BORAL RESOURCES (NSW) PTY LTD

ABN: 51 000 756 507

2024 Annual Environmental Management Report

Stockton Transgressive Dune Quarry

Prepared by:

RWCorkery&co

April 2025

ACKNOWLEDGEMENT

R.W. Corkery & Co. acknowledge and pay our respects to the Traditional Custodians of the lands in NSW and Australia on which our projects are located. We value the knowledge, advice and involvement of the Elders and extended Aboriginal community that contribute to our Projects and extend our respect to all Aboriginal and Torres Strait Islander peoples.

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2024 Annual Environmental Management Report

Stockton Transgressive Dune Quarry

Period: 1 January 2024 to 31 December 2024

Prepared for:

Boral Resources (NSW) Pty Ltd
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Ref No. 822/15 April 2025

RWCorkery&co

Table 1
Title Block

Name of operation	Stockton Transgressive Dune Quarry
Name of operator	Boral Resources (NSW) Pty Ltd
Development consent / project approval #	DA 140-6-2005
Name of holder of development consent / project approval	Boral Resources (NSW) Pty Ltd
Water licence #	Groundwater Licence 20BL171772
Name of holder of water licence	Boral Resources (NSW) Pty Ltd
AEMR start date	1 January 2024
AEMR end date	31 December 2024
I, Rod Johnson, certify that this audit report is a true and accurate record of the compliance status of the Stockton Transgressive Dune Quarry for the period 1 January 2023 to 31 December 2023 and that I am authorised to make this statement of behalf of Boral Resources (NSW) Pty Ltd. *Note.* *a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.* *b) The Crimes Act 1900 contains other offences relating to false and misleading information: Section 192G (Intention to defraud by false or misleading statement – maximum penalty 5 years imprisonment); Section 307A, 307B and 307C (false or misleading application/information/documents – maximum penalty 2 years imprisonment or $22,000, or both).*	
Name of authorised reporting officer	Rod Johnson
Title of authorised reporting officer	Quarry Manager
Signature of authorised reporting officer	
Date	30 April 2025

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LIST OF ACRONYMS

AEMR	Annual Environmental Management Review
ANZECC	Australia and New Zealand Environment and Conservation Council
BTEX	Benzene, toluene, ethylbenzene and xylene
CRD	cumulative rainfall deviation
DA	Development Application
dB(A)	A-weighted decibels
DCCEW	Department of Climate Change, Environment and Water
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
DPIE	Department of Planning, Industry and Environment
EC	Electrical Conductivity
ECS	Environmental Management Strategy
EIS	Environmental Impact Statement
EPL	Environment Protection Licence
EPP	Environmental Permit Planner
GDE	Groundwater Dependent Ecosystem
GWMP	Groundwater Management Plan
HLM	Hunter Land Management
MDL	Mineral Deposit Limited
NPWS	National Parks and Wildlife Services
NSW	New South Wales
RAR	Response to Auditor Recommendations
RLMP	Rehabilitation and Landscape Management Plan
RWC	R.W. Corkery & Co. Pty Limited
TARP	Trigger Action Response Plan
TPH	Total Petroleum Hydrocarbons
WAL	Water Access Licence

1. Statement of Compliance

Table 2
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	Yes / No
DA 140-6-2005	No
EPL 10132	Yes

Table 3
Non-compliances

Relevant Approval	Condition #	Condition Description (summary)	Compliance Status	Comment	Where Addressed in Annual Review
DA 140-6-2005	Schedule 2 Condition 2	The Applicant shall carry out the development generally in accordance with DA-140-6-2005	Low Risk	This condition relates to general compliance with requirements described in DA 140-6-2005, the EIS for the operation and associated documents. Due to the non-compliances with Condition 12 of Schedule 3 of DA 140-6-2005, the operation does not comply with the condition.	9.1.1, 9.1.2
DA 140-6-2005	Schedule 3 Condition 12	Requirement to implement a Groundwater Monitoring Program in accordance with the approved plan.	Low Risk	Aspects of the groundwater and surface water monitoring program were not undertaken in accordance with GWMP.	9.1.1 and 9.2.1

Compliance Status Key

Risk level	*Colour code*	*Description*
High	*Non-compliant*	*Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.*
Medium	*Non-compliant*	*Non-compliance with:* • *potential for serious environmental consequences, but is unlikely to occur; or* • *potential for moderate environmental consequences, but is likely to occur.*
Low	*Non-compliant*	*Non-compliance with:* • *potential for moderate environmental consequences, but is unlikely to occur; or* • *potential for low environmental consequences, but is likely to occur.*
Administrative non-compliance	*Non-compliant*	*Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).*

2. Introduction

2.1 Scope and Format

The Stockton Transgressive Dune Quarry ("Stockton Quarry") is owned and operated by Boral Resources (NSW) Pty Ltd ("Boral") and is located east of Fullerton Cove, approximately 9km northeast of Newcastle (see **Figure 1**). Development Consent DA 140-6-2005 (DA 140-6-2005) was granted on 24 January 2006 to permit extraction of sand from the active dune system within Pit 7 (see **Figure 2**), an area historically mined by Mineral Deposits Limited (MDL). It is noted that former Pits 1-6 are now covered under the new approval, SSD-52984213, and this document is not required to report on the status of works under this approval (**Figure 2**).

This *Annual Environmental Management Report* (AEMR) has been compiled by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Boral Resources (NSW) Pty Ltd ("Boral"). This report is applicable for the period 1 January 2024 to 31 December 2024 ("the reporting period"). The information presented within this AEMR has been prepared based on information provided by Boral and observations made during a site visit on 3 March 2025.

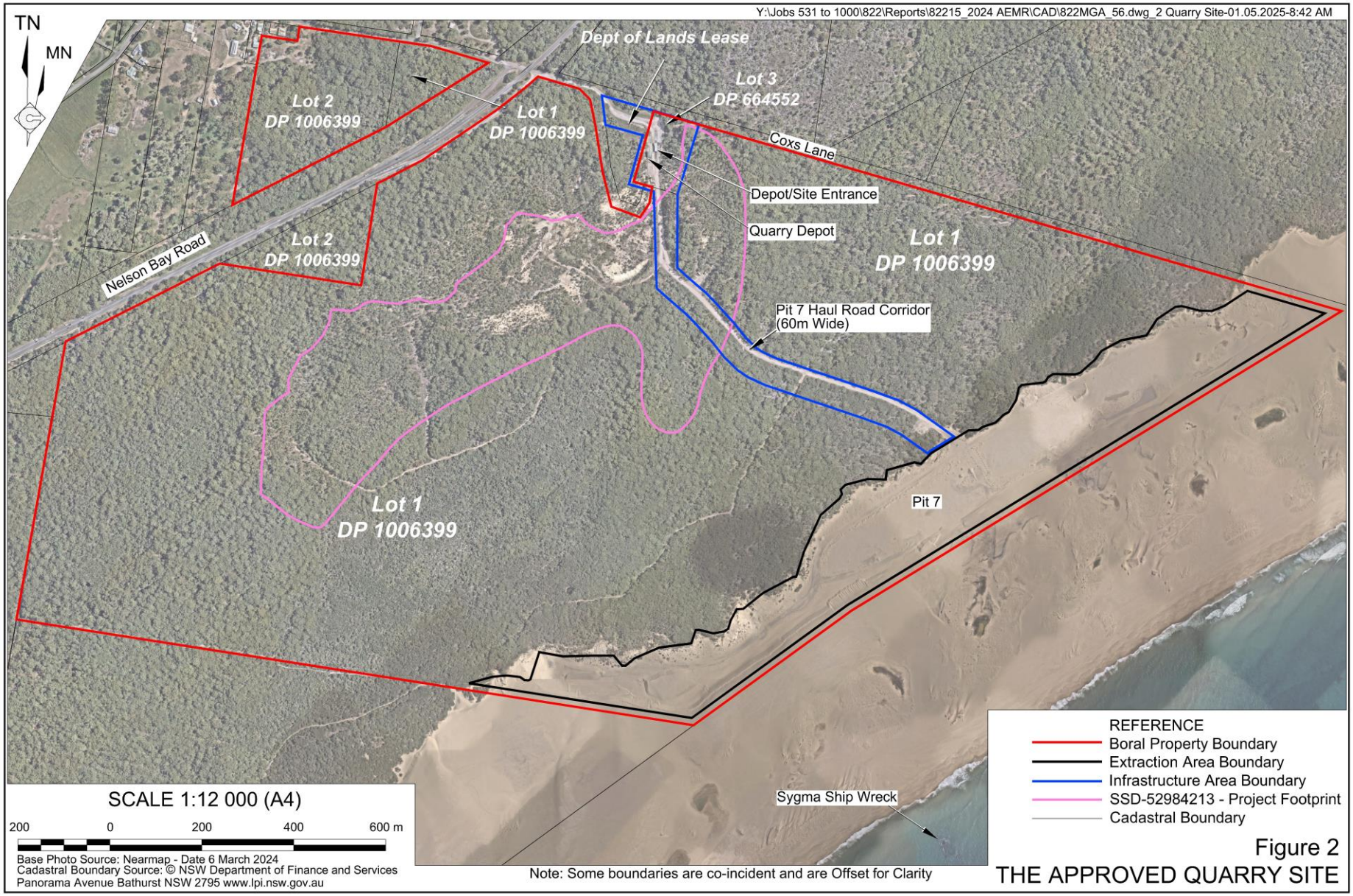
It should be noted that this AEMR has been prepared based upon the approval and licencing requirements applicable for the reporting period, however, the report generally follows the format and content requirements identified in the *Annual Review Guideline* dated October 2015.

This AEMR has been prepared in accordance with *Condition 4(3)* of Development Consent 140-6-2005 to record the activities and environmental monitoring undertaken within the Stockton Quarry during the reporting period and to outline the activities and environmental monitoring planned throughout the next reporting period (1 January 2025 to 31 December 2025). *Condition 4(3)* requires the preparation of a report that:

- identifies the standards and performance measures that apply to the development (see Section 3 and Section 7);
- describes the works carried out throughout the last 12 months (see Section 5);
- describes the works that will be carried out throughout the next 12 months (Section 12);
- includes a summary of the complaints received during the past year, and compares this to the complaints received in previous years (see Section 11.2);
- includes a summary of the monitoring results for the development during the past year (see Section 8, Section 9 and Section 10);
- includes an analysis of these monitoring results against the relevant:
  - *impact assessment criteria;*
  - *monitoring results from previous years; and*
  - *predictions in the EIS.*

  (see Sections 8 and Section 9);

Figure 1
LOCALITY PLAN



Note: Some boundaries are co-incident and are Offset for Clarity

Figure 2
THE APPROVED QUARRY SITE

- identifies any trends in the monitoring results over the life of the development to date (see Section 8 and Section 9);
- identifies any non-compliance(s) during the previous year (see Section 1, Section 11 and **Appendix 1**); and
- describes what actions were, or are, being taken to ensure future compliance (see Section 11).

2.2 Key Personnel Contact Details

The key personnel contact names, positions and phone numbers are as follows.

Name	Position	24 Hour Contact
Mr Rod Johnson	Quarry Manager	0401 896 198

2.3 Management of Document Preparation

This report has been prepared by Ms Claudia Le Quesne, (B.Sc (Biology); M MarScMgt) Environmental Consultant with R.W. Corkery & Co. Pty Limited, and was peer reviewed by Mr Caiden O'Connor, (B.Sc. (Geology)) Senior Environmental Consultant, with the same Company.

On behalf of Boral, Mr Rod Johnson supplied documentation and information for review and inclusion within the report.

Mr Ben Rose, Director and Principal Hydrogeologist at Groundwater Check, prepared the annual Groundwater Monitoring Review (included as **Appendix 2**).

3. Existing Approvals

Boral is required to operate the Stockton Quarry in accordance with a development consent and four licences, listed in **Table 4**.

Table 4
Stockton Quarry – Approvals and Licences

Consent/Lease/Licence	Issue Date	Expiry Date
Development Consent 140-6-2005	24/01/2006	15/10/2028[#]
Development Consent SSD-52984213	08/08/2024	31/12/2034[>]
Environment Protection Licence No 10132	13/07/2007*	1 December[+]
Crown Land Licence No. LI 196915	08/11/1994	Termination date not specified
Bore Licence 20 BL 171772	04/03/2008	In Perpetuity
Water Access Licences 20AL213136 20AL220991 20AL221243 20AL221416		

\# Provides for "20 years after the date operations commence" – Condition 2(5)
[>] Relates to the Stockton Dry Sand Extraction Project with reporting not required as part of this AEMR.
* Date Received
\+ Anniversary Date

No modifications or variations to the development consent or licences outlined in **Table 4** were obtained within the reporting period.

Table 5 outlines the sections within this document that address the conditional requirements under Development Consent 140-6-2005 *Condition 4(3)* regarding annual reporting.

Boral operates the Stockton Quarry in accordance with Environment Protection Licence (EPL) 10132. This licence incorporates standard conditions for extractive industries and includes a limit for noise emissions from Quarry operations (see Section 8.1).

A development application (SSD-9490) to permit extraction of sand from inland dunes within the Boral property using free dig and dredging methods was publicly exhibited between 13 March 2020 and 9 April 2020. That application is separate to the wind-blown sand extraction activities permitted under DA 140-6-2005 with product despatch and associated transportation activities the only components that would require combined limitations. At the time of finalising this report, that application was yet to be determined.

Due to the ongoing delay in resolving outstanding water matters relating to SSD-9490, Boral determined that an interim application would be required to maintain extraction operations. A separate development application (SSD-52984213) to extract the remaining dry sand resource by free dig method from within the inland dune area was publicly exhibited between 14 September 2023 and 11 October 2023. Approval of SSD-52984213 was granted on 8 August 2024. It is noted that this report considers matters relating to DA 140-6-2005 only and reporting obligations under SSD-52984213 will be undertaken separately in accordance with the conditions of consent.

Table 5
Development Consent 140-6-2005 (Mod 2) Condition 4(3) Requirements

Development Consent 140-6-2005 *Condition 4(3)*	AEMR Section
Condition 4(3)(a) – Identify the standards and performance measures that apply to the development	Sections 8.1, 9.1 and 9.2
Condition 4(3)(b) – Describe the works carried out in the last 12 months	Sections 5 and 10.1
Condition 4(3)(c) – Describe the works that will be carried out in the next 12 months.	Section 12
Condition 4(3)(d) – Include a summary of the complaints received during the past year, and compare this to the complaints received in previous years.	Section 11.2
Condition 4(3)(e) – Include a summary of the monitoring results for the development during the past year	Sections 8, 9.1 and 9.2
Condition 4(3)(f) – Include an analysis of these monitoring results against the relevant: ▪ impact assessment criteria; ▪ monitoring results from previous years; and ▪ predictions in the EIS.	Sections 8, 9.1 and 9.2
Condition 4(3)(g) – Identify any trends in the monitoring results over the life of the development.	Sections 8, 9.1 and 9.2
Condition 4(3)(h) – Identify any non-compliances during the previous year.	Section 11.3
Condition 4(3)(i) – Describe what actions were, or are being taken to ensure compliance.	Section 11.3

A groundwater licence (20BL171772) was re-issued to Boral on 4 March 2008 by the then Department of Water and Energy (now Water NSW) for the purposes of groundwater monitoring. This licence covers the groundwater bores that constitute the groundwater monitoring network (described in detail in Section 9.2.1).

Despatch of sand products from the Depot entrance to Coxs Lane occurs via a road constructed across Crown Reserve 170039 (under a Crown Land Licence No. LI 196915). This licence was granted by the Minister for Land and Water Conservation on 8 November 1994 and will remain in force until Boral determines to revoke the licence in accordance with *Condition 38* of the Licence.

Water Access Licence (WAL) 20AL213136 (zero share allocation) was issued on 5 January 2015, to permit extraction of water from the Stockton Groundwater Source. Water within this source is managed through the *Water Sharing Plan for the North Coast Coastal Sands Groundwater Sources 2016*. The WAL permits extraction of groundwater in accordance with the conditions provided in the licence.

Boral lodged an application for a Water Allocation Licence (ROI-20-019) with the Natural Resources Access Regulator on 9 December 2020 and was granted WAL 20AL220991 and 20AL221243 for 100 and 320 shares respectively under the *North Coast Coastal Sands Groundwater Sources - Stockton Groundwater Source*. Boral was granted WAL 20AL221416 for a further 104 shares during the reporting period. Water management during the reporting period is described in Section 9.1 and groundwater management and monitoring is described in Section 9.2.

4. Site Components

Development Consent 140-6-2005 refers to "the Site" (i.e. the specific area within the Boral landholding to which the DA applies). **Figure 2** displays the boundary of the Site which incorporates the following principal components.

i) Extraction Area (Pit 7) (29.7 ha)

ii) Infrastructure Area (7.8ha) – includes the Pit 7 haul road, the Depot and access from Coxs Lane

It is important to note that the Site does not include:

- Pits 1 to 6 which were previously operated under the provisions of D2010/94; nor
- Extraction Area of Inland Dune (Pits 1-6) as approved under SSD-52984213.

5. Operations Summary

5.1 Introduction

The following subsections provide a summary of activities undertaken during the reporting period. Activities were generally consistent with those described in previous environmental management reporting.

All activities occurred during the approved operating hours during the reporting period.

Plates 1 to **6** display photographs of the Stockton Quarry taken on 3 March 2025 and are representative of operations that occurred within the reporting period.

5.2 Extraction Operations

Extraction during the reporting period occurred entirely within Pit 7 (as shown on **Figure 3**), a defined area in which existing dune sands are present. Pit 7 is located between the frontal beach dune system and existing vegetation and does not disturb the frontal dune and beach system and does not remove sand from the foredune or interfere with beach replenishment.

Two types of sand are recovered from Pit 7, namely concrete sand and fill sand. Concrete sand is essentially free of organic materials and other impurities, whereas fill sand potentially includes some organic matter and other materials and is primarily used as fill material. During the reporting period only concrete sand was recovered.

During the reporting period, concrete sand was principally extracted from the northern (~30%), eastern (~10%) and southern (~60%) sections of Pit 7 (see **Figure 3**). All the sand recovered was loaded directly into road-registered trucks from the active extraction area.

Production during the reporting period and forecast for the 2025 reporting period is displayed in **Table 6**. During the reporting period, the reported production rate from Pit 7 was 173,639 tonnes (t), all of which was concrete sand. The forecast production is expected to be higher than the current reporting period.

Table 6
Production Summary – tonnes (t)

Material	Approved limit	Previous reporting period (actual)	This reporting period (actual)	Next reporting period (forecast)
Concrete Sand	500,000tpa (DA 140-6-2005)	118,821	173,639	150,000
Fill Sand		0	0	0
Total		118,821	173,639	150,000

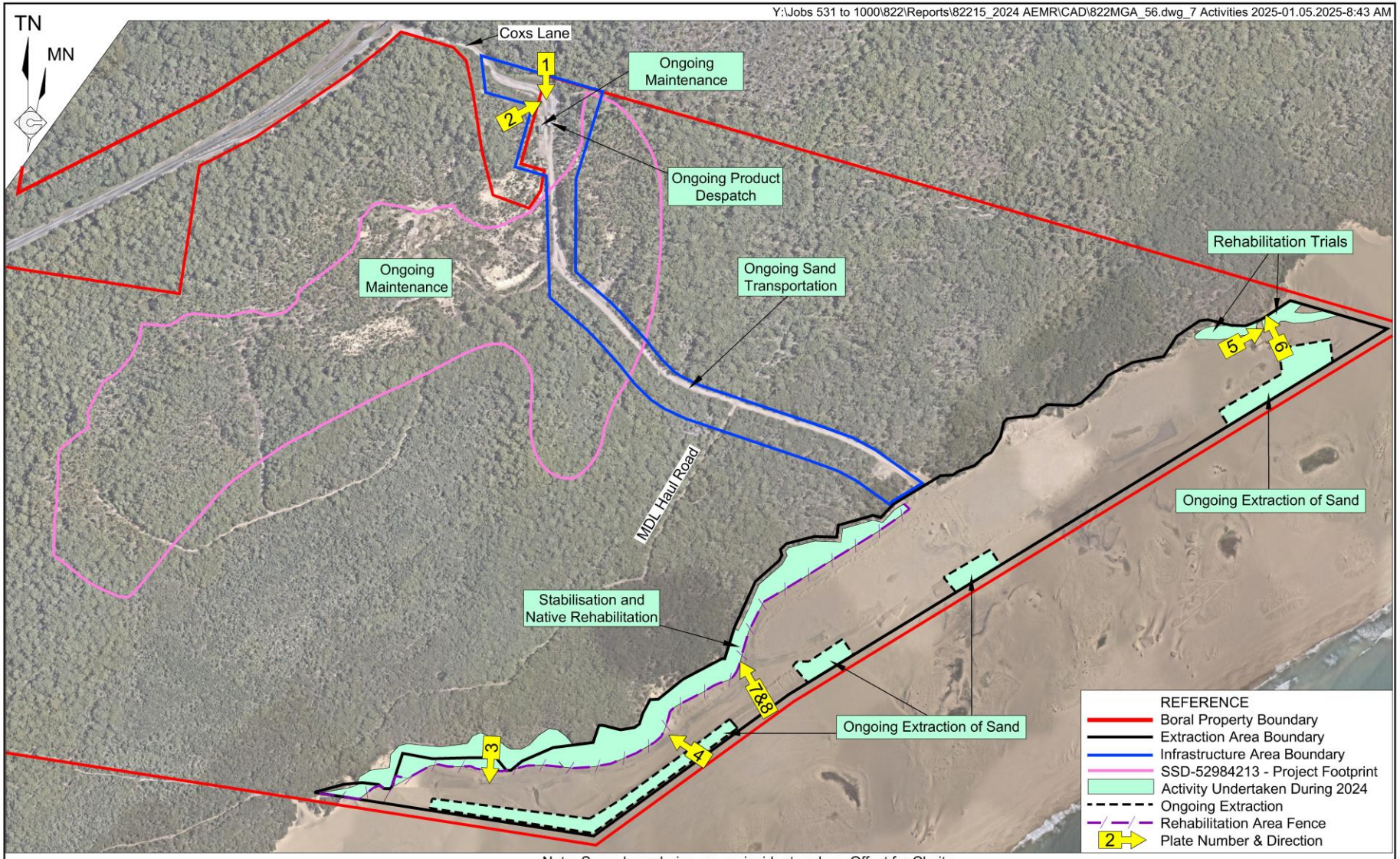


Figure 3
ACTIVITIES UNDERTAKEN DURING 2024

Y:\Jobs 531 to 1000\822\Reports\82215_2024 AEMR\CAD\822MGA_56.dwg_Plates 1-6-09.04.2025-10:25 AM

Plate 1: View of the depot including office, weighbridge, workshop and watercart
(Ref: E822M_0080)

Plate 2: View of the Pit 7 Haul Road at the exit of Pit 7
(Ref: E822M_0079)

Plate 3: View south taken from the Haul Road on the southern end of Pit 7 showing coir logs in rehab area
(Ref: E822M_0076)

Plate 4: View north taken from the Haul Road on the southern end of Pit 7 showing rehab area
(Ref: E822M_0071)

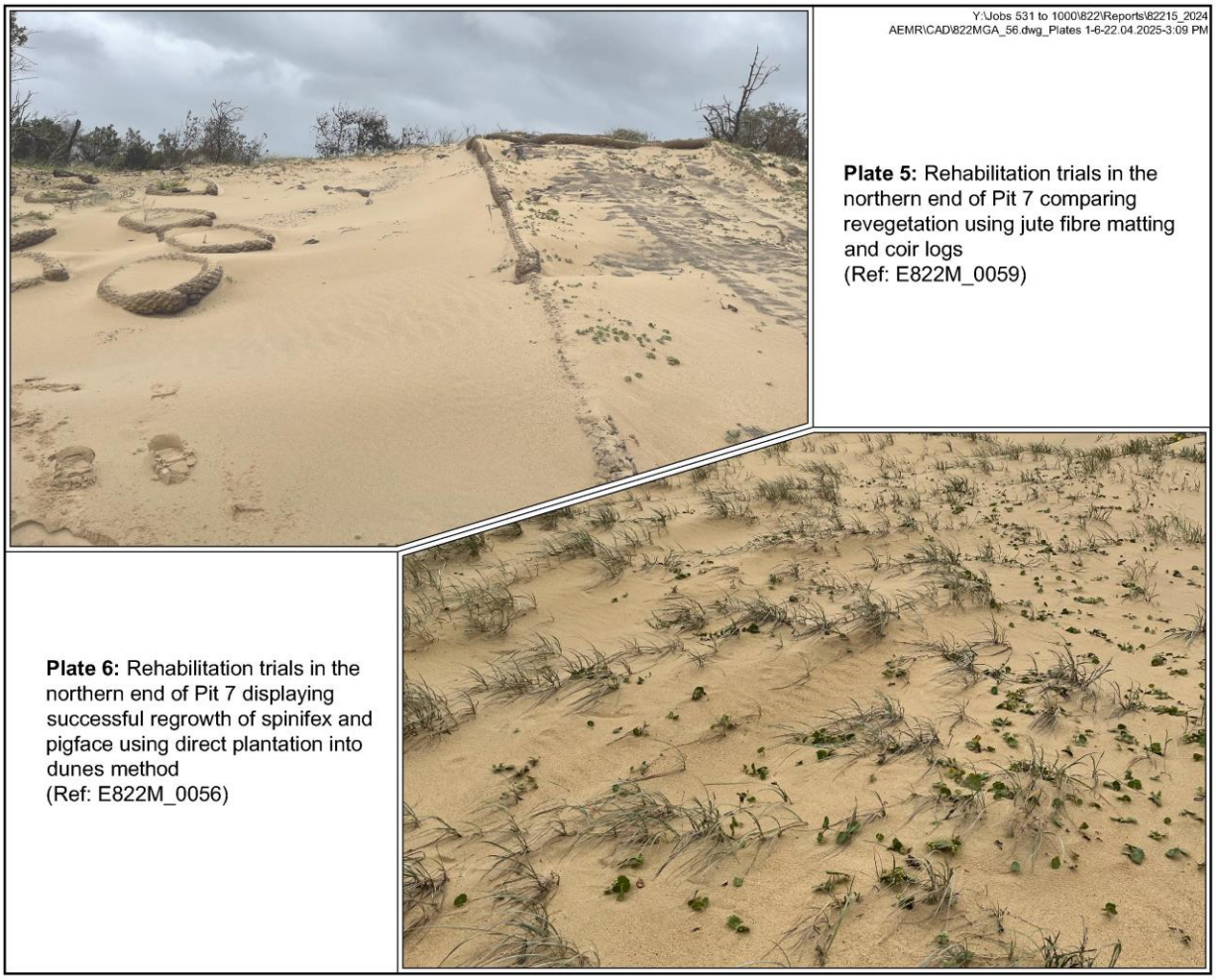


Plate 5: Rehabilitation trials in the northern end of Pit 7 comparing revegetation using jute fibre matting and coir logs
(Ref: E822M_0059)

Plate 6: Rehabilitation trials in the northern end of Pit 7 displaying successful regrowth of spinifex and pigface using direct plantation into dunes method
(Ref: E822M_0056)

5.3 Processing Activities

Where necessary, sand is screened to remove natural materials that may have been buried within the dunes as they formed naturally. Where screening is required, mobile screening equipment is used on a campaign basis to screen and stockpile sand. Screening was undertaken for approximately five weeks in May 2023 with 27,000 tonnes of sand screened.

5.4 Transport Activities

All products were despatched via the on-site weighbridge located near the Quarry entrance near Coxs Lane. There are no conditions within DA 140-6-2005 limiting truck movements from the Quarry, although it is noted that the annual product despatch limit provides a limit to truck movements. A total of 4,943 laden loads were despatched from the Quarry during the reporting period (equivalent to 9,886 total truck movements in and out of the Quarry). All laden trucks travel westwards along Coxs Lane and use the southbound on-ramp to Nelson Bay Road. Those trucks that needed to travel northwards to Medowie, Nelsons Bay and Raymond Terrace and beyond take a U-turn at the Fern Bay Road Roundabout before travelling northwards. The access arrangements for the Quarry are described in the Quarry driver induction documents which all drivers are required to sign during induction and/or training.

5.5 Employment, Operating Hours, Utilities and Services

5.5.1 Employment

During the reporting period, a total of three full-time personnel and one labour hire were employed at the Quarry.

5.5.2 Operating Hours

The permissible operating hours, as set out in *Condition 3(8)* of Development Consent 140-6-2005 (Mod 2), were adhered to during the reporting period.

Extended hours for major supply contracts were not required during the reporting period. Operations on a Saturday have been limited due to the decrease in production on site.

5.5.3 Utilities and Services

Water Usage

Boral obtains its water requirements for its on-site use from three sources.

i) Boral purchased its own water cart in September 2021 and sources water for dust suppression from an approved standpipe.

ii) All water used for on-site ablutions is collected from rainwater and supplemented with purchased water supplied in bulk, as required.

iii) All drinking water is brought to site in 19L containers.

During the reporting period, dust suppression required approximately 0.78 ML of water which is significantly lower than the long-term average water usage for dust suppression i.e. 12ML per annum.

Rainwater capture continued during the reporting period through the use of the existing 10,000L water storage tank. This ensures there is sufficient water stored for on-site ablutions and purchase of supplementary bulk water was not required.

Equipment and Diesel Usage

Equipment used throughout the reporting period included the following.

- Volvo 180H Front-end loader
- Cat D7 LGP Bulldozer
- “Fuel Ute” (Ford Ranger with 400L tank to service dozer and screen)
- STG WT13000 Water Truck (Hino 500)
- Finlay 696 3-deck inclined screen

Annual diesel usage of all on-site mobile equipment was approximately 70,247L, an increase of approximately 28,877L from the previous reporting period. This is principally due to the increased production during the reporting period.

Electrical Power

The Quarry Depot is connected to mains electricity providing power to both the office and workshop and for security lighting and monitoring. During the reporting period, the electrical power usage was approximately 873kW.h per month. This represented a decrease in electricity usage compared to 2023 (approximately 919kW.h per month).

5.6 Waste Management

The dedicated waste metal bin and waste skips were utilised throughout the reporting period, as well as the existing fortnightly general waste collection service. A total of 3,220kg of waste was collected from the waste bins during the reporting period.

No waste oil was collected during the reporting period. Service suppliers were asked to remove oil and filters from site wherever possible during 2024 to minimise costs associated with waste oil removal.

5.7 Construction Activities

No construction activities were undertaken during the reporting period.

6. Actions Required

6.1 DPHI Feedback on 2023 AEMR

Feedback on the 2023 AEMR was provided by Department of Planning, Housing and Infrastructure (DPHI) on 5 July 2024 outlining that it generally satisfied the reporting requirements of the consent. It was further noted that the non-compliance with Schedule 3 Condition 12 of DA 140 6 2005 identified in the 2023 AEMR would be assessed separately. Boral subsequently received a penalty notice on 20 December 2024 and was required to pay a fine as a result of the non-compliance. It is noted that Boral intends to follow the Trigger Action Response Plan outlined in the existing Groundwater Management Plan prior to the approval of the updated management plan submitted in April 2025.

6.2 Independent Environmental Audit

David Bone (EMM) was commissioned to undertake an independent environmental audit (IEA) for the period February 2019 to June 2024. The IEA was submitted to DPHI on 11 October 2024 in conjunction with a Response to Auditor Recommendations (RAR).

Table 7 presents a summary of the proposed actions submitted by Boral in the RAR in response to non-compliances and provides comments on the achievement of these commitments.

Table 7
2024 Independent Environmental Audit – Recommendations and Actions

Page 1 of 2

Audit Recommendation	Boral's Response	Progress
Boral consult with Council to discuss potential options for clearer signage of load limit restriction on Coxs Lane and alternate access route.	Boral to arrange discussion and proposal with Council regarding increase signage of TfNSW load limit restrictions on Coxs Lane.	Complete – new signage installed on 24 September 2019 regarding load limits on Coxs Lane. All drivers will continue to undergo Site Drivers Induction which describes the access arrangements of the Quarry.
Boral to undertake ongoing groundwater monitoring in accordance with the approved Groundwater Monitoring program and report outcomes in future AEMRs.	GWMP TARP to be followed while Boral review and update the GWMP groundwater monitoring with consultant to ensure ongoing monitoring is in accordance with an approved GWMP.	Ongoing – see Section 9 and **Appendix 2** of this report.
Boral to assess and report on noise monitoring against all relevant condition references, ensuring correct identification of active areas of operation.	Boral to undertake a new noise assessment onsite.	Completed in March 2025 with no issues identified.

Table 7 (Cont'd)
2024 Independent Environmental Audit – Recommendations and Actions

Audit Recommendation	Boral's Response	Progress
Boral undertakes the necessary reviews and updates to management plans in a timely manner and consistent with the timeframes specified in the consent following completion of this and all future independent environmental audits	All management plans are to be reviewed and updated and submitted to DPHI within three months of this independent audit	In progress – all management plans were reviewed within three months. It is noted that all plans were considered appropriate with the exception of the GWMP. The GWMP was updated and submitted to DPHI in April 2025.
Boral to investigate POEO public record regarding the non-compliance relating to an uncontrolled discharge of surface water from site occurring in 2020 and update to reflect an accurate description of the events.	Boral to review the POEO public record and update where it does not relate to this premise, i.e. remove the reference to the sediment basin.	Complete – as the Quarry Site does not have offsite discharge the reference has been removed.

7. Environmental Management

7.1 Environmental Management Responsibilities

The overall management of Pit 7 and all quarrying and related activities is the responsibility of the Quarry Manager, Mr Rod Johnson, who is assisted on site by Boral employees.

Environmental management and monitoring is undertaken generally in accordance with the following documents prepared for the Quarry.

- Environmental Management Strategy (ECS, January 2017) – prepared in accordance with *Condition 4(1)*, of DA 140-6-2005.
- Erosion and Sediment Management Plan (Boral, July 2018) – prepared in accordance with *Condition 3(11)*, DA 140-6-2005.
- Groundwater Management Plan (Jacobs, 2019) – prepared in accordance with *Condition 3(12)* of DA 140-6-2005. and
- Rehabilitation and Landscape Management Plan (RWC, September 2018) – prepared in accordance with *Condition 3(19)* of DA 140-6-2005.

The operations are also undertaken in accordance with Boral's Corporate Environmental Policy.

Boral also require Quarry management to review and complete a monthly Environmental Permit Planner (EPP) that covers general environmental management and performance.

Prior to undertaking work on site, all employees, visitors, contractors and drivers are inducted and provided with Boral's environmental and occupational health and safety requirements. All personnel on site are trained and encouraged to identify a range of environmental risks and to either manage and/or inform management. Signage has also been established to alert all truck drivers to notify site personnel if they observe any trespassers within the Boral property at Stockton.

8. Noise

8.1 Relevant Criteria

Condition 3(7) of Development Consent 140-6-2005 (Mod 2) is relevant to noise compliance assessment and is reproduced as follows.

> *The Applicant shall ensure the noise generated by the development does not exceed 35dB(A)Leq(15 minute) at the nearest residential receiver.*
>
> *Notes:*
>
> - *Noise from the development is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30 meters of a dwelling (rural situations) where the dwelling is more than 30 meters from the boundary, to determine compliance with the noise limits in the above table. Where it can be demonstrated that direct measurement of noise from the development is impractical, the DECC may accept alternative means of determining compliance. The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.*
> - *Noise from the premises is to be measured at 1m from the dwelling façade to determine compliance with the noise limit.*
> - *The Criteria above apply to noise emissions under the following weather conditions:*
>   - *wind speed up to 3 m/s as 10m above ground level; or*
>   - *temperature inversion conditions of up to 3oC/100m and wind speed up to 2m/s at 10m above ground level.*

Condition L6 of the EPL 10132 is relevant to the noise compliance assessment and is reproduced as follows.

> *Noise emissions from the premises must not exceed an Leq(15 minute) noise emission criterion of 35dB(A) at the nearest residential receiver.*

8.2 Noise Monitoring

Boral typically only conduct noise monitoring following complaints from residents which is consistent with the approved Environmental Management Strategy (ECS, 2017). However, a noise monitoring survey was undertaken by Muller Acoustic Consulting in December 2021 with the results summarised in the 2021 AEMR. The results of this survey identified that operational emissions generated by the Quarry comply with all relevant statutory noise limits. Furthermore, Quarry-related noise emissions generally remain inaudible at monitoring locations and are masked by extraneous non-quarry sources. These results are consistent with historical noise monitoring results and predictions in the relevant assessment documents.

The 2024 independent audit found that the active operation area was incorrectly identified in the 2021 report, as Pit 7 is not included in the mapping. Due to this, a new noise assessment is recommended to be undertaken onsite. This is expected to occur during the 2025 reporting period. It is expected potential noise impacts would remain a low risk for the operation.

9. Water Management

9.1 Surface Water

Surface water monitoring is undertaken in accordance with the Groundwater Management Plan (GWMP) prepared by Jacobs in 2019. Groundwater Check undertook an external review of the surface water monitoring results collected during the reporting period as part of the annual groundwater monitoring review. A copy of the annual groundwater monitoring review (Groundwater Check, 2025) for the reporting period is provided as **Appendix 2** of this document. A summary of the results of surface water monitoring is provided in Section 9.1.2.

9.1.1 Surface Water Monitoring Network

Surface water monitoring sites, SW1, SW2, SW3 and SW4 are included in the GWMP to monitor potential impacts to Groundwater Dependent Ecosystems (GDEs) proximal to operational areas (**Figure 4**). SW1 and SW2 are located inland of the current extraction area and intermittently contain surface water. GDEs near these sites comprise swamp forests in the dune swales and low-lying heath. SW3 and SW4 are located seaward of the extraction area. GDEs in the vicinity of SW3 and SW4 comprise small ephemeral and mobile shallow deflation basins, vegetated with a variety of grasses, sedges and reeds. Due to the variable nature of the foredune system, the locations of the two GDE monitoring sites may change between sampling programs.

Surface water sampling was generally completed in accordance with the GWMP during the reporting period with the exception of the following.

- Total Petroleum Hydrocarbons (TPH)[1] were not monitored annually
- Surface water monitoring was undertaken generally monthly, which is beyond the quarterly frequency requirement for all analytes except TPH and BTEX (annual frequency).
- TRH/BTEX monitoring was only undertaken at SW4 as other locations were dry at the time of sampling.

9.1.2 Surface Water Results and Analysis

Tables 8 and **9** present the results of monthly pH and EC surface water sampling, respectively. It is noted that the GWMP does not provide trigger levels for surface water due to insufficient baseline data and requires that sites SW1 to SW4 are assessed against the ANZECC 2000 guidelines until sufficient data is collected to enable development of site-specific trigger levels.

[1] It is noted that total recoverable hydrocarbons (TRH) were monitored instead of total petroleum hydrocarbons (TPH). Results for TRH and TPH are considered to be interchangeable.

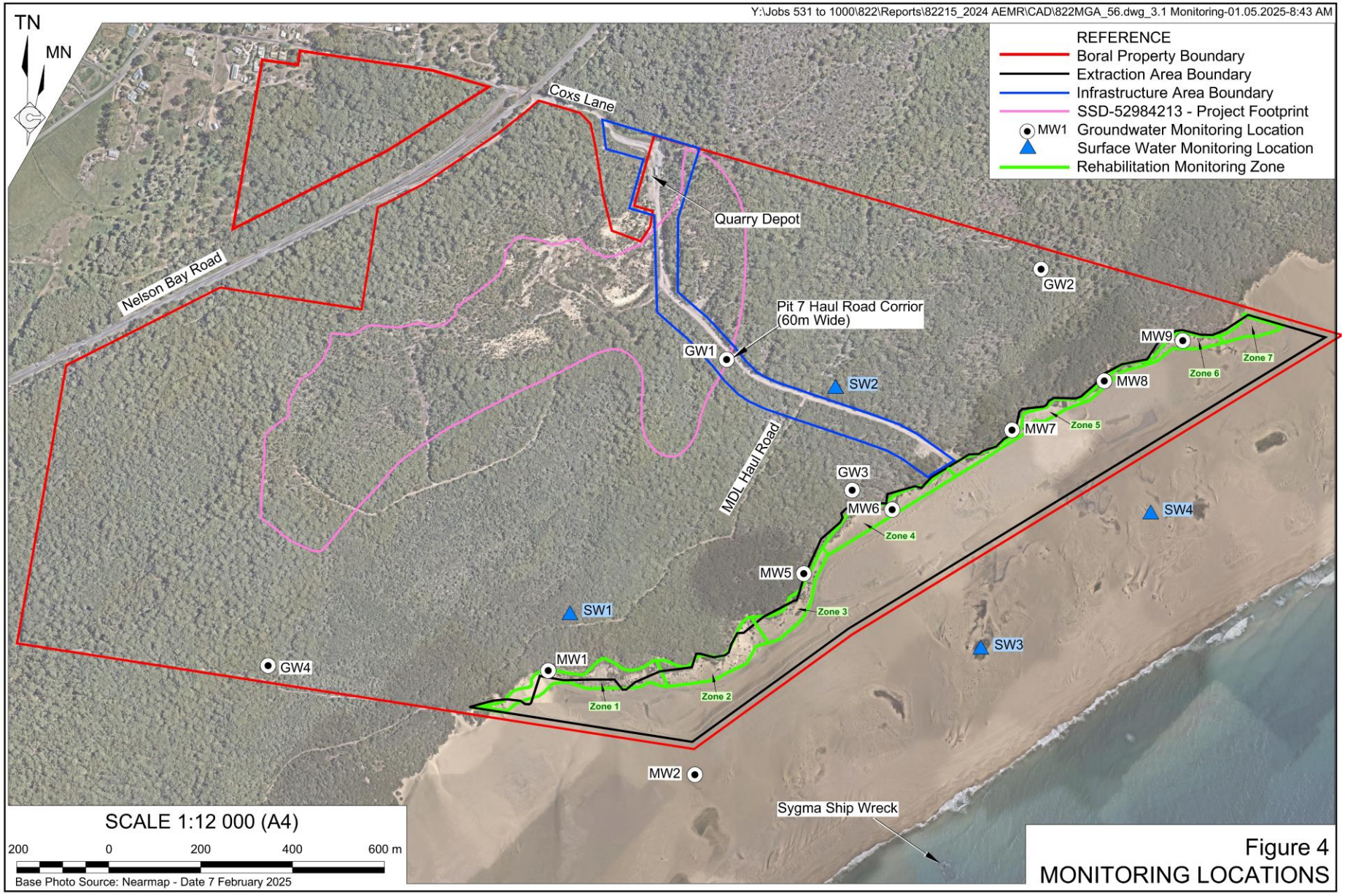

Y:\Jobs 531 to 1000\822\Reports\82215_2024 AEMR\CAD\822MGA_56.dwg_3.1 Monitoring-01.05.2025-8:43 AM
TN
MN
REFERENCE
Boral Property Boundary
Extraction Area Boundary
Infrastructure Area Boundary
SSD-52984213 - Project Footprint
MW1 Groundwater Monitoring Location
Surface Water Monitoring Location
Rehabilitation Monitoring Zone
Coxs Lane
Quarry Depot
Nelson Bay Road
Pit 7 Haul Road Corrior (60m Wide)
GW1
GW2
GW3
GW4
MW1
MW2
MW5
MW6
MW7
MW8
MW9
SW1
SW2
SW3
SW4
MDL Haul Road
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Sygma Ship Wreck
SCALE 1:12 000 (A4)
200 0 200 400 600 m
Base Photo Source: Nearmap - Date 7 February 2025
Figure 4
MONITORING LOCATIONS

Table 8
Surface Water pH Monitoring Results

Monitoring Location	Lower / upper trigger level [1]	2024 range (pH units)	2024 average (pH units)
SW1	6.50 / 8.50	4.6 – 5.2	4.8
SW2		6.6 – 7.4	6.9
SW3		7.8 – 8.4	8.1
SW4		8.3 – 9.2	8.6
Red values indicate exceedance of trigger values. Note 1: ANZECC 2000 default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers.			
Source: Groundwater Check (2025) – Table 4-1			

Average pH levels fell during the reporting period and were typically within guideline values except for SW1 and SW4. It is noted that the pH recorded for SW1 and SW4 are consistent with the results of the previous reporting period and historical data. As such, it is considered that the exceedances reflect natural variation for the site and are not reflective of variation caused by quarry operations.

