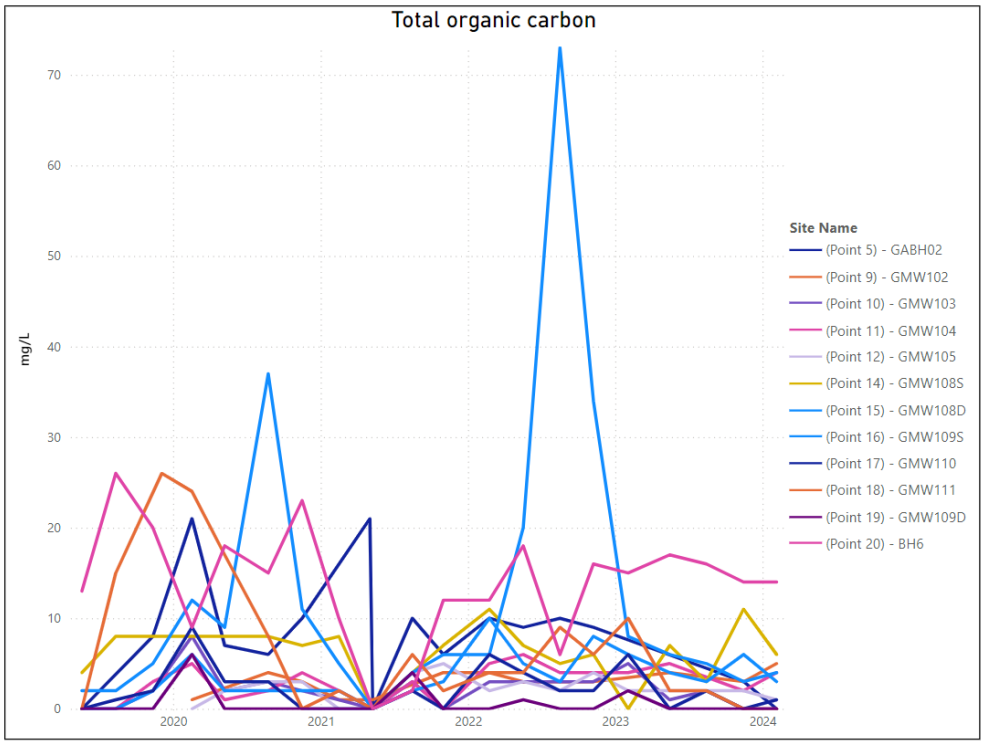
Graph 8 Zinc Trends



4.5.3 Total Organic Carbon (TOC)

As shown in the graph below, TOC concentrations have varied significantly over time with overall increases during this reporting period. This can most likely be attributed to continual water flow from previous rainfall events that have mobilised solutes within the groundwater system.

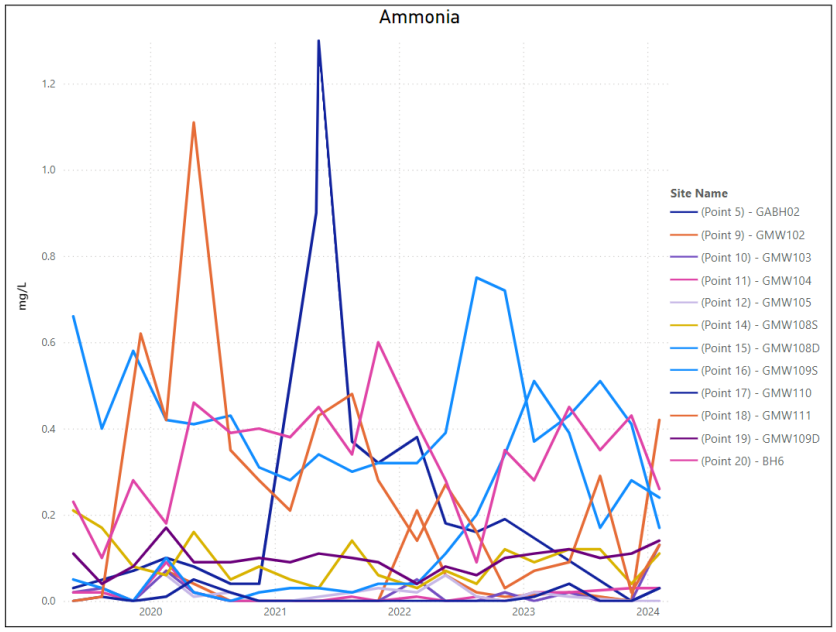
Graph 9 -TOC Trends



4.5.4 Ammonia-N

As shown in the graph below, ammonia-N was reported below the threshold level of 0.95 mg/L throughout the reporting period. With the groundwater network continuing to flow, ammonia levels have stabilised within the site.

Graph 10: Ammonia- N Trends



4.5.5 Other Analytes

The full suite of graphed trends for the same period are provided in Appendix B, with a summary of observable trends provided below. Concentrations have generally stabilised as the groundwater network continues to flow.

Major anions and cations, total dissolved solids, nutrients, pH and electrical conductivity were all heavily influenced by rainfall events during the 2022/23 period as solutes were mobilised in the water column. There is an overall trend of stabilisation during this reporting period compared to the previous two years.

OC and OP Pesticides, PAH, BTEX and Total Phenolic concentrations were all reported below the laboratory PQLs during all monitoring events.

4.6 EA Predictions

The EA predictions were that leachate migration into groundwater would be controlled via the permeability of the landfill liner. Additionally, no high value groundwater dependent ecosystems are located within the vicinity of the facility, and the landfill would present a relatively low risk if leachate did migrate into groundwater.

Based on the overall groundwater assessment, results have generally confirmed the EA predictions in the groundwater system underlying the facility. The Water Balance Analysis (GHD 2021) summarises groundwater characteristics as outlined below, and this will be updated in the next reporting period:

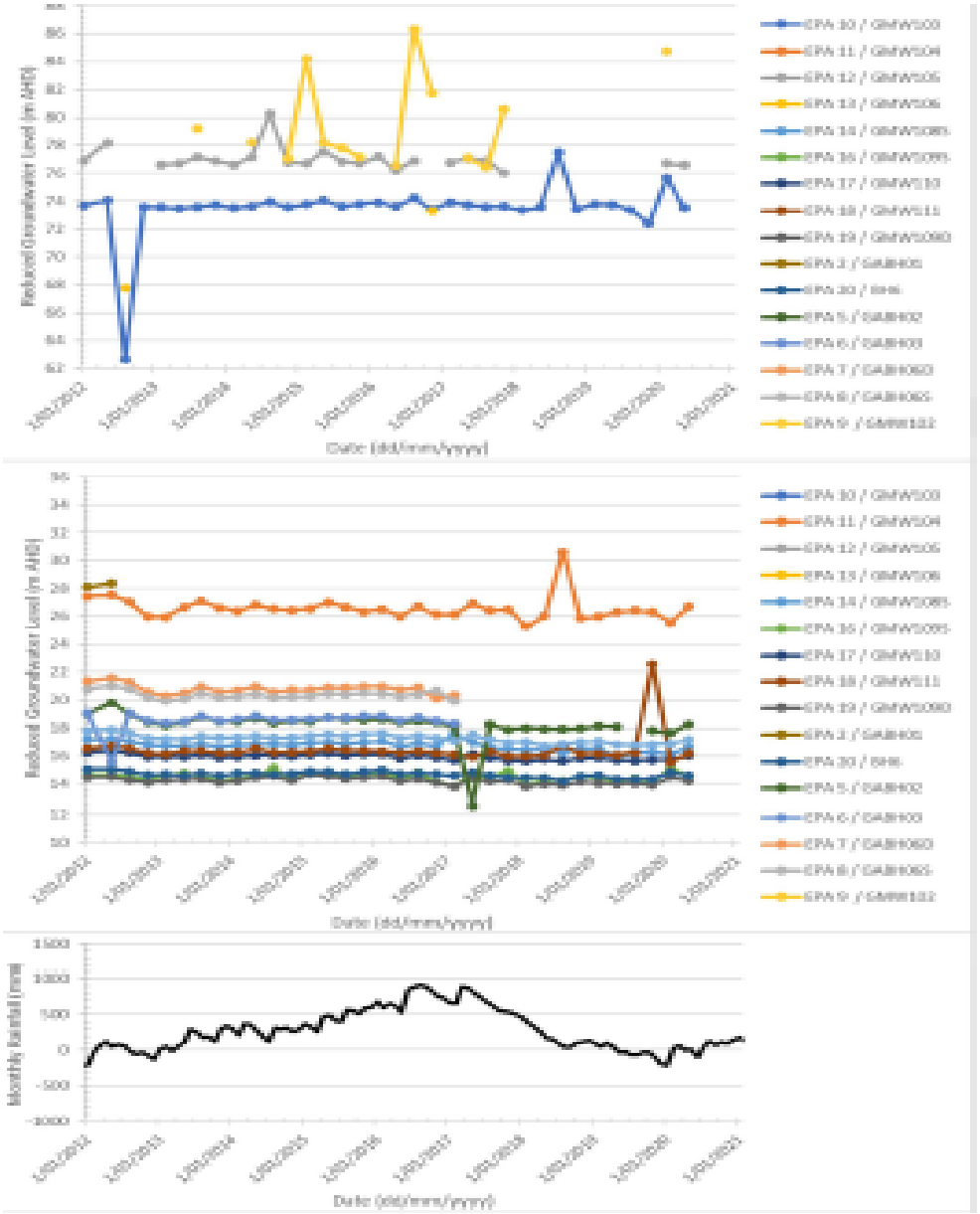
Water level measurements are taken quarterly from the landfill monitoring bores. The monitoring bore hydrographs are shown below and have been presented to characterise the seasonal groundwater response. The hydrographs have been presented over two reduced groundwater level ranges, as there is a considerable difference in elevation between the northern, elevated part of the site, and the flatter topographies to the south.

The water level monitoring data was received from Council and there are multiple monitoring anomalies, as water levels can change by over 6 m in some instances. In general terms, most monitoring bores show very limited seasonal fluctuation, i.e., generally less than 1 m variation.
A monthly residual mass curve of rainfall has been prepared to identify long term rainfall trends and has also been presented in the figure below. The rainfall data was sourced from Bellambi AWS climate station (68228) for the period 1990 to 2021, to characterise the influence of climate on groundwater levels. The absolute value of the residual mass curve is not significant; however the slope of the curve is:

– A positive slope indicates a wetter than average period
– A negative slope indicates a drier than average period
– A section of both negative and positive indicates a period of generally average rainfall
– The grade of the slope indicates how much wetter or drier than average the climate is

The residual mass curve indicates that the rainfall has been above average between 2013 and 2017, below average between 2017 and 2019, and relatively average since this period. In unconfined or water table aquifers, with relatively shallow water tables, increases in rainfall tend to result in a corresponding increase in groundwater levels. Such a response has not been obviously identified in the monitoring bore hydrographs. The relatively stable response in the hydrographs could be due to:
– Very low recharge rates in the bedrock aquifer
– In some parts of the site, groundwater levels in monitoring bores may be being artificially recharged by near site features e.g. leaking lagoons, stormwater channels or leaking buried services.

Figure 5 Monitoring Bore Hydrographs



5 Waste Monitoring – Trade Waste and Leachate

Sampling of trade wastewater and leachate was undertaken in order to satisfy Approval No. 11_0094 Schedule 4, conditions pertaining to 'Waste'. The findings for the 2023/2024 reporting period are provided in the sections below.

5.1 Overview

Trade wastewater and leachate sampling was undertaken by ALS Environmental in accordance with the *Consent to Discharge Industrial Trade Wastewater* (Sydney Water 2023). The monitoring locations are shown in Figure 5. A summary of the monitoring requirements is detailed in the table below.

Table 5-1: Trade Waste Monitoring Requirements

<table>
<tr><th>Activity</th><th>Description</th></tr>
<tr><td>Purpose</td><td>Trade Wastewater: Confirm quality of wastewater discharged from the facility.
Leachate: Chemically characterise the leachate to allow assessment of potential environmental harm and impacts.</td></tr>
<tr><td>Frequency</td><td>Trade Wastewater:
Monthly in accordance with EPL 5862. Monitoring was completed in:
On 13th March 2023 and every 22 days thereafter. If trade wastewater was not discharged on a scheduled day, then sampling was taken the next day when trade wastewater was discharged.
Leachate:
On 3 March 2023 and every week thereafter.</td></tr>
<tr><td>Locations</td><td>Sampling locations were in accordance with Sydney Water 2023, and included the Eastern Arm Collection Well, Balance Tank and Trade Wastewater (locations are depicted as Leachate Treatment Plant in Figure 5). In addition, sampling was also undertaken at Leachate Ponds P1 and S1.</td></tr>
<tr><td>Methodology</td><td>Trade Wastewater: Composite samples were collected over a 24 hour period using a composite autosampler, while grab samples were collected pre and post monitoring;
The composite samples were collected over one full production day by combining equal volumes taken over 30 minute intervals. The volumes collected were at least 5L over the full day; and
Readings of the flowmeter were obtained at the start and end of each sampling day.
Leachate: The ponds were sampled using a 'scoop' whereas the Balance Tank samples are directly collected from the tap, and the Eastern Arm Collection well is sampled using a bailer.</td></tr>
<tr><td>Analytes/Field Parameters</td><td>Samples were subject to laboratory analysis for the following:

Table 5-2: Trade Wastewater and Leachate Parameters
<table>
<tr><th colspan="2">Trade Wastewater</th><th>Leachate (CW-East, Balance Tank and Pond P1 and S1)</th></tr>
<tr><td>EC</td><td>Ammonia-N</td><td>TDS, TSS</td></tr>
<tr><td>Biological Oxygen Demand (BOD)</td><td>TSS</td><td>pH</td></tr>
<tr><td>TDS</td><td>EC</td><td>Ammonia-N</td></tr>
<tr><td>pH</td><td>Temperature</td><td>Temperature</td></tr>
</table>
Discrete samples were tested for pH, EC and temperature using a calibrated water quality meter at the start and finish of each day.</td></tr>
</table>

Figure 6: Wastewater and Leachate Sampling Locations

5.2 Performance Criteria

On the 20th August 2023, a trade waste agreement was signed that lowered the levels of some discharge parameters. This expired on the 20th August 2025, and guidelines proposed were lowered once more. Council is currently in negotiations with Sydney Water to maintain the same levels as per the previous agreement and upgrade the existing sewer line.

The current performance criteria for trade wastewater discharged from the facility to the sewer is provided in the table below:

Acceptance Standard	Performance Criteria	Guidance Document
Volume Discharged	605 kL/day	Sydney Water 2023
Concentrations	Start and finish: pH 7-10 Ammonia – N: 100 mg/L TSS: 600 mg/L TDS: 10 000 mg/L Temperature: < 38^{0}C	
Maximum Daily Mass	Ammonia: 28.3 kg/day TSS: 150 kg/day TDS: 2500 kg/day BOD: 50 kg/day Ammonia: 100 mg/L	

Section 4, Condition O7.2 of EPL 5862 states that the ' *licensee must maintain a leachate management system to collect and direct all leachate to a point for treatment and disposal to sewer*'. The leachate is treated at the facility and is discharged as Trade Wastewater.

The performance criteria for leachate contained at the facility is provided in the table below:

Acceptance Standard	Performance Criteria	Guidance Document
Leachate	No discharge of leachate to waters under dry weather conditions (<10 mm of rainfall in 24 hours) or stormwater events of less than 1:25 year, 24 hour recurrence interval (< 371.5 mm rainfall in 24 hours)	Section 3 L1.3 of EPL 5862

Note: Discharge of leachate from the pond caused by a 1:25 year, 24 hour recurrence interval storm event or greater does not constitute a breach of EPL 5862.

Consistent with the surface water monitoring performance criteria, Section 7.4 of the LEMP (Draft Golder 2020) for the facility states that all leachate results are to be assessed against the relevant water quality guidelines, specifically: ANZAST(2018) Freshwater (95%) guidelines.

5.3 Results

5.3.1 Trade Wastewater Discharged

The full tabulated trade wastewater results for the 2023-2024 reporting period are provided in Appendix C.

The volumes discharged and the analyte concentrations, including maximum daily mass and long-term average daily mass concentrations, were all reported below the trigger values specified in the performance criteria, with pH also reported within the recommended range. The maximum and minimum concentrations reported were as follows:

Table 5.3: Trade Waste Concentrations

Analyte	Minimum	Maximum	Performance Criteria
Volume Discharged	05/12/2023 0.12 kL	02/08/2023 0.18 kL	605 kL/day
pH start	7.4	7.9	pH 7-10
pH finish	6.8	8.2	
Ammonia-N Concentrations	0.0 mg/L	91.6 mg/L	100 mg/L
Ammonia -N Maximum Daily Mass	0.0 kg	0.02 kg	Maximum Daily Mass: 21 kg/day Long Term Average:3.98 kg/day
TSS	9 mg/L	60 mg/L	600 mg/L
TDS	582 mg/L	1330 mg/L	10 000mg/L
Temperature	15^{O} C	23^{0} C	< 38^{0} mg/L

5.4 Conformances

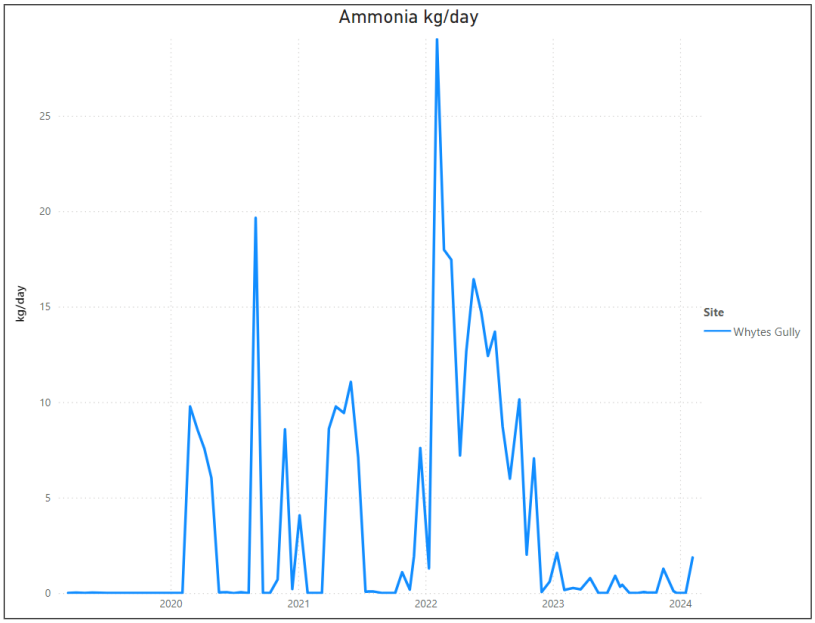
Based on the monitoring data over the reporting period, there were no breaches.

5.5 Monitoring Trends

5.5.1 Ammonia

Ammonia stabilised during this reporting period after two years of continual heavy rainfall and the performance criteria of 21.0 kg/day was not exceeded.

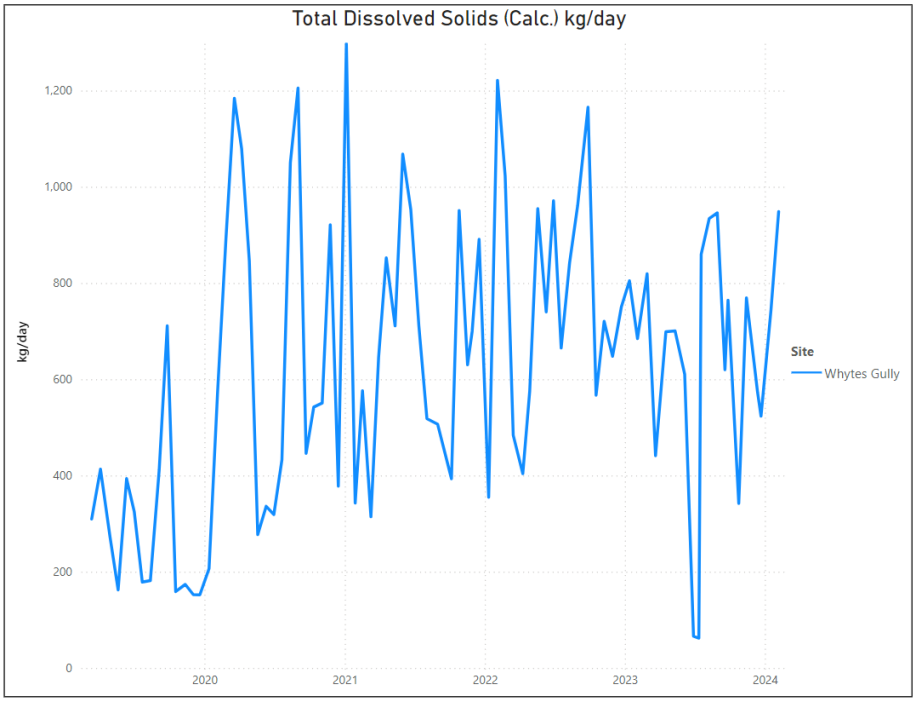
Graph 11: Ammonia Trends



5.5.2 TDS

As shown in the graph below, TDS concentrations have been subject to fluctuations influenced by sporadic rainfall events. Nonetheless, concentrations have been reported well below the performance criteria of 2500 kg/day over the life of the project (with exception of initial plant commissioning).

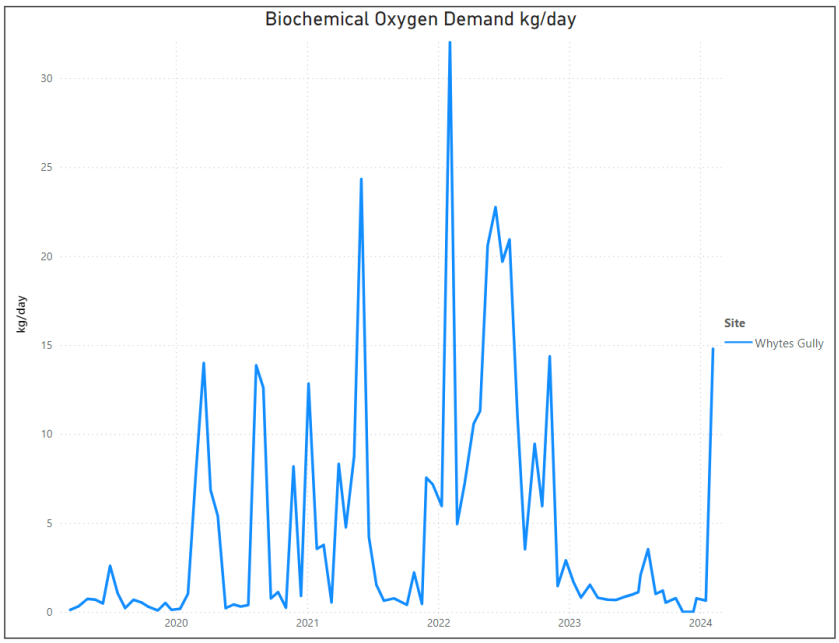
Graph 12: TDS Trends



5.5.3 Biological Oxygen Demand (BOD)

As shown in the graph below, BOD concentrations in trade wastewater have generally remained low in this reporting period. Previous heavy rainfall and continual flushing of the system has most likely contributed to this result, in conjunction with leachate system upgrades and improved ongoing management practices.

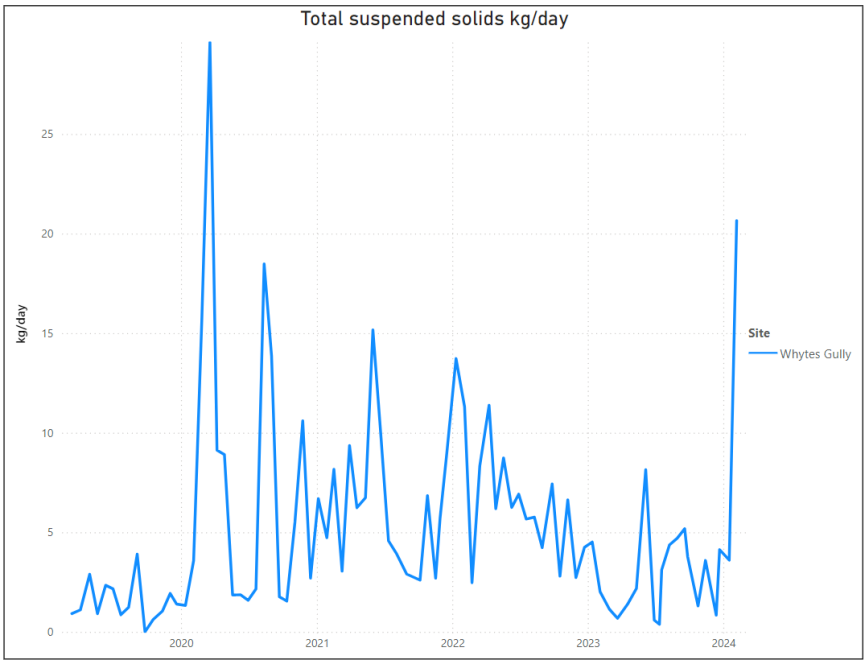
Graph 13: BOD Trends



5.5.4 TSS

As shown in the graph below, TSS concentrations in trade wastewater have been stable over the dry period like most parameters. The initial rainfall event resulted in an individual exceedance, however, when averaged over a 12 month period (as per Sydney Trade Waste Agreement 2023), these were under the agreed license requirements.

Graph 14: TSS Trends



5.6 EA Predictions

There were no EA predictions pertaining to trade wastewater discharged. This is primarily an agreement with Sydney Water based on wastewater quality and quantity discharged to sewer.

6 Waste- General

Waste screening and monitoring is required to satisfy Project Approval_No.11_0094 Schedule 4, conditions pertaining to 'Waste'. The findings for the 2023/24 reporting period are provided in the sections below.

6.1 Overview

Waste screening and monitoring was undertaken by Council for the 2022/23 reporting period in accordance with EPL 5862 and Project Approval No.11_0094. A summary of the requirements are detailed in the table below:

Table 6-1: Waste Screening

Activity	Description
Purpose	To ensure that the facility only accepts wastes that are authorised for receipt as per EPL 5862.
Frequency	**Random vehicle audits**: Daily **Screening of waste:** Continuous **Screening when truck tipping at the tip face or tipping at transfer station**: Continuous
Location	Weighbridge and transfer station tipping face.

Methodology	• Signs are present at the facility clearly stating the material accepted. The customer declares at the weighbridge the type of waste being disposed. Where the weighbridge operator is suspicious of the waste load, an inspection of the load is conducted. • Inspections via above load CCTV at the weighbridge. • Industrial loads require an application to be submitted with the waste loads- which is then reviewed by the weighbridge operator. • Visual inspection of small vehicle loads at the tipping face of the transfer station.

6.2 Performance Criteria

The performance criteria for waste received at the facility in the 2023/2024 reporting period is provided in the following table:

Table 6.2: Waste Received Criteria

Acceptance Standard	Performance Criteria	Guidance Document
Rejected Loads	Quantity of unacceptable waste types rejected.	Draft LEMP (Golder 2020)
	Number of detection reports of any waste rejected.	
	Number of incidences whereby unacceptable waste was discovered at the tipping face.	
	Monitoring data indicating consistent occurrences of unacceptable waste being detected.	
Tyres	No disposal of tyres <1.2 m in diameter.	EPL 5862
	No stockpiling of more than 50 tonnes at any one time.	
General solid waste (non-putrescible)	No more than 180 000 tonnes per annum.	Schedule 3, Condition 5 Project Approval No. 11_0094.
General solid waste (non-putrescible)		
Asbestos	*Not currently accepted at the facility.*	

6.3 Results

During the reporting period, only suitable waste streams were accepted at the facility, with an inbound total of 93 032.91 tonnes of material received. This is less than the maximum allowable performance criteria limit (180 000 tonnes per annum (tpa)).

6.3.1 Rejected Loads

244 rejected loads were recorded during this reporting period weighing 5.44 tonnes.

6.3.2 Tyres

A total of 863 tyres were received during the reporting period. The tyres are temporarily stored at the facility in accordance with EPL 5862, following which they were collected and taken offsite for recycling by Tyrecycle.

6.3.3 Other Inbound and Outbound Waste

Table 6-4: Inbound and Outbound Waste

Waste Stream Description	Inbound (tonnes)
Mixed Waste – Clean Up Australia Day	5.48
Dead Animals	28.38
General Waste	47 863.81
Commercial General Waste (inc. Council Waste)	26 780.36
Weighbridge Failure – Small Domestic Waste	-
TOTAL	**93 032.91**
Specific Items (tyres and mattresses)	4150 (items)
Recyclables (metals and e-waste)	1781.22

Waste Stream Description	Outbound (tonnes)
1. External Sources	1986.74
2. Outbound	5706.54
TOTAL	**7693.28**

1 Includes: computers/televisions, CRC, general recyclables, metal and motor oil.

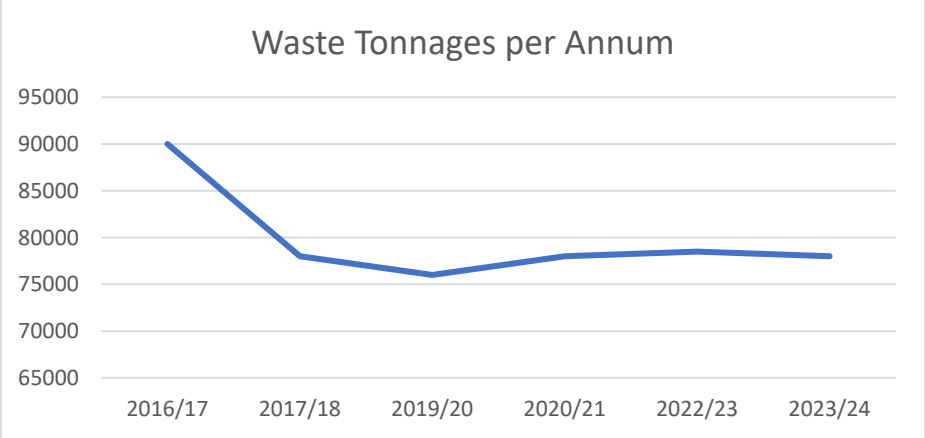
2 Includes: clay, computer/televisions, gravel/aggregate, green waste, mattresses, 'other', rejected material, material from the revolve/recycle area, tyres and VENM.

6.4 Conformances

In relation to waste, the facility operated in conformance during the 2023/2024 reporting period.

6.5 Monitoring Trends

The total waste stream volumes received at the facility have generally decreased since the facility began operating. This reporting period continued to see a similar trend and overall trends can be seen below.



6.6 EA Predictions

The EA predictions were made based on historical weighbridge records. In the EA predictions, it was reported that the waste volume received at the facility between the period 2008 and 2012 would range between approximately 120 000 -150 000 tpa.

It was predicted that the volume of waste accepted at the facility would not increase, and the waste stream volume for this reporting period was consistent with this EA prediction. Waste volumes continue to decrease overall in relation to this EA prediction, resultant of more formal recycling programs, introduction of the organics program (FOGO) and overall diversion from landfill.

7 Air Quality Monitoring – Landfill Gases

Landfill gas monitoring was completed in order to satisfy Project Approval No. 11_0094 conditions in Schedule 4, pertaining to 'Air Quality'. The findings for the 2023/24 reporting are provided in the sections below.

7.1 Overview

Surface gas, subsurface gas and gas accumulation into buildings, monitoring was undertaken by ALS Environmental in accordance with the *NSW EPA Environmental Guidelines: Solid waste landfills (second addition) 2016 (NSW EPA, 2016).* The monitoring locations are shown in Figure 6. A summary of the monitoring requirements for the facility are detailed in the table below:

Table 7-1: Air Quality Monitoring Requirements

Activity	Description
Purpose	Demonstrate that the cover material and extraction system is controlling the emissions of landfill gas.
Frequency	Monthly in accordance with EPL 5862.
Locations	• Transects 1-11[1] • Former landfill cell located to the north-west of the current active cell. Transects: A, C, D, E, F, G, H and I. • Recycle/Revolve East and West; and • Reddalls Road and Farmborough Road fence lines.
Methodology	Monitoring was undertaken using a calibrated *Inspectra Laser Gas Detector*. Methane concentrations were recorded at 5 cm above the ground surface in areas containing intermediate or final cover. The monitoring was undertaken at 25 metre spaced out transects on calm days, where wind speeds were <10 km/hour.
Subsurface Monitoring	

Purpose	Assess the presence of methane along the perimeter of the landfill cell and the potential for offsite migration.
Frequency	Monthly in accordance with EPL 5862.
Locations	12 landfill gas monitoring wells, including: EPA Point 21 (LFG MW1) to Point 32 (LFG MW12) in accordance with EPL 5862.
Methodology	Monitoring was undertaken using a calibrated *Inspectra Laser Gas Detector*.
Gas Accumulation	
Purpose	Demonstrate that methane along the perimeter of the landfill cell and the potential for offsite migration.
Frequency	Monthly in accordance with EPL 5862.
Locations	• Weighbridge • Glengarry Cottage (administrative building) • Recycling Transfer Station • Whytes Gully Operations Hub • Old SWERF/Visy site • Neighbouring properties within 250 m (these formally declined monitoring by WCC)
Methodology	Monitoring was undertaken using a calibrated *Inspectra Laser Gas Detector*.

Figure 6: Landfill Gas Monitoring Locations

7.2 Performance Criteria

The performance criteria adopted for the 2023/24 reporting period for landfill gases is provided in the table below:

Table 7-2: Landfill Gas Performance Criteria

Details	Corrective Action Criteria	Mandatory Reporting Requirement	Guidance Document
Surface Gas	Methane: 500 parts per million (ppm)	Yes	NSW EPA (2016)
Subsurface Gas	Methane: 1.0% volume/volume (v/v)	Yes	
	Carbon Dioxide: 1.5% v/v, above established background levels.	No	
Gas Accumulation	Methane :1% v/v	Yes	

7.3 Results

The landfill gas monitoring results for the 2023/24 reporting period are summarised in the following sections, with a copy of the full results provided in Appendix D.

7.3.1 Surface Methane

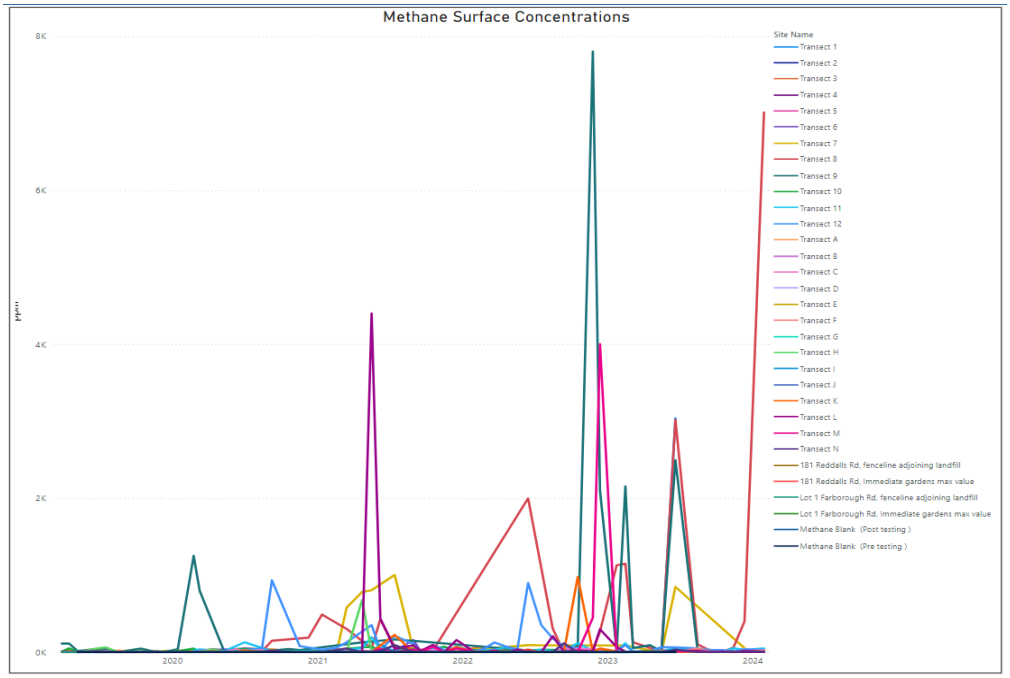
1000 surface gas samples were recorded this reporting period. On two sampling events, four transects recorded levels above 500 ppm (twelve readings) within the reporting period.

These were recorded as follows:

Sampling Date	Transect No.	Location - Methane result (ppm)
21/06/2023	1	1-1040, 3-750, 4-812, 5-1029, 6-2325, 7-3040, 9-2234
	7	2-8850
	8	2-3020
	9	4-2480, 5-2495
30/01/2024	8	3-7010

These elevated readings correlated to the previous heavy rainfall areas where the transects remain saturated. These levels continue to increase as the site became saturated with the heavy rainfall conditions over the past three reporting periods. The transects with increased levels are located in the upper areas of the site.