Table 9
Surface Water EC Monitoring Results

Monitoring Location	Lower / Upper Trigger Level [1]	2024 Range (µS/cm)	2024 Average (µS/cm)
SW1	125 / 2200	197 – 413	294
SW2		253 – 677	380
SW3		210 – 559	331
SW4		213 – 463	321
Red values indicate exceedance of trigger values. Note 1: ANZECC 2000 default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers.			
Source: Groundwater Check (2025) – Table 4-2			

The average EC recorded during the reporting period were within guideline values and were generally consistent across all monitoring locations.

9.1.3 Discussion

The SW1, SW2, SW3 and SW4 analyte concentrations were similar to typical groundwater concentrations for a given analyte, suggesting that quarrying activities are unlikely to have had an impact on surface water quality. While exceedances of trigger values are noted, there is no reason to believe that the results are indicative of an influence from quarrying. Based on 2024 surface water monitoring results, there appears to be no significant trends indicating that surface water quality has been impacted by quarrying operations. With continued data collection, the understanding of surface water quality is expected to improve.

9.1.4 Comparison to EIS Predictions

Due to the lack of topsoil and vegetation cover, the Environmental Impact Statement (EIS) (ERM, 2005) concludes that the consequent high groundwater recharge and negligible surface runoff would result in insignificant impacts to surface water quality. Despite lacking baseline data, a review of 2024 surface water results cannot attribute any exceedances to quarry operations. Results are therefore consistent with the EIS (ERM, 2005).

9.2 Groundwater

Groundwater Check undertook an external review of the groundwater monitoring results collected during the reporting period with the results discussed in Section 9.2.3. A copy of the annual groundwater monitoring review for the reporting period is provided as **Appendix 2** of this document. A summary of the results of groundwater monitoring is provided in Section 9.2.2.

Groundwater is required to be monitored at the Quarry as outlined within Development Consent 140-6-2005 (Mod 2) *Condition 3(12)* which states that:

The Groundwater Monitoring Program shall include:

a) detailed baseline data on groundwater levels, flows and quality, based on statistical analysis, to benchmark the pre-quarrying natural variation in groundwater levels and quality;

b) groundwater impact assessment criteria; and

c) a program to monitor groundwater levels and quality.

9.2.1 Groundwater Monitoring Network

Figure 4 displays the locations of the groundwater monitoring bore network. The current groundwater monitoring network includes 10 monitoring bores. All bores are licensed under monitoring license 20BL171772. The monitoring network includes groundwater monitoring bores (MW series bores) that were installed as part of the Stockton Sand Quarry monitoring network, as well as four pre-existing groundwater monitoring bores (GW series bores).

As noted in the 2021 AEMR, monitoring bore MW2, a bore included in the 2019 GWMP groundwater monitoring network, was found to have been removed by persons unknown on 3 November 2021, whilst completing a groundwater monitoring round. Boral have reported the loss of MW2 to the then Department of Planning and Environment (DPE) and advised that they are no longer able to carry out monitoring at the bore. Additionally, Boral has advised that they do not propose to replace the bore due to its location on Worimi lands under the control of National Parks and have no way of protecting the bore from vandalism. It was also stated that bore MW11, a bore included in the 2019 GWMP groundwater monitoring network was destroyed, and Boral do not intend to replace the bore.

Groundwater Check (2025) has reviewed the current groundwater monitoring network and concluded that despite MW2 and MW11 being destroyed, the current monitoring network is considered suitable. It is noted that there is now a substantial monitoring gap between MW1 and MW5, however with the lack of historical impacts due to quarrying and the low risk of future impacts, reduced monitoring bore frequency is not considered to pose a significant risk.

Groundwater sampling was generally completed in accordance with the GWMP during the reporting period with the exception of the following.

- Water quality and groundwater levels were not monitored at MW2 and MW11 due to the loss of the bores. Consecutive groundwater quality quarterly trigger level exceedances were not actioned (i.e. repeat sampled, reported and investigated) as per the 2019 GWMP Trigger Action Response Plan (TARP). There were consecutive quarterly trigger level exceedances at all groundwater monitoring locations. The associated analytes comprised aluminium, chromium, iron, potassium, sodium, chloride, phosphorus and hardness.

An update to the GWMP is currently in progress and expected to be in force during the 2025 reporting period.

9.2.2 Groundwater Results and Analysis

9.2.2.1 Groundwater Levels

Table 10 presents the collated groundwater level results from the groundwater monitoring network.

Table 10
Groundwater Levels (m AHD)

Month	MW1	MW5	MW6	MW7	MW8	MW9	GW1	GW2	GW3	GW4
	Water Level (m AHD)									
Upper Trigger	*2.92*	*2.51*	*2.66*	*2.52*	*2.57*	*2.56*	*2.92*	*2.72*	*2.60*	*2.28*
Lower Trigger	*0.98*	*0.77*	*0.60*	*1.17*	*1.23*	*1.22*	*0.98*	*0.99*	*1.13*	*1.00*
January	1.14	1.13	1.16	1.18	1.20	1.19	1.16	1.26	1.14	1.05
February	1.20	1.32	1.42	1.42	1.40	1.38	1.22	1.34	1.38	1.06
March	1.17	1.19	1.24	1.27	1.28	1.29	1.22	1.25	1.22	1.04
April	1.42	1.53	1.58	1.61	1.61	1.62	1.28	1.52	1.55	1.22
May	1.91	2.09	2.17	2.24	2.24	2.26	1.91	2.22	2.17	1.69
June	2.25	2.40	2.53	2.61	2.65	2.67	2.48	2.76	2.53	2.16
July	2.31	2.37	2.48	2.57	2.58	2.59	2.57	2.83	2.51	2.27
August (7/8)	2.14	2.18	2.31	2.36	2.36	2.37	2.39	2.61	2.30	2.12
August (22/8)	2.03	2.06	2.14	2.21						
September	1.96	1.97	2.04	2.10	2.11	2.12	2.24	2.41	2.05	1.97
October	1.83	1.86	1.94	2.00	1.99	1.99	2.08	2.25	1.94	1.82
November	1.70	1.75	1.83	1.88	1.89	1.91	1.87	2.03	1.82	1.63
December	1.62	1.66	1.72	1.78	1.80	1.82	1.80	1.95	1.73	1.56
Average[1]	2.64	1.88	1.85	1.67	1.81	1.96	1.66	1.78	1.80	1.90
Median[1]	2.51	1.87	1.78	1.60	1.77	2.01	1.61	1.73	1.77	1.84

Red values indicate exceedance of trigger values.
Note 1: Statistics derived from all available data

Source: Groundwater Check (2025) – Modified after Table 3-1

During the reporting period, there was an apparent correlation between the groundwater levels and the cumulative rainfall deviation trend (CRD) observed, indicating rainfall recharge of groundwater occurring at the Quarry Site. The first half of 2024 experienced rainfall conditions above the long-term average values, while the second half experienced below average rainfall conditions. These patterns in rainfall were reflected in groundwater levels where the exceedances experienced at bores MW7, MW8, MW9 and GW2 during the June and July monitoring events reflect the increase in rainfall experienced from April through to June 2024. The fluctuation of groundwater levels as result of the increase in rainfall during this period can be observed across all monitoring bores. As such, it is considered that the groundwater levels recorded during the reporting period are reflective of the natural environmental and not impacted by quarrying activities.

9.2.2.2 Groundwater Quality

Tables 11 and **12** present the results of field parameters recorded for the groundwater quality monitoring program for pH and EC levels, respectively. Laboratory assessed monitoring records are presented in Appendix B of Jacobs (2024) (see **Appendix 2**).

Table 11
Groundwater pH Monitoring Results

Monitoring Location	Lower / upper triggers	2024 range (pH units)	2024 average (pH units)	Long term average (2007 to 2024)
MW1	5.67 / 7.47	5.20 – 6.10	5.64	6.17
MW5	5.88 / 7.68	6.20 – 6.40	6.30	6.42
MW6	6.60 / 7.65	6.90 – 7.20	7.00	6.99
MW7	6.64 / 7.53	6.90 – 7.30	7.14	7.08
MW8	6.71 / 7.59	7.30 – 7.40	7.38	7.20
MW9	4.93 / 8.33	5.90 – 6.50	6.15	6.54
Red values indicate exceedance of trigger values.				
Source: Groundwater Check (2025) – Table 3-2				

Table 12
Groundwater Electrical Conductivity Monitoring Results

Monitoring Location	Lower / upper triggers	2024 range (µS/cm)	2024 average (µS/cm)	Long term average (2007 to 2024) (µS/cm)
MW1	195 / 444	324 - 546	452	361
MW5	105 / 1015	467 - 782	631	497
MW6	115 / 584	115 - 375	318	334
MW7	470 / 1037	470 - 876	769	692
MW8	453 / 1021	453 – 960	806	760
MW9	155 / 965	155 – 504	458	526
Red values indicate exceedance of trigger values.				
Source: Groundwater Check (2025) – Table 3-3				

During the reporting period, pH values for all monitored bores ranged from 5.20 to 7.40, with an average pH of 6.62. At MW1, the samples taken in June (pH 5.20), and November (pH 5.40), were considered slightly acidic and were below the trigger value of 5.67. At all other locations and monitoring events, the observed pH values in 2024 were within the trigger level range.

Throughout the reporting period, EC values ranged from 277 to 960µS/cm, with an average of 576µS/cm. At MW1 measurements of EC were above the upper trigger of 444µS/cm during March (546µS/cm), August (471µS/cm) and September (505µS/cm), however a declining trend is noted and the values are well within the range of EC values across the site. There are no deleterious trends apparent and the observed EC values during the monitoring period are consistent with historical variation and are considered to lie within natural variability.

Groundwater Check reviewed the results of a range of analytes nominated within the GWMP, with observations summarised in **Appendix 2**. Several baseline triggers were exceeded during the reporting period. These results were reviewed against historical data for the site and it was noted that the levels reflected natural conditions, consistent with historic records. It was considered that observations of values outside the upper and lower trigger levels were reflective of the natural variation of groundwater within the locally recharged, shallow groundwater system that is readily influenced by rainfall, evaporation / evapotranspiration and coastal processes. Consistent with previous years, the results do not indicate trends away from site-based trigger levels or historical variation. Therefore it is considered that the minor and short-term variations of the groundwater setting recorded are a reflection of the natural environment and are not related to Quarry activities.

9.2.3 Discussion

The results of groundwater monitoring during the reporting period indicate the following.

- Groundwater levels continued to fluctuate naturally in response to rainfall recharge and seasonal patterns and were not impacted by quarrying operations.
- Several groundwater quality triggers, defined in the GWMP, were exceeded during the reporting period. However, the groundwater setting remained consistent with historical patterns during the reporting period. Minor and short-term exceedances of site-based trigger levels remain consistent with historical data.
- Quarrying operations are having a negligible impact on the groundwater setting.

During the next reporting period, it is recommended that groundwater level and quality monitoring frequency remain consistent with that specified by the GWMP. An update to the GWMP is currently in progress to ensure ongoing monitoring is undertaken in accordance with an approved GWMP. Groundwater Check (2025) further recommends that any consecutive quarterly groundwater trigger level exceedances should be actioned as per the TARP within the GWMP. Comparison to EIS Predictions

The EIS (ERM, 2005) predicts minimal impacts to groundwater levels if sand extraction is restricted to 2.5m AHD, which would limit potential impacts to changes in local groundwater recharge characteristics. Quarry activities are not predicted to influence local or regional groundwater supply. The 2024 groundwater level data indicate that the quarry has not impacted groundwater supply and the results are therefore consistent with the EIS.

Extraction limits proposed in the EIS (ERM, 2005) were adopted to ensure quarry operations had no direct impact on local or regional groundwater quality. Following review of the 2024 groundwater laboratory results, it has been concluded that quarry activity has not impacted groundwater quality as exceedances lie within historical ranges and can be attributed to natural variability. The 2024 groundwater quality results are therefore consistent with the predictions outlined in the EIS.

10. Rehabilitation

10.1 Rehabilitation During the Reporting Period

Boral is required to progressively rehabilitate the site, including the batters, buffer area, floor of the extraction area and haul road, in a manner that is generally consistent with the final landform described in the EIS, to the satisfaction of the Planning Secretary.

A Rehabilitation and Landscape Management Plan (RLMP) was prepared by R.W. Corkery & Co. Pty Limited (RWC) in September 2018 in accordance with *Condition 3(19)* of DA 184-6-2005. The objectives of the plan are as follows.

- *To ensure compliance with all relevant project approval conditions, statements of commitment and reasonable community expectations.*
- *To implement appropriate progressive rehabilitation and landscape management and mitigation measures during Quarry development.*
- *To appropriately manage site preparation works to ensure that suitable rehabilitation material remains for rehabilitation operations during all stages of the Quarry.*
- *To implement appropriate weed, pest and bushfire management measures.*
- *To implement appropriate corrective and preventative actions, if required.*
- *To establish a final landform that is consistent with the surrounding remnant vegetation.*

Rehabilitation and maintenance activities undertaken during the reporting period are displayed in **Figure 5**. In summary, rehabilitation activities undertaken during the reporting period included the following.

- Rehabilitation trials to compare direct planting into dune, jute fibre matting, and coir logs (**Plate 5** and **Plate 6)**.
- Maintenance of existing jute fibre matting areas within the transgressive dune system located on the border to existing vegetated areas (**Plate 3, Plate 4** and **Plate 6**). The existing jute matting is often damaged during strong winds and requires pegging or other obstacles to limit wind damage.
- Application of timber and coir logs and pegging within the transgressive dune system currently under rehabilitation to provide additional stabilisation in these areas (**Plate 3, Plate 4** and **Plate 5**).
- Translocation of dune colonising species (Spinifex, Pig Face and Coastal Wattle) to stabilise and revegetate dune systems (**Plate 3** to **Plate 8**).

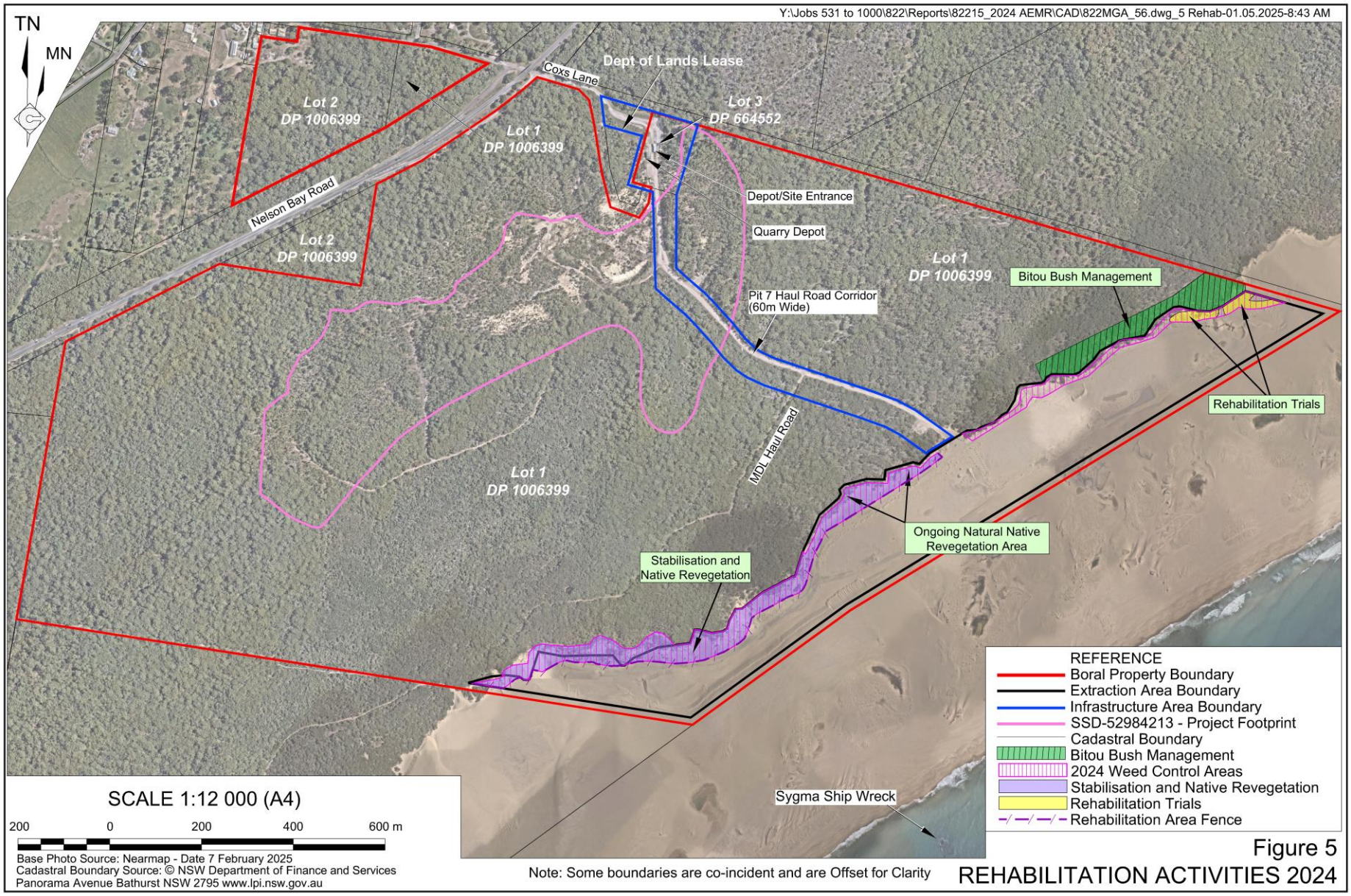


Figure 5
REHABILITATION ACTIVITIES 2024

- Minor profiling and removal of significant amounts of litter along the transgressive dune system to repair damage caused by trespassers and litter from recreational beach users.
- Maintenance of the active rehabilitation area in former extraction pits.

At the Quarry Site, Boral have implemented RehSnap stations. RehSnap stations are an initiative created by the Quarry manager to monitor rehabilitation progress at set vantage points across the Quarry Site, allowing for the same photo to be easily replicated and compared. An example of the progress captured by the RehSnap stations is displayed in **Plate 7** and **Plate 8**.

It is noted that the approved operation does not include the previously approved and operated Pits 1 to 6 (see **Figure 2**), nor is rehabilitation of these areas subject to DA 140-6-2005.

Table 13 presents an assessment of the progress of rehabilitation during the reporting period against the rehabilitation target and performance criteria nominated in the RLMP.

Table 13
Rehabilitation Targets and Performance Indicators

Management Measure	Frequency	Performance Indicators	Targets	Status Report – 2024
Compliance with approved extraction boundaries to prevent encroachment into existing vegetation.	Ongoing	Weekly visual inspections of boundary markers. Review of extraction activities for each year in the Annual Environmental Management Report (AEMR).	No disturbance beyond the extraction boundary.	No area beyond the extraction boundary was disturbed during the reporting period.
Use of site haul roads to contain disturbance to approved areas.	Ongoing	Daily visual inspections of haul road.	No disturbance beyond the existing haul roads.	All vehicles continued to use existing haul roads. No area beyond the existing haul roads were disturbed during the reporting period.
Erosion and sediment controls are maintained and functional.	Ongoing	Daily visual inspection for evidence of erosion or uncontrolled discharge. Additional inspections following prolonged or heavy periods of rain.	Water management structures are functioning effectively to minimise erosion.	All water management structures continued to function effectively during the reporting period.
Toolbox talks to educate Quarry personnel of risks to flora and fauna due to vegetation clearing.	Ongoing	Quarry personnel educated / informed of native flora and fauna likely to be encountered.	Reduce risk to native flora and fauna that may be encountered at the Quarry.	Periodic toolbox talks were undertaken throughout the reporting period to educate Quarry personnel of native flora and fauna likely to be encountered on site.
Weed management programs by a person suitably experienced in weed identification and involving spraying and manual weed removal.	Quarterly (or more frequent if needed)	Maintenance weeding occurs quarterly and is recorded in daily work sheets.	Weed infestations are contained and weed cover is no greater than surrounding remnant vegetation.	Periodic weed management programs were undertaken throughout the reporting period (see Section 9.2).
Visual monitoring programs of site security by Quarry personnel.	Ongoing	Daily visual inspection for evidence of trespassers.	The site is secured.	Security measures continued to be implemented during the reporting period. A total of eight incidents were recorded during the reporting period (see Section 10.1).
Visual monitoring programs of feral animal presence by Quarry personnel.	Ongoing	Daily visual inspection for evidence of feral animals.	Feral animal presence is used to guide ongoing management.	Visual monitoring programs continued to be undertaken during the reporting period.
Feral animal control programs involving trapping and/or baiting.	As needed	Baiting program undertaken by suitably qualified person.	The Quarry does not become a harbor for feral animals.	No wild dog baiting was undertaken during the reporting period.
Visual monitoring programs of progressive revegetation activities.	Following planting campaigns and then monthly.	Revegetation success and signs of dieback monitored at least monthly. Native vegetation coverage and percentage foliage cover recorded in the Annual Environmental Management Report.	Revegetation campaigns have an 85% success rate. Revegetation failures are replaced.	Revegetation continued to be monitored during the reporting period within Pit 7. It was noted that translocated Pig Face and Coastal Wattle was more successful in establishing cover than Spinifex in the lower dunes.

Table 13 (Cont'd)
Rehabilitation Targets and Performance Indicators

Management Measure	Frequency	Performance Indicators	Targets	Status Report – 2024
Visual inspection of active coconut fibre matting areas within the transgressive dune system located on the border to existing vegetated areas.	Weekly	Condition of coconut fibre and potential damage due to strong winds or trespassers.	Dunes are stable and vegetation is regenerating naturally.	Areas in which jute fibre matting have been installed are stabilising successfully with significantly more vegetation cover noted during the site inspection than in the previous year.
Application of timber and logs in Pit 7 to stabilise dunes.	As needed based on monitoring	Dunes becoming stable and natural vegetation regeneration is occurring.	Dunes are stable and vegetation is regenerating naturally. Foredune has an average angle of repose of approximately 34 degrees.	Coir logs continued to be installed in rehabilitation areas during the reporting period with previously stabilised dune faces showing signs of natural regeneration.
Revegetation of dunes in Pit 7 with stabilising species.	Annual campaigns	Revegetated plants are surviving.	Dunes are stable and vegetation cover is approaching 15%.	Stabilisation and revegetation of dunes in Pit 7 continued throughout the reporting period. Rehabilitation trials undertaken to determine the most appropriate revegetation method.
Maintenance of Pits 1 to 6, including replanting (if required).	As needed based on results of monitoring	Vegetation is starting to naturally regenerate.	Vegetation cover of 70% 75% of species consistent with flora species in **Appendix 1**. Weed coverage less than 5%.	Pits 1 to 6 continued to be maintained during the reporting period principally through the undertaking of targeted weeding campaigns (see Section 10.2).

Table 14 presents a summary of the outcomes of rehabilitation within each of the rehabilitation monitoring zones within Pit 7. It is noted that rehabilitation is currently limited to areas immediately adjacent to existing vegetation at the western extent of Pit 7. **Figure 4** displays the location of each rehabilitation monitoring zone.

Table 14
Rehabilitation Performance Monitoring

Rehab Zone	Current success of Revegetation program	Results of Dieback (%)	Cover of Native Vegetation (%)	Cover of Foliage (%)	Plantings conducted	Evidence of Weed Infestation
Zone 1	Very Good Dune is stable Evidence of natural revegetation occurring from top of dune. Growth in the northern section of zone is very good. Coastal Wattle planting is going well.	No evidence of dieback	20-25% Mostly Spinifex	20% Mostly spinifex Coastal wattle going well	Coastal Wattle	None
Zone 2	Very Good Dune is stable Plantings of Pigface are surviving and look healthy, Spinifex is stable and evidence of spread. Plantings of Coastal Wattle are progressing very well, especially in low areas	No evidence of dieback	20-30% Mostly Spinifex and Pigface Coastal Wattle growing well	30% Mostly Spinifex and Pigface Coastal Wattle in lower areas	Coastal Wattle and Pigface	None Bitou shoots targeted
Zone 3	Good Plantings of Pigface and Coastal Wattle are surviving and look healthy, Spinifex is stable and evidence of spread	No evidence of dieback	10-15% Mostly Spinifex and Pigface plantings	20% Mostly Spinifex and Pigface plantings	Coastal Wattle	None Bitou shoots targeted
Zone 4	Good This zone is stable and natural revegetation is dominant, prevalent in hollows. Coastal Wattle planted in areas.	No evidence of dieback	30% Mostly Spinifex and Pigface plantings	30% Mostly Spinifex and Pigface	Coastal Wattle plantings	None
Zone 5	Good This zone is stable and natural revegetation is dominant Spinifex is starting to grow onto road in areas	No evidence of dieback	60% Mostly Spinifex and tree regrowth	60% Mostly Spinifex and tree regrowth	None	None
Zone 6	Good Dune is stable Plantings of Pigface and Coastal Wattle are surviving and look healthy	No evidence of dieback	30% Mostly Spinifex and Pigface plantings	30% Mostly Spinifex and pigface plantings	Coastal Wattle Pigface	None
Zone 7	Good Coir logs placed to assist in dune stabilisation. Evidence of Spinifex growing runners along coir logs Coir logs trapping drifting sand very well. Individual coir logs wells placed and planted out with Pigface and Coastal Wattle. Watering undertaken on new plantings	No evidence of dieback	10% Mostly Spinifex	10% Mostly Spinifex Coastal wattle going well Pig Face going well, capturing sand and growing through.	Planting of Coastal Wattle and pigface Focus on plantings in rows to trap sand	None

10.2 Weed Management

In previous reporting periods Hunter Land Management (HLM) was commissioned to complete weed management activities at the Stockton Quarry, with a focus directed at Bitou Bush weed spraying.

During the reporting period, HLM was enlisted to conduct Bitou Bush weed spraying on the north western boundary of Pit 7 (**Figure 3**) while other weed management activities were undertaken internally. This was partially due to reduced production and staff availability to complete weeding activities. Weed management undertaken by Boral predominantly consisted of manual removal of weeds.

Boral has confirmed that Port Stephens Council is aware of the presence of Chinese Violet on site and that the locations have been recorded on their register.

The following weeds will continue to be targeted during future mixed weed spraying campaigns.

- Chinese Violet
- Mother of Millions
- Ambrosia
- Berry Bush
- Bitou Bush
- Burr
- Canary Island Date Palm
- Castor Oil Plant
- Cobblers Pegs
- Dandelion
- Fire Weed
- Fleabane
- Guinea Grass
- Lantana
- Milk Thistle
- Natal Grass
- Pampas Grass
- Primrose
- Purple Top
- Rocket
- Salt Bush
- Scotch Thistle
- Sticky Weed
- Stinking Roger
- Summer Grass
- Torpedo Grass
- Vetch.

10.3 Feral Animal Control

No wild dog baiting was conducted during the reporting period.

11. Community

11.1 Security and Public Safety

Security Incidents

A total of 144 security and public safety incidents occurred during the reporting period. Incidents are the Quarry Site are classified into three categories as follows.

- Hazard – event has potential to cause harm, injury or damage.
- Incident – event could lead to or has led to harm injury or damage.
- Near Miss – event where harm was likely, but didn't occur.

Of the 144 incidents, 129 were recorded as "Hazard", 13 were recorded as "Near Miss" and two were recorded as "Incident".

Table 15 presents a summary of the security and public safety incidents which occurred during the reporting period.

Table 15
Security Incidents

Category	Number of Incidents Recorded	Summary
Hazard	129	Hazard incidents recorded consist of events where the property experienced theft of markers or posts and damage to property fences were observed. Events where unknown vehicles or persons entered the haulage roads or Pit 7 area were also noted.
Incident	2	One Incident involved unknown persons breaking into the Quarry Site compound and theft items from Quarry vehicles. The other Incident involved unknown persons accessing the Quarry Site and breaking into the Sea Containers.
Near Miss	13	Near Miss incidents recorded involve events where unknown vehicles or persons entered the haulage roads or Pit 7 area, including events where this occurred during operations. Events where persons on horseback entered Pit 7 during operations and unknown persons were found to have cut through wire fencing surrounding rehabilitation areas were also recorded.
Source: Boral 2025		

Status of Fencing

The existing fencing arrangement was continued throughout the reporting period with the maintenance of high visibility line/reflective tags and warning signs surrounding the operations area (consistent with **Figure 6**). The high visibility line/reflective tags and warning signs are installed at the property boundary as this has been proven to reduce the potential for vandalism of the signs to occur (compared with previous practices that applied the signs 50m outside of the high visibility line/reflective tags).

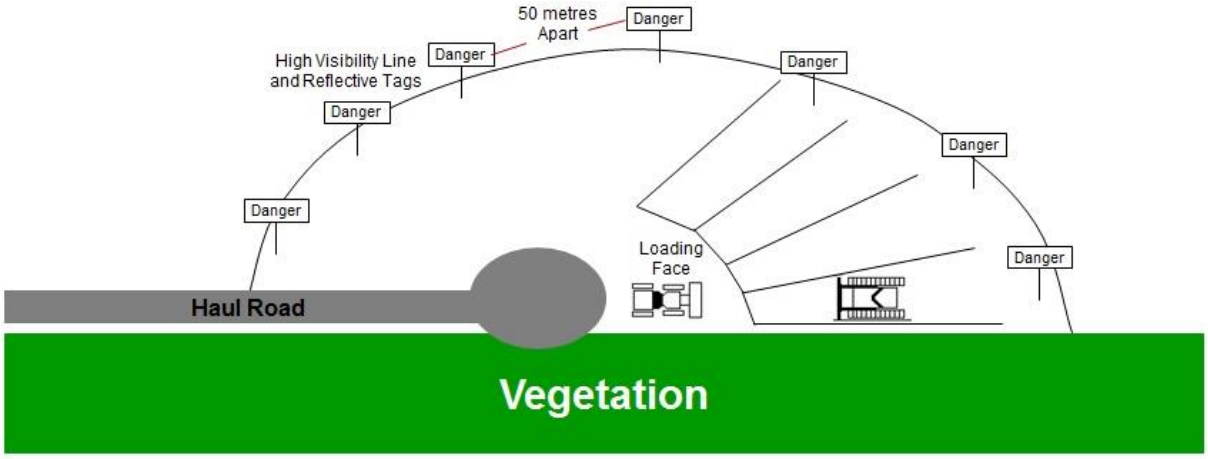


Figure 6 Plan View of Extraction Area showing Signage and High Visibility Line

These signs and high visibility line on the current fencing are maintained in place during operational and non-operational times. Personnel check the signs and high visibility line regularly to ensure they are in place and immediately repair any damaged sections. Posts for signage and high visibility line are made of flexible shatterproof plastic to prevent injury to public during possible collision. The warning signs are now attached to stakes using eyelets to improve performance during strong wind conditions.

Current Public Risk Controls

In addition to procedures and standards required by Boral, the following controls have also been in place during the reporting period to reduce the risk of public interaction.

- **Operate and Maintain Safe Batters**

  Boral continues to maintain a working extraction area face that does not produce a grade greater than 1:3 (V:H) (18 degrees at the base) to blend the extraction area with the surrounding dune system to limit risks to quad bikers and 4WD vehicles.

- **Equipment Requirements**

  Heavy earthmoving equipment continues to operate on the windblown dunes with fit-for-purpose safety equipment, such as, flashing lights for visibility in all weather conditions, UHF radio for site communications and rear camera.

- **Operating Hours**

  Boral has elected to limit operation on Saturdays unless required to satisfy client demand. Although operations on a Saturday are approved between the hours of 6.15am and 12pm (and 6.15am to 3.00pm during major supply contacts), the hours of operation have been reduced due to the decrease in production on site.

- **Trespasser Procedures**

  Truck drivers and quarry personnel continue to inform site management in the event they notice any trespassers (including pedestrians, 4WD vehicles, motorcyclists or equestrians) within the site following which the procedure requires that all heavy vehicle machinery be stopped until safe to do so (i.e. the trespasser leaves the Quarry).

11.2 Complaints Records and Management

Condition M4.1 within EPL 10132 requires the licensee to keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies. *Condition M5.1* requires a telephone complaint line for the purpose of receiving any complaints from the members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant.

No complaints were received on the Boral special complaints line established for the Quarry during the reporting period which is consistent with the previous reporting period.

No complaints were received from DPHI, Council or any other authority during the reporting period.

Complaints will continue to be logged within the complaints register and investigated fully when they are received.

11.3 Compliance Summary

An internal compliance review was undertaken by R.W. Corkery & Co. during a site visit on 3 March 2025 and is provided as **Appendix 1**. The compliance review considers all conditions of DA 140-6-2005 and EPL 10132 as well as the EIS for the operation (ERM, 2005) and associated application documents and management plans.

In summary, the operation remained generally compliant with its conditional requirements during the reporting period, however, aspects of the groundwater and surface water monitoring program were not undertaken in accordance with GWMP. Details of the oversights are included in Sections 9.1.1 and 9.2.1.

It is acknowledged that failure to implement the monitoring requirements under the GWMP was non-compliant with both the GWMP and DA 140-6-2005, however the risk of environmental harm was minor given the long history of compliance and good environmental performance at the Quarry. An update to the GWMP is currently in progress to prevent ongoing non-compliances relating to the GWMP occurring.

11.4 Other Matters

During August of 2024, Boral received an email from the Department of Climate Change, Environment and Water (DCCEW) advising of a potential Aboriginal area of interest exposed by wind erosion, which may require management. Representatives from DCCEW, National Parks and Wildlife Services (NPWS) and DPHI subsequently attended the Quarry Site to assess the area and identify options for its protection. It was subsequently determined that the area should be fenced to ensure the protection of the Aboriginal heritage noting that this activity has been completed. Boral has engaged a heritage consultant to liaise with NPWS, Worimi and Boral on the best long term option to protect the area.

12. Activities to be Completed in the next Reporting Period

The following section provides a brief summary of the operational activities planned throughout 2025. **Figure 7** presents the location(s) of the activities described.

12.1 Extraction and Loading Activities

Extraction of concrete sand will continue within Pit 7 throughout the next reporting period, i.e. from 1 January 2025 to 31 December 2025. **Figure 7** displays the approximate area of sand extraction proposed throughout 2025.

12.2 Processing Activities

Campaign screening will be undertaken where necessary throughout the reporting period, likely operating for a few weeks at a time. Screening will operate within the active extraction areas and stored adjacent to the active extraction areas.

The screening campaigns will result in product stockpiles being ready for direct loading to product vehicles, as required.

12.3 Water Management

Surface water and groundwater will continue to be managed in accordance with the Erosion and Sediment Management Plan and GWMP.

12.4 Waste Management

The dedicated waste metal bin and waste skips will continue to be utilised throughout the reporting period. The existing fortnightly general waste collection service will also continue.

Waste oil is collected and stored within a 300L bunded tank, located within the fuel storage and maintenance shed. Renewable Oils will continue to remove the waste oil at regular intervals as required, with this expected to occur quarterly during the reporting period, similar to previous reporting periods.

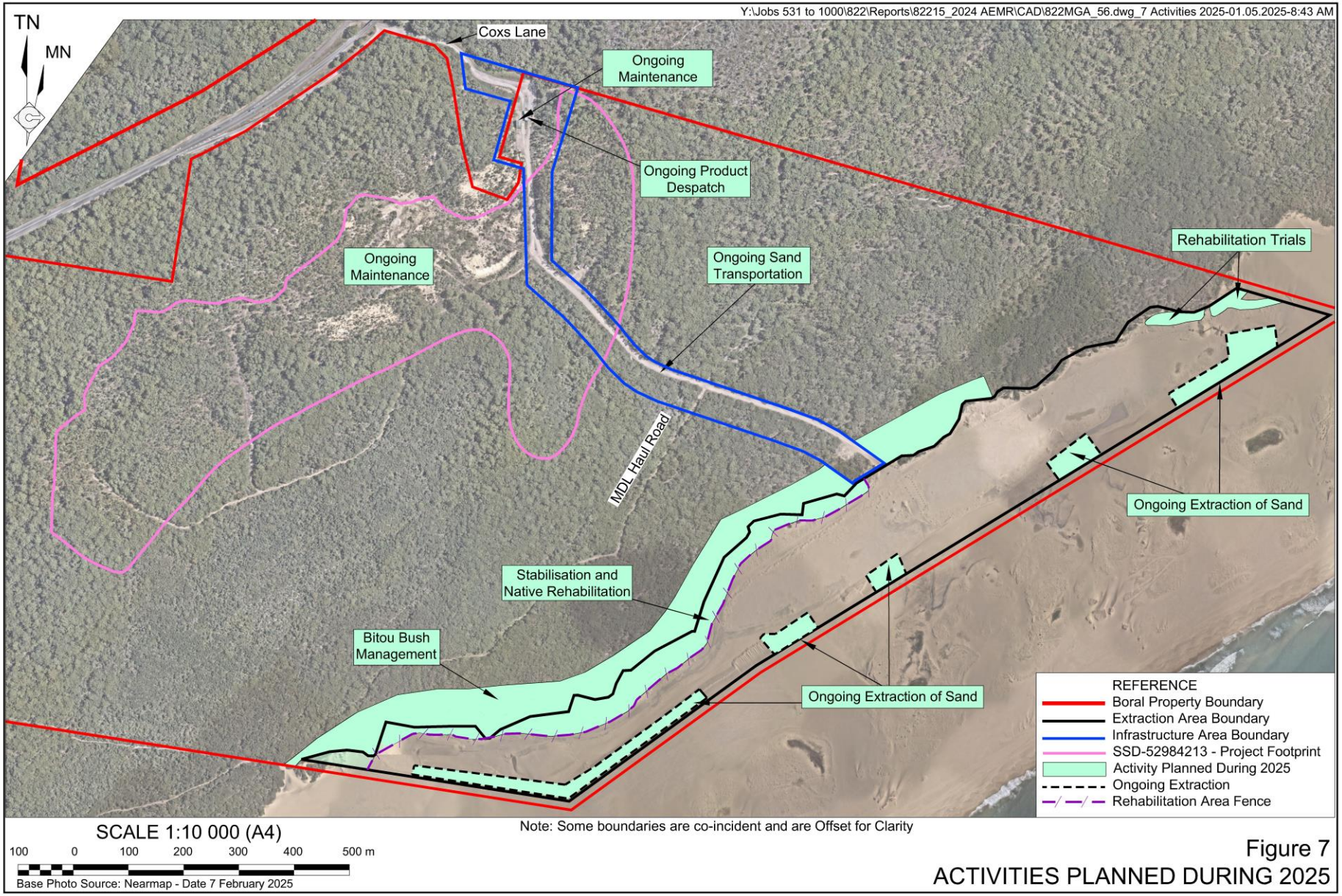


Figure 7
ACTIVITIES PLANNED DURING 2025

12.5 Product Despatch

All products will continue to be despatched via the on-site weighbridge and all laden trucks will continue to travel westwards along Coxs Lane and use the southbound on-ramp to Nelson Bay Road. It is conservatively estimated that 4,230 laden truck loads would be despatched from the Quarry in 2025.

The final destination for sand products will continue to be split consistent with current operations with approximately half despatched to the south and half despatched to the north of the Quarry.

12.6 Security and Public Safety

It is proposed that the fencing arrangement within the 2025 reporting period will involve the ongoing use of high visibility line with reflective tags and warning signs as displayed on **Figure 6**. Posts for signage and high visibility line are made of flexible shatterproof plastic to prevent injury to public during possible collision.

12.7 Rehabilitation Activities

The following rehabilitation activities are planned to occur throughout the 2025 reporting period, subject to suitable climatic conditions and other external factors.

- Ongoing management of active jute fibre matting areas within transgressive dune system located on the border to existing vegetated areas.
- Application of coir logs (see **Figure 7**) to stabilise the dune surface and encourage natural revegetation. Areas that have started to degrade will be recovered.
- Continuation of trialling the success of revegetation via direct planting into the dune (**Figure 7)**.
- Continuation of the utilisation of RehSnap stations to monitor rehabilitation success (**Plate 7** and **Plate 8**)
- Ongoing maintenance of Pit 6 rehabilitation area.
- Continued natural revegetation on final stages on the western side of the previously extracted eastern extraction area (see **Figure 7**).
- 1080 baiting programs undertaken in consultation with National Parks and other local landowners, would continue in the event there is an increase in feral animal sightings.
- Bitou Bush weed management by HLM will continue along the western boundary of Pit 7. Other weed management of ongoing rehabilitation areas will continue to be undertaken internally.

12.8 Environmental Documentation

It is noted that all management plans for the site have been reviewed and updated, where required, following the completion of the independent audit completed during the reporting period.

12.9 Other Matters

Ongoing consultation will be undertaken with a heritage consultant to manage correspondence between NPWS, Worimi and Boral regarding the best long-term option to protect the potential Aboriginal area of interest exposed by wind erosion adjacent to Pit 7 (see Section 11.4).

13. References

ANZECC (2000). *Australian and New Zealand Guidelines Fresh and Marine Water Quality.*

Boral Resources (NSW) Pty Ltd (2018). *Erosion and Sediment Control Plan*, July 2018.

ERM (2005). *Stockton Sandpit Windblown Sand Extraction Environmental Impact Statement*. Prepared for Boral Resources (Country) Pty Ltd.

ECS (2017) *Environmental Management Strategy*. Compiled on behalf of Boral Resources (NSW) Pty Ltd

Jacobs Group (Australia) Pty Limited (2019). *Groundwater Management Plan*. Prepared for Boral Resources (NSW) Pty Ltd.

Groundwater Check Pty Limited (2025). *Groundwater Assessment for 2024 AEMR*. Compiled on behalf of Boral Resources (NSW) Pty Ltd.

R.W. Corkery & Co. Pty Limited (RWC) (2018). *Rehabilitation and Landscape Management Plan*. Prepared on behalf of Boral Resources (NSW) Pty Ltd.

Appendix 1

Compliance Schedule for Relevant Development Consent Conditions for Stockton Transgressive Dune Quarry Activities

1 January 2024 to 31 December 2024

(Total No. of pages including blank pages = 22)

Table A1-1
Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 2: ADMINISTRATION CONDITIONS				
Obligation to Minimise Harm to the Environment				
1.	The Applicant shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the development.	Yes	No harm to the environment resulted from the operation or rehabilitation of the Quarry during the reporting period.	O/D
Terms of Approval				
2.	The Applicant shall carry out the development generally in accordance with the: a) Development Application: DA 140-6-2005 b) EIS titled Environmental Impact Statement Stockton Sandpit Extraction, dated June 2005; c) report titled Stockton Quarry EIS Response to Submissions, dated August 2005; d) Letter from Environmental Resources Management Australia Pty Ltd to the Department dated 20 October 2005 about site rehabilitation; e) the modification application for Mod 2 and supporting letter dated 12 January 2011; and f) conditions of this development consent.	Yes	General compliance	O/D
3.	If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.	N/A		
4.	The Applicant shall comply with any reasonable requirements of the Director-General arising from the Department's assessment of: a) any reports, plans or correspondence that are submitted in accordance with this development consent; and b) the implementation of any actions or measures contained in these reports, plans or correspondence.	Yes	All reasonable requirements made by DPIE were addressed during the reporting period as outlined in Sections 6.1 and 6.2.	O/D

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Table A1-1 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 2: ADMINISTRATION CONDITIONS (Cont'd)				
Limits on Approval				
5.	Quarrying operations may take place on the site for a period of 20 years after the commencement of operations.	NYA		
6.	The Applicant shall not transport more than 500 000 tonnes of product from the site each calendar year.	Yes	Annual production during the reporting period was 173,639.45 tonnes.	D
7.	The Applicant shall not extract sand or carry out any work below 2.5m AHD.	Yes	Boral confirmed that extraction did not occur below 2.5m AHD during the reporting period. Depth markers have been installed within Pit 7 to ensure this limit is not exceeded.	O
Protection of Public Infrastructure				
8.	The Applicant shall: a) repair, or pay the full costs associated with repairing any public infrastructure that is damaged by the development; and b) relocate, or pay the full costs associated with relocating any public infrastructure that needs to be relocated as a result of the development.	N/A	No public infrastructure was damaged or needed to be relocated during the reporting period.	O
Operation of Plant and Equipment				
9.	The Applicant shall ensure that all plant and equipment at the site, or used in connection with the development, are: a) maintained in a proper and efficient condition; and b) operated in a proper and efficient manner.	Yes	Boral reported that all equipment was maintained during the reporting period.	O
Reporting				
10.	At least one month before operations commence, the Applicant shall notify the Director-General in writing of the date of the commencement of operation of the development.	N/A	Not applicable to the reporting period.	

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Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS **GENERAL EXTRACTION AND PROCESSING PROVISIONS**				
Identification of Boundaries				
1.	Prior to carrying out any development on the site, the Applicant shall: a) engage a registered surveyor to mark out the boundaries of the approved limits of extraction; and	NYA	Not applicable to the reporting period.	D
	b) submit a survey plan of these boundaries to the Director-General, to the satisfaction of the Director-General.	NYA	Not applicable to the reporting period.	D
TRAFFIC AND TRANSPORT				
Transport Route				
2.	The Applicant shall ensure that all heavy vehicles coming to or leaving the site use the Nelson Bay Road interchange, and do not use Fullerton Cove Road and Coxs Lane west of the Nelson Bay Road interchange, except as directed by the Police or other authorities.	Yes	Boral reported that all vehicles used the approved transport route. This approved transport route is clearly identified during the drivers induction.	D
Road Haulage				
3.	The Applicant shall ensure that all loaded vehicles entering or leaving the site are covered.	Yes	Boral reported that all loads were covered during the reporting period.	O
4.	The Applicant shall ensure that all loaded vehicles leaving the site are cleaned of materials that may fall on the road before they are allowed to leave the site.	Yes	Boral reported that drivers inspect their loads prior to departing the Quarry and that during the reporting period no material was tracked onto external roads.	O
Haul Road				
5.	The Applicant shall construct the proposed haul road on the site to the satisfaction of the Director-General.	N/A	Not applicable during the reporting period.	
Parking				
6.	The Applicant shall provide sufficient parking on-site for all quarry-related traffic to the satisfaction of the Director-General.	Yes	Sufficient parking is available at the site. Upgrades to the parking area were undertaken during the reporting period as discussed in Section 5.7.	O

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Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

<table>
<tr><th>Condition No.</th><th>Paraphrased Requirement</th><th>Compliance</th><th>Comment</th><th>Basis*</th></tr>
<tr><td colspan="5">SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS
GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)</td></tr>
<tr><td colspan="5">NOISE</td></tr>
<tr><td colspan="5">Noise Limits</td></tr>
<tr><td>7.</td><td>The Applicant shall ensure that the noise generated by the development does not exceed 35dB(A) $L_{eq\ (15\ minute)}$ at the nearest residential receiver.</td><td>Yes</td><td>Boral conduct noise monitoring, only following complaints from residents which is consistent with the approved Environmental Management Strategy. Additionally, Boral conducts noise monitoring every five years to ensure noise remains below the noise limits. The next monitoring event is planned for the 2025 reporting period.</td><td>O</td></tr>
<tr><td colspan="5">Operating Hours</td></tr>
<tr><td>8.</td><td>The Applicant shall comply with the operating hours in Table 1:
Table 1: Operating Hours
<table>
<tr><th>Period</th><th>Normal Operations</th><th>During Major Supply Contracts</th></tr>
<tr><td>Monday to Friday</td><td>6.15am to 5.00pm</td><td>6.15am to 6.00pm</td></tr>
<tr><td>Saturday</td><td>6.15am to 12 noon</td><td>6.15am to 3.00pm</td></tr>
<tr><td>Sundays and Public Holidays</td><td>No operations</td><td>No operations</td></tr>
</table></td><td>Yes</td><td>Boral reported that no operations occurred outside the approved operating hours during the reporting period.
Operations do not typically occur on a Saturday.</td><td>D</td></tr>
<tr><td colspan="5">SOIL AND WATER</td></tr>
<tr><td colspan="5">Pollution of Waters</td></tr>
<tr><td>9.</td><td>Except as may be expressly provided by a DEC licence, the Applicant shall comply with section 120 of the Protection of the Environment Operations Act 1997; during the carrying out of the development.</td><td>Yes</td><td>No pollution of waters occurred during the reporting period.</td><td>O</td></tr>
<tr><td colspan="5">Monitoring and Management</td></tr>
<tr><td>10.</td><td>Prior to carrying out any development on the site, the Applicant shall prepare and implement a Soil and Water Management Plan for the development, in consultation with DNR, and to the satisfaction of the Director-General.
The Plan must be prepared by a suitably qualified hydrogeologist / hydrologist whose appointment(s) have been approved by the Director-General, and shall include:
a) an Erosion and Sediment Control Plan; and
b) a Ground Water Monitoring Program.</td><td>N/A</td><td>Not applicable during the reporting period.</td><td></td></tr>
</table>

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Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)				
SOIL AND WATER (Cont'd)				
Monitoring and Management (Cont'd)				
11.	The Erosion and Sediment Control Plan shall: a) be consistent with the requirements of Managing Urban Stormwater, Soils and Construction Volume 1, 4th edition (Landcom); b) identify activities that could cause soil erosion and generate sediment; c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters; d) describe the location, function, and capacity of erosion and sediment control structures; and e) describe what measures would be implemented to maintain the structures over time.	Yes	The approved Erosion and Sediment Control Plan satisfies these requirements.	D
12.	The Ground Water Monitoring Program shall include: a) detailed baseline data on ground water levels, flows and quality, based on statistical analysis, to benchmark the pre-quarrying natural variation in groundwater levels and quality; b) ground water impact assessment criteria; and c) a program to monitor ground water levels and quality.	No	The following matters were not undertaken in accordance with the approved GWMP. • Water quality and groundwater levels were not monitored at MW2 and MW11 due to the loss of the bores. • Consecutive groundwater quality quarterly trigger level exceedances were not actioned as per the GWMP Trigger Action Response Plan (TARP).	D/O
13.	Within 3 months of the completion of each independent environmental audit required under Condition 4, Schedule 4, the Applicant shall review, and if necessary, update the Soil and Water Management Plan to the satisfaction of the Director-General.	Yes	Not applicable to the reporting period.	D

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Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)				
VISUAL IMPACT				
14.	The Applicant shall implement all practicable measures to minimise the visual impacts of the development on Stockton Beach to the satisfaction of the Director-General.	Yes	No actions required during reporting period. To assist with the minimisation of visual impacts, Boral ensures no vehicles remain on the beach outside of operating hours.	O
HAZARD MANAGEMENT				
Safety				
15.	The Applicant shall: a) place appropriate warning signs surrounding the active extraction area; and	Yes	Warning signs are placed along the dune system to warn beach users of the presence of the Quarry.	O
	b) ensure that all sand extraction working faces are of no greater slope than 1:3 (V: H) when left at the end of each working day,	Yes	Boral reported that this condition was satisfied during the reporting period by utilising bulldozers to push the extraction faces, and was the case during the site visit.	O
	to the satisfaction of the Director-General.	Yes	The hazard management approach was approved in documentation relating to Modification 2 to the development consent in June 2011.	O
Dangerous Goods				
16.	The Applicant shall ensure that the storage, handling, and transport of dangerous goods are conducted in accordance with the relevant Australian Standards, particularly AS194C, and AS1596, and the Dangerous Goods Code.	Yes	All hazardous materials are stored in a secure bunded area consistent with the relevant Australian Standards.	O
BUSH FIRE MANAGEMENT				
17.	The Applicant shall: a) ensure that the development is suitably equipped to assist in the management of any fires on-site; and b) assist the rural fire service and emergency services as much as possible if there is a fire on-site.	Yes	Standard firefighting equipment is available, and Boral personnel are available to assist with regional firefighting where needed.	O
Rehabilitation				
18.	The Applicant shall progressively rehabilitate the site, including the batters, buffer area, floor of the extraction area and haul road, in a manner that is generally consistent with the final landform described in the EIS, to the satisfaction of the Director-General.	Yes	Rehabilitation activities continued during the reporting period to progressively develop the final landform and encourage vegetation grown along the dune system.	O

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Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS **GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)**				
REHABILITATION AND LANDSCAPING				
Rehabilitation and Landscape Management Plan				
19.	Prior to carrying out any development on the site, the Applicant shall prepare and subsequently implement a Rehabilitation and Landscape Management Plan for the development in consultation with Council, and to the satisfaction of the Director-General. This plan must: a) identify the disturbed area at the site; b) describe in general the short, medium, and long-term measures that would be implemented to rehabilitate the site; c) describe in detail the measures that would be implemented over the next 5 years to rehabilitate the site; d) describe how the performance of these measures would be monitored over time; e) describe the measures that would be implemented to prevent and eradicate the occurrence of pests and weeds on the site; and f) set completion criteria for the rehabilitation of the site.	Yes	The approved Rehabilitation and Landscape Management Plan satisfies these requirements.	D
20.	Within 3 months of the completion of each independent environmental audit required under Condition 4, Schedule 4, the Applicant shall review, and if necessary, update the Rehabilitation and Landscape Management Plan to the satisfaction of the Director-General.	Yes	Not applicable to the reporting period.	D

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Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS				
GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)				
REHABILITATION AND LANDSCAPING (Cont'd)				
Rehabilitation and Landscape Management Plan (Cont'd)				
Rehabilitation Bond				
21.	Prior to carrying out any development on the site, the Applicant shall lodge a rehabilitation bond for the development with the Director-General. The sum of the bond shall be calculated at \$0.50/m^2 for the total additional area to be disturbed in each 5 year review period, or as otherwise directed by the Director-General.	Yes	A Rehabilitation Bond has been submitted to DPHI.	D
22.	Within 3 months of the completion of each independent environmental audit required under Condition 4, Schedule 4, the Applicant shall review, and if necessary, revise, the sum of the bond to the satisfaction of the Director-General. This review must consider: a) the effects of inflation; b) any changes to the total area of disturbance; and c) the performance of the rehabilitation against the completion criteria of the Rehabilitation and Landscape Management Plan.	Yes	The sum of the bond was revised during the reporting period. No amendment was required.	D
PRODUCTION DATA				
23.	The Applicant shall: a) provide annual production data to the Department of Primary Industries using the standard form for that purpose; and b) include a copy of this data in the AEMR.	 Yes Yes	 The annual production data is provided to the relevant government agencies each year. This data is provided in Section 5.2 of the AEMR.	 D D
QUARRY EXIT STRATEGY				
24.	At least 3 years prior to the cessation of quarrying, the Applicant shall prepare a Quarry Exit Strategy for the development, in consultation with the Council, and to the satisfaction of the Director-General. The plan must: a) define the objectives and criteria for quarry closure; b) investigate options for the future use of the site;	NYA	In preparation for the 2025 reporting period.	

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Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 3: SPECIFIC ENVIRONMENTAL CONDITIONS **GENERAL EXTRACTION AND PROCESSING PROVISIONS (Cont'd)**				
QUARRY EXIT STRATEGY (Cont'd)				
24. (Cont'd)	c) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the development; and d) describe how the performance of these measures would be monitored over time.			
SCHEDULE 4 - ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING				
ENVIRONMENTAL MANAGEMENT STRATEGY				
1.	Prior to carrying out any development on the site, the Applicant shall prepare, and subsequently implement, an Environmental Management Strategy for the development to the satisfaction of the Director-General. This strategy must: a) provide the strategic context for environmental management of the development; b) identify the statutory requirements that apply to the development; c) describe in general how the environmental performance of the development would be monitored and managed during the development; d) describe the procedures that would be implemented to: – keep the local community and relevant agencies informed about the operation – and environmental performance of the development; – receive, handle, respond to, and record complaints; – resolve any disputes that may arise during the course of the development; – respond to any non-compliance; – manage cumulative impacts; and – respond to emergencies; and	Yes	The approved Environmental Management Strategy satisfies these requirements.	D

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Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 4 - ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING (Cont'd)				
ENVIRONMENTAL MANAGEMENT STRATEGY (Cont'd)				
1. (Cont'd)	e) describe the role, responsibility, authority, and accountability of all the key personnel involved in environmental management of the development; and f) Be updated within 3 months of the completion of each independent environmental audit.			
2.	Within 3 months of the completion of each independent environmental audit required under Condition 4 below, the Applicant shall review, and if necessary, update the Strategy to the satisfaction of the Director-General	Yes	Not applicable to the reporting period.	D
ANNUAL REPORTING				
3.	Each year following the date of this consent, the Applicant shall prepare and submit an Annual Environmental Management Report (AEMR) to the Director-General and the relevant agencies. This report must:	Yes	This report	D
	a) identify the standards and performance measures that apply to the development; b) describe the works carried out in the last 12 months; c) describe the works that will be carried out in the next 12 months; d) include a summary of the complaints received during the past year, and compare this to the complaints received in previous years; e) include a summary of the monitoring results for the development during the past year; f) include an analysis of these monitoring results against the relevant: – impact assessment criteria; – monitoring results from previous years; and – predictions in the EIS.	Yes	These requirements are satisfied in this AEMR.	D

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Table A1-1 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Development Consent DA94-4-2004 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
SCHEDULE 4 - ENVIRONMENTAL MANAGEMENT, MONITORING, AUDITING AND REPORTING (Cont'd)				
ANNUAL REPORTING (Cont'd)				
3. (Cont'd)	g) identify any trends in the monitoring results over the life of the development; h) identify any non-compliance during the previous year; and i) describe what actions were, or are being taken to ensure compliance.			
INDEPENDENT ENVIRONMENTAL AUDIT				
4.	Within 3 years of the date of this consent, and every 5 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:	Yes	Not applicable to the reporting period.	D
5.	Within 3 months of commissioning this audit, the Applicant shall submit a copy of the audit report to the Director-General, with a response to the recommendations contained in the audit report.	Yes	Not applicable to the reporting period.	D
ACCESS TO INFORMATION				
6.	Within 1 month of the approval of any management plan/strategy or monitoring program required under this consent (or any subsequent revision of these management plans/strategies or monitoring programs), the completion of the independent audits required under this consent, or the completion of the AEMR, the Applicant shall to the satisfaction of the Director-General: a) provide a copy of the relevant documents to the Council and relevant agencies; and b) ensure that a copy of the relevant documents is made publicly available at the quarry.	Yes	All relevant plans, strategies and audit have been provided to Council and are available for public review at the Quarry.	D

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Table A1-2
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
1. Administrative Conditions				
A1 - What the licence authorises and regulates				
A1.1	This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation. Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.	Yes	All activities remained consistent with the approved scheduled activities.	D
	Scheduled Activity / **Fee Based Activity** / **Scale**			
	Extractive Activities / Land-based extractive activity / > 100000 - 500000T extracted, processed or stored			
A2 - Premises or plant to which this licence applies				
A2.1	The licence applies to the following premises: **Premises Details** Stockton Sand Quarry 18-20 Cox's Lane Fullerton Cove NSW 2318 Lot 3 DP 664552, Lot 1 DP 1006399, Lot 2 DP 1006399 Part Portions 3 and 167 Parish of Stowell. DP 753192 and Crown Reserve R170039	N/A		
A3 - Information supplied to the EPA				
A3.1	Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.	Yes	All works and activities complied with the conditions of this licence during the reporting period.	O

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
2. Limit Conditions				
L1 - Pollution of waters				
L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	Yes	No pollution of waters occurred during the reporting period.	Yes
L2 - Waste				
	The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below. Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below. Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below. This condition does not limit any other conditions in this licence.	Yes	No waste material was received on site during the reporting period.	Yes

Code	Waste	Description	Activity	Other Limits
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005.	As specified in each particular resource recovery exemption	NA

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
2. Limit Conditions (Cont'd)				
L3 - Noise limits				
L3.1	Noise emissions from the premises must not exceed an $L_{eq(15\ minute)}$ noise emission criterion of 35 dB(A) at the nearest residential receiver.	Yes	While compliance with these limits was not demonstrated during the reporting period, the absence of complaints, location of the nearest receiver and historical compliance indicates that this condition would have been satisfied.	O
L3.2	Noise from the premises is to be measured at the worst affected point or within the residential boundary, or the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise limit in this licence.	Yes	While compliance with these limits was not demonstrated during the reporting period, the absence of complaints, location of the nearest receiver and historical compliance indicates that this condition would have been satisfied.	O
L3.3	The noise emission limit identified in this licence applies in the following weather conditions: • wind speed up to 3m/s at 10m above ground level; or • temperature inversion conditions of up to 30C/100m and wind speed up to 2m/s at 10m above ground level.	N/A		
3. Operating Conditions				
O1 - Activities must be carried out in a competent manner				
O1.1	Licensed activities must be carried out in a competent manner. This includes: a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.	Yes	Boral reports that all activities were carried out in a competent manner during the reporting period. This includes the management of materials and substances used to carry out the operation such as diesel and other hazardous substances. All waste generated by the operation was managed in accordance with the Environmental Management Strategy.	O
O2 - Maintenance of plant and equipment				
O2.1	All plant and equipment installed at the premises or used in connection with the licensed activity: a) must be maintained in a proper and efficient condition; and b) must be operated in a proper and efficient manner.	Yes	Boral reports that all plant and equipment was maintained and operated in a proper and efficient manner.	O

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
3. Operating Conditions (Cont'd)				
O3 - Dust				
O3.1	The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.	Yes	Boral reports that dust was managed appropriately during the reporting period, and that they regularly utilise the use of a water cart.	O
O3.2	Trucks entering and leaving the premises that are carrying loads must be covered at all times, except during loading and unloading.	Yes	Boral reports that all loads were covered during the reporting period.	O
O4 - Processes and management				
O4.1	All fuel and chemicals stored on site must be stored in an appropriately sealed, bunded area as per EPA guidelines.	Yes	All fuel and chemicals were stored appropriately on site.	O
O5 - Other operating conditions				
O5.1	Rehabilitation Suitable barriers must be installed to restrict vehicular access to area awaiting or being rehabilitated.	Yes	Warning signs are in place along the dune system and areas under rehabilitation are fenced. However, given that the dune system is open to the beach areas, it is not possible to restrict beach users from the site permanently. A fence has been erected to block trespassers on the rehabilitation area.	O
	Stabilisation of regeneration areas must be carried out as soon as practicable to minimise wind-blown dust generated from the premises.	Yes	Areas within the site that are undergoing rehabilitation have in the past been stabilised with coconut fibre matting to reduce wind-blown dust and encourage revegetation.	O
	Rehabilitation must be carried out as quickly as practicable, in such a manner as to minimise dust generated and to prevent pollution.	Yes	Rehabilitation is commenced as soon as practical.	O
4. Monitoring and Recording Conditions				
M1 - Monitoring records				
M1.1	The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.	N/A	There are no monitoring requirements in EPL 10132.	D
M1.2	All records required to be kept by this licence must be: a) in a legible form, or in a form that can readily be reduced to a legible form; b) kept for at least 4 years after the monitoring or event to which they relate took place; and	N/A	There are no monitoring requirements in EPL 10132.	D

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
4. Monitoring and Recording Conditions (Cont'd)				
M1 - Monitoring records (Cont'd)				
M1.2 (Cont'd)	c) produced in a legible form to any authorised officer of the EPA who asks to see them. The following records must be kept in respect of any samples required to be collected for the purposes of this licence: a) the date(s) on which the sample was taken; b) the time(s) at which the sample was collected; c) the point at which the sample was taken; and d) the name of the person who collected the sample.			
M2 Recording of pollution complaints				
M2.1	The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.	Yes	A complaints register is maintained, however no complaints were received during the reporting period.	O
M2.2	The record must include details of the following: a) the date and time of the complaint; b) the method by which the complaint was made; c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; d) the nature of the complaint; e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and f) if no action was taken by the licensee, the reasons why no action was taken.	Yes	A complaints register is maintained, however no complaints were received during the reporting period.	O
M2.3	The record of a complaint must be kept for at least 4 years after the complaint was made.	Yes	A complaints register is maintained, however no complaints were received during the reporting period.	O

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
4. Monitoring and Recording Conditions (Cont'd)				
M2 Recording of pollution complaints (Cont'd)				
M2.4	The record must be produced to any authorised officer of the EPA who asks to see them.	NYA	No requests were received during the reporting period.	O
M3 - Telephone complaints line				
M3.1	The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from embers of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.	Yes	A telephone complaints line was maintained, however no complaints were received during the reporting period.	O
M3.2	The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.	Yes	The telephone complaints number is displayed on the front gate of the Quarry.	O
M3.3	The preceding two conditions do not apply until 3 months after: a) the date of the issue of this licence or b) if this licence is a replacement licence within the meaning of the Protection of the Environment	Noted		
5. Reporting Conditions				
R1 - Annual return documents				
R1.1	The licensee must complete and supply to the EPA an Annual Return in the approved form comprising: a) a Statement of Compliance; and b) a Monitoring and Complaints Summary. At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.	Yes	Annual Return submitted for the period 1 December 2022 to 30 November 2023.	D
R1.2	An Annual Return must be prepared in respect of each reporting period, except as provided below.	Noted		

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
5. Reporting Conditions (Cont'd)				
R1 - Annual return documents (Cont'd)				
R1.3	Where this licence is transferred from the licensee to a new licensee: a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.	Noted		
R1.4	Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on: a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.	Noted Noted		
R1.5	The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').	Yes	Annual Return submitted for the period 1 December 2023 to 30 November 2024.	D
R1.6	The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.	Noted		

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
5. Reporting Conditions (Cont'd)				
R1 - Annual return documents (Cont'd)				
R1.7	Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by: a) the licence holder; or b) by a person approved in writing by the EPA to sign on behalf of the licence holder.	Yes	Compliance declaration was signed by the Quarry Manager, Operations Manager, General Manager and Environmental Manager.	
R1.8	A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.	Noted		
R2 - Notification of environmental harm				
R2.1	Notifications must be made by telephoning the Environment Line service on 131 555.	Noted		
R2.2	The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.	Noted	No notifications were required during the reporting period.	O
R3 - Written report				
R3.1	Where an authorised officer of the EPA suspects on reasonable grounds that: a) where this licence applies to premises, an event has occurred at the premises; or b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.	Noted		

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
5. Reporting Conditions (Cont'd)				
R3 - Written report (Cont'd)				
R3.2	The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.	Noted		
R3.3	The request may require a report which includes any or all of the following information: a) the cause, time and duration of the event; b) the type, volume and concentration of every pollutant discharged as a result of the event; c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event; d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort; e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants; f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and g) any other relevant matters.	Noted		
R3.4	The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.	Noted		

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Table A1-2 (Cont'd)
Internal Compliance Audit of Relevant Conditions of Environment Protection Licence 10132 for Stockton Transgressive Dune Quarry from 1 January 2024 to 31 December 2024

Condition No.	Paraphrased Requirement	Compliance	Comment	Basis*
6. General Conditions				
G1 - Copy of licence kept at the premises or plant				
G1.1	A copy of this licence must be kept at the premises to which the licence applies.	Yes	A copy of the licence is available at the Quarry.	D
G1.2	The licence must be produced to any authorised officer of the EPA who asks to see it.	Noted		
G1.3	The licence must be available for inspection by any employee or agent of the licensee working at the premises.	Noted		

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Appendix 2

Stockton Sand Quarry Annual Groundwater Monitoring Review for the 2024 AEMR

(Total No. of pages including blank pages = 66)

Groundwater CHECK

REPORT ON: **2024 Annual Groundwater & Surface Water Monitoring Data Review: Boral's Stockton Sand Quarry, Stockton, NSW**

PREPARED FOR: **Boral Resources (NSW) Pty Ltd c/- R.W. Corkery & Co. Pty Ltd**

PREPARED BY: **Groundwater Check Pty Ltd**

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Copyright Statement

Limitations Statement

The sole purpose of this report is to present the findings of a groundwater and surface water monitoring data review, in connection with Boral's Stockton Sand Quarry, to support the 2024 Annual Environmental Management Report. The report was commissioned by Boral Resources (NSW) Pty Ltd ('the Client') and was produced in accordance with, and is limited to, the scope of services set out in the proposal & contract between Groundwater Check and the Client. That scope of services, as described in this report, was developed with the Client.

All reports and conclusions that deal with sub-surface conditions are based on interpretation and judgement and as a result have uncertainty attached to them. This report contains interpretations and conclusions which are uncertain due to the nature of the investigations and data.

This report is based on assumptions that the site conditions as revealed through sampling are indicative of conditions throughout the site. The findings are the result of typical assessment techniques used in accordance with normal practices and standards, and (to the best of Groundwater Check's knowledge) they represent a reasonable interpretation of the current conditions on the site. Sampling techniques, by definition, cannot determine the conditions between the sample points. Therefore, this report cannot be taken to contain a full representation of the sub-surface conditions. This report only provides an indication of the likely sub-surface conditions.

The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analysis, together with re-evaluation of the observations, findings and conclusions expressed in this report

Conditions encountered during the project or others' site investigations may be different from those inferred in this report, for the reasons explained in this limitation statement. If this is the case, Groundwater Check reserves the right to revise any of the interpretations, findings and conclusions expressed in this report.

In preparing this report, Groundwater Check has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and from other sources. Except as otherwise stated in the report, Groundwater Check has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete, then it is possible that our observations, interpretations, findings and conclusions as expressed in this report may change.

Groundwater Check has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

Except as specifically stated in this report, Groundwater Check makes no statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use.

The report should be read in full. Any excerpts may not be necessarily representative of the report's findings.

The report has been prepared exclusively for the Client and no liability is accepted for any use or reliance on the report by any third party.

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Document Control				
Document Title	2024 Annual Groundwater & Surface Water Monitoring Data Review: Boral's Stockton Sand Quarry, Stockton, NSW			
Document No.	PRJ_0001_RPT_001_R01.docx			
Author(s)	Ben Rose			
Revision No.	**Status**	**Issued by – Date**	**Distributed to**	**Comments Rec'd from – Date**
00	Draft	B Rose – 09/03/2025	R.W. Corkery & Co. Pty Ltd	17/03/2025
01		B Rose – 18/03/2025	R.W. Corkery & Co. Pty Ltd	

Contents

1. Introduction

1.1 Overview

Boral Resources (NSW) Pty Ltd (Boral) owns and operates the Stockton Sand Quarry (the Quarry), located east of Fullerton Cove, approximately 9km northeast of Newcastle.

Groundwater Check Pty Ltd was engaged by Boral to undertake a review of groundwater and surface water monitoring data, in support of the 2024 Annual Environmental Management Report (AEMR) for the Quarry, prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of Boral, in accordance with Development Consent DA No. 140-6-2005 ("DA 140-6-2005") *Condition 4 (3)*.

1.2 Approvals history & background

1.2.1 Summary

Development Consent 140-6-2005 was granted for the Quarry on 24 January 2006 and was amended in May 2006 and again in June 2011. Quarry operations commenced on 15 October 2008 and involve extraction of windblown sand from the unsaturated zone of the Stockton sand dunes.

Boral lodged a separate development application (SSD-52984213) to extract the remaining dry sand resource by free dig method from within the inland dune area. This was approved on 8 August 2024.

Historic heavy mineral sand extraction operations have previously occurred in the area dating back to 1976, including within the backdune and fordune areas. Currently, Boral does not extract sand from below the water table. The Quarry is located within the Stockton Groundwater Source of the Water Sharing Plan (WSP) for the North Coast Coastal Sands Groundwater Sources 2016.

The Quarry currently has three 'aquifer' Water Access Licenses (WALs), WAL43827 (reference no. 20AL220991), WAL44499 (reference no. 20AL221243) and WAL45028 (reference no. 20AL221416), for share components of 100, 320 and 104 units, respectively It is understood that WALs WAL43827 and WAL44499 were granted in the year 2021, whilst WAL WAL45028 was granted in the year 2023. During the reporting period, it is understood that no groundwater was extracted under these WALs.

1.2.2 Relevant development consent conditions

Groundwater and surface water is monitored in accordance with the approved groundwater and surface water monitoring program (see Section 2).

Development Consent 140-6-2005, *Condition 3 (12)*, states:

The Groundwater Monitoring Program shall include:

a) Detailed baseline data on groundwater levels, flows and quality, based on statistical analysis, to benchmark the pre-quarrying natural variation in groundwater levels and quality

b) Groundwater impact assessment criteria

c) A program to monitor groundwater levels and quality.

Environmental Protection License (No. 10132) for the Quarry does not specify any groundwater monitoring but outlines in Condition L1.1 that the licensee must comply with Section 120 of the *Protection of the Environment Operations Act (1997)* (based upon no specific water quality limit conditions).

1.3 Scope of works

The scope of this report is as follows:

- Review the current groundwater and surface water monitoring network and assess its adequacy
- Review groundwater and surface water monitoring data between 1 January 2024 and 31 December 2024 (the “reporting period”), consisting of:
    - Groundwater level data from 10 monitoring bores
    - Groundwater quality data from 6 monitoring bores
    - Surface water quality data from 4 surface water monitoring locations
- Review rainfall records over the reporting period
- Review monitoring data trends and compare results during the reporting period to trigger levels or guideline levels
- Assess whether monitoring results align with Environmental Impact Statement (EIS) predictions
- Provide recommendations pertaining to groundwater and surface monitoring, as necessary.

The groundwater and surface water monitoring, including trigger levels, are governed by the Quarry’s approved Groundwater and Surface Water Monitoring Program (GSWMP, 2019). As such, the monitoring data has been assessed in accordance with the 2019 GSWMP (see Section 2).

2. Groundwater & Surface Water Monitoring Program

In March 2020, the then NSW Department of Planning, Industry and Environment (DPIE), now NSW Department of Planning, Housing and Infrastructure (DPHI), approved the GSWMP (Jacobs, 2019), which governs groundwater and surface water monitoring, including trigger levels.

The 2024 groundwater and surface water monitoring data has been assessed in accordance with the 2019 GSWMP.

Groundwater and surface water monitoring locations, parameters, frequencies and trigger levels, as stipulated by the 2019 GSWMP, are outlined in Section 2.1 and 2.2, respectively.

2.1 Groundwater

2.1.1 Groundwater monitoring network

Except for MW2 and MW11, the current groundwater monitoring network is as documented in the 2019 GSWMP and is summarised in Table 2-1 and shown in Figure 1, Appendix A. MW2 and MW11 were destroyed in 2020 and 2021, respectively.

For completeness, construction information and locations of additional destroyed monitoring bores, which featured in the Quarry's historical groundwater monitoring network, are shown in Figure 2, Appendix A.

Table 2-1: Summary information for current active GSWMP (Jacobs, 2019) monitoring bores

Location ID	Easting (GDA2020/MGA z56)	Northing (GDA2020/MGA z56)	Elevation (mAHD)	Depth (mbgl)	Screened interval (mbgl)
MW1	391033.18	6364178.70	4.41	25	19 - 25
MW5	391589.37	6364389.51	4.89	8	2 - 8
MW6	391781.84	6364528.68	3.51	8	2 - 8
MW7	392043.24	6364701.93	4.03	8	2 - 8
MW8	392243.25	6364808.87	2.98	8	2 - 8
MW9	392414.21	6364896.50	5.50	8	2 - 8
GW1	391421.50	6364855.41	3.00	NP[1]	NP[1]
GW2	392029.21	6365104.71	2.99	NP[1]	NP[1]
GW3	391885.48	6364616.17	4.00	NP[1]	NP[1]
GW4	390446.55	6364168.51	3.86	NP[1]	NP[1]

Notes: [1] NP = not provided

2.1.2 Groundwater monitoring parameters, frequencies & locations

Ongoing groundwater monitoring, as outlined in the 2019 GWSMP, is summarised in Table 2-2.

Table 2-2: Groundwater monitoring parameters, frequencies and locations

Parameter	Frequency	Location
Water level	Monthly	All groundwater monitoring bores (Table 2-1)
Field water quality parameters: • pH • EC	Quarterly	MW series groundwater monitoring bores (Table 2-1)
Laboratory analytes: • Na, K, Ca, Mg, HCO3, CO3, Cl, SO4 • Al, As, B, Cd, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Se, Zn • Alkalinity, Hardness, Phosphorous, Nitrate-N, Sulphate, turbidity	Quarterly	MW series groundwater monitoring bores (Table 2-1)

2.1.3 Groundwater trigger levels

Groundwater trigger levels, as defined in the 2019 GSWMP, for current groundwater monitoring bores, for groundwater levels, pH, EC and laboratory analytes, are shown in Table 2-3, Table 2-4, Table 2-5 and Table 2-6, respectively.

Table 2-3: Groundwater level trigger levels

Location ID	Units	Upper limit	Lower limit
MW1	mAHD	2.92	0.98
MW5	mAHD	2.51	0.77
MW6	mAHD	2.66	0.60
MW7	mAHD	2.52	1.17
MW8	mAHD	2.57	1.23
MW9	mAHD	2.56	1.22
GW1	mAHD	2.92	0.98
GW2	mAHD	2.72	0.99
GW3	mAHD	2.60	1.13
GW4	mAHD	2.28	1.00

Table 2-4: Groundwater pH trigger levels

Location ID	Upper threshold limit (pH units)	Lower threshold limit (pH units)
MW1	7.47	5.67
MW5	7.68	5.88
MW6	7.65	6.6
MW7	7.53	6.64
MW8	7.59	6.71
MW9	8.33	4.93

Table 2-5: Groundwater EC trigger levels

Location ID	Upper threshold limit (µS/cm)	Lower threshold limit (µS/cm)
MW1	444	195
MW5	1015	105
MW6	584	115
MW7	1037	470
MW8	1021	453
MW9	965	155

Table 2-6: Groundwater trigger levels for laboratory analytes

Analyte	MW1		MW5		MW6		MW7		MW8		MW9	
	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit
Turbidity (NTU)	145.4	na	39.4	na	33.2	na	187	na	25.7	na	74.7	na
Chloride (mg/L)	47	15.8	200.5	na	44	3.8	134	na	190.2	na	136.3	na
Sulphate as SO4 (mg/L)	48.8	na	76.18	na	56.6	na	191.7	na	196	na	41.7	na
Aluminium (mg/L)	0.251	na	1.861	na	0.158	na	0.391	na	0.077	na	1.515	na
Arsenic (mg/L)	0.02	na	0.024	na	0.026	na	0.067	na	0.029	na	0.111	na
Boron (mg/L)	0.089	na	0.09	na	0.078	na	0.091	na	0.085	na	0.095	na
Calcium (mg/L)	76.2	na	141.1	na	102.9	1.86	196.5	5.1	197.2	18.7	140.2	na
Cadmium (mg/L)	0.003	na	0.003	na	0.002	na	0.002	na	0.002	na	0.004	na
Chromium (mg/L)	0.009	na	0.01	na	0.006	na	0.005	na	0.006	na	0.007	na
Copper (mg/L)	0.011	na	0.011	na	0.012	na	0.007	na	0.01	na	0.004	na
Iron (mg/L)	1.78	na	2.68	na	3.44	na	8.23	na	10.69	na	7.21	na
Potassium (mg/L)	4.6	na	5.7	na	2.8	na	5.2	0.4	4.6	0.3	7.1	na
Magnesium (mg/L)	9.7	na	20	na	7.6	na	14.3	1.8	14.1	1.1	12.1	2.8
Manganese (mg/L)	0.03	na	0.32	na	0.06	na	0.82	na	0.32	na	1.32	na
Nitrogen (mg/L)	0.001	na	0.001	na	0.001	na	0.001	na	0.001	na	0.001	na
Sodium (mg/L)	38.6	na	173.3	na	26.8	na	99.2	na	127.4	na	78.7	na
Nickel (mg/L)	0.026	na	0.076	na	0.074	na	0.012	na	0.064	na	0.022	na
Lead (mg/L)	0.008	na	0.022	na	0.01	na	0.009	na	0.014	na	0.008	na
Selenium (mg/L)	0.009	na	0.011	na	0.011	na	0.009	na	0.009	na	0.009	na

Zinc (mg/L)	0.124	na	0.03	na	0.027	na	0.028	na	0.022	na	0.061	na
Filterable Reactive P (mg/L)	0.03	na	0.07	na	0.37	na	0.21	na	0.38	na	0.3	na
Nitrate - N (mg/L)	10.57	na	4.74	na	2.38	0.01	1.36	na	0.91	na	1.04	na
Alkalinity (mg CaCO3/L	157.4	6.2	293.3	18	246	22.8	313.3	74.6	317.8	71.7	360.32	na
Hardness as CaCO3	170.5	66.4	431.2	117.7	274.4	144.2	487.1	274.8	501.1	283.8	484.7	11.1
Mercury (mg/L)	0.0016	na	0.0016	na	0.0015	na	0.0016	na	0.0016	na	0.0016	na
Fluoride (mg/L)	0.755	0.002	0.753	na	0.726	na	0.732	na	0.746	na	0.736	na

Notes: na – method results in negative value or value below limit of reporting.

2.2 Surface water

2.2.1 Surface water monitoring network

Surface water monitoring sites were developed to monitor Groundwater Dependent Ecosystems (GDEs).

Surface water monitoring locations, as documented in the 2019 GSWMP, SW1, SW2, SW3 and SW4, are included in Figure 1, Appendix A and are summarised in Table 2-7.

Due to the dynamic nature of the foredune system, the locations of SW3 and SW4 may shift between sampling programs, as the GDEs they monitor can move.

Table 2-7: Surface water sampling locations

Location ID	Easting [1] (GDA2020/MGA z56)	Northing [1] (GDA2020/MGA z56)	Location type
SW1	391010	6364304	Located inland of current extraction area and intermittently contain surface water. GDE consisting of swamp forest in the dune swales and low-lying heath.
SW2	391685	6364820	
SW3	392437	6364534	Located seaward of current extraction area. GDE consisting of small ephemeral and mobile (due to variable nature of foredune system) shallow deflation basins, vegetated with a variety of grasses. Sedges and reeds.
SW4	391974	6364212	

Notes: [1] Indicative coordinate.

2.2.2 Surface water monitoring parameters, frequencies & locations

Ongoing surface water monitoring, as outlined in the 2019 GWSMP, is summarised in Table 2-8.

Table 2-8: Surface water monitoring parameters, frequencies and locations

Parameter	Frequency	Location
Field water quality parameters: • pH • EC	Quarterly	SW1, SW2, SW3, SW4
Laboratory analytes: • Na, K, Ca, Mg, HCO3, CO3, Cl, SO4 • Al, As, B, Cd, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Se, Zn • Alkalinity, Hardness, Phosphorous, Nitrate-N, Sulphate	Quarterly	
Laboratory analytes: • BTEX • TPH	Annually	

2.2.3 Surface water trigger levels

The 2019 GSWMP did not provide trigger levels for the surface water monitoring locations due to insufficient baseline data. Instead, it required that the surface water sites be assessed against the assessment criteria shown in Table 2-9 until site specific trigger levels are developed.

Boral has indicated that site specific surface water assessment criteria/trigger levels are currently being developed in a Water Management Plan, which is yet to be finalised. Therefore, review of surface water monitoring data for the 2024 data review has been assessed against the 2019 GSWMP criteria (Table 2-9).

ANZG (2018) notes that increases in water hardness reduce the toxicity of some metals (cadmium, chromium, lead, nickel, zinc), and concentrations of these metals are compared to their hardness modified guideline levels.