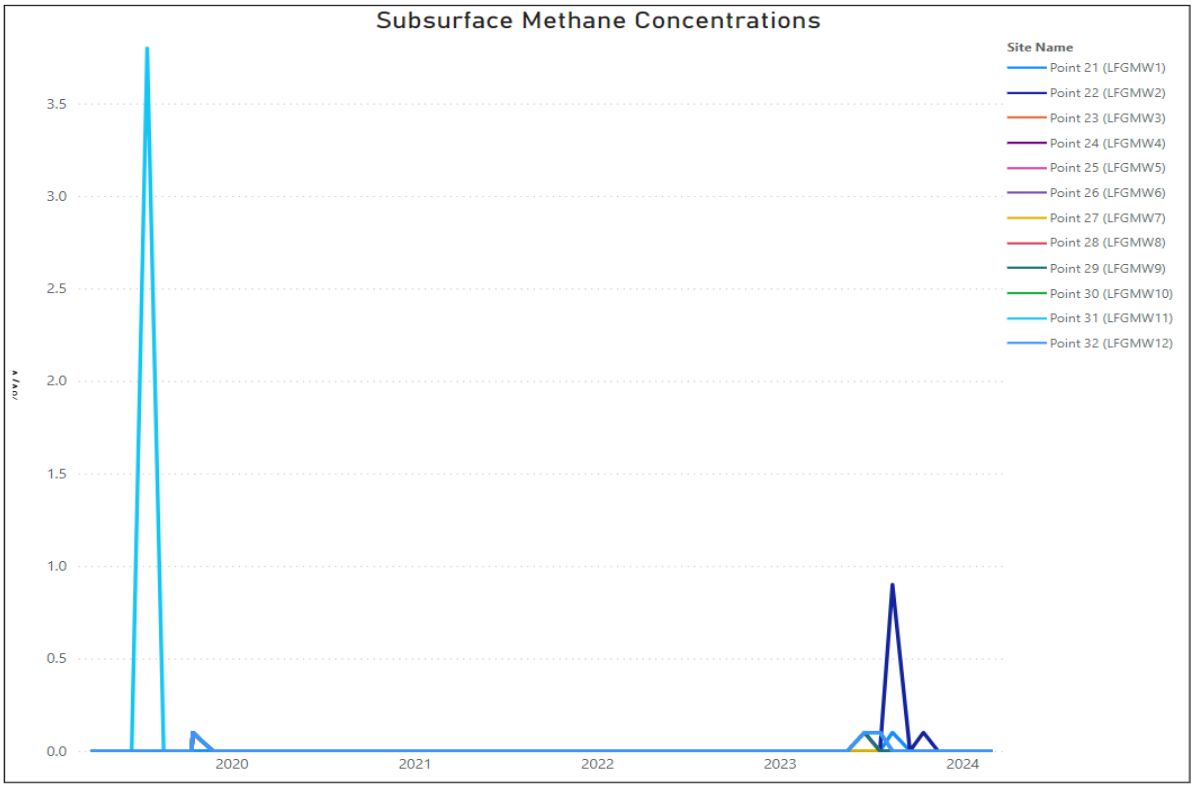
Graph 16: Methane Concentrations



7.3.1 Subsurface Methane

No subsurface gas results were recorded over 1.0 % vv. All readings were around 0 for the reporting period, with the exception of testing on the 21st/06/2023. This coincided with elevated gas readings at Whytes Gully during the same sampling event.

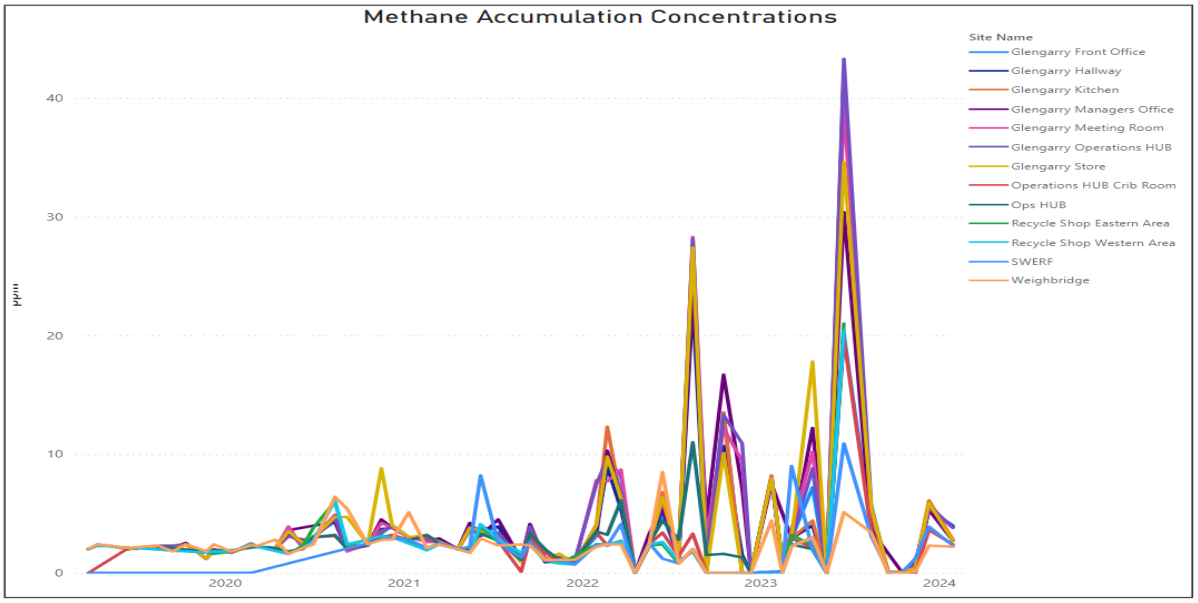
Graph 17: Subsurface Methane Concentrations



7.3.2 Gas Accumulation

As shown in the following graph, the methane concentrations accumulating into buildings have remained low even though there has been increased levels again over the last few reporting periods. Again, the higher levels correlated with heavy rainfall events. There was an elevated reading on the 21st/06/2023, which coincided with the high readings in surface gas monitoring on the same sampling event.

Graph 18: Methane Accumulation Concentrations



7.3.3 EA Prediction

There were no predictions pertaining to concentrations of methane accumulating into buildings, subsurface and near surface emissions.

8 Air Quality Monitoring – Dust

Dust monitoring was completed in order to satisfy Approval No. 11_0094 conditions in Schedule 4, pertaining to 'Air Quality'. The findings for the 2023/24 reporting period are provided in the section below.

8.1 Overview

Dust monitoring was undertaken on a continuous basis using dust deposition gauges as detailed in the table below, with sampling location presented in Figure 7.

Table 8-1: Dust Monitoring Requirements

Activity	Description	
Purpose	Measure respirable dust due to sensitive receptors.	
Frequency	Continual basis with dust deposition gauges (DDG) collected and analysed monthly.	
Locations	A total of locations are monitored, including DDG1 – DDG5 which were placed around the perimeter which were placed around the perimeter of the facility, with high-vol samplers set up at two of these locations (DDG1 and DDG2 – Glengarry Cottage and Whytes Gully).	
Methodology	The dust deposition gauges were installed by ALS Environmental in accordance with *Australian Standard (AS) 3580.10.1:2003 Methods for analysis of ambient air, Method 10.1: Determination of particulate matter- deposited matter- gravimetric method (AS 3580.10.1:2003).* The gauges were placed around the perimeter of the facility's boundaries with bottles swapped out on a monthly basis. Once per month, respirable dust sampling (particulate (PM)) was undertaken at least two locations utilising a PM_{10} sampler.	
Analytes	The laboratory analysis was as follows: **Table 8-2 Dust Analysis Schedule**	
	Ash content (g/m^2/month and mg)	Total suspended particulates (TSP)
	Combustible matter (g/m^2/month and mg)	PM_{10}
	Total insoluble matter (g/m^2/month and mg)	

Figure 7: Dust Monitoring Locations

8.2 Performance Criteria

The dust monitoring performance criteria adopted for the facility is provided in the following table:

Details	Averaging Period	Criteria	Guidance Document
Long-term for Particulate Matter			
TSP	Annual	90 µg/m^3	Approval No. 11_0094
PM_{10}	Annual	30 µg/m^3	
Short-term for Particulate Matter			
PM_{10}	24 hour	50 µg/m^3	Approval No. 11_0094
Long-term for Deposited Dust			
Deposited dust	Annual	Maximum increase in deposited dust level: 2 g/m^2/mon	Approval No. 11_0094
		Maximum total deposited dust level: 4 g/m^2/mon	

8.3 Results

The tabulated dust monitoring results are provided in Appendix F.

TSP and PM_{10} concentrations varied on a monthly basis across the monitoring period, however remained within compliance limits.

8.4 Conformances

The facility conformed to air quality criteria throughout this reporting period. An updated Air Quality Management Plan was approved by the EPA and DPE in the previous reporting period.

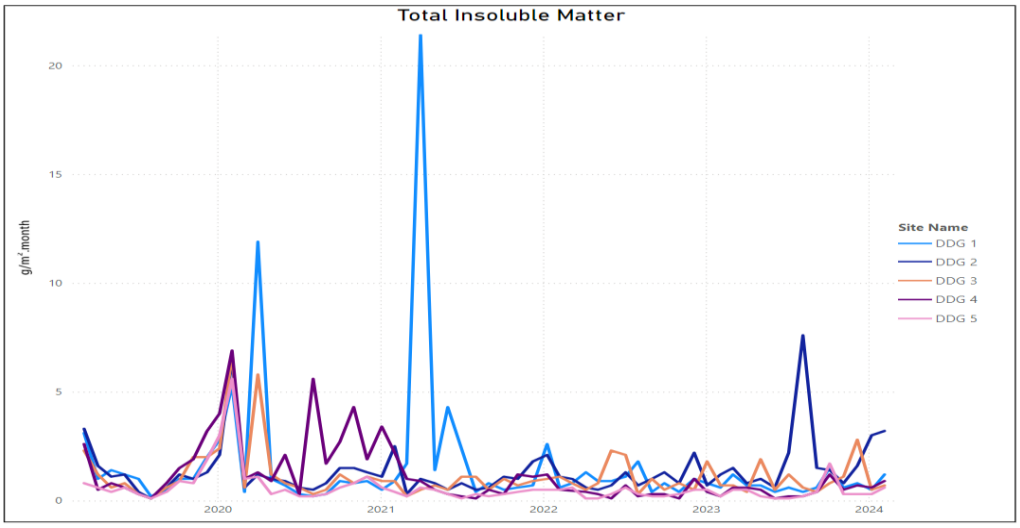
8.5 Monitoring Trends

The graphed monitoring trends measured at the Dust Deposition Gauges (DDGs) for the 2023/2024 reporting period are provided below.

8.5.1 Total Insoluble Matter

As shown in the graph below, dust concentrations have been subject to fluctuations but were below the performance criteria (4 g/m^2/month). There were elevated levels detected on the 18/09/2023.

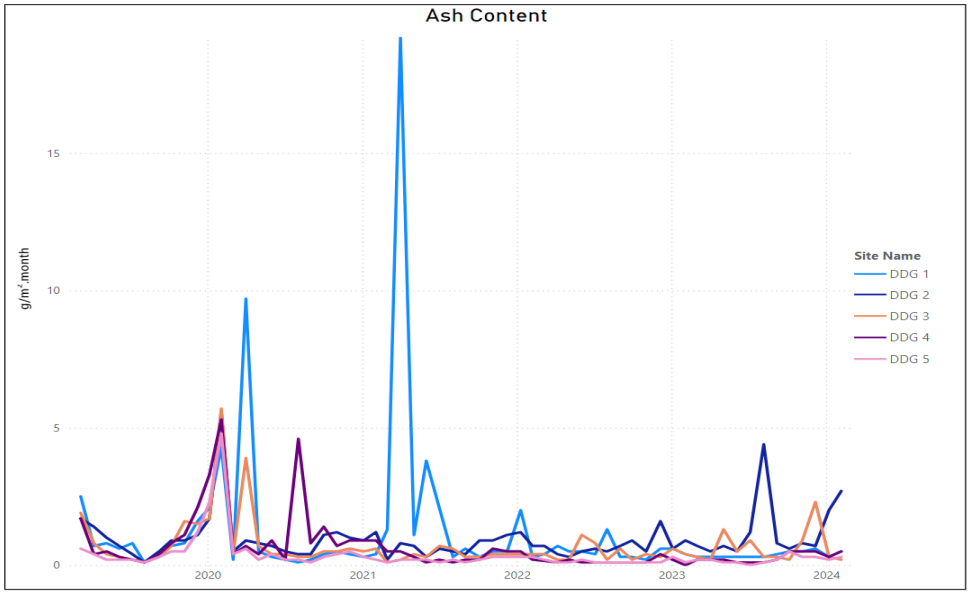
Graph 19: Total Insoluble Matter



8.5.1 Ash Content

There are no trigger values for ash content. As shown in the graph below, ash content continued to remain at low levels this reporting period. In the 2019/2020 severe bushfire season, ash content spiked to above 10 g/m^2/month at the peak.

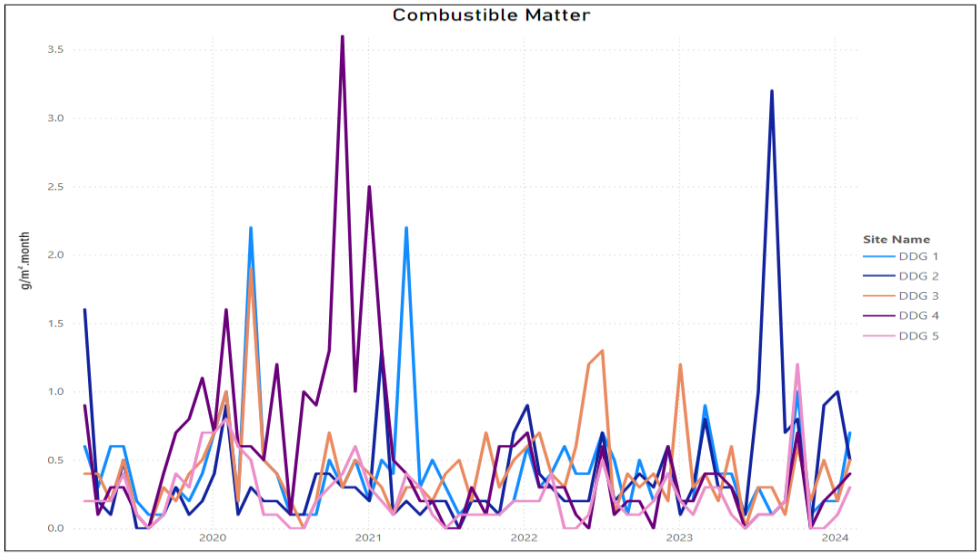
Graph 20: Ash Content



8.5.2 Combustible Matter

There are no trigger values for combustible matter. As shown in the graph below, combustible matter has been subject to fluctuations across the monitoring period, with levels remaining lower than the 2020/21 reporting period when bushfires were at their peak. There was a noticeable peak during this reporting period, which coincided with a controlled burn in the National Parks of the Illawarra Escarpment.

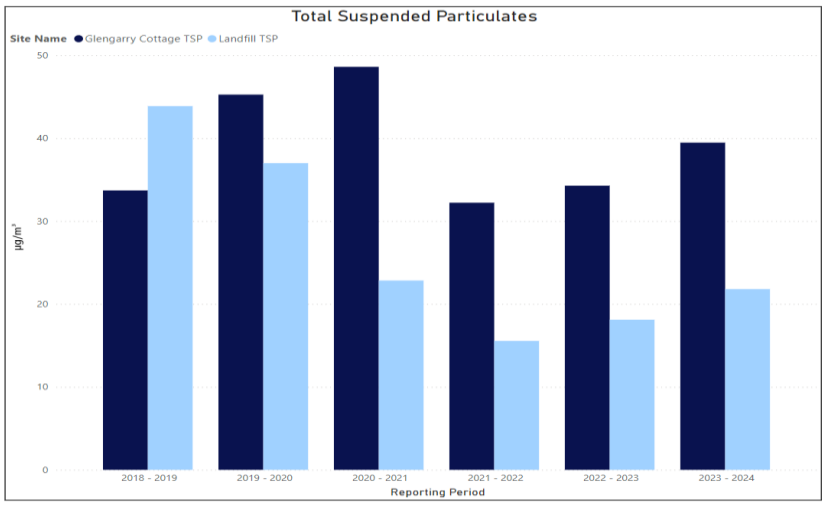
Graph 21: Combustible Matter



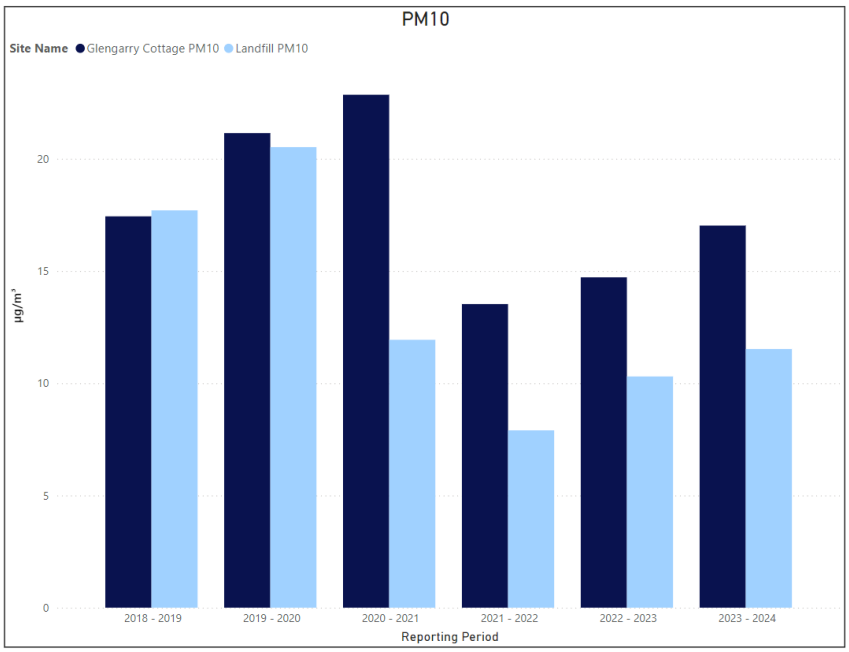
8.5.3 Rolling Monthly Average

As shown in the following graphs, there has been a continued steady increase at DDG1 (Glengarry) and DDG2 (Whytes Gully) in the last reporting period.

Graph 22: TSP Rolling Monthly Average



Graph 23: PM_{10} Rolling Monthly Average



EA Predictions

The EA predictions made from dispersive modelling undertaken suggested that, should the implementation of appropriate mitigation and management measures undertaken, there would be compliance with the relevant legislative criteria at all potential offsite residences. During the operational phase of the project, the identified mitigation measures includes dust suppression, restriction of the active tipping face and required daily cover areas.

The most significant occurrence in this reporting period is the beginning of construction of the new cell in February 2024. This may influence air quality; and additional measures have been put in place around the working area in accordance with compliance requirements.

Overall, in this reporting period, measures have proved to be effective and are consistent with EA predictions.

9 Air Quality Monitoring – Odour

Odour management is required at the facility to satisfy Approval No. 11_0094 in Schedule 4, pertaining to 'Air Quality'. The findings 2023/24 reporting period are provided in the section below.

9.1 Overview

Whilst not a mandatory requirement, Council proactively undertakes odour inspections on a daily basis around the perimeter of the facility. This is undertaken in order to determine the source of any potential odour breaches, and where additional active management is required.

9.2 Performance Criteria

In reference to odour, EPL 5862 stipulates that no offensive odours are emitted beyond the boundary of the facility. As such, the performance criteria for potential offensive odour emissions are formal complaints received from the public and ad hoc offsite odour monitoring by the Council and EPA.

9.3 Results

Council received a total of 23 complaints from the public during the reporting period pertaining to offensive odours noted outside the facility's boundary. This level of complaint is consistent with the previous two reporting periods, where complaints had risen due to change in catchment use.

During the previous reporting periods, there were a number of changes in land use in the surrounding catchment. With the implementation of FOGO, increase in commercial organics composting has occurred in the industrial precinct adjacent to the facility. There has also been an increase in bitumen production in the same period, resulting in an increase in potential odour sources close to the landfill.

9.4 Conformances

Due to the changing nature of industrial production within the catchment, it has been difficult to identify the source of the odour complaints. However, Council has followed up on odour complaints, updated deodouriser infrastructure, increased monitoring and ensured operations are conducted in accordance with best practice at all times.

The Air Quality Management Plan (August 2021) provides a detailed framework for odour management at the site.

9.5 Trends

There appears to be an overall decrease in complaints as the weather conditions settled back to a more normal pattern during this reporting period.

10 Noise Monitoring

Noise monitoring and management is required at the facility to satisfy Approval 11_0094 Conditions in Schedule 4, pertaining to noise. Monitoring Locations are shown below.

10.1 Overview

Noise monitoring at the facility commenced in early March 2019 in accordance with the NSW Industrial Noise Policy (2000) and Whytes Gully New Landfill Cell Noise Management Plan (Golder 2019). Should any noise complaints be received, additional noise monitoring events will be undertaken. No noise complaints have been received in this reporting period.

10.2 Performance Criteria

The following criteria apply to the 5 residential receiver locations on the perimeter of the facility:

Residential Receiver Location	L_{Aeq}(15 min)
N1	47
N2	45
N3	38
N4	35
N5	35

10.3 Results

The following Table provides the results for the reporting period.

Table 10:1- Noise Monitoring Data

		Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24
N1															
Laeq	dB	50	48.3	51.1	no access	no results		49.8	48.4	51.7	no results	no results	46.7	no access	56
Lamax	dB	71.4	72.9	69.5	no access	no results		74.7	82.9	85.7	no results	no results	72.2	no access	86.7
N2															
Lamax	dB	46.8	56.9	67.2	no access	no results	54.9	54	53.4	42.3	no results	no results	53.7	no access	57.3
Laeq	dB	66.1	75.2	89.5	no access	no results	80	76.9	78.2	64.3	no results	no results	73.9	no access	87.3
N3															
Laeq	dB	71.3	71.1	67.3	69.6	no results	74.2	73.8	72.6	72.4	no results	no results	69.4	75.2	75.7
Lamax	dB	88.9	92.5	92.3	84.6	no results	94.5	90.4	90.4	89.2	no results	no results	91.8	89.7	91.2
N4															
Lamax	dB	51.4	52.9	52.4	42.6	no results	57.5	no results	56.8	57.3	no results	no results	64.6	48	46.8
Laeq	dB	76.2	75.2	83.7	71.2	no results	82.9	no results	71.6	80.4	no results	no results	72.3	67.2	88.9
N5															
Laeq	dB	52.7	49.7	53	51.7	no results	50.9	no results	49.6	48.9	no results	no results	52.3	59.9	46.2
Lamax	dB	72.2	72.8	69.5	71.7	no results	76	no results	76.6	86.1	no results	no results	86.6	85.7	72.7

10.4 Conformances

The results from monthly monitoring at the perimeter receivers were predominantly non-conforming. This is not the result of noise emanating from the facility, but rather the surrounding catchment. Due to the change in land use discussed in the previous section, the noise criteria are now not achievable in a light industrial area. They were previously set when the area was a predominantly rural residential and are not applicable to current surrounding industrial land use.

10.5 Trends

Noise monitoring continued to be above threshold levels and will require review due to the change in surrounding catchment characteristics. Only limited sampling was able to be undertaken during this period due to ongoing wet weather resulting in some monitoring sites not able to be accessed.

11 Complaints, Incidences and Community Consultation

11.1 Complaints

During the 2023-24 reporting period, a total of 23 complaints were received. This is consistent with the previous reporting period and is in line with the previous years with normal rainfall conditions.

All complaints were pertaining to offensive odour and were reported through via EPA to Council.

11.2 Incidents

Two environmental incidents were reported during the 2023/24 reporting period. One event was associated with stormwater overflow after a rain event and the other related to a small fire at the Small Vehicle Transfer Station. A summary of the incidents is provided below.

11.2.1 Fire 22nd April 2023

A small fire was identified by one of the waste operatives at 8.15 am at the Small Vehicle Transfer Station (SVTS). Waste had been pushed into the corner of the push wall in preparation for loading when the spotter noticed flames. The Emergency Response Plan was activated, and the fire was extinguished using the site water cart at 8.20 am. The fire was believed to be started by an ignited battery.

11.2.2 Stormwater Overflow 6th November 2023

Stormwater overflow occurred from the polishing pond after continuous heavy rainfall on the 4th and 5th November 2023. This resulted in over 70 mm of rainfall falling in a 24-hour period. During this event, the stormwater management system was monitored continually by the Operations Staff, when it began to overflow slowly into the Dapto Creek catchment. The water quality results on the 6th November 2023 were as follows:

- Point 1 (overflow/discharge from site)
  pH 8.6
  TSS 62mg/L

Testing was undertaken every 24 hours and results were compliant on the 8th November 2023 resulting in no material harm to the downstream catchment.

11.3 Community Consultation

Community consultation on strategic directions for waste was undertaken during this reporting period to update the existing plan. Engagement activities included a face to face workshop, an online survey, meetings with community group and Aboriginal elders' meetings and a stakeholder workshop. Whilst this engagement and consultation was based around the development of the draft strategy, it emphasised providing and receiving feedback from the community around the waste facility and its operations. The community were given the opportunity to let us know what improvements they would like to see at the WWARRP and what was important to them in relation to the four goals that were developed namely:

- Goal 1, Reduce Waste to Landfill.
- Goal 2, Transition to a Circular Economy.
- Goal 3, Reduce our Waste Related Emissions.
- Goal 4, Improve our Waste Management.

Following the adoption of the waste strategy, an implementation plan will be developed. This will be provided to the community indicating construction timeframes, budgets and opportunities for community feedback.

12 Compliances and Non-compliances

In accordance with EPA Licence Conditions (EPL 5862), the facility generally operated in compliance during the 2023/24 reporting period. The improved weather conditions allowed site repairs to be undertaken in accordance with compliance requirements for the first time in many years.

In relation to the specific Project Approval No. 11_0094 compliance requirements, the last Independent Environmental Audit (2020) reported the facility generally operated in compliance with all conditions. In correspondence dated 15/02/2021 (Response to Audit Recommendations), the following table was to be addressed based on identified non-compliances.

Condition of Consent	Management Plan	Details on what will be revised	Submission Date
Schedule 3 Condition 2	Landfill Environmental Management Plan (LEMP)	The body of the main LEMP document.	Draft Document complete & being reviewed by Council.
Schedule 4 Condition 14	Soil, Water & Leachate Management Plan	Develop a Stormwater Management Plan	Approved
Schedule 4 Condition 17	Soil, Water & Leachate Management Plan	Develop a Leachate Management Plan	Approved
Schedule 4 Condition 18	Soil, Water & Leachate Management Plan	Finalise Entire Plan	Approved
Schedule 4 Condition 24	Air Quality Management Plan	Dust monitoring Plan and review of dust monitoring requirements at Whytes Gull7	Approved

The 2020 Independent Environmental Audit listed several conditions to be addressed in the following reporting period. These are summarised below:

Condition Number	Activity	Status
Schedule 3 Condition 2	Update the LEMP to reflect current practices	Draft Document complete & being reviewed by Council
Schedule 4 Condition 14	17 Stormwater Exceedances in the previous reporting period	Soil, Water & Leachate Management Plan complete and implemented.
Schedule 4 Condition 15	Development of a Stormwater Management Plan	Soil, Water & Leachate Management Plan complete and implemented.
Schedule 4 Condition 17	Review and update the Leachate Management System	Soil, Water & Leachate Management Plan complete and implemented.
Schedule 4 Condition 24	A review of dust monitoring requirements will be undertaken	Air Quality Management Plan complete and implemented.
Schedule 4 Condition 30	A greenhouse gas management plan will be developed	Draft being developed by Council in accordance with new state government legislative requirements.

13 Recommendations

In accordance with the formal recommendations presented in correspondence from DPE from the previous reporting period relating the findings of the IEA and the outcomes of this AEMR, Council proposes to address the following in the next reporting period:

- Schedule 3 Condition 2 Landfill Environmental Management Plan (LEMP).
    - The body of the main document of the Landfill Environmental Management Plan to be updated by the 15th February 2025.
- Schedule 4 Condition 30 Greenhouse Gas Management Plan
    - Complete the final plan by 1st March 2025.
- Reinstatement of a regular community consultation program.

It is also planned to undertake a license review of (EPL 5862) this reporting period to update a number of conditions pertaining to water quality guideline comparison. Currently, drinking water guidelines are used for comparison purposes, however these are not appropriate for a light industrial/semi-rural catchment. This has influenced a number of non-conformances (particularly groundwater monitoring results) and will be reviewed and updated in the license and The Soil, Water and Leachate Management Plan that forms part of the LEMP update.

It is also recommended to undertake a review of surrounding noise levels based on the change in catchment use.

14 Conclusions

This reporting period saw improved weather conditions and Operations return to historical trends. Site repairs were able to be undertaken and several stormwater management projects completed in accordance with legislative requirements. Improved management practices have seen a decrease in non-compliances pertaining to site stormwater and leachate management under normal weather conditions.

Schedule 5 of MP 11_0094 states that an Independent Environmental Audit is required every 5 years. This will be due in 2025 and must address the following:

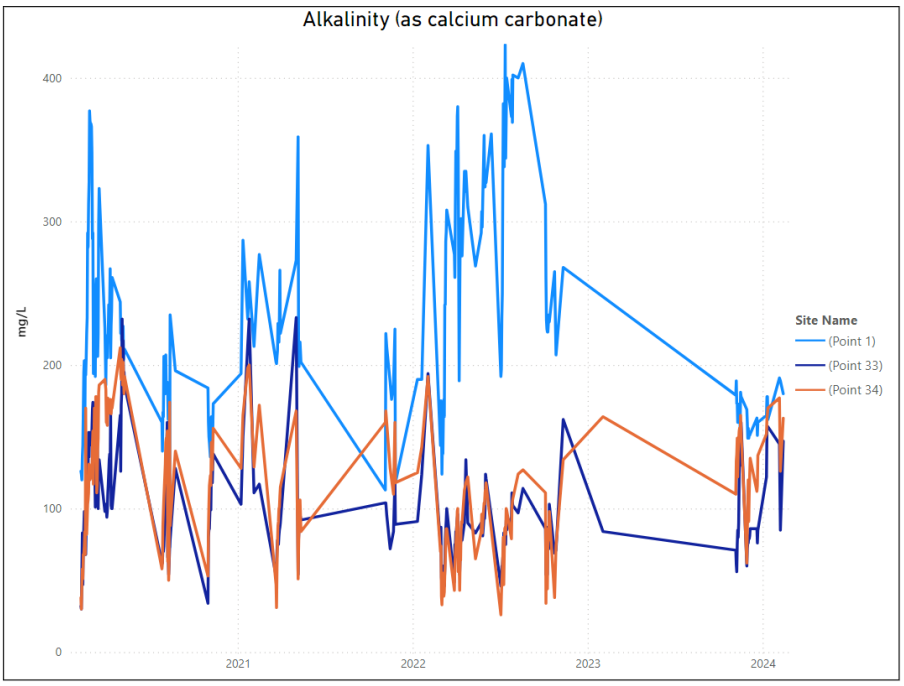
(a) be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Director-General;
(b) include consultation with the relevant agencies;
(c) assess the environmental performance of the project and assess whether it is complying with the relevant requirements in this approval and any relevant EPL (including any plan or program required under these approvals);
(d) review the adequacy of any plans or programs required under these approvals; and, if appropriate;
(e) recommend measures or actions to improve the environmental performance of the Project, and/or any plan or program required under these approvals; and
(f) be placed on Council's website within 2 weeks of its completion.