Updated guidance on guideline-value derivation by Batley et al. (2018) and Warne et al. (2018) advised that no hardness adjustment should be undertaken for copper for chronic toxicity, but that hardness adjustments should still be incorporated for other hardness-sensitive metals until otherwise advised.

Table 2-9: Surface water sample assessment criteria

Location ID	Analytes	Guideline for assessment	Trigger value
SW1	Analytes as shown in Table 2-8	• ANZECC 2000 Freshwater aquatic ecosystem (slightly to moderately disturbed) 95% species protection • ANZECC 2000 Default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers • ANZECC 2000 Ranges of default trigger values for conductivity (EC, salinity), turbidity and suspended particulate matter (SPM) indicative of slightly disturbed ecosystems in south-east Australia, lowland rivers	Specific trigger levels to be confirmed in next review of GSWMP, after review and update in an independent audit completed in 2024.
SW2			
SW3		• ANZECC 2000 Marine aquatic ecosystem (slightly to moderately disturbed) 95% species protection • ANZECC 2000 Default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers • ANZECC 2000 Ranges of default trigger values for conductivity (EC, salinity), turbidity and suspended particulate matter (SPM) indicative of slightly disturbed ecosystems in south-east Australia, lowland rivers	
SW4			

2.3 Trigger action response plan (TARP)

The Trigger Action Response Plan (TARP), as documented in the 2019 GSWMP, is shown in Table 2-10. The TARP details the required responses in the case of groundwater triggers being reached.

Table 2-10: Trigger Action Response Plan (TARP)

Aspect	Parameter	Frequency	Purpose	Trigger	Trigger action	Purpose	Trigger Response Action	Responsibility
Groundwater level monitoring	Groundwater level	Monthly	To identify any impacts to the groundwater level due to quarry operations.	Two consecutive monthly observations indicating a steady decline in groundwater levels below the designated lower trigger level threshold (Table 2-3)	Repeat water level monitoring to confirm exceedance. Review data for accuracy. Refer the matter to an independent hydrogeologist / environmental scientist (or similar) to review.	Identify, investigate and report on impacts to groundwater levels. Inform agencies of baseline assessment and monitoring.	Inform relevant regulatory agencies within 7 days of being notified of the exceedance with an exceedance notification letter. Exceedance investigation report to be issued within 60-days of initial notification to authorities.	Boral Resources (NSW) Pty Limited Environmental Officer
Groundwater quality monitoring	EC	Quarterly	To identify any impacts to the groundwater quality due to quarry operations	Two consecutive quarterly EC observations above the designated upper trigger level threshold values (Table 2-5)	Repeat sampling of monitoring bore exceeding trigger. Review data for accuracy. Refer the matter to an independent hydrogeologist / environmental scientist (or similar) to review.	Identify, investigate and report on impacts to groundwater quality. Potentially prompt further investigation and sampling for analytes. Confirm and review trigger levels.		
	pH			Two consecutive quarterly pH observations outside of the designated trigger level threshold values (Table 2-4)				
	Major ions and metals			Two consecutive quarterly observations above the designated upper trigger level threshold values (Table 2-6)				

3. Groundwater monitoring results & assessment

3.1 2024 groundwater monitoring network status & adequacy

The groundwater monitoring network's status throughout 2024 was consistent with that in 2023 and is considered adequate.

3.2 Assessment of 2024 groundwater monitoring against 2019 GSWMP

Groundwater monitoring throughout 2024 was generally completed in accordance with the 2019 GSWMP. The following exceptions are noted:

- Monitoring was not undertaken at MW2 and MW11 as these bores were destroyed in 2020 and 2021, respectively.
- Consecutive groundwater quality quarterly trigger level exceedances were not actioned (i.e. repeat sampling, reporting and investigation).

3.3 Groundwater levels

Groundwater levels measured in 2024 are shown in Table 3-1 and are plotted with monthly rainfall and monthly cumulative rainfall deviation in Figure 3 and Figure 4, Appendix A. The rainfall data was extracted from SILO for 61078 WILLIAMTOWN RAAF BoM Station.

Groundwater level trigger exceedances during 2024 occurred at MW8 and MW9, where one observation (highlighted red in Table 3-1) at each bore was below the lower trigger level. Both observations were 0.03 m lower than the lower trigger levels. Additionally, at MW7, MW8, MW9 and GW2, each of these monitoring bores had two observations (highlighted orange in Table 3-1) which were above the upper trigger levels.

In general, the first half of the 2024 monitoring period is characterised by above average rainfall and the second half of the monitoring period is characterised by typical tending to below average rainfall. There is an apparent visual correlation between observed 2024 groundwater levels and the cumulative rainfall deviation trend.

The MW8 and MW9 trigger breeches coincide with near the end of a relatively dry period that commenced in mid-2022. Conversely, the other trigger exceedances coincide with near the peak of a sharp increase in cumulative rainfall deviation that commenced near the start of 2024.

Groundwater level trends throughout the 2024 monitoring period are attributed to natural variability associated with rainfall and the trigger exceedances are interpreted to not have been caused by quarrying.

Table 3-1: Groundwater level monitoring data summary for 2024

	MW1	MW5	MW6	MW7	MW8	MW9	GW1	GW2	GW3	GW4
Upper trigger	2.92	2.51	2.66	2.52	2.57	2.56	2.92	2.72	2.60	2.28
Lower trigger	0.98	0.77	0.60	1.17	1.23	1.22	0.98	0.99	1.13	1.00
Date										
24/01/2024	1.14	1.13	1.16	1.18	1.20	1.19	1.16	1.26	1.14	1.05
21/02/2024	1.20	1.32	1.42	1.42	1.40	1.38	1.22	1.34	1.38	1.06
March (19/03/2024 or 20/03/2024)	1.17	1.19	1.24	1.27	1.28	1.29	1.22	1.25	1.22	1.04

17/04/2024	1.42	1.53	1.58	1.61	1.61	1.62	1.28	1.52	1.55	1.22
15/05/2024	1.91	2.09	2.17	2.24	2.24	2.26	1.91	2.22	2.17	1.69
June (20/06/2024 or 21/06/2024)	2.25	2.40	2.53	2.61	2.65	2.67	2.48	2.76	2.53	2.16
10/07/2024	2.31	2.37	2.48	2.57	2.58	2.59	2.57	2.83	2.51	2.27
7/08/2024	2.14	2.18	2.31	2.36	2.36	2.37	2.39	2.61	2.30	2.12
22/08/2024	2.03	2.06	2.14	2.21	2.20					
September (3/09/2024 or 04/09/2024)	1.96	1.97	2.04	2.10	2.11	2.12	2.24	2.41	2.05	1.97
2/10/2024	1.83	1.86	1.94	2.00	1.99	1.99	2.08	2.25	1.94	1.82
November (26/11/2024 or 27/11/2024)	1.70	1.75	1.83	1.88	1.89	1.91	1.87	2.03	1.82	1.63
11/12/2024	1.62	1.66	1.72	1.78	1.80	1.82	1.80	1.95	1.73	1.56
Long term average	2.64	1.88	1.85	1.67	1.81	1.96	1.66	1.78	1.80	1.90
Long term median	2.51	1.87	1.78	1.60	1.77	2.01	1.61	1.73	1.77	1.84

Notes: Red highlight = below lower trigger level. Orange highlight = above upper trigger level.

3.4 Groundwater quality

3.4.1 pH

pH data is plotted in Figure 5, Appendix A and summarised in Table 3-2. During the reporting period, pH ranged from 5.20 to 7.40, with an average of 6.62. Trigger exceedances during 2024 occurred at MW1. Two samples (results of 5.2 [June] and 5.4 [November]) were below the lower trigger of 5.67.

Since 2019, pH levels at MW1 have remained relatively low, following a decline that began in mid-2018. This trend is unique to MW1 and is not observed in other bores. In 2024, pH levels are still low but generally higher than those recorded in 2021 and 2022, and similar to levels observed in 2023. Thus, the pH trend in 2024 is stable, not decreasing further, and higher than the lows seen in 2021 and 2022. Additionally, three of the five pH samples taken in 2024 align with pH levels observed during a similar low period at MW1 in 2007, suggesting that naturally low pH levels may occur at this site during certain periods.

pH levels at other bores are stable and the 2024 data is consistent with historical data. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

Table 3-2: Groundwater pH monitoring data summary

Location ID	Upper trigger limit (pH units)	Lower trigger limit (pH units)	2024 minimum	2024 average	2024 maximum	Long-term average (2007 to 2024)
MW1	7.47	5.67	5.20	5.64	6.10	6.17
MW5	7.68	5.88	6.20	6.30	6.40	6.42
MW6	7.65	6.6	6.90	7.00	7.20	6.99
MW7	7.53	6.64	6.90	7.14	7.30	7.08
MW8	7.59	6.71	7.30	7.38	7.40	7.20
MW9	8.33	4.93	5.90	6.15	6.50	6.54

3.4.2 Electrical conductivity

EC data is plotted in Figure 6, Appendix A and summarised in Table 3-3. During the reporting period, EC ranged from 277 to 960, with an average of 576.

Trigger exceedances during 2024 occurred at MW1. Three samples (results of 546, 471 and 505 µS/cm) were above the trigger of 444 µS/cm. The exceedances occurred in March, August and September.

2024 EC data is consistent with the historical data. The maximum MW1 EC level of 546 µS/cm during 2024 is well below the historical site wide maximum EC level of about 1,000 µS/cm. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

Table 3-3: Groundwater EC monitoring data summary

Location ID	Upper trigger limit (µS/cm)	Lower trigger limit (µS/cm)	2024 minimum (µS/cm)	2024 average (µS/cm)	2024 maximum (µS/cm)	Long-term average (2007 to 2024) (µS/cm)
MW1	444	195	324	452	546	361
MW5	1015	105	467	631	782	497
MW6	584	115	277	318	375	334
MW7	1037	470	643	769	876	692
MW8	1021	453	710	806	960	760
MW9	965	155	405	458	504	526

3.4.3 Laboratory results

Groundwater results from comprehensive laboratory analysis are presented in graphs in Figures 7 to 31, Attachment A, with raw 2024 results provided in Appendix B. Trigger exceedances are discussed below.

- **Aluminium (Figure 7, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1**: All samples (five) above trigger of 0.251 mg/L. Maximum observation of 1.80 mg/L.
    - **MW5**: One sample (result of 2.4 mg/L) taken in November above trigger of 1.861 mg/L.
    - **MW8**: One sample (result of 0.08 mg/L) taken in June above trigger of 0.077 mg/L.

- **MW9**: Three samples (results of 1.7, 1.7 and 2.3 mg/L) above trigger of 1.515 mg/L. Maximum observation of 2.3 mg/L. The exceedances occurred in March, September and November.

Aluminium trigger levels were exceeded at four of the six monitoring bores in 2024. Historical observations show similar elevated levels at MW5 and MW9 in 2013 and 2014, and earlier (i.e. 2010 and prior). There is a potential increasing trend in aluminium levels at MW1, MW5 and MW9, starting in 2021 or 2022. From mid-2020 to mid-2022 there is a clear increasing trend in rainfall, as indicated by the monthly CRD. The recent increased aluminium levels could be representative of natural variation influenced by the above average rainfall from mid-2020 to mid-2022. In the context of the historical dataset, the trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Arsenic (Figure 8, Appendix A):** Trigger exceedances during 2024 were as follows:

  - **MW6**: Two samples (results of 0.039 and 0.037 mg/L) above trigger of 0.026 mg/L. The exceedances occurred in March and June.

  Historical observations at MW6 are similar from mid-2010 onwards. In the context of the historical dataset, the trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Chromium (Figure 11, Appendix A):** Trigger exceedances during 2024 were as follows:

  - **MW7**: Two samples (results of 0.007 and 0.007 mg/L) above trigger of 0.005 mg/L. The exceedances occurred in June and September.

  - **MW9**: One sample (result of 0.008 mg/L) taken in September above trigger of 0.007 mg/L.

  The trigger levels were only exceeded by a small margin and the 2024 observations are consistent with the historical dataset. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Iron (Figure 13, Appendix A): Trigger exceedances during 2024 were as follows:**

  - **MW1**: Four samples (results of 2.5, 2.3, 2.2 and 2.6 mg/L) out of five samples were above the trigger of 1.78 mg/L. The exceedances occurred in March, June, August and September.

  The trigger levels were only exceeded by a small margin and the 2024 observations are consistent with the historical dataset. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Zinc (Figure 18, Appendix A):** Trigger exceedances during 2024 were as follows:

  - **MW5**: Three samples (results of 0.048, 0.040, 0.042 mg/L) out of four samples were above the trigger of 0.03 mg/L. The exceedances occurred in June, September and November.

  - **MW6**: All five samples (results of 0.034, 0.049, 0.028, 0.032 and 0.037 mg/L) were above the trigger of 0.027 mg/L. The exceedances occurred in March, June, August, September and November.

  - **MW7**: Three samples (results of 0.03, 0.044 and 0.029 mg/L) out of five samples were above the trigger of 0.028 mg/L. The exceedances occurred in March, June, and September.

  - **MW8**: Four samples (results of 0.026, 0.049, 0.023 and 0.028 mg/L) out of five samples were above the trigger of 0.022 mg/L. The exceedances occurred in March, June, August and November.

The trigger levels were only exceeded by a small margin and the 2024 observations are consistent with the historical dataset. A general rising trend occurred throughout 2023 and was noted in the 2023 AEMR groundwater review. However, this trend did not continue throughout 2024. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Chloride (Figure 20, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1:** Four samples (results of 110, 88, 120 and 95 mg/L) out of four were above the trigger of 47 mg/L. The exceedances occurred in March, June, September and November.
    - **MW7**: One sample (result of 150 mg/L) taken in November was above the trigger of 134 mg/L.
    - **MW8**: One sample (result of 200 mg/L) taken in June was above the trigger of 190.2 mg/L.

    Chloride levels in 2024 are broadly consistent with the historical dataset. However, it is noted that from 2021 to present, chloride levels are generally higher than measurements made during the period of 2017 until the end of 2020. Based on 2023 and 2024 data, there is no increasing trend that has continued throughout 2024. The 2024 data is consistent with observations made in 2021, 2022 and 2023. The relatively elevated chloride levels from 2021 onwards may be associated with the period of increased rainfall between mid-2020 and mid-2022, as indicated by the increasing CRD trend during this time. Periods of relatively higher chloride have also occurred earlier, during 2013 and 2014.

    All 2024 observations are within the historical site wide measurements for chloride. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Total hardness (Figure 24, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1:** Three samples (results of 41, 60 and 31 mg/L) were below the lower trigger of 66.4 mg/L. The exceedances occurred in June, September and November.
    - **MW5**: Three samples (results of 89, 110 and 78 mg/L) were below the lower trigger of 117.7 mg/L. The exceedances occurred in March, June and November.
    - **MW6**: All four samples (results of 130, 130, 97 and 100 mg/L) were below the lower trigger of 144.2 mg/L. The exceedances occurred in March, June, September and November.
    - **MW7**: All samples (results of 230, 170, 210, 190 and 230 mg/L) were below the lower trigger of 274.8 mg/L. The exceedances occurred in March, June, August, September and November.
    - **MW8**: All samples (results of 160, 200, 170, 150 and 180 mg/L) were below the lower trigger of 283.8 mg/L. The exceedances occurred in March, June, August, September and November.

    Hardness levels in 2024 are consistent with the historical dataset, including the entire dataset, and when viewing relatively recent data from 2021 onwards. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Sodium (Figure 25, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1:** All samples (results of 55, 39, 54, 61 and 53 mg/L) were above the trigger of 38.6 mg/L. The exceedances occurred in March, June, August, September and November.

    MW1 sodium levels during 2024 are consistent with 2023 data. However, it is noted that from 2021 onwards, some locations, such as MW1, have sodium levels that are relatively elevated compared to a prior period between 2018 and the end of 2020 or 2021.

All 2024 observations are within the historical site wide measurements for sodium and there are examples of earlier relatively increased periods of sodium, such as 2013 to 2014. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Potassium (Figure 26, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1:** One sample (results of 6 mg/L) taken in March was above the trigger of 4.6 mg/L.

    MW1 potassium levels during 2024 are consistent with the historical dataset and within the historical site wide measurements for potassium. The trigger exceedance is attributed to natural variability and is not considered a result of quarrying.

- **Nitrate (Figure 29, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW6:** Four samples (results of <0.005, <0.005, <0.005 and 0.01 mg/L) were below or equal to the lower trigger of 0.01 mg/L. The samples were taken in March, June, September and November.

    MW6 nitrate levels are consistent with the historical dataset. The trigger exceedance is attributed to natural variability and is not considered a result of quarrying.

- **Total phosphorus (Figure 30, Appendix A):** Trigger exceedances during 2024 were as follows:
    - **MW1:** All four samples (all result of <0.05) may have been above the upper trigger of 0.03 mg/L. This is unknown due to the limit of reporting. The samples were taken in March, June, September and November.
    - **MW5:** All four samples (results of 0.2, 0.1, 0.1 and 0.2 mg/L) were above the trigger of 0.07 mg/L. The samples were taken in March, June, September and November.
    - **MW6:** One sample (results of 0.4 mg/L) taken in June was above the trigger of 0.37 mg/L.

    2024 total phosphorus levels are consistent with the historical dataset. The trigger exceedances are attributed to natural variability and are not considered a result of quarrying.

4. Surface water monitoring results & assessment

4.1 2024 surface water monitoring network status & adequacy

The surface water monitoring network's status throughout 2024 was consistent with that in 2023 and is considered adequate.

4.2 Assessment of 2024 surface water monitoring against 2019 GSWMP

Surface water monitoring throughout 2024 was generally completed in accordance with the 2019 GSWMP. The following exceptions are noted:

- BTEX/TRH analysis were not completed for SW1, SW2 and SW3, only SW4. This is because these locations were 'dry' at the time of the annual BTEX/TRH sampling round.

4.3 Surface water quality

4.3.1 pH

Surface water pH data is plotted in Figure 32, Appendix A and summarised in Table 4-1. During the reporting period, surface water pH ranged from 4.6 to 9.2, with an average of 7.2.

The following 2024 observations were outside the guideline ranges:

- **SW1:** All samples (nine in total) were below the lower guideline level of 6.5.
- **SW4:** Five out of 12 samples were above the lower guideline level of 8.5.

Since surface water monitoring began in 2020, pH has been relatively stable at SW1, SW2, SW3 and SW4. All 2024 data is consistent with the historical dataset.

The observations outside of the guideline levels are attributed to natural variability and are not considered a result of quarrying.

Table 4-1: Surface water pH monitoring data summary

Location ID	Lower – Upper guideline level [1]	2024 range	2024 average	Long-term average (2020 to 2024)
SW1	6.5 – 8.5	4.6 – 5.2	4.8	4.98
SW2		6.6 – 7.4	6.9	7.40
SW3		7.8 – 8.4	8.1	8.25
SW4		8.3 – 9.2	8.6	8.49

Notes: [1] ANZECC 2000 default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers.

4.3.2 Electrical conductivity

Surface water EC data is plotted in Figure 33, Appendix A and summarised in Table 4-2. During the reporting period, surface water EC ranged from 197 to 677 µS/cm, with an average of 333 µS/cm.

The 2024 EC observations are within the guideline range and the 2024 data is consistent with the historical dataset.

Table 4-2: Surface water EC monitoring data summary

Location ID	Lower – Upper guideline level (µS/cm) [1]	2024 range (µS/cm)	2024 average (µS/cm)	Long-term average (2020 to 2024) (µS/cm)
SW1	125 – 2,200	197 – 413	286	294
SW2		253 – 677	388	380
SW3		210 – 559	326	331
SW4		213 – 463	325	321

Notes: [1] ANZECC 2000 default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers.

4.3.3 Laboratory results

Surface water results from comprehensive laboratory analysis are presented in graphs in Figures 34 to 58, Attachment A, with raw 2024 results provided in Appendix C. Surface water laboratory results for SW1, SW2, SW3 and SW4 were compared against ANZECC 2000 freshwater trigger values for 95% species protection and ANZECC 2000 default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems, lowland rivers. The following 2024 observations were outside the guideline ranges

- **Aluminium (Figure 34, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1**: All samples (nine in total) were above the guideline level of 0.055 mg/L. The 2024 observations ranged from 0.37 mg/L to 0.72 mg/L. The exceedances occurred in April, May, June, July, August, September, October, November and December.
    - **SW2**: Seven out of nine samples were above the guideline level of 0.055 mg/L. The 2024 observations ranged from 0.04 mg/L to 0.37 mg/L. The exceedances occurred in May, June, July, August, September, October and November.

  The 2024 aluminium observations are consistent with the historical dataset. SW1 has had relatively elevated levels since the monitoring commenced, and SW2 has displayed numerous periods with relatively high levels. The guideline level exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Arsenic (Figure 35, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW3**: One sample (result 0.025 mg/L) taken in April was above the guideline level of 0.013 mg/L.

  The 2024 observations are consistent with the historical dataset. SW3 has displayed arsenic concentrations not dissimilar to the 0.025 mg/L result since monitoring commenced in 2020. The guideline level exceedance is attributed to natural variability is not considered a result of quarrying.

- **Chromium (Figure 38, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1**: One sample (result 0.002 mg/L) taken in October was above the guideline level of 0.001 mg/L.

  The 2024 chromium observations are consistent with the historical dataset. It is noted that no hardness modifier was applied to SW1. If the same hardness modifier that was applied for SW2, SW3 and SW4 was applied to SW1, then the guideline value would have been higher (0.0025 mg/L) and not exceeded. The guideline level exceedance is attributed to natural variability and is not considered a result of quarrying.

- **Copper (Figure 39, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1**: One sample (result 0.002 mg/L) taken in June was above the guideline level of 0.0014 mg/L.
    - **SW2**: Four samples (results 0.003, 0.003, 0.002 and 0.002 mg/L) out of ten samples were above the guideline level of 0.0014 mg/L. The exceedances occurred in February, June, September and October.
    - **SW4**: Six samples (results 0.002, 0.004, 0.002, 0.002, 0.002 and 0.003 mg/L) out of 12 samples were above the guideline level of 0.0014 mg/L. The exceedances occurred in January, February, March and April.

    The 2024 observations are consistent with the historical dataset. The guideline level exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Nickel (Figure 43, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1**: One sample (result 0.04 mg/L) taken in October was above the guideline level of 0.011 mg/L.
    - **SW2**: One sample (result 0.04 mg/L) taken in October was above the guideline level of 0.0275 mg/L.

    The guideline level exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Zinc (Figure 45, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1**: All samples (nine in total) were above the guideline level of 0.008 mg/L. The 2024 observations ranged from 0.038 mg/L to 0.089 mg/L. The exceedances occurred in April, May, June, July, August, September, October, November and December.
    - **SW2**: All samples (10 in total) were above the guideline level of 0.02 mg/L. The 2024 observations ranged from 0.033 mg/L to 0.089 mg/L. The exceedances occurred in February, April, May, June, July, August, September, October, November and December.
    - **SW3**: Three (results of 0.027, 0.03 and 0.028 mg/L) out of eight samples were above the guideline level of 0.02 mg/L. The exceedances occurred in May, June and September.
    - **SW4**: Two (results of 0.022 and 0.023 mg/L) out of twelve samples were above the guideline level of 0.02 mg/L. The exceedances occurred in June and September.

    The 2024 zinc observations are consistent with the historical dataset. The guideline level exceedances are attributed to natural variability and are not considered a result of quarrying.

- **Total phosphorus (Figure 57, Appendix A):** Guideline exceedances during 2024 were as follows:
    - **SW1, SW2, SW3 and SW4:** All samples exceeded the guideline value of 0.025 mg/L when the limit of reporting value was used for cases where the result was below the limit of detection. The maximum observed value was 0.10 mg/L. It is noted that the laboratory's limit of reporting for this analyte was <0.05 mg/L.

    The 2024 observations are consistent with the historical dataset. The guideline level exceedances are attributed to natural variability and are not considered a result of quarrying.

Regarding the annual sampling round which tests for BTEX and TRH, only SW4 was tested because the other locations were ‘dry’. BTEX results were below the laboratory limit of reporting (<1 or <2 µg/L). TRH fractions

C15 – C28, C10 – C36, >C10 – C16 and >C10 – C40 had concentrations of 160, 160, 140 and 140 µg/L, respectively. Other TRH fractions were below laboratory limits of reporting. The TRH detections are likely associated with recreational 4wd vehicles, not quarrying.

5. 2024 monitoring results compared to EIS predictions

5.1 Groundwater levels

The EIS (ERM, 2005) predicts minimal impacts to groundwater levels when sand extraction is restricted to 2.5 mAHD, limiting potential impacts to changes in local groundwater recharge characteristics. Quarry activities are not predicted to influence local or regional groundwater supply.

2024 groundwater level data does not indicate that the quarry has impacted groundwater supply and results are therefore consistent with the EIS (ERM, 2005).

5.2 Groundwater quality

Extraction limits proposed in the EIS (ERM, 2005) were to ensure quarry operation had no direct impact on local or regional groundwater quality. Following review of the 2024 groundwater laboratory results, quarry activity is not interpreted to have impacted groundwater quality as trigger exceedances lie within historical ranges and are attributed to natural variability. 2024 groundwater quality results are therefore in-line with EIS (ERM, 2005) predictions.

5.3 Surface water quality

Due to minimal topsoil and vegetation cover, the EIS (ERM, 2005) concludes that the consequent high groundwater recharge and negligible surface runoff will result in insignificant impacts to surface water quality. Although site specific trigger levels have not been developed for surface water, review of the 2024 surface water results does not suggest impacts caused by quarrying. Consequently, these findings align with the EIS (ERM, 2005).

6. Conclusions and recommendations

Groundwater levels, pH, EC, and a comprehensive groundwater laboratory analysis suite observed during the 2024 reporting period were reviewed in conjunction with historical data. Based on this review, it is interpreted that the quarry operations are not impacting groundwater resources. Whilst several trigger exceedances were noted, these are attributed to natural variability.

Surface water pH, EC and a comprehensive laboratory analysis suite observed during the 2024 reporting period were reviewed in conjunction with historical data. In contrast to the groundwater dataset, the historical surface water dataset is shorter and commences in 2020. Based on this review of data collected from 2020 to 2024, it is interpreted that the quarry operations are not impacting surface water quality. Whilst several guideline level exceedances were noted, these are attributed to natural variability.

The 2024 monitoring results are in-line with EIS predictions.

The following recommendations are made:

- In 2025 and beyond, except for destroyed locations MW2 and MW11, at a minimum, groundwater level and quality monitoring should be completed as specified in the current approved 2019 GSWMP.
- For 2025 and beyond, trigger exceedances should be actioned as per the 2019 GSWMP.
- Once available, future surface water data should be assessed against site specific trigger levels, currently being developed in the impending Water Management Plan.
- If site-specific surface water quality triggers are developed, during trigger development, if practical/accessible and present, consideration should be given to monitoring some surface water control sites, well away from quarrying, so data from SW1, SW2 and SW3 and SW4 can be compared to data from such control sites.

7. References

ANZECC. (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environmental and Conservational Council, and Agriculture and Resource Management Council of Australia and New Zealand.

Batley, GE, van Dam, RA, Warne, MStJ, Chapman, JC, Fox, DR, Hickey CW & Stauber, JL, 2018, Technical Rationale for Changes to the Method for Deriving Australian and New Zealand Water Quality Guideline Values for Toxicants, CSIRO Land and Water Report, Lucas Heights.

Jacobs, 2019. Stockton Sand Quarry Groundwater Management Plan, document I.D. IA147700_001f | F, dated 3 December 2019.

Jacobs, 2024, Groundwater assessment for 2023 AEMR, document I.D. IA133802-2021-NW-LTR-0001, dated 02 April 2024.

Warne, et al. (2018). Revised method for deriving Australian and New Zealand water quality guideline values for toxicants - update of 2015 version. Prepared for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments. August 2015 - updated October 2018. Canberra.

Appendix A. Figures

392751 E
6365618 N

GW2
GW1
SW2
MW9
MW8
MW7
GW3
MW6
SW3
MW5
SW1
SW4
MW1
GW4

Legend

Current active GSWMP (Jacobs, 2019) water monitoring locations

- Groundwater monitoring location
- Surface water monitoring location
- Tenement
- Current extraction area

Image source: Google Satellite

389848 E
6363758 N

Map CRS: EPSG:7856
Coordinate Units: Meters
Project File: PRJ_0001_GIS_001_R00.qgz
Page Size: 420 x 297 mm

Figure 1: Boral Stockton Sand Quarry current active GSWMP (Jacobs, 2019) water monitoring locations

0 0.1 0.2 0.3 0.4 0.5 km
kilometers
Scale 1:7,500

2025-01-10, Created: Ben Rose

Groundwater CHECK

393151 E
6365572 N

GW5
MW11
MW9
MW10 (old)
MW10
MW7
MW8
MW5 (old)
MW6
MW3
MW4
MW3 (old)
MW1
MW2
MW2 (most recent, included in 2019 GSWMP)

Location ID	East (GDA2020/MGA z56)	North (GDA2020/MGA z56)	Elevation (mAHD)	Depth (mbgl)	Screen interval (mbgl)	Status
MW1	391128.50	6364096.41	21.70	22.70	19.7 – 22.7	Destroyed
MW2 (most recent, included in 2019 GSWMP)	391352.31	6363952.15	9.86	25.00	19 – 25	Destroyed
MW2	391331.50	6364059.41	23.80	25.00	22 – 25	Destroyed
MW3 (old)	391457.50	6364186.41	21.00	23.50	20.5 – 23	Destroyed
MW3	391428.50	6364226.41	19.50	25.00	19 – 25	Destroyed
MW4	391699.50	6364230.41	9.50	10.00	7 – 10	Destroyed
MW5 (old)	391670.50	6364405.41	14.20	NP	NP	Destroyed
MW5A	391677.00	3634495.40	6.00	15.80	12.8 – 15.8	Destroyed
MW6	391864.50	6364376.41	11.80	14.70	11.7 – 14.7	Destroyed
MW7	392080.50	6364629.41	14.10	17.50	14.5 – 17.5	Destroyed
MW8	392274.50	6364634.41	14.20	17.50	14.5 – 17.5	Destroyed
MW9	392338.50	6364847.41	2.60	5.00	2-5 – 0	Destroyed
MW10 (old)	392629.50	6364846.41	9.40	11.50	8.5 – 11.5	Destroyed
MW10	392604.50	6364758.41	11.00	21.00	15 – 21	Destroyed
MW11	392600.50	6364952.41	15.50	18.00	12 – 18	Destroyed
GW5	390705.50	6365183.41	NP	NP	NP	Destroyed

Note: NP = not provided

Legend
- Historic groundwater monitoring locations
- Tenement
- Current extraction area

Image source: Google Satellite

389281 E
6363092 N

Map CRS: EPSG:7856
Coordinate Units: Meters
Project File: PRJ_0001_GIS_001_R00.qgz
Page Size: 420 x 297 mm

Figure 2: Boral Stockton Sand Quarry historic groundwater monitoring locations

0 0.2 0.4 0.6 0.8 1 km
kilometers
Scale 1:10,000
2025-01-13, Created: Ben Rose

Groundwater CHECK

Figure 3: MW Series Groundwater Levels and Monthly Rainfall

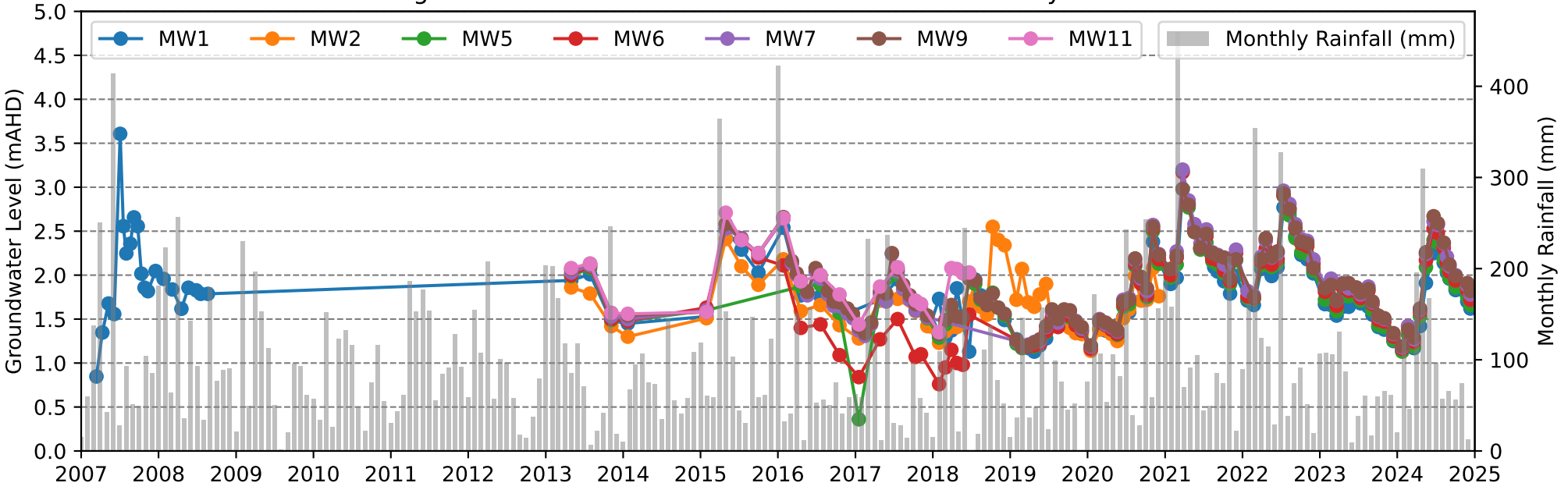
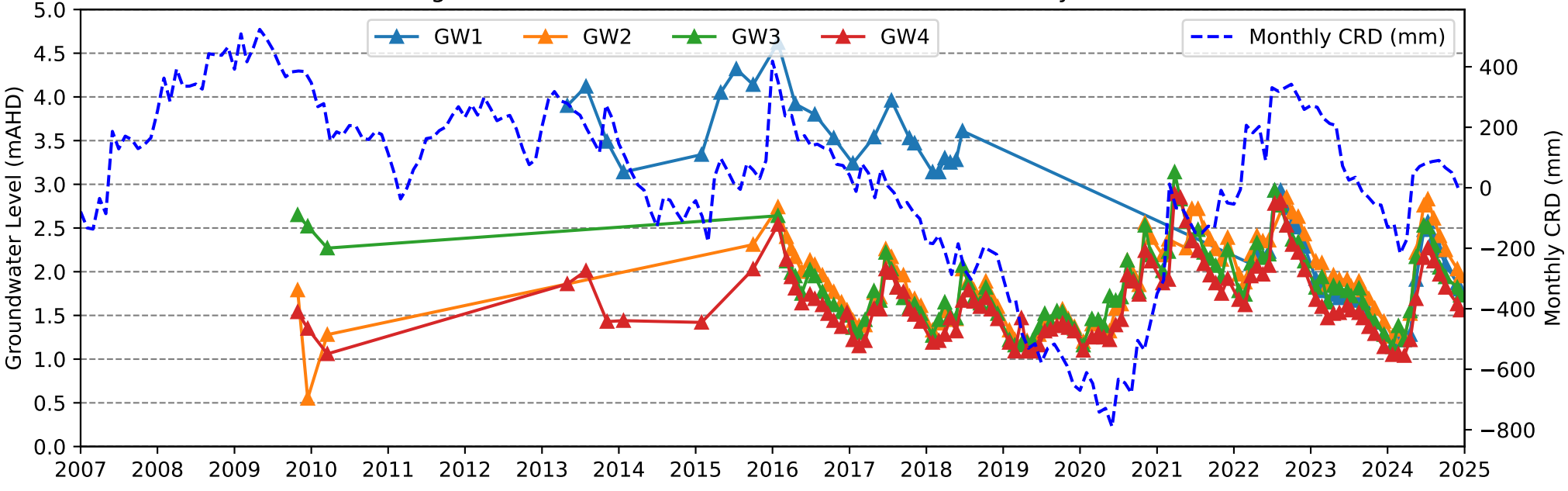


Figure 4: GW Series Groundwater Levels and Monthly CRD



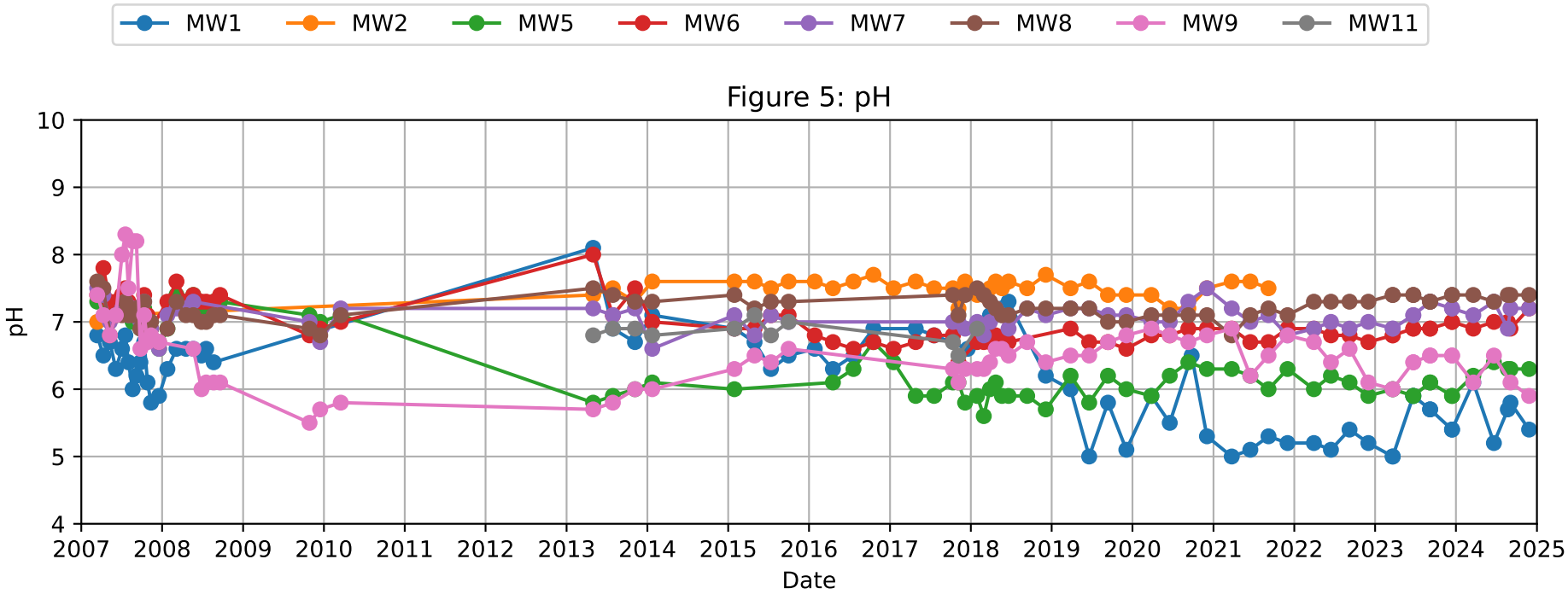


Figure 5: pH

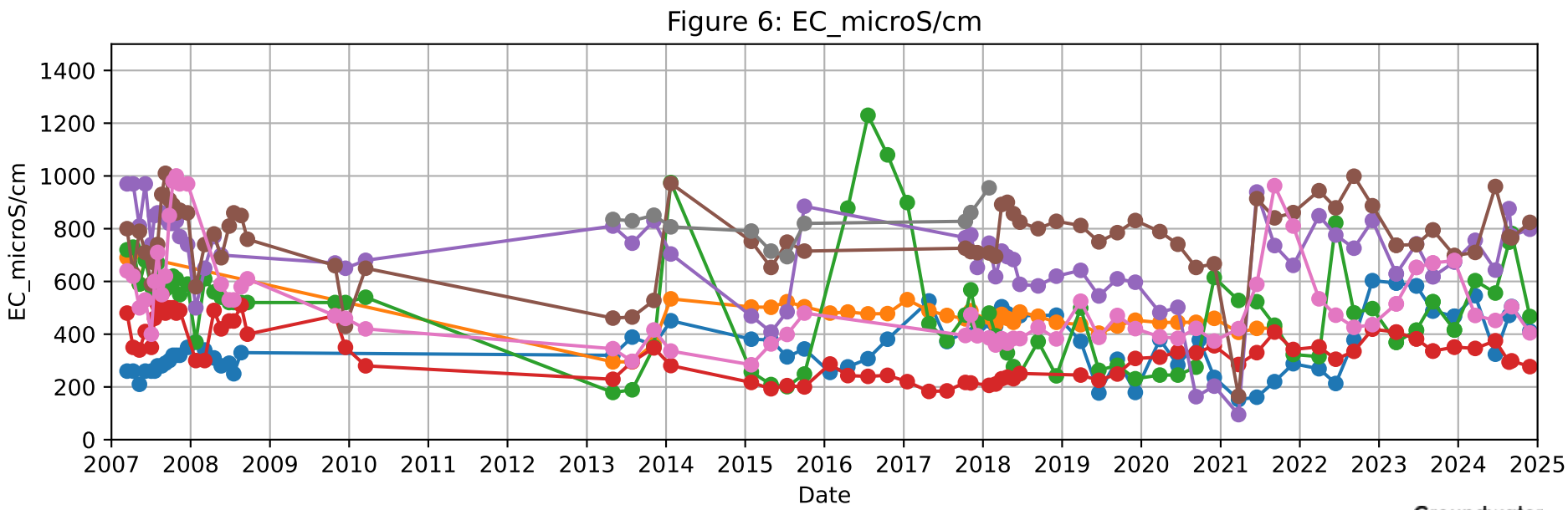


Figure 6: EC_microS/cm

Figure 7: Aluminium_Al_(mg/L)

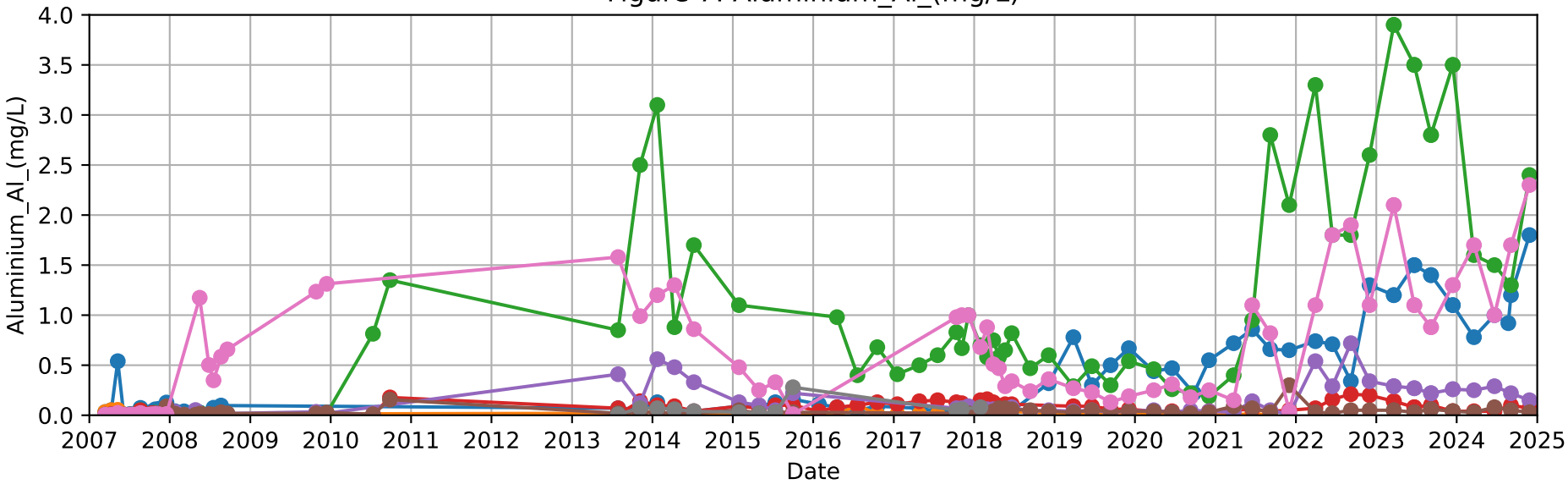
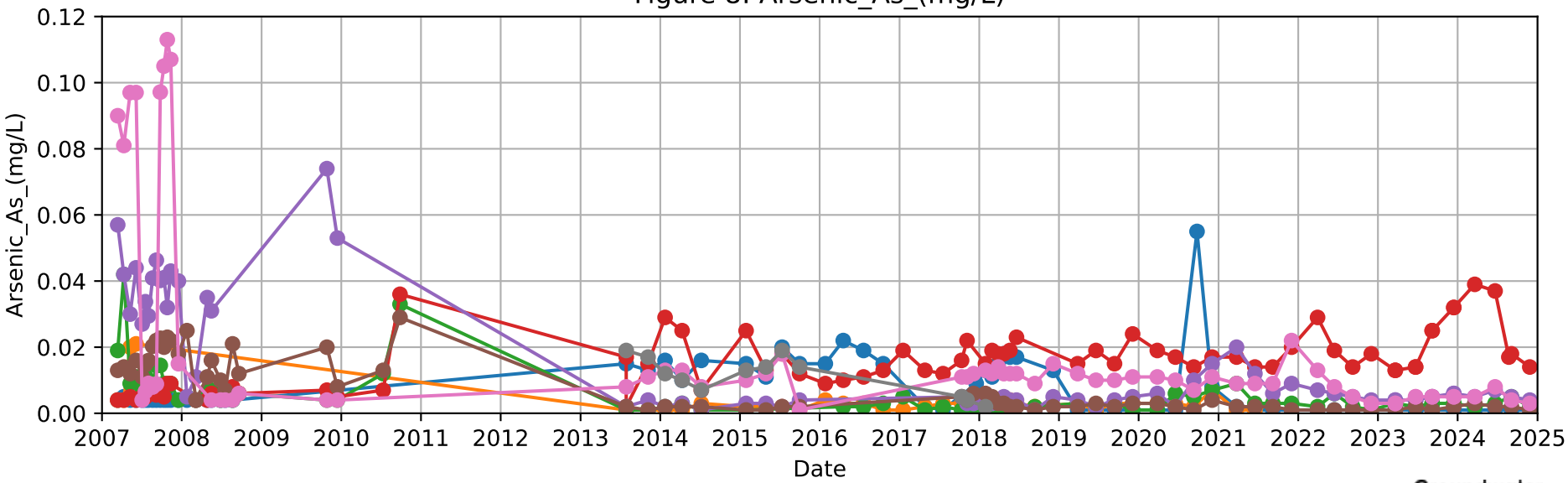


Figure 8: Arsenic_As_(mg/L)



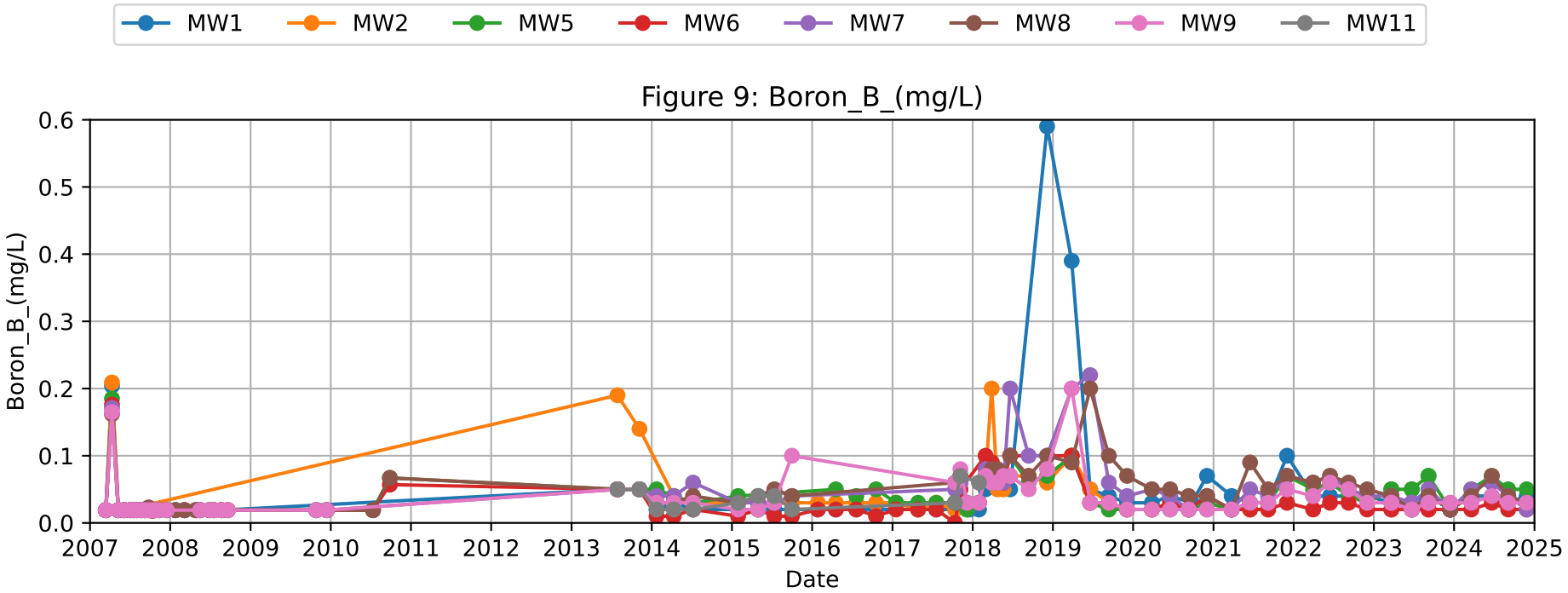


Figure 9: Boron_B_(mg/L)

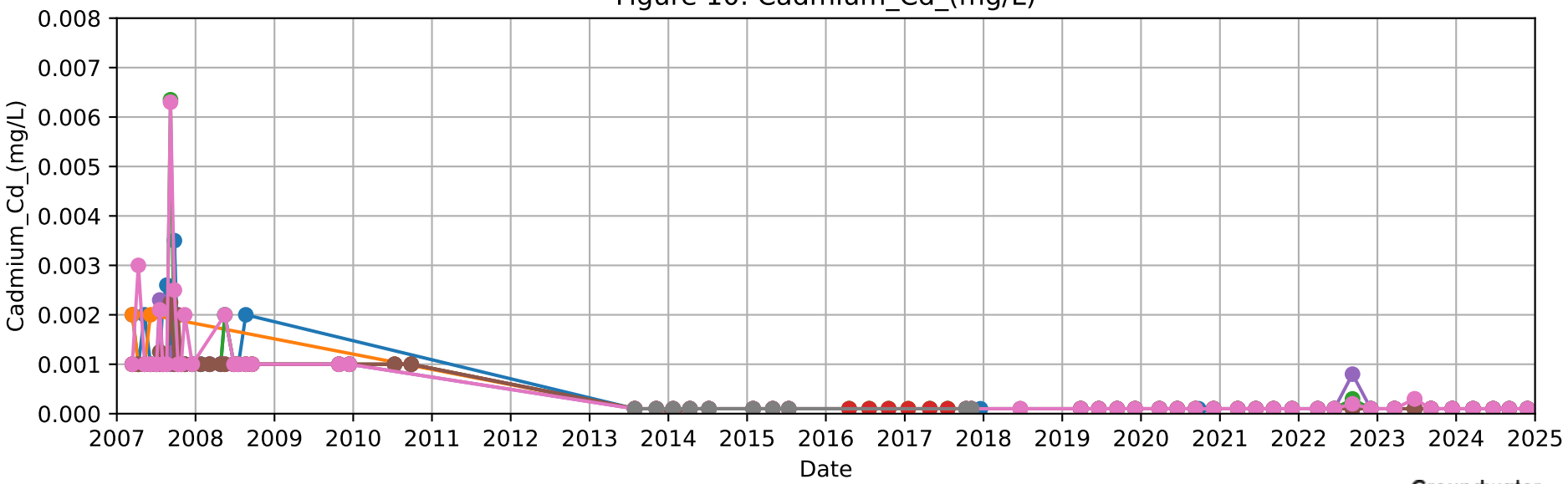
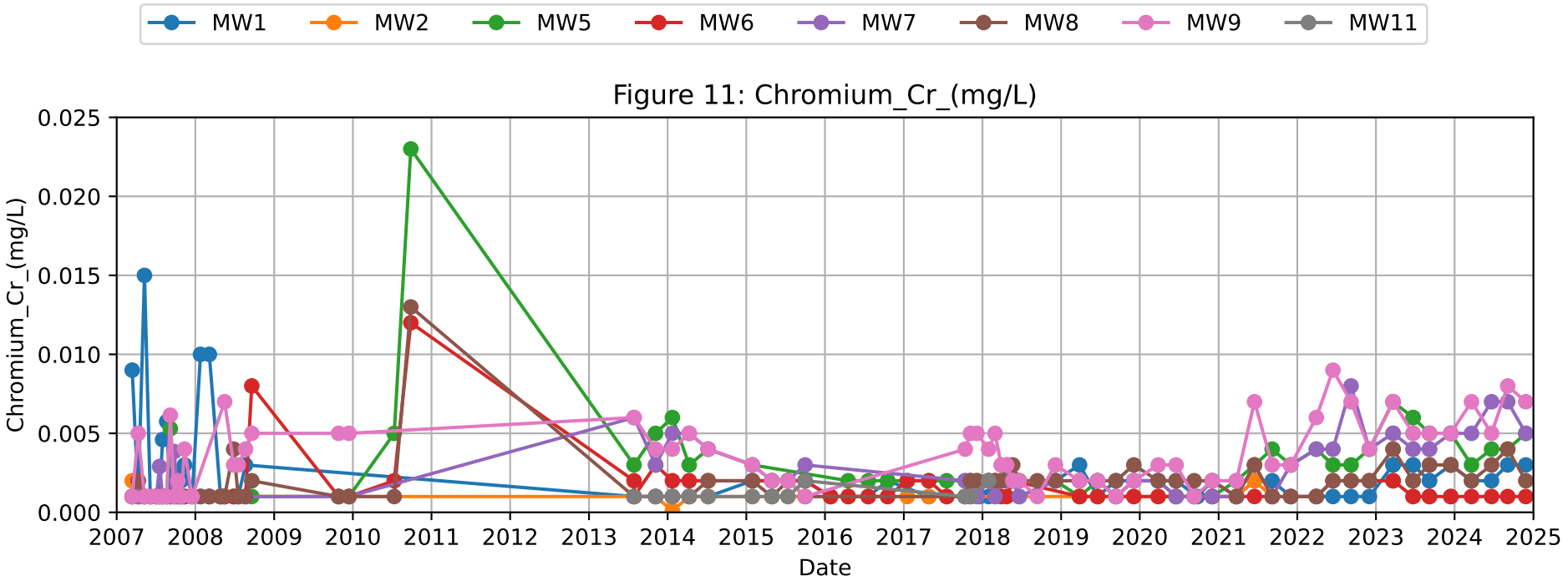


Figure 10: Cadmium_Cd_(mg/L)


MW1
MW2
MW5
MW6
MW7
MW8
MW9
MW11
Figure 11: Chromium_Cr_(mg/L)
Chromium_Cr_(mg/L)
0.025
0.020
0.015
0.010
0.005
0.000
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Date

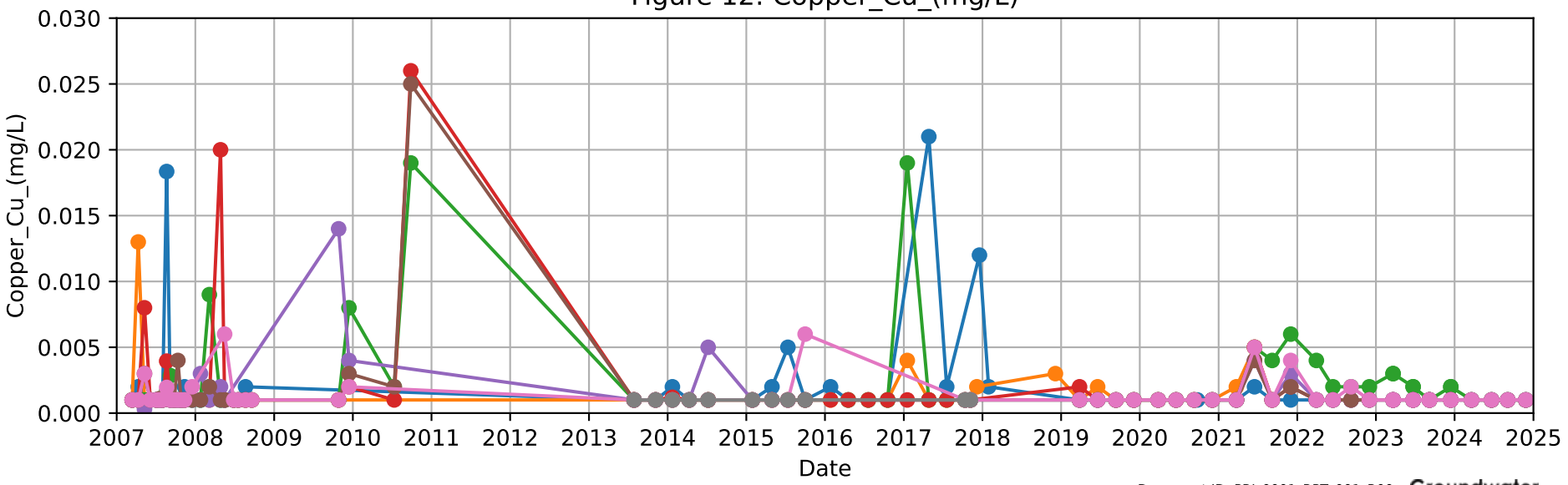


Figure 12: Copper_Cu_(mg/L)
Copper_Cu_(mg/L)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Date

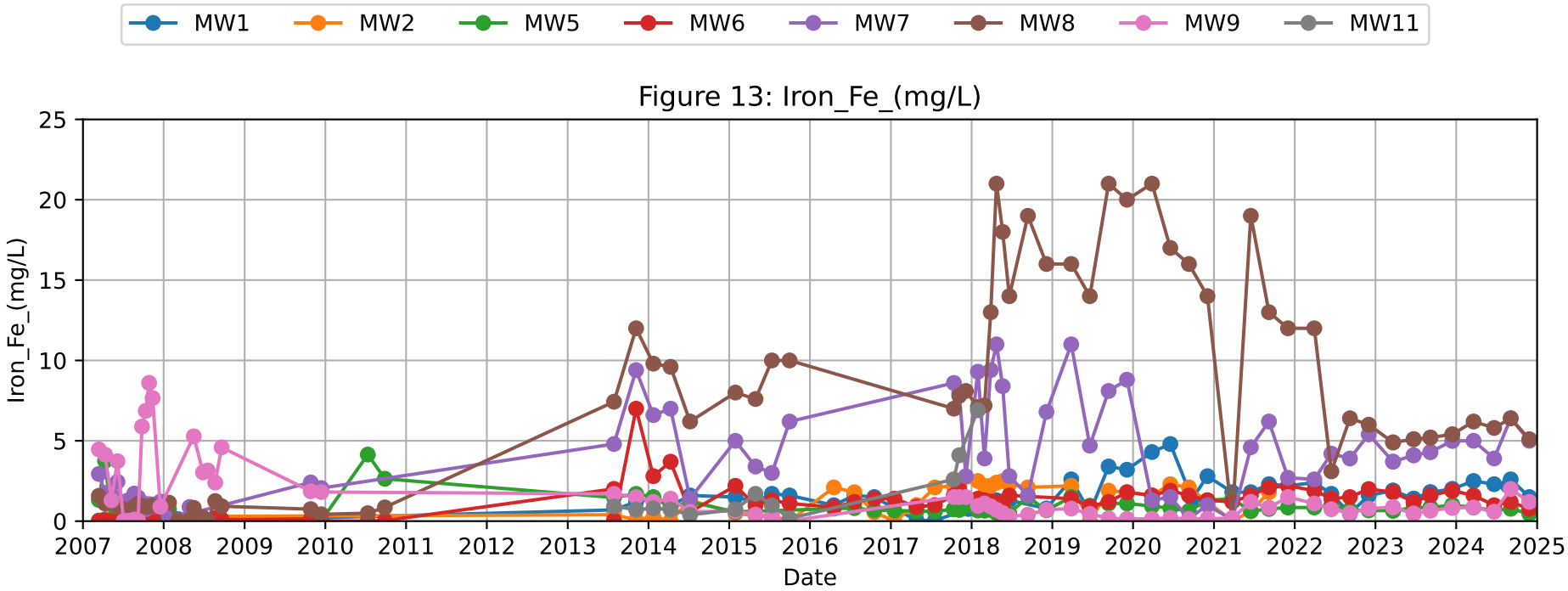


Figure 13: Iron_Fe_(mg/L)

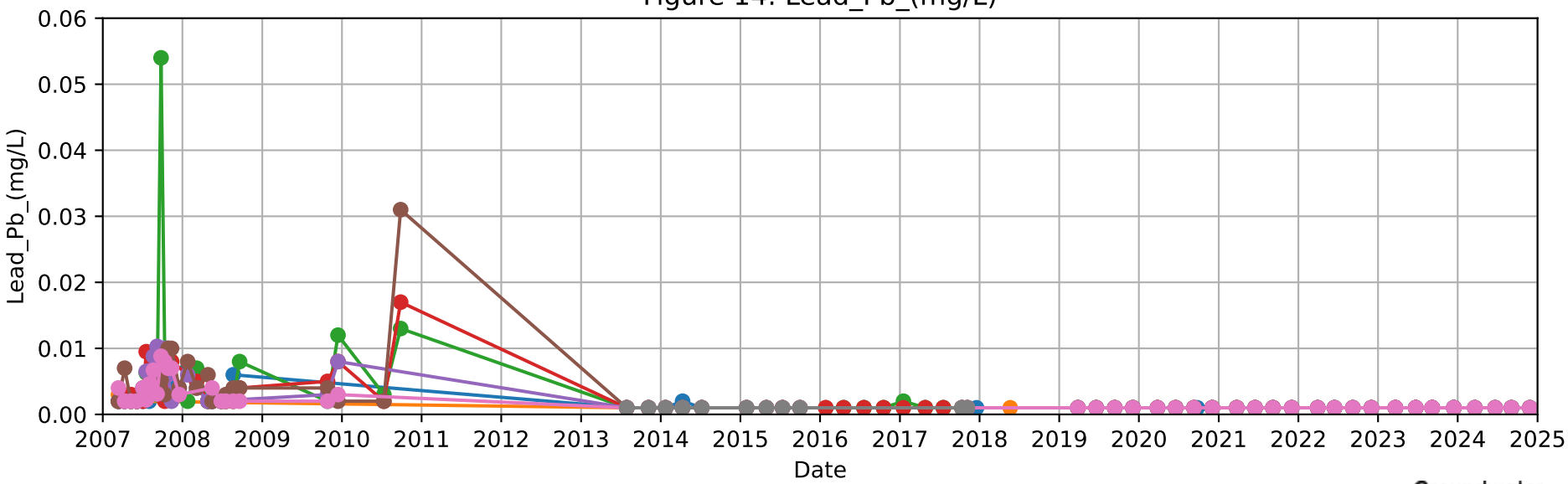


Figure 14: Lead_Pb_(mg/L)

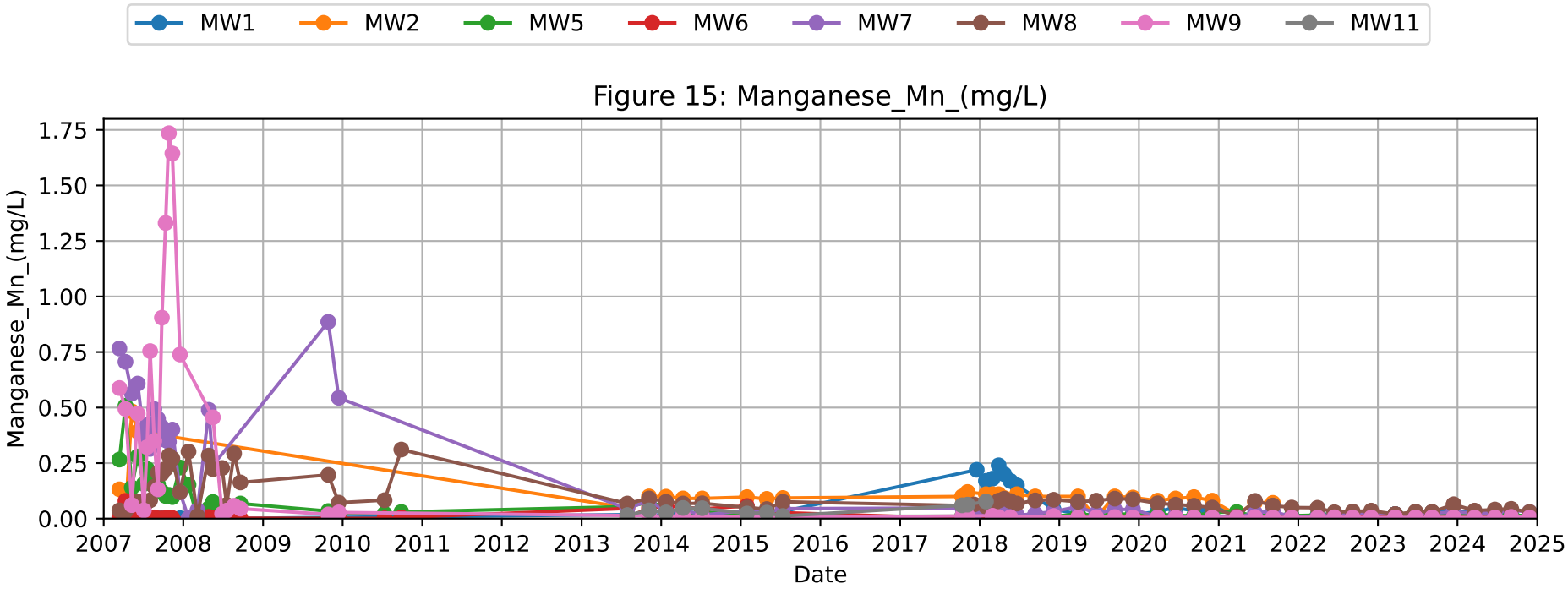


Figure 15: Manganese_Mn_(mg/L)

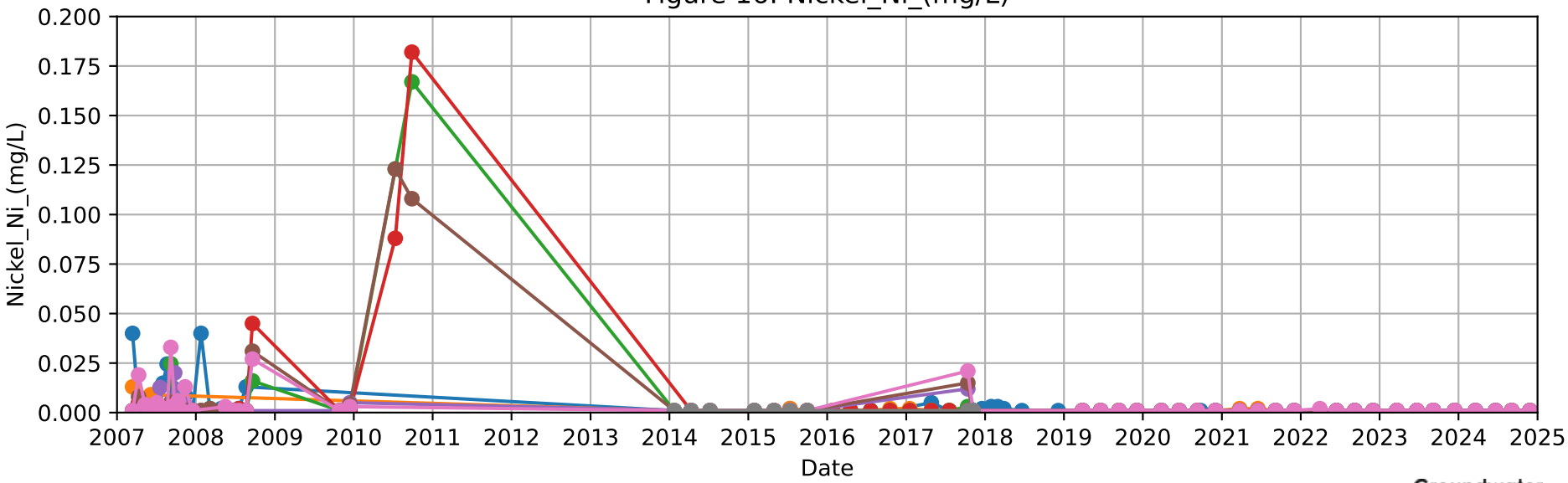


Figure 16: Nickel_Ni_(mg/L)

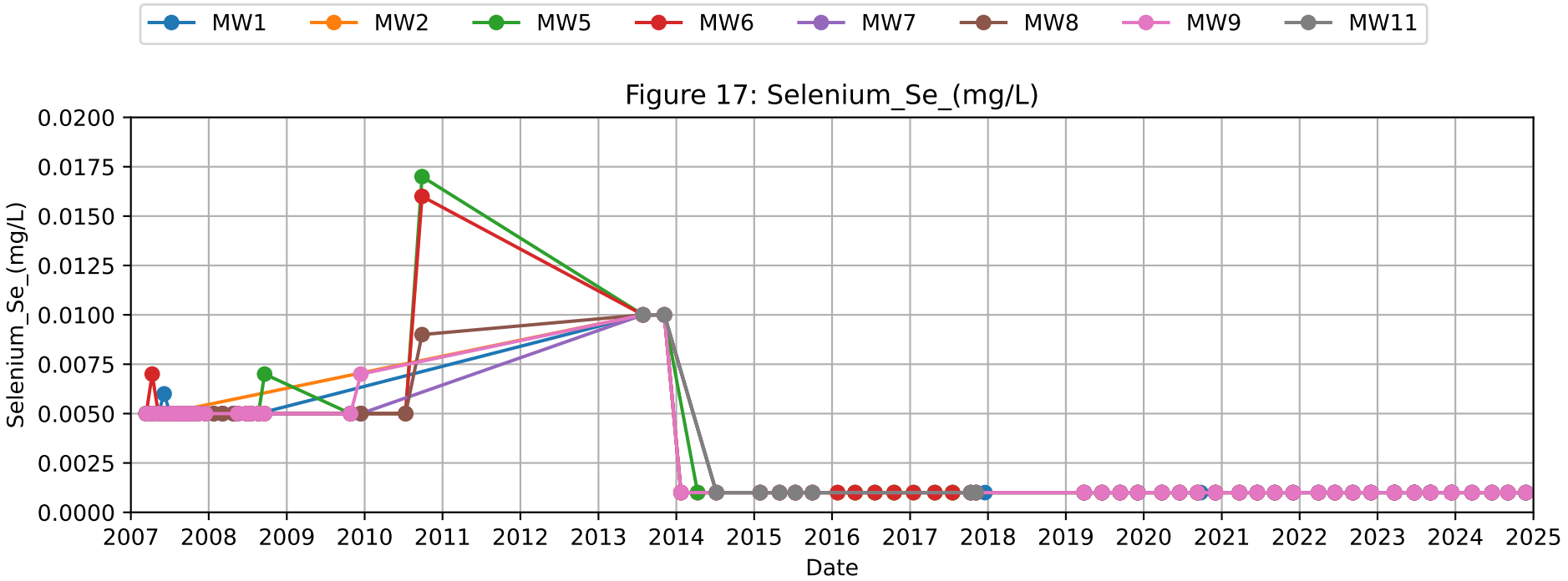


Figure 17: Selenium_Se_(mg/L)

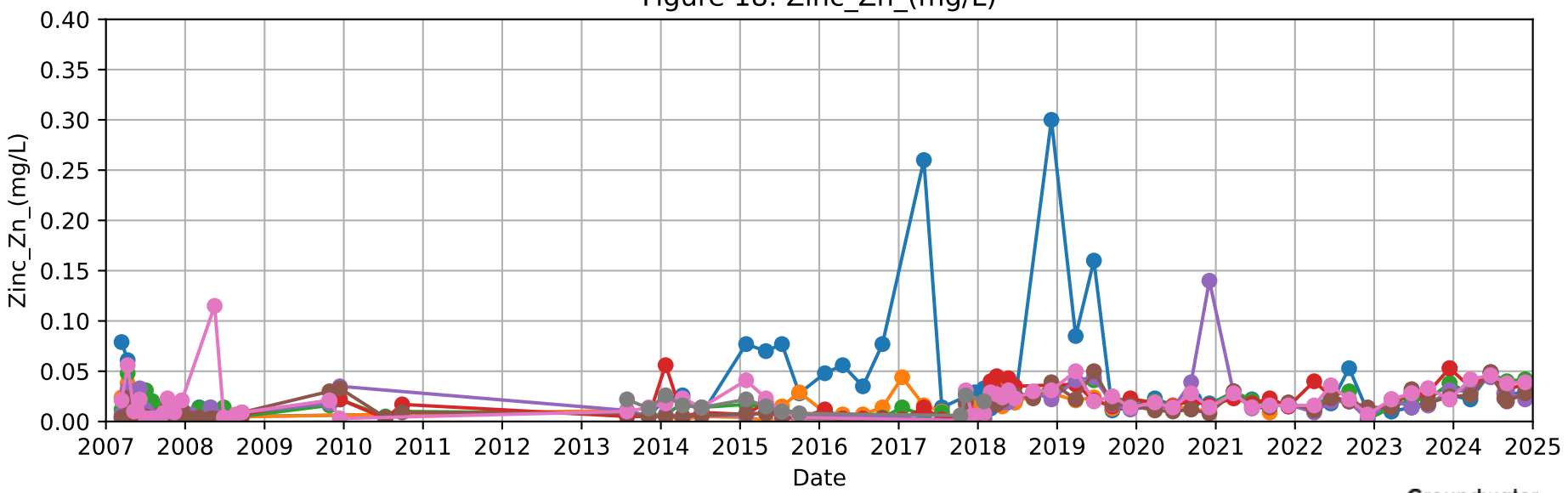


Figure 18: Zinc_Zn_(mg/L)

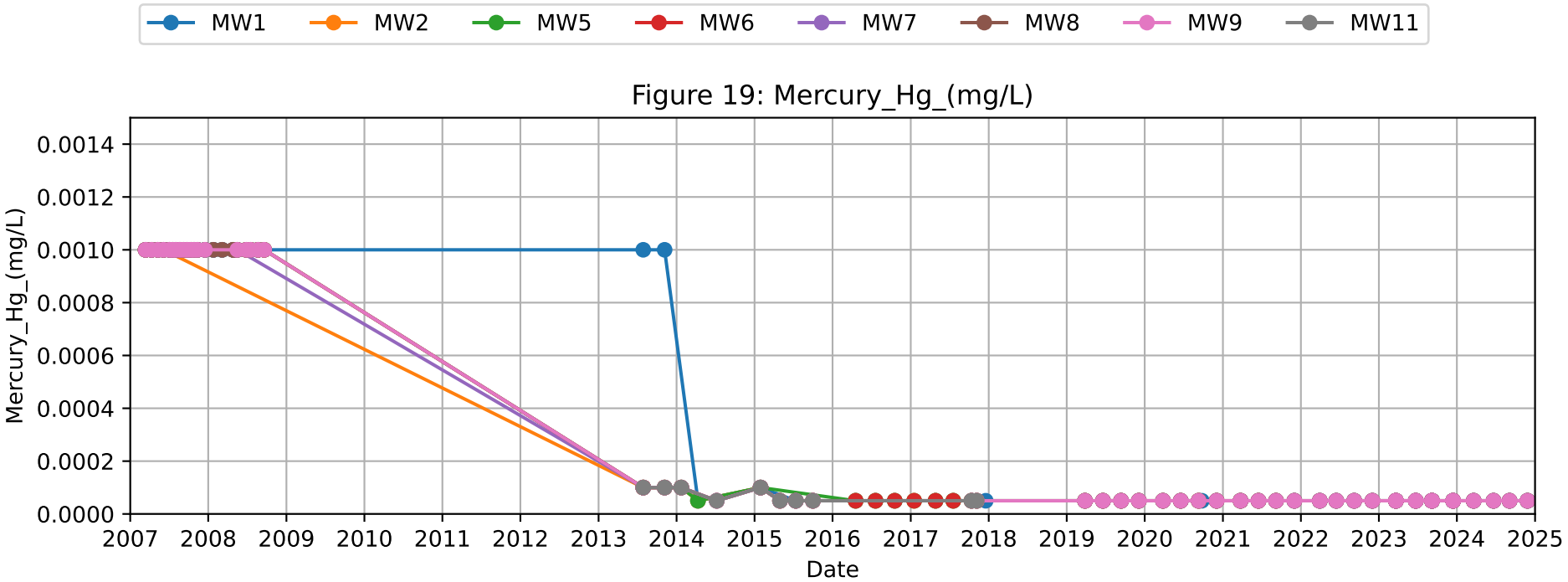


Figure 19: Mercury_Hg_(mg/L)

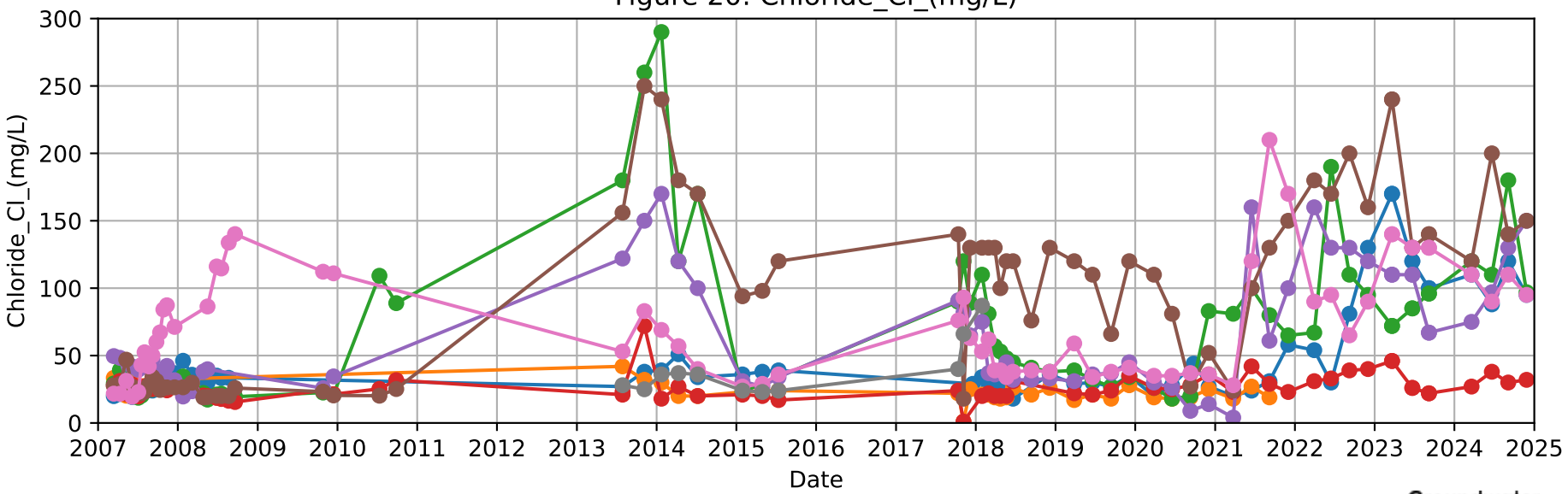


Figure 20: Chloride_Cl_(mg/L)

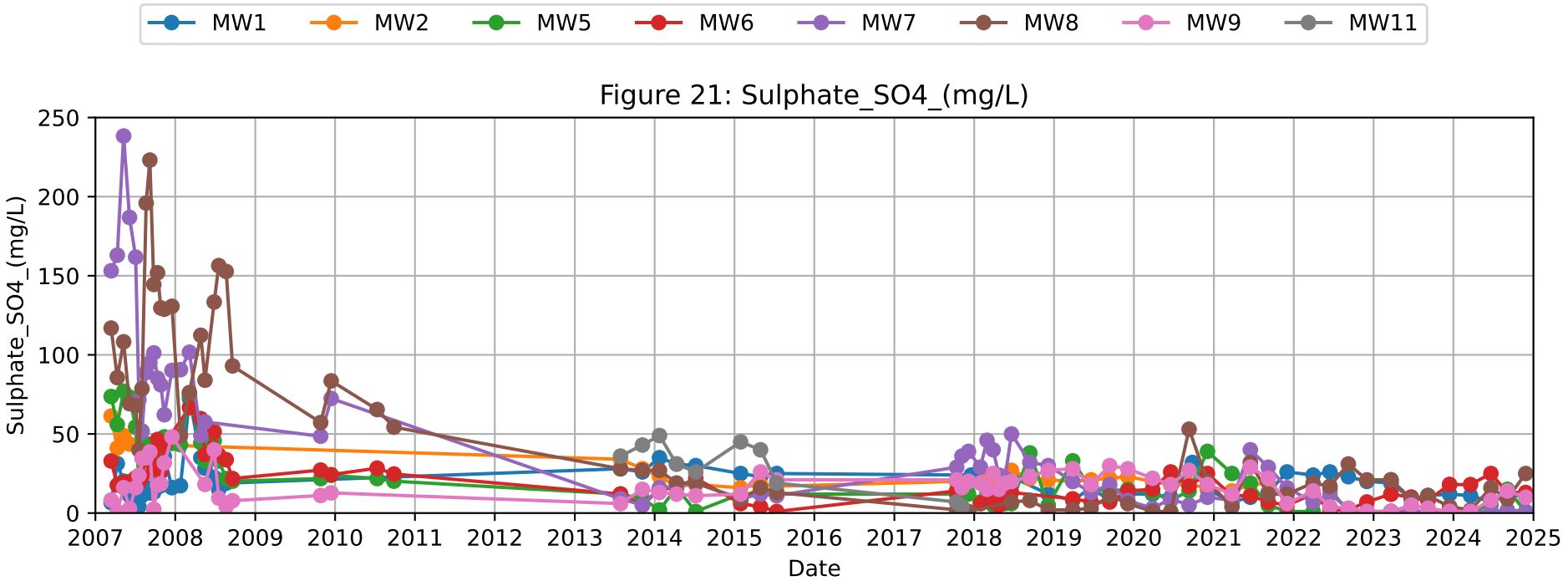


Figure 21: Sulphate_SO4_(mg/L)

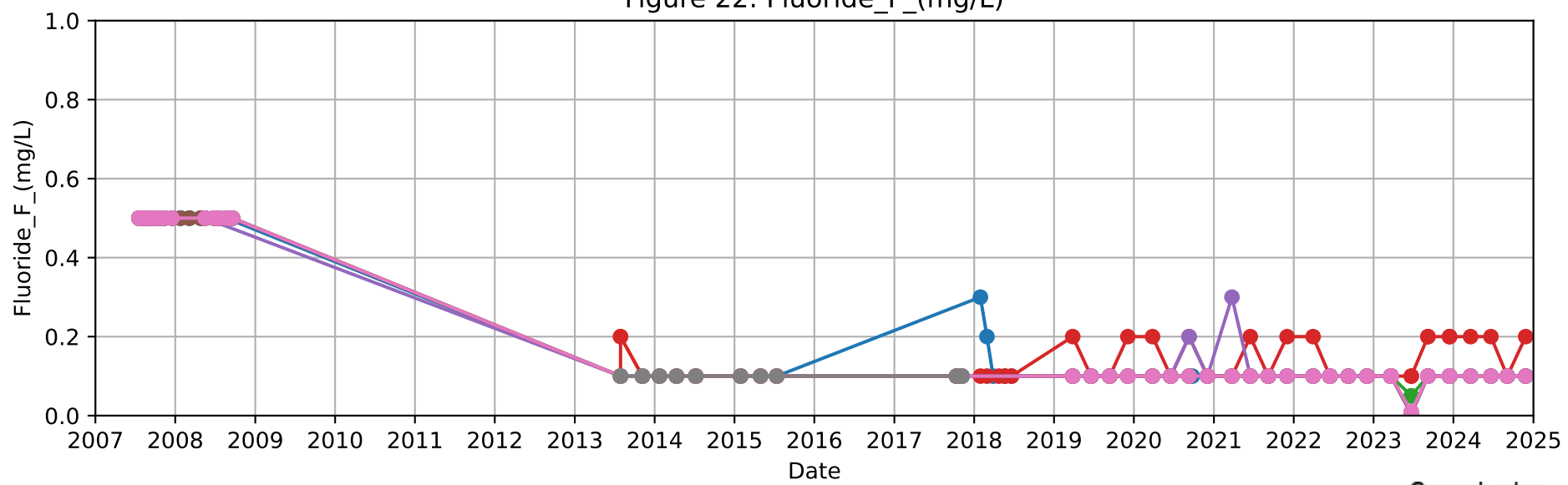


Figure 22: Fluoride_F_(mg/L)