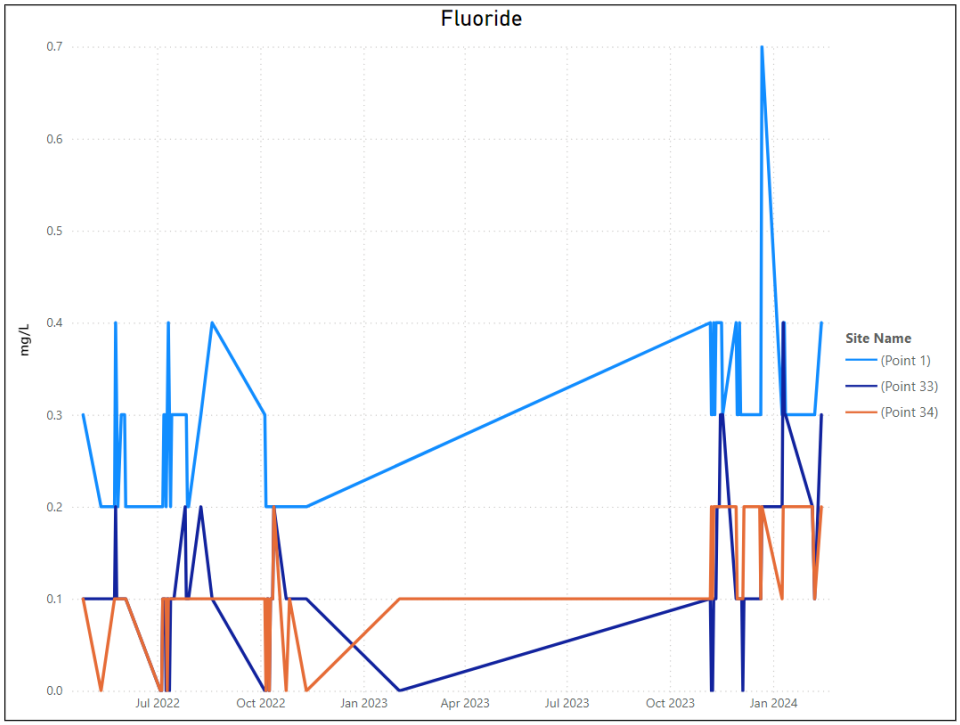
APPENDICES

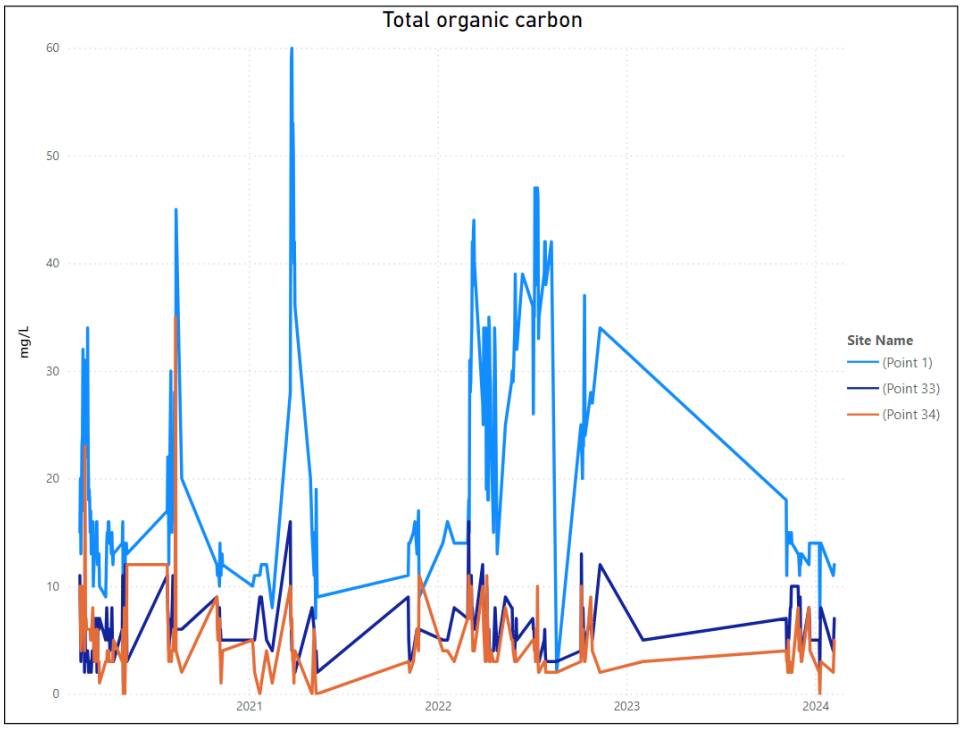
Appendix A: Surface Water: Tabulated Results and Trends (2022/23)

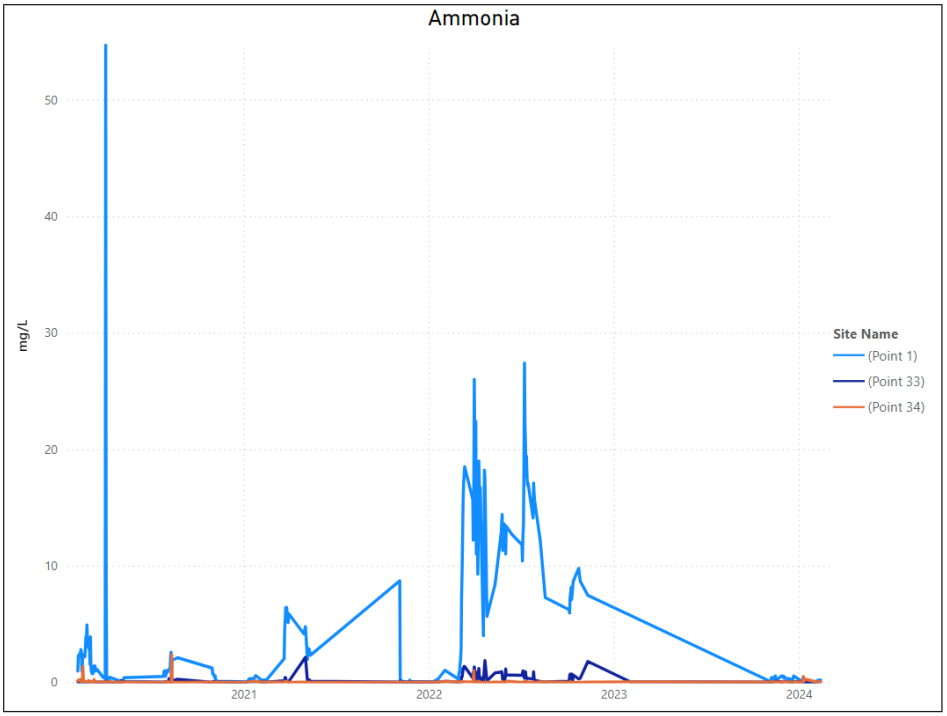
Table 1: Surface Water Results

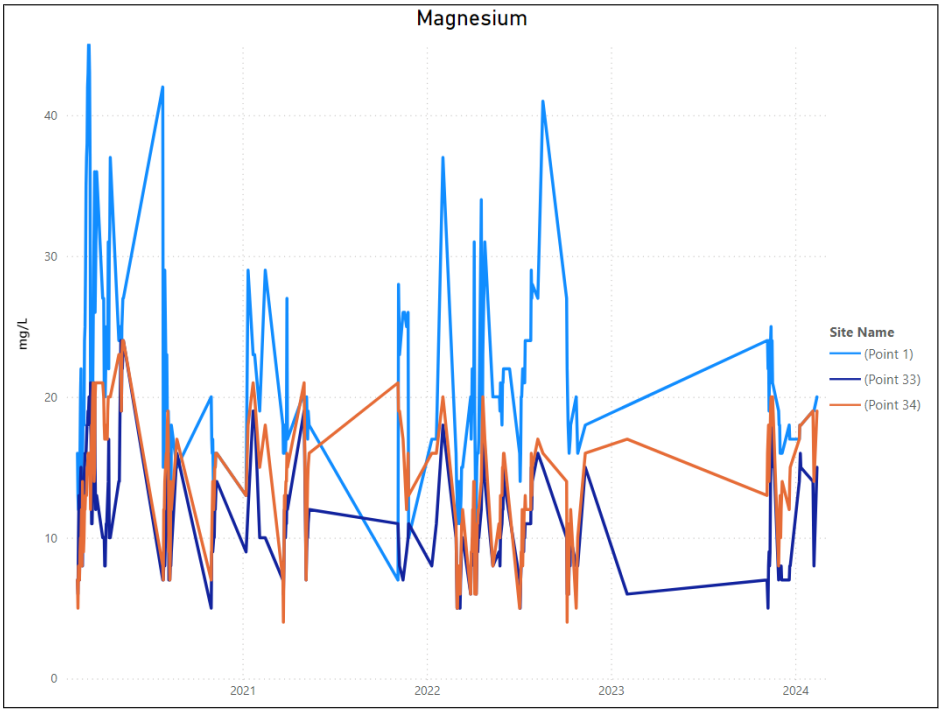
		Alkalinity (as calcium carbonate)	Ammonia	Calcium	Chloride	Conductivity	Dissolved Oxygen	Filterable iron	Fluoride	Magnesium	Nitrate as N	pH	Potassium	Sodium	Sulfate	Temperature	Total organic carbon	Total Phenolics	Total suspended solids
Units		mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	pH	mg/L	mg/L	mg/L	°C	mg/L	mg/L	mg/L
Site Name	Sample Date																		
(Point 1)	06/11/2023	179	0.07	26	180	969	8.58	<0.05	0.4	24	1.06	8.6	20	128	51	19.3	18	<0.05	62
	07/11/2023	189	0.07	45	115	702	5.20	<0.05	0.3	24	0.67	7.6	11	85	55	19.1	11	<0.05	50
	08/11/2023	173	0.40	25	141	844	8.02	<0.05	0.3	22	1.16	8.2	18	114	47	24.1	15	<0.05	21
	09/11/2023	173	0.35	26	142	847	7.94	<0.05	0.4	24	1.17	8.3	18	123	49	26.6	14	<0.05	31
	10/11/2023	160	0.21	29	112	684	7.17	<0.05	0.3	19	0.98	7.8	14	91	44	21.7	14	<0.05	25
	11/11/2023	167	0.41	24	130	792	7.91	0.07	0.4	22	1.17	8.2	16	106	42	27.1	15	<0.05	8
	12/11/2023	168	0.41	25	133	760	8.26	<0.05	0.4	22	1.21	8.0	17	106	49	25.1	14	<0.05	9
	13/11/2023	170	0.44	27	131	813	8.01	<0.05	0.4	24	1.05	7.8	18	108	41	25.1	14	<0.05	6
	14/11/2023	173	0.20	28	141	772	5.95	<0.05	0.4	25	1.23	7.5	18	110	40	21.9	14	<0.05	6
	15/11/2023	156	0.51	27	124	816	7.85	<0.05	0.4	21	0.95	8.0	18	105	39	24.8	14	<0.05	<5
	16/11/2023	181	0.54	27	139	821	7.48	0.08	0.4	24	0.83	8.0	17	126	42	24.5	15	<0.05	<5
	17/11/2023	178	0.17	28	146	790	5.60	<0.05	0.3	21	1.12	7.6	17	107	41	22.4	14	<0.05	10
	29/11/2023	169	0.56	29	101	700	8.06	<0.05	0.4	19	0.63	7.5	14	83	41	24.7	13	<0.05	18
	30/11/2023	160	0.52	28	69	609	8.16	<0.05	0.3	18	0.83	7.8	12	71	42	21.8	13	<0.05	48
	01/12/2023	149	0.50	30	67	588	8.08	<0.05	0.3	18	0.88	7.9	13	68	34	22.6	12	<0.05	13
	02/12/2023	156	0.40	29	58	573	7.73	<0.05	0.4	16	0.31	7.9	12	65	44	23.3	11	<0.05	<5
	03/12/2023	149	0.50	28	55	560	7.32	<0.05	0.3	16	0.28	7.9	11	61	41	25.4	13	<0.05	<5
	04/12/2023	151	0.41	34	57	558	7.85	<0.05	0.3	16	0.68	8.0	12	63	41	26.4	12	<0.05	8
	05/12/2023	151	0.33	31	53	558	7.60	<0.05	0.3	16	1.06	7.9	12	62	41	27.4	13	<0.05	<5
	06/12/2023	152	0.35	31	57	560	7.80	<0.05	0.3	16	1.08	8.0	12	63	41	25.0	13	<0.05	<5
	20/12/2023	163	0.24	26	56	590	8.00	<0.05	0.3	18	0.54	8.2	12	64	39	24.7	12	<0.05	<5
	21/12/2023	151	0.36	32	56	593	7.87	<0.05	0.3	17	1.58	8.0	11	63	40	23.0	14	<0.05	<5
	22/12/2023	160	0.54	33	62	586	7.56	<0.05	0.7	17	0.45	7.9	11	62	36	23.3	14	<0.05	<5
	09/01/2024	165	0.03	32	56	578	10.3	<0.05	0.3	17	0.15	8.9	10	61	36	26.0	14	<0.05	6
	10/01/2024	178	0.06	34	60	605	9.26	<0.05	0.4	18	0.13	9.0	11	64	37	26.6	7	<0.05	<5
	11/01/2024	178	0.03	34	60	615	10.4	<0.05	0.4	18	<0.10	9.5	11	63	37	28.0	14	<0.05	19
	12/01/2024	162	<0.01	24	54	602	10.0	<0.05	0.3	18	<0.01	9.3	11	64	39	29.0	14	<0.05	23
	05/02/2024	191	0.06	30	70	680	7.08	<0.05	0.3	19	0.02	8.2	11	71	30	28.8	11	<0.05	6
	07/02/2024	189	0.17	30	67	352	9.01	<0.05	0.3	19	0.09	7.7	12	67	26	19.4	12	<0.05	6
	13/02/2024	180	0.20	30	70	635	7.82	<0.05	0.4	20	0.07	8.1	14	70	30	26.0		<0.05	14
(Point 33)	06/11/2023	71	0.02	16	51	330	8.60	<0.05	0.1	7	0.50	7.4	4	30	25	19.4	7	<0.05	8
	07/11/2023	61	0.01	17	26	219	7.76	<0.05	<0.1	6	0.20	7.4	3	23	19	19.8	4	<0.05	<5
	08/11/2023	56	0.03	15	23	210	7.02	<0.05	<0.1	5	0.08	7.3	2	19	17	21.5	4	<0.05	6
	09/11/2023	75	0.03	18	35	289	6.96	<0.05	0.1	8	0.14	7.4	5	32	19	24.0	5	<0.05	9
	10/11/2023	85	0.01	22	36	297	7.74	<0.05	0.1	9	0.18	7.4	3	28	26	20.5	5	<0.05	<5
	11/11/2023	80	0.04	19	35	298	6.37	0.08	0.1	8	0.16	7.2	4	31	20	23.3	5	<0.05	24
	12/11/2023	90	0.05	21	41	342	5.78	0.10	0.2	9	0.13	7.3	4	36	21	23.7	6	<0.05	8
	13/11/2023	122	0.05	28	75	465	5.05	0.08	0.2	14	0.19	7.5	7	52	27	22.8	7	<0.05	7
	14/11/2023	136	0.07	32	77	473	6.63	<0.05	0.2	16	0.21	7.3	7	60	27	19.4	8	<0.05	<5
	15/11/2023	130	0.07	32	86	569	4.83	<0.05	0.3	15	0.24	7.2	8	64	30	22.3	8	<0.05	<5
	16/11/2023	158	0.05	31	95	562	6.12	0.09	0.3	16	0.20	7.5	8	72	32	21.0	10	<0.05	11
	17/11/2023	160	0.09	36	114	584	6.86	0.05	0.3	18	0.26	7.4	10	76	32	20.0	10	<0.05	<5
	29/11/2023	60	0.02	15	35	258	6.96	0.15	0.1	7	0.60	7.0	4	24	17	22.0	10	<0.05	27
	30/11/2023	72	0.04	17	32	279	7.58	0.09	0.1	8	0.42	7.6	4	27	20	19.6	8	<0.05	14
	01/12/2023	76	0.08	19	30	280	7.61	0.07	0.1	8	0.28	7.6	3	25	17	20.8	5	<0.05	<5
	02/12/2023	76	0.05	18	26	245	7.55	<0.05	0.1	8	0.08	7.3	2	22	16	21.9	5	<0.05	<5
	03/12/2023	81	0.06	18	30	286	7.52	0.09	0.1	8	0.26	7.3	4	27	20	21.1	9	<0.05	<5
	04/12/2023	79	0.07	22	26	259	7.55	0.07	0.1	8	0.10	7.6	3	25	14	22.9	5	<0.05	<5
	05/12/2023	81	0.06	18	27	251	7.37	0.11	<0.1	7	0.10	7.3	3	22	14	24.6	4	<0.05	<5
	06/12/2023	86	0.06	19	27	352	6.33	0.16	0.1	7	0.07	7.3	2	23	13	24.4	4	<0.05	<5
	20/12/2023	86	<0.01	18	28	358	8.61	0.09	0.1	7	0.14	7.8	3	24	17	19.4	8	<0.05	10
	21/12/2023	76	0.02	19	29	268	6.74	0.11	0.1	8	0.14	7.5	3	25	14	20.3	7	<0.05	<5
	22/12/2023	85	0.06	20	28	277	6.78	0.09	0.2	8	0.12	7.4	3	26	14	20.3	5	<0.05	<5
	09/01/2024	122	0.03	31	42	402	6.21	<0.05	0.2	14	0.07	7.5	3	34	13	22.6	5	<0.05	<5
	10/01/2024	154	0.43	33	50	467	6.46	0.09	0.4	15	0.05	7.6	5	45	21	23.8	2	<0.05	<5
	11/01/2024	156	0.05	34	52	503	5.84	0.13	0.3	16	0.54	7.6	6	47	22	25.1	7	<0.05	<5
	12/01/2024	157	0.02	29	51	494	6.15	0.07	0.3	15	0.02	7.5	5	46	19	25.9	8	<0.05	<5
	05/02/2024	145	0.02	31	44	422	4.10	0.15	0.2	14	0.02	7.5	3	33	8	25.6	4	<0.05	<5
	07/02/2024	85	0.03	19	33	258	7.70	0.07	0.1	8	0.15	7.4	4	27	11	20.9	7	<0.05	5
	13/02/2024	147	0.04	30	52	477	4.82	<0.05	0.3	15	0.08	7.3	6	49	19	23.4		<0.05	<5
(Point 34)	06/11/2023	110	0.01	34	66	452	9.04	<0.05	0.1	13	1.11	7.5	4	35	34	19.3	4	<0.05	8
	07/11/2023	133	<0.01	41	75	466	8.54	<0.05	0.2	16	0.58	7.7	3	39	35	21.0	3	<0.05	<5
	08/11/2023	138	0.02	42	67	512	9.28	<0.05	0.1	17	0.33	7.8	3	40	35	22.3	3	<0.05	<5
	09/11/2023	149	0.07	44	54	523	9.56	<0.05	0.2	18	0.18	7.8	4	44	36	24.6	2	<0.05	6
	10/11/2023	122	<0.01	34	44	384	9.23	<0.05	0.2	14	0.32	7.6	3	35	31	18.3	5	<0.05	<5
	11/11/2023	138	0.02	38	58	486	9.32	<0.05	0.2	16	0.13	7.7	3	39	32	22.9	3	<0.05	9
	12/11/2023	148	0.03	40	58	520	7.00	<0.05	0.2	17	0.07	7.6	3	39	32	20.8	2	<0.05	<5
	13/11/2023	154	0.02	44	65	513	7.28	<0.05	0.2	19	0.02	7.6	4	42	33	20.1	3	<0.05	10
	14/11/2023	156	0.03	46	66	449	8.55	<0.05	0.2	20	<0.01	7.6	3	42	31	17.6	2	<0.05	<5
	15/11/2023	147	0.02	44	66	528	5.87	<0.05	0.2	18	<0.01	7.4	3	40	31	21.0	2	<0.05	<5
	16/11/2023	165	<0.01	42	56	494	8.62	<0.05	0.2	18	<0.01	7.7	3	43	32	21.2	2	<0.05	<5
	17/11/2023	154	0.03	49	77	510	9.26	<0.05	0.2	20	<0.01	7.8	4	43	34	22.0	2	<0.05	<5
	29/11/2023	62	<0.01	18	35	272	8.68	0.14	0.2	8	0.75	7.3	3	23	19	21.0	8	<0.05	16
	30/11/2023	83	0.02	22	34	299	8.93	0.09	0.1	10	0.53	7.9	3	26	22	18.6	6	<0.05	5
	01/12/2023	106	0.05	28	40	361	8.78	<0.05	0.1	12	0.32	7.7	4	30	23	18.5	4	<0.05	<5
	02/12/2023	120	0.05	31	38	361	9.35	<0.05	0.1	13	0.22	7.7	3	31	27	19.4	4	<0.05	<5
	03/12/2023	91	0.05	23	33	312	9.28	0.10	0.1	10	0.16	7.6	3	27	22	21.1	6	<0.05	<5
	04/12/2023	111	0.02	31	38	368	9.43	<0.05	0.1	12	0.07	7.7	3	30	25	22.9	4	<0.05	<5
	05/12/2023	124	0.02	33	41	399	9.93	<0.05	0.1	13	0.06	7.7	3	33	26	24.2	3	<0.05	<5
	06/12/2023	135	0.04	36	41	421	8.15	<0.05	0.2	14	0.05	7.5	3	34	26	20.9	3	<0.05	<5
	20/12/2023	112	<0.01	24	34	285	7.02	0.09	0.2	12	0.32	7.6	3	28	24	20.7	8	<0.05	14
	21/12/2023	116	<0.01	33	36	402	8.38	0.07	0.1	14	0.18	7.7	3	33	25	18.8	6	<0.05	<5
	22/12/2023	137	0.04	37	43	441	7.77	0.05	0.2	15	0.09	7.7	3	34	26	18.0	4	<0.05	<5
	09/01/2024	152	0.01	39	42	463	7.86	<0.05	0.1	17	<0.01	7.6	3	34	26	22.9	2	<0.05	<5
	10/01/2024	163	0.48	42	44	470	7.24	<0.05	0.2	18	<0.01	7.4	3	35	26	23.1	<1	<0.05	<5
	11/01/2024	166	0.05	42	44	501	7.19	<0.05	0.2	18	<0.05	7.6	3	35	26	24.7	2	<0.05	<5
	12/01/2024	170	0.28	37	45	495	6.64	<0.05	0.2	18	0.28	7.5	3	36	26	24.9	3	<0.05	<5
	05/02/2024	177	0.03	43	46	510	5.44	<0.05	0.2	19	<0.01	7.6	3	36	24	23.7	2	<0.05	<5
	07/02/2024	126	0.04	33	40	591	5.52	<0.05	0.1	14	0.24	8.0	3	30	20	23.5	5	<0.05	<5
	13/02/2024	163	0.06	41	48	500	5.96	<0.05	0.2	19	0.01	7.4	8	34	25	21.4		<0.05	<5

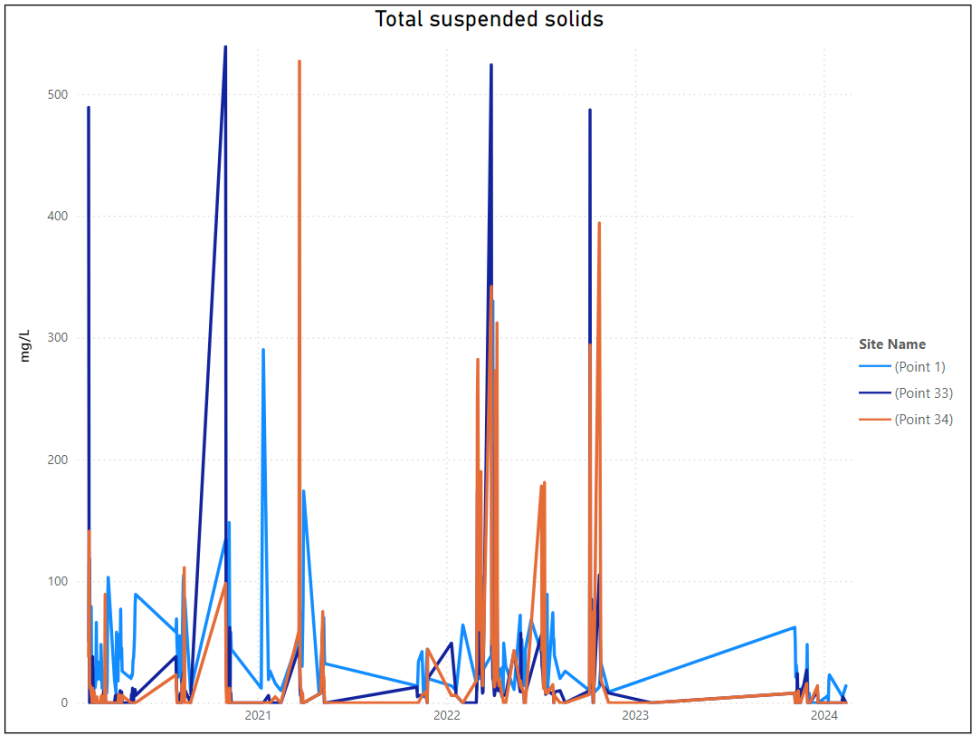

Alkalinity (as calcium carbonate)
mg/L
400
300
200
100
0
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

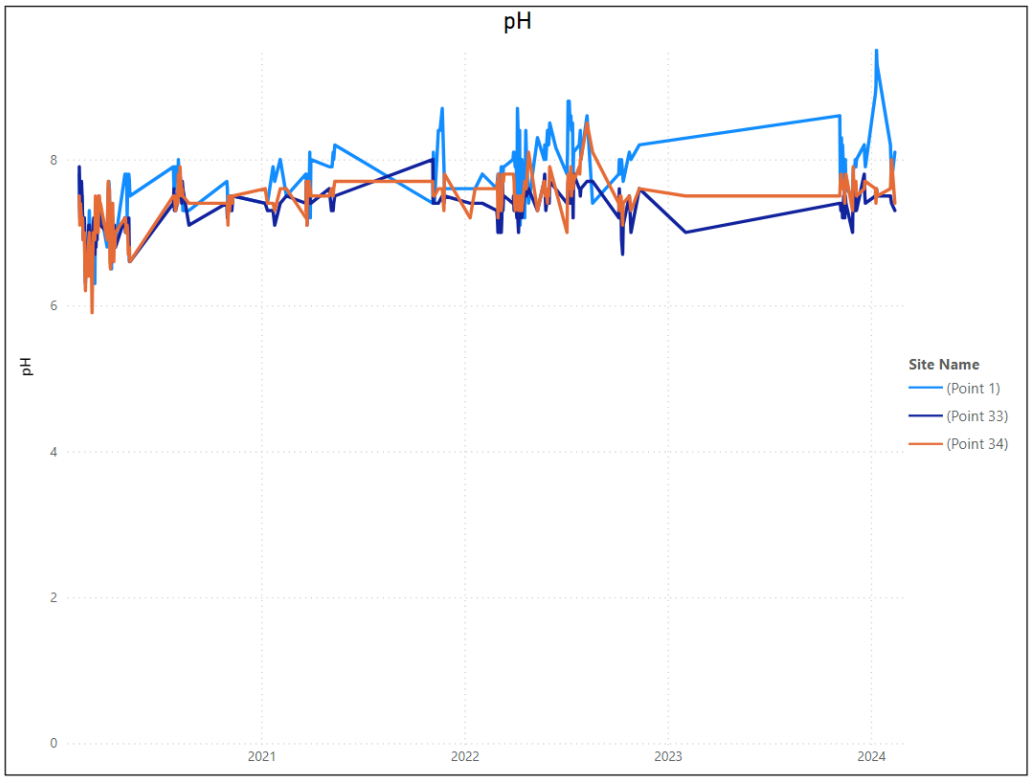

Fluoride
mg/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Jul 2022
Oct 2022
Jan 2023
Apr 2023
Jul 2023
Oct 2023
Jan 2024
Site Name
(Point 1)
(Point 33)
(Point 34)

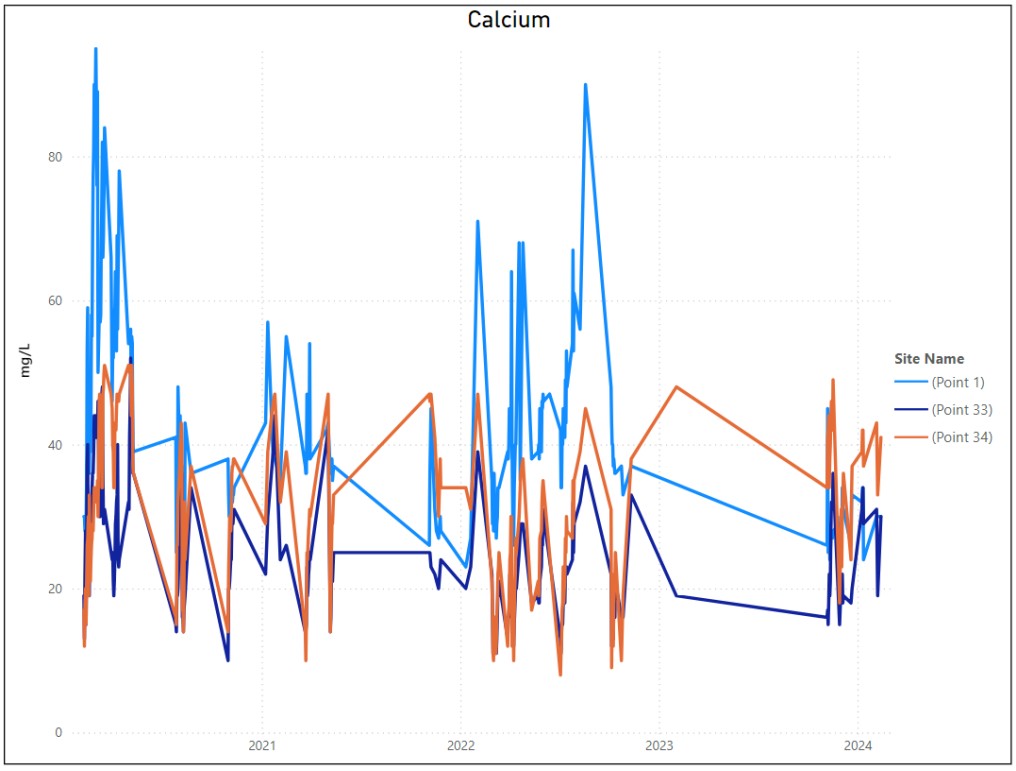

Total organic carbon
60
50
40
30
20
10
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

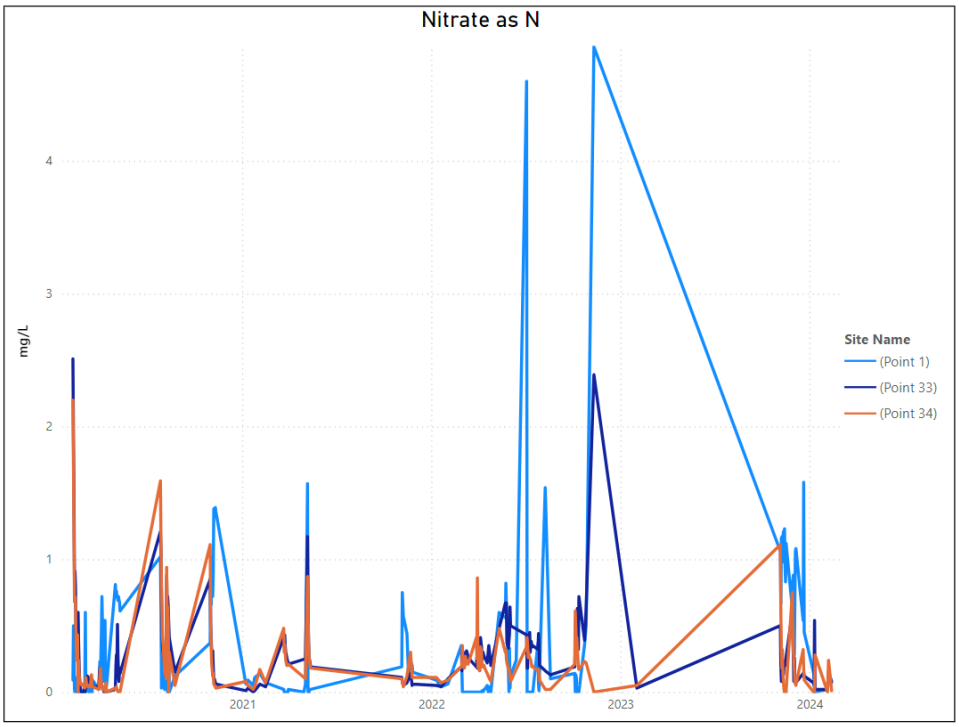

Ammonia
50
40
30
20
10
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

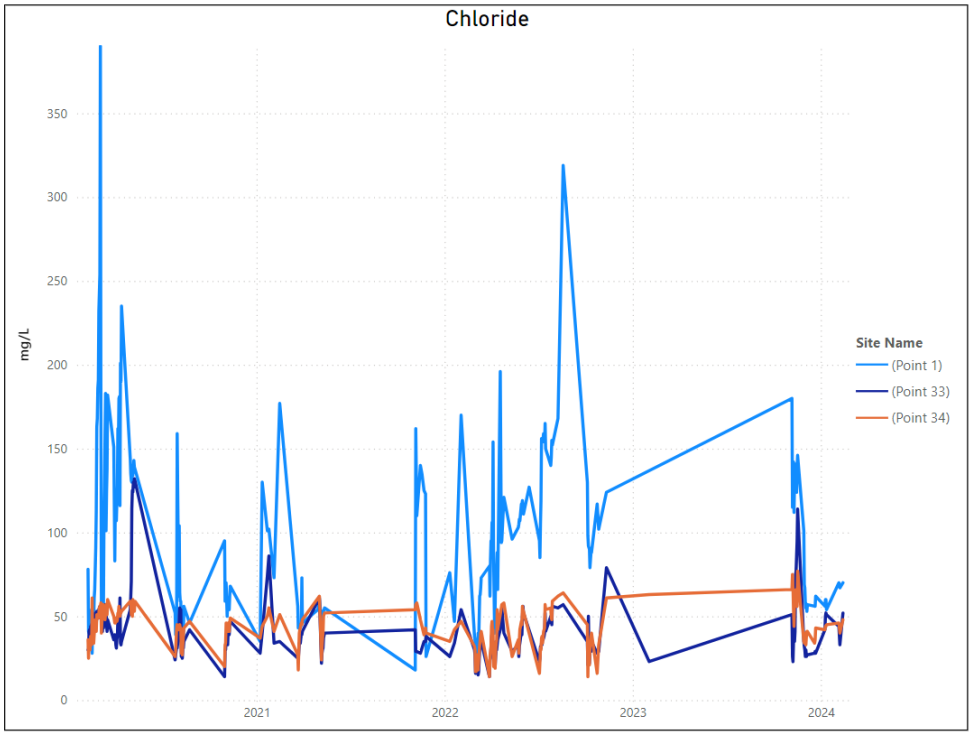

Magnesium
mg/L
40
30
20
10
0
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

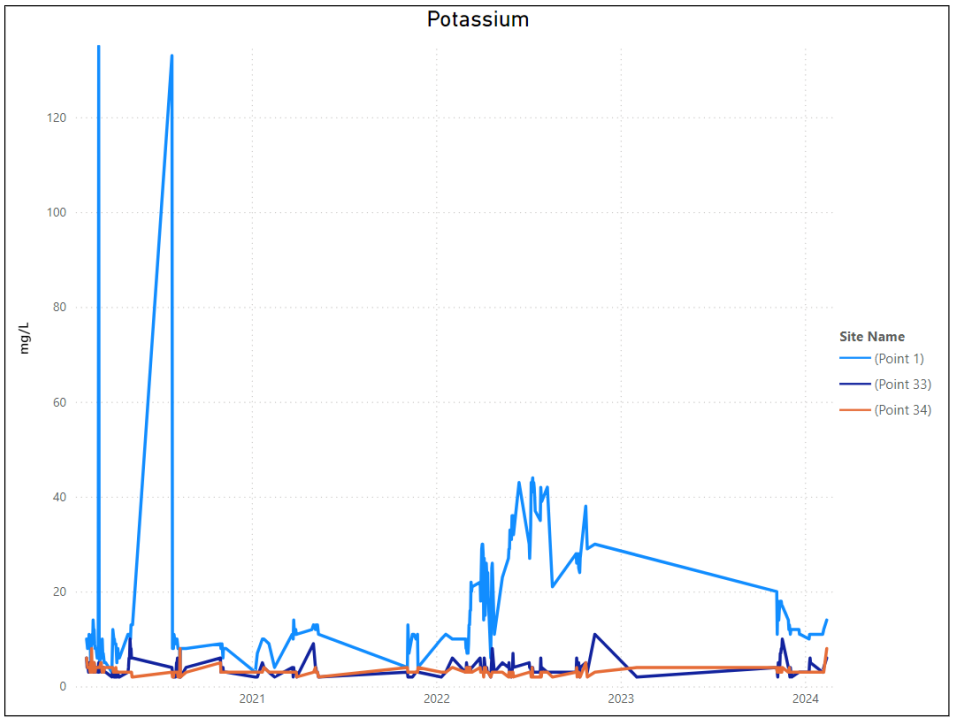

Total suspended solids
mg/L
500
400
300
200
100
0
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

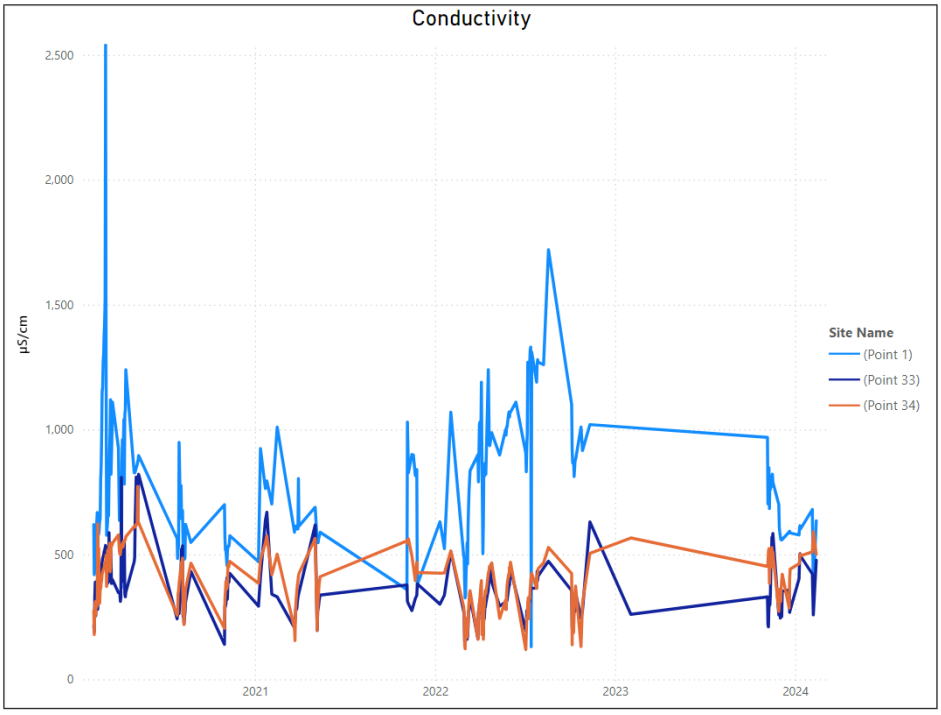

pH
8
6
4
2
0
pH
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

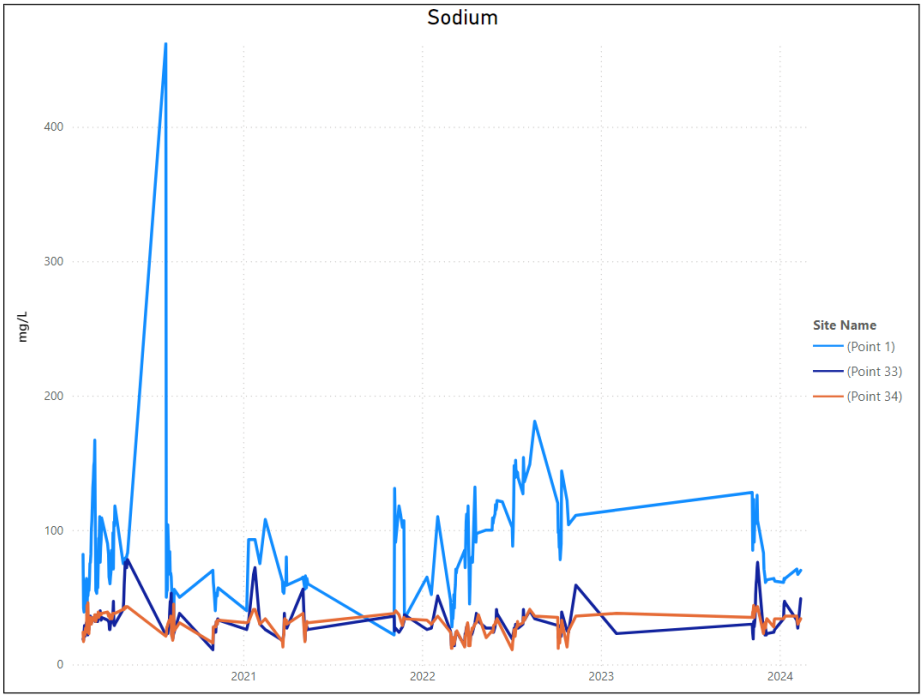

Calcium
80
60
40
20
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

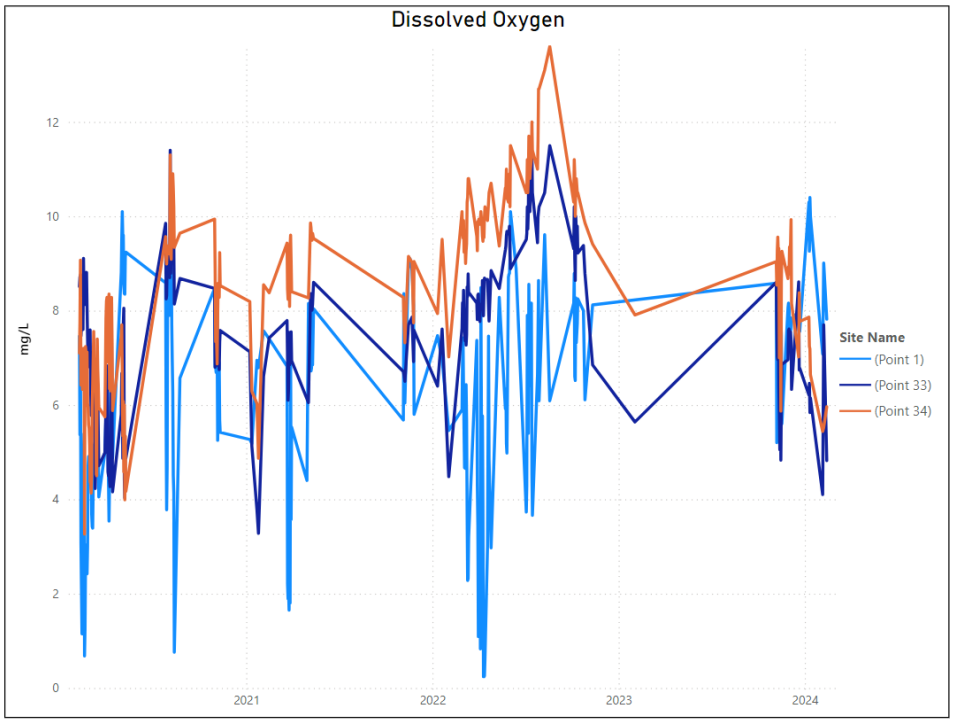

Nitrate as N
mg/L
0
1
2
3
4
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