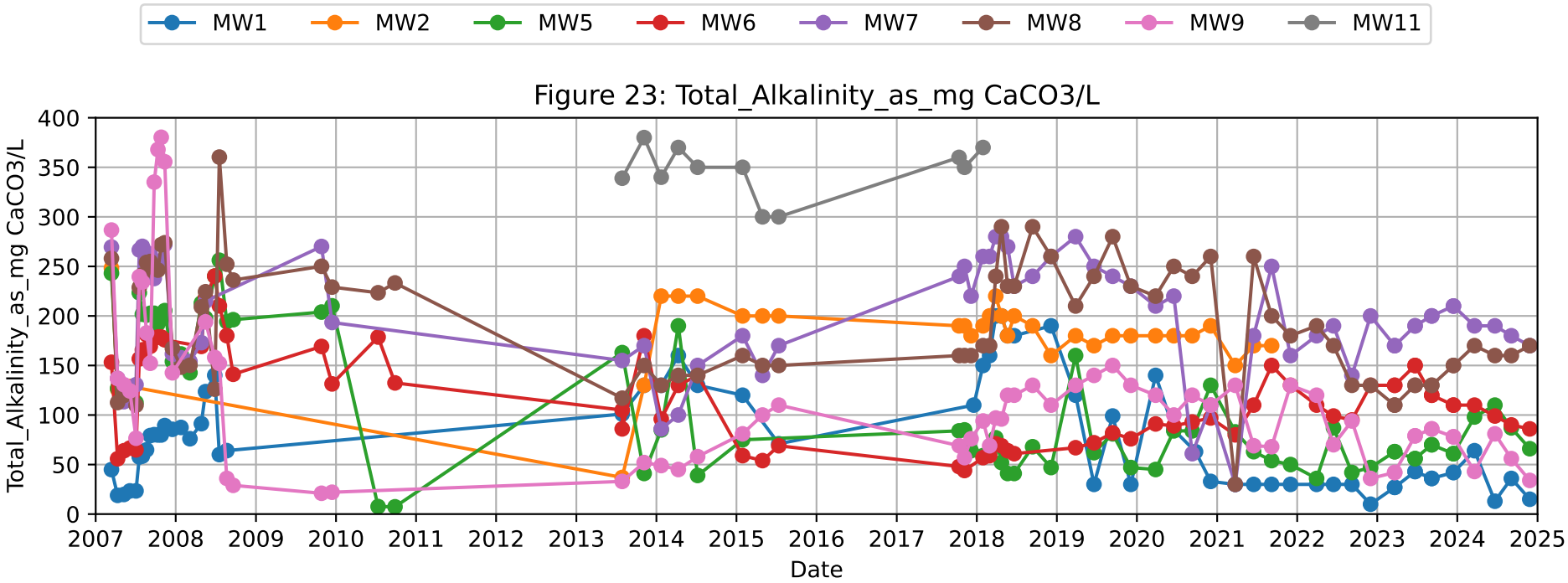


Figure 23: Total_Alkalinity_as_mg CaCO3/L

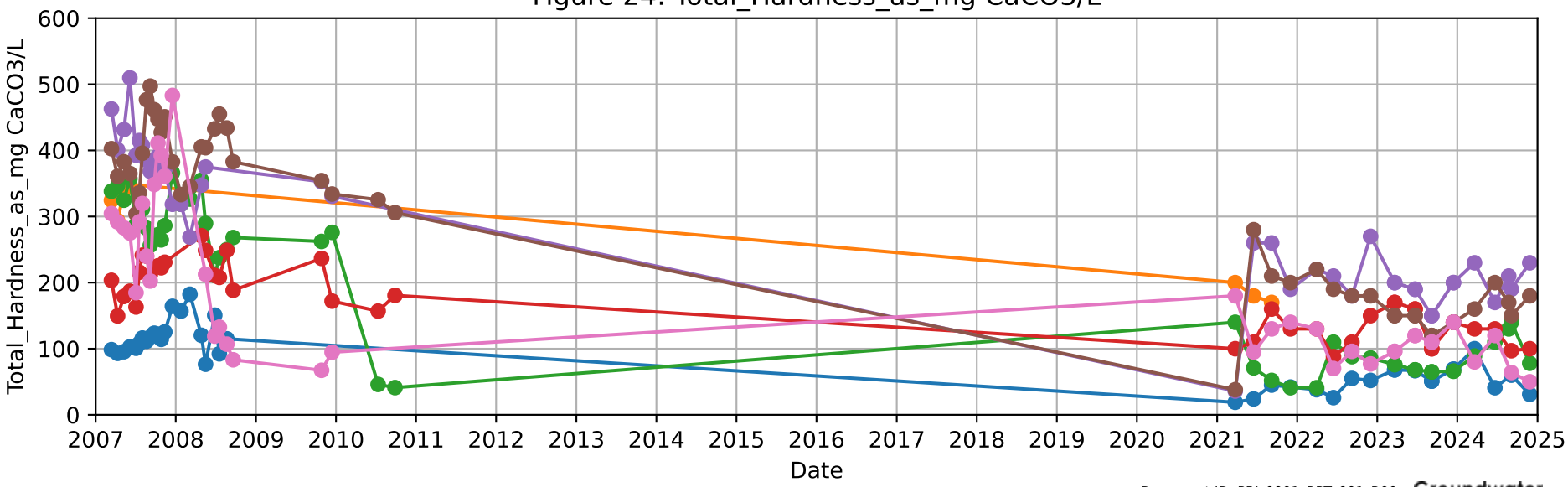


Figure 24: Total_Hardness_as_mg CaCO3/L

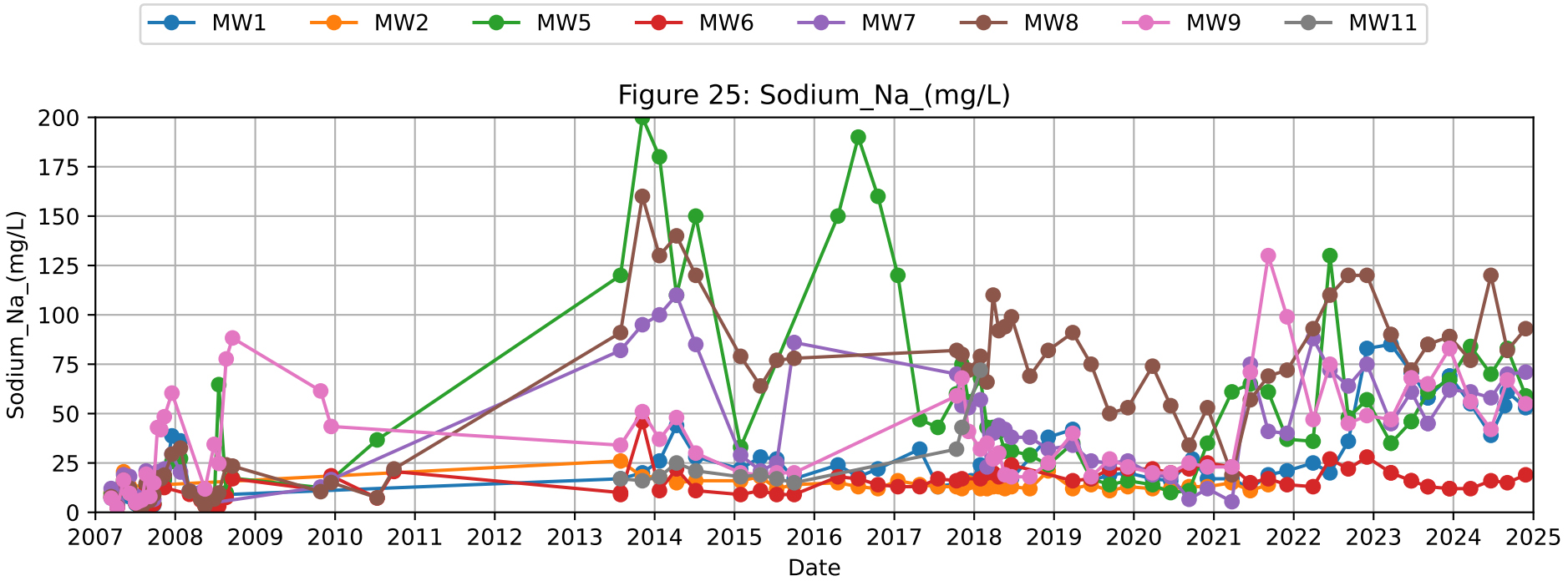


Figure 25: Sodium_Na_(mg/L)

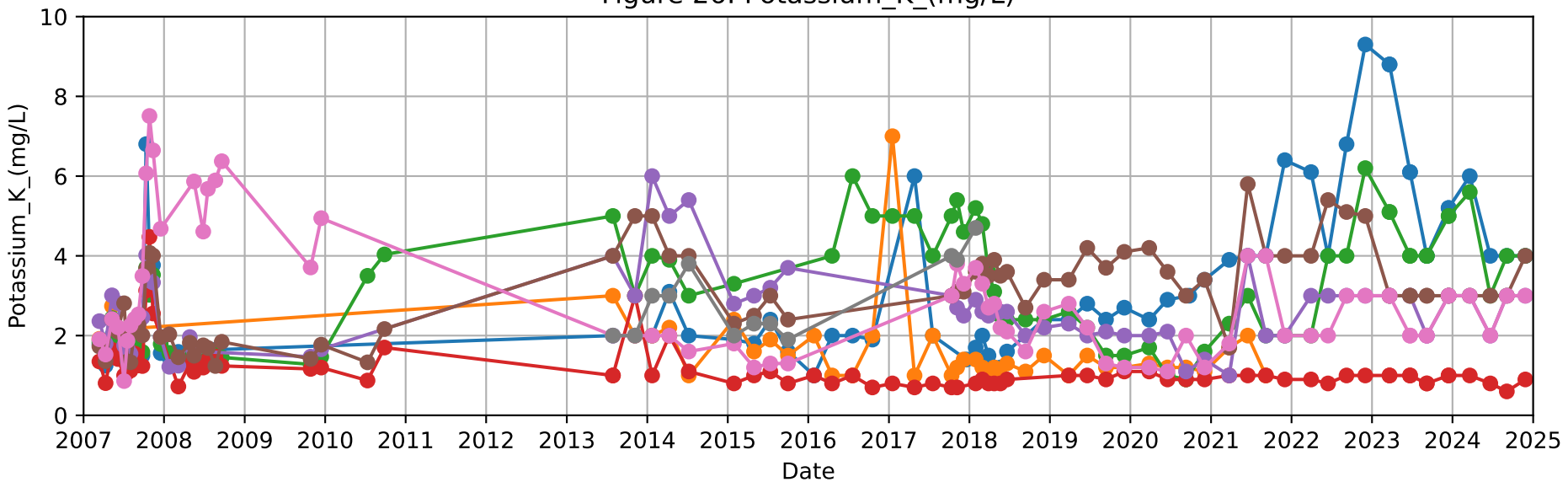


Figure 26: Potassium_K_(mg/L)

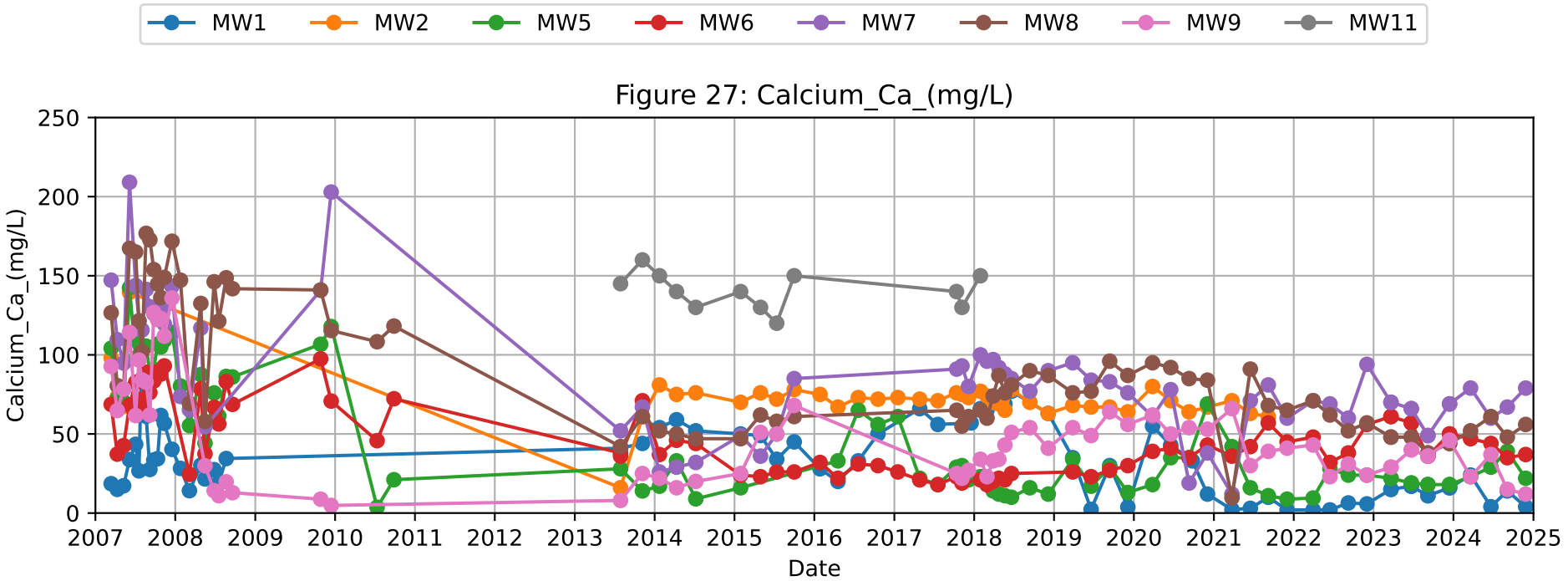


Figure 27: Calcium_Ca_(mg/L)

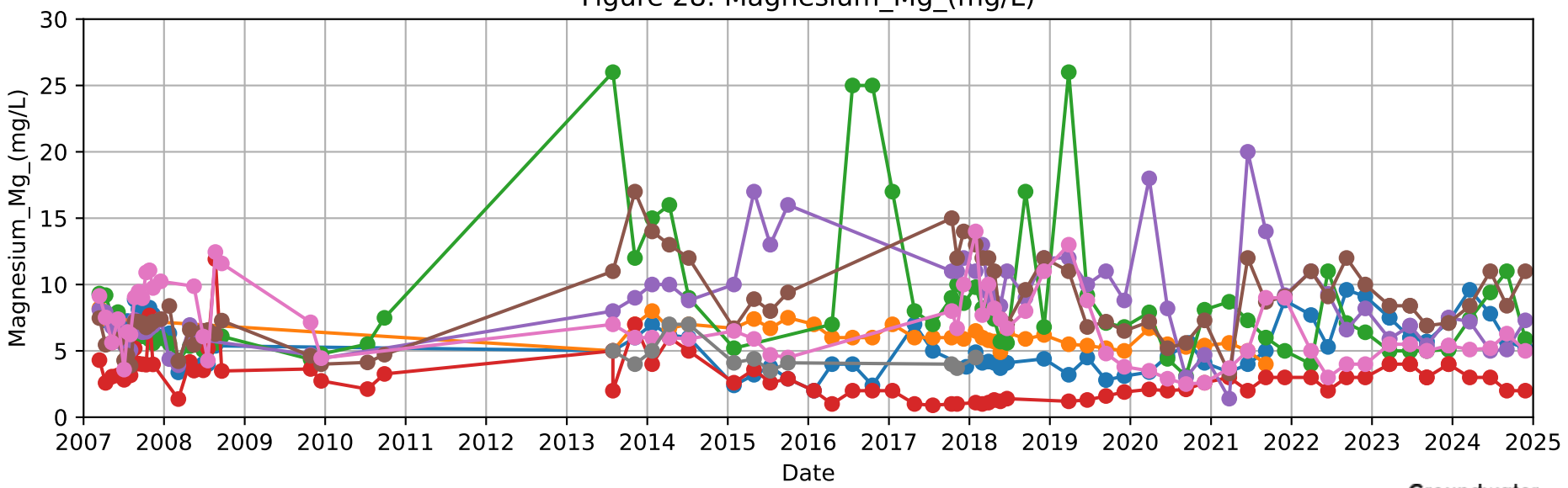


Figure 28: Magnesium_Mg_(mg/L)

Figure 29: Nitrate_as_N_(mg/L)

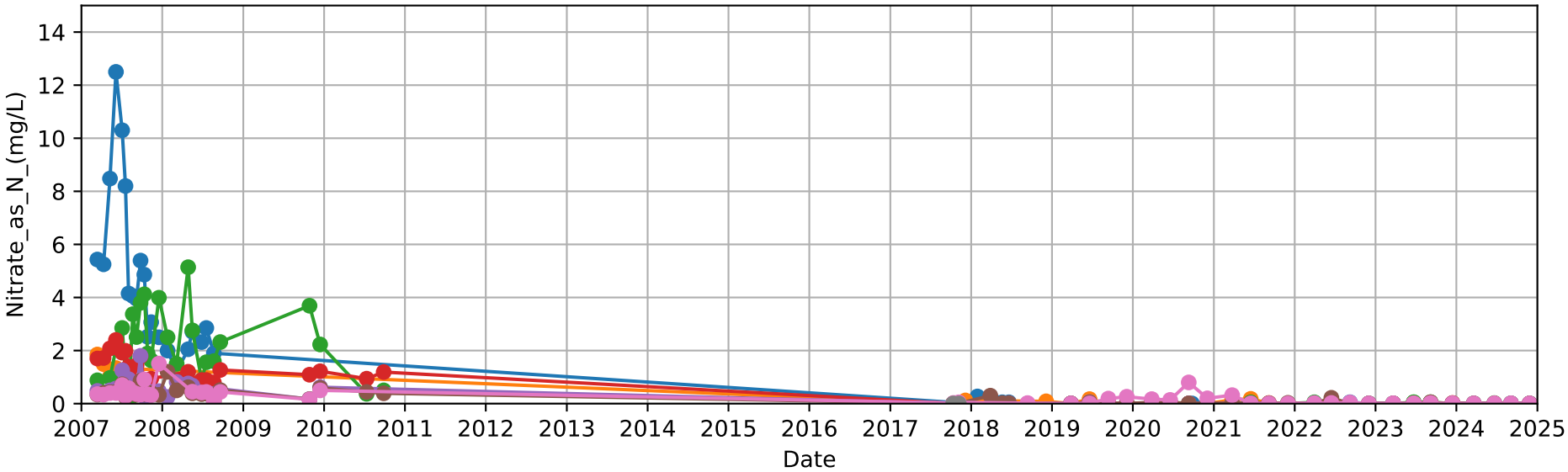
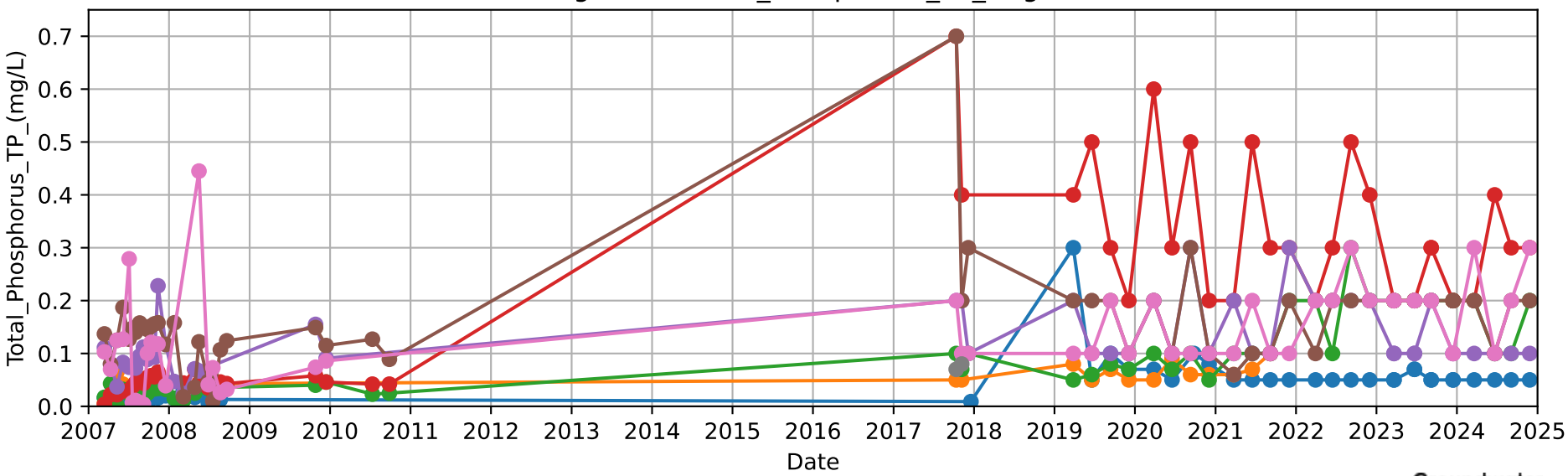


Figure 30: Total_Phosphorus_TP_(mg/L)



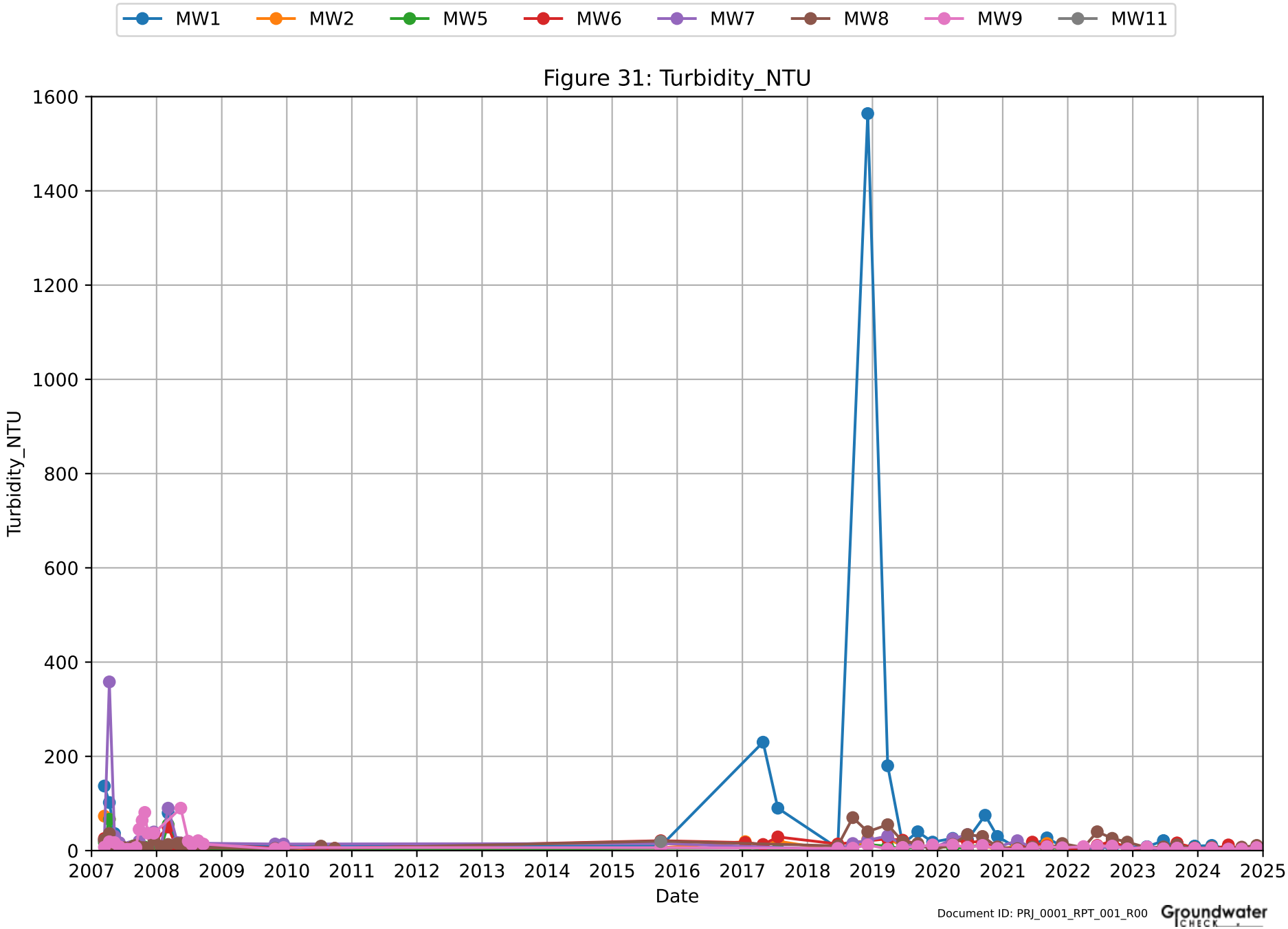

MW1
MW2
MW5
MW6
MW7
MW8
MW9
MW11
Figure 31: Turbidity_NTU
Turbidity_NTU
0
200
400
600
800
1000
1200
1400
1600
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Date

Figure 32: pH

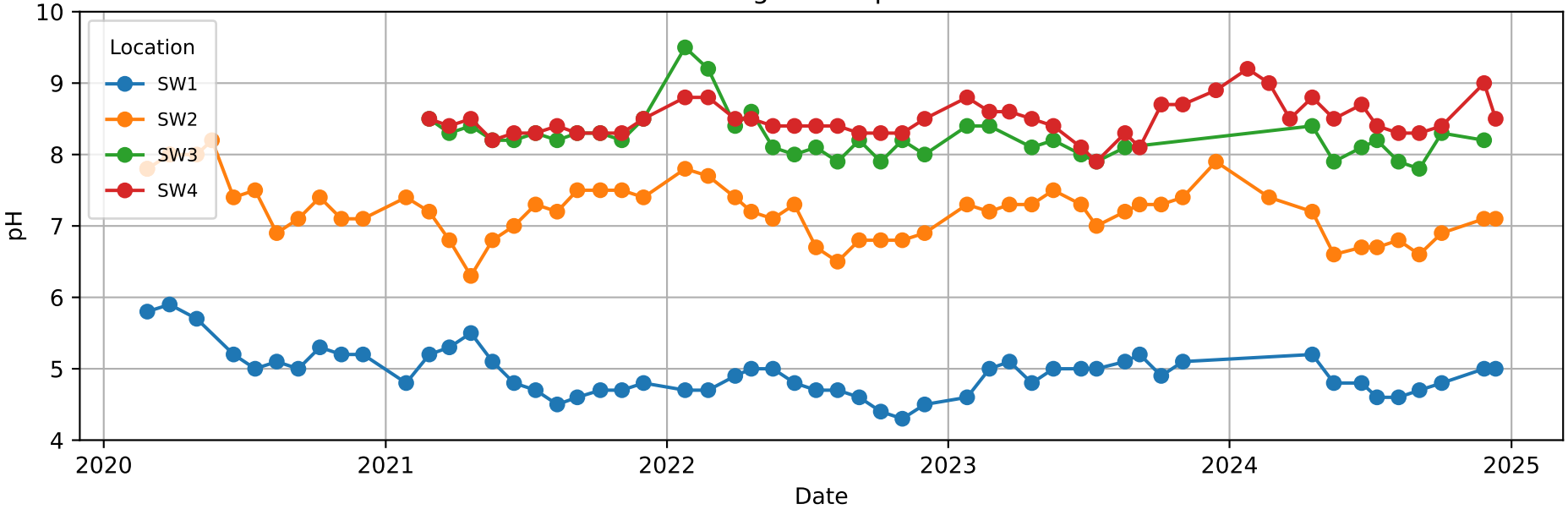


Figure 33: EC_microS/cm

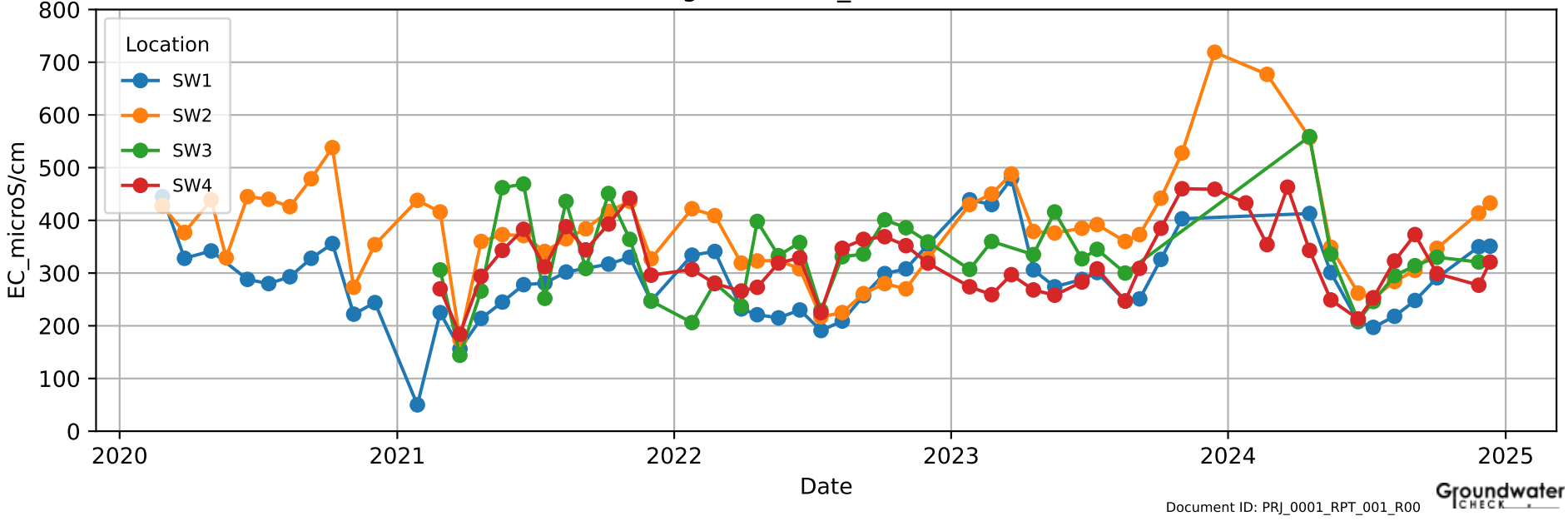


Figure 34: Aluminium_Al_(mg/L)

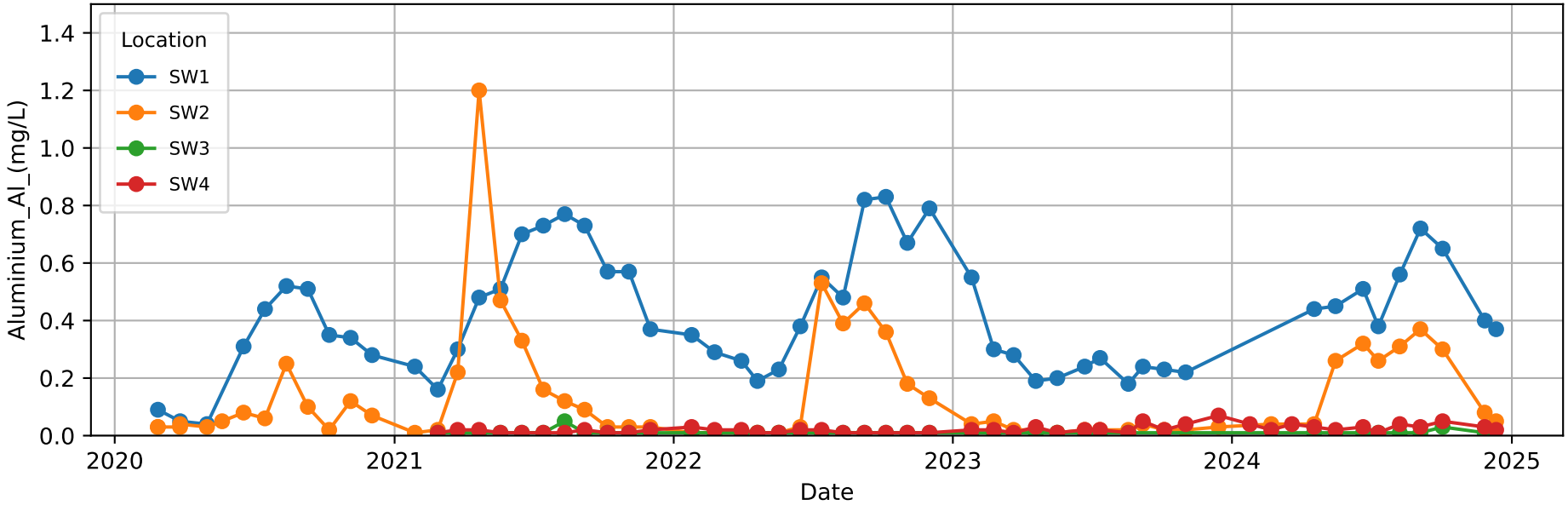


Figure 35: Arsenic_As_(mg/L)

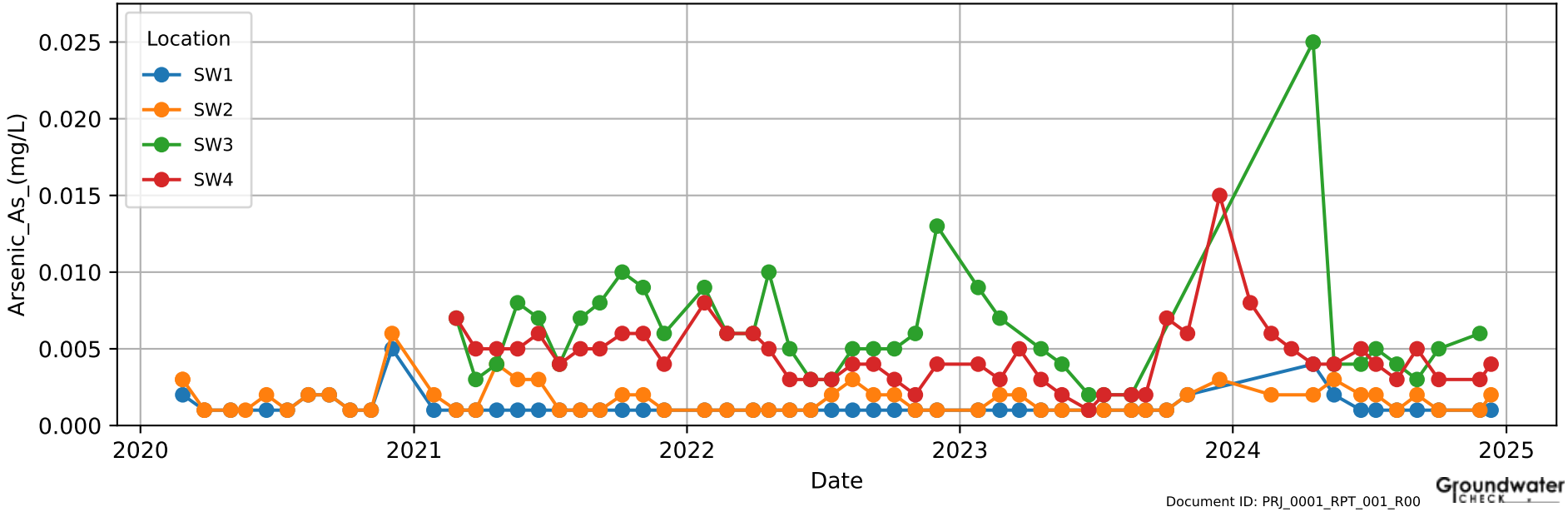


Figure 36: Boron_B_(mg/L)

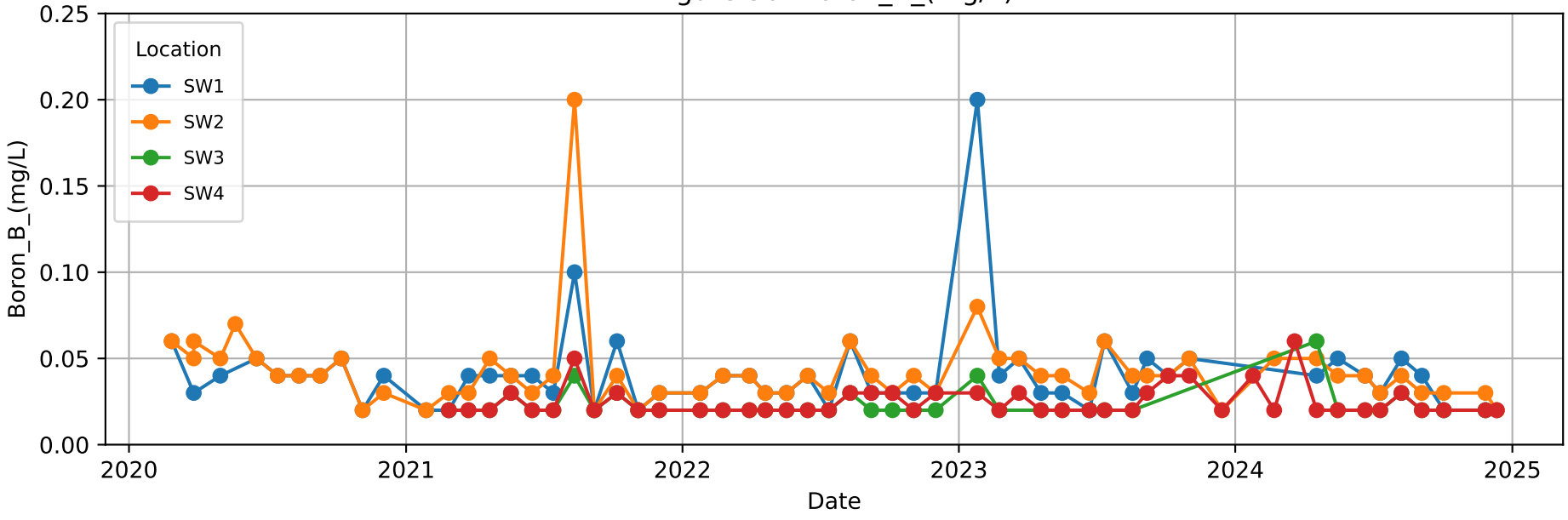


Figure 37: Cadmium_Cd_(mg/L)

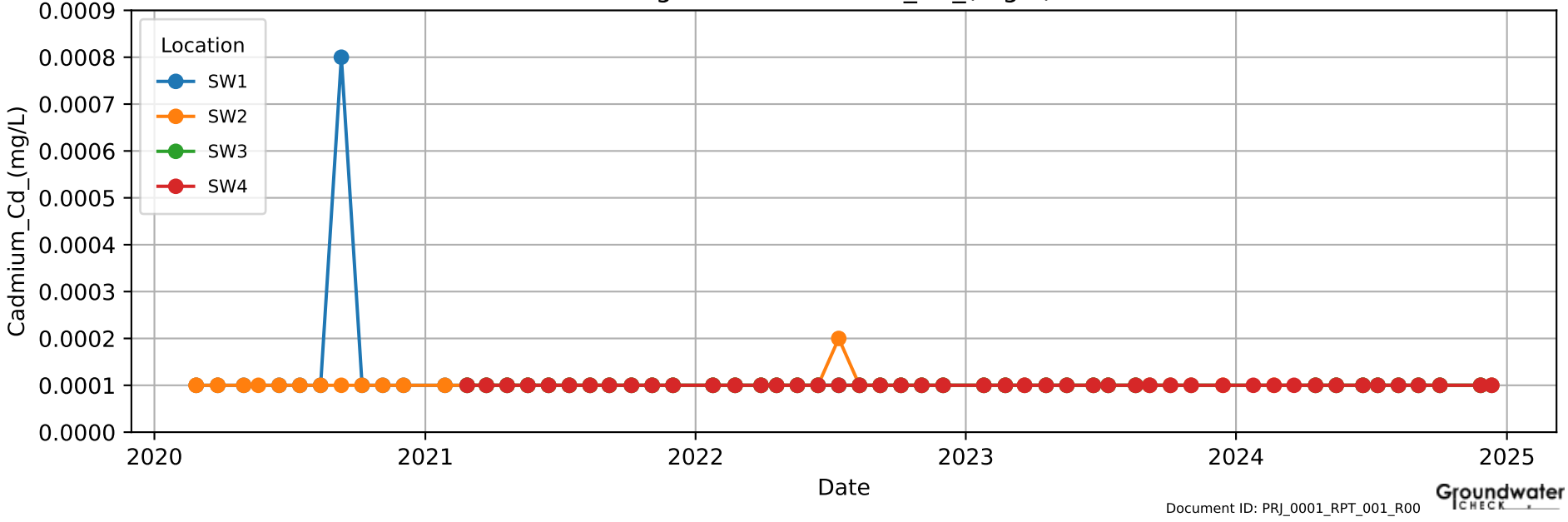


Figure 38: Chromium_Cr_(mg/L)

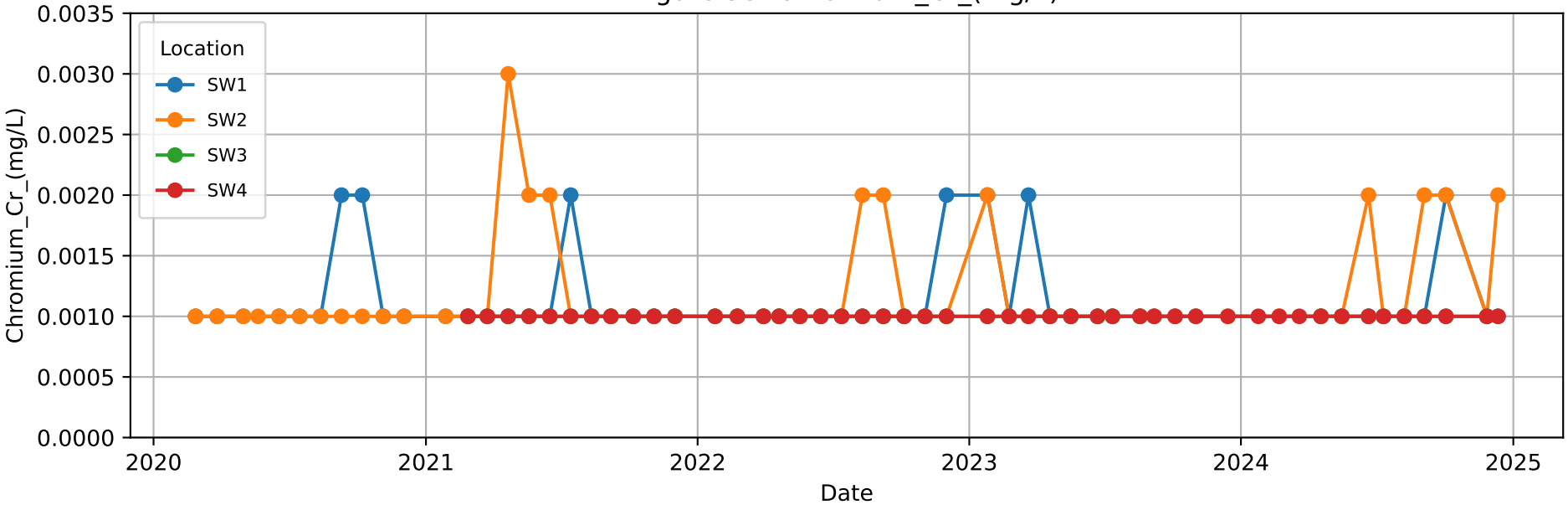


Figure 39: Copper_Cu_(mg/L)

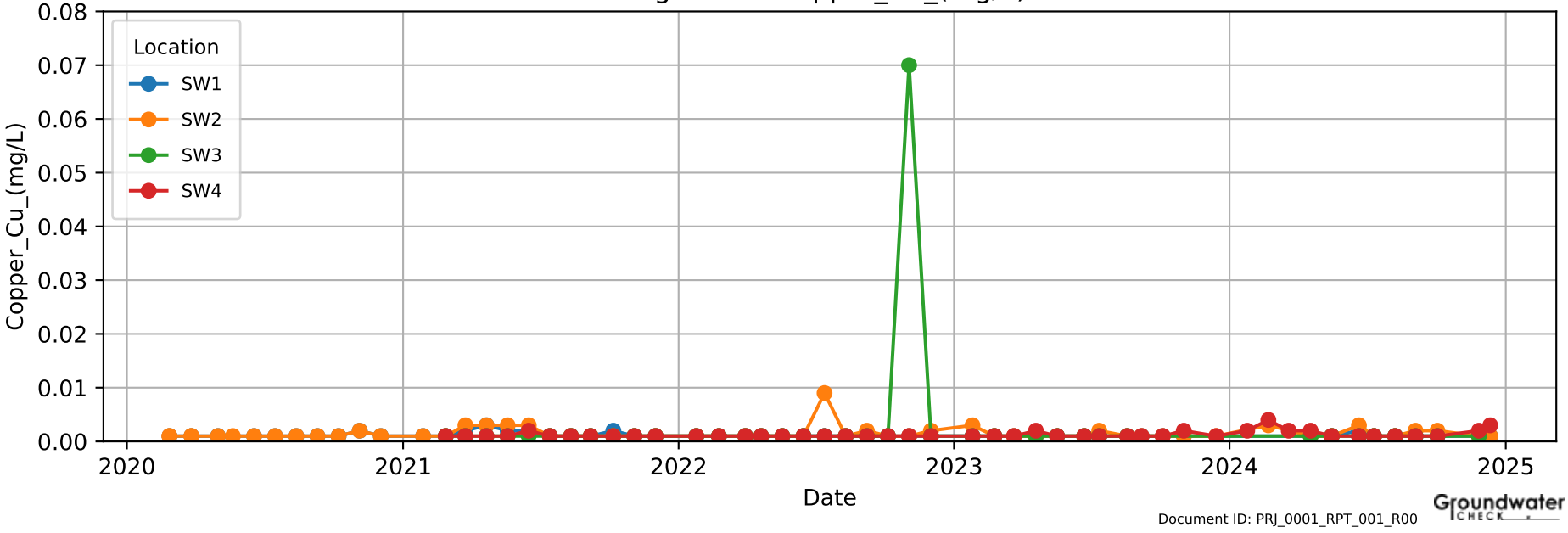


Figure 40: Iron_Fe_(mg/L)

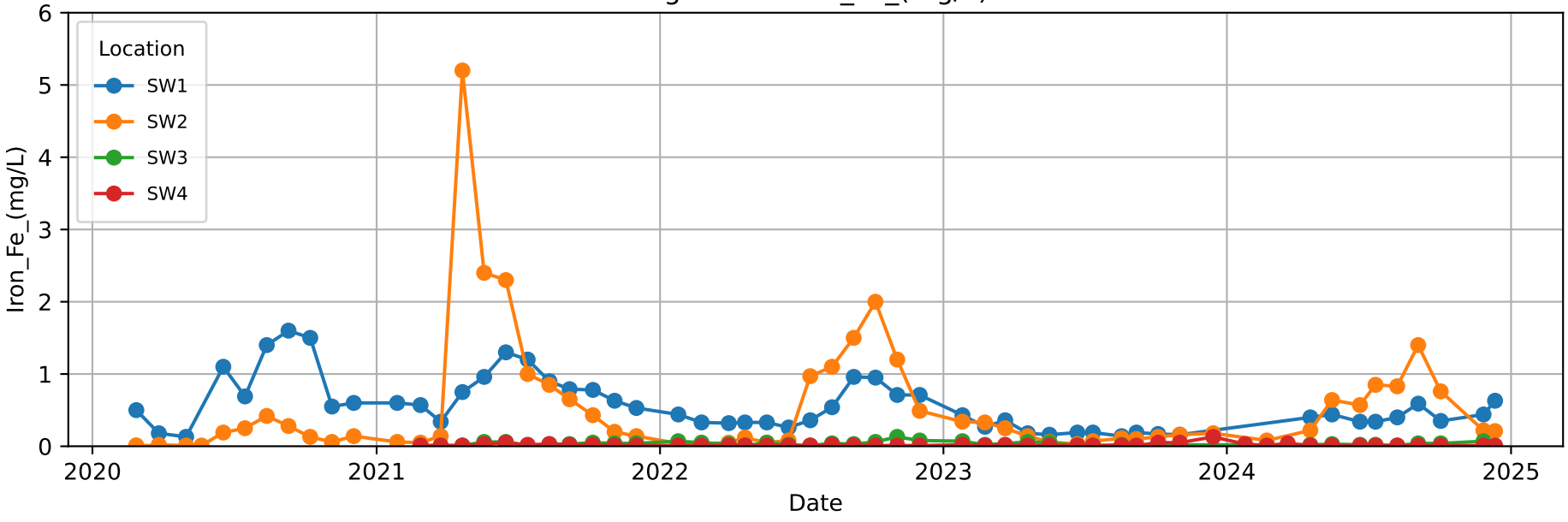
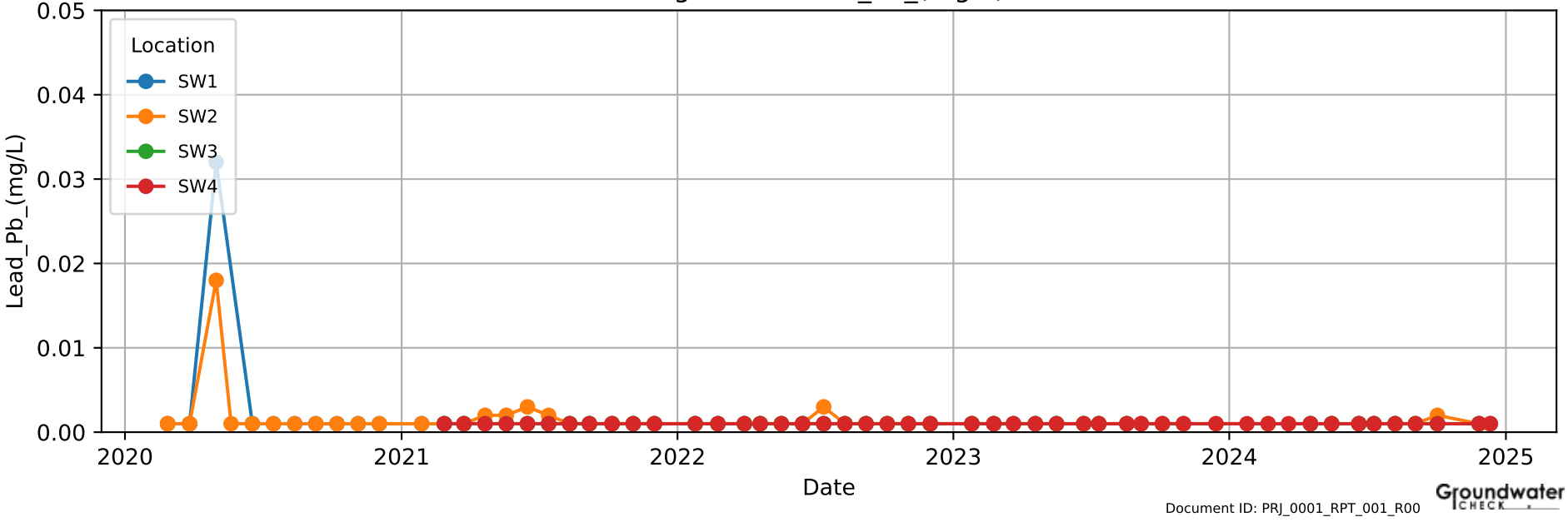


Figure 41: Lead_Pb_(mg/L)



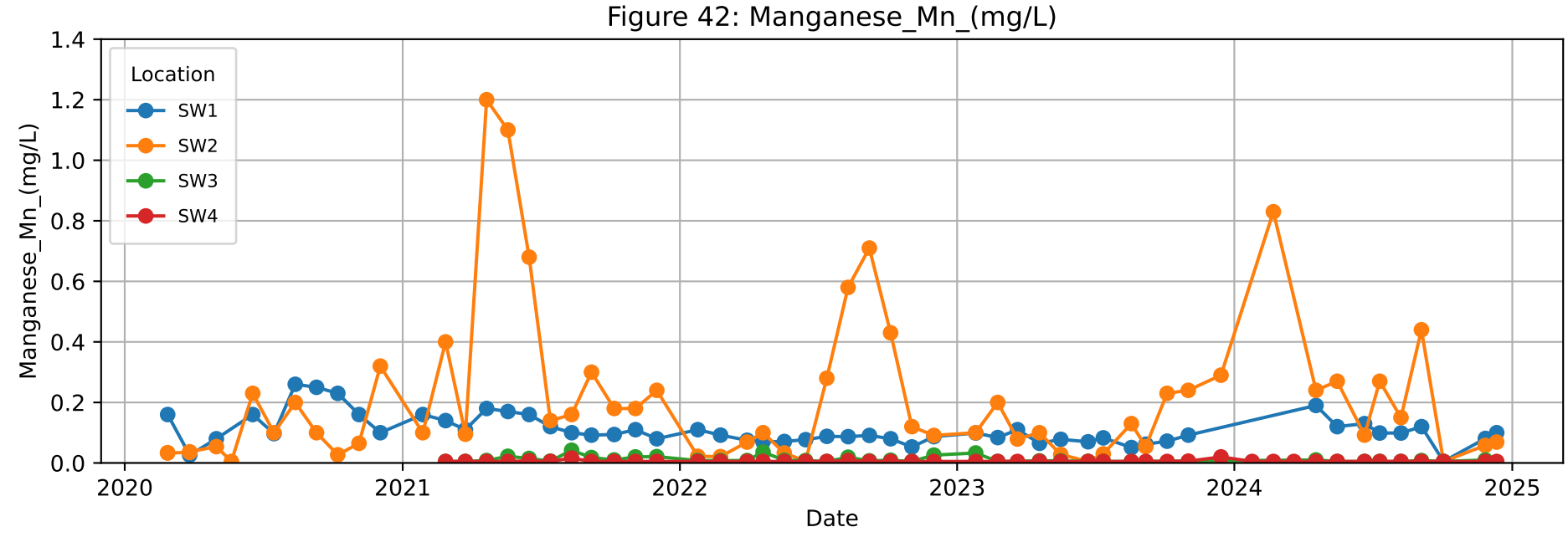


Figure 42: Manganese_Mn_(mg/L)

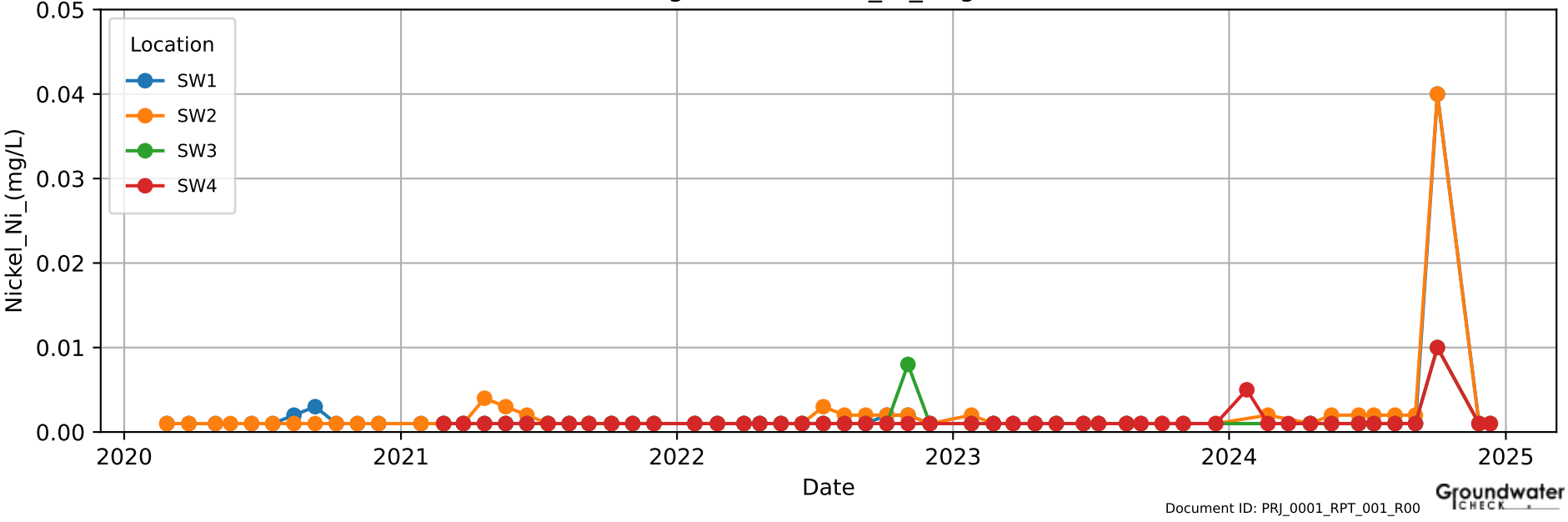


Figure 43: Nickel_Ni_(mg/L)

Figure 44: Selenium_Se_(mg/L)

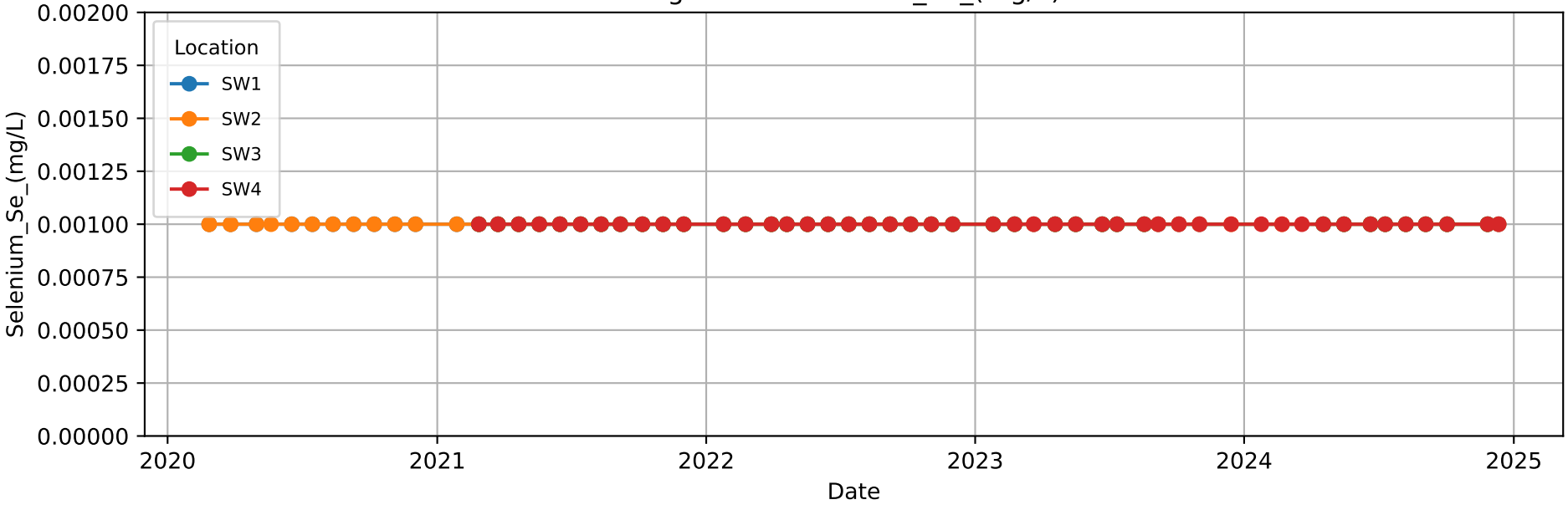


Figure 45: Zinc_Zn_(mg/L)

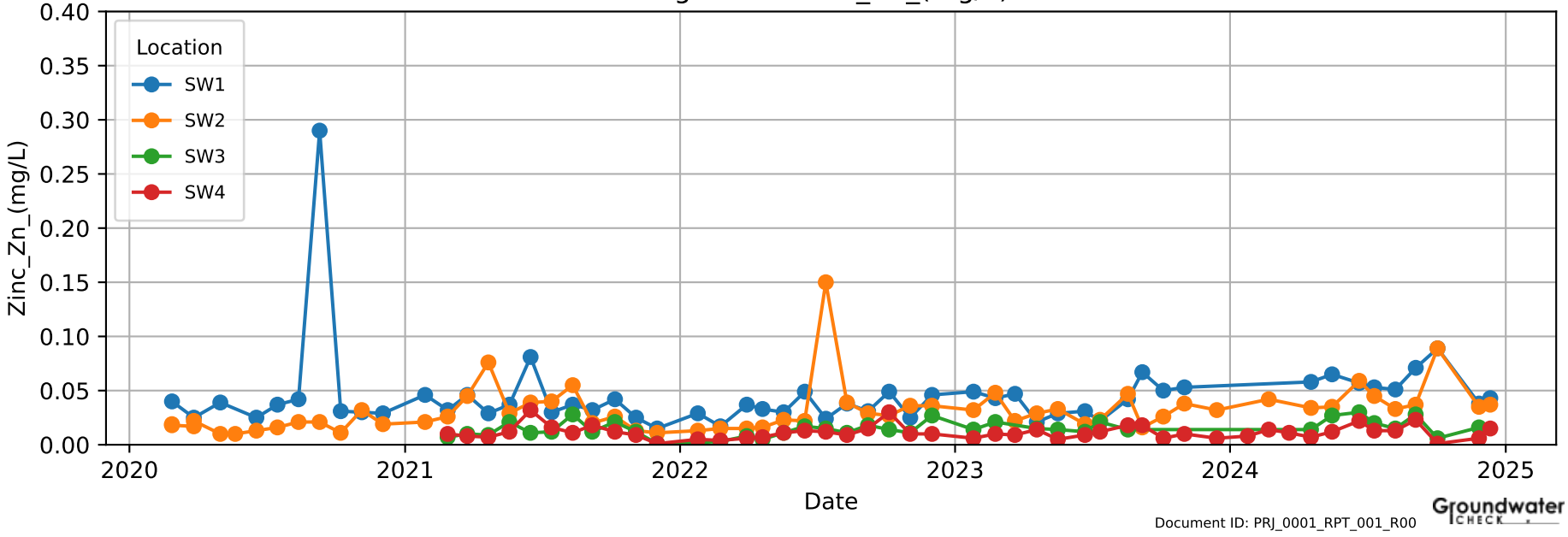


Figure 46: Mercury_Hg_(mg/L)

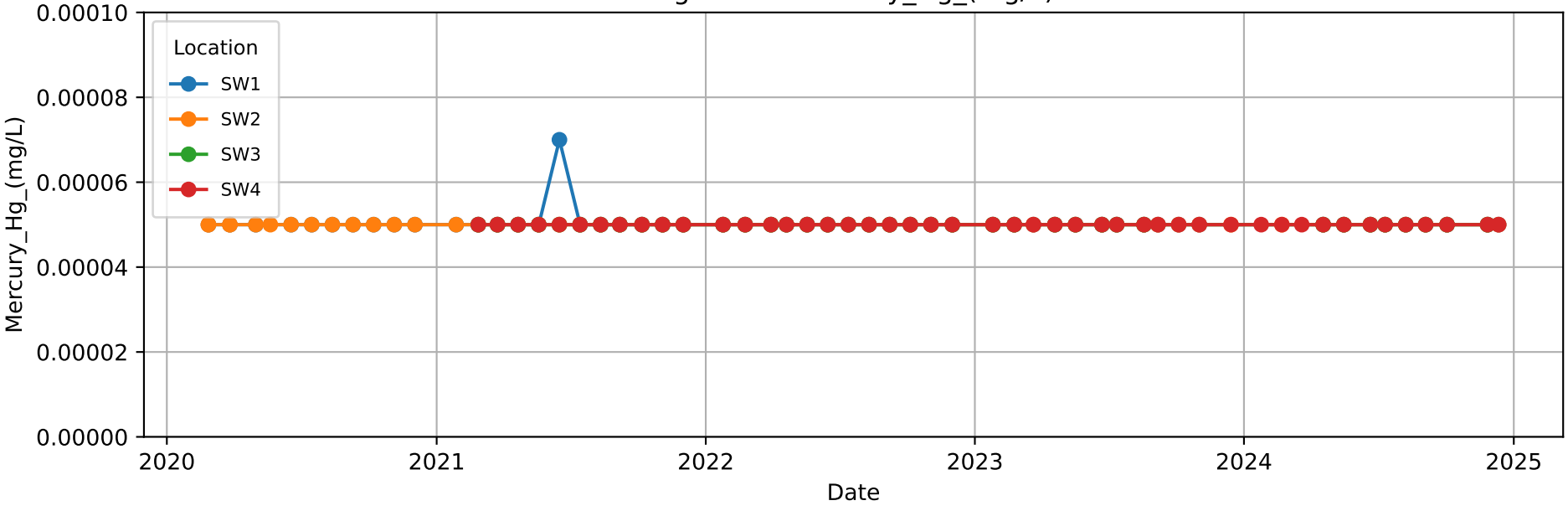


Figure 47: Chloride_Cl_(mg/L)

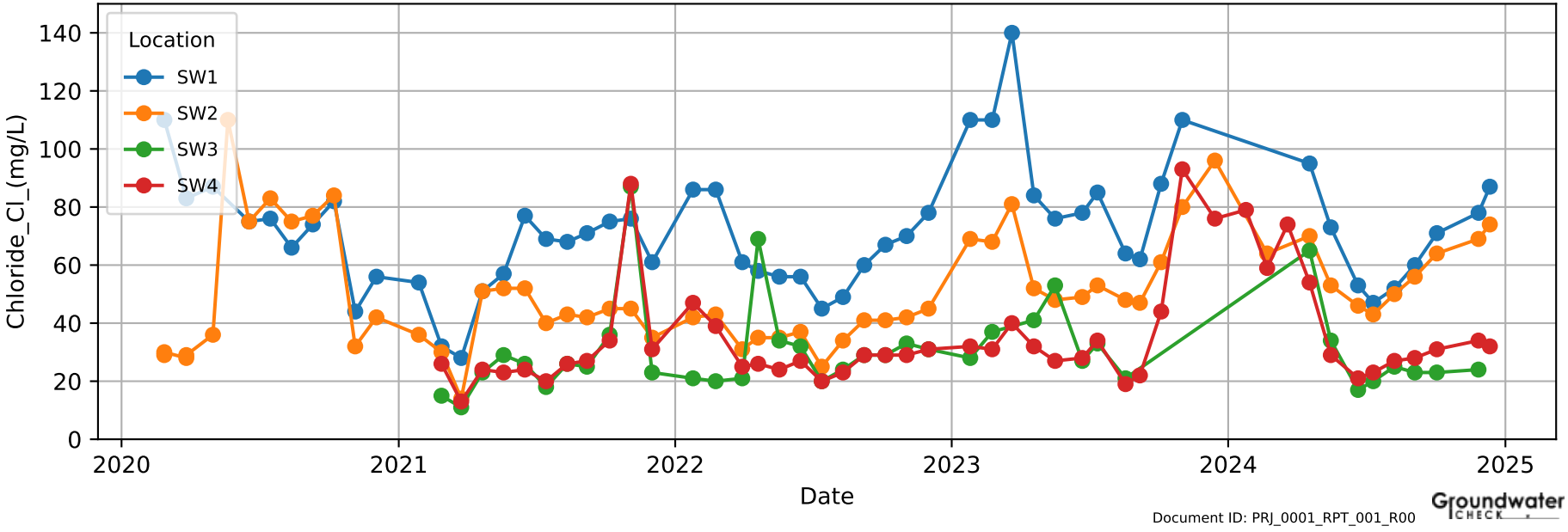


Figure 48: Sulphate_SO4_(mg/L)

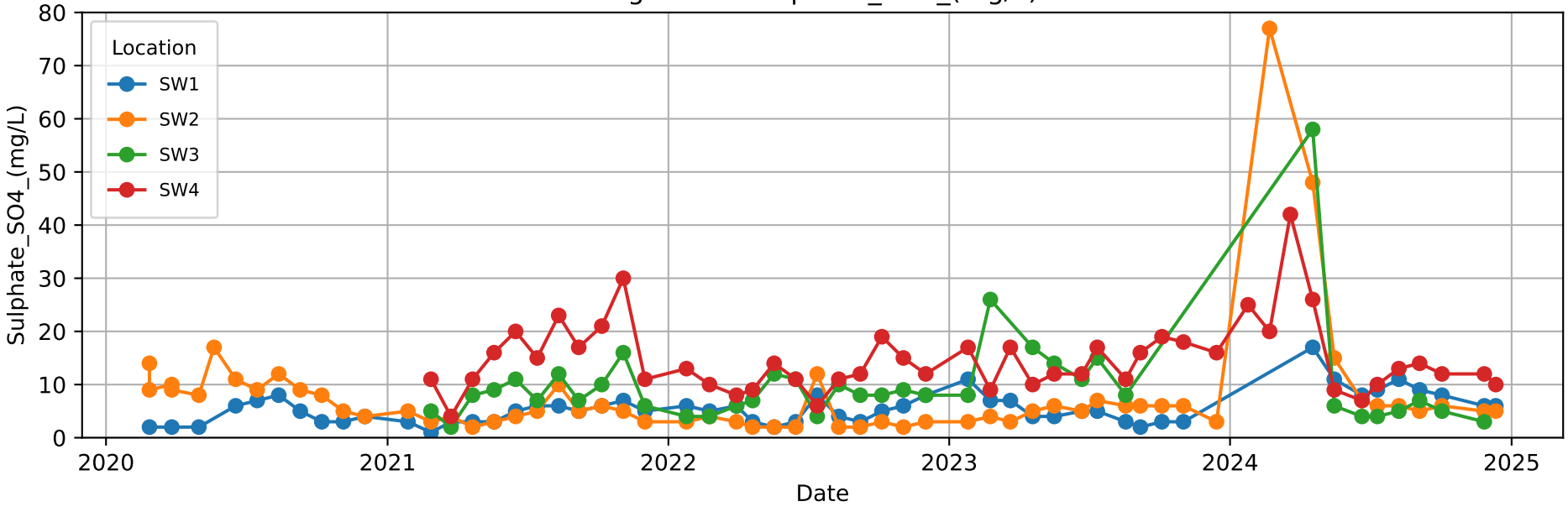


Figure 49: Fluoride_F_(mg/L)

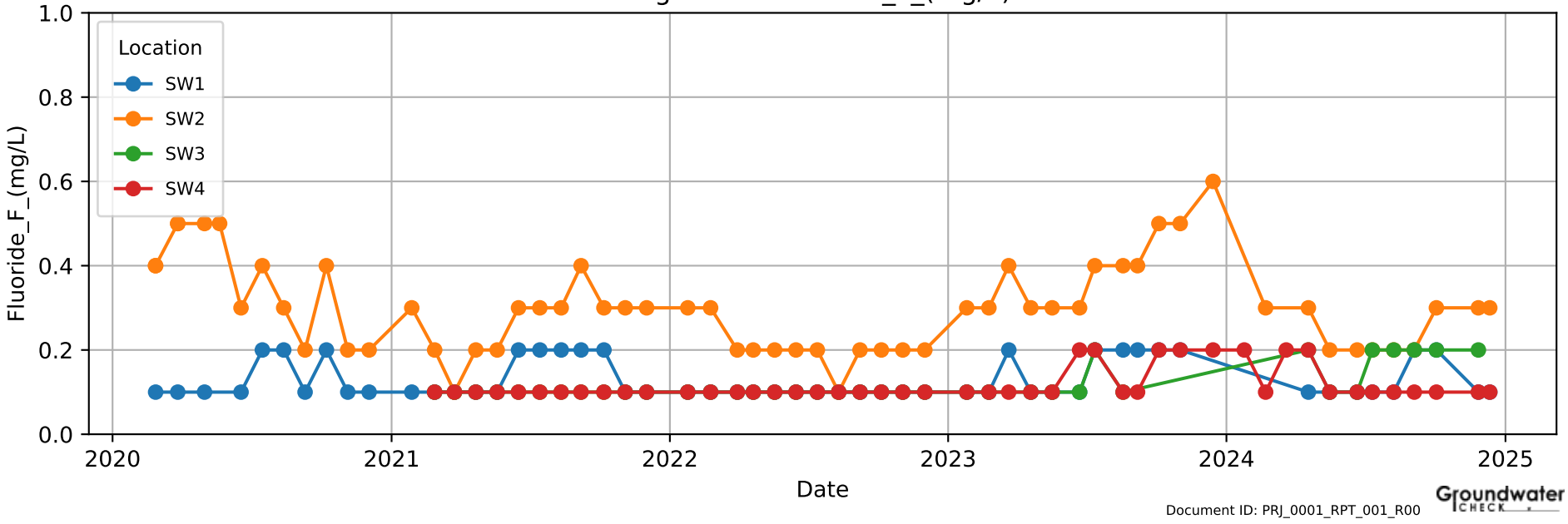


Figure 50: Total_Alkalinity_as_mg CaCO3/L

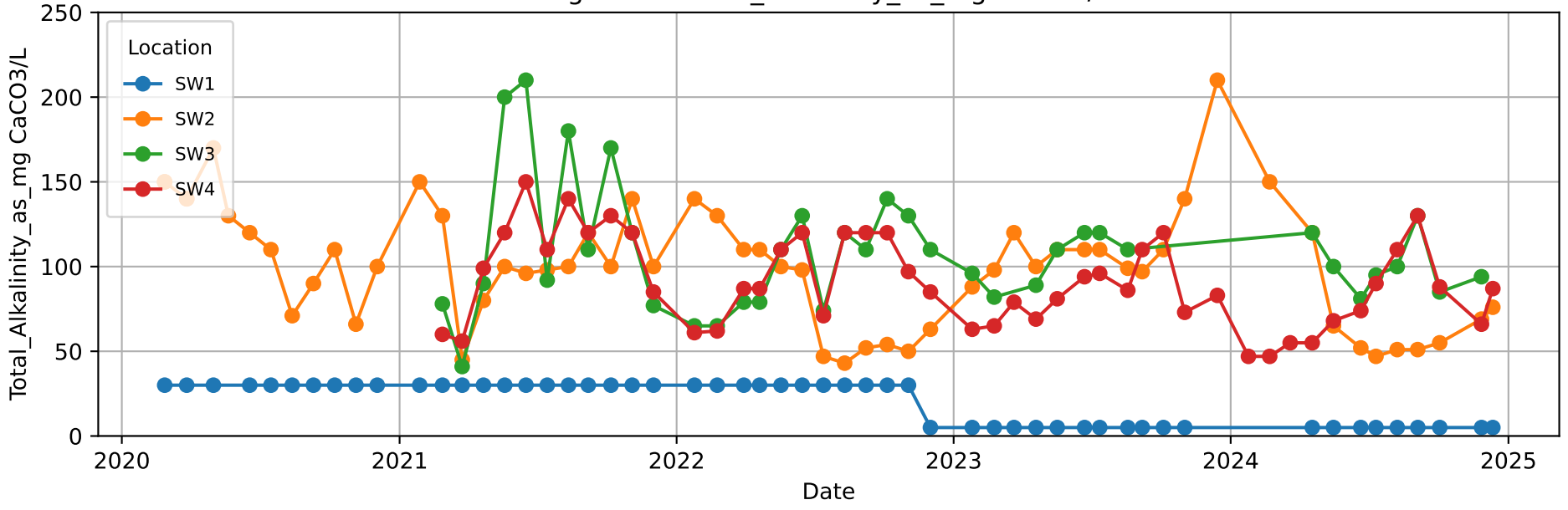


Figure 51: Total_Hardness_as_mg CaCO3/L

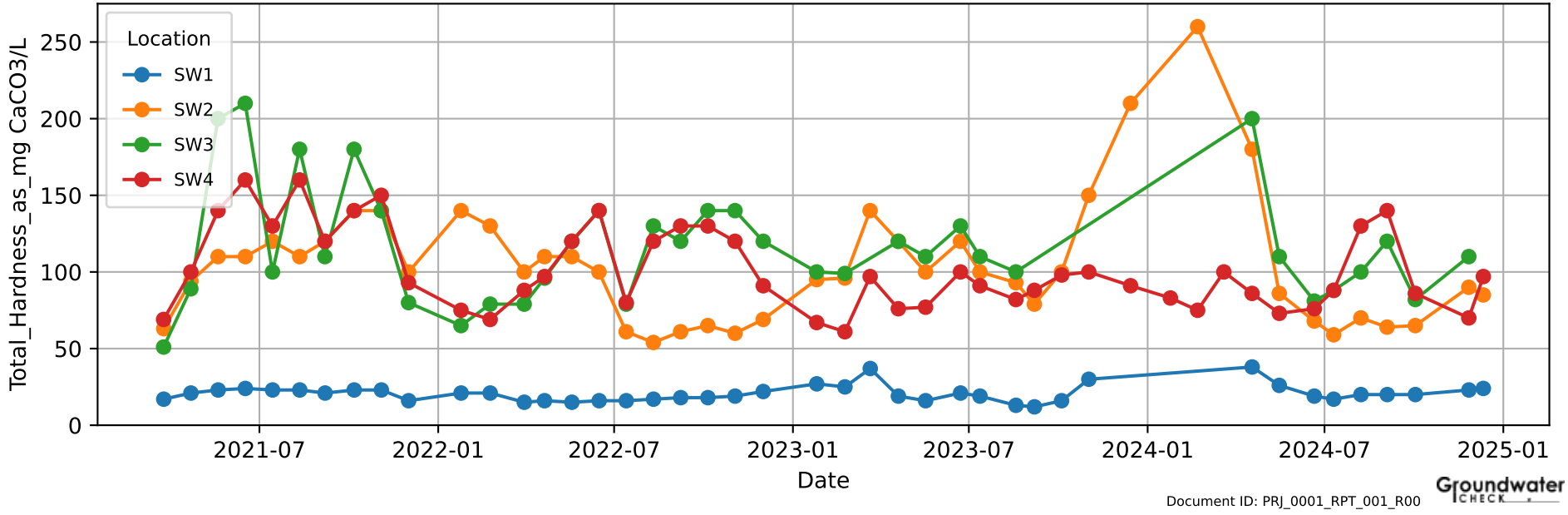


Figure 52: Sodium_Na_(mg/L)

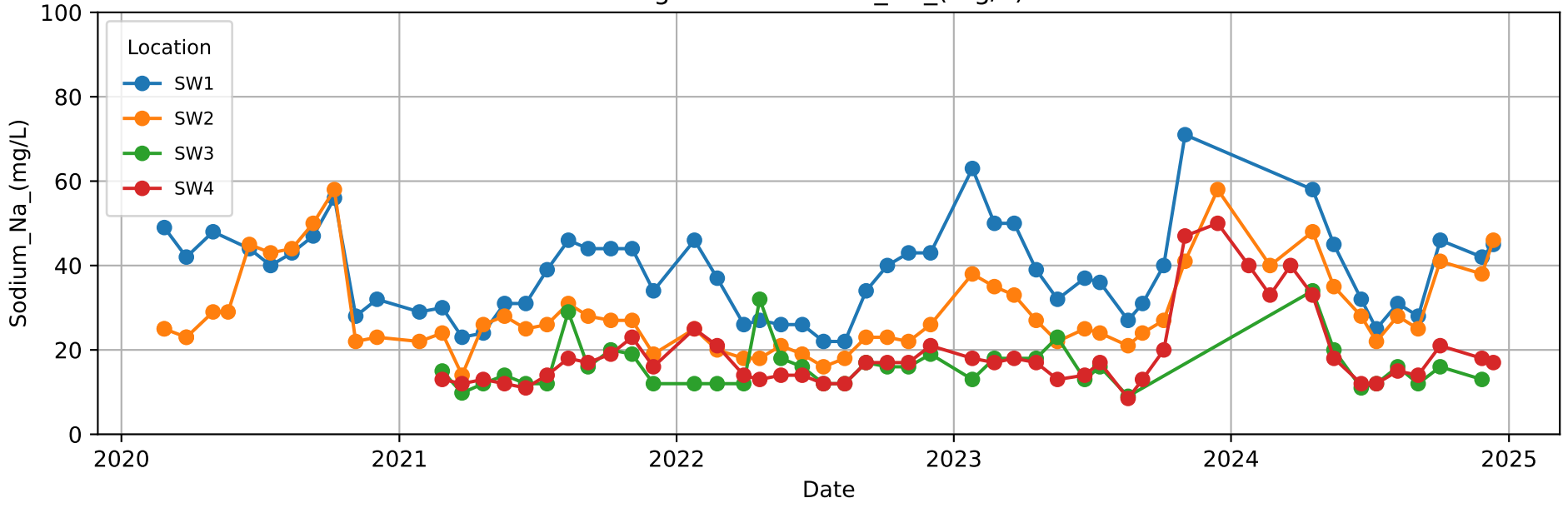


Figure 53: Potassium_K_(mg/L)

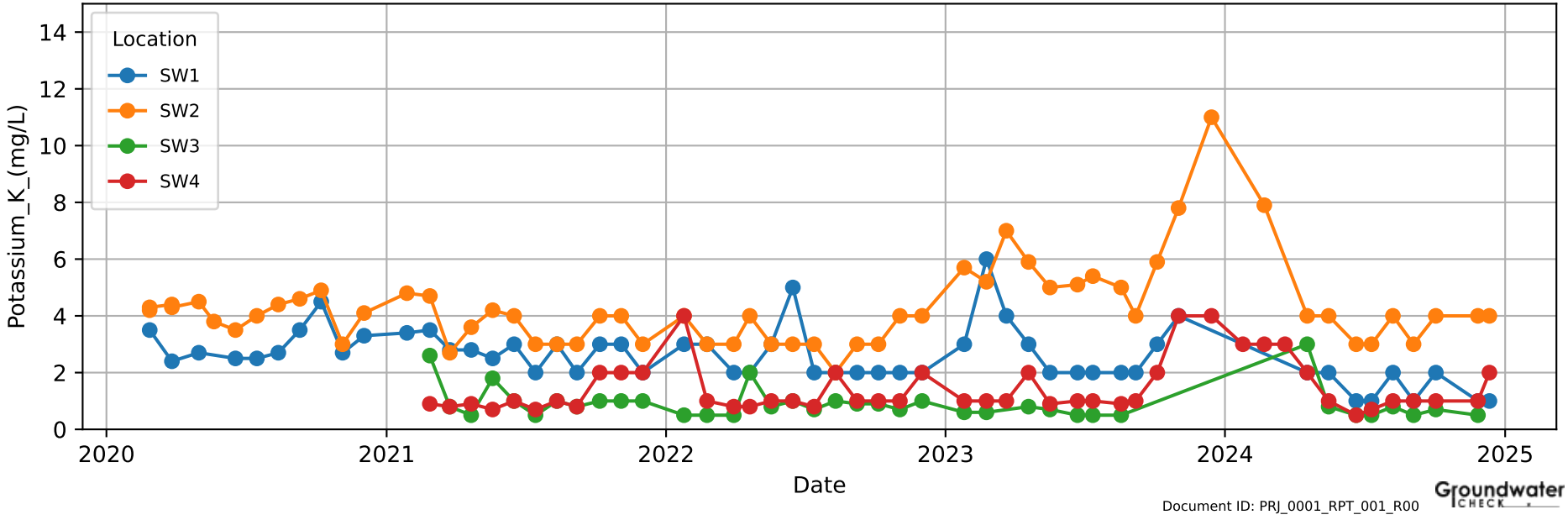


Figure 54: Calcium_Ca_(mg/L)