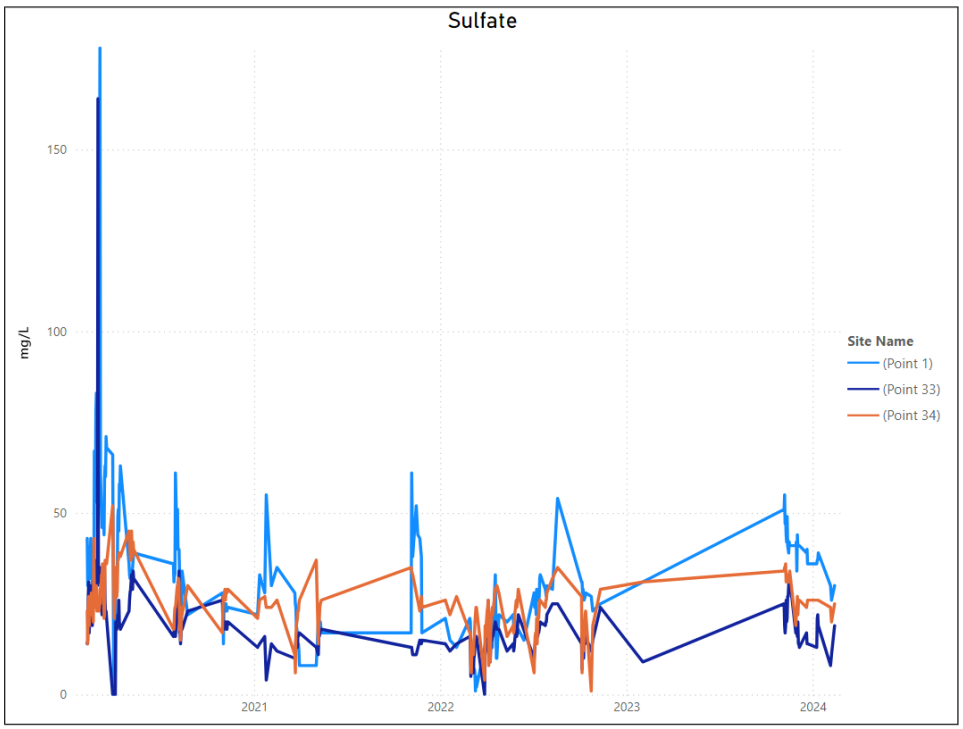

Chloride
mg/L
0
50
100
150
200
250
300
350
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

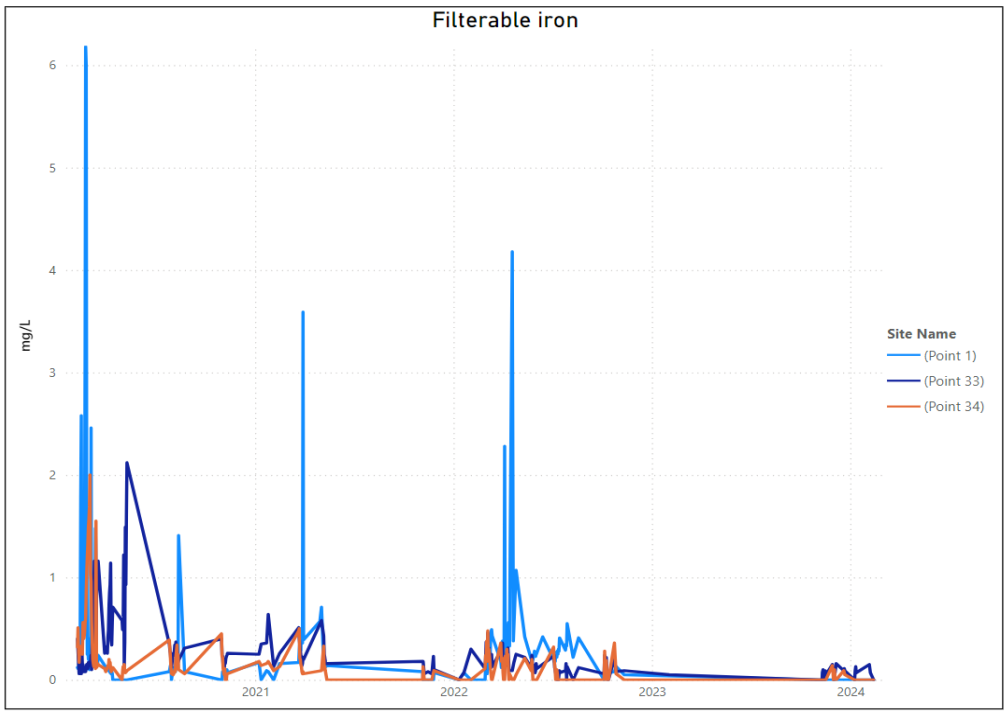

Potassium
120
100
80
60
40
20
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

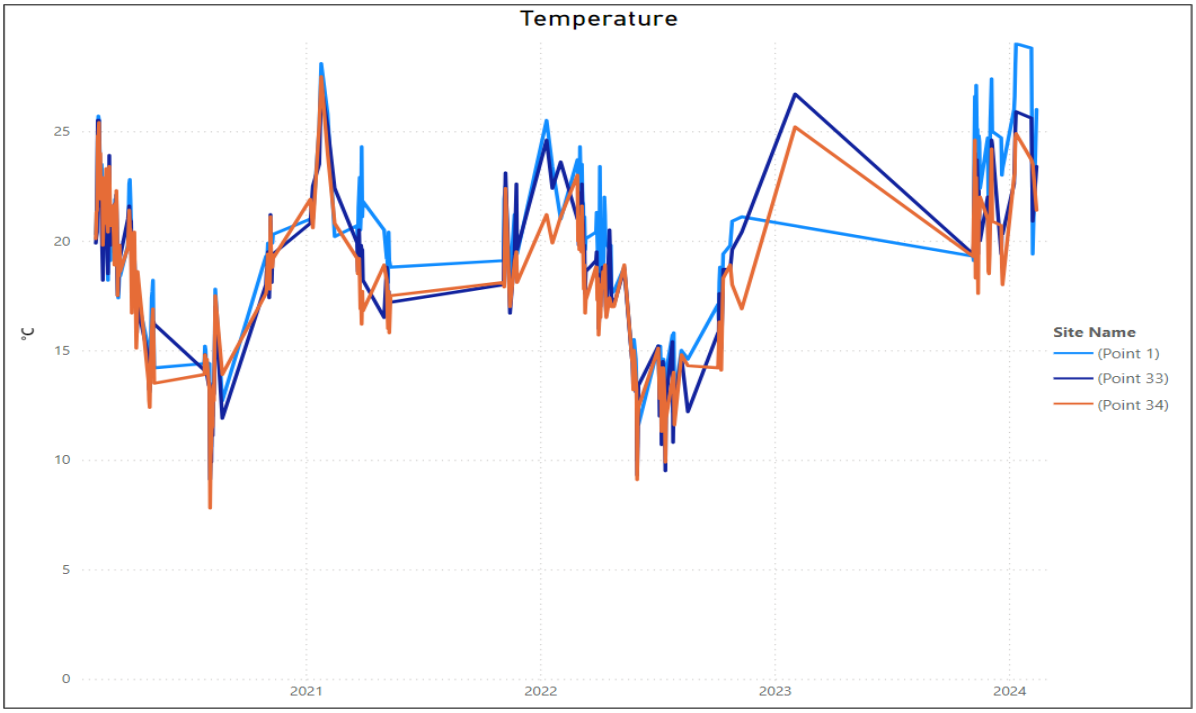

Conductivity
2,500
2,000
1,500
1,000
500
0
µS/cm
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)


Sodium
400
300
200
100
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)


Dissolved Oxygen
12
10
8
6
4
2
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)


Sulfate
150
100
50
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)


Filterable iron
6
5
4
3
2
1
0
mg/L
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

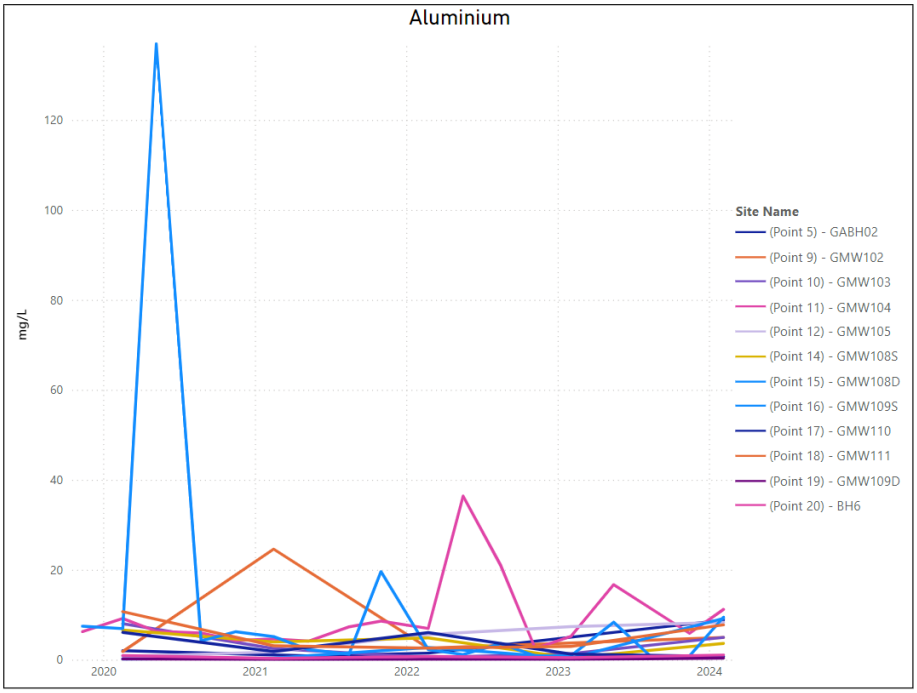

Temperature
°C
25
20
15
10
5
0
2021
2022
2023
2024
Site Name
(Point 1)
(Point 33)
(Point 34)

Appendix B: Groundwater

Results and Trends

		Alkalinity (as calcium carbonate)	Aluminium	Ammonia	Arsenic	Barium	Benzene	Cadmium	Calcium	Chloride	Chromium (hexavalent)	Chromium (Total)	Cobalt	Conductivity	Copper	Depth	Ethyl benzene	Ethylbenzene	Fluoride
Units		mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	Meters	µg/L	µg/L	mg/L
Site Name	Sample Date																		
(Point 5) - GABH02	15/11/2023	846		<0.01					285	1070				4550		5.03			
	05/02/2024	958	8.80	0.03	0.001	0.067	<1	<0.0001	293	1250	<0.01	0.016	0.009	5330	0.012	4.56	<2	<2	0.6
(Point 9) - GMW102	16/05/2023	115		0.02					21	16				304		7.42			
	15/11/2023	104		<0.01					19	18				296		4.25			
	05/02/2024	100	4.96	0.42	<0.001	0.038	<1	<0.0001	21	19	<0.01	0.002	0.007	267	0.012	6.90	<2	<2	0.1
(Point 10) - GMW103	16/05/2023	528		0.02					133	232				1740		7.65			
	15/08/2023	438		<0.01					122	222				1340		7.98			
	15/11/2023	398		<0.01					131	268				1650		7.47			
	05/02/2024	593	4.97	0.13	0.002	0.024	<1	<0.0001	128	68	<0.01	0.005	0.017	1440	0.018	7.60	<2	<2	0.4
(Point 11) - GMW104	16/05/2023	260	16.7	0.02		0.052		0.0001	39	80		0.010	0.016	829	0.031	6.81			
	15/11/2023	340	5.88	0.03		0.022		<0.0001	54	139		0.004	0.005	1100	0.013	7.72			
	05/02/2024	147	11.2	0.03	<0.001	0.036	<1	<0.0001	28	64	<0.01	0.004	0.006	544	0.017	6.70	<2	<2	0.5
(Point 12) - GMW105	16/05/2023	41		0.01					5	32				228		10.8			
	15/11/2023	39		<0.01					4	28				200		11.21			
	05/02/2024	43	8.31	<0.01	<0.001	0.030	<1	0.0001	10	30	<0.01	0.004	0.007	203	0.012	10.53	<2	<2	0.2
(Point 14) - GMW108S	16/05/2023	274		0.12					40	142				846		2.25			
	15/08/2023	423		0.12					118	516				2170		2.65			
	15/11/2023	205		0.04					40	201				920		2.54			
	05/02/2024	252	3.64	0.11	<0.001	0.076	<1	<0.0001	44	93	<0.01	0.002	0.004	758	0.005	2.31	<2	<2	0.3
(Point 15) - GMW108D	16/05/2023	485		0.39					132	638				2550		1.73			
	15/08/2023	491		0.17					144	623				2640		2.17			
	15/11/2023	307		0.28					87	423				1750		2.11			
	05/02/2024	409	9.18	0.24	0.001	0.174	<1	<0.0001	149	572	<0.01	0.006	0.010	2320	0.018	1.85	<2	<2	0.3
(Point 16) - GMW109S	16/05/2023	217	8.35	0.43		0.175		0.0004	69	192		0.009	0.030	979	0.040	3.27			
	15/08/2023	218	0.58	0.51		0.143		<0.0001	115	362		<0.001	0.043	1440	0.008	3.42			
	15/11/2023	224	0.84	0.41		0.164		<0.0001	163	664		<0.001	0.047	1850	0.002	3.14			
	05/02/2024	288	9.46	0.17	0.004	0.277	<1	0.0004	127	377	<0.01	0.012	0.051	1700	0.037	3.40	<2	<2	0.2
(Point 17) - GMW110	16/05/2023	681		0.04					192	911				3560		3.77			
	15/08/2023	631		<0.01					209	825				3560		4.12			
	15/11/2023	563		<0.01					198	813				3590		4.03			
	05/02/2024	647	0.76	0.03	<0.001	0.004	<1	<0.0001	208	924	<0.01	<0.001	<0.001	3660	0.001	3.75	<2	<2	0.4
(Point 18) - GMW111	16/05/2023	681		0.09					150	903				3840		6.20			
	15/08/2023	727		0.29					166	834				3680		6.60			
	15/11/2023	610		0.02					142	789				3560		6.55			
	05/02/2024	691	7.77	0.13	0.001	0.075	<1	<0.0001	137	811	<0.01	0.005	0.009	3420	0.013	5.19	<2	<2	0.4
(Point 19) - GMW109D	16/05/2023	240		0.12					105	550				1840		2.84			
	15/08/2023	231		0.10					113	504				1780		3.05			
	15/11/2023	208		0.11					103	517				1800		2.88			
	05/02/2024	240	0.38	0.14	<0.001	0.174	<1	<0.0001	111	524	<0.01	<0.001	0.003	1810	<0.001	2.82	<2	<2	0.4
(Point 20) - BH6	16/05/2023	606		0.45					83	621				2750		2.30			
	15/08/2023	606		0.35					94	626				2680		2.65			
	15/11/2023	470		0.43					52	340				1830		2.46			
	05/02/2024	676	1.05	0.26	0.005	0.114	<1	<0.0001	87	669	<0.01	0.002	0.016	2760	0.006	2.22	<2	<2	0.7

		Lead	Magnesium	Manganese	Mercury	Nitrate as N	Organochlorine Pesticides	Organophosphate Pesticides	pH	Polycyclic aromatic hydrocarbons	Potassium	Sodium	Sulfate	Toluene	Total Dissolved Solids	Total organic carbon	Total Petroleum Hydrocarbons	Total Phenolics	Xylene	Zinc
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH	µg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L
Site Name	Sample Date																			
(Point 5) - GABH02	15/11/2023		188						6.6		2	563	183		3370	3				
	05/02/2024	0.004	204	0.529	<0.0001	<0.01	<0.5	<0.5	6.7	<0.5	3	599	152	<2	3480	<1	<100	<0.05	<2	0.039
(Point 9) - GMW102	16/05/2023		6						6.5		<1	20	15		252	4				
	15/11/2023		8						6.8		<1	30	14		333	3				
	05/02/2024	0.002	8	0.666	<0.0001	<0.01	<0.5	<0.5	6.7	<0.5	2	24	10	<2	196	5	<20	<0.05	<2	0.037
(Point 10) - GMW103	16/05/2023		46						7.1		<1	150	100		920	1				
	15/08/2023		42						7.0		1	151	85		902	2				
	15/11/2023		49						7.1		<1	157	80		1060	<1				
	05/02/2024	0.014	47	0.469	<0.0001	<0.01	<0.5	<0.5	7.3	<0.5	2	153	52	<2	876	<1	<100	<0.05	<2	0.029
(Point 11) - GMW104	16/05/2023	0.011	24	2.03					7.1		<1	89	38		448	5				0.061
	15/11/2023	0.004	35	0.607					7.3		<1	143	66		692	2				0.023
	05/02/2024	0.005	18	0.562	<0.0001	0.02	<0.5	<0.5	6.8	<0.5	2	68	36	<2	394	4	<100	<0.05	<2	0.026
(Point 12) - GMW105	16/05/2023		2						6.0		<1	32	12		182	2				
	15/11/2023		2						6.1		<1	32	11		214	2				
	05/02/2024	0.006	4	0.276	<0.0001	1.30	<2.0	<0.5	6.2	<0.5	2	32	10	<2	185	1	<100	<0.05	<2	0.030
(Point 14) - GMW108S	16/05/2023		23						6.8		2	117	36		524	7				
	15/08/2023		82						6.7		3	328	140		1430	3				
	15/11/2023		28						6.9		2	147	144		730	11				
	05/02/2024	0.002	24	0.344	<0.0001	<0.01	<0.5	<0.5	7.5	<0.5	3	106	28	<2	573	6	<20	<0.05	<2	<0.005
(Point 15) - GMW108D	16/05/2023		88						6.7		4	336	179		1560	4				
	15/08/2023		88						6.6		3	392	168		1760	3				
	15/11/2023		53						6.7		5	258	113		1200	6				
	05/02/2024	0.009	79	1.36	<0.0001	<0.01	<0.5	<0.5	7.0	<0.5	8	293	120	<2	1690	3	<100	<0.05	<2	0.036
(Point 16) - GMW109S	16/05/2023	0.027	41	3.10					6.2		2	79	97		576	6				0.120
	15/08/2023	0.007	72	5.60					6.1		3	105	81		1040	5				0.045
	15/11/2023	0.001	104	7.66					6.3		3	176	103		2140	3				0.019
	05/02/2024	0.019	81	5.98	<0.0001	0.01	<0.5	<0.5	6.3	<0.5	4	144	100	<2	1340	4	<20	<0.05	<2	0.103
(Point 17) - GMW110	16/05/2023		165						6.6		1	456	365		2460	<1				
	15/08/2023		160						6.5		2	495	334		2490	2				
	15/11/2023		157						6.7		1	472	346		2750	<1				
	05/02/2024	<0.001	163	0.035	<0.0001	6.08	<0.5	<0.5	6.8	<0.5	2	490	297	<2	2720	1	<100	<0.05	<2	<0.005
(Point 18) - GMW111	16/05/2023		147						6.9		2	573	374		2500	2				
	15/08/2023		142						6.7		3	614	320		2500	2				
	15/11/2023		128						6.9		2	558	300		2500	<1				
	05/02/2024	0.005	121	1.71	<0.0001	0.02	<0.5	<2.0	7.3	<0.5	3	555	228	<2	2300	<1	<100	<0.05	<2	0.037
(Point 19) - GMW109D	16/05/2023		62						6.8		1	196	24		1210	<1				
	15/08/2023		58						6.7		1	205	20		1310	<1				
	15/11/2023		57						6.8		1	207	25		1460	<1				
	05/02/2024	<0.001	61	0.898	<0.0001	<0.01	<0.5	<0.5	6.9	<0.5	1	209	23	<2	1330	<1	<20	<0.05	<2	<0.005
(Point 20) - BH6	16/05/2023		75						6.7		2	421	51		1630	17				
	15/08/2023		74						6.7		2	442	72		1730	16				
	15/11/2023		44						6.8		1	322	38		1210	14				
	05/02/2024	0.005	74	2.59	<0.0001	0.02	<0.5	<0.5	6.9	<0.5	2	479	55	<2	1760	14	<100	<0.05	<2	0.013


Aluminium
mg/L
120
100
80
60
40
20
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
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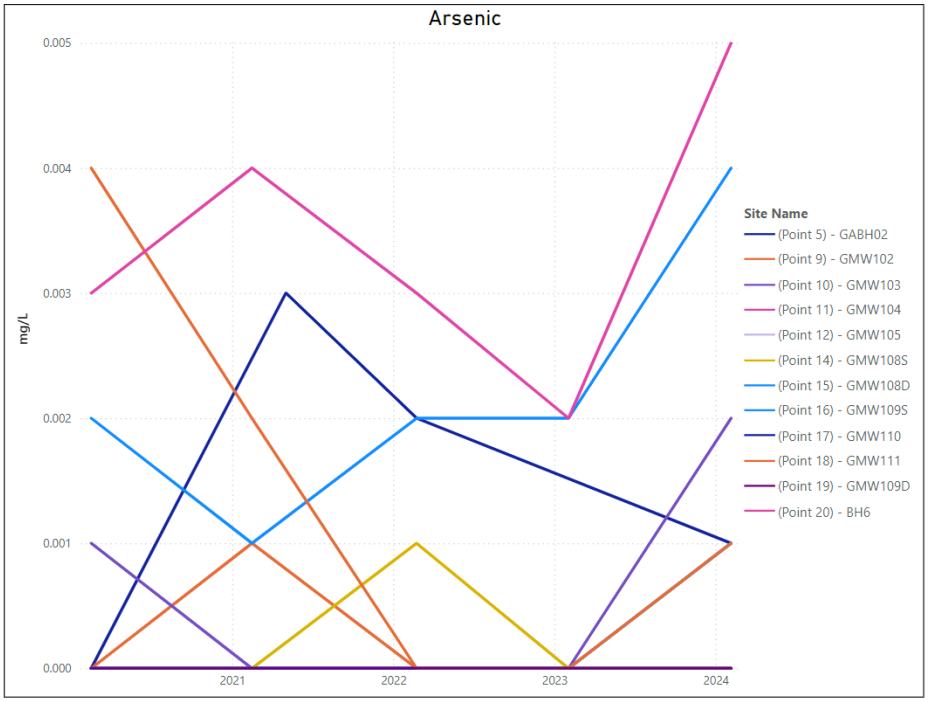
Arsenic
mg/L
0.005
0.004
0.003
0.002
0.001
0.000
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
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(Point 17) - GMW110
(Point 18) - GMW111
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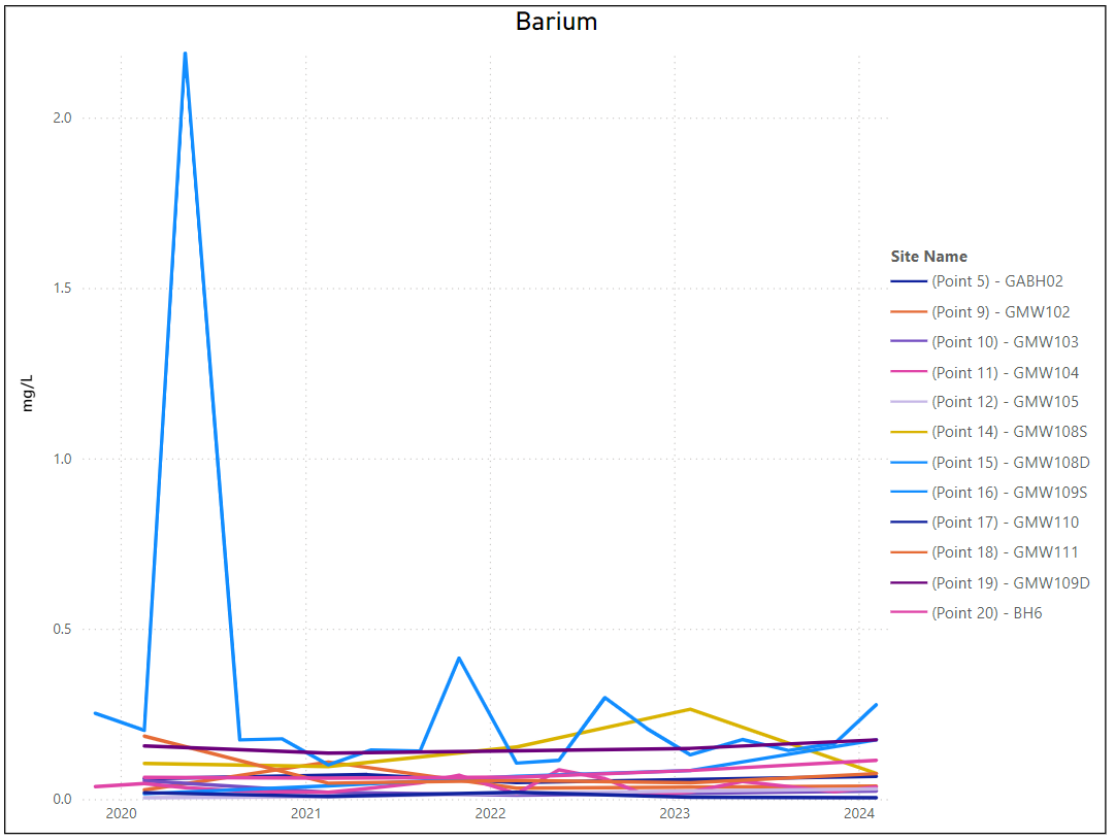
(Point 20) - BH6


Barium
mg/L
2.0
1.5
1.0
0.5
0.0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
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(Point 17) - GMW110
(Point 18) - GMW111
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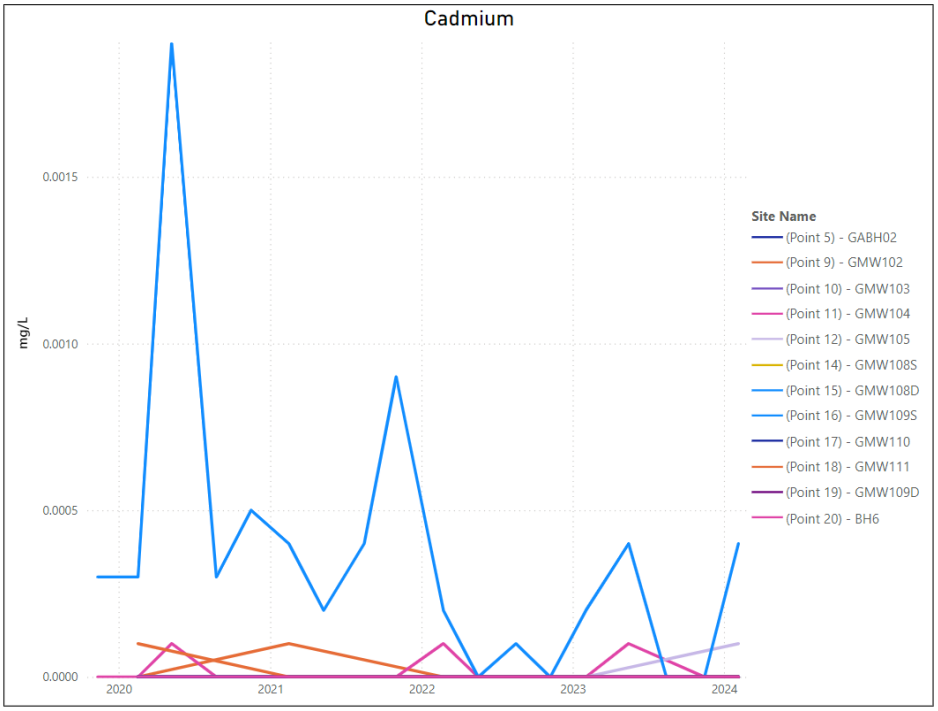
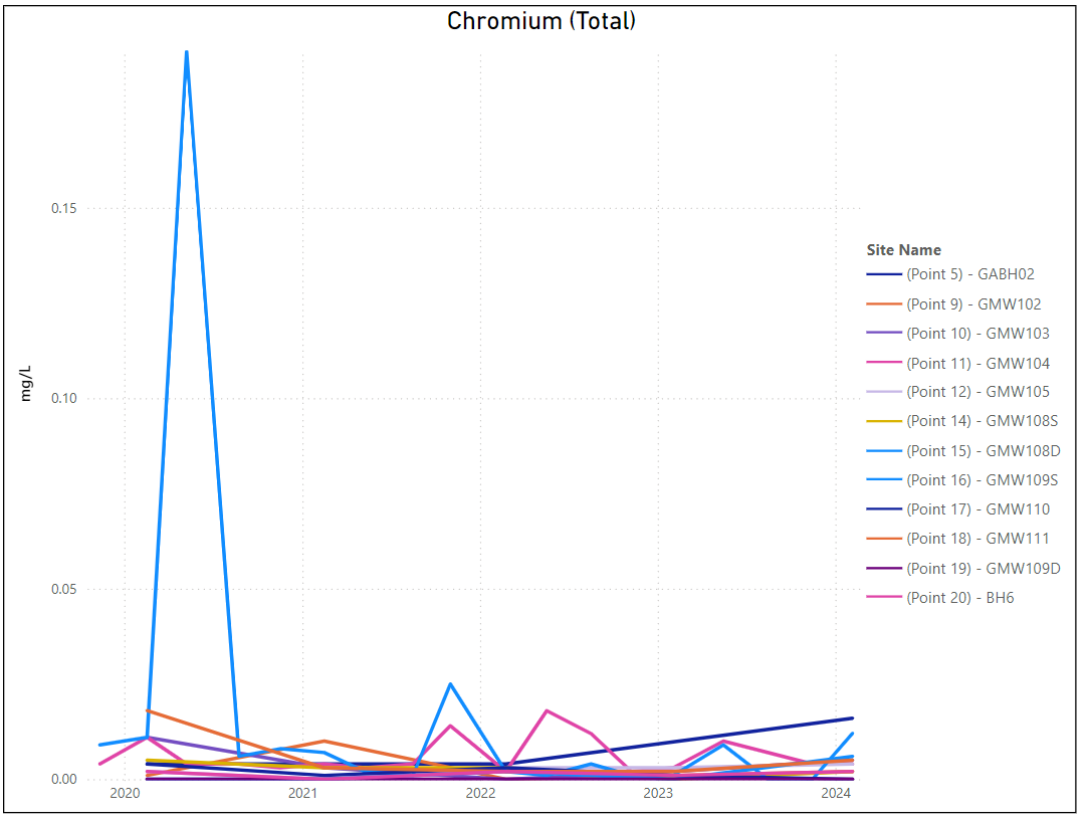
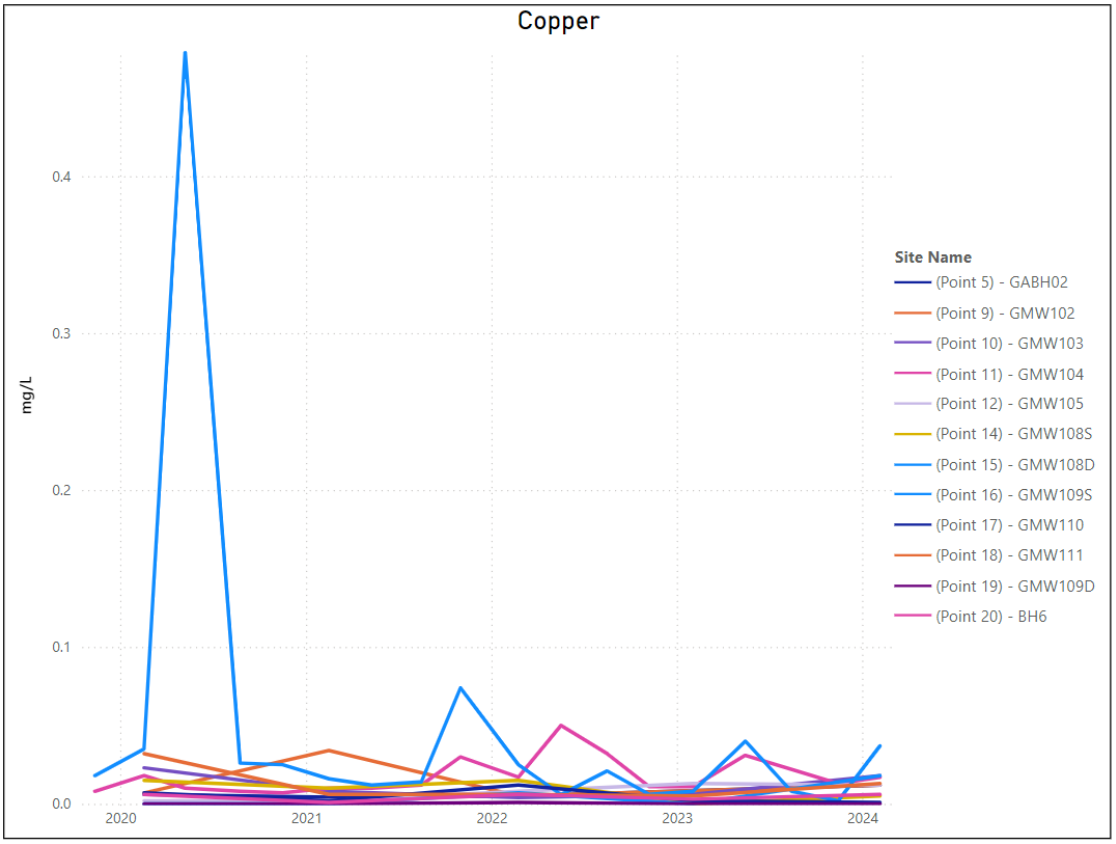
(Point 20) - BH6


Cadmium
mg/L
0.0015
0.0010
0.0005
0.0000
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Chromium (Total)
mg/L
0.15
0.10
0.05
0.00
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Copper
mg/L
0.4
0.3
0.2
0.1
0.0
2020
2021
2022
2023
2024
Site Name
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(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
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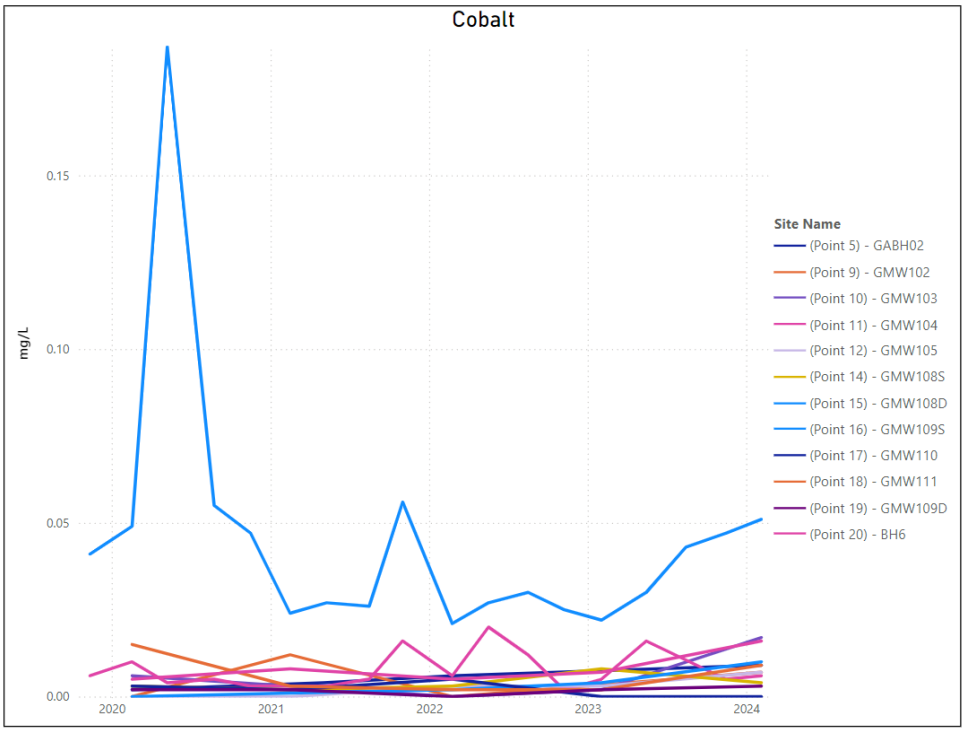
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Cobalt
mg/L
0.15
0.10
0.05
0.00
2020
2021
2022
2023
2024
Site Name
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(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
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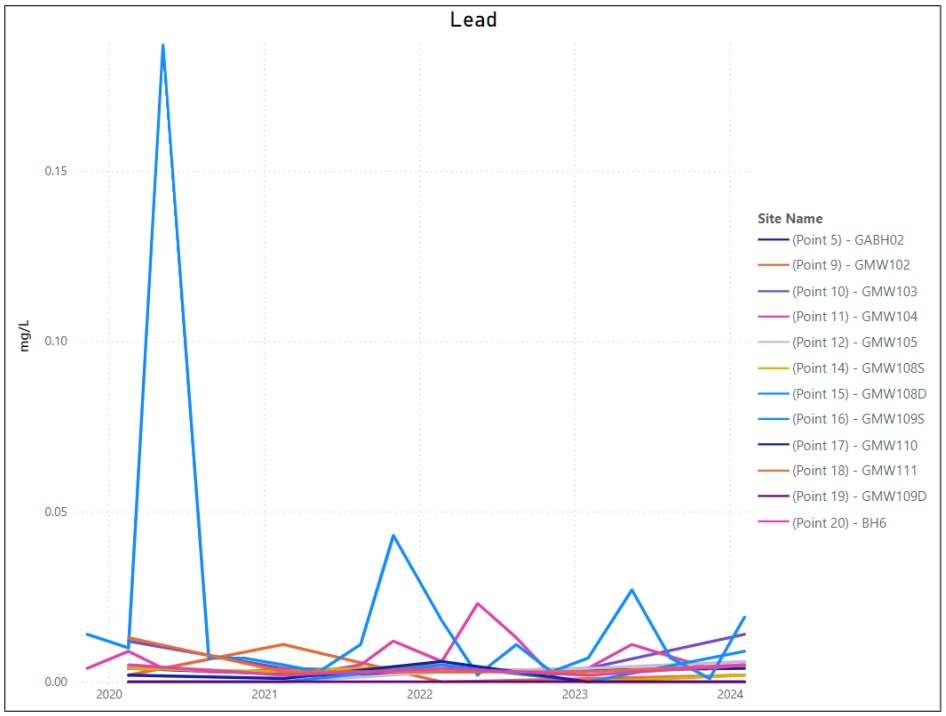
(Point 20) - BH6


Lead
mg/L
0.15
0.10
0.05
0.00
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
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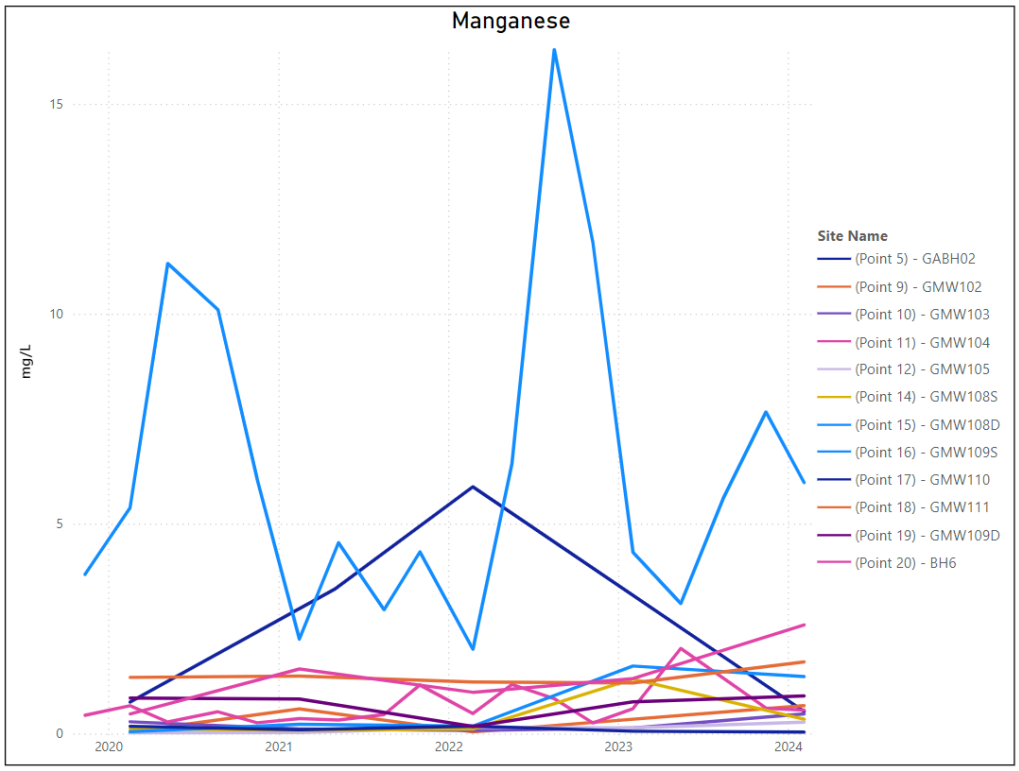
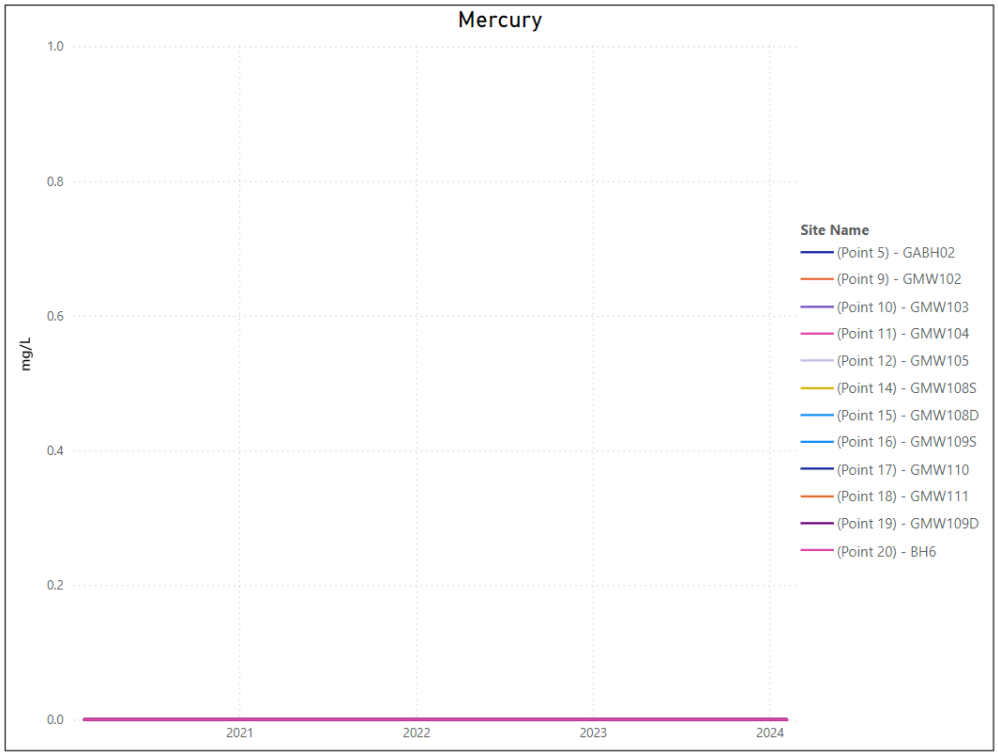
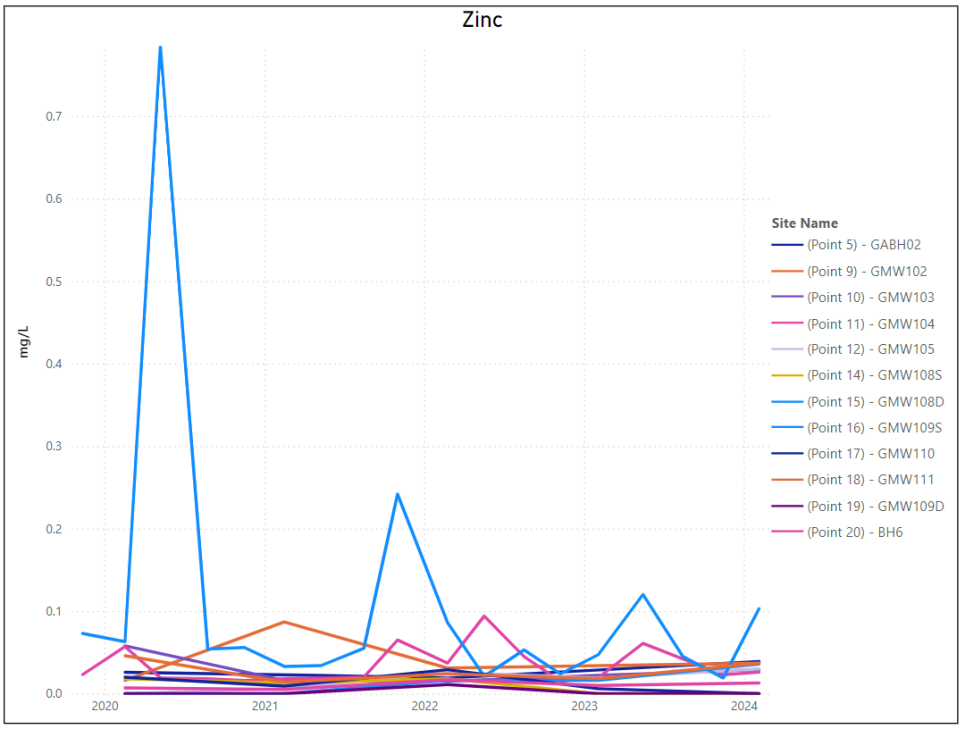
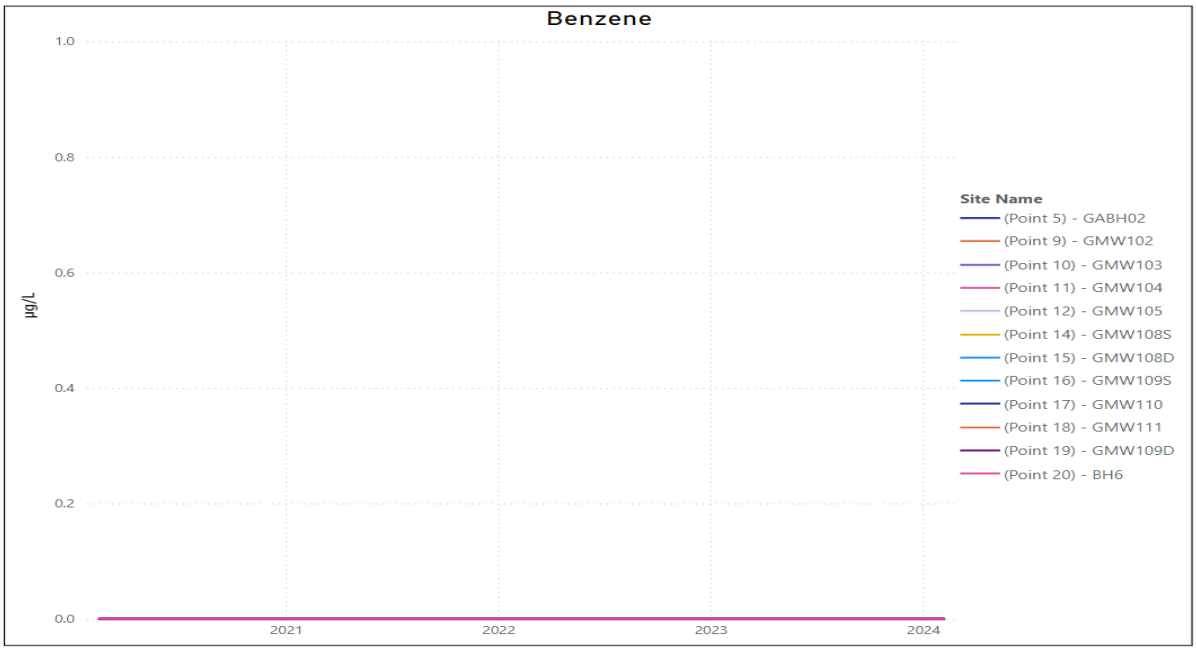
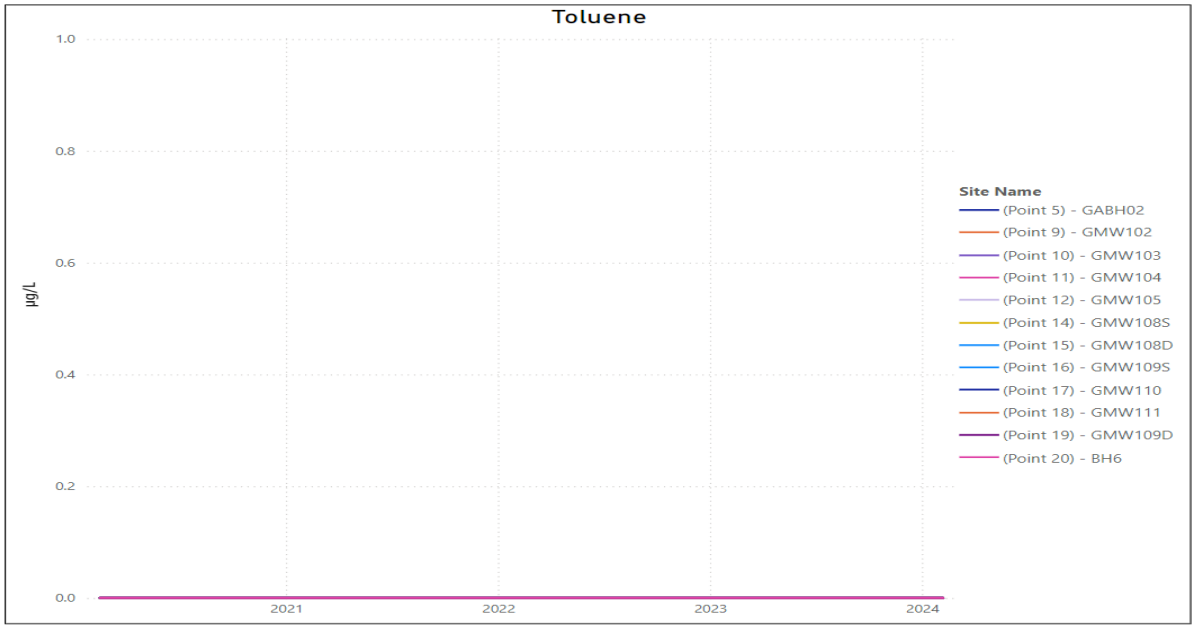
(Point 19) - GMW109D
(Point 20) - BH6

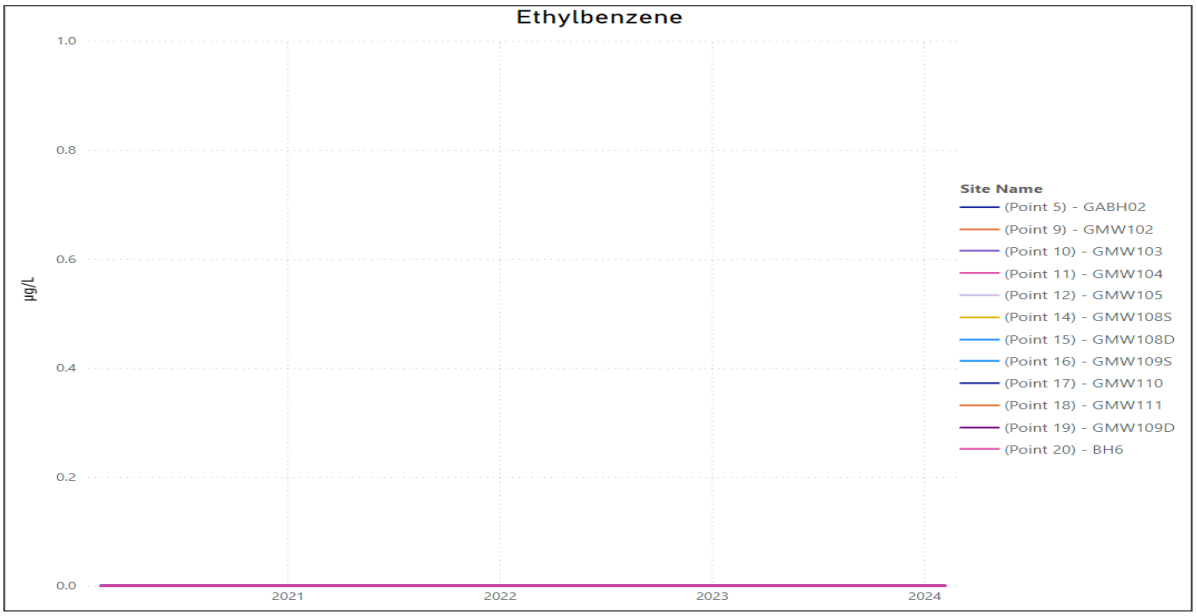

Manganese
15
10
5
0
mg/L
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

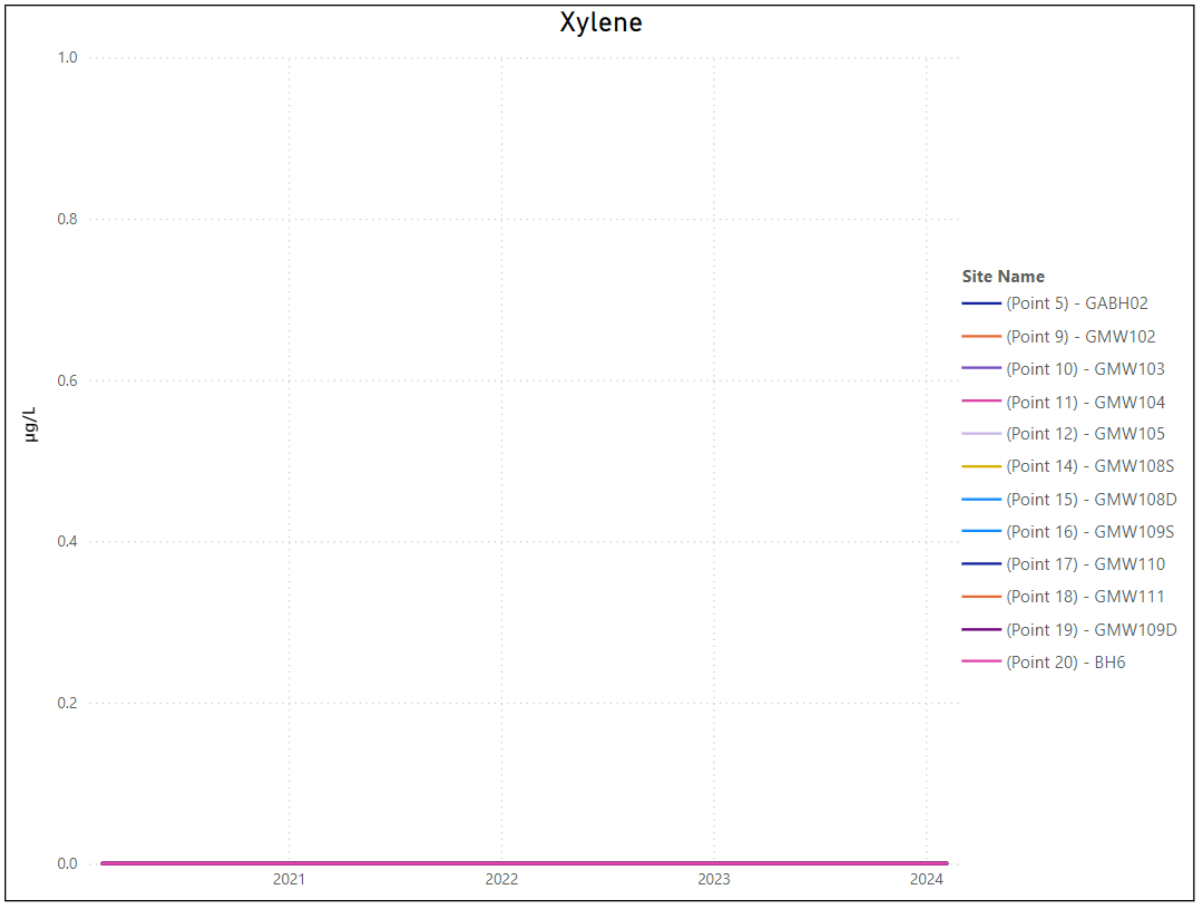

Mercury
1.0
0.8
0.6
0.4
0.2
0.0
mg/L
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

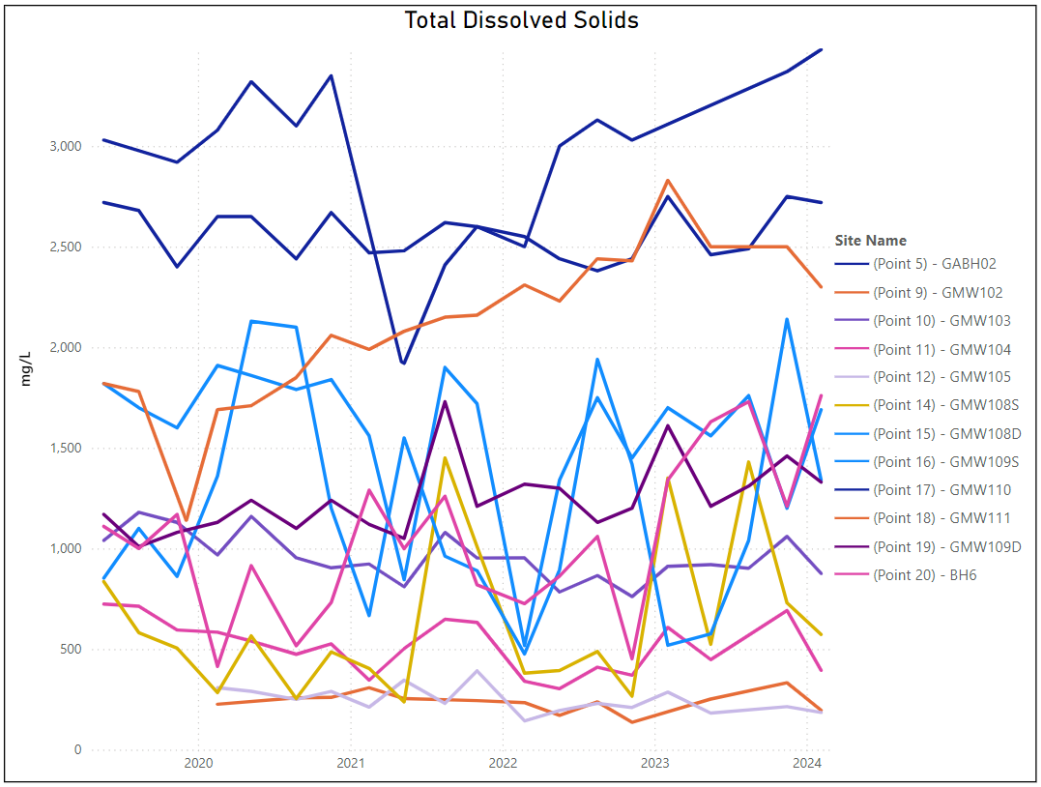

Zinc
mg/L
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

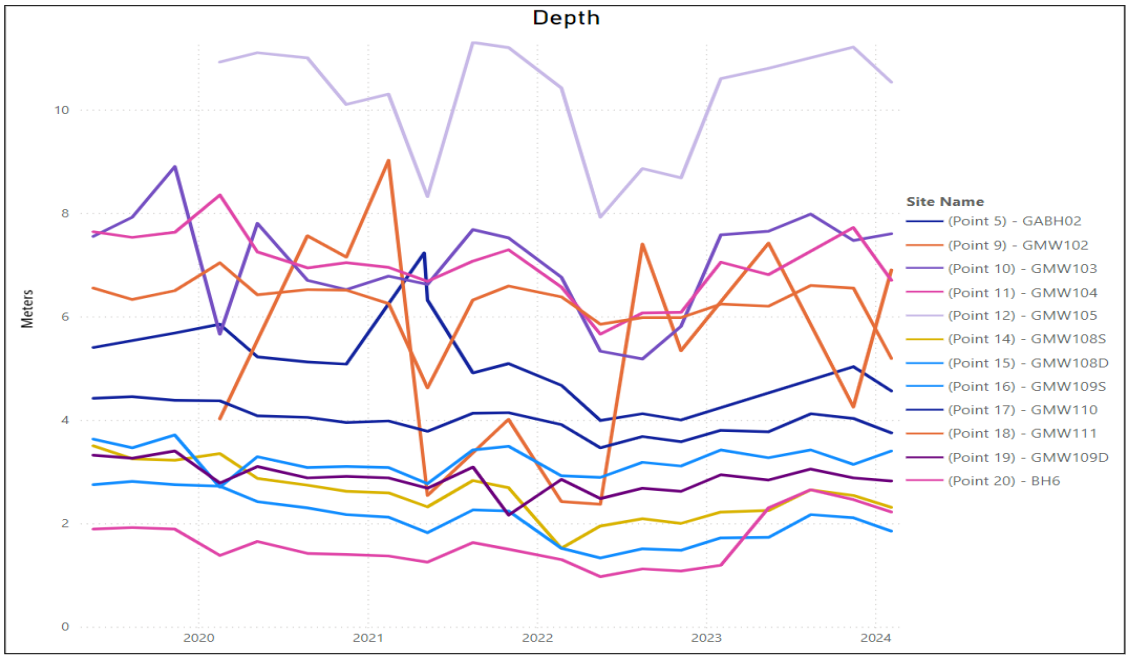

Benzene
µg/L
1.0
0.8
0.6
0.4
0.2
0.0
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

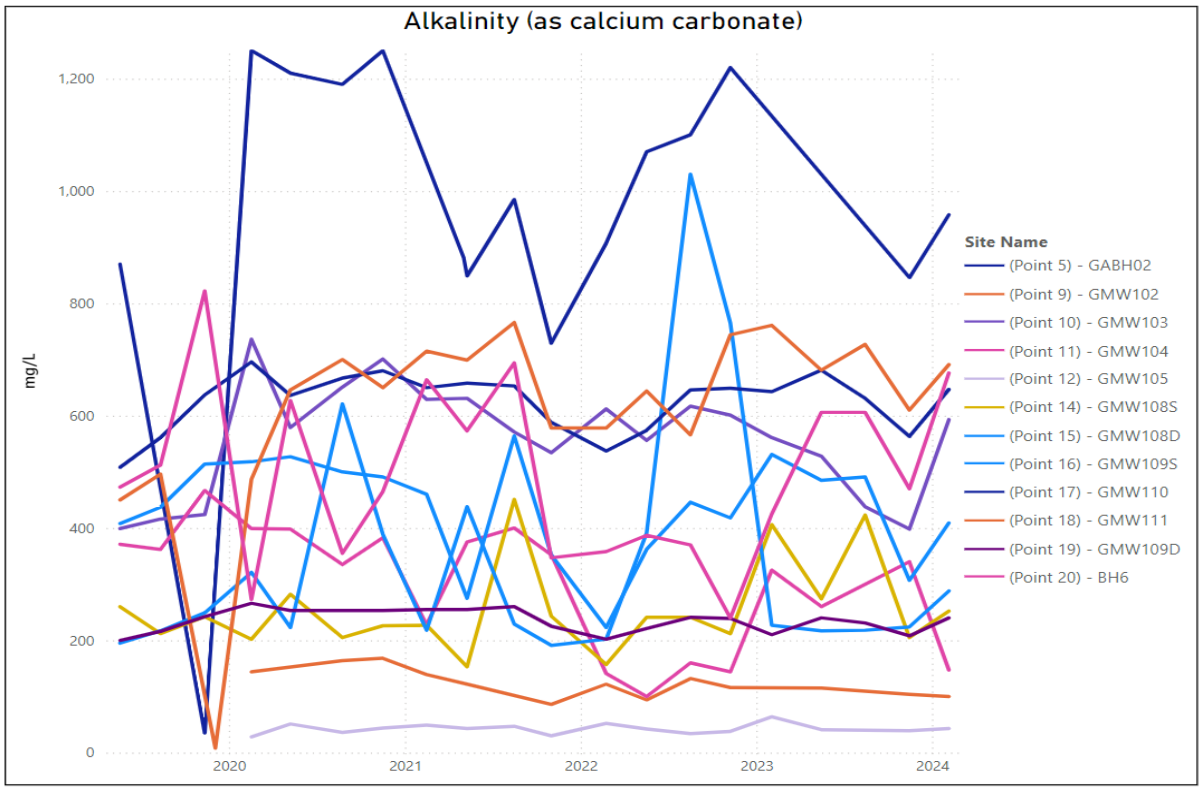

Toluene
1.0
0.8
0.6
0.4
0.2
0.0
µg/L
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

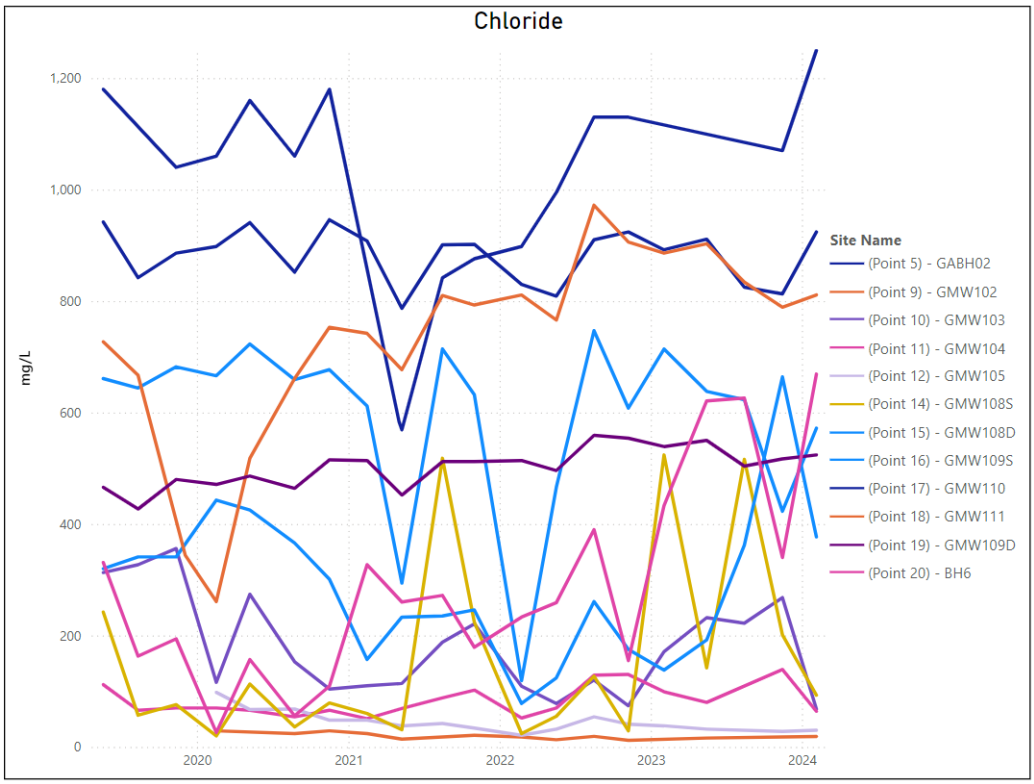

Ethylbenzene
1.0
0.8
0.6
0.4
0.2
0.0
µg/L
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

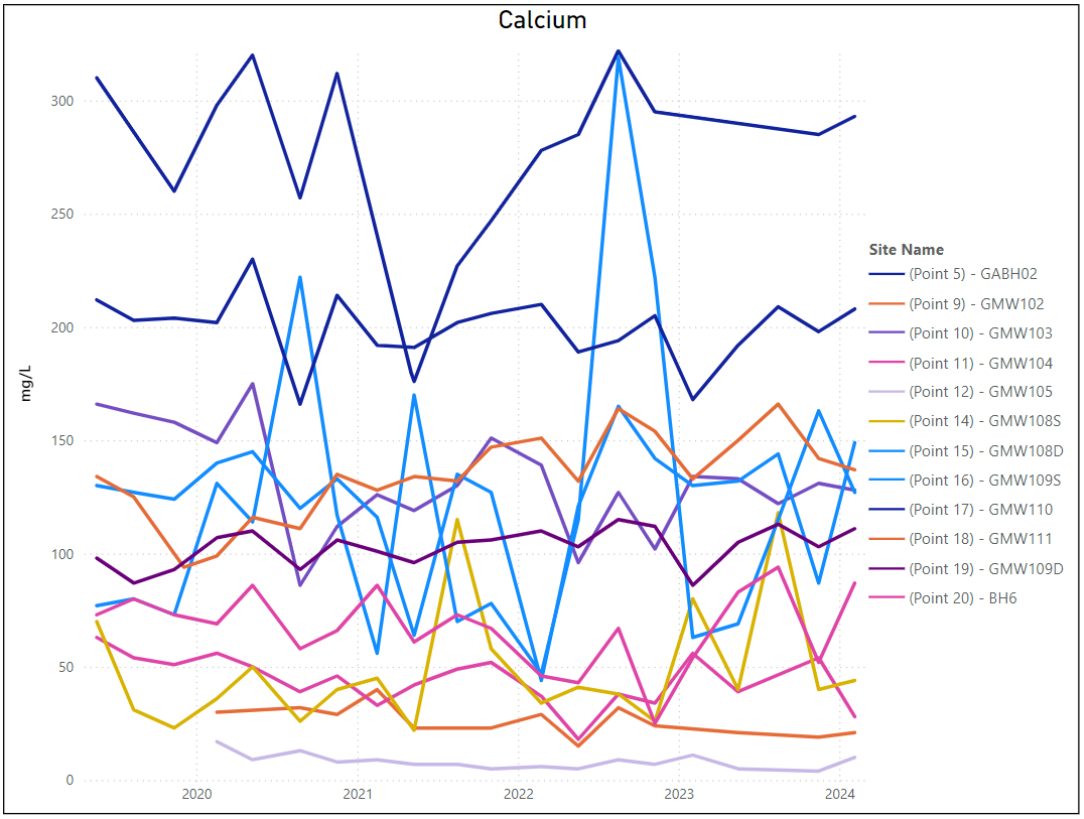

Xylene
1.0
0.8
0.6
0.4
0.2
0.0
µg/L
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

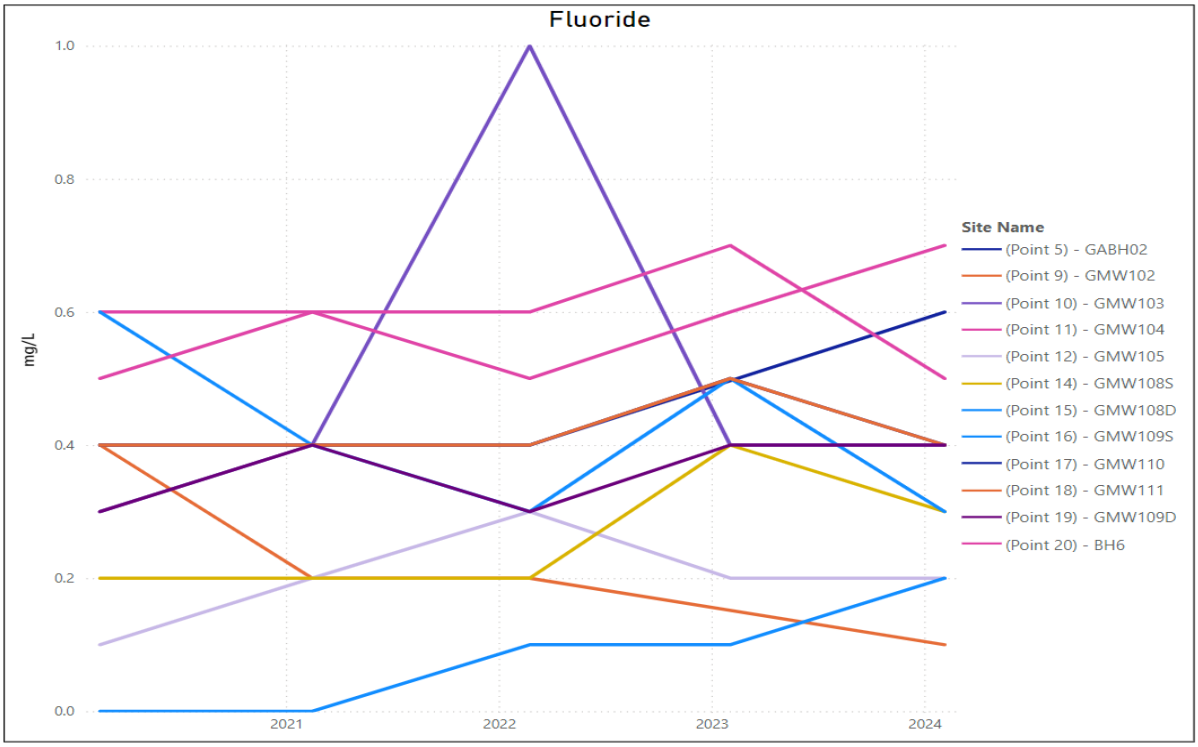

Total Dissolved Solids
mg/L
3,000
2,500
2,000
1,500
1,000
500
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

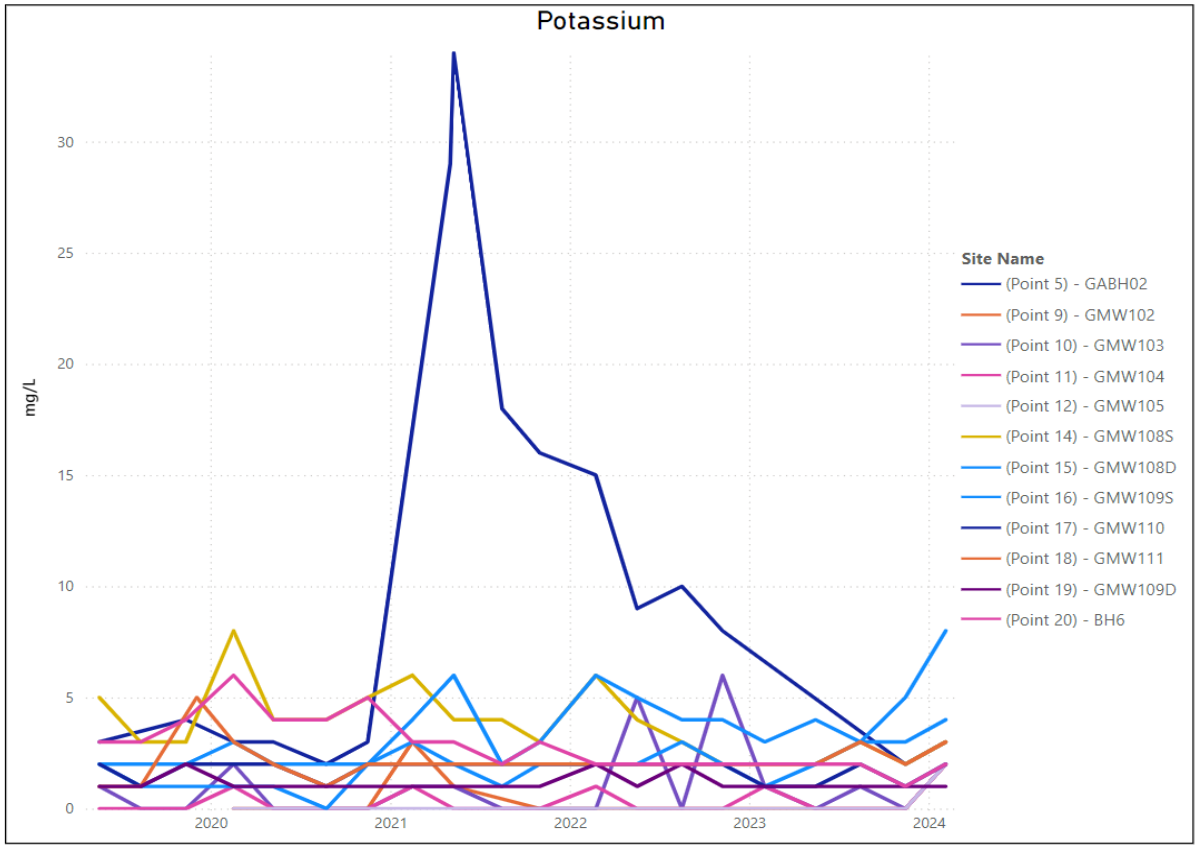

Depth
Meters
10
8
6
4
2
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

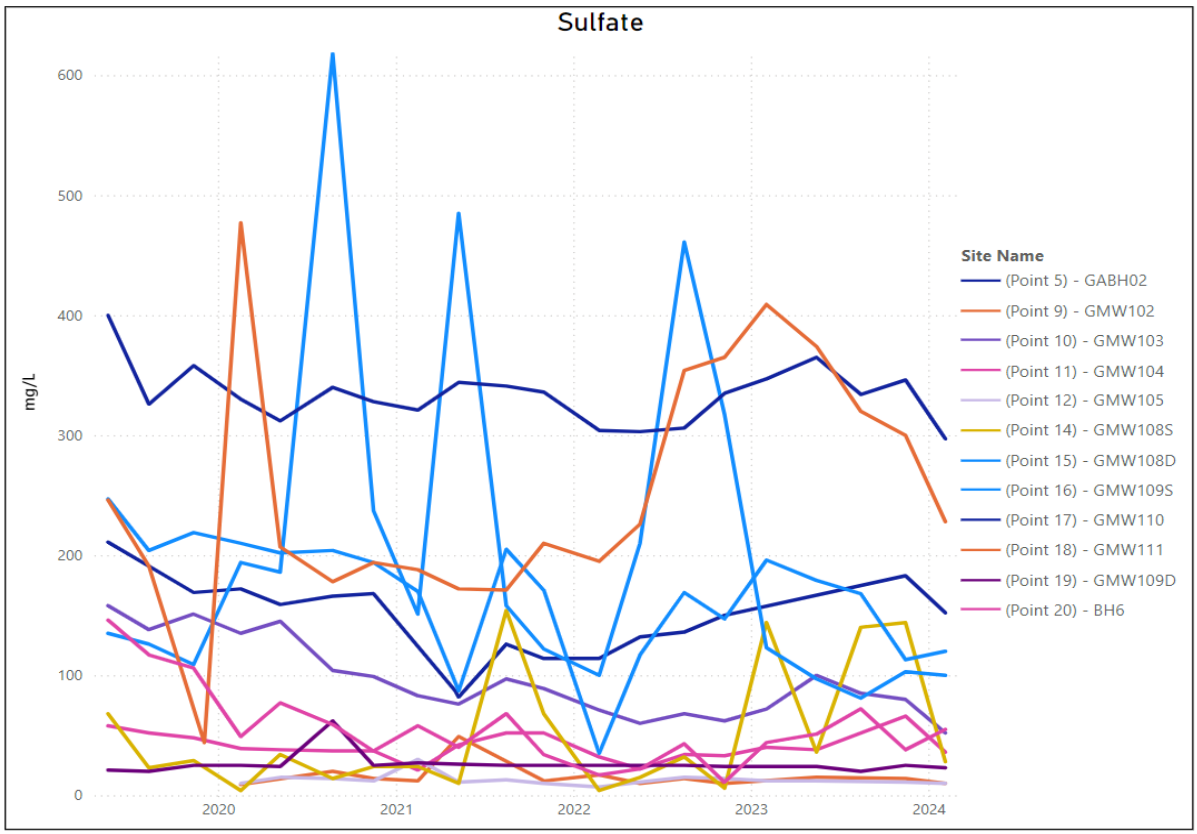

Alkalinity (as calcium carbonate)
mg/L
1,200
1,000
800
600
400
200
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

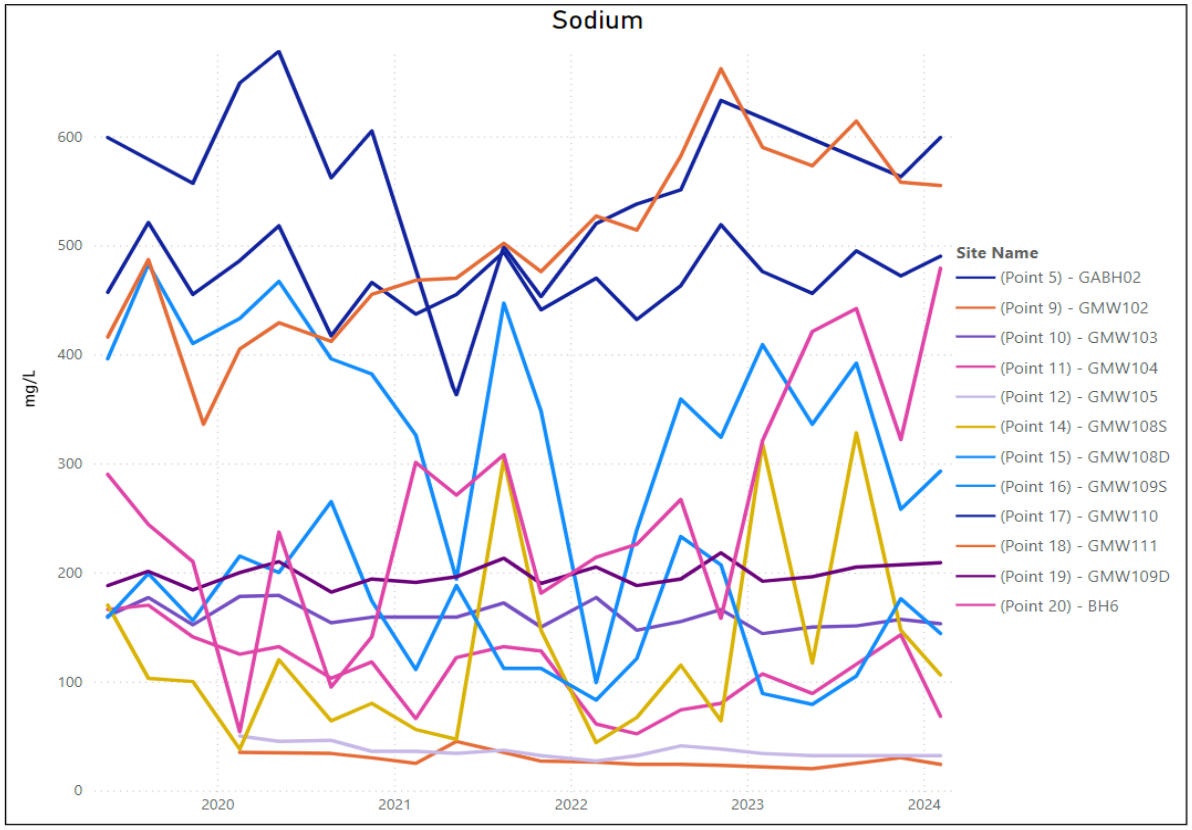

Chloride
mg/L
1,200
1,000
800
600
400
200
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

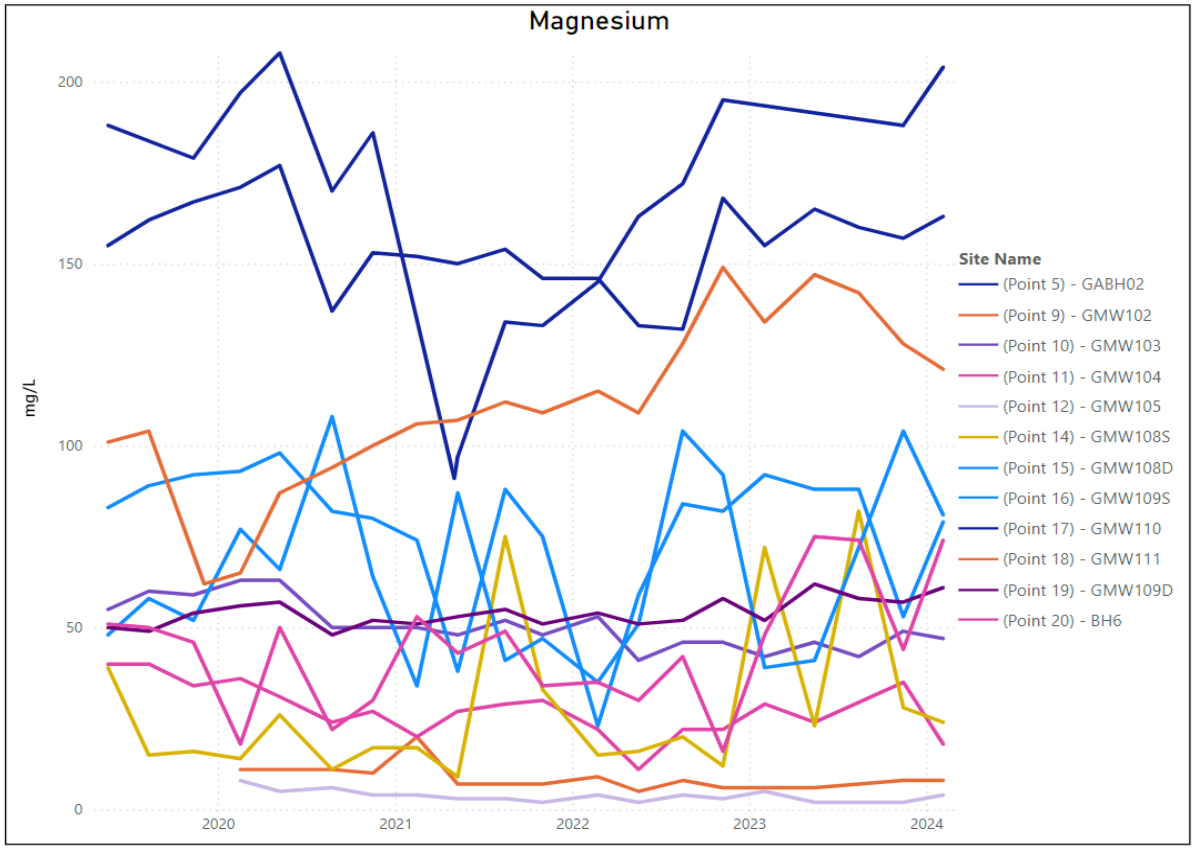

Calcium
mg/L
300
250
200
150
100
50
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

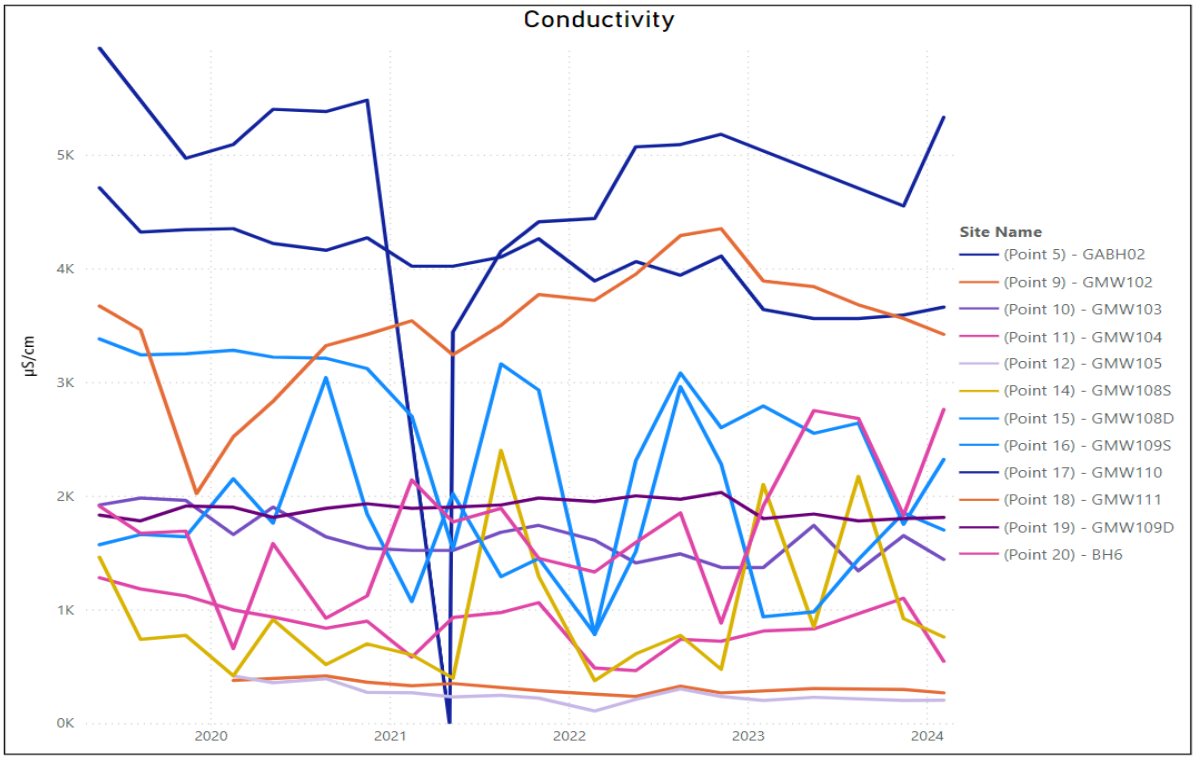

Fluoride
mg/L
1.0
0.8
0.6
0.4
0.2
0.0
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

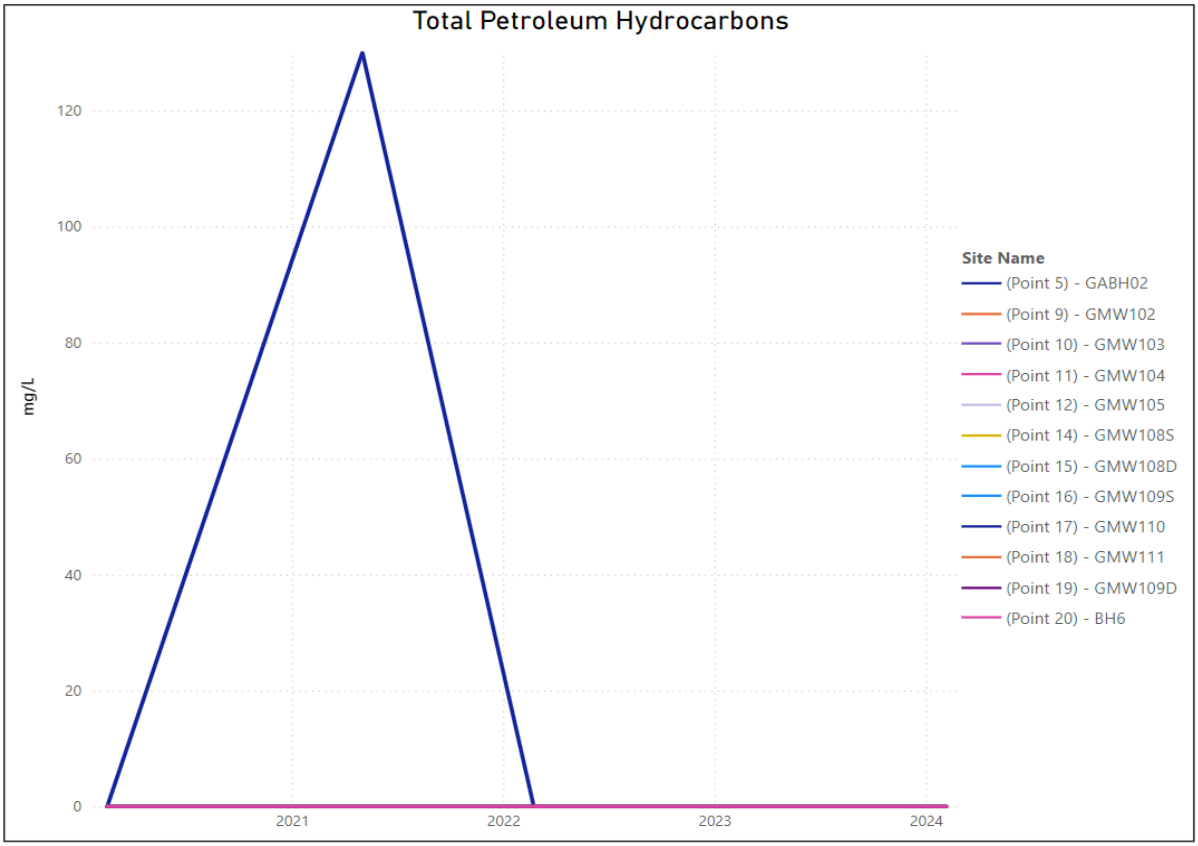

Potassium
mg/L
30
25
20
15
10
5
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

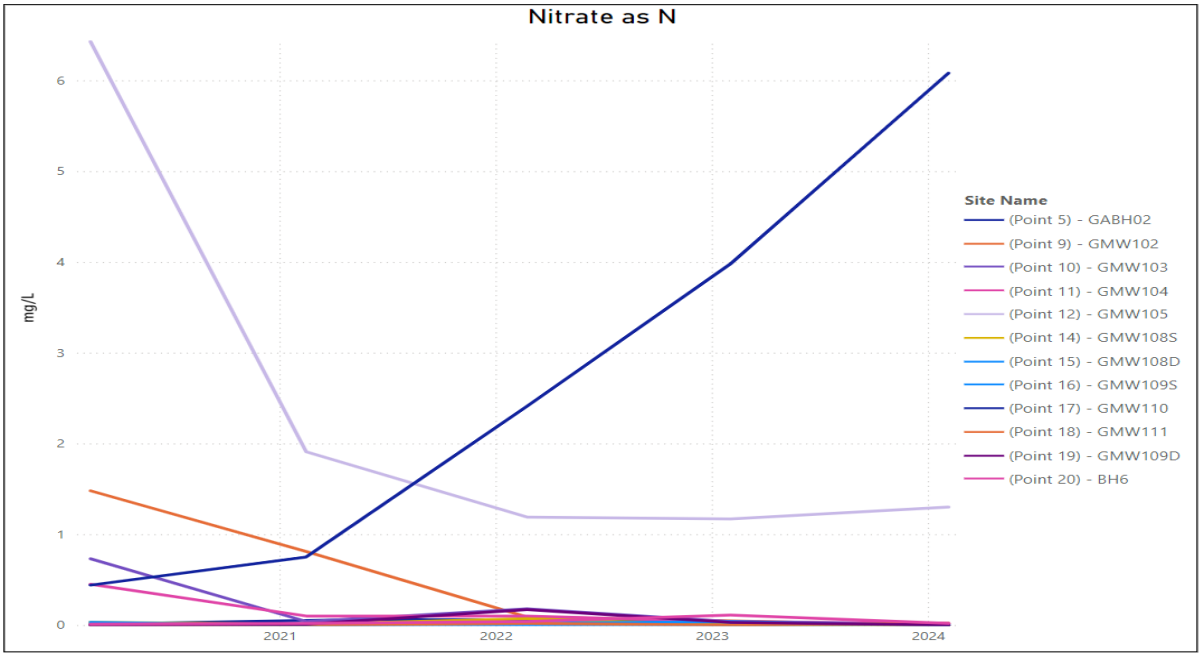

Sulfate
mg/L
600
500
400
300
200
100
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

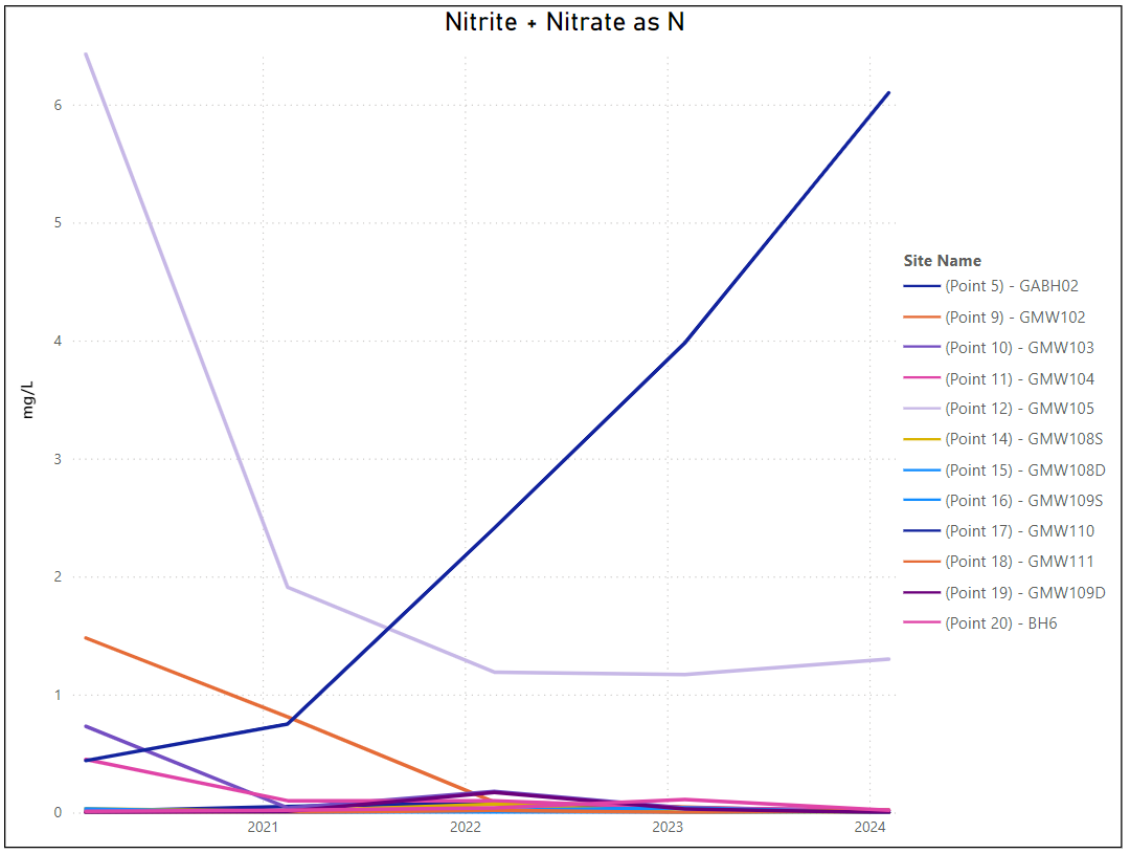

Sodium
mg/L
600
500
400
300
200
100
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

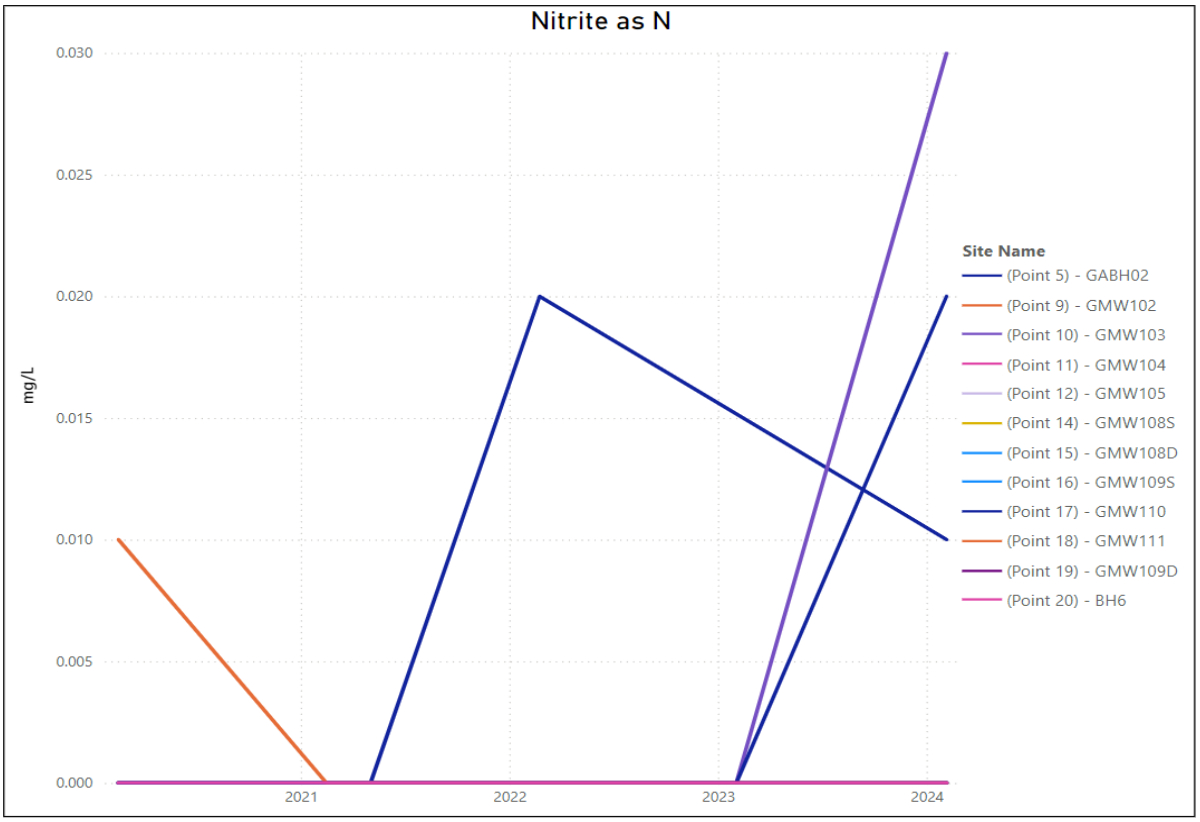

Magnesium
mg/L
200
150
100
50
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

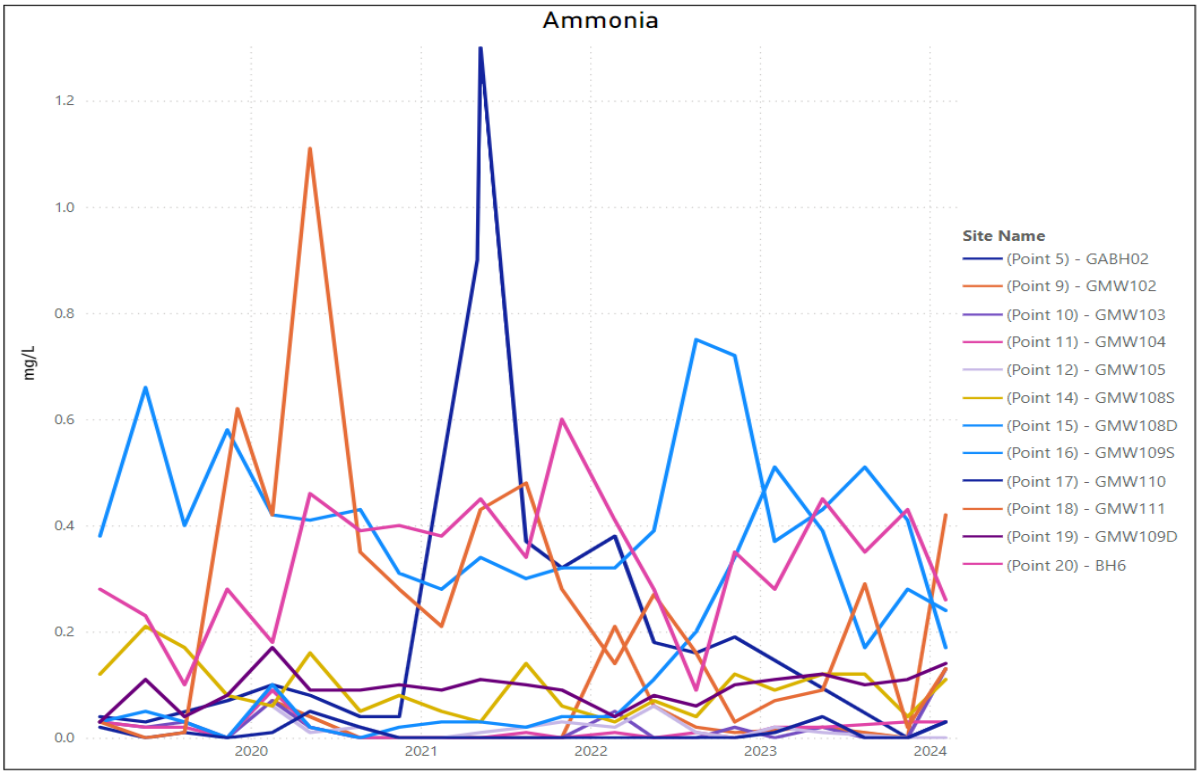

Conductivity
µS/cm
5K
4K
3K
2K
1K
0K
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

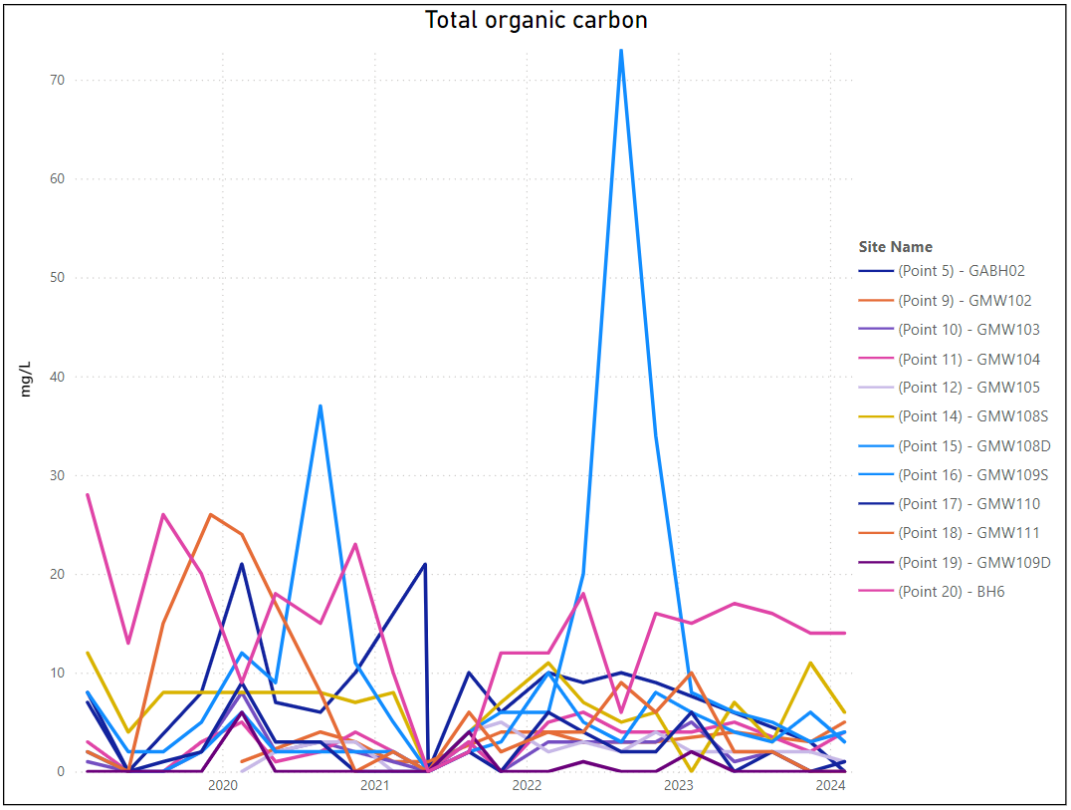

Total Petroleum Hydrocarbons
mg/L
120
100
80
60
40
20
0
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

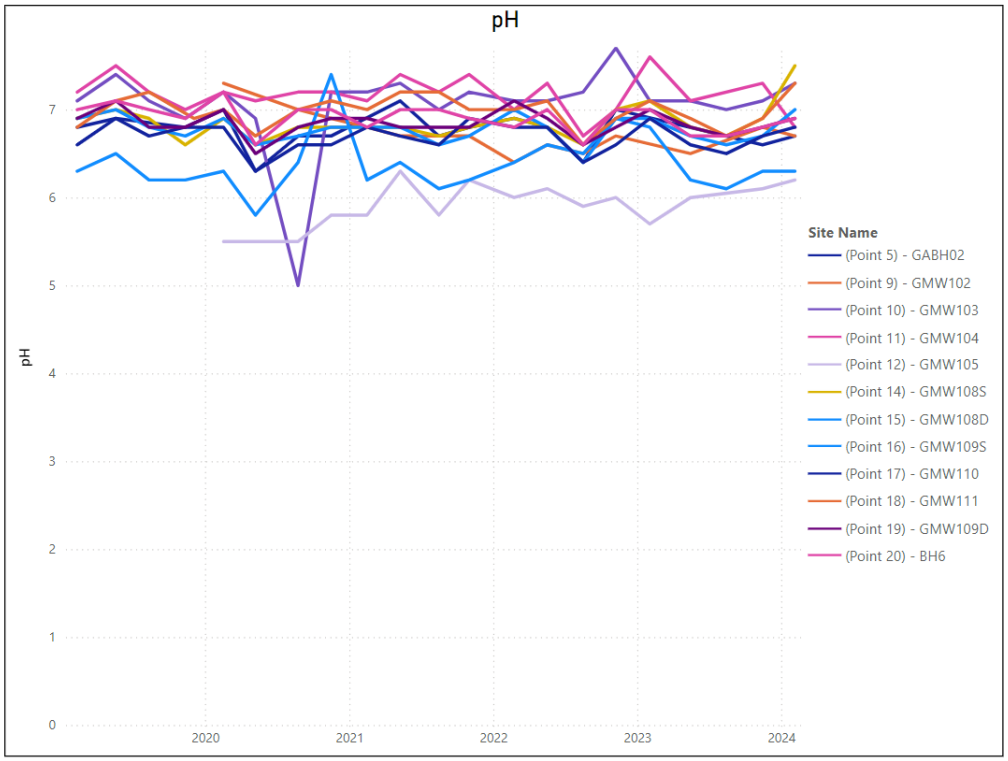

Nitrate as N
mg/L
0
1
2
3
4
5
6
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Nitrite + Nitrate as N
mg/L
0
1
2
3
4
5
6
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Nitrite as N
0.030
0.025
0.020
0.015
0.010
0.005
0.000
mg/L
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Ammonia
1.2
1.0
0.8
0.6
0.4
0.2
0.0
mg/L
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


Total organic carbon
mg/L
70
60
50
40
30
20
10
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6


pH
pH
7
6
5
4
3
2
1
0
2020
2021
2022
2023
2024
Site Name
(Point 5) - GABH02
(Point 9) - GMW102
(Point 10) - GMW103
(Point 11) - GMW104
(Point 12) - GMW105
(Point 14) - GMW108S
(Point 15) - GMW108D
(Point 16) - GMW109S
(Point 17) - GMW110
(Point 18) - GMW111
(Point 19) - GMW109D
(Point 20) - BH6

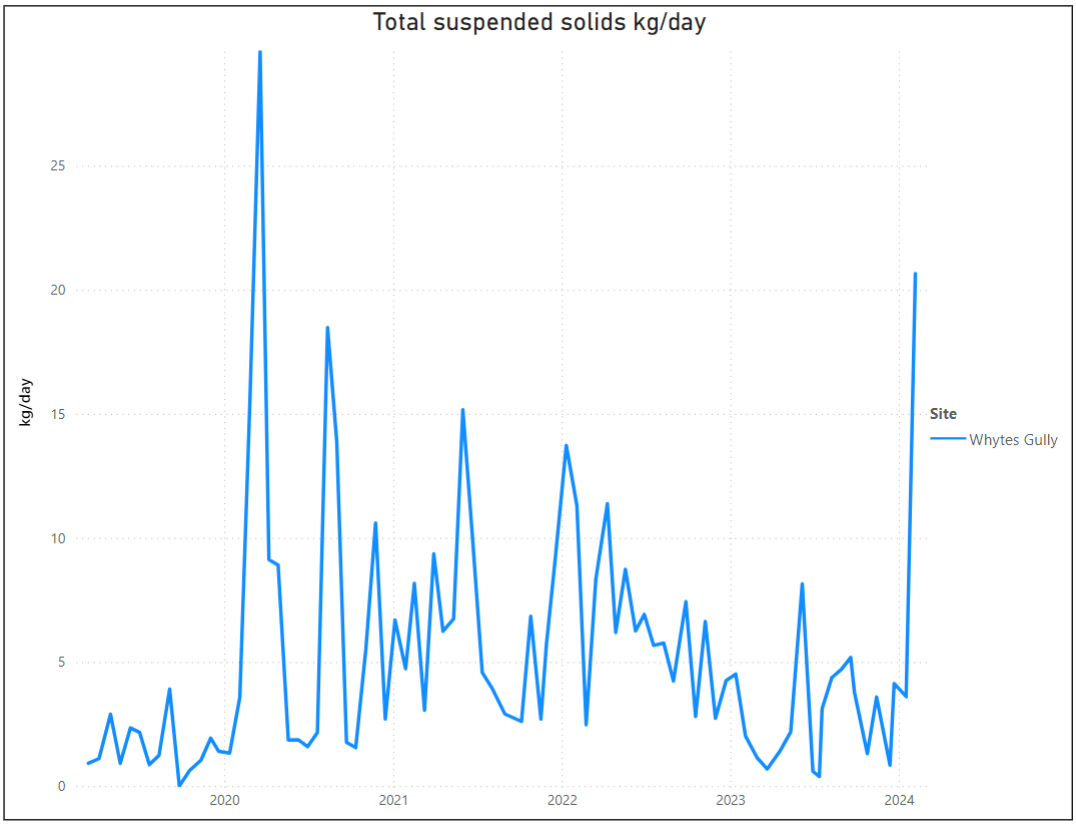
Appendix C: Trade Wastewater:

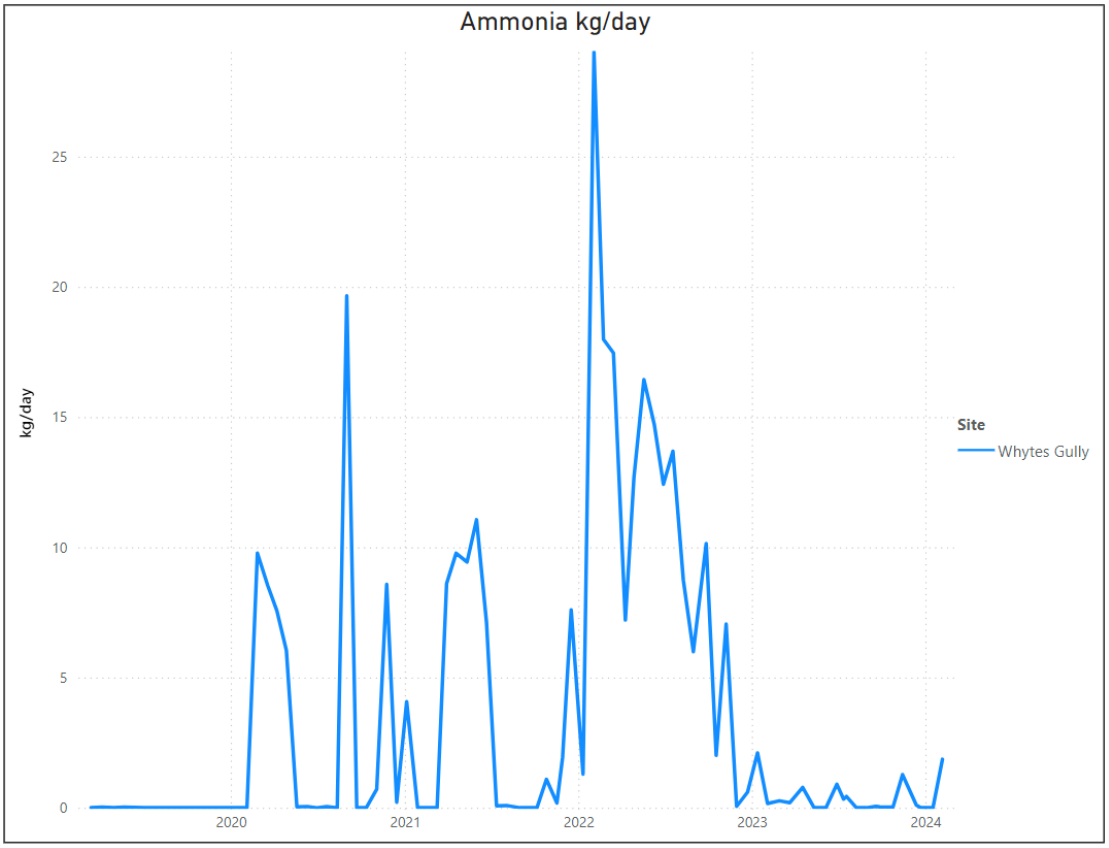
Tabulated Results and Trends

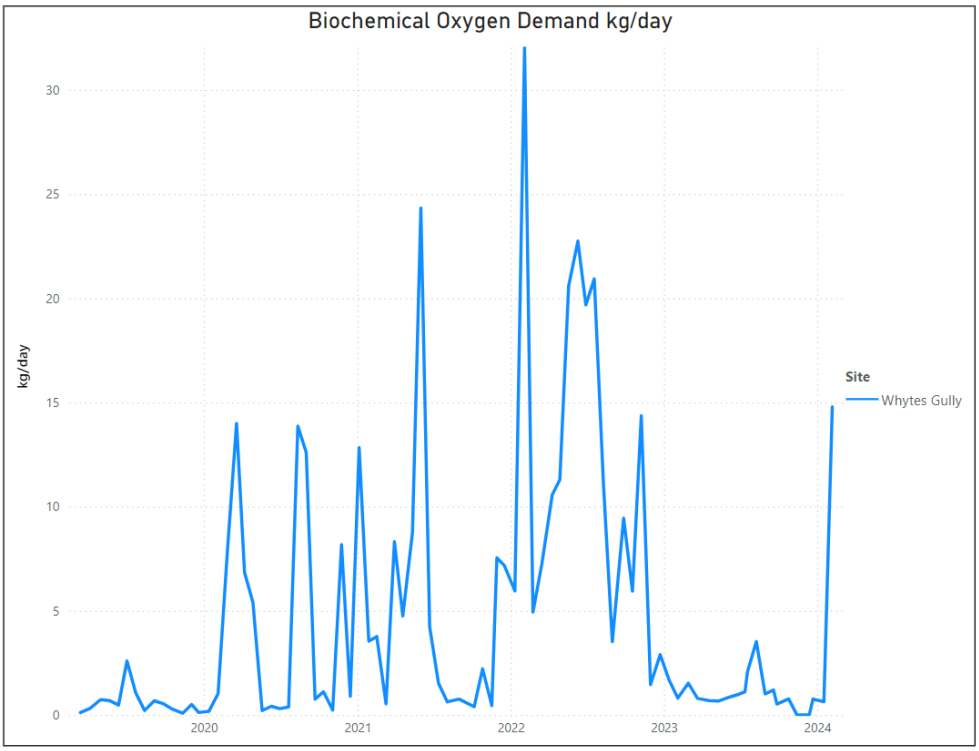
		22/03/2023	23/03/2023	17/04/2023	18/04/2023	11/05/2023	12/05/2023	05/06/2023	06/06/2023	28/06/2023	29/06/2023	12/07/2023	13/07/2023	18/07/2023	19/07/2023	08/08/2023	09/08/2023	29/08/2023	30/08/2023
Compound Name	Units																		
Ammonia	mg/L	1.7			4.5		0.		0.		65.8		25.2		2.5		0.		0.
Biochemical Oxygen Demand	mg/L	7.			4.		4.		6.		73.		85.		12.		21.		6.
Electrical Conductivity @ 25°C	µS/cm	5,960.			6,210.		6,410.		6,570.		7,410.		7,290.		7,640.		8,550.		8,660.
Finish Time	hrs	0.			0.		0.		0.		0.		0.		0.		0.		0.
Temperature	°C		23.		19.		15.		19.		9.		10.		17.		16.		18.
Total Dissolved Solids (Calc.)	mg/L	3,870.			4,040.		4,170.		4,270.		4,820.		4,740.		4,970.		5,560.		5,630.
Total suspended solids	mg/L	6.			8.		13.		57.		43.		29.		18.		26.		28.
Volume Discharged	kL	114.			173.		168.		143.		13.7		13.1		173.		168.		168.
Volume Discharged (corrected)	kL	114.			173.		168.		143.		13.7		13.1		173.		168.		168.
Meter Reading (start)	kL	207,893.6			212,303.96		216,456.21		220,655.78		223,954.56		224,202.7		224,356.49		227,777.28		231,236.94
Meter Reading (finish)	kL	208,007.12			212,476.76		216,624.08		220,799.		223,968.28		224,215.83		224,529.69		227,945.66		231,405.34
pH (start)	pH		7.7	7.4		7.6		7.7		7.7		7.7		8.		7.5		7.6	
pH (finish)	pH		7.6		7.3		7.6		7.6		7.7		7.8		8.5		7.5		7.6
Ammonia kg/day	kg/day	0.1938			0.7785		0.		0.		0.90146		0.33012		0.4325		0.		0.
Biochemical Oxygen Demand kg/day	kg/day	0.798			0.692		0.672		0.858		1.0001		1.1135		2.076		3.528		1.008
Total Dissolved Solids (Calc.) kg/day	kg/day	441.18			698.92		700.56		610.61		66.034		62.094		859.81		934.08		945.84
Total suspended solids kg/day	kg/day	0.684			1.384		2.184		8.151		0.5891		0.3799		3.114		4.368		4.704

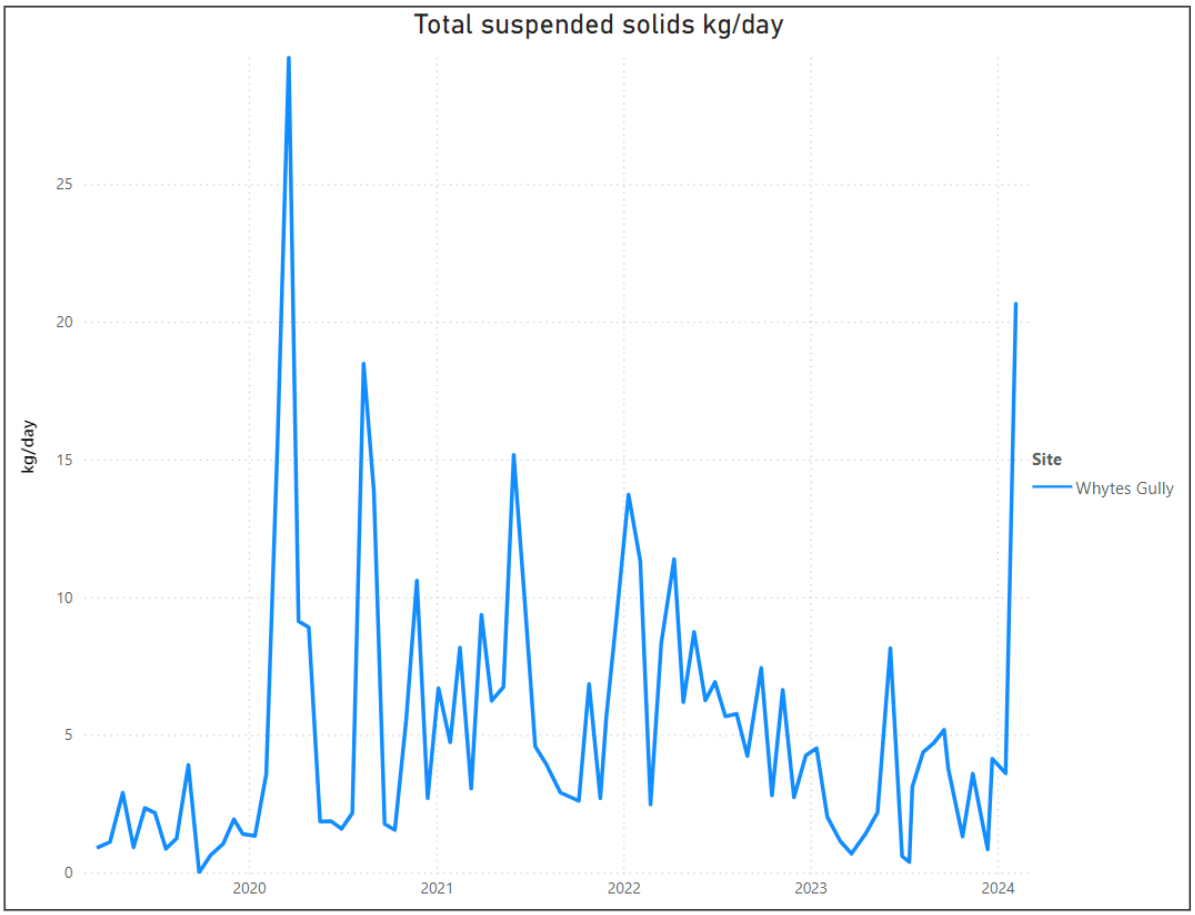
		18/09/2023	19/09/2023	26/09/2023	27/09/2023	24/10/2023	25/10/2023	13/11/2023	14/11/2023	12/12/2023	13/12/2023	21/12/2023	22/12/2023	16/01/2024	17/01/2024	05/02/2024	06/02/2024	28/02/2024	29/02/2024
Compound Name	Units																		
Ammonia	mg/L		0.6		0.3		0.6		7.8		0.6		0.		0.		7.3		11.8
Biochemical Oxygen Demand	mg/L		13.		5.		16.		0.		0.		5.		3.		58.		30.
Electrical Conductivity @ 25°C	µS/cm		10,300.		11,200.		10,900.		7,270.		5,240.		5,270.		5,400.		5,720.		5,380.
Finish Time	hrs		0.		0.		0.		0.		0.		0.		0.		0.		0.
Temperature	°C		32.		26.		29.		23.		29.		24.		25.		27.		28.
Total Dissolved Solids (Calc.)	mg/L		6,700.		7,280.		7,080.		4,720.		3,410.		3,420.		3,510.		3,720.		3,500.
Total suspended solids	mg/L		56.		36.		27.		22.		5.		27.		17.		81.		44.
Volume Discharged	kL		92.5		105.		48.3		163.		168.		153.		212.		255.		136.
Volume Discharged (corrected)	kL		92.5		105.		48.3		163.		168.		153.		212.		255.		136.
Meter Reading (start)	kL		233,145.45		233,939.05		236,353.62		237,938.79		242,660.68		244,119.08		248,684.7		252,961.66		258,375.71
Meter Reading (finish)	kL		233,237.96		234,044.01		236,401.96		238,101.47		242,828.7		244,272.11		248,896.23		253,217.12		258,512.21
pH (start)	pH	7.6		7.6		7.6		7.5		7.5		7.4		7.3		7.3		7.8	
pH (finish)	pH		7.5		7.6		7.9		7.6		7.7		7.5		7.5		7.4		8.
Ammonia kg/day	kg/day		0.0555		0.0315		0.02898		1.2714		0.1008		0.		0.		1.8615		1.6048
Biochemical Oxygen Demand kg/day	kg/day		1.2025		0.525		0.7728		0.		0.		0.765		0.636		14.79		4.08
Total Dissolved Solids (Calc.) kg/day	kg/day		619.75		764.4		341.964		769.36		572.88		523.26		744.12		948.6		476.
Total suspended solids kg/day	kg/day		5.18		3.78		1.3041		3.586		0.84		4.131		3.604		20.655		5.984

Trade Wastewater Graphs






Biochemical Oxygen Demand kg/day
kg/day
30
25
20
15
10
5
0
2020
2021
2022
2023
2024
Site
Whytes Gully


Total suspended solids kg/day
kg/day
25
20
15
10
5
0
2020
2021
2022
2023
2024
Site
Whytes Gully

Appendix D: Landfill Gas Tabulated results and trends

Table 1: Subsurface Gas Results

			Bal	Baro	CH4	CH4 Peak	CO	CO2	CO2 Peak	Flow	H2S	Relative Pressure	SWL	Well Depth
Units			%	hPa	%v/v	%v/v	ppm	%v/v	%v/v	l/h			Meters	Meters
Monitorin	Sample ID	Sample Date												
21	LFG MW1	15/02/2023	98.3	1010	0	0	1	0	0	0	0	-0.02	2.67	10.2
		7/03/2023	98.7	999	0	0	1	0	0.1	0.2	0	0.02	2.8	10.2
		17/04/2023	95.8	1015	0	0	2	0	0	0.3	0	0.02	2.79	10.2
		17/05/2023	99.2	1022	0	0	0	0.1	0.1	0	0	0	3.03	10.2
		20/06/2023	78.3	1011	0	0	0	0.1	0.1	2.7	0	0	3.22	10.2
		21/07/2023	82.5	1007	0	0	0	0	0.3	0.1	0	0.02	3.5	10.2
		15/08/2023	78.8	1010	0.1	0.1	0	0.3	1.8	0.2	0	0.1	3.72	10.20
		19/09/2023	78.5	1010	<0.1	<0.1	0	2.6	3.9	<0.1	0	0.05	4.05	10.20
		16/10/2023	80.4	1005	<0.1	<0.1	1	0.1	0.2	<0.0	0	0.02	4.01	10.20
		14/11/2023	79.9	1005	<0.1	<0.1	1	0.2	0.6	0.1	0	0.05	3.90	10.20
		12/12/2023	79.1	1010	<0.1	<0.1	0	0.2	0.4	<0.1	0	0.10	3.63	10.20
		24/01/2024	79.2	1005	<0.1	<0.1	0	0.5	0.5	<0.1	0	-0.02	3.15	10.20
22	LFG MW2	15/02/2023	98.5	1010	0	0	1	0	1	0.1	0	0	DRY	10.36
		7/03/2023	98.9	999	0	0	1	0	1.5	0.1	0	0.07	DRY	10.36
		17/04/2023	95.8	1015	0	0	1	0	1.2	0.3	0	0.12	DRY	10.36
		17/05/2023	99	1021	0	0	0	0.4	0.4	0	0	-0.03	DRY	10.36
		20/06/2023	78.6	1011	0	0.1	0	0.1	1.7	0.2	0	0.03	DRY	10.36
		21/07/2023	98	1007	0	0	0	0.1	1.6	0.1	0	0	DRY	10.36
		15/08/2023	78.6	1010	0.9	1	5	0.3	0.3	-0.3	0	0.03	DRY	10.36
		19/09/2023	81.9	1004	<0.1	<0.1	0	1	2.7	<0.1	0	0.03	DRY	10.36
		16/10/2023	80.1	1005	0.1	0.1	1	0.2	0.2	0.3	0	-0.05	DRY	10.36
		14/11/2023	80.1	1005	<0.1	<0.1	1	<0.1	1.0	0.2	0	0.03	DRY	10.36
		12/12/2023	79.6	1010	<0.1	<0.1	0	<0.1	3.5	0.4	0	0.07	9.28	10.36
		24/01/2024	79.4	1005	<0.1	<0.1	0	0.1	0.1	<0.1	0	-0.07	9.22	10.36
23	LFG MW3	15/02/2023	97.7	1010	0	0	1	1	1	0.2	0	0.03	5.74	10.52
		7/03/2023	97.6	999	0	0	2	1.4	1.6	-0.2	0	0.03	5.75	10.52
		17/04/2023	94.8	1015	0	0	1	1.2	1.2	0.4	0	0.02	5.45	10.52
		17/05/2023	96.4	1016	0	0	0	3.1	3.1	0.1	0	0.03	5.6	10.52
		20/06/2023	77.7	1011	0	0	0	1.9	1.9	0.2	0	0	7.72	10.52
		21/07/2023	79.4	1007	0	0	0	1.5	4.4	0.1	0	0	5.8	10.52
		15/08/2023	80.9	1010	<0.1	0.1	0	1.8	1.8	0.2	0	0.12	5.11	10.52
		19/09/2023	79.3	1004	<0.1	<0.1	0	2.2	2.2	0.1	0	0.04	5.65	10.52
		16/10/2023	78.8	1005	<0.1	<0.1	1	1.4	1.6	0.3	0	0.14	5.69	10.52
		14/11/2023	80.2	1005	<0.1	<0.1	1	1.1	1.1	0.3	0	0.07	5.49	10.52
		12/12/2023	80.1	1010	<0.1	<0.1	0	3.3	4.4	0.4	0	0.07	5.72	10.52
		24/01/2024	79.6	1005	<0.1	<0.1	0	2.9	2.9	<0.1	0	-0.02	5.60	10.52
24	LFG MW4	15/02/2023	98.2	1010	0	0	1	0.6	0.8	0.1	0	0	8.21	9.27
		7/03/2023	98.1	999	0	0	1	0.9	1.5	0.2	0	0	8.21	9.27
		17/04/2023	95.7	1015	0	0	1	0.7	0.7	0.1	0	0.05	8.18	9.27
		17/05/2023	99.4	1016	0	0	0	0.1	0.1	0.1	0	0.02	8.92	9.27
		20/06/2023	79.1	1011	0	0	0	1.4	1.4	0.1	0	0.05	8.16	9.27
		21/07/2023	77.5	1007	0	0	0	5	8.1	0.4	0	0.04	8.25	9.27
		15/08/2023	79.1	1010	<0.1	<0.1	0	1	2	0.2	0	0	8.34	9.27
		19/09/2023	82.4	1004	<0.1	<0.1	0	8.8	8.8	<0.1	0	-0.12	8.88	9.27
		16/10/2023	79.5	1005	<0.1	<0.1	1	1.2	7.6	0.3	0	-0.04	8.97	9.27
		14/11/2023	80.3	1005	<0.1	<0.1	2	0.2	0.3	0.2	0	0.09	9.11	9.27
		12/12/2023	80.9	1010	<0.1	<0.1	0	4.9	5.2	0.4	0	0.12	DRY	9.39
		24/01/2024	81.3	1005	<0.1	<0.1	0	4.0	4.0	<0.1	0	0.05	8.68	9.27

			Bal	Baro	CH4	CH4 Peak	CO	CO2	CO2 Peak	Flow	H2S	Relative Pressure	SWL	Well Depth
Units			%	hPa	%v/v	%v/v	ppm	%v/v	%v/v	l/h			Meters	Meters
Monitorin	Sample ID	Sample Date												
26	LFG MW6	15/02/2023	98.6	1010	0	0	1	0	0.3	0	0	0	DRY	10.85
		7/03/2023	99	999	0	0	1	0.1	0.1	0.2	0	0.02	DRY	10.85
		17/04/2023	96.6	1015	0	0	1	0	0	0.2	0	0.07	DRY	10.85
		17/05/2023	99	1015	0	0	0	0.2	0.2	0.1	0	0.02	DRY	10.85
		20/06/2023	78.4	1011	0	0	0	0.1	0.3	0.1	0	0.05	DRY	10.85
		21/07/2023	78	1007	0	0	0	0	0.5	0.2	0	0.11	DRY	10.85
		15/08/2023	79.3	1010	<0.1	<0.1	0	0.1	0.6	0.2	0	0.03	DRY	10.85
		19/09/2023	82.1	1004	<0.1	<0.1	0	4.8	4.8	<0.1	0	0.14	DRY	10.85
		16/10/2023	79.3	1005	<0.1	<0.1	0	0.1	0.5	0.2	0	0.04	DRY	10.85
		14/11/2023	80.9	1005	<0.1	<0.1	1	2.0	2.0	0.1	0	0.09	DRY	10.85
		12/12/2023	79.1	1013	<0.1	<0.1	0	0.1	0.3	0.2	0	0.07	DRY	10.85
		24/01/2024	79.5	1005	<0.1	<0.1	0	0.8	0.8	<0.1	0	0.02	DRY	10.85
27	LFG MW7	15/02/2023	98.2	1010	0	0	1	0.4	0.4	0	0	0	7.5	12.33
		7/03/2023	99.2	999	0	0	0	0	0.5	0.3	0	0.02	7.56	12.33
		17/04/2023	95.9	1015	0	0	0	0	0.2	0.4	0	-0.02	7.63	12.33
		17/05/2023	98.3	1015	0	0	0	0.7	0.9	0.1	0	0	7.7	12.33
		20/06/2023	78.3	1011	0	0.1	0	0.3	0.4	0.1	0	0.12	7.83	12.33
		21/07/2023	95.5	1008	0	0.1	0	0.2	1.4	0	0	0.04	7.9	12.33
		15/08/2023	79.5	1010	<0.1	<0.1	0	0.7	0.9	0.2	0	0.07	8.02	12.33
		19/09/2023	80.4	1004	<0.1	<0.1	0	0.3	0.3	<0.1	0	0.03	8.17	12.33
		16/10/2023	79.5	1005	<0.1	<0.1	1	0.5	0.5	0.1	0	-0.04	8.2	12.33
		14/11/2023	80.7	1005	<0.1	<0.1	0	0.9	0.9	0.2	0	0.15	8.09	12.33
		12/12/2023	79.2	1013	<0.1	<0.1	0	0.3	1.0	0.3	0	0.03	7.74	12.33
		24/01/2024	79.6	1005	<0.1	<0.1	0	0.1	0.1	<0.1	0	-0.02	7.18	12.33
28	LFG MW8	15/02/2023	98.6	1010	0	0	1	0	0.4	0.2	0	0.05	7.48	10.37
		7/03/2023	99.3	999	0	0	1	0	0.4	0.2	0	0.05	7.67	10.37
		17/04/2023	95.8	1015	0	0	1	0	0.2	0.6	0	0.05	7.5	10.37
		17/05/2023	98.9	1015	0	0	0	0.1	0.2	0	0	0.02	9.9	10.37
		20/06/2023	77.5	1011	0.1	0.1	0	0.1	0.7	0	0	0.03	7.73	10.37
		21/07/2023	79.1	1008	0	0.3	0	0.1	2.7	0.2	0	-0.04	7.76	10.37
		15/08/2023	79.5	1009	<0.1	<0.1	0	0.1	0.2	0.3	0	0.05	7.75	10.37
		19/09/2023	80.7	1004	<0.1	<0.1	0	0.1	0.1	0.1	0	-0.03	7.98	10.37
		16/10/2023	79.3	1005	<0.1	<0.1	0	0.2	1.2	0.1	0	0.02	7.76	10.37
		14/11/2023	80.3	1005	<0.1	<0.1	1	<0.1	1.2	0.2	0	0.05	7.42	10.37
		12/12/2023	79.1	1013	<0.1	<0.1	0	0.1	2.9	0.2	0	0.03	6.94	10.37
		24/01/2024	79.5	1005	<0.1	<0.1	0	0.1	0.1	<0.1	0	-0.02	7.02	10.37
29	LFG MW9	15/02/2023	98.3	1010	0	0	1	0.3	2.9	0	0	0.03	6	10.7
		7/03/2023	99.1	999	0	0	1	0.2	6.5	0.7	0	-0.02	6.18	10.7
		17/04/2023	95.2	1015	0	0	1	0.2	1.4	0.6	0	-0.03	5.86	10.7
		17/05/2023	96.3	1015	0	0	0	2.8	2.8	0.1	0	-0.02	6.2	10.7
		20/06/2023	78	1011	0.1	0.1	0	0.3	3.5	0.2	0	0.07	6.52	10.7
		21/07/2023	78.7	1008	0	0.1	0	1.3	5.1	0.1	0	-0.04	6.66	10.7
		15/08/2023	78.4	1008	<0.1	<0.1	0	1	1	0.3	0	0.03	6.75	10.70
		19/09/2023	79.4	1004	<0.1	<0.1	0	1.8	1.8	0.1	0	0.09	6.76	10.70
		16/10/2023	79	1005	<0.1	<0.1	1	0.7	2.9	0.2	0	0.05	6.71	10.70
		14/11/2023	81.4	1005	<0.1	<0.1	0	1.1	2.5	0.1	0	-0.02	5.45	10.70
		12/12/2023	81.0	1013	<0.1	<0.1	0	2.9	3.5	0.2	0	0.12	3.87	10.70
		24/01/2024	80.0	1005	<0.1	<0.1	0	1.8	1.8	<0.1	0	0.09	4.88	10.70
30	LFG MW10	15/02/2023	96	1010	0	0	1	2.8	2.8	0.1	0	0	9.85	12.38
		7/03/2023	92.9	999	0	0	1	6.8	6.8	0.2	0	0	9.87	12.38
		17/04/2023	93.8	1015	0	0	0	1.5	1.5	0.4	0	0	9.85	12.38
		17/05/2023	94.5	1015	0	0	0	4.8	4.8	0.1	0	0.02	10.16	12.38
		20/06/2023	78.1	1011	0.1	0.1	0	3.5	3.5	0	0	0.03	10.15	12.38
		21/07/2023	78.2	1008	0.1	0.1	0	2.9	6.3	0.1	0	0	10.29	12.38
		15/08/2023	78.4	1008	<0.1	<0.1	0	1	1.5	0.6	0	0.12	10.37	12.38
		19/09/2023	79.9	1004	<0.1	<0.1	0	2.1	2.1	<0.1	0	0.03	10.58	12.38
		16/10/2023	79.9	1005	<0.1	<0.1	1	3.2	4.7	0.3	0	0	10.26	12.38
		14/11/2023	81.9	1005	<0.1	<0.1	0	2.7	3.2	0.2	0	0.07	9.89	12.38
		12/12/2023	83.7	1013	<0.1	<0.1	0	3.7	3.7	0.2	0	0.07	9.56	12.38
		24/01/2024	85.0	1007	<0.1	<0.1	0	5.2	5.2	<0.1	0	-0.03	10.00	12.38
31	LFG MW11	15/02/2023	97.1	1010	0	0	1	1.5	4.1	0.1	0	0	5.13	9.36
		7/03/2023	95.9	999	0	0	1	3.6	3.6	0.2	0	-0.07	5.49	9.36
		17/04/2023	93.8	1015	0	0	1	1.3	1.3	0.4	0	0.03	5.26	9.36
		17/05/2023	94.6	1015	0	0	1	4.7	4.7	0.1	0	0	5.43	9.36
		20/06/2023	79.9	1011	0.1	0.1	0	2.7	2.7	0	0	0.03	5.59	9.36
		21/07/2023	79.7	1008	0.1	0.1	0	6.3	5.5	0.4	0	0	6.62	9.36
		15/08/2023	78.8	1008	<0.1	<0.1	0	1.4	5.1	0.1	0	0.07	5.34	9.36
		19/09/2023	81.1	1004	<0.1	<0.1	0	5.9	5.9	<0.1	0	0.03	5.6	9.36
		16/10/2023	80.3	1005	<0.1	<0.1	0	5.7	5.7	0.2	0	0.05	5.53	9.36
		14/11/2023	80.3	1005	<0.1	<0.1	2	3.4	3.4	0.1	0	0.00	4.39	9.36
		12/12/2023	80.0	1013	<0.1	<0.1	0	3.4	3.4	0.3	0	0.00	4.85	9.36
		24/01/2024	81.1	1007	<0.1	<0.1	0	6.0	6.0	<0.1	0	0.03	4.87	9.36
32	LFG MW12	15/02/2023	94.5	1010	0	0	1	4.2	4.2	0.1	0	-0.02	4.76	10.46
		7/03/2023	96.2	999	0	0	1	3.4	3.4	0	0	0.03	4.9	10.46
		17/04/2023	94.8	1015	0	0	0	1.2	1.2	0.2	0	0.03	4.91	10.46
		17/05/2023	96.6	1015	0	0	0	2.6	2.6	0.1	0	0.03	4.93	10.46
		20/06/2023	78.3	1011	0.1	0.1	0	2.4	2.4	0.1	0	0.02	5.05	10.46
		21/07/2023	81.3	1008	0.1	0.1	0	5.5	2.4	0.4	0	0.04	5.1	10.46
		15/08/2023	81.3	1008	<0.1	<0.1	0	5.2	5.2	0.3	0	0.02	5.05	10.46
		19/09/2023	82.1	1004	<0.1	<0.1	0	5.2	5.2	<0.1	0	0.03	4.93	10.46
		16/10/2023	80.6	1005	<0.1	<0.1	1	1	1	0.1	0	0.09	4.87	10.46
		14/11/2023	82.3	1005	<0.1	<0.1	1	2.6	2.6	0.2	0	0.12	4.16	10.46
		12/12/2023	82.0	1013	<0.1	<0.1	0	2.9	2.9	0.3	0	0.00	4.51	10.46
		24/01/2024	86.8	1007	<0.1	<0.1	0	8.2	8.2	<0.1	0	0.03	4.59	10.46

Table 2: Accumulation – Buildings

Location	Sample Number	06/03/2023	18/04/2023	17/05/2023	21/06/2023	18/07/2023	16/08/2023	20/09/2023	17/10/2023	14/11/2023	12/12/2023	30/01/2024	28/02/2024
Crib Room	Operations HUB Crib Room	2.9	2.1	0	19.8	2.3	3.4	0.1	0	0.0	3.6	2.4	2.8
Glengarry Cottage	Glengarry Front Office	2.9	7.2	0	20.1	8.5	3.9	0	0.1	0.5	5.3	4.0	4.6
	Glengarry Hallway	2.9	4	0	42	8	4	0	0.1				4.7
	Glengarry Kitchen	2.9	4.4	0	42.2	7.3	4.8	0	0.1		6.1	2.8	4.0
	Glengarry Managers Office	2.9	12.2	0	30.4	8.6	3.6		0.1	0.8		2.7	4.5
	Glengarry Meeting Room		10.2	0	39.4	8.8	5.1	0	0.1	0.4		3.8	4.8
	Glengarry Operations HUB	2.8	8.8	0	43.3	9.1	5.7	0	0.1	0.7	5.7	3.8	4.6
	Glengarry Store	2.9	17.8	0	34.6	8.8	5.5	0.1	0.1	0.4	5.9	2.7	4.3
	Mangers Office							0					
	Max Garden Reading								0.1		2.3	2.4	9.7
	Max Reading Garden							0.1					
	Max reading gardens	3.4	2.5	0	20.6	4.8	2.9						
Ops Office	Ops HUB	2.4	2	0	20.4	2.3							
Recycle Centre	1						3.5	0	0	0.1	2.7	2.0	7.6
	2						3.4	0	0	0.1	2.9	2.0	8.2
	Recycle Shop Eastern Area	3.2	2.3	0	21	2.3							
	Recycle Shop Western Area	2.3	3	0	20.4	2.3							
SWERF	SWERF	2.2	1.8	0	10.9	2.3	3	0	0	0.0	3.2	2.3	3.6
Weighbridge	Weighbridge	2.2	3	0	5.1	2.3	3.4	0	0	0.1	2.3	2.2	5.0

Table 3: Surface Gas Results

		6/03/2023	18/04/2023	17/05/2023	21/06/2023	18/07/2023	16/08/2023	20/09/2023	17/10/2023	14/11/2023	12/12/2023	30/01/2024	28/02/2024
Location	Sample Number												
Transect 1	1				1040								
	10				460								
	11	8.8	2.5	0	9.2	6.5							
	12	4.9	3.8	1.2	41	22.8							
	2				160								
	3				750								
	4				812								
	5				1029								
	6				2325								
	7				3040								
	8				320								
	9				2234								
Transect 7	1			0	34	26.2					55.2		
	2			0	850	125					7.5		
	3			0	2.6	1750					6.6		
	4					2980					7.7		
	5					2695					5.9		
	6					425							
Transect 8	1			0	300	17.3	14.3	5.6	6	7.5	4.8	2.8	
	2	6.1		1.2	3020	10.7	5.9	12.7	6.1	5.3	403	3.0	
	3	16.5		9.8		35.6	6.6	10	1.6	4.6	5.9	7010	
	4	130		0		150	103	7	0.7	62.7	4.3	3.3	
	5	16.3		0		698		7.8	0.7	14.6	4.8	2.9	
	6	11.2		0		104			0.8				
Transect 9	1	8.2	64.2	12.9	48.3	10.4	9	5.1	0.4	0.1			
	2	7	3.5	0	31	12.3	6.7	1.1	0.5	0.8			
	3	6.1	9.9	0	38	22.4	4.1	9.7	11.5	18.5			
	4	7.3	6.7	2.1	2480	44.5	15.8	6.8	10.4	1.8			
	5	6.3	36.6	0	2495	26.5	10.5	6.4	8.2	1.0			
	6	8.9	93	8.9	107	13	3.7		7.8	6.8			
	7	55.8							1.8				
Transect 10	1	2.2	2	13.4	19	10.1	2.7	0	8.1	0.0	2.3	6.0	2.3
	10	4.5	2.9	0	24.6	4.3	2.7	0.1	15.8	1.5	2.9	4.9	9.0
	11	6	4.6	0	2.5	10.4	3	0	0.8	0.1	19.1	7.3	4.0
	12	2.5	2.3	0	1.8	2.1	2.9	0	0.7	0.3	3.4	2.6	4.0
	13	8.2	2	9.1	31.7	7.3			0.7	0.6	3.3	2.9	6.6
	14	5.2	2.9		0.6	2.8			0.6	0.0		3.2	
	15	1.9			1.2				0.6	0.1		2.6	
	16				44.1				1	0.0		4.4	
	2	2.1	2.3	11.7	37.2	5	2.8	0.1	5.6	0.0	2.2	3.8	2.4
	3	2.2	2.3	0	51	2.4	2.7	0	5.4	0.3	2.0	3.7	2.4
	4	1.9	2	0	51.2	2.2	2.6	0.1	2.2	0.0	2.0	2.7	2.4
	5	1.9	3	0	0	2.7	2.6	0.1	0.9	0.2	1.9	2.6	2.4
	6	1.9	3.9	0	0.1	10.3	4.4	0.1	2	0.1	6.1	2.7	2.6
	7	2	3	0	1.7	3.6	20.7	0	1.5	0.1	2.6	4.9	3.9
	8	3.6	5.9	0	8.7	24.2	4.4	0.8	1.3	1.6	5.2	3.0	4.6
	9	2.1	3.3	2.2	28	31.8	3	0	6.3	0.0	2.6	3.9	4.8
Transect 11	1	8.8	2.5	0	9.2	6.5	3	0	0.7	0.1	3.4	3.0	5.3
	2	4.9	3.8	1.2	41	22.8	4.8	0.3	0.9	0.7	10.6	2.8	5.1
	3	13.1	2.7	1.4	59	9.5	11	7.8	0.8	5.1	7.6	9.2	4.9
	4	7.9	4.9	13.2	19.1	5.5	3.9	0.7	5.1	0.5	29.3	51.2	4.2
	5	3.8	6.9	0	16.3	8.8	3.1	0.3	2.8	1.6	6.1	3.5	4.3
	6	4.4	13.1	0	21.4	9.9	40.3	0.3	2.2	54.1	11.4	4.2	3.4
	7	12.2	2.3	1.7	31.9					0.0			
	8	6.3			30.5								
Transect 12	1	5.1	19.9	65.5	65.2	106	51.9	31.5	31.1	12.4	24.4	31.2	11.5
	2	5.6	6.5	68.2	34	34	9.5	13.4	14	7.9	3.9	7.5	20.3
	3	5.8	10.7	40.2	17.7	23	12.4	11.4	8.2	8.2	26.8	7.8	18.0
	4	7.7	9.9	33.1	0	5.9	11.3	0.1	5.9	10.3	4.4	28.0	11.2
	5	3.2	6.9	28.2	0.1	25.5	7.6	0.5	0.8	1.9	27.3	8.3	3.4
	6	8.7	8.5	20.8	0	11.7	10.4	0.5	0.6	2.5	28.7	4.0	13.6
	7	7.1		18.9	1.3	10.8	50.7	6.1	1.2	12.1	7.2	3.3	7.3
	8				14.1	18			5.8		39.8	9.3	
Transect A	1	2.5	2.6	0	0	23.5	9.2	6.5	0.1	0.0	3.4	2.2	2.4
	2	2.6	2.7	0	0	3.9	8.1	5.9	0	0.0	3.4	2.1	2.5
	3	2.5	2.5	0	0	2.8	11.7	1.3	0	0.0	3.4	2.1	2.4
	4	2.5	2.5	0	0	3.5	12	0.3	0	0.0	3.4	2.1	2.4
	5		2.6		0	2.7		0.1	0				2.4
Transect C	1	2.4	2.5	0	0	3.7	11.1	0.3	0	0.0	3.3	2.1	
	10		2.8										
	2	2.5	2.6	0	0	2.6	9.9	1.9	0	0.5	3.2	2.1	
	3	2.6	2.9	0	0	2.7	8.8	2.1	0	0.1	3.1	2.1	
	4	12.7	3.1	0	0	2.6	8.8	6.2	0	1.6	3.0	2.2	
	5	2.5	2.9	0	0	2.9	20.1	5.4		0.1	4.3	14.0	
	6	2.7	3	0	0	6.5	14.5	6.7	5.2	8.2	3.0	22.1	
	7	2.6	2.8	15.2	0	8	25.7	9	0.9	0.0	2.9	30.1	
	8	2.4	2.8	20.2	0	6.9	20.3	1.7	14.3	0.0	2.8	23.1	
	9		2.7	24.3	0								
Transect D	1	2.4	14	0	0	11.5	7.1	0.4	1.2	7.1	2.0	2.2	
	2	2.5	9.3	0	0	7.1	9.2	5.6	0	8.2	2.0	2.2	
	3	2.5	3	10.9	0	8.5	9.2	2.1	0	7.6	2.1	2.2	
	4	2.4	3.9	9.3	0	9.3	17.7	2.2	0	1.1	2.0	2.4	
	5	2.4	3.6	11.1	0	7.2	13	5.2	0	0.2	2.3	5.9	
	6		12.6		0.1	5.8			0	0.0			

		6/03/2023	18/04/2023	17/05/2023	21/06/2023	18/07/2023	16/08/2023	20/09/2023	17/10/2023	14/11/2023	12/12/2023	30/01/2024	28/02/2024
Location	Sample Number												
Transect E	1	2.3	7.2	0	0.1	7.9	30.6	7.4	0.1	0.0	1.8	9.1	
	2	2.3	3.2	0	0	8.8	17.7	6.7	0.7	0.0	1.9	4.5	
	3	2.3	4	0	0	2.6	28.1	5.9	9.1	0.0	3.5	2.5	
	4	2.4	4.9	0	0.1	6.1	22.3	6	6.4	0.1	11.6	4.3	
	5	2.4	23.3	0	0.1	14.4	15.3	8.1	6.5	0.0	7.7	8.3	
	6	2.5	11.5	0	0	28.1					6.7	7.2	
	7	2.3	7.1	0							7.4	10.1	
Transect F	1	2.5	4.3	8.1	0	2.9	34.3	0	8.9	0.8	2.0	15.8	
	2	2.1	2.7	0	0	2.8	52.4	5.3	0.2	2.1	1.9	6.6	
	3	2.2	2.1	0	0	3.8	22.2	6.4	0.2	1.3	1.9	8.3	
	4	2.2	3.2	0	0	4	13.1	1.8	0.1	1.4	1.9	8.9	
	5	2.2	2.9	0	0	2.8	22.5	0.3	0	1.0	1.9	14.9	
	6	2.3	2.4	0	0	3.2	16.3	2	0.1	1.0	1.8	7.1	
	7	2.3	2.2	0	0	13.4	15.9	5.5	0	0.0	1.8	10.1	
	8	3.7	2.3	0		16.6	7.9		0	0.0	1.8	2.2	
Transect G	1	2.2	4.9	0	0	3.8	12.4	0.5	0	0.1	2.3	2.2	
	2	2.3	4.6	0	0	3.7	11.5	1.2	0	0.4	2.4	2.2	
	3	2.3	5.1	0	0	2.6	9.1	0.3	0	0.0	2.1	2.2	
	4	2	2.8	0	0	2.7	14.9	0.9	0.1	5.1	2.0	2.8	
	5	2.2	2.8	0	0	2.6	16.3	0.4	0.2	1.9	2.0	2.7	
	6	2.2	2.9	0	0	2.8	19.9	1.4	1	9.3	2.0	6.0	
	7	2.2	3.6	0	0	2.7	7.8			13.1	2.0	11.3	
Transect H	1	2.1	2.8	14.1	0.1	2.9	2.8	1	10.3	0.0	2.7	14.9	2.4
	2	2.3	2.6	12.1	0	2.9	2.8	0.6	0	0.1	2.6	8.0	2.4
	3	2.4	2.6	13.2	0.1	2.6	2.9	0.9	0.1	0.0	2.6	2.7	2.4
	4	2.1	3.3	12.6	0	2.8	3.2	1.6	0	0.0	2.6	5.8	2.4
	5	2.1	5.8	10.5	0	4.1	11.8	1.5	0.1	1.0	2.6	2.6	2.4
	6	2	6.5	11.3	0	4.2	11.5	0.1	0	1.2	3.3	2.5	2.5
	7	2.1	6.9		0				0			2.2	2.5
	8	2.1											
Transect I	1	2.5	2.8	0	0.1	2.7	9.6	1.4	11.2	0.0	2.5	5.0	
	2	2	2.9	0	0	2.5	6.5	1.3	0	0.0	2.5	9.8	
	3	2	14.3	0	0	2.4	2.7	0.9	0	0.0	2.3	7.2	
	4	2.1	11.4	11.8	0	2.4	21.8	0	0	0.0	2.3	6.3	
	5	2	7.4	10.3	0	2.4	11.9	6.6	0	0.0	2.4	2.6	
	6	2.1	7.7	10.9	0	2.5	7.6	0.6	0	0.0	2.4	6.2	
Transect J	1	2	2.8		0.1	4.1	4.6	0.1	0.1	0.1	7.0	5.8	
	2	2.2	2.9		0	2.8	4.1	0	1.9	0.0	6.1	6.9	
	3	2.1	2.9		0.1	2.5	10.8	1.2	0	0.0	6.1	6.3	
	4	2	3.1		0	2.4	8.5	0.2	0.4	0.0	5.1	3.0	
	5	2.1	3.4		0	2.5	8.9	0.9	1.6	0.0	6.7	3.9	
	6	2	2.5		0	2.5	7.1	0	0.9	0.0	6.7		
	7				13.1								
Transect K	1	2.3	14.7		0.1	2.6	7	0.1	0	0.7	12.5	3.5	
	2	2	2		0.1	2.5	7.5	0	0	0.0	4.3	5.1	
	3	1.9	2.8		0	2.4	13.4	0	0.1	0.0	7.1	6.5	
	4	2.2	2		2.1	2.4	13.6	0	5.3	0.0	8.5	7.3	
	5	2.2	2.3		0	2.3	7.6	0	5.9	0.0	15.9	7.2	
	6	2.1	3.1		0	2.5	5.6	0	7.7	0.0	7.8	7.9	
Transect L	1	2.2	1.9	0	0	2.6	4.8	0.8	9.1	0.1	5.7	3.9	
	2	7	2.2	10.5	0.1	6.2	20.8	0	6.6	0.1	4.5	4.3	
	3	2.1	7.4	0	0.1	2.5	4.4	0.1	6.6	0.0	4.3	3.4	
	4	6	2.5	0	0.1	2.8	4.6	0.3	5.9	0.3	4.5	2.7	
	5	2.1			20.6	2.2	5.2		8	1.2	3.6		
	6	2.1			9		5.2		7.6	1.5	3.5		
Transect M	1	2.6	2.4	0	0	2.8	10.1	0	0.7	0.0	3.7	5.3	
	2	2	4.1	10.4	0	6.9	9.1	1	1.3	0.6	19.1	9.2	
	3		2.6	0	0	17.3	9.2	0	1.4	0.0	5.6	2.9	
	4		3.1		12.8	1.9	11.8	0	1.8	0.0	4.6	3.2	
	5				0	2		0.8	0.9	1.2	4.1		
	6								1.5	0.2	11.3		
Transect N	1	1.9	3.9	0	2.5	1.9	5.1	0.3	6.3	0.0	6.4	5.3	
	2	2	2.6	0	0.6	1.9	3.3	0	6.8	0.0	6.3	5.3	
	3	2.1	2.4	0	36.2	9.9	4	0.1	1.5	0.1	5.9	6.3	
	4	2.1	2.8	0	0	2	3.3	0	2.1	0.0	13.3	5.5	
	5	2	4.9	0	0.1	2.1	3.3	0.6	1.8	0.0	5.9	7.7	
	6	1.9	2.1	0	0	2.2	4.6	0.1	1.4	0.0	6.1	6.0	
181 Reddalls Rd, fenceline adjoining landfill	1	2.3	2.3	0	0	2.4							
	3	2.3	2.2	0	0	2.3							
	5	2.3	2.1	0	0	2.6							
	7	2.3	2.4	0	0.1	2.3							
	8	2.4	2.3	0	0	2.3							
181 Reddalls Rd, Immediate gardens max value	1		2.5	0		2.3							
	2	2.3	2.3	0	0	2.3							
	4	2.3	2.3	0	0	2.3							
	6	2.3	2.2	0	0	2.3							
Methane Blank (Post testing)	1	2	2	0	0.3	2.6							
Methane Blank (Pre testing)	1	1.9	2.1	0	8.5	2.4							

Appendix E: Dust : Tabulated Data and Trends

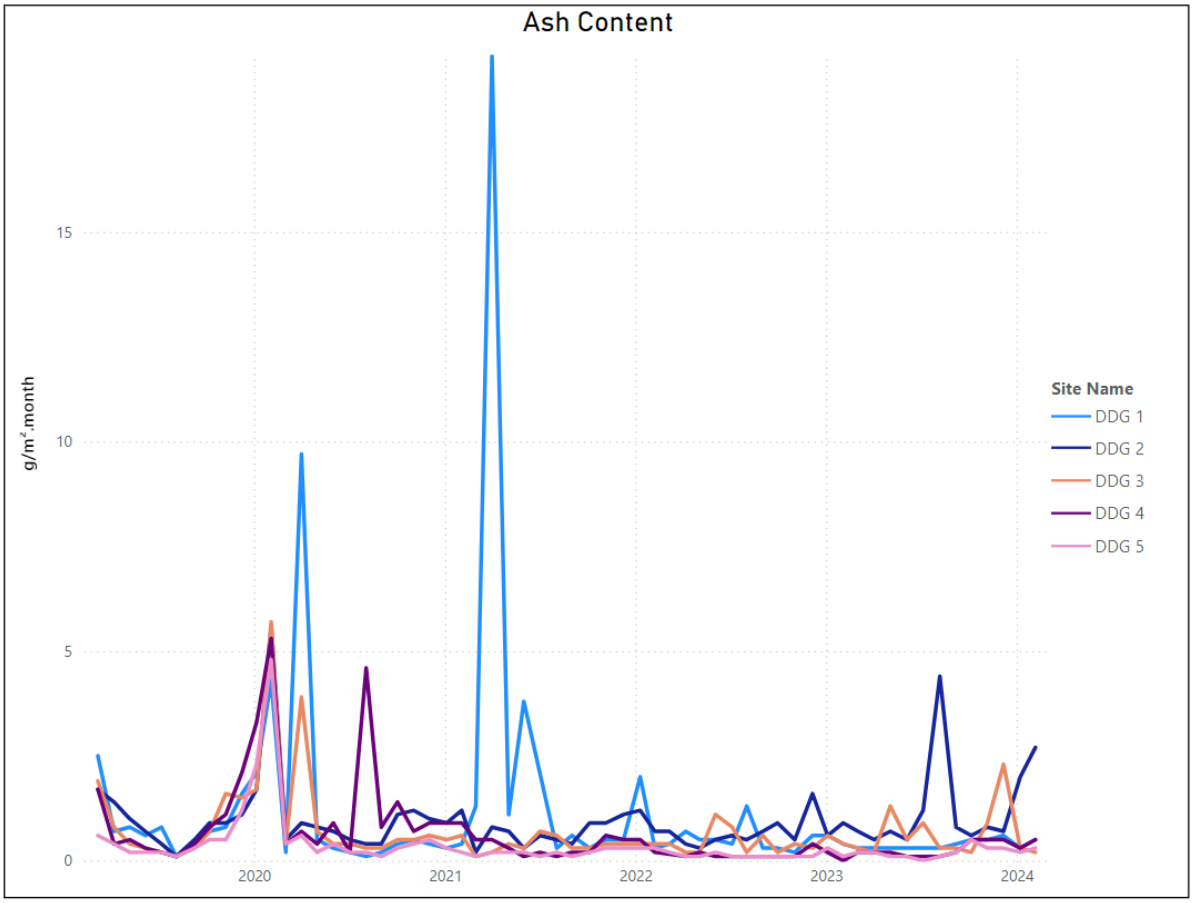
Table 1: Respirable Dust

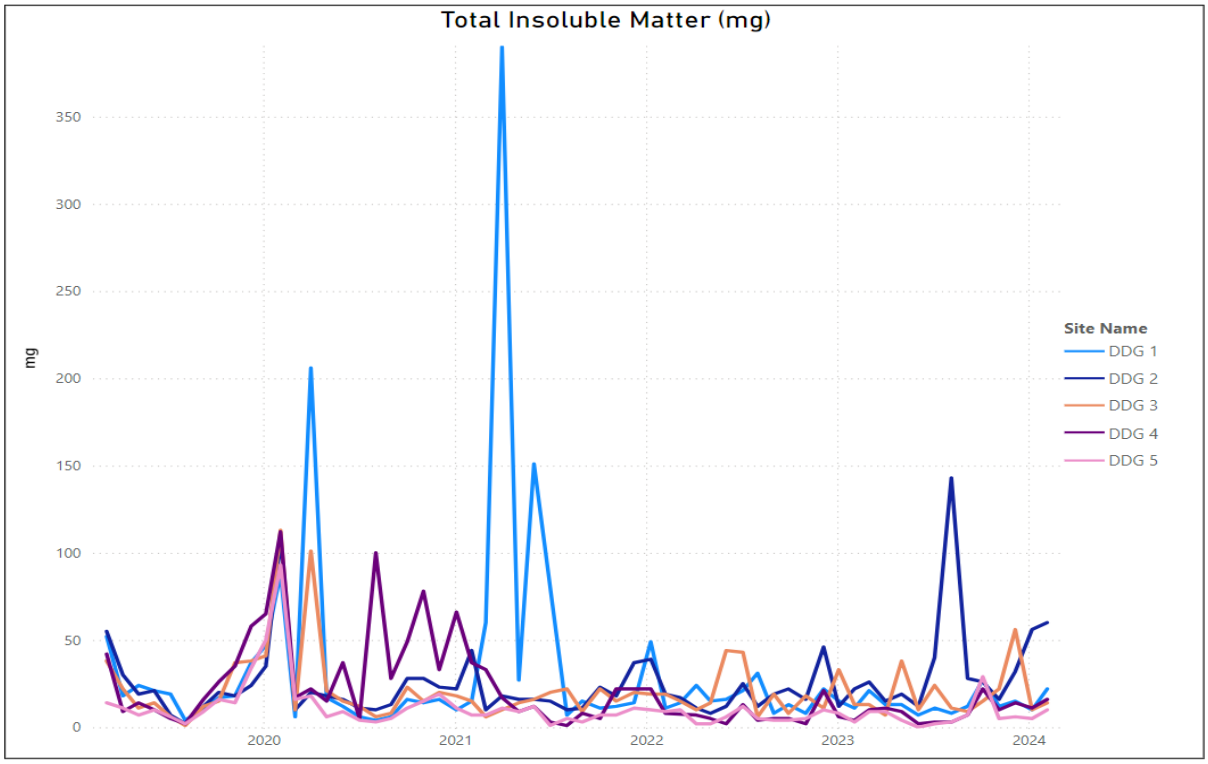
		PM10	PM10 (mass per filter)	Total Suspended Particulates	Total Suspended Particulates (mass per filter)
Units		µg/m³	mg/filter	µg/m³	mg/filter
Site Name	Sample Date				
Glengarry Cottage PM10	23/03/2023	11.7	17.6		
	17/04/2023	21.0	32.3		
	16/05/2023	11.4	17.4		
	20/06/2023	8.5	13.3		
	17/07/2023	18.8	29.3		
	14/08/2023	1.7	2.7		
	18/09/2023	56.2	83.7		
	17/10/2023	3.2	5.1		
	13/11/2023	18.9	28.8		
	12/12/2023	19.1	28.8		
	15/01/2024	13.5	20.6		
	20/02/2024	13.3	20.1		
Glengarry Cottage TSP	23/03/2023			16.8	25.4
	17/04/2023			50.4	77.7
	16/05/2023			25.2	38.9
	20/06/2023			23.1	36.3
	17/07/2023			58.8	92.2
	14/08/2023			3.0	4.7
	18/09/2023			122	182
	17/10/2023			9.2	14.4

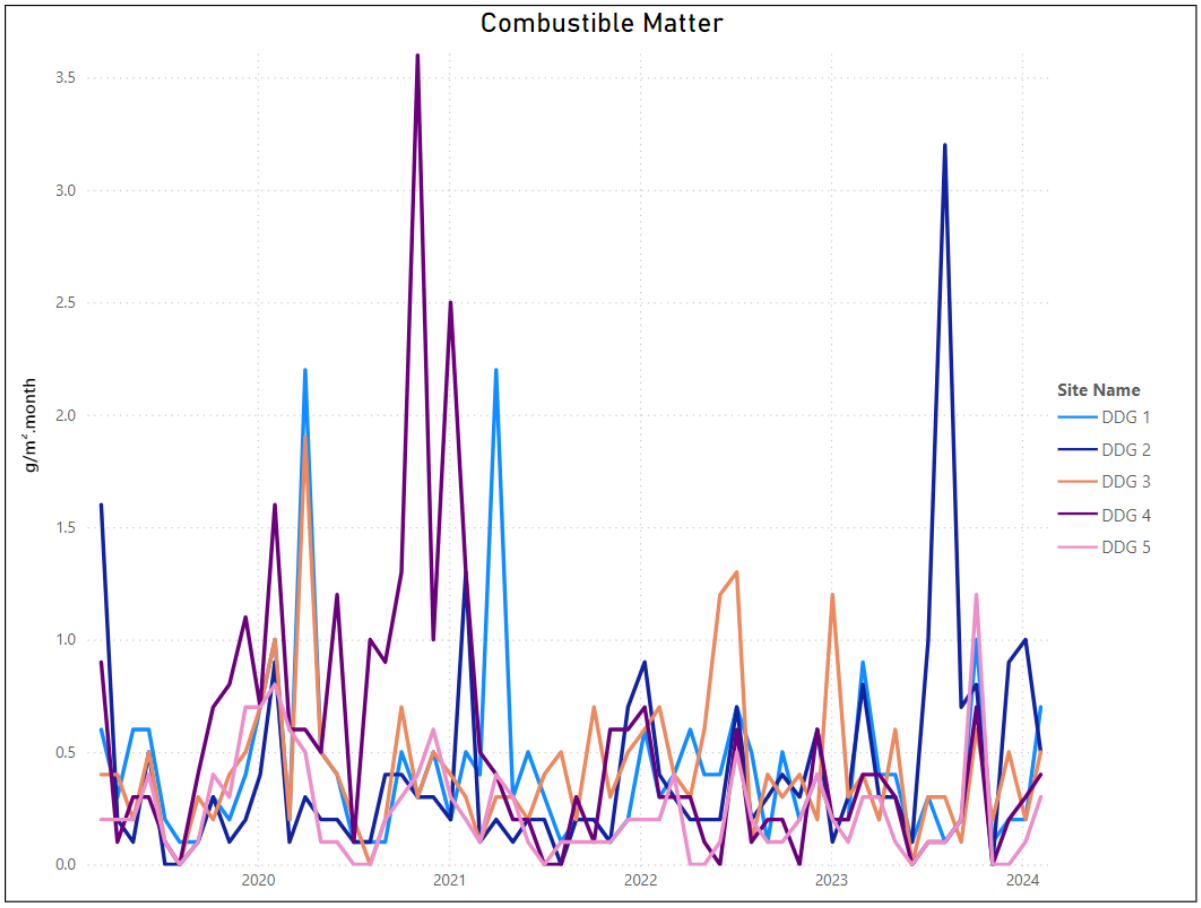
	13/11/2023			44.1	67.2
	12/12/2023			43.2	65.0
	15/01/2024			23.1	35.3
	20/02/2024			28.7	43.5
Landfill PM10	22/03/2023	15.6	23.4		
	18/04/2023	13.4	20.2		
	17/05/2023	5.5	8.5		
	22/06/2023	9.3	14.2		
	18/07/2023	5.8	8.9		
	15/08/2023	4.5	7.0		
	20/09/2023	19.2	28.5		
	18/10/2023	8.6	13.2		
	14/11/2023	17.2	20.8		
	13/12/2023	14.9	21.9		
	16/01/2024	15.1	22.5		
	21/02/2024	9.1	13.6		
Landfill TSP	22/03/2023			20.5	30.9
	18/04/2023			21.2	32.1
	17/05/2023			12.2	18.9
	21/06/2023			20.2	31.3
	18/07/2023			12.8	19.8
	15/08/2023			9.2	14.4
	20/09/2023			34.3	50.8
	18/10/2023			18.5	28.5
	14/11/2023			32.6	39.3
	13/12/2023			26.9	39.5
	16/01/2024			23.8	35.5
	21/02/2024			17.9	26.6

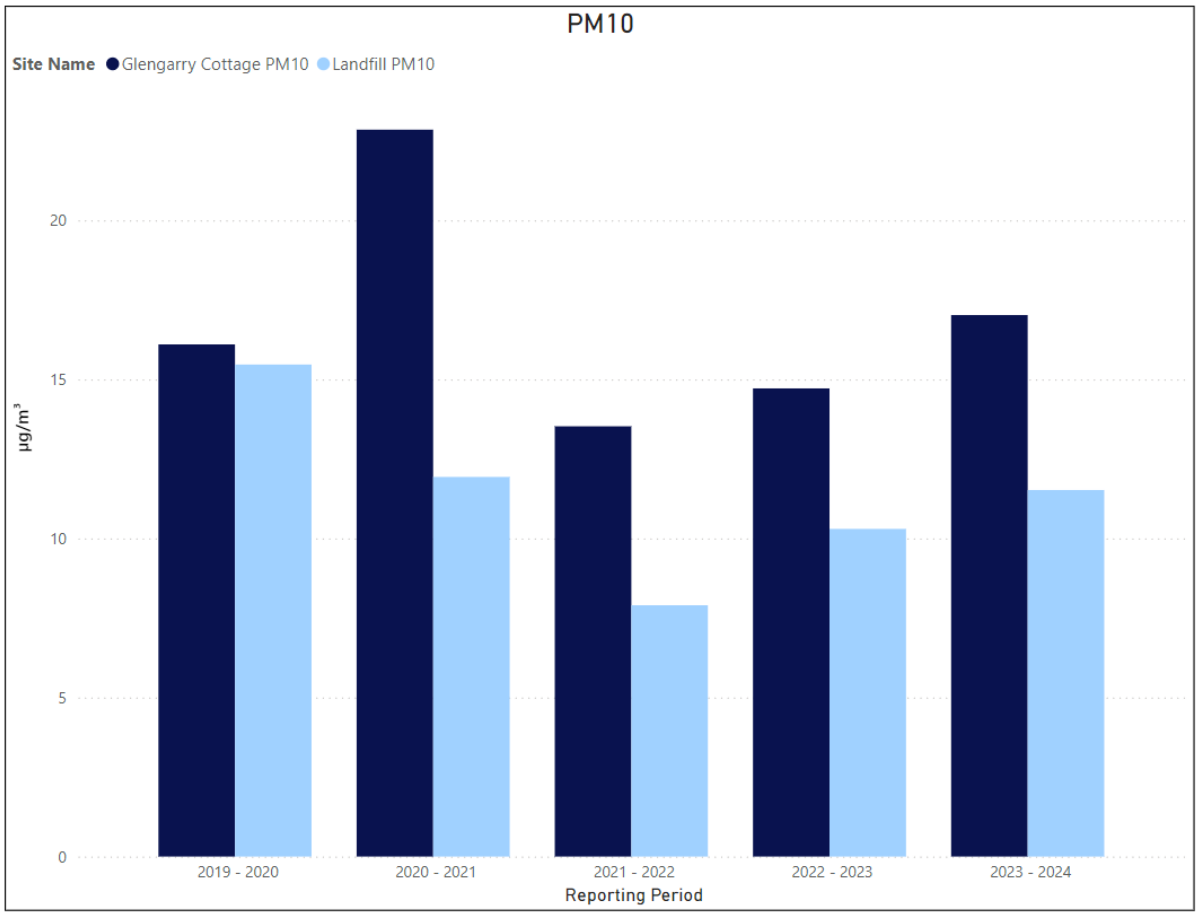
Table 2 Total Insoluble Matter

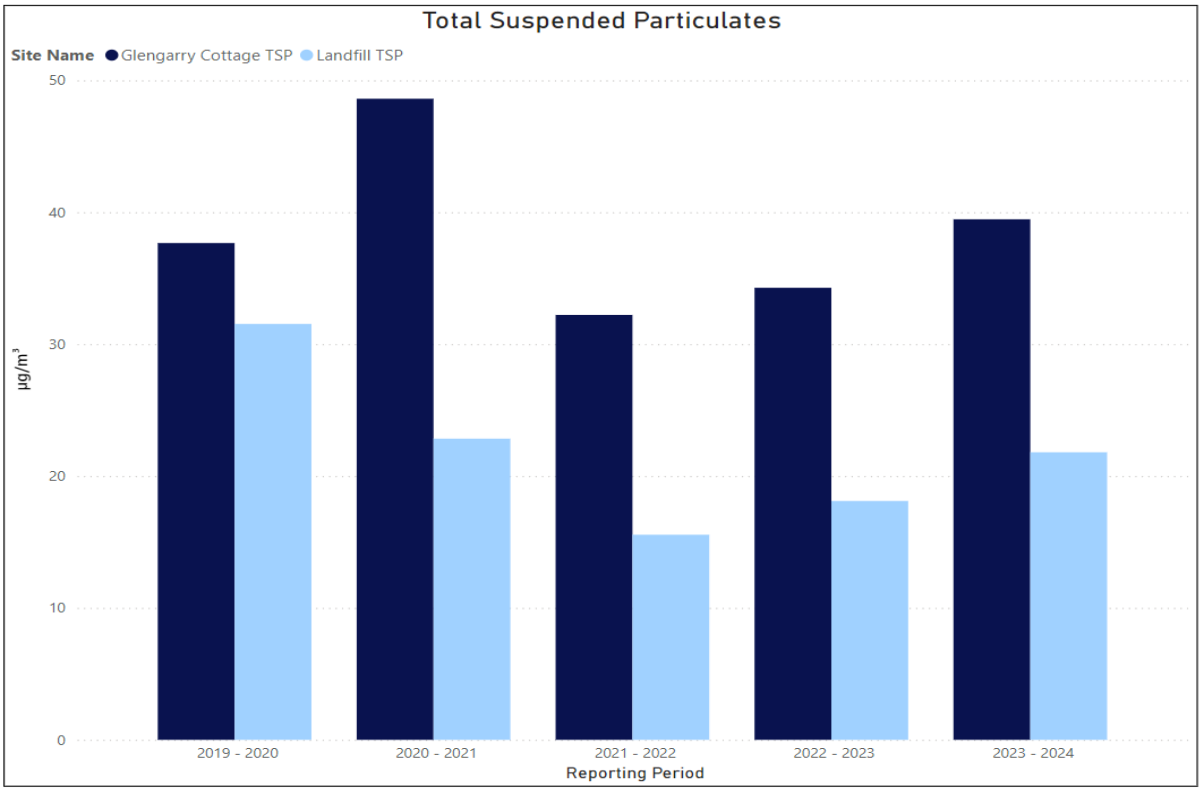
Site Name			DDG 1	DDG 2	DDG 3	DDG 4	DDG 5
Sample Date	Chemical Name	Units					
03/03/2023	Total Insoluble Matter	g/m².month	1.2	1.5	0.7	0.6	0.5
03/04/2023	Total Insoluble Matter	g/m².month	0.7	0.8	0.4	0.6	0.5
04/05/2023	Total Insoluble Matter	g/m².month	0.7	1.0	1.9	0.5	0.2
05/06/2023	Total Insoluble Matter	g/m².month	0.4	0.6	0.5	0.1	0.1
06/07/2023	Total Insoluble Matter	g/m².month	0.6	2.2	1.2	0.2	0.1
07/08/2023	Total Insoluble Matter	g/m².month	0.4	7.6	0.6	0.2	0.2
07/09/2023	Total Insoluble Matter	g/m².month	0.6	1.5	0.4	0.4	0.4
06/10/2023	Total Insoluble Matter	g/m².month	1.5	1.4	0.8	1.2	1.7
06/11/2023	Total Insoluble Matter	g/m².month	0.6	0.8	1.1	0.5	0.3
07/12/2023	Total Insoluble Matter	g/m².month	0.8	1.6	2.8	0.7	0.3
08/01/2024	Total Insoluble Matter	g/m².month	0.5	3.0	0.5	0.6	0.3
06/02/2024	Total Insoluble Matter	g/m².month	1.2	3.2	0.7	0.9	0.6




Total Insoluble Matter (mg)
mg
350
300
250
200
150
100
50
0
2020
2021
2022
2023
2024
Site Name
DDG 1
DDG 2
DDG 3
DDG 4
DDG 5


Combustible Matter
g/m².month
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2020
2021
2022
2023
2024
Site Name
DDG 1
DDG 2
DDG 3
DDG 4
DDG 5


PM10
Site Name
Glengarry Cottage PM10
Landfill PM10
µg/m³
20
15
10
5
0
2019 - 2020
2020 - 2021
2021 - 2022
2022 - 2023
2023 - 2024
Reporting Period


Total Suspended Particulates
Site Name
Glengarry Cottage TSP
Landfill TSP
50
40
30
20
10
0
µg/m³
2019 - 2020
2020 - 2021
2021 - 2022
2022 - 2023
2023 - 2024
Reporting Period