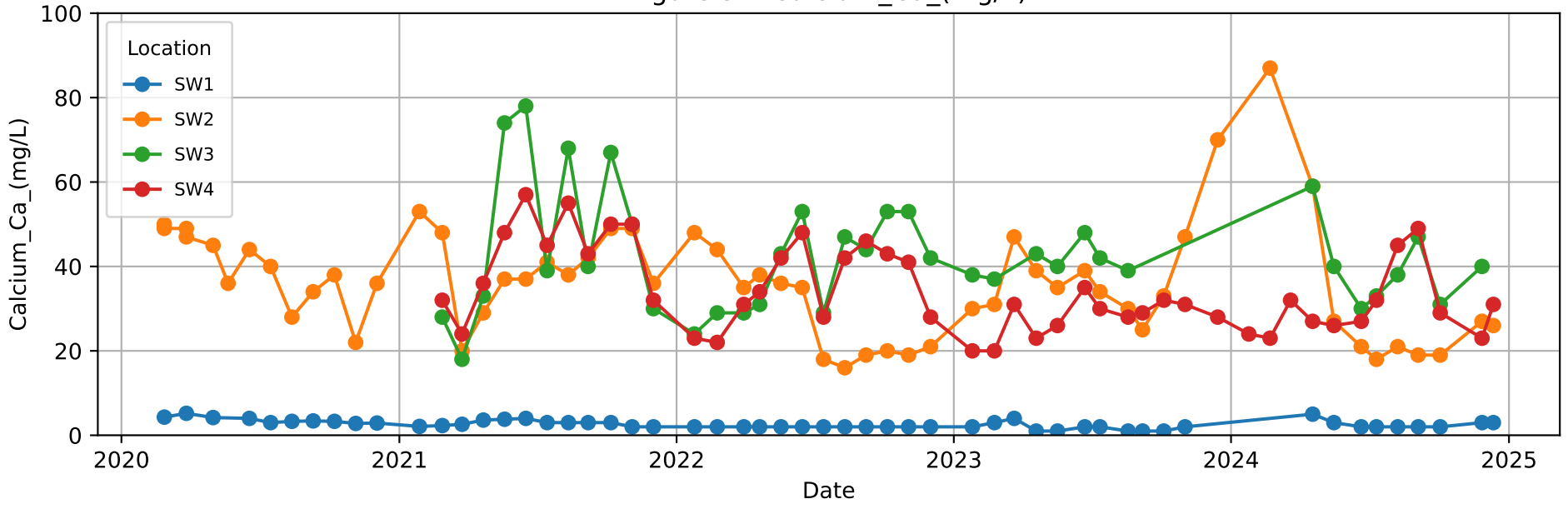
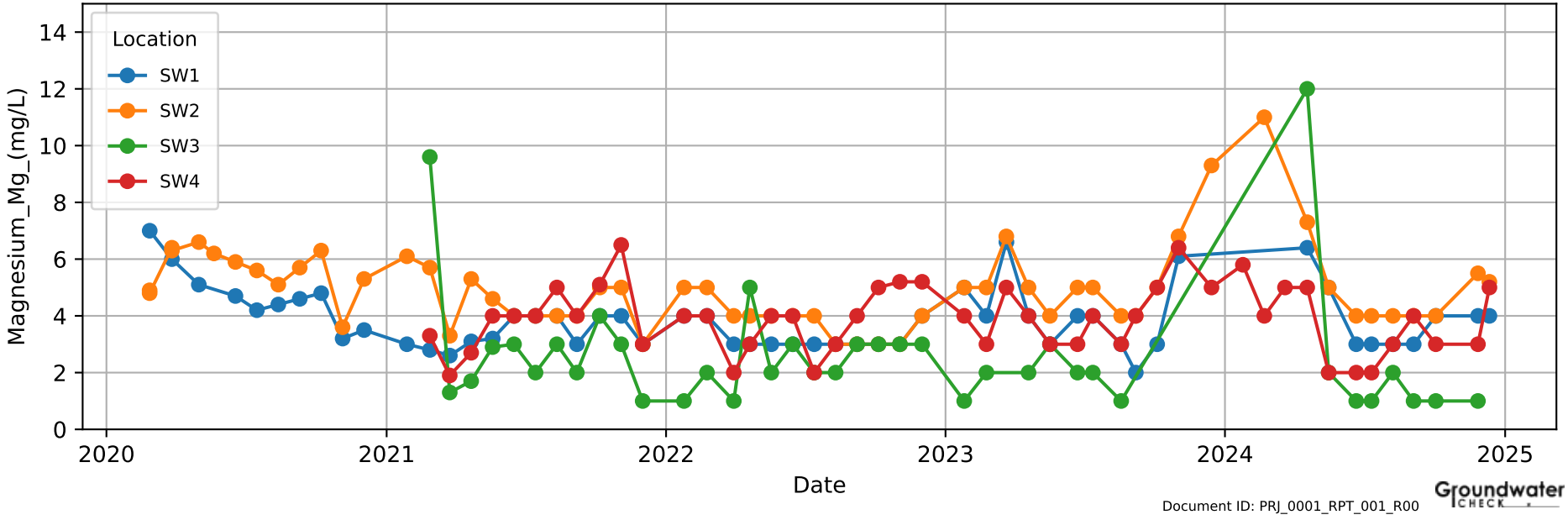


Figure 55: Magnesium_Mg_(mg/L)



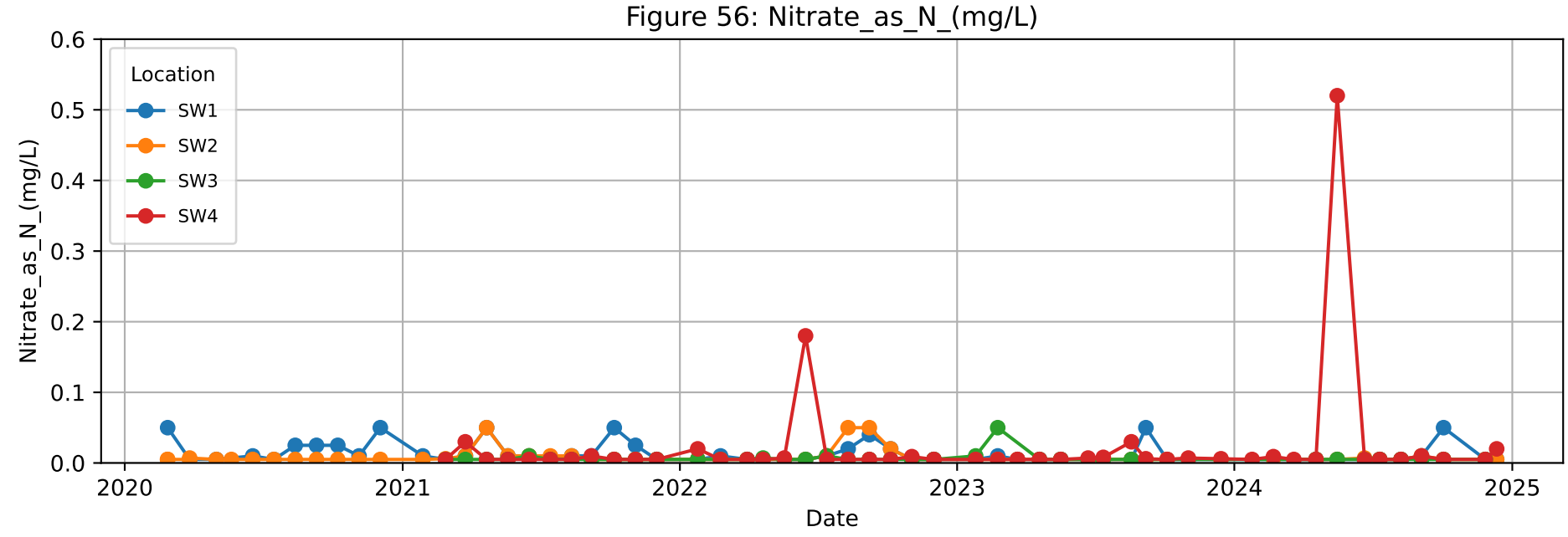


Figure 56: Nitrate_as_N_(mg/L)

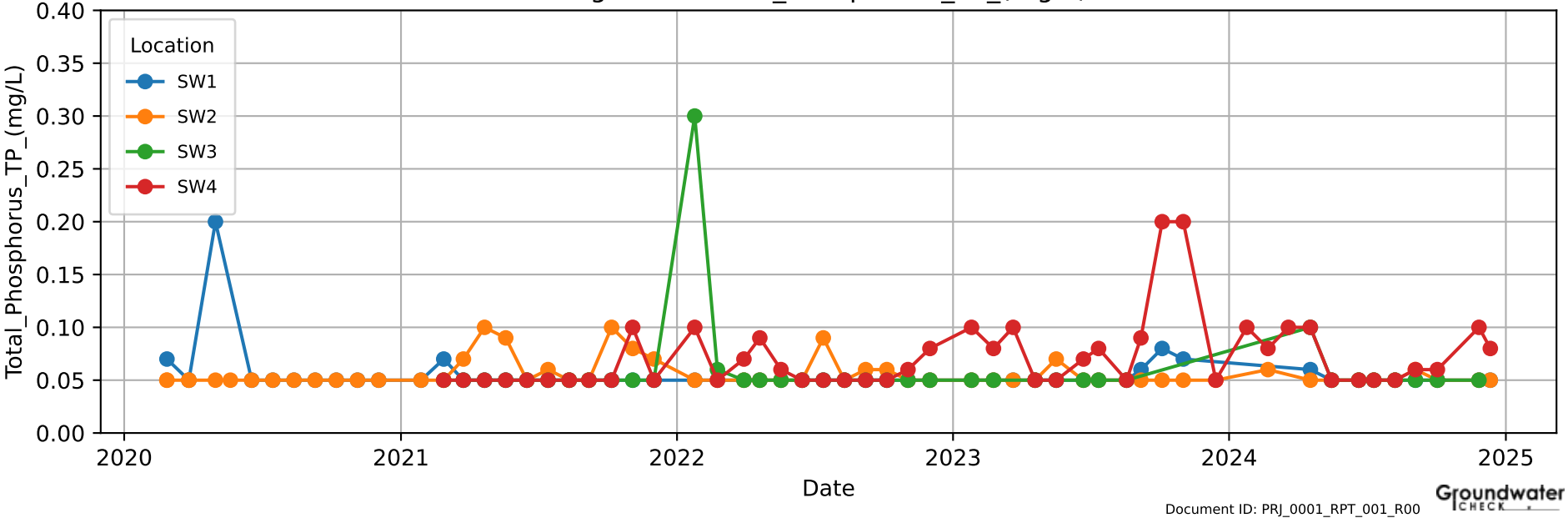
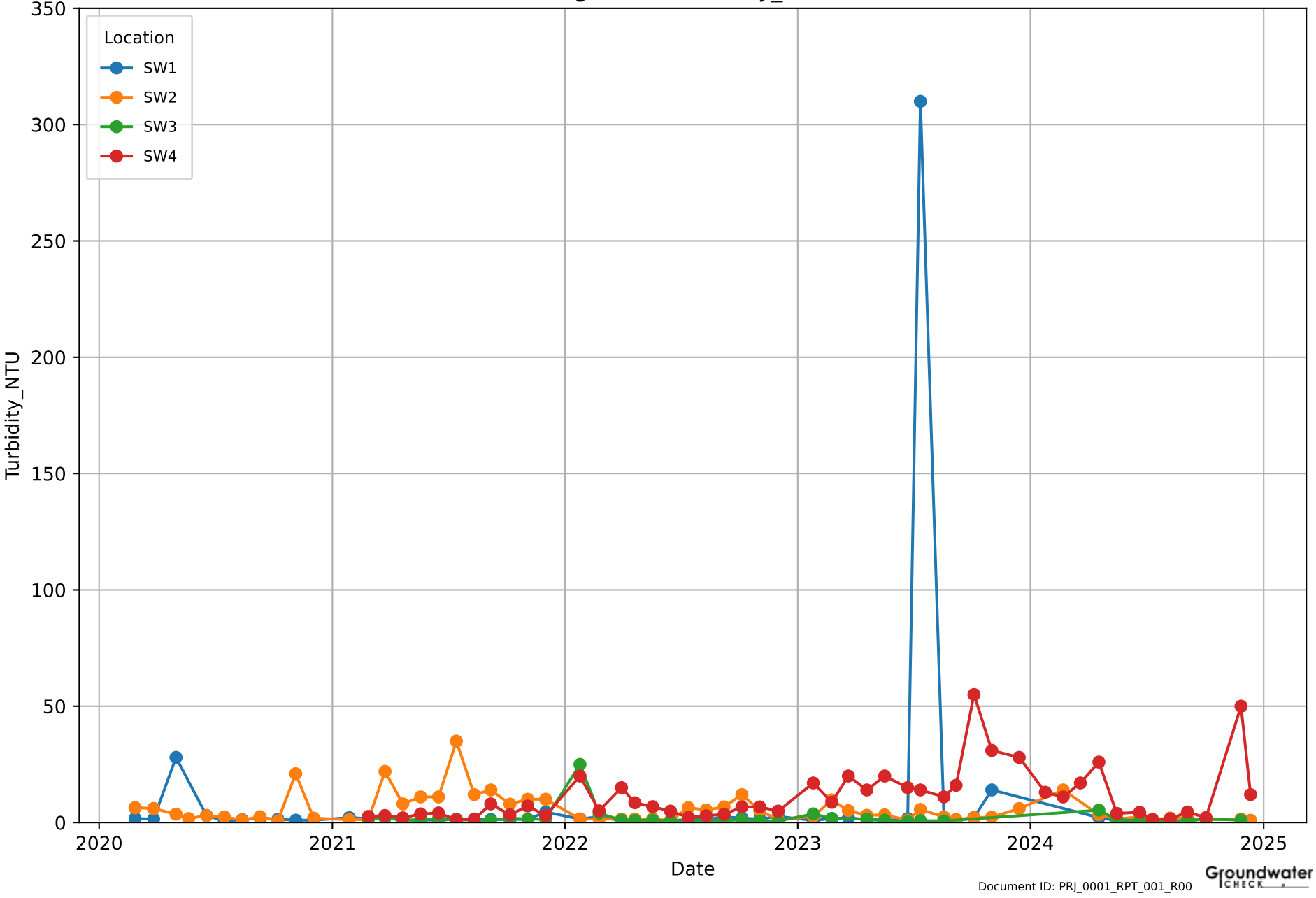


Figure 57: Total_Phosphorus_TP_(mg/L)

Figure 58: Turbidity_NTU



Appendix B. 2024 Groundwater quality monitoring results

Date	Location	pH	EC_microS/cm	Aluminium_Al_(mg/L)	Arsenic_As_(mg/L)	Boron_B_(mg/L)	Cadmium_Cd_(mg/L)	Chromium_Cr_(mg/L)	Copper_Cu_(mg/L)	Iron_Fe_(mg/L)	Lead_Pb_(mg/L)	Manganese_Mn_(mg/L)	Nickel_Ni_(mg/L)	Selenium_Se_(mg/L)	Zinc_Zn_(mg/L)	Mercury_Hg_(mg/L)
19/03/2024	MW1	6.1	546	0.78	<0.001	0.04	<0.0001	0.002	<0.001	2.5	<0.001	0.022	<0.001	<0.001	0.022	<0.00005
20/06/2024	MW1	5.2	324	1	<0.001	0.04	<0.0001	0.002	<0.001	2.3	<0.001	0.017	<0.001	<0.001	0.049	<0.00005
22/08/2024	MW1	5.7	471	0.92						2.2						
3/09/2024	MW1	5.8	505	1.2	<0.001	0.03	<0.0001	0.003	<0.001	2.6	<0.001	0.019	<0.001	<0.001	0.026	<0.00005
26/11/2024	MW1	5.4	412	1.8	<0.001	0.04	<0.0001	0.003	<0.001	1.5	<0.001	0.009	<0.001	<0.001	0.03	<0.00005
19/03/2024	MW5	6.2	603	1.6	0.002	0.05	<0.0001	0.003	0.001	0.85	<0.001	0.015	0.001	<0.001	0.028	<0.00005
20/06/2024	MW5	6.4	556	1.5	0.003	0.07	<0.0001	0.004	<0.001	0.67	<0.001	0.013	<0.001	<0.001	0.048	<0.00005
22/08/2024	MW5	6.3	749													
3/09/2024	MW5	6.3	782	1.3	0.005	0.05	<0.0001	0.004	<0.001	0.77	<0.001	0.019	<0.001	<0.001	0.04	<0.00005
26/11/2024	MW5	6.3	467	2.4	0.002	0.05	<0.0001	0.005	<0.001	0.46	<0.001	0.009	<0.001	<0.001	0.042	<0.00005
19/03/2024	MW6	6.9	346	0.04	0.039	0.02	<0.0001	<0.001	<0.001	1.6	<0.001	<0.005	<0.001	<0.001	0.034	<0.00005
20/06/2024	MW6	7	375	0.04	0.037	0.03	<0.0001	<0.001	<0.001	0.99	<0.001	<0.005	<0.001	<0.001	0.049	<0.00005
22/08/2024	MW6	7	294		0.017										0.028	
3/09/2024	MW6	6.9	299	0.1	0.018	<0.02	<0.0001	0.001	<0.001	1.2	<0.001	<0.005	<0.001	<0.001	0.032	<0.00005
26/11/2024	MW6	7.2	277	0.07	0.014	<0.02	<0.0001	0.001	<0.001	0.77	<0.001	<0.005	<0.001	<0.001	0.037	<0.00005
19/03/2024	MW7	7.1	756	0.25	0.005	0.05	<0.0001	0.005	<0.001	5	<0.001	0.025	<0.001	<0.001	0.03	<0.00005
20/06/2024	MW7	7.3	643	0.29	0.007	0.06	<0.0001	0.007	<0.001	3.9	<0.001	0.026	<0.001	<0.001	0.044	<0.00005
22/08/2024	MW7	6.9	876												0.028	
3/09/2024	MW7	7.2	773	0.22	0.005	0.04	<0.0001	0.007	<0.001	6.4	<0.001	0.038	<0.001	<0.001	0.029	<0.00005
26/11/2024	MW7	7.2	798	0.15	0.004	0.02	<0.0001	0.005	<0.001	5	<0.001	0.03	<0.001	<0.001	0.022	<0.00005
19/03/2024	MW8	7.4	710	0.03	0.003	0.04	<0.0001	0.002	<0.001	6.2	<0.001	0.036	<0.001	<0.001	0.026	<0.00005
20/06/2024	MW8	7.3	960	0.08	0.002	0.07	<0.0001	0.003	<0.001	5.8	<0.001	0.041	<0.001	<0.001	0.049	<0.00005
22/08/2024	MW8	7.4	769												0.023	
3/09/2024	MW8	7.4	765	0.05	0.002	0.04	<0.0001	0.004	<0.001	6.4	<0.001	0.044	<0.001	<0.001	0.02	<0.00005
26/11/2024	MW8	7.4	824	0.03	0.001	0.03	<0.0001	0.002	<0.001	5.1	<0.001	0.03	<0.001	<0.001	0.028	<0.00005
19/03/2024	MW9	6.1	471	1.7	0.005	0.03	<0.0001	0.007	<0.001	0.85	<0.001	<0.005	<0.001	<0.001	0.042	<0.00005
20/06/2024	MW9	6.5	452	1	0.008	0.04	<0.0001	0.005	<0.001	0.59	<0.001	<0.005	<0.001	<0.001	0.046	<0.00005
3/09/2024	MW9	6.1	504	1.7	0.004	0.03	<0.0001	0.008	<0.001	2	<0.001	0.008	<0.001	<0.001	0.038	<0.00005
26/11/2024	MW9	5.9	405	2.3	0.003	0.03	<0.0001	0.007	<0.001	1.2	<0.001	<0.005	<0.001	<0.001	0.039	<0.00005
19/03/2024	MW1	Chloride_Cl_(mg/L)	Sulphate_SO4_(mg/L)	Fluoride_F_(mg/L)	Total_Alkalinity_as_mg CaCO3/L	Total_Hardness_as_mg CaCO3/L	Sodium_Na_(mg/L)	Potassium_K_(mg/L)	Calcium_Ca_(mg/L)	Magnesium_Mg_(mg/L)	Nitrate_as_N_(mg/L)	Total_Phosphorus_TP_(mg/L)	Turbidity_NTU			
20/06/2024	MW1	110	11	<0.1	64	100	55	6	24	9.6	<0.005	<0.05	11			
22/08/2024	MW1	88	7	<0.1	13	41	39	4	4	7.8	<0.005	<0.05	3.9			
3/09/2024	MW1						54									
26/11/2024	MW1	120	11	<0.1	36	60	61	4	14	5.7	<0.010	<0.05	2.5			
19/03/2024	MW5	95	11	<0.1	15	31	53	4	4	5.2	<0.005	<0.05	3.4			
20/06/2024	MW5	120	<1	<0.1	98	89	84	5.6	23	7.4	<0.005	0.2	4.4			
22/08/2024	MW5	110	5	<0.1	110	110	70	3	29	9.4	0.02	0.1	3.3			
3/09/2024	MW5					130										
26/11/2024	MW5	180	15	<0.1	87	140	83	4	39	11	<0.010	0.1	3.6			
19/03/2024	MW6	97	<1	<0.1	66	78	59	4	22	5.9	<0.005	0.2	2.8			
20/06/2024	MW6	27	18	0.2	110	130	12	1	47	3	<0.005	0.2	1.7			
22/08/2024	MW6	38	25	0.2	99	130	16	0.8	44	3	0.01	0.4	12			
3/09/2024	MW6															
26/11/2024	MW6	30	13	0.1	90	97	15	0.6	35	2	<0.005	0.3	1.6			
19/03/2024	MW7	32	13	0.2	86	100	19	0.9	37	2	<0.005	0.3	4.8			
20/06/2024	MW7	75	<1	<0.1	190	230	61	3	79	7.2	<0.005	0.1	3.5			
22/08/2024	MW7	97	<1	<0.1	190	170	58	2	60	5	<0.005	0.1	3.2			
3/09/2024	MW7					210										
26/11/2024	MW7	130	2	<0.1	180	190	70	3	67	5.1	<0.010	0.1	3.5			
19/03/2024	MW8	150	<1	<0.1	170	230	71	3	79	7.3	<0.005	0.1	2.2			
20/06/2024	MW8	120	2	<0.1	170	160	77	3	52	8.4	<0.005	0.2	7.4			
22/08/2024	MW8	200	16	<0.1	160	200	120	3	61	11	0.005	0.1	2.3			
3/09/2024	MW8					170										
26/11/2024	MW8	140	9	<0.1	160	150	82	3	48	8.4	<0.005	0.2	7.4			
19/03/2024	MW9	150	25	<0.1	170	180	93	4	56	11	<0.005	0.2	11			
20/06/2024	MW9	110	<1	<0.1	43	80	56	3	23	5.1	<0.005	0.3	5.4			
3/09/2024	MW9	90	8	<0.1	81	120	42	2	37	5.2	0.01	0.1	3			
26/11/2024	MW9	110	14	<0.1	56	64	67	3	15	6.3	<0.010	0.2	3.2			
		95	10	<0.1	34	50	55	3	12	5	<0.005	0.3	6.5			

Appendix C. 2024 Surface water quality monitoring results

Reference	Description	Sample	Sample	Pre-treatment/Preservation	Sampling Method	Sampling Comments	Matrix	Temperature	pH	Electrical Conductivity	Dissolved Oxygen	Oxidation Reduction Potential#	Turbidity	Total Dissolved Solids
15621/1	Stockton Dams - Monthly	SW1 (MDL South)	24/01/2024 0:00			Almost dry - No sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15621/2	Stockton Dams - Monthly	SW2 (MDL North)	24/01/2024 0:00			Almost dry - No sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15621/3	Stockton Dams - Monthly	SW3 (Beach North)	24/01/2024 0:00			Dry - No sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15621/4	Stockton Dams - Monthly	SW4 (Beach South)	24/01/2024 10:14	AS5667.1	AS5667.4 Lake, Grab	Very shallow, algae	Water	25.2	9.2	433	10.4	250	13	260
15716/1	Stockton Dams - Monthly	SW1 (MDL South)	21/02/2024 0:00			Too shallow to sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15716/2	Stockton Dams - Monthly	SW2 (MDL North)	21/02/2024 9:48	AS5667.1	AS5667.4 Lake, Grab	Very shallow	Water	23.1	7.4	677	4.4	255	14	430
15716/3	Stockton Dams - Monthly	SW3 (Beach North)	21/02/2024 0:00			Dry - no sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15716/4	Stockton Dams - Monthly	SW4 (Beach South)	21/02/2024 10:12	AS5667.1	AS5667.4 Lake, Grab	Very shallow	Water	25.6	9	354	9.1	198	11	180
15831/1	Stockton Dams - Annual	SW1 (MDL South)	19/03/2024 13:42	AS5667.1	AS5667.4 Lake, Grab	Dry, no sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15831/2	Stockton Dams - Annual	SW2 (MDL North)	19/03/2024 9:28	AS5667.1	AS5667.4 Lake, Grab	Dry, no sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15831/3	Stockton Dams - Annual	SW3 (Beach North)	19/03/2024 9:46	AS5667.1	AS5667.4 Lake, Grab	Dry, no sample	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
15831/4	Stockton Dams - Annual	SW4 (Beach South)	19/03/2024 10:08	AS5667.1	AS5667.4 Lake, Grab	Very shallow	Water	23.3	8.5	463	9.3	144	17	260
15958/1	Stockton Dams - Monthly	SW1 (MDL South)	17/04/2024 12:26	AS5667.1	AS5667.4 Lake, Grab	Shallow	Water	24.7	5.2	413	5.3	235	2.1	320
15958/2	Stockton Dams - Monthly	SW2 (MDL North)	17/04/2024 11:49	AS5667.1	AS5667.4 Lake, Grab		Water	20.5	7.2	557	3.7	272	3.4	430
15958/3	Stockton Dams - Monthly	SW3 (Beach North)	17/04/2024 10:18	AS5667.1	AS5667.4 Lake, Grab	Very shallow, vegetation, tadpoles	Water	23.8	8.4	559	11.7	186	5.3	420
15958/4	Stockton Dams - Monthly	SW4 (Beach South)	17/04/2024 10:39	AS5667.1	AS5667.4 Lake, Grab	Shallow	Water	23.7	8.8	343	9.8	183	26	240
16131/1	Stockton Dams - Monthly	SW1 (MDL South)	15/05/2024 10:41	AS5667.1	AS5667.4 Lake, Grab		Water	17.5	4.8	301	2.1	264	0.8	260
16131/2	Stockton Dams - Monthly	SW2 (MDL North)	15/05/2024 11:01	AS5667.1	AS5667.4 Lake, Grab		Water	17.4	6.6	349	1.5	187	1.5	280
16131/3	Stockton Dams - Monthly	SW3 (Beach North)	15/05/2024 11:51	AS5667.1	AS5667.4 Lake, Grab		Water	20.5	7.9	336	7.8	244	1.3	210
16131/4	Stockton Dams - Monthly	SW4 (Beach South)	15/05/2024 12:07	AS5667.1	AS5667.4 Lake, Grab		Water	21	8.5	249	9.3	131	3.9	170
16347/1	Stockton Dams - Monthly	SW1 (MDL South)	20/06/2024 11:19	AS5667.1	AS5667.4 Lake, Grab		Water	12	4.8	208	3.9	206	1.1	140
16347/2	Stockton Dams - Monthly	SW2 (MDL North)	20/06/2024 10:53	AS5667.1	AS5667.4 Lake, Grab		Water	11.9	6.7	262	2.9	220	2.4	200
16347/3	Stockton Dams - Monthly	SW3 (Beach North)	20/06/2024 11:42	AS5667.1	AS5667.4 Lake, Grab		Water	13	8.1	210	10.2	202	0.7	120
16347/4	Stockton Dams - Monthly	SW4 (Beach South)	20/06/2024 12:02	AS5667.1	AS5667.4 Lake, Grab	Algae	Water	12.2	8.7	213	11.5	179	4.4	110
16514/1	Stockton Dams - Monthly	SW1 (MDL South)	10/07/2024 10:27	AS5667.1	AS5667.4 Lake, Grab		Water	13.8	4.6	197	3.4	303	0.5	230
16514/2	Stockton Dams - Monthly	SW2 (MDL North)	10/07/2024 10:46	AS5667.1	AS5667.4 Lake, Grab		Water	13.8	6.7	253	4.2	249	1.3	230
16514/3	Stockton Dams - Monthly	SW3 (Beach North)	10/07/2024 11:20	AS5667.1	AS5667.4 Lake, Grab	Algal bloom	Water	15	8.2	246	9.9	241	0.8	210
16514/4	Stockton Dams - Monthly	SW4 (Beach South)	10/07/2024 11:39	AS5667.1	AS5667.4 Lake, Grab	Algal bloom	Water	14.9	8.4	253	10.1	211	1.3	200
16642/1	Stockton Dams - Monthly	SW1 (MDL South)	7/08/2024 12:13	AS5667.1	AS5667.4 Lake, Grab		Water	13.7	4.6	218	5.1	314	0.7	350
16642/2	Stockton Dams - Monthly	SW2 (MDL North)	7/08/2024 9:46	AS5667.1	AS5667.4 Lake, Grab		Water	12.6	6.8	284	4.2	251	1.9	190
16642/3	Stockton Dams - Monthly	SW3 (Beach North)	7/08/2024 10:10	AS5667.1	AS5667.4 Lake, Grab	Algae	Water	14.2	7.9	295	10	250	0.7	130
16642/4	Stockton Dams - Monthly	SW4 (Beach South)	7/08/2024 10:32	AS5667.1	AS5667.4 Lake, Grab	Algae	Water	14.1	8.3	323	11.2	243	1.6	160
16760/1	Stockton Dams - Monthly	SW1 (MDL South)	3/09/2024 13:24	AS5667.1	AS5667.4 Lake, Grab		Water	20.6	4.7	248	4.3	253	0.7	160
16760/2	Stockton Dams - Monthly	SW2 (MDL North)	3/09/2024 8:49	AS5667.1	AS5667.4 Lake, Grab		Water	14.4	6.6	305	2.5	160	1.9	200
16760/3	Stockton Dams - Monthly	SW3 (Beach North)	3/09/2024 9:16	AS5667.1	AS5667.4 Lake, Grab	Very shallow, algae	Water	13.1	7.8	314	8.1	249	0.8	200
16760/4	Stockton Dams - Monthly	SW4 (Beach South)	3/09/2024 9:37	AS5667.1	AS5667.4 Lake, Grab	Shallow, algae	Water	13	8.3	373	10.9	218	4.5	240
16842/1	Stockton Dams - Monthly	SW1 (MDL South)	2/10/2024 12:09	AS5667.1	AS5667.4 Lake, Grab		Water	21.9	4.8	291	6.3	222	1.5	230
16842/2	Stockton Dams - Monthly	SW2 (MDL North)	2/10/2024 9:53	AS5667.1	AS5667.4 Lake, Grab		Water	18.8	6.9	347	4.4	189	1.2	260
16842/3	Stockton Dams - Monthly	SW3 (Beach North)	2/10/2024 10:19	AS5667.1	AS5667.4 Lake, Grab	Very shallow, algae	Water	22.1	8.3	330	12.9	127	1.5	150
16842/4	Stockton Dams - Monthly	SW4 (Beach South)	2/10/2024 10:40	AS5667.1	AS5667.4 Lake, Grab		Water	20.7	8.4	299	9.7	150	2.1	160
17109/1	Stockton Dams - Monthly	SW1 (MDL South)	26/11/2024 14:03	AS5667.1	AS5667.4 Lake, Grab		Water	27.1	5	350	3.8	140	1.2	250
17109/2	Stockton Dams - Monthly	SW2 (MDL North)	26/11/2024 10:12	AS5667.1	AS5667.4 Lake, Grab		Water	23.7	7.1	414	7.2	218	1.5	230
17109/3	Stockton Dams - Monthly	SW3 (Beach North)	26/11/2024 10:34	AS5667.1	AS5667.4 Lake, Grab	Very shallow	Water	27.4	8.2	321	10.2	169	1	110
17109/4	Stockton Dams - Monthly	SW4 (Beach South)	26/11/2024 10:50	AS5667.1	AS5667.4 Lake, Grab	Very shallow, algae	Water	26.6	9	277	10.4	42	50	100
17194/1	Stockton Dams - Monthly	SW1 (MDL South)	11/12/2024 10:10	AS5667.1	AS5667.4 Lake, Grab		Water	23.4	5	351	3	250	0.9	250
17194/2	Stockton Dams - Monthly	SW2 (MDL North)	11/12/2024 9:18	AS5667.1	AS5667.4 Lake, Grab	shallow	Water	22.9	7.1	433	2.9	253	0.9	310
17194/3	Stockton Dams - Monthly	SW3 (Beach North)	11/12/2024 10:32	AS5667.1	AS5667.4 Lake, Grab	no sample, dry	Water	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	
17194/4	Stockton Dams - Monthly	SW4 (Beach South)	11/12/2024 10:37	AS5667.1	AS5667.4 Lake, Grab		Water	27.5	8.5	321	10.7	217	12	180

Reference	Aluminium	Arsenic	Boron	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Selenium	Zinc	Mercury	Chloride, Cl	Sulphate, SO4	Fluoride, F	Sodium-Dissolved	Potassium-Dissolved	Calcium-Dissolved	Magnesium-Dissolved	Total Alkalinity	Total Hardness	Nitrate as N	Total Phosphorus	Total Nitrogen	Phosphate as P
15621/1																										
15621/2																										
15621/3																										
15621/4	0.04	0.008	0.04	<0.0001	<0.001	0.002	0.03	<0.001	<0.005	<0.005	<0.001	0.008	<0.00005	79	25	0.2	40	3	24	5.8	47	83	<0.005	0.1		
15716/1																										
15716/2	0.04	0.002	0.05	<0.0001	<0.001	0.003	0.08	<0.001	0.83	0.002	<0.001	0.042	<0.00005	64	77	0.3	40	7.9	87	11	150	260	0.006	0.06		
15716/3																										
15716/4	0.02	0.006	<0.02	<0.0001	<0.001	0.004	0.01	<0.001	<0.005	<0.001	<0.001	0.014	<0.00005	59	20	0.1	33	3	23	4	47	75	0.009	0.08		
15831/1																										
15831/2																										
15831/3																										
15831/4	0.04	0.005	0.06	<0.0001	<0.001	0.002	0.04	<0.001	<0.005	<0.001	<0.001	0.011	<0.00005	74	42	0.2	40	3	32	5	55	100	<0.005	0.1		
15958/1	0.44	0.004	0.04	<0.0001	<0.001	0.001	0.4	<0.001	0.19	0.001	<0.001	0.058	<0.00005	95	17	0.1	58	2	5	6.4	5	38	<0.005	0.06		
15958/2	0.04	0.002	0.05	<0.0001	<0.001	0.001	0.22	<0.001	0.24	0.001	<0.001	0.034	<0.00005	70	48	0.3	48	4	59	7.3	120	180	<0.005	<0.05		
15958/3	<0.01	0.025	0.06	<0.0001	<0.001	<0.001	0.02	<0.001	0.01	0.001	<0.001	0.014	<0.00005	65	58	0.2	34	3	59	12	120	200	<0.005	0.1		
15958/4	0.03	0.004	0.02	<0.0001	<0.001	0.002	<0.01	<0.001	<0.005	<0.001	<0.001	0.007	<0.00005	54	26	0.2	33	2	27	5	55	86	<0.005	0.1		
16131/1	0.45	0.002	0.05	<0.0001	<0.001	<0.001	0.44	<0.001	0.12	0.001	<0.001	0.065	<0.00005	73	11	0.1	45	2	3	5	<5.0	26	<0.005	<0.05		
16131/2	0.26	0.003	0.04	<0.0001	<0.001	0.001	0.64	<0.001	0.27	0.002	<0.001	0.035	<0.00005	53	15	0.2	35	4	27	5	65	86	<0.005	<0.05		
16131/3	<0.01	0.004	<0.02	<0.0001	<0.001	<0.001	0.03	<0.001	<0.005	<0.001	<0.001	0.027	<0.00005	34	6	0.1	20	0.8	40	2	100	110	<0.005	<0.05		
16131/4	0.02	0.004	<0.02	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005	<0.001	<0.001	0.012	<0.00005	29	9	0.1	18	1	26	2	68	73	0.52	<0.05		
16347/1	0.51	0.001	0.04	<0.0001	0.001	0.002	0.34	<0.001	0.13	0.001	<0.001	0.057	<0.00005	53	8	0.1	32	1	2	3	<5.0	19	<0.005	<0.05		
16347/2	0.32	0.002	0.04	<0.0001	0.002	0.003	0.57	<0.001	0.092	0.002	<0.001	0.059	<0.00005	46	7	0.2	28	3	21	4	52	68	0.007	<0.05		
16347/3	<0.01	0.004	<0.02	<0.0001	<0.001	<0.001	0.02	<0.001	<0.005	<0.001	<0.001	0.03	<0.00005	17	4	0.1	11	<0.5	30	1	81	81	<0.005	<0.05		
16347/4	0.03	0.005	<0.02	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005	<0.001	<0.001	0.022	<0.00005	21	7	0.1	12	<0.5	27	2	74	76	<0.005	<0.05		
16514/1	0.38	<0.001	0.03	<0.0001	<0.001	0.001	0.34	<0.001	0.099	0.001	<0.001	0.053	<0.00005	47	9	0.1	25	1	2	3	<5.0	17	<0.005	<0.05		
16514/2	0.26	0.002	0.03	<0.0001	0.001	0.001	0.85	<0.001	0.27	0.002	<0.001	0.045	<0.00005	43	6	0.2	22	3	18	4	47	59	<0.005	<0.05		
16514/3	<0.01	0.005	<0.02	<0.0001	<0.001	<0.001	0.02	<0.001	<0.005	<0.001	<0.001	0.02	<0.00005	20	4	0.2	12	<0.5	33	1	95	88	<0.005	<0.05		
16514/4	0.01	0.004	<0.02	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005	<0.001	<0.001	0.013	<0.00005	23	10	0.1	12	0.7	32	2	90	88	<0.005	<0.05		
16642/1	0.56	<0.001	0.05	<0.0001	<0.001	0.001	0.4	<0.001	0.099	0.001	<0.001	0.051	<0.00005	52	11	0.1	31	2	2	3	<5.0	20	<0.005	<0.05		
16642/2	0.31	0.001	0.04	<0.0001	0.001	0.001	0.83	<0.001	0.15	0.002	<0.001	0.033	<0.00005	50	6	0.2	28	4	21	4	51	70	<0.005	<0.05		
16642/3	0.01	0.004	0.03	<0.0001	<0.001	<0.001	0.01	<0.001	<0.005	<0.001	<0.001	0.015	<0.00005	25	5	0.2	16	0.8	38	2	100	100	<0.005	<0.05		
16642/4	0.04	0.003	0.03	<0.0001	<0.001	<0.001	0.01	<0.001	0.005	<0.001	<0.001	0.013	<0.00005	27	13	0.1	15	1	45	3	110	130	<0.005	<0.05		
16760/1	0.72	<0.001	0.04	<0.0001	0.001	<0.001	0.59	<0.001	0.12	0.001	<0.001	0.071	<0.00005	60	9	0.2	28	1	2	3	<5.0	20	<0.010	<0.05	1.2	<0.005
16760/2	0.37	0.002	0.03	<0.0001	0.002	0.002	1.4	<0.001	0.44	0.002	<0.001	0.037	<0.00005	56	5	0.2	25	3	19	4	51	64	<0.010	0.06	1.6	<0.005
16760/3	<0.01	0.003	<0.02	<0.0001	<0.001	<0.001	0.04	<0.001	0.008	<0.001	<0.001	0.028	<0.00005	23	7	0.2	12	<0.5	47	1	130	120	<0.005	<0.05	0.3	<0.005
16760/4	0.03	0.005	0.02	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.005	<0.001	<0.001	0.023	<0.00005	28	14	<0.1	14	1	49	4	130	140	0.01	0.06	0.2	<0.005
16842/1	0.65	<0.001	<0.02	<0.0001	0.002	<0.001	0.35	<0.001	<0.005	0.04	<0.001	0.089	<0.00005	71	8	0.2	46	2	2	4	<5.0	20	<0.050	<0.05	1.4	<0.005
16842/2	0.3	0.001	0.03	<0.0001	0.002	0.002	0.76	0.002	<0.005	0.04	<0.001	0.089	<0.00005	64	6	0.3	41	4	19	4	55	65	<0.005	<0.05	1.2	<0.005
16842/3	0.03	0.005	<0.02	<0.0001	<0.001	<0.001	0.04	<0.001	<0.005	0.01	<0.001	0.006	<0.00005	23	5	0.2	16	0.7	31	1	85	82	<0.005	<0.05	0.2	<0.005
16842/4	0.05	0.003	<0.02	<0.0001	0.001	<0.001	<0.01	<0.001	<0.005	0.01	<0.001	<0.001	<0.00005	31	12	0.1	21	1	29	3	88	86	<0.005	0.06	0.1	<0.005
17109/1	0.4	<0.001	0.02	<0.0001	0.001	<0.001	0.44	<0.001	0.081	<0.001	<0.001	0.038	<0.00005	78	6	0.1	42	1	3	4	<5.0	23	<0.005	<0.05	1	<0.005
17109/2	0.08	0.001	0.03	<0.0001	0.001	<0.001	0.22	<0.001	0.058	0.001	<0.001	0.035	<0.00005	69	5	0.3	38	4	27	5.5	69	90	<0.005	<0.05	1.3	<0.005
17109/3	<0.01	0.006	<0.02	<0.0001	<0.001	<0.001	0.07	<0.001	0.01	<0.001	<0.001	0.016	<0.00005	24	3	0.2	13	<0.5	40	1	94	110	<0.005	<0.05	0.4	<0.005
17109/4	0.03	0.003	<0.02	<0.0001	<0.001	0.002	<0.01	<0.001	<0.005	<0.001	<0.001	0.006	<0.00005	34	12	0.1	18	1	23	3	66	70	<0.005	0.1	0.9	<0.005
17194/1	0.37	<0.001	<0.02	<0.0001	0.001	<0.001	0.63	<0.001	0.1	0.001	<0.001	0.043	<0.00005	87	6	0.1	45	1	3	4	<5.0	24	<0.005	<0.05	1.2	<0.005
17194/2	0.05	0.002	0.02	<0.0001	0.002	<0.001	0.21	<0.001	0.069	0.001	<0.001	0.037	<0.00005	74	5	0.3	46	4	26	5.2	76	85	<0.005	<0.05	0.9	<0.005
17194/3																										
17194/4	0.02	0.004	<0.02	<0.0001	<0.001	0.003	<0.01	<0.001	<0.005	0.001	<0.001	0.015	<0.00005	32	10	<0.1	17	2	31	5	87	97	0.02	0.08	1.4	<0.005

Reference	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-xylene	Total Xylenes	Sum of BTEX	Naphthalene	TRH C6 - C9	TRH C6 - C10	TRH C6 - C10 less BTEX (F1)	TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	TRH C10 - C36 (sum)	TRH >C10 - C16	TRH >C16 - C34	TRH >C34 - C40	TRH >C10 - C40 (sum)	
15621/1																				
15621/2																				
15621/3																				
15621/4																				
15716/1																				
15716/2																				
15716/3																				
15716/4																				
15831/1																				
15831/2																				
15831/3																				
15831/4	<1	<1	<1	<2	<1	<2	<2	<1.0	<10	<10	<10	<50	160	<100	160	140	<100	<100	140	
15958/1																				
15958/2																				
15958/3																				
15958/4																				
16131/1																				
16131/2																				
16131/3																				
16131/4																				
16347/1																				
16347/2																				
16347/3																				
16347/4																				
16514/1																				
16514/2																				
16514/3																				
16514/4																				
16642/1																				
16642/2																				
16642/3																				
16642/4																				
16760/1																				
16760/2																				
16760/3																				
16760/4																				
16842/1																				
16842/2																				
16842/3																				
16842/4																				
17109/1																				
17109/2																				
17109/3																				
17109/4																				
17194/1																				
17194/2																				
17194/3																				
17194/4																